UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 52-043-ESP
PSEG POWER, LLC AND PSEG NUCLEAR, LLC	)	
	)	January 14, 2016
(Early Site Permit Application)	)	

PSEG RESPONSES TO INITIAL BOARD QUESTIONS

Pursuant to the Memorandum and Order (Initial Board Questions and Associated Administrative Directives) issued by the Atomic Safety and Licensing Board (Board) on December 15, 2015, PSEG Power, LLC and PSEG Nuclear, LLC (collectively, PSEG) provide their responses to the Board's written questions identified in that Order. Those questions generally pertain to subjects discussed in the Nuclear Regulatory Commission (NRC) Staff's *Safety Evaluation of the Early Site Permit Application in the Matter of PSEG Power, LLC and PSEG Nuclear, LLC for the PSEG Early Site Permit Site*, dated September 2015.

In the December 15, 2015 Order, the Board stated that "most of the Board's questions are directed primarily to the NRC Staff. As appropriate, however, answers to the Board's questions should be submitted both by the NRC Staff and by the Applicant. To the extent practicable, the parties are encouraged to coordinate their responses so as to avoid repetition." December 15, 2015 Order at 2. In accordance with the Board's directions, PSEG has coordinated its responses with the NRC Staff to the extent practicable. As a result, PSEG is not providing written responses to all of the Board's questions. Instead, PSEG is providing responses to those questions for which it concluded that a response by the applicant would be appropriate and

beneficial to support this proceeding. The questions not being answered in whole or in part by PSEG are identified in this submittal.

PSEG's responses to the Board's questions are provided in Attachment A. All of the Board's questions are repeated in the Attachment, followed by either PSEG's response or a notation that the Staff exclusively is responding to the question. Each PSEG response identifies the individual(s) supporting the response on behalf of PSEG. Attachment B provides the affidavits for the individuals who are responding on behalf of PSEG. As directed by the Board, those affidavits are submitted "under oath, so that they are suitable for receipt into evidence without the necessity of the personal appearance of each expert or individual." December 15, 2015 Order at 1 (quoting Licensing Board Order (Initial Scheduling Order) (Nov. 16, 2015) at 4 (unpublished)). Attachment C provides the statements of qualifications for the individuals submitting affidavits.

Respectfully submitted,

Executed in Accord with 10 C.F.R. § 2.304(d)

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Dated in Washington, DC
this 14th day of January 2016

ATTACHMENT A

PSEG RESPONSES TO INITIAL BOARD QUESTIONS

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PSEG RESPONSES TO INITIAL BOARD QUESTIONS

SER Question 1: **Pursuant to 10 C.F.R. § 52.24(a), in order to authorize issuance of an ESP the Licensing Board must make the following safety findings:**

> **(1) An application for an early site permit meets the applicable standards and requirements of the [AEA] and the Commission's regulations;**
>
> **(2) Notifications, if any, to other agencies or bodies have been duly made;**
>
> **(3) There is reasonable assurance that the site is in conformity with the provisions of the Act, and the Commission's regulations;**
>
> **(4) The applicant is technically qualified to engage in any activities authorized;**
>
> **(5) The proposed inspections, tests, analyses and acceptance criteria, including any on emergency planning, are necessary and sufficient, within the scope of the early site permit, to provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Act, and the Commission's regulations; [and]**
>
> **(6) Issuance of the permit will not be inimical to the common defense and security or to the health and safety of the public . . . .**

Staff shall briefly summarize those portions of its review that support each of these findings. (At its option, Staff may defer its response to this question until the response date (February 25, 2016) for prefiled testimony and exhibits.)

PSEG RESPONSE (J. Mallon; D. Robillard):

PSEG provides the following response to explain its conclusions for why the ESP application (ESPA) for the PSEG Site provides a sufficient basis to make the necessary safety findings in 10 CFR 52.24(a). As demonstrated below, the ESPA and the corresponding NRC Staff *Safety Evaluation of the Early Site Permit Application in the Matter of PSEG Power, LLC and PSEG Nuclear, LLC for the PSEG Early Site Permit Site* (SER) fully support all of the safety findings that must be made in Section 52.24(a) to issue the requested ESP for the PSEG Site. Each of the safety findings is addressed in more detail below.

10 CFR 52.24(a)(1) ("An application for an early site permit meets the applicable standards and requirements of the Act and the Commission's regulations")

The ESPA for the PSEG Site meets the applicable standards and requirements of the Atomic Energy Act of 1954, as amended (Act) and the Commission's regulations.

The ESPA addresses all relevant NRC regulations for issuance of an ESP, including those in 10 CFR Parts 20 (Standards for Protection Against Radiation), 50 (Domestic Licensing of Production and Utilization Facilities), 51 (Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions), 52 (Licenses, Certifications, and Approvals for Nuclear Power Plants), 73 (Physical Protection of Plants and Materials) and 100 (Reactor Site Criteria). The ESPA also was prepared based on relevant NRC guidance, including NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition* (SRP); RS-002, *Processing Applications for Early Site Permits*; NRC Regulatory Guide 1.70, *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants*; NRC Regulatory Guide 1.206, *Combined License Applications for Nuclear Power Plants (LWR Edition)*; Interim Staff Guidance (ISG); other Regulatory Guides; Bulletins; Generic Letters; and other NUREGs.

The NRC Staff reviewed the ESPA and evaluated it against the applicable regulations, including those in 10 CFR Parts 20, 50, 51, 52, 73, and 100. The NRC Staff considered applicable portions of the SRP, ISGs, Regulatory Guides, Bulletins, Generic Letters, and other NUREGs. Based on the ESPA and the NRC Staff's review, documented in the SER, PSEG concludes that, for the purpose of issuing the ESP for the PSEG Site, the applicable standards and requirements of the Act and the Commission's regulations have been met.

As discussed in SER Chapter 22 (Conclusions), the Staff also has concluded that the applicable standards and requirements in the Commission's regulations have been met. PSEG agrees with that conclusion.

10 CFR 52.24(a)(2) ("Notifications, if any, to other agencies or bodies have been duly made")

PSEG understands that the NRC Staff has made any required notifications to other agencies or bodies with respect to the ESPA for the PSEG Site. As discussed in NUREG-2168, *Environmental Impact Statement for an Early Site Permit (ESP) at the PSEG Site* (FEIS),

Volume 1, page iii, the NRC consulted with Federal, State, Tribal, and local agencies on the ESPA, and published notice of the ESPA (i.e., in local newspapers and the *Federal Register*).

10 CFR 52.24(a)(3) ("There is reasonable assurance that the site is in conformity with the provisions of the Act, and the Commission's regulations")

There is reasonable assurance that the PSEG Site is in conformity with the provisions of the Act and the Commission's regulations. PSEG provided information, analysis, and conclusions, primarily in the SSAR, regarding site-specific conditions, including geography and demography of the site; nearby industrial, transportation, and military facilities; site meteorology; site hydrology; and site geology, seismology, and geotechnical engineering to ensure that the PSEG Site is in conformance with the provisions of the Act and the Commission's regulations. In addition to a review of that information, PSEG also evaluated aircraft hazards, liquid and gaseous radioactive releases, emergency planning, and accidents.

As discussed in SER Chapter 22 (Conclusions), the Staff has concluded that the ESPA satisfies the applicable standards set out in the NRC regulations, subject to the limitations and conditions proposed by the Staff in the SER. Additionally, as stated in the SER, Subsection 2.1.1.5, page 2-4, the Staff concluded that PSEG established site characteristics and design parameters acceptable to meet the requirements of 10 CFR 52.17(a)(1), 10 CFR 100.3, and the radiological consequence evaluation factors in 10 CFR 50.34(a)(1). The Staff also affirmed that PSEG provided sufficient details about the PSEG site location and site area, as documented in SSAR Subsections 2.1.2 (Exclusion Area Authority and Control), 2.1.3 (Population Distribution), and 13.3 (Emergency Planning) and SSAR Chapter 15 (Transient and Accident Analysis). These details allowed the Staff to conclude that PSEG met the requirements in 10 CFR 52.17(a)(1) and 10 CFR Part 100 regarding site location and description. PSEG agrees with all of those conclusions.

10 CFR 52.24(a)(4) ("The applicant is technically qualified to engage in any activities authorized")

The applicants are technically qualified to engage in the activities that would be authorized by the ESP for the PSEG Site. As discussed in SSAR Subsection 1.4.1 (Applicant), PSEG Power, LLC is a Delaware limited liability company, which is wholly owned by Public Service Enterprise Group, Incorporated, a corporation formed under the laws of the State of New Jersey. PSEG Nuclear, LLC is a Delaware limited liability company formed to own and operate nuclear generating stations and is a wholly owned subsidiary of PSEG Power, LLC. PSEG Nuclear, LLC is the owner and licensed operator of the Hope Creek Generating Station and the partial owner and licensed operator of the Salem Nuclear Generating Station, Units 1 and 2. PSEG has over 38 years of commercial operations experience with Salem Units 1 and 2 and the Hope Creek unit. As stated in SSAR Subsection 1.4.1.1, it is anticipated that PSEG Nuclear, LLC will be the licensed operator of the new plant at the PSEG Site. Accordingly, PSEG is technically qualified to engage in activities related to commercial nuclear power plants, including any activities authorized by the ESP for the PSEG Site.

10 CFR 52.24(a)(5) ("The proposed inspections, tests, analyses and acceptance criteria, including any on emergency planning, are necessary and sufficient, within the scope of the early site permit, to provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Act, and the Commission's regulations")

The proposed inspections, tests, analyses, and acceptance criteria (ITAAC), including those on emergency planning, are necessary and sufficient, within the scope of the ESP, to provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Act, and the Commission's regulations.

PSEG proposed ITAAC related to emergency planning in the ESPA, Part 5, Emergency Plan, Attachment 10, Emergency Planning-Inspections, Tests, Analyses, and Acceptance Criteria (EP-ITAAC). These EP-ITAAC are reproduced in SER Appendix A (Permit Conditions, COL Action Items, Site Characteristics, Bounding Design Parameters, and Inspections, Tests, Analyses, and Acceptance Criteria), Section A.5.1 (ITAAC for the ESP). These EP-ITAAC are the only ITAAC that are applicable to a plant parameter envelope-based ESPA. The EP-ITAAC address the relevant standards and requirements for emergency plans set forth in 10 CFR 50.47(b) and Part 50, Appendix E (Emergency Planning and Preparedness for Production and Utilization Facilities), including requirements related to the emergency classification system, notification methods and procedures, emergency communications, public education and information, emergency facilities and equipment, accident assessment, protective response, exercises and drills, and implementing procedures.

As discussed in SER Chapter 22 (Conclusions), the Staff has concluded that the proposed EP-ITAAC are necessary and sufficient, within the scope of the ESP, to provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Act, and the Commission's rules and regulations. PSEG agrees with that conclusion.

10 CFR 52.24(a)(6) ("Issuance of the permit will not be inimical to the common defense and security or to the health and safety of the public")

Issuance of the ESP would not be inimical to the common defense and security or to the health and safety of the public.

As discussed above, PSEG provided information, analysis, and conclusions regarding site-specific conditions, including geography and demography of the site; nearby industrial, transportation, and military facilities; site meteorology; site hydrology; and site geology, seismology, and geotechnical engineering to ensure that issuance of the permit will not be inimical to public health and safety. In addition to a review of that information, PSEG also evaluated aircraft hazards, liquid and gaseous radioactive releases, emergency planning, and accidents. PSEG has confirmed that radiological releases and human doses during both normal operation and design basis accident scenarios will remain within regulatory limits. PSEG has further considered emergency planning for the PSEG site. These evaluations support a conclusion that issuance of the ESP will not be inimical to public health and safety

Additionally, the applicants for the ESP are U.S. companies that already own and operate nuclear power plants, and the physical security to be implemented at the PSEG Site for any future reactors is adequate to protect the facility. These issues provide further support for the conclusion that issuance of the ESP will not be inimical to the common defense and security.

As discussed in SER Chapter 22 (Conclusions), the Staff also has concluded that the issuance of the ESP for the PSEG Site will not be inimical to the common defense and security or to public health and safety. PSEG agrees with the Staff's conclusion.

SER Question 2: Were any significant calculations performed by the Applicant and documented in the SSAR for which Staff did not perform its own confirmatory calculations? If so, what were they? Why is independent verification not necessary?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 3: Identify those areas where Staff either reviewed Applicant's computer code input or performed significant analysis using the computer code. Briefly describe the reviewer's prior experience with those codes.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 4: Given that three nuclear power reactors are already located adjacent to the proposed site, was Staff able to rely on any information already in its possession and thereby conserve its resources for analysis of the most important safety-related issues? Explain.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 5: Given that three nuclear power reactors are already located adjacent to the proposed site, what efforts did Staff make to focus on potential cumulative and interactive effects with respect to safety-related issues? Explain.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 6: **Throughout the SER, Staff "concludes" certain things and "finds" certain other things. Does Staff's use of either term connote a different decisional process or a different standard of proof? Or are these terms used interchangeably?**

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 7: **Except as already discussed the SER or in response to other, more specific questions set forth below, Staff shall identify any regulatory guides that were directly or indirectly applicable and explain how they were applied or adapted to Staff's review.**

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 8: **Except as otherwise discussed in response to more specific questions set forth below, identify significant issues (if any) to which Staff determined that no regulatory guide applied, and explain how Staff addressed such issues.**

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 9: **The Commission has stated that license conditions must be "precisely drawn so that the verification of compliance becomes a largely ministerial . . . act." Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), CLI-00-13, 52 NRC 23, 34 (2000). Does Staff contend that this standard does or does not apply to each of the nine permit conditions Staff proposes in the SER (at pp. A-2 through A-6)?**

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 10: **In the middle of the second paragraph on page 2-12, Staff states:**

> **Therefore, in RAI 32, Questions 02.01.03-5 and 02.01.03-6, the staff requested that the applicant analyze this information and population data and clarify based on growth rates from 2000 to 2010 U.S. Census, whether Middletown, DE, could be a**

future population center. If so, the staff requested that the applicant demonstrate compliance with population distance requirement in 10 CFR 100.21(b), such that the future growth and developments of Middletown, DE will not be closer than 11.3 km (7 mi) west of the PSEG Site, including growth into and around Odessa, DE, or discuss any changes to the current LPZ boundary.

Does Staff contend that 10 C.F.R. § 100.21(b) requires applicants to apply siting criteria to future population estimates? If so, explain.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 11: On pages 2-12 & 13, Staff discusses Applicant's projected population density of 497 people per square mile in the year 2021, which is considered to be the first year of plant operation. Since plant operation by 2021 is unlikely, should there be a COL application at some point in the future, will the criterion of RG 4.7 be revisited at that time?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 12: Was any consideration given to missiles that might be generated by an explosion?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 13: Has Staff compared severe weather as described in the SSAR with equivalent information in Hope Creek and Salem plant documents? If so, are there any significant differences?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 14: This section explains Applicant's reasons for selecting the lower altitude delta T for determining the atmosphere stability class:

[T]he applicant explained that the use of the delta-temperature between the 45-m (150-ft) and 10-m (33-ft) heights is more appropriate than the use of the delta-temperature between the 91-m (300-ft) and 10-m (33-ft) levels. This is because short-term and long-term releases from each of the reactor technologies used to develop the plant parameter envelope (PPE) are considered to occur at ground level. Using this lower layer to determine the stability class is more representative of conditions that would affect a ground-level release.

Is it reasonable or conservative to treat all releases as occurring at ground level?

PSEG RESPONSE (J. Mallon):

As discussed in SSAR Subsections 2.3.2.2.2 (Atmospheric Stability), 2.3.4 (Short-Term (Accident) Diffusion Estimates), and 2.3.5 (Long-Term (Routine) Diffusion Estimates), the gaseous effluents in both the short-term (accident) and long-term (routine) dose analyses are modeled as ground-level releases, with no plume rise calculated and no terrain corrections applied. This assumption is conservative because the receptors are located at the ground level, and the ground-level release model provides the bounding values for the χ/Q and D/Q factors. Therefore, because the ground-level release scenario provides a bounding case, elevated releases are not considered in the ESPA.

This approach is conservative for other reasons as well. As summarized in SER Subsection 2.3.4.4.4 (Conservative Short-Term Atmospheric Dispersion Estimates for EAB and LPZ), on page 2-68,

> The applicant modeled one ground-level release point and did not take credit for building wake effects, as described in SSAR Section 2.3.4.1. Ignoring building wake effects for a ground-level release decreases the amount of atmospheric turbulence assumed to be in the vicinity of the release point, resulting in higher (more conservative) χ/Q values. A ground-level release assumption is, therefore, acceptable to the staff.

The text in SER Subsection 2.3.5.4.2 (Release Characteristics and Receptors) on page 2-72 addresses long-term atmospheric dispersion estimates for routine releases. It states:

> The applicant modeled one ground-level release point, setting the minimum building cross-sectional area and building height to zero, as described in SSAR Section 2.3.5.1. The applicant assumed a ground-level release to model routine releases. A ground-level release is a conservative assumption at a relatively flat terrain site, such as the PSEG Site, resulting in higher χ/Q and D/Q values when compared to a mixed-mode (i.e., part-time ground, part-time elevated) release or a 100-percent elevated release, as discussed in RG 1.111, Revision 1. Therefore, the staff finds a ground-level release assumption acceptable.

For these reasons, PSEG concludes that it is both reasonable and conservative to treat releases as occurring at ground level.

SER Question 15: If a release occurred as a hot air plume at ground level, could not that plume rise to above the level of the lower delta T measurement?

PSEG RESPONSE (J. Mallon):

If a release occurred as a hot air plume at ground level, the plume could rise above the level of the lower delta-T measurement. However, as discussed in the response to Question #14, a ground level release is conservative. Therefore, an increase in elevation of the plume would result in lower (less conservative) χ/Q values.

SER Question 16: On page 2-67, Staff states: "a COL or CP applicant citing this ESP will need to assess the dispersion of airborne radioactive materials to the control room at the COL or CP stage." Is this requirement captured in a COL Action Item? If not, why not?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 17: On page 2-68, Staff states:

> **The applicant modeled one ground-level release point and did not take credit for building wake effects, as described in SSAR Section 2.3.4.1. Ignoring building wake effects for a ground-level release decreases the amount of atmospheric turbulence assumed to be in the vicinity of the release point, resulting in higher (more conservative) χ/Q values. A ground-level release assumption is, therefore, acceptable to the staff.**

Staff assumes a ground-level release with no building wakes is conservative relative to a ground-level release with building wakes accounted for. However it does not address the conservatism of assuming a ground-level release for a release at a higher elevation. Why is assuming a ground-level release conservative for an above ground-level release?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 18: What is the definition of the "10 percent exceedance high tide"?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 19: Are the maximum rainfall, flood, surge, seiche, wave runup, tsunami, etc. for the PSEG site consistent with those for the Hope Creek and Salem plants? Explain any significant differences.

PSEG RESPONSE (J. Mallon):

The maximum flood-causing mechanisms are similar at Salem Generating Station, Hope Creek Generating Station, and the PSEG Site that is the subject of the ESPA. Direct comparisons cannot be made between maximum water surface elevations of each mechanism at Salem and Hope Creek and the PSEG Site, as the wave runup calculations are made against different surfaces (vertical walls of plant buildings at Salem and Hope Creek versus the riprap slope at the elevated PSEG Site). However, the resulting water levels are generally consistent between the three different licensing bases, and the storm surge event represents the design basis flood in all cases.

Two notable differences in water surface elevations for the analysis of the flood-causing mechanisms are:

- Flooding in Streams and Rivers – The PSEG Site SSAR analysis used the combined events criteria provided in ANS-2.8-1992, *Determining Design Basis Flooding at Power Reactor Sites*, which specified the inclusion of the worst regional hurricane in determining the still water level. This resulted in an approximately 10 ft. of water surface elevation difference in still water level.

- Dam Breaches and Failures – The Hope Creek Updated Final Safety Analysis Report (UFSAR) accounts for the then-proposed construction of Tocks Island Dam, which was subsequently de-authorized by Congress. Due to the large size of this proposed dam on the main stem of the Delaware River, the potential flood heights reported in the Hope Creek UFSAR are significantly above those reported in the PSEG Site SSAR.

These two differences, however, have no impact on the design basis flood represented by the storm surge event for Salem, Hope Creek, or the PSEG Site.

SER Question 20: On page 2-99, Staff states:

> **Additionally, although the overall resolution of the applicant's basin model was somewhat coarse . . . the staff recognizes that these assumptions are needed given the large area the model encompasses and associated computational limitations.**

Was any study performed to show that the coarseness of the model did not significantly affect these calculations? How much uncertainty could there be in this calculation without affecting the design basis flood?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 21: Staff notes that the Applicant determined parameters for the Probable Maximum Hurricane (PMH) from data reported in the 1979 National Weather Service Technical Report NWS 23. Using this reference, the Applicant chose a value of 28 nautical miles for the Radius of Maximum Winds (R) for the PMH used in their numerical models, shown on SSAR Table 2.4.5-4.

Would a larger R for the PMH significantly affect the modeled values for maximum total water surface elevation at the PSEG site? If so, given that the Radius of Maximum Winds for Hurricane Sandy was much larger than 28 nautical miles, why is the R value selected for the PMH considered sufficiently conservative?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 22: On page 2-125, Staff states:

> **Through independent confirmatory analysis, the staff determined that application of PMH storm parameters as input in the SLOSH model produces water surface elevations that exceed the publically available SLOSH Display Program (V. 1.61g) data for Category 4 storms in the PSEG project area.**

What is the significance of this statement? Does it mean that the code is being used outside of its range of applicability?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 23: What are the water surface elevations at the PSEG site that resulted from Staff's application of the SLOSH model? Why is the ADCIRC+SWAN methodology preferred to the SLOSH methodology?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 24: **On page 2-126, Staff states:**

> **As a second step in the independent analysis, the staff confirmed the ability to reproduce the PSEG study model results near the project site for similar model settings and storm forcing. The staff executed the PSEG study Hurricane Isabel validation simulation and the PMH storm simulation. The results from the independent Hurricane Isabel and PMH storm simulations, presented in Table 2.4.5-2 below, showed nearly identical values near the project site with differences in maximum water levels on the order of 0.01 m (0.03 ft).**

This paragraph suggests that in Table 2.4.5-2 one would find Staff confirmatory calculations (right two columns of the table) showing nearly the same results as one of the PSEG calculations. However the two staff calculations in that table do not show close agreement with any PSEG calculation. Staff shall provide the comparison between Staff and PSEG calculations that demonstrates the ability of Staff to replicate PSEG calculations. Staff shall also provide a table showing all the sensitivity calculations performed by Staff.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 25: **On page 2-132, Staff states:**

> **The staff accepted the applicant's PMSS of 9.78 m (32.1 ft) as the DBF noting that it was a very conservative analysis and most realistic of the simulations with the post-addition of the 10 percent exceedance high tide.**

Table 2.4.5-2 on page 2-130 appears to show that 32.1 ft is near the low end of the calculations displayed in the table. Staff shall summarize the factors leading to the conclusion that this value is conservative.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 26: **On page 2-139, Staff discusses Applicant's intention to defer some work to the COL application stage:**

> **In SSAR Section 2.5.5, the applicant stated that the analysis of slopes will be conducted at the COL stage. SSAR Section 2.5.5.1 discusses the general site slope characteristics and states that analyses will consider potential failure surfaces extending into the Delaware River. The applicant's text also states that portions of the site outside the new plant power block are relatively flat, and that there are no**

existing slopes on the site, either natural or manmade, that could affect the stability of the site.

This section of the SER is evaluating the Probable Maximum Tsunami. What is the significance of site slope characterization to the potential sources of tsunamis?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 27: Staff states on page 2-140 that the 1929 Mw = 7.2 submarine earthquake and associated landslide in the Grand Banks resulted in a tsunami with a runup height of 27 m on the coast of Newfoundland. Are there geological reasons why a similar combination of events could not occur off the coast of the mid-Atlantic states?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 28: On page 2-143, Staff provides a brief analysis of potential tsunami sources from intra-plate earthquakes and states that the primary sources of intra-plate earthquakes suitably located to generate tsunamis are the mid-Atlantic Ridge and associated transform faults.

Staff shall comment on the 2013 journal article by Hough, Munsey and Ward proposing that a small tsunami observed in the Delaware River near Philadelphia in 1817 was produced by a significant ("low- to mid-M7") earthquake located along a northeast trending seismic zone off the eastern coast of the United States. Does Staff agree with the conclusions presented in this paper and, if so, does the location and nature of this seismic zone have the potential to generate a significant tsunami hazard for the PSEG site?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 29: On page 2-145, Staff states that the Applicant commissioned an independent analysis of 26 well boring logs collected within the footprints of the proposed new power block and east of the existing operating station, but notes that due to the limited geologic information and the complicated estuarine/fluvial and artificial fill architecture of the PSEG Site, the evaluation of the boring logs in a paleotsunami deposit sense is inconclusive.

Other than contacting representatives of the New Jersey Geological Survey, did Staff pursue any additional inquiries to identify studies indicating the presence of Quaternary age paleotsunami deposits in the region bordering Delaware Bay?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 30: On page 2-145, Staff discusses the estimated age of the Currituck landslide:

> **Approximately 4-9 m (13 ft to 30 ft) of sediment has accumulated since the Currituck landslide (Locat, et al., 2009b) leading to an estimated age of the failure of between 25,000-50,000 ybp, based on average sedimentation rates of 5 cm/year (2 in./year) for sediment burying the scar and deposits (Locat, et al., 2009b and Lee, 2009).**

In actuality, the reference cited by Staff (Lee, 2009) states: "Deposition rates are likely about 5 cm/ky for the Holocene and about 20 cm/ky for the late Pleistocene." Staff shall confirm that the omission of "k"—thereby increasing the deposition rate by a factor of 1,000—is merely a typographical error. Staff shall also confirm that the 25,000-50,000 year age calculation is based upon an average of the Holocene and Late Pleistocene deposition rates, and not solely upon the Holocene rate of 5 cm/ky.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 31: In the discussion of the hazards posed by tsunamis generated by volcanic landslides in the Canary Islands, Staff notes that the hydrodynamic model used by Ward and Day predicts wave heights on the eastern shore of North America of 10-25 m, but goes on to state on pages 2-142 through 143 that "The hydrodynamic model used by Ward and Day (Ward and Day, 2001), however, does not include the effects of non-linear advection or wave breaking. More recent research that incorporates these effects suggests wave heights along the eastern U.S. coast from this failure would be less than 3 m (9.8 ft) (Mader, 2001) or less than 1 m (3 ft) (Gisler and Weaver, 2006)."

Are there more recently published numerical simulations of Canary Islands sourced tsunamis that predict the maximum heights of tsunami waves on the east coast of the United States? If so, how do these simulations compare with those of the earlier studies cited in the SER?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 32: Have new geological data become available or new numerical methodologies been developed that would lead Staff experts to question the results of their numerical simulation for a tsunami generated by a volcanic landslide in the Canary Islands? In other words, in light of tsunami research published since the 2011 Fukushima Dai-ichi accident, does the Staff remain confident that its assessment of the potential hazard posed by tsunamis at the PSEG site is sufficiently conservative?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 33: In its discussion of the numerical simulations of tsunamis generated by a Currituck-like submarine landslide, Staff states on page 2-148 that "[o]f immediate note is the rapid attenuation of wave height through the entrance of the Delaware Bay." With regard to their simulation of a tsunami caused by a Canary Islands volcanic landslide, Staff states on page 2-150 that "Similar to Currituck, the scattering of the wave at the entrance is the primary wave height reducer." In both simulations the wave height at the PSEG site is substantially lower than the wave height at the bay entrance.

Can Staff cite any documented examples of tsunamis that entered estuaries and experienced wave height reductions on scales similar to those indicated by the numerical simulations? In other words, do the observed behaviors of tsunamis support the Staff's conclusion based on their numerical models?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 34: On page 2-173, Staff states:

> **The applicant is a co-owner of the Merrill Creek Reservoir, which is used for low flow augmentation during times of drought to allow the applicant to continue water withdrawal from the Delaware River for power generation.**

Given that PSEG is not the sole owner of the reservoir, what assurances are there that this source of low flow augmentation will always remain available?

PSEG RESPONSE (J. Mallon):

As stated in SSAR Subsections 2.4.1.2.3 (Dams and Reservoirs) and 2.4.11.2 (Low Water from Drought), the Merrill Creek Reservoir ensures sufficient flows downstream during a drought so PSEG may continue to withdraw water from the Delaware River to maintain power generation at multiple power plants on the Delaware River. This flow augmentation from Merrill Creek is initiated when flows at Trenton, which is approximately 80 miles north of the PSEG Site at river mile (RM) 133, fall below 3,000 cubic feet per second (cfs). Flow augmentation offsets consumptive use during power generation to assure that the salt line remains at or below the Philadelphia area freshwater intakes, which are north of RM 80, or about 28 miles north of the PSEG Site. Merrill Creek does not provide flow augmentation for the purposes of safety or non-safety cooling system operability for the Merrill Creek Owners Group plants; it is intended to allow power generation to continue for these power plants without impacting the salt line in the Delaware River.

The cooling system for the new plant will use brackish water from the Delaware River as the cooling water supply. As stated in SER Subsection 2.4.11.4.2 (Low Water from Drought), even with negligible flow at Trenton (1.0 cfs), tidal flow rather than freshwater flow is capable of providing ample and sufficient cooling water supply for the PSEG Site. Whether Merrill Creek is or is not discharging is not a factor in meeting the low water flow requirements for the PSEG Site, and the availability of flow augmentation from Merrill Creek is not necessary. Therefore, further assurances of the availability of low flow augmentation from the Merrill Creek Reservoir are unnecessary.

Additionally, as stated in SSAR Subsection 2.4.11.5 (Plant Requirements), on page 2.4-140,

> Tidal flow at the PSEG Site ranges from 400,000 cfs to 472,000 cfs (References 2.4.11-13 and 2.4.11-16). Therefore, the new plant site is located in an area where the tidal flow is much greater than the flow required by the intake structure for the selected reactor technology, thus making the [water surface elevation (WSEL)] the critical factor in plant design, as opposed to the available flow in the Delaware River.
>
> During extreme low water conditions, the Delaware River at the new plant location reaches a minimum elevation of -15.9 ft. NAVD, as discussed in Subsection 2.4.11.3.1. The mean lower low water elevation at the Reedy Point NOAA tidal gage station (gage 8551910) is -3.0 ft. NAVD (Reference 2.4.11-10). The intake structure provides a non-safety-related and, depending on the type of reactor technology selected, potentially a safety-related source of water for the new plant. Therefore, the safety-related intake structure for the selected reactor technology will be designed for operation considering the low water conditions identified in this subsection.

This provides further assurances regarding the availability of water for the PSEG Site.

SER Question 35: On page 2-180, Staff states:

> **Although the applicant indicated that the aquifer/aquitard sequence for the site includes the Kirkwood-Cohansey Formation, the New Jersey Geological Survey (Dames & Moore, 1988) has indicated that this Formation is absent from the site area. Since the applicant performed field studies and derived parameters from these studies for the interval proposed to be the Kirkwood-Cohansey Formation, the formal name for this interval had no impact on the staff's evaluations and conclusions in this report.**

Staff shall confirm that it has concluded that, because the geological and hydrological parameters of these rocks have been determined, it does not matter that the unit was misidentified by the Applicant.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 36: On page 2-186, Staff asserts:

> **In a June 30, 2011, response, the applicant provided several qualitative arguments, summarized below, as to why a release toward the east side is the most conservative . . . . These arguments for the conservatism of the westerly path noted that a substantially longer easterly travel time allowed for more radionuclide decay before discharge to surface water. (Emphasis added).**

Was this simply a typographical error? Explain.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 37: On page 2-199, Staff states:

> **The applicant (PSEG) followed guidance in Regulatory Guide (RG) 1.208, "A Performance Based Approach to Define Site-Specific Earthquake Ground Motion," to define the following four zones around the site and conducted investigations in those zones that became progressively more detailed passing from site region to site location:**
>
> - **Site region – Area within a 320-kilometer (km) (200-mile (mi)) radius of the site location**
> - **Site vicinity – Area within a 40-km (25-mi) radius of the site location**
> - **Site area – Area within an 8-km (5-mi) radius of the site location**
> - **Site location – Area within a 1-km (0.6-mi) radius of the proposed plant**

10 C.F.R. § 100.23(c) provides that:

> **The size of the region to be investigated and the type of data pertinent to the investigations must be determined based on the nature of the region surrounding the proposed site. (Emphasis added).**

Did the Applicant provide an assessment of "the nature of the region surrounding the proposed site" to show that the guidance of RG 1.208 was appropriate for the PSEG site? If so, did the Staff evaluate this assessment? If not, why is it appropriate for Applicant to follow the guidance of a Regulatory Guide rather than the requirements of the regulations?

PSEG RESPONSE (J. Mallon):

Although the ESPA followed guidance in RG 1.208, *A Performance-Based Approach to Define Site-Specific Earthquake Ground Motion*, in defining the four zones identified in the question, it also considered the nature of the region surrounding the proposed site in determining the size of the region to be investigated and the type of data pertinent to the investigations of the geologic and seismic issues addressed in 10 CFR 100.23(c).

For example, SSAR Subsection 2.5.1 (Basic Geologic and Seismologic Information) describes and illustrates the breadth of the geological evaluation. PSEG conducted extensive literature review, study of aerial photographs and remote sensing data, and interviews with knowledgeable professionals. Those sources covered a region larger than the RG 1.208 guidance. However, because RG 1.208 establishes specific radii for guidance, those radii are shown on SSAR figures for reference.

Additionally, SSAR Figures 2.5.1-1 (Site Region Physiographic Provinces) and 2.5.1-2a (Site Region Geologic Map) show the position of the PSEG Site relative to physiographic provinces and regional geology. These figures demonstrate that the nature of the region outside the 200-mile regional radius is substantially the same as that within it. PSEG's study of available literature was not limited by the regional area definition, even though the focus was on the areas within that radius with increasing detail given to the site vicinity, site area, and site location, as is intended by the guidance in RG 1.208. For example, SSAR Figure 2.5.1-18 (Site Region Seismicity) illustrates the consideration of seismic zones defined by regional seismicity and includes many earthquakes outside the 200-mile radius.

Furthermore, SSAR Subsection 2.5.2 (Vibratory Ground Motion) describes the application of the Central and Eastern United States Seismic Source Characterization (CEUS-SSC) model (NUREG-2115) as the basis for the evaluation of ground motions. All of the CEUS-SSC Mmax sources, seismotectonic sources, and regional large magnitude events (RLME) were evaluated during the ground motion studies. SSAR Figures 2.5.2-56 (CEUS SSC (NUREG-2115) Seismicity Catalog), 2.5.2-57 (Large Updated Seismicity Catalog for CEUS SSC Study Region), and 2.5.2-58 (ANSS Authoritative Regions) show that consideration for updating the earthquake catalog extended beyond the 200-mile site regional circle. By using the CEUS-SSC model, PSEG concludes that the intent of 10 CFR 100.23(c) is met.

SER Question 38: This section describes the evaluation of the ground motion response spectra. Should a COL be granted at some future date and a plant be built, what parts of this evaluation (or updated version thereof) will become design basis information for that plant?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 39: On page 2-244, Staff states that "[t]hese models were reviewed by the staff as part of prior ESP and COL applications' reviews." What prior ESP and COL applications is Staff referring to, and where is this review documented?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 40: On page 2-280, Staff states:

> **The applicant acknowledged that large portions of the site vicinity are tidal marshes and any liquefaction features developed in that environment would be relatively quickly degraded and not easily recognized during aerial or ground reconnaissance investigations.**

Given that liquefaction features would not be easily recognized, were any alternative tests considered? Explain.

PSEG RESPONSE (J. Mallon):

There are no practical alternative tests available for identifying liquefaction features at a reconnaissance level. Activities such as excavating test trenches or using ground penetrating radar are often performed after a possible feature has been identified, but these are not considered reconnaissance techniques. However, SSAR Subsection 2.5.1 (Basic Geologic and Seismologic Information) describes and illustrates the breadth of the geological evaluation. PSEG conducted extensive literature review, study of aerial photographs and remote sensing data, and interviews with knowledgeable professionals. These activities did not reveal evidence of liquefaction.

SER Question 41: In Appendix A.1 of the SER, Staff proposed that the Commission include a license condition (Permit Condition No. 3) on an applicant for a COL or CP referencing the PSEG early site permit that requires the applicant to perform detailed

geologic mapping of excavations and evaluate features discovered in those excavations. Are these excavations likely to expose undisturbed sediments and, if so, as part of this geologic evaluation, will the Applicant and/or Staff experts be required to carry out analyses specifically designed to identify paleotsunami deposits?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 42: Do the subsurface materials at the PSEG site differ in any significant way from those at the Hope Creek and Salem sites?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 43: On page 2-332, Staff states: "the applicant stated that it has not yet established the criteria to estimate the site-specific total and differential settlement because …." Is this something that must be evaluated at the COL stage, and if so, should there be a COL Action Item for it?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 44: On page 2-336, Staff identifies Permit Condition 4 stating, "the staff identified Permit Condition 4, which addresses the need for additional geotechnical investigations and liquefaction assessments for a COL or CP." But Permit Condition 4, as set forth on the same page, make no mention of "additional geotechnical investigations" or "liquefaction assessments." Instead it requires that Applicant "remove and replace the soil." Which is the correct representation of the Permit Condition?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 45: The potential for an aircraft hazard is evaluated in SSAR section 3.5.1.6. The criteria for eliminating an aircraft from hazard consideration are cited by Staff on page 3-2 as:

> **The site-to-airport distance (D) is between 5 and 10 statute miles and the projected annual number of operations is less than 500 D^2, or the site-to airport distance (D) is**

greater than 10 statute mi, and the projected annual number of operations is less than 1000 D^2.

Table 3.5-1 of the SSAR demonstrates that each airport considered by itself meets this criteria. However by evaluating "Limited Distance/Screening Limit" for each airport it can be seen that an aggregate of the airports do not pass this screening by a factor of 2.38. How does considering each airport on its own provide adequate assurance that area airports are not a potential hazard to a new unit? Is it permissible to parse a single hazard (aircraft) into subdivisions (aircraft from different airports) to show that that possible hazard meets safety criteria?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 46: On page 3-4, Staff cites an acceptance criterion for airplane crash as, "The radiological consequences of 10 CFR Part 100 exposure criteria are considered met if it is demonstrated that the probability of radiological release or core damage frequency (CDF) is less than 10^{-7} per year." Where is this criterion documented?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 47: How many events, each having a CDF just less than 10^{-7} per year, are acceptable before the aggregate becomes a significant risk? How does the safety evaluation assure that the sum total of all risks is acceptable?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 48: In the third paragraph of the subsection titled "Gaseous Effluent Source Term Analysis," Staff discusses the absence of dose factors for five radionuclides. Staff states that Applicant explained that the five nuclides are short-lived daughters of long-lived parents, and that there are no dose factors for them in the dose-factor library. Because they are radionuclides, there will be a dose from their decay. Has this dose been accounted for in the dose factor for the parent radionuclides? If not, have they simply been neglected? If so, why is this an adequate treatment?

PSEG RESPONSE (J. Mallon):

In NRC RAI 6, Question 11.03-1, the NRC made the following request on this topic:

> Table 1.3-7 of the PSEG ESP provides the annual release rate from gaseous effluents for each isotope that is expected to be released from each of the proposed reactor designs. Table 1.3-7 also indicates the bounding release rate for each isotope. This table is mostly consistent with Table 11.3-5, which uses the bounding release rate for each isotope (obtained from Table 1.3-7) to compute a total gaseous release rate for all units (both new and existing units). However, Table 11.3-5 appears to be missing some of the isotopes identified in Table 1.3-7, specifically Kr-90, Rh-103m, Rh-106, Ba-137m, and Xe-139.
>
> Please provide this missing information in the PSEG ESP Application.

In the March 3, 2011 Response to NRC RAI 6, Question 11.03-1 (ADAMS Accession No. ML110660201), PSEG explained:

> The identified radionuclides are excluded for two reasons. First some of the radionuclides have very short half-lives (Kr-90, Xe-139). They will decay before reaching the offsite receptors and therefore, will not contribute to the dose. The second reason for excluding some radionuclides is because they are short-lived daughter[s] of the longer-lived parents and their effect on dose is included with the parent radionuclide. These radionuclides (and parents) are Ba-137m (Cs-137), Rh-106 (Ru-106), and Rh-103m (Ru-103). Since these radionuclides that are excluded from the dose calculation are either negligible contributors to the dose or are included with the parent radionuclides, excluding these radionuclides will have no effect on the calculated doses.

Consistent with the response to RAI 6, PSEG updated SSAR Table 11.3-5 (Gaseous Release Source Terms) to include the following footnotes:

c) Radionuclides Kr-90 and Xe-139 are short lived and will decay prior to release to the environment and are therefore, not included in this table.

d) The emissions from Rh-103m, Rh-106, and Ba-137m are attributed to their parent radionuclides and therefore, are not included in this table.

For these reasons, PSEG considers the treatment of the doses from these radionuclides to be appropriate.

SER Question 49: In the subsection titled "10 CFR Part 50, Appendix I, Gaseous Dose Compliance," on page 11-9, Staff discusses Applicant's calculation of the dose to "a member of the public being located at the nearest site boundary for the full duration of the year." Figure 2.3-8 of the SER makes it appear that the nearest site boundary might be in

the Delaware River. Was this the location of the calculation or was the nearest site boundary on land used?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 50: On page 11-11, Staff explains the reason that the calculated total body dose is close to the limit. The reasons provided include the statement:

> **(2) in the GASPAR computer code, when the Undecayed, Undepleted and Decayed, Undepleted X/Q values are equal, the equation GASPAR II uses to solve for decay time sets time equal to zero. Without a decay time, the short-lived gaseous radionuclides increase the total dose.**

Staff shall explain this statement in more detail.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 51: Under the subheading "Population Dose Evaluation—Gaseous Effluents" on page 11-12 the following two sentences appear:

> **Table 11.4.2-3 of this report lists the population doses that the applicant calculated as compared to the staff's verification of the applicant's results.**
>
> **Table 11.4.2-3 below shows the assumptions and parameters used by the applicant that resulted in the same dose for the total body and a slightly lower dose for the thyroid when compared to the staff's bounding independent assessment.**

The first of these sentences appears to reflect the content of Table 11.4.2-3. The second sentence does not. Staff shall provide clarification.

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 52: Staff shall briefly describe any significant differences between the current site emergency plan and that which would be used if an additional reactor is built on the PSEG site.

PSEG RESPONSE (J. Mallon):

The PSEG Site Emergency Plan, provided as Part 5 of the ESPA, is essentially the same as the current emergency plan for Salem/Hope Creek. The only potential significant differences between the current emergency plan and that which would be used if an additional reactor is built on the PSEG Site are related to the specific reactor technology. These technology specific differences include items such as the location of the technical and operations support centers, the Emergency Action Level (EAL) scheme, and the power supplies to communications equipment. PSEG has not selected a reactor technology to be built at the PSEG Site. Therefore, PSEG developed attachments to the Emergency Plan submitted with the ESPA to address information specific to the four proposed technologies:

- U.S. Evolutionary Power Reactor (U.S. EPR) (Attachment 9)
- Advanced Boiling-Water Reactor (ABWR) (Attachment 7)
- U.S. Advanced Pressurized-Water Reactor (US-APWR) (Attachment 8)
- Advanced Passive 1000 (AP1000) (Attachment 6)

PSEG will revise the Emergency Plan accordingly following the selection of the reactor technology.

Furthermore, as noted in Section 7 of the Emergency Plan, local area evacuation alarms will be provided when available. Additionally, certain aspects of the technology-specific EALs required by 10 CFR 50.47(b)(4) and 10 CFR 50 Appendix E Section IV.B cannot be completed until actual as-built information is available, and the Technical Specifications are finalized.

SER Question 53: On page 13-26, Staff states that its "primary focus" was to evaluate the emergency plan against NUREG-0654, Planning Standard F. On what else did Staff focus in its evaluation?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 54: On page 13-32, Staff states that its "primary focus" was to evaluate the emergency plan against NUREG-0654, Planning Standard H. On what else did Staff focus its evaluation?

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 55: **On page 13-49, Staff states that its "primary focus" was to evaluate the emergency plan against NUREG-0654, Planning Standard L. On what else did Staff focus its evaluation?**

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

SER Question 56: **On page 15-5, Staff states that "[t]he estimated site characteristic χ/Q values for the proposed site are lower than the corresponding site parameter χ/Q values." What is the difference between a site characteristic value and a site parameter? Why do their ratios being less than 1.0 ensure satisfactory radiological consequences?**

PSEG RESPONSE:

To avoid repetition, only the NRC Staff is responding to this question.

ATTACHMENT B

AFFIDAVITS FOR PSEG RESPONSES TO INITIAL BOARD QUESTIONS

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 52-043-ESP
PSEG POWER, LLC AND PSEG NUCLEAR, LLC	)	
	)	January 14, 2016
(Early Site Permit Application)	)	

AFFIDAVIT OF JAMES MALLON

I, James Mallon, do hereby affirm:

1. I am the Nuclear Development Manager for the Nuclear Development Department at PSEG Power, LLC. A statement of my professional qualifications is attached.
2. PSEG Power, LLC and PSEG Nuclear, LLC are providing responses to questions raised by the Atomic Safety and Licensing Board in the Memorandum and Order (Initial Board Questions and Associated Administrative Directives), issued on December 15, 2015.
3. I am responsible for the responses provided in Attachment A to the "PSEG Responses to Initial Board Questions" for which I am listed as the author.
4. Those responses were prepared by me or under my direction. I attest to the accuracy of those responses, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those responses, and my statements in this affidavit, are true and correct to the best of my information, knowledge, and belief.

Executed in Accord with 10 C.F.R. § 2.304(d)

James Mallon
Nuclear Development Manager
Nuclear Development Department
PSEG Power, LLC
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Salem, NJ 08079
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E-mail: James.Mallon@pseg.com

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 52-043-ESP
PSEG POWER, LLC AND PSEG NUCLEAR, LLC	)	
	)	January 14, 2016
(Early Site Permit Application)	)	

AFFIDAVIT OF DAVID ROBILLARD

I, David Robillard, do hereby affirm:

1. I am a Licensing Engineer for the Nuclear Development Department at PSEG Power, LLC. A statement of my professional qualifications is attached.
2. PSEG Power, LLC and PSEG Nuclear, LLC are providing responses to questions raised by the Atomic Safety and Licensing Board in the Memorandum and Order (Initial Board Questions and Associated Administrative Directives), issued on December 15, 2015.
3. I am responsible for the responses provided in Attachment A to the "PSEG Responses to Initial Board Questions" for which I am listed as the author.
4. Those responses were prepared by me or under my direction. I attest to the accuracy of those responses, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those responses, and my statements in this affidavit, are true and correct to the best of my information, knowledge, and belief.

Executed in Accord with 10 C.F.R. § 2.304(d)

David Robillard
Licensing Engineer
Nuclear Development Department
PSEG Power, LLC
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ATTACHMENT C

STATEMENTS OF PROFESSIONAL QUALIFICATIONS FOR PSEG RESPONSES TO INITIAL BOARD QUESTIONS

James Mallon

PSEG Power, LLC

Energy and Environmental Resource Center
244 Chestnut Street
Salem, New Jersey 08079
Phone: 856-339-7908
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EDUCATION

ANSI 3.1 SRO Certification - 2003

Graduate Business Courses for an M.B.A., University of Southern Maine

B.A. Physics, Franklin and Marshall College, Lancaster, Pa., 1981

PROFESSIONAL EXPERIENCE

PSEG Power, LLC

2011 – Present

Since 2011 Mr. Mallon has been the Manager of Nuclear Development for PSEG. This includes the Early Site Permit project, partnering with Holtec International on SMR design, land acquisition for Nuclear Development, and advanced technology monitoring.

2008 – 2011

Mr. Mallon was the Early Site Permit Manager during the initial phases of the project, including the choice to pursue an ESP, vendor selection, application preparation, and response to NRC requests of additional information.

Exelon Nuclear

2006 – 2008

Mr. Mallon was on loan as Licensing Manager for Salem and Hope Creek stations, responsible for all NRC submittals from both stations. During this time he led licensing efforts to obtain a license amendment for a 15% Extended Power Uprate on Hope Creek.

2004 – 2006

In 2004 Mr. Mallon became the Regulatory Assurance Manager for the Peach Bottom Atomic Power Station. In the capacity he was responsible for site interface with NRC, INPO, OSHA,

and PA DEP. He successfully led site teams to close NRC Supplemental inspections for Emergency Diesel performance problems, and for an excessive number of SCRAMs

2003 – 2004

Mr. Mallon was the Director of Training for the Peach Bottom Atomic Power Station, where he was responsible for all site accredited and non-accredited training.

2000 – 2003

Following the merger that created Exelon, Mr. Mallon was the Corporate Radiation Protection Manager. In that capacity he initiated practices to effectively oversee fleet RP activities post merger. This practice enabled Radiation Protection to quickly move to a standard program and enhanced communication throughout the fleet. Mr. Mallon established a process for development of the standard procedures involving site subject matter experts. Using this process all programs were standardized within scheduled times with no contracted resources.

Maine Yankee Atomic Power Company

1996 – 2000

Mr. Mallon was the Radiation Protection & Waste Manager prior to and during the decommissioning of the facility. He managed the Radiation Protection program during highly challenging work such as site wide asbestos abatement, chemical decontamination of coolant systems, and removal of all reactor coolant piping and components. Mr. Mallon also worked with stakeholders to resolve concerns about the end state of the site and provide the organization with regulatory certainty.

Environmental Dimensions Inc.

1995 – 1996

In 1995 Mr. Mallon consulted to Sandia National Laboratories as a Senior Health Physicist. He authored the Internal Dosimetry Technical Basis Document to meet 10CFR835 requirements and developed process management tools for program activities and for evaluating radiochemistry services provided by contract labs.

PECO Energy Co

1988 – 1995

Mr. Mallon worked in a number of positions of increasing responsibility at the Limerick Generating Station. He began as a Radiological Engineer, became a First line supervisor in Radiation Protection and ultimately was the Health Physics Support Manager responsible for the Dosimetry, Respiratory Protection, HP Instrumentation, and Process and Effluent Radiation Monitoring Programs. As Support Manager he managed the implementation of the 10CFR20

revision, including scope determination, work schedule development, and supervised extensive rewrites of 45 procedures, changes to the corporate exposure tracking database, and training for 1800 workers.

1987 – 1988

Mr. Mallon was a contracted engineer working in PECO's corporate office. He established a program to provide an ALARA review during the design of plant modifications.

Stone and Webster Engineering Corporation

1982 – 1986

Mr. Mallon held a series of positions of increasing responsibility starting from Engineer to eventually becoming the Principal Radiation Protection Engineer. As the Principal Engineer for the Nine Mile Point Unit 2 project, Mr. Mallon supervised twelve engineers working on design basis calculations for equipment qualification, shielding, licensing and effluent monitoring.

David L. Robillard

PSEG Power, LLC

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EDUCATION

1993, A. S. – Nuclear Technology, Excelsior College, Albany, New York
2013, B. S. – Business Administration, Excelsior College, Albany, New York

PROFESSIONAL EXPERIENCE

PSEG Power, LLC

2008 – Present

Since 2008 Mr. Robillard has been the Licensing Lead and Quality Assurance Specialist for the PSEG Early Site Permit application project. In this role Mr. Robillard has been the primary interface with the NRC Safety and Environmental Project Managers, and has the responsibility for ensuring the quality and accuracy of all submittals to the NRC.

General Public Utilities/AmerGen

2002 – 2008

In 2002, Mr. Robillard accepted a position as a Licensing Engineer at Exelon's corporate office in Kennett Square, PA. In this capacity he coordinated the development of license amendment request submittals to the Nuclear Regulatory Commission, and provided licensing support for the Exelon fleet of operating stations. In 2005, Mr. Robillard provided licensing support to the Exelon integration team responsible for implementing the Exelon Management Model at the Salem/Hope Creek Generating Stations. In 2006, Mr. Robillard provided licensing support to the Exelon team responsible for the characterization and remediation of groundwater contamination at Exelon nuclear stations. In 2007, Mr. Robillard was re-assigned to the Oyster Creek Nuclear Generating Station, where he led station efforts to improve performance in the areas of Regulatory Assurance, Training, Emergency Preparedness and Quality Assurance.

2000 – 2002

In 2000, Mr. Robillard became a Work Week Manager where he coordinated the planning and implementation of all work at Oyster Creek.

1978 – 2000

In 1978, Mr. Robillard began working at Oyster Creek, as a Quality Assurance Specialist. Mr. Robillard was a member of the QA organization for 18 years, during which time he qualified as a Level III inspector in the Mechanical, Electrical and I&C disciplines and certified as a Lead Auditor. From 1993 – 1995 Mr. Robillard was a member of the Process Reengineering Team whose charter was to redesign the work management processes at Oyster Creek and Three Mile Island nuclear plants.

U. S. Navy

1970 – 1978

Mr. Robillard started his nuclear career in 1970 as a Machinist Mate in the U. S. Navy. In 1974 Mr. Robillard was assigned to the pre-commissioning crew of the USS PHILADELPHIA (SSN 690), where he qualified as Engineering Watch Supervisor, the senior enlisted watchstander in the engine room.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 52-043-ESP
PSEG POWER, LLC AND PSEG NUCLEAR, LLC	)	
	)	January 14, 2016
(Early Site Permit Application)	)	

CERTIFICATE OF SERVICE

Pursuant to 10 C.F.R. § 2.305, I certify that, on this date, a copy of the "PSEG Responses to Initial Board Questions" was served upon the Electronic Information Exchange (the NRC's E-Filing System) in the above-captioned proceeding.

Signed (electronically) by Stephen J. Burdick
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