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	)	ASLBP No. 15-943-01-ESP-BC01
	)	
(Early Site Permit Application)	)	February 25, 2016

NRC STAFF TESTIMONY RELATED TO FEBRUARY 8, 2016 ORDER
TOPIC 4: ADDITIONAL DISCUSSION OF SALT DRIFT IMPACTS TO WETLANDS

Q1: Please state your name, occupation, employer, and professional qualifications.

A1: (MW) My name is Michael Willingham. I am employed as a Project Manager in the Hydrology and Meteorology Branch 2, in the Division of Site Safety and Environmental Reviews, in the Office of New Reactors, U.S. Nuclear Regulatory Commission (NRC). I am the technical reviewer for terrestrial ecology and land use for the environmental review associated with the application submitted May 25, 2010, by PSEG Power, LLC and PSEG Nuclear, LLC (together, PSEG or Applicant) for an Early Site Permit (ESP) at the PSEG Site in Salem County, New Jersey. A statement of my professional qualifications is included in Ex. NRC002.

(NG) My name is Neil Giffen. I am employed as a Natural Resources Manager of the Facilities and Operations Directorate at the Oak Ridge National Laboratory (ORNL), in Oak Ridge, Tennessee. I am employed by UT-Battelle, LLC (UT-Battelle), a not-for-profit, limited liability partnership between the University of Tennessee and Battelle Memorial Institute, which was established for the sole purpose of managing and operating the ORNL facilities for the U.S. Department of Energy.

As part of my official responsibilities, I assisted the NRC Staff in its environmental review associated with the application submitted May 25, 2010, by PSEG for an ESP at the PSEG Site. My assistance to the NRC Staff was specifically in the areas of terrestrial and wetlands ecology. A statement of my professional qualifications is included in Ex. NRC002.

Q2: Please describe your responsibilities with regard to the Staff's review of the PSEG Early Site Permit (ESP) application.

A2: (MW) As the terrestrial ecology reviewer assigned to PSEG ESP environmental review, I was responsible for preparing the terrestrial and wetlands ecology portions of Sections 2.4, 4.3, 5.3, 7.3, and 9.3 of the final environmental impact statement (FEIS) (Ex. NRC004A and NRC004B).

(NG) In my assignment to the PSEG ESP environmental review, I was responsible for assisting the NRC Staff in preparing the terrestrial and wetlands ecology portions of Sections 2.4, 4.3, 5.3, 7.3, and 9.3 of the FEIS (Ex. NRC004A and NRC004B).

Q3: What is the purpose of your testimony?

A3: (MW, NG) The purpose of our testimony is to provide additional information related to the Staff's review of salt drift and deposition in the FEIS.

Q4: What is the expected cumulative salt drift deposition rate from all sources including the proposed nuclear power plant at the PSEG Site?

A4: (MW, NG) As noted in NRC staff responses 22 and 23 to the Board's second round of questions (Ex. NRC016), the cumulative maximum salt deposition from the Hope Creek Generating Station (HCGS) natural draft cooling tower (NDCT), proposed linear mechanical draft cooling towers (LMDCTs), and natural salt deposition would result in a cumulative salt deposition rate of 3.74 kg/ha/mo. This salt deposition rate includes the combined rates expected for the new cooling tower (1.31 kg/ha/mo), the existing HCGS cooling tower (1.13 kg/ha/mo), and natural salt deposition for the area (1.3 kg/ha/mo). In the Staff's response to Question 22 (Ex. NRC016), the Staff stated that the salt deposition areas would not entirely overlap, and therefore the numerical values from the two cooling towers are not directly additive. The maximum salt drift deposition expected from the proposed LMDCT would occur within 700 m to the east, and the maximum salt drift deposition from the existing HCGS NDCT would occur within 400m of the southeast side. Figure 5-3, p. 5-19, in the FEIS (Ex. NRC004A) shows salt deposition rates from the proposed LMDCT at the PSEG Site. Therefore, the value of 3.74 kg/ha/mo is a conservative maximum bounding limit and actual rates would be expected to be lower.

Q5: What habitat types could potentially be affected by salt drift from man-made sources?

A5: (MW, NG) Figure 2-4 in Section 2.2.1, pg. 2-7, of the FEIS (Ex. NRC004A) provides a visual representation of the land use resources and terrestrial habitats on the PSEG Site and nearby offsite areas. The dominant habitat type 700 m east and southeast of the location of the proposed LMDCTs is *Phragmites*-dominated coastal wetlands. Other existing land use types that could potentially be affected by salt drift deposition from the LMDCTs include disturbed wetlands, *Phragmites*-dominated interior wetlands, and developed land uses. Figure 4-1 in Section 4.1.1 (pg. 4-6) of the FEIS (Ex. NRC004A) shows that most if not all the *Phragmites*-dominated interior wetlands that could be affected by salt drift deposition from the propose LMDCTs would be permanently disturbed during building of the proposed units and infrastructure and would be reverted to urban/developed land uses. All of the land uses and habitats within 400 m of the east and northeast sides of the existing HCGS MDCT are urban/developed land uses and *Phragmites*-dominated coastal wetlands.

As described in Section 2.4.1.1, pg. 2-54 of the FEIS (Ex. NRC004A), *Phragmites*-dominated coastal wetlands account for 155.6 ac (19 percent) of the existing PSEG Site. They are composed of primarily *Phragmites australis* (common reed), an introduced invasive species. This habitat is tidally influenced and, as described in Section 2.3.3.1, p. 2-48, of the FEIS (Ex. NRC004A), can have salinity ranges from 1 to 9 ppt. Thus, vegetation species in this habitat type would be expected to have a higher level of salinity tolerance than those in upland or freshwater environments, and therefore the cumulative impacts of salt deposition on the site and the vicinity would be minimal. For these reasons, the staff's analysis and conclusion in the FEIS regarding the minimal impacts of salt deposition did consider all of the potentially affected wetlands.

Q6: Please explain how salt drift and deposition can result in impacts to plant species at the PSEG Site.

A6: (MW, NG) The NRC Staff relied on the comprehensive review of scientific literature presented in Sections 4.3.4 and 4.3.5.1 of NUREG-1437, the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, and guidance found in in Section 5.3.3.2 of the Environmental Standard Review Plan (NUREG-1555), for a technical basis underlying the potential effects of salt drift on terrestrial and wetland ecosystems. Sections 4.3.4 and 4.3.5.1 of NUREG-1437 state that vegetation damaged by salt drift could show signs of leaf damage, growth and seed yield reduction, and changes to community structure. The degree of injury to a plant is related to the climatic conditions, stage of life cycle, and its tolerance to salt. Typically, salt drift is more likely to damage vegetation in more arid environments, less salt tolerant species, and plants during their growing season. Salt drift deposition also has the potential to cause soil salinization, which could damage vegetation. This process is more likely to occur in areas that do not see significant rainfall events. Section 2.9, pg. 2-172, of the FEIS describes the regional climate as a continental climate that experiences coastal marine influences Ex. (NRC004A). Section 2.9.1.4 (pg. 2-174) of the FEIS (Ex. NRC004A) states that the mean annual rainfall for the PSEG Site area ranges from 36.04 in. at the site to 46.28 in. at Dover, Delaware. This annual rainfall amount would be expected to prevent the occurrence of soil salinization in an amount that could damage vegetation.

Section 5.3.3.2 of NUREG-1555 states that general guidelines suggest that many vegetation species have a threshold for visible leaf damage with salt drift deposition rates in the range of 10 to 20 kg/ha/mo in any month during the growing season. Additionally, NUREG-1437 reports that the *Cornus florida* (flowering dogwood), the least salt tolerant of the species referenced in the results of the comprehensive literature review, showed signs of acute injury at deposition rates above 1.2 kg/ha/week (5.1 kg/ha/mo). In comparison, NUREG-1437 reported that *Acer rubrum* (red maple), a common species found in deciduous scrub/shrub wetlands such as those located on the PSEG Site, would expect to show signs of acute injury at salt drift deposition rates above 474.0 kg/ha/wk (2031.4 kg/ha/mo). The cumulative maximum salt deposition rate of 3.74 kg/ha/mo would occur during the winter. This cumulative maximum deposition rate is less than that expected to cause acute injury to the most sensitive species listed in NUREG-1437 and would not occur during the growing season of plants on and in the vicinity of the PSEG Site (FEIS at p. 5-18) (Ex. NRC004A). As described in response to Question 5 above, due to the PSEG site's coastal location, most vegetation in the vicinity of the PSEG site is generally expected to have a high level of salinity tolerance—particularly, higher than that of a sensitive species like the flowering dogwood. Therefore, the salt deposition is expected to have a minimal impact on plant species.

Q7: Could an incremental increase in salt drift adversely affect threatened or endangered plant or animal species?

A7: (MW, NG) No known Federally-listed endangered or threatened vegetation or animal species occur within areas that would be affected by salt drift.

State-listed species that could occur within the wetlands affected by salt drift include a number of different bird species. Most of these are wading bird species (i.e., great blue heron, little blue heron, black-crowned night-heron, snowy egret, cattle egret, glossy ibis) that use these wetlands for foraging. One raptor species, the northern harrier, does have the potential to nest in these wetlands. These are all species that commonly frequent coastal wetland habitats and are acclimated to saline environments. Therefore, the incremental increase in salt deposition rates resulting from the new cooling tower, which is still within the tolerable rates for plants, would not be expected to impact these bird species.

Q8: Does this conclude your testimony?

A8: (MW, NG) Yes.

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AFFIDAVIT OF MICHAEL WILLINGHAM

I, Michael Willingham, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications (Ex. NRC002) are true and correct to the best of my knowledge and belief. I attest to the accuracy of my testimony and endorse its inclusion into the record of this proceeding.

Executed in Accord with 10 CFR § 2.304(d)

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Executed at Rockville, Maryland
This 25th day of February, 2016

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AFFIDAVIT OF NEIL GIFFEN

I, Neil Giffen, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications (Ex. NRC002) are true and correct to the best of my knowledge and belief. I attest to the accuracy of my testimony and endorse its inclusion into the record of this proceeding.

Executed in Accord with 10 CFR § 2.304(d)

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Executed at Oak Ridge, Tennessee
This 25th day of February, 2016