PSEG Power L.L.C.
Nuclear Development
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PSEG
Power LLC

ND-2011-0012
March 21, 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. 8, SRP Section: 02.05.04 - Stability of Subsurface Materials and Foundations

References: 1) PSEG Power, LLC letter to USNRC, Application for Early Site Permit for the PSEG Site, dated May 25, 2010

2) RAI No. 8, SRP Section: 02.05.04 - Stability of Subsurface Materials and Foundations, dated February 22, 2011 (eRAI 5249)

The purpose of this letter is to respond to the request for additional information (RAI) identified in Reference 2 above. This RAI addresses Stability of Subsurface Materials and Foundations, as described in Section 2.5.4 of the Site Safety Analysis Report (SSAR), as submitted in Part 2 of the PSEG Site Early Site Permit Application, Revision 0.

Enclosure 1 provides our response for RAI No. 8, Question No. 02.05.04-1. Our response to RAI No. 8, Question No.02.05.04-1 requires a revision to portions of Tables 2.5.4.2-2 and 2.5.4.2-8 as well as text in section 2.5.4.2. Enclosures 2 through 5 provide the tables of values requested in the RAI, while Enclosure 6 provides one CD-ROM containing the requested Excel files used to prepare the tables provided in Enclosures 2 through 5. Enclosure 7 contains the marked up table and text pages to be revised. Enclosure 8 includes the new regulatory commitment established in this submittal.

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NRO

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

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 21st day of March, 2011.

Sincerely,

David P. Lewis
Nuclear Development Project Director
PSEG Power, LLC

Enclosure 1: Response to NRC Request for Additional Information, RAI No. 8, Question No. 02.05.04-1, SRP Section: 02.05.04 - Stability of Subsurface Materials and Foundations
Enclosure 2: Tables RAI-8-1 through RAI-8-16 in response to part a) of RAI No. 8
Enclosure 3: Tables RAI-8-17 through RAI-8-20 in response to part b) of RAI No.8
Enclosure 4: Tables RAI-8-21 through RAI-8-28 in response to part c) of RAI No.8
Enclosure 5: Tables RAI-8-29 through RAI-8-36 in response to part d) of RAI No.8
Enclosure 6: 1 CD-ROM containing Excel files for Tables RAI-8-1 through RAI-8-36
Enclosure 7: Proposed Revisions Part 2 – Site Safety Analysis Report Section 2.5.4.2
Enclosure 8: 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-2011-0012, dated March 21, 2011

ENCLOSURE 1

RESPONSE to RAI No. 8

QUESTION 02.05.04-1

Response to RAI No. 8, Question 02.05.04-1:

In Reference 2, the NRC staff asked PSEG for information regarding the Stability of Subsurface Materials and Foundations, as described in Section 2.5.4 of the Site Safety Analysis Report. The specific request was:

In accordance with 10 CFR 100.23(d)(4), the staff requests that the applicant provide additional information on siting factors for design conditions that must be evaluated, such as liquefaction potential. Specifically, the staff requests that the applicant provide the following data to support NRC staff's liquefaction confirmatory analysis:

a) A table containing the SPT N_{60} values varying with depth, for all borings used to develop the values presented in Table 2.5.4.2-8. Table 2.5.4.2-8 only presents average N_{60} values for each stratum and/or combination of one or more layers.

b) A table containing the Shear Wave Velocity (Vs) and Shear modulus, varying with depth, from the downhole geophysical measurements.

c) A table containing the values presented in Figures 2.5.4.7-21 through 2.5.4.7-28.

d) A table containing the effective overburden pressure and the total stresses varying with depth for all boring used to develop the liquefaction assessment.

Please provide the requested data in electronic format (e.g., Excel spreadsheet) to ensure data accuracy.

PSEG Response to NRC RAI:

The information requested in RAI No. 8 has been prepared from project data files. The preparation is described for each part in the response below. The requested tables are presented in Enclosures 2 through 4 of this response. As requested, a CD with the electronic Excel spreadsheets is submitted with the response.

Part a): The information used for developing the SPT N_{60} values in SSAR Table 2.5.4.2-8 came from records of borings EB-1, EB-2, EB-3, EB-4, EB-5, EB-6/EB-6A, EB-7, EB-8, NB-1, NB-2, NB-3, NB-4, NB-5, NB-6, NB-7,and NB-8. Each boring log contains the depths below existing ground at the time of the boring for breaks among the various strata encountered by the boring. The SPT N_{60} values from each boring log were tabulated by depth and separated by strata. As discussed in SSAR section 2.5.4.2, geologic formations with similar engineering properties were grouped into geotechnical engineering strata for engineering purposes. The SPT N_{60} values associated with each stratum or combination of strata were then averaged to obtain the SPT N_{60} value shown in SSAR Table 2.5.4.2-8. Enclosure 2 contains Tables RAI-8-1 through RAI-8-16 (one table per boring) in which values for depth, SPT N_{60} and associated stratum or combination of strata are presented.

In preparing the tables for this response, a minor discrepancy was found in the assignment of stratigraphy to split spoon samples. During preparation of the SSAR, some samples from EB-1, NB-3 and NB-4 were incorrectly assigned to the wrong stratum, resulting in erroneous divisions between the Hydraulic Fill, Alluvium and Kirkwood formations in these three borings. The tables prepared for this response show the correct divisions. All the corrections made were for samples above the competent layer, and there is no impact to the analyses presented in subsequent sections of 2.5.4. Tables 2.5.4.2-2 and 2.5.4.2-8 have been revised to reflect the corrections. Text in SSAR Section 2.5.4.2 has also been revised to reflect the corrections and to correct a typographical error in the total number of sheets in Table 2.5.4.2-2. The revised text and tables are included in Enclosure 7. The corrections will be incorporated in the next SSAR revision.

Part b): Geophysical logging (P-S suspension) was performed in four boreholes – EB-3, EB-8G, NB-1 and NB-8. SSAR Figures 2.5.4.4-2a through 2.5.4.4-5b show graphical presentations of the Vs values with depth below existing ground at the time of the exploration. A tabular presentation of the shear wave velocity (Vs) and depth values shown on the figures was submitted by GeoVision, the geophysical subcontractor, as part of the geophysical logging report. In order to respond to RAI No. 8, soil unit weight values at the Vs depths were used to calculate the Shear modulus at low strain (G_{max}), and these values were added to the Vs and depth tables. Total unit weights for soils of Hydraulic Fill, Alluvium, Kirkwood Formation, Vincentown Formation, Hornerstown Formation, Navesink Formation and Mount Laurel Formation were obtained from the results of laboratory tests performed on intact samples obtained from these formations and from values reported previously in the Dames & Moore Report, SSAR Reference 2.5.4.2-13. A total unit weight of 125 pounds per cubic foot was assigned for soils below the Mount Laurel Formation for which laboratory test data was either limited or not available. For Hydraulic Fill and Alluvium, which will be removed as part of the site development, unit weight values were also obtained from published correlations between N-values, soil types and unit weight as published in Reference RAI-8-1. Enclosure 3 contains Tables RAI-8-17 through RAI-8-20 showing the depth, Vs value at that depth, total unit weight value at that depth, and G_{max} at that depth, as requested by RAI No. 8.

Part c): The graphs on SSAR Figures 2.5.4.7-21 through 2.5.4.7-28 were plotted using a series of data points from a calculation of the variation of the ratio G/G_{max} and Damping with shear strain. As illustrated in SSAR Figure 2.5.4.7-8(a), the soil profile was divided into Layers A, B, C and D for analysis purposes. Tables RAI-8-21 through RAI-8-28 in Enclosure 4 provide the data used to create SSAR Figures 2.5.4.7-21 through 2.5.4.7-28.

Part d): Tables RAI-8-29 through RAI-8-36 in Enclosure 5 present the requested tables of total and effective overburden pressures with depth below existing ground at the time of the drilling for the eight borings used in the liquefaction evaluation. Total unit weights for soils of

Hydraulic Fill, Alluvium, Kirkwood Formation, Vincentown Formation, Hornerstown Formation, Navesink Formation and Mount Laurel Formation were obtained from the results of laboratory tests performed on intact samples obtained from these formations and from values reported previously in the Dames & Moore Report, SSAR Reference 2.5.4.2-13. A total unit weight of 125 pounds per cubic foot was assigned for soils below the Mount Laurel Formation for which laboratory test data was either limited or not available. For Hydraulic Fill and Alluvium, which will be removed as part of the site development, some unit weight values were also obtained from published correlations between N-values, soil types and unit weight as published in Reference RAI-8-1. The soft soils of the Hydraulic Fill, Alluvium, Kirkwood and upper portion of the Vincentown Formations will be removed and replaced as described in SSAR section 2.5.4.8.2, therefore, no liquefaction evaluation of the in place soils above the planned depth of removal was performed.

References:

RAI-8-1. Bowles, J. E., "Foundation Analysis and Design", Third Edition, Chapter 3, pp 100-101, McGraw-Hill, 1982

Associated PSEG Site ESP Application Revisions:

Tables 2.5.4.2-2 and 2.5.4.2-8, as well as associated text in Section 2.5.4.2 will be modified in the next scheduled update to the SSAR.

Enclosure 7 includes a mark up of the proposed SSAR revision.

PSEG Letter ND-2011-0012, dated March 21, 2011

ENCLOSURE 2

Tables RAI-8-1 through RAI-8-16 in response to part a) of RAI No. 8

Table RAI-8-1
SPT N_{60} Values with Depth, Boring EB-1 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot(bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	20	22.17	Artificial Fill
2	3.5	10	11.09	Artificial Fill
3	6.0	1	1.11	Hydraulic Fill
4	8.5	0	0.00	Hydraulic Fill
5	11.0	1	1.26	Hydraulic Fill
6	13.5	1	1.26	Hydraulic Fill
7	16.0	1	1.26	Hydraulic Fill
8	21.0	2	2.81	Hydraulic Fill
9	26.0	0	0.00	Hydraulic Fill
10	31.0	0	0.00	Hydraulic Fill
11	36.0	0	0.00	Hydraulic Fill
12	41.0	29	42.86	Alluvium
13	46.0	17	25.13	Alluvium
14	51.0	24	35.47	Alluvium
15	56.0	21	31.04	Kirkwood
16	61.0	19	28.08	Kirkwood
17	66.0	23	33.99	Kirkwood
18	70.8	20	29.56	Kirkwood
19	77.5	14	20.69	Kirkwood
20	81.2	8	11.82	Kirkwood
21	86.0	9	13.30	Kirkwood
22	91.0	5	7.39	Kirkwood
23	96.1	11	16.26	Kirkwood
24	101.0	19	28.08	Kirkwood
25	105.2	100	147.80	Vincentown
26	110.8	22	32.52	Vincentown
27	115.9	30	44.34	Vincentown
28	121.1	46	67.99	Vincentown
29	126.2	39	57.64	Vincentown
30	131.0	100	147.80	Vincentown
31	135.7	100	147.80	Vincentown
32	141.0	25	36.95	Vincentown
33	145.1	100	147.80	Hornerstown

Table RAI-8-1
SPT N_{60} Values with Depth, Boring EB-1 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot(bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	151.0	27	39.91	Hornerstown
35	156.1	31	45.82	Hornerstown
36	160.9	62	91.64	Hornerstown
37	166.0	60	88.68	Navesink
38	170.9	64	94.59	Navesink
39	176.0	66	97.55	Navesink
40	181.0	96	141.89	Navesink
41	185.9	68	100.50	Mount Laurel
42	190.5	100	147.80	Mount Laurel
43	195.2	100	147.80	Mount Laurel
44	200.1	100	147.80	Mount Laurel
45	211.0	78	115.28	Mount Laurel
46	220.8	100	147.80	Mount Laurel
47	230.5	100	147.80	Mount Laurel
48	240.3	100	147.80	Mount Laurel
49	250.5	100	147.80	Mount Laurel
50	260.6	100	147.80	Mount Laurel
51	270.3	100	147.80	Mount Laurel
52	280.6	100	147.80	Mount Laurel
53	290.9	100	147.80	Mount Laurel
54	300.9	43	63.55	Wenonah
55	311.1	45	66.51	Marshalltown
56	316.0	22	32.52	Marshalltown
57	320.9	42	62.08	Marshalltown
58	330.9	87	128.59	Marshalltown
59	340.8	50	73.90	Englishtown
60	346.0	50	73.90	Englishtown
61	351.0	50	73.90	Englishtown

Table RAI-8-2
SPT N_{60} Values with Depth, Boring EB-2 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot(bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	15	16.63	Artificial Fill
2	3.5	9	9.98	Artificial Fill
3	6.0	17	18.84	Artificial Fill
4	8.5	3	3.33	Hydraulic Fill
5	11.0	2	2.51	Hydraulic Fill
6	13.5	2	2.51	Hydraulic Fill
7	16.0	0	0.00	Hydraulic Fill
8	21.0	2	2.81	Hydraulic Fill
9	26.3	0	0.00	Hydraulic Fill
10	31.3	0	0.00	Hydraulic Fill
11	36.2	0	0.00	Hydraulic Fill
12	41.0	16	23.65	Alluvium
13	46.8	7	10.35	Alluvium
14	51.0	5	7.39	Alluvium
15	56.0	3	4.43	Alluvium
16	61.0	5	7.39	Alluvium
17	66.3	3	4.43	Kirkwood
18	71.0	2	2.96	Kirkwood
19	76.1	1	1.48	Kirkwood
20	81.0	2	2.96	Kirkwood
21	86.0	3	4.43	Kirkwood
22	91.3	0	0.00	Kirkwood
23	96.0	0	0.00	Kirkwood
24	101.0	29	42.86	Kirkwood
25	106.0	28	41.38	Vincentown
26	110.7	100	147.80	Vincentown
27	115.9	38	56.16	Vincentown
28	120.9	100	147.80	Vincentown
29	125.2	100	147.80	Vincentown
30	130.8	59	87.20	Vincentown
31	135.2	100	147.80	Vincentown
32	140.8	100	147.80	Vincentown
33	146.0	55	81.29	Hornerstown

Table RAI-8-2
SPT N_{60} Values with Depth, Boring EB-2 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot(bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	151.0	44	65.03	Hornerstown
35	156.0	39	57.64	Hornerstown
36	160.8	58	85.72	Hornerstown
37	166.0	76	112.33	Navesink
38	171.0	48	70.94	Navesink
39	176.2	77	113.81	Navesink
40	180.7	100	147.80	Navesink
41	185.8	100	147.80	Mount Laurel
42	190.1	100	147.80	Mount Laurel
43	195.2	100	147.80	Mount Laurel
44	200.6	100	147.80	Mount Laurel

Table RAI-8-3
SPT N_{60} Values with Depth, Boring EB-3 (Sheet 1 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot(bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	39	46.86	Artificial Fill
2	3.5	9	10.81	Artificial Fill
3	6.0	4	4.81	Hydraulic Fill
4	8.5	3	3.60	Hydraulic Fill
5	11.0	7	9.53	Hydraulic Fill
6	13.5	2	2.72	Hydraulic Fill
7	16.0	2	2.72	Hydraulic Fill
8	21.0	2	3.04	Hydraulic Fill
9	26.0	0	0.00	Hydraulic Fill
10	31.0	0	0.00	Hydraulic Fill
11	36.0	0	0.00	Hydraulic Fill
12	41.0	18	28.84	Alluvium
13	46.0	6	9.61	Alluvium
14	51.0	5	8.01	Alluvium
15	56.0	7	11.21	Kirkwood
16	61.0	7	11.21	Kirkwood
17	66.0	2	3.20	Kirkwood
18	71.0	7	11.21	Kirkwood
19	76.0	2	3.20	Kirkwood
20	81.0	0	0.00	Kirkwood
21	86.0	0	0.00	Kirkwood
22	91.0	0	0.00	Kirkwood
23	96.0	23	36.85	Kirkwood
24	101.0	13	20.83	Kirkwood
25	106.0	45	72.09	Kirkwood
26	111.0	71	113.74	Vincentown
27	116.0	37	59.27	Vincentown
28	121.0	31	49.66	Vincentown
29	125.6	22	35.24	Vincentown
30	130.6	32	51.26	Vincentown
31	134.9	100	160.20	Vincentown
32	140.5	100	160.20	Vincentown
33	145.6	53	84.91	Hornerstown

Table RAI-8-3
SPT N_{60} Values with Depth, Boring EB-3 (Sheet 2 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot(bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	150.6	22	35.24	Hornerstown
35	155.4	100	160.20	Hornerstown
36	160.6	69	110.54	Hornerstown
37	165.2	100	160.20	Navesink
38	170.6	60	96.12	Navesink
39	175.6	49	78.50	Navesink
40	180.6	86	137.77	Navesink
41	185.6	63	100.93	Mount Laurel
42	190.4	100	160.20	Mount Laurel
43	194.8	100	160.20	Mount Laurel
44	199.8	100	160.20	Mount Laurel
45	210.6	66	105.73	Mount Laurel
46	220.6	100	160.20	Mount Laurel
47	230.2	100	160.20	Mount Laurel
48	240.2	100	160.20	Mount Laurel
49	250.3	100	160.20	Mount Laurel
50	260.5	100	160.20	Mount Laurel
51	270.3	100	160.20	Mount Laurel
52	280.5	100	160.20	Mount Laurel
53	290.6	63	100.93	Mount Laurel
54	300.6	17	27.23	Wenonah
55	310.6	53	84.91	Marshalltown
56	320.6	25	40.05	Marshalltown
57	330.6	61	97.72	Marshalltown
58	340.6	28	44.86	Englishtown
59	350.6	10	16.02	Englishtown
60	360.6	18	28.84	Englishtown
61	370.6	22	35.24	Englishtown
62	380.6	21	33.64	Englishtown
63	390.6	21	33.64	Woodbury
64	400.6	23	36.85	Woodbury
65	410.6	24	38.45	Woodbury
66	420.6	46	73.69	Merchantville

Table RAI-8-3
SPT N_{60} Values with Depth, Boring EB-3 (Sheet 3 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot(bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
67	430.6	43	68.89	Merchantville
68	440.6	82	131.36	Merchantville
69	450.6	53	84.91	Magothy
70	631.0	71	113.74	Potomac

Table RAI-8-4
SPT N_{60} Values with Depth, Boring EB-4 (Sheet 1 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot(bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	65	68.25	Artificial Fill
2	3.6	15	15.75	Artificial Fill
3	6.0	3	3.15	Hydraulic Fill
4	8.3	4	4.20	Hydraulic Fill
5	11.0	2	2.38	Hydraulic Fill
6	13.5	4	4.76	Hydraulic Fill
7	16.0	21	24.99	Hydraulic Fill
8	18.5	10	13.30	Hydraulic Fill
9	20.8	10	13.30	Hydraulic Fill
10	23.5	5	6.65	Hydraulic Fill
11	26.0	9	11.97	Hydraulic Fill
12	28.5	6	8.40	Hydraulic Fill
13	31.0	8	11.20	Hydraulic Fill
14	33.5	1	1.40	Hydraulic Fill
15	36.0	2	2.80	Hydraulic Fill
16	38.5	0	0.00	Hydraulic Fill
17	41.0	0	0.00	Hydraulic Fill
18	43.5	8	11.20	Hydraulic Fill
19	46.0	8	11.20	Alluvium
20	48.5	5	7.00	Alluvium
21	51.0	21	29.40	Alluvium
22	53.5	19	26.60	Alluvium
23	56.0	15	21.00	Alluvium
24	58.5	24	33.60	Alluvium
25	61.0	5	7.00	Alluvium
26	63.5	0	0.00	Alluvium
27	66.0	6	8.40	Kirkwood
28	68.5	5	7.00	Kirkwood
29	71.0	7	9.80	Kirkwood
30	73.5	22	30.80	Kirkwood
31	76.0	4	5.60	Kirkwood
32	78.5	6	8.40	Kirkwood
33	81.0	4	5.60	Kirkwood

Table RAI-8-4
SPT N_{60} Values with Depth, Boring EB-4 (Sheet 2 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	83.5	2	2.80	Kirkwood
35	86.0	6	8.40	Kirkwood
36	88.5	7	9.80	Kirkwood
37	91.0	0	0.00	Kirkwood
38	93.5	6	8.40	Kirkwood
39	96.0	0	0.00	Kirkwood
40	98.5	3	4.20	Kirkwood
41	101.0	0	0.00	Kirkwood
42	103.5	2	2.80	Kirkwood
43	106.0	3	4.20	Kirkwood
44	107.7	100	140.00	Kirkwood
45	110.3	100	140.00	Vincentown
46	113.5	15	21.00	Vincentown
47	116.0	72	100.80	Vincentown
48	118.5	18	25.20	Vincentown
49	120.2	100	140.00	Vincentown
50	122.7	100	140.00	Vincentown
51	125.6	100	140.00	Vincentown
52	128.5	52	72.80	Vincentown
53	130.1	100	140.00	Vincentown
54	133.4	100	140.00	Vincentown
55	136.0	25	35.00	Vincentown
56	137.7	100	140.00	Vincentown
57	140.2	100	140.00	Vincentown
58	143.5	29	40.60	Vincentown
59	145.7	100	140.00	Vincentown
60	148.2	100	140.00	Hornerstown
61	150.7	100	140.00	Hornerstown
62	153.2	100	140.00	Hornerstown
63	155.2	100	140.00	Hornerstown
64	157.7	100	140.00	Hornerstown
65	161.0	43	60.20	Hornerstown

Table RAI-8-4
SPT N_{60} Values with Depth, Boring EB-4 (Sheet 3 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
66	163.5	64	89.60	Hornerstown
67	166.0	38	53.20	Hornerstown
68	167.7	100	140.00	Hornerstown
69	170.9	100	140.00	Navesink
70	173.5	78	109.20	Navesink
71	176.0	77	107.80	Navesink
72	178.5	78	109.20	Navesink
73	181.0	75	105.00	Navesink
74	183.5	85	119.00	Navesink
75	185.9	100	140.00	Navesink
76	188.5	100	140.00	Navesink
77	191.0	54	75.60	Mount Laurel
78	193.5	85	119.00	Mount Laurel
79	195.7	100	140.00	Mount Laurel
80	197.7	100	140.00	Mount Laurel
81	200.1	100	140.00	Mount Laurel

Table RAI-8-5
SPT N_{60} Values with Depth, Boring EB-5 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	10	11.46	Artificial Fill
2	3.5	10	11.46	Artificial Fill
3	6.7	0	0.00	Hydraulic Fill
4	8.5	10	11.46	Hydraulic Fill
5	11.0	2	2.60	Hydraulic Fill
6	13.5	0	0.00	Hydraulic Fill
7	16.0	0	0.00	Hydraulic Fill
8	20.3	0	0.00	Hydraulic Fill
9	25.6	0	0.00	Hydraulic Fill
10	30.3	0	0.00	Hydraulic Fill
11	35.0	20	30.56	Alluvium
12	40.0	17	25.98	Alluvium
13	45.0	13	19.86	Alluvium
14	50.2	12	18.34	Alluvium
15	55.0	9	13.75	Kirkwood
16	60.0	10	15.28	Kirkwood
17	65.0	14	21.39	Kirkwood
18	70.0	24	36.67	Kirkwood
19	75.0	24	36.67	Kirkwood
20	80.0	33	50.42	Kirkwood
21	85.0	31	47.37	Kirkwood
22	90.0	64	97.79	Kirkwood
23	95.0	66	100.85	Kirkwood
24	100.0	48	73.34	Vincentown
25	105.0	53	80.98	Vincentown
26	110.0	27	41.26	Vincentown
27	115.0	24	36.67	Vincentown
28	120.0	26	39.73	Vincentown
29	124.0	100	152.80	Vincentown
30	130.0	28	42.78	Vincentown
31	135.0	59	90.15	Vincentown
32	140.0	58	88.62	Vincentown
33	145.0	100	152.80	Vincentown

Table RAI-8-5
SPT N_{60} Values with Depth, Boring EB-5 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	150.0	100	152.80	Hornerstown
35	155.0	25	38.20	Hornerstown
36	160.0	35	53.48	Hornerstown
37	165.0	77	117.66	Navesink
38	170.0	80	122.24	Navesink
39	175.0	66	100.85	Navesink
40	180.0	100	152.80	Navesink
41	185.0	100	152.80	Mount Laurel
42	189.2	100	152.80	Mount Laurel
43	194.1	100	152.80	Mount Laurel
44	199.2	100	152.80	Mount Laurel

Table RAI-8-6
SPT N_{60} Values with Depth, Boring EB-6 and EB-6A (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	24	27.50	Artificial Fill
2	3.5	14	16.04	Artificial Fill
3	5.3	4	4.58	Hydraulic Fill
4	8.6	17	19.48	Hydraulic Fill
5	11.0	4	5.20	Hydraulic Fill
6	13.5	0	0.00	Hydraulic Fill
7	15.6	3	3.90	Hydraulic Fill
8	20.5	2	2.90	Hydraulic Fill
9	25.5	0	0.00	Hydraulic Fill
10	30.5	0	0.00	Hydraulic Fill
11	35.5	38	58.06	Alluvium
12	40.5	24	36.67	Alluvium
13	45.5	31	47.37	Alluvium
14	50.5	17	25.98	Alluvium
15	55.5	18	27.50	Kirkwood
16	60.5	15	22.92	Kirkwood
17	65.5	13	19.86	Kirkwood
18	70.5	33	50.42	Vincentown
19	75.5	28	42.78	Vincentown
20	80.5	23	35.14	Vincentown
21	85.5	28	42.78	Vincentown
22	90.5	33	50.42	Vincentown
23	95.6	54	82.51	Vincentown
24	100.6	20	30.56	Vincentown
25	105.6	42	64.18	Vincentown
26	110.6	21	32.09	Vincentown
27	115.6	30	45.84	Vincentown
28	120.6	30	45.84	Vincentown
29	125.6	27	41.26	Vincentown
30	129.7	100	152.80	Vincentown
31	135.2	100	152.80	Vincentown
32	139.8	100	152.80	Vincentown
33	144.7	100	152.80	Hornerstown

Table RAI-8-6
SPT N_{60} Values with Depth, Boring EB-6 and EB-6A (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	150.6	28	42.78	Hornerstown

Table RAI-8-7
SPT N_{60} Values with Depth, Boring EB-7 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	27	29.93	Artificial Fill
2	3.5	6	6.65	Hydraulic Fill
3	6.0	0	0.00	Hydraulic Fill
4	8.2	6	6.65	Hydraulic Fill
5	10.4	15	18.84	Hydraulic Fill
6	13.5	1	1.26	Hydraulic Fill
7	15.5	2	2.51	Hydraulic Fill
8	21.0	2	2.81	Hydraulic Fill
9	26.0	0	0.00	Hydraulic Fill
10	31.0	0	0.00	Hydraulic Fill
11	36.0	2	2.96	Hydraulic Fill
12	41.0	12	17.74	Alluvium
13	46.0	9	13.30	Alluvium
14	51.0	14	20.69	Alluvium
15	56.0	7	10.35	Kirkwood
16	61.0	16	23.65	Kirkwood
17	66.0	7	10.35	Kirkwood
18	71.0	11	16.26	Kirkwood
19	76.0	0	0.00	Kirkwood
20	81.0	11	16.26	Kirkwood
21	86.0	15	22.17	Vincentown
22	91.0	38	56.16	Vincentown
23	96.0	30	44.34	Vincentown
24	100.6	100	147.80	Vincentown
25	106.0	23	33.99	Vincentown
26	111.0	31	45.82	Vincentown
27	116.0	58	85.72	Vincentown
28	121.0	26	38.43	Vincentown
29	125.6	100	147.80	Vincentown
30	131.0	30	44.34	Vincentown
31	135.0	100	147.80	Vincentown
32	140.8	100	147.80	Vincentown
33	146.0	23	33.99	Vincentown

Table RAI-8-7
SPT N_{60} Values with Depth, Boring EB-7 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	151.0	46	67.99	Hornerstown
35	156.0	57	84.25	Hornerstown
36	161.0	97	143.37	Hornerstown
37	166.0	39	57.64	Hornerstown
38	171.0	41	60.60	Navesink
39	176.0	72	106.42	Navesink
40	181.0	62	91.64	Navesink
41	185.9	100	147.80	Navesink
42	190.7	100	147.80	Mount Laurel
43	195.2	100	147.80	Mount Laurel
44	200.2	100	147.80	Mount Laurel

Table RAI-8-8
SPT N_{60} Values with Depth, Boring EB-8 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	14	15.52	Artificial Fill
2	3.5	4	4.43	Hydraulic Fill
3	6.0	0	0.00	Hydraulic Fill
4	8.5	0	0.00	Hydraulic Fill
5	11.0	1	1.26	Hydraulic Fill
6	13.3	0	0.00	Hydraulic Fill
7	15.8	5	6.28	Hydraulic Fill
8	21.1	0	0.00	Hydraulic Fill
9	26.2	0	0.00	Hydraulic Fill
10	31.3	7	10.35	Alluvium
11	36.0	5	7.39	Alluvium
12	42.4	8	11.82	Alluvium
13	47.0	6	8.87	Kirkwood
14	51.8	4	5.91	Kirkwood
15	56.0	0	0.00	Kirkwood
16	61.0	10	14.78	Vincentown
17	65.8	25	36.95	Vincentown
18	70.5	16	23.65	Vincentown
19	75.8	21	31.04	Vincentown
20	81.0	23	33.99	Vincentown
21	84.2	43	63.55	Vincentown
22	91.0	24	35.47	Vincentown
23	94.9	59	87.20	Vincentown
24	100.9	67	99.03	Vincentown
25	106.0	16	23.65	Vincentown
26	110.8	32	47.30	Vincentown
27	116.0	24	35.47	Vincentown
28	121.0	24	35.47	Vincentown
29	126.1	21	31.04	Vincentown
30	130.8	16	23.65	Vincentown
31	135.8	23	33.99	Vincentown
32	140.2	100	147.80	Vincentown
33	146.0	28	41.38	Vincentown

Table RAI-8-8
SPT N_{60} Values with Depth, Boring EB-8 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	150.0	100	147.80	Vincentown
35	156.0	54	79.81	Hornerstown
36	161.0	62	91.64	Hornerstown
37	165.9	100	147.80	Hornerstown
38	170.9	65	96.07	Hornerstown
39	176.0	98	144.84	Navesink
40	181.0	69	101.98	Navesink
41	186.0	89	131.54	Navesink
42	191.0	85	125.63	Navesink
43	195.9	100	147.80	Mount Laurel
44	200.0	100	147.80	Mount Laurel
45	210.0	100	147.80	Mount Laurel
46	220.9	100	147.80	Mount Laurel
47	230.8	100	147.80	Mount Laurel
48	240.9	100	147.80	Mount Laurel
49	250.7	100	147.80	Mount Laurel
50	260.7	100	147.80	Mount Laurel
51	270.5	100	147.80	Mount Laurel
52	280.7	100	147.80	Mount Laurel
53	290.7	100	147.80	Mount Laurel
54	301.3	100	147.80	Mount Laurel

Table RAI-8-9
SPT N_{60} Values with Depth, Boring NB-1 (Sheet 1 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	15	15.75	Artificial Fill
2	3.5	12	12.60	Hydraulic Fill
3	6.0	10	10.50	Hydraulic Fill
4	8.5	0	0.00	Hydraulic Fill
5	11.0	20	23.80	Hydraulic Fill
6	13.5	36	42.84	Hydraulic Fill
7	16.0	0	0.00	Hydraulic Fill
8	21.0	0	0.00	Hydraulic Fill
9	26.0	0	0.00	Hydraulic Fill
10	31.0	0	0.00	Hydraulic Fill
11	36.0	4	5.60	Hydraulic Fill
12	41.0	0	0.00	Hydraulic Fill
13	46.0	16	22.40	Alluvium
14	51.0	34	47.60	Alluvium
15	56.0	0	0.00	Kirkwood
16	61.0	0	0.00	Kirkwood
17	66.0	29	40.60	Kirkwood
18	71.0	10	14.00	Vincentown
19	76.0	30	42.00	Vincentown
20	81.0	15	21.00	Vincentown
21	86.0	17	23.80	Vincentown
22	91.0	14	19.60	Vincentown
23	96.0	17	23.80	Vincentown
24	101.0	26	36.40	Vincentown
25	106.0	24	33.60	Vincentown
26	111.0	26	36.40	Vincentown
27	116.0	26	36.40	Vincentown
28	120.7	100	140.00	Hornerstown
29	126.0	18	25.20	Hornerstown
30	131.0	26	36.40	Hornerstown
31	136.0	31	43.40	Hornerstown
32	141.0	48	67.20	Navesink
33	146.0	78	109.20	Navesink

Table RAI-8-9
SPT N_{60} Values with Depth, Boring NB-1 (Sheet 2 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	151.0	44	61.60	Navesink
35	156.0	65	91.00	Navesink
36	161.0	82	114.80	Navesink
37	166.0	78	109.20	Mount Laurel
38	170.2	100	140.00	Mount Laurel
39	175.2	100	140.00	Mount Laurel
40	180.2	100	140.00	Mount Laurel
41	186.0	64	89.60	Mount Laurel
42	191.0	59	82.60	Mount Laurel
43	196.0	51	71.40	Mount Laurel
44	200.8	100	140.00	Mount Laurel
45	210.6	100	140.00	Mount Laurel
46	220.6	100	140.00	Mount Laurel
47	230.7	100	140.00	Mount Laurel
48	241.0	100	140.00	Mount Laurel
49	251.0	23	32.20	Mount Laurel
50	261.0	49	68.60	Mount Laurel
51	271.0	26	36.40	Wenonah
52	281.0	62	86.80	Marshalltown
53	291.0	34	47.60	Marshalltown
54	301.0	100	140.00	Marshalltown
55	311.0	34	47.60	Englishtown
56	320.9	100	140.00	Englishtown
57	331.0	25	35.00	Englishtown
58	341.0	46	64.40	Englishtown
59	351.0	49	68.60	Woodbury
60	361.0	27	37.80	Woodbury
61	371.0	21	29.40	Woodbury
62	381.0	19	26.60	Woodbury
63	391.0	48	67.20	Merchantville
64	401.0	52	72.80	Merchantville
65	411.0	31	43.40	Merchantville
66	420.7	100	140.00	Magothy

Table RAI-8-9
SPT N_{60} Values with Depth, Boring NB-1 (Sheet 3 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
67	431.0	72	100.80	Magothy
68	440.7	100	140.00	Magothy
69	450.8	100	140.00	Magothy
70	470.3	80	112.00	Potomac
71	490.0	100	140.00	Potomac
72	509.7	100	140.00	Potomac
73	529.9	100	140.00	Potomac
74	600.7	100	140.00	Potomac

Table RAI-8-10
SPT N_{60} Values with Depth, Boring NB-2 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	15	16.63	Artificial Fill
2	3.5	15	16.63	Artificial Fill
3	8.0	1	1.11	Hydraulic Fill
4	15.0	0	0.00	Hydraulic Fill
5	20.9	0	0.00	Hydraulic Fill
6	26.0	2	2.81	Hydraulic Fill
7	31.0	4	5.91	Hydraulic Fill
8	36.0	1	1.48	Hydraulic Fill
9	41.0	3	4.43	Hydraulic Fill
10	46.0	7	10.35	Alluvium
11	50.9	2	2.96	Alluvium
12	56.0	14	20.69	Alluvium
13	60.9	21	31.04	Alluvium
14	66.1	19	28.08	Kirkwood
15	71.0	8	11.82	Kirkwood
16	76.3	5	7.39	Kirkwood
17	81.0	29	42.86	Vincentown
18	86.0	11	16.26	Vincentown
19	91.1	11	16.26	Vincentown
20	96.1	31	45.82	Vincentown
21	101.0	21	31.04	Vincentown
22	106.0	25	36.95	Vincentown
23	111.0	25	36.95	Vincentown
24	116.0	33	48.77	Hornerstown
25	121.0	24	35.47	Hornerstown
26	126.0	33	48.77	Hornerstown
27	130.9	49	72.42	Navesink
28	135.9	75	110.85	Navesink
29	141.0	56	82.77	Navesink
30	146.0	65	96.07	Navesink
31	150.9	67	99.03	Navesink
32	155.3	100	147.80	Mount Laurel
33	160.0	100	147.80	Mount Laurel

Table RAI-8-10
SPT N_{60} Values with Depth, Boring NB-2 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	165.2	100	147.80	Mount Laurel
35	170.2	100	147.80	Mount Laurel
36	176.0	93	137.45	Mount Laurel
37	181.0	55	81.29	Mount Laurel
38	186.0	59	87.20	Mount Laurel
39	190.8	100	147.80	Mount Laurel
40	195.8	100	147.80	Mount Laurel
41	200.6	100	147.80	Mount Laurel
42	210.7	100	147.80	Mount Laurel
43	220.7	100	147.80	Mount Laurel
44	231.0	55	81.29	Mount Laurel
45	241.0	47	69.47	Mount Laurel
46	251.0	40	59.12	Mount Laurel
47	261.0	37	54.69	Wenonah
48	271.0	40	59.12	Wenonah
49	281.0	26	38.43	Marshalltown
50	291.0	56	82.77	Marshalltown
51	301.0	28	41.38	Englishtown

Table RAI-8-11
SPT N_{60} Values with Depth, Boring NB-3 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	39	40.95	Artificial Fill
2	3.5	11	11.55	Artificial Fill
3	6.0	0	0.00	Hydraulic Fill
4	8.5	0	0.00	Hydraulic Fill
5	10.6	0	0.00	Hydraulic Fill
6	12.8	0	0.00	Hydraulic Fill
7	16.0	0	0.00	Hydraulic Fill
8	21.2	0	0.00	Hydraulic Fill
9	26.1	6	8.40	Hydraulic Fill
10	31.1	0	0.00	Hydraulic Fill
11	36.1	0	0.00	Hydraulic Fill
12	40.7	2	2.80	Alluvium
13	45.7	5	7.00	Alluvium
14	50.6	13	18.20	Alluvium
15	55.6	0	0.00	Kirkwood
16	60.6	0	0.00	Kirkwood
17	65.6	6	8.40	Vincentown
18	70.6	8	11.20	Vincentown
19	75.6	16	22.40	Vincentown
20	80.6	33	46.20	Vincentown
21	85.6	17	23.80	Vincentown
22	90.6	35	49.00	Vincentown
23	95.6	49	68.60	Vincentown
24	100.6	20	28.00	Vincentown
25	105.6	99	138.60	Vincentown
26	109.9	100	140.00	Vincentown
27	111.6	100	140.00	Vincentown
28	115.6	26	36.40	Hornerstown
29	120.6	49	68.60	Hornerstown

Table RAI-8-11
SPT N_{60} Values with Depth, Boring NB-3 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
30	125.6	28	39.20	Hornerstown
31	130.6	42	58.80	Hornerstown
32	135.6	61	85.40	Navesink
33	140.6	80	112.00	Navesink
34	145.6	38	53.20	Navesink
35	150.6	89	124.60	Navesink
36	155.6	83	116.20	Navesink
37	160.5	100	140.00	Mount Laurel
38	164.8	100	140.00	Mount Laurel
39	169.7	100	140.00	Mount Laurel
40	174.8	100	140.00	Mount Laurel
41	180.6	100	140.00	Mount Laurel
42	185.6	69	96.60	Mount Laurel
43	190.6	66	92.40	Mount Laurel
44	195.3	100	140.00	Mount Laurel
45	200.2	100	140.00	Mount Laurel

Table RAI-8-12
SPT N_{60} Values with Depth, Boring NB-4 (Sheet 1 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	99	118.95	Artificial Fill
2	3.5	4	4.81	Hydraulic Fill
3	6.0	0	0.00	Hydraulic Fill
4	8.5	0	0.00	Hydraulic Fill
5	11.0	0	0.00	Hydraulic Fill
6	13.5	0	0.00	Hydraulic Fill
7	16.0	0	0.00	Hydraulic Fill
8	18.5	0	0.00	Hydraulic Fill
9	21.0	0	0.00	Hydraulic Fill
10	23.5	0	0.00	Hydraulic Fill
11	26.0	0	0.00	Hydraulic Fill
12	28.5	0	0.00	Hydraulic Fill
13	31.0	8	12.82	Hydraulic Fill
14	33.5	0	0.00	Hydraulic Fill
15	36.0	0	0.00	Hydraulic Fill
16	38.5	5	8.01	Alluvium
17	41.0	4	6.41	Alluvium
18	43.5	5	8.01	Alluvium
19	46.0	20	32.04	Alluvium
20	48.5	20	32.04	Alluvium
21	51.0	23	36.85	Alluvium
22	53.5	12	19.22	Alluvium
23	56.0	4	6.41	Kirkwood
24	62.5	6	9.61	Kirkwood
25	66.0	2	3.20	Kirkwood
26	68.5	42	67.28	Kirkwood
27	71.0	14	22.43	Vincentown
28	76.0	23	36.85	Vincentown
29	78.0	12	19.22	Vincentown
30	81.0	26	41.65	Vincentown
31	83.5	20	32.04	Vincentown
32	86.0	36	57.67	Vincentown
33	88.5	37	59.27	Vincentown

Table RAI-8-12
SPT N_{60} Values with Depth, Boring NB-4 (Sheet 2 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	91.0	22	35.24	Vincentown
35	93.5	18	28.84	Vincentown
36	96.0	100	160.20	Vincentown
37	98.5	21	33.64	Vincentown
38	101.0	16	25.63	Vincentown
39	103.5	13	20.83	Vincentown
40	108.5	20	32.04	Vincentown
41	111.0	98	157.00	Vincentown
42	113.5	44	70.49	Vincentown
43	116.0	25	40.05	Vincentown
44	117.7	100	160.20	Vincentown
45	121.0	19	30.44	Vincentown
46	122.7	100	160.20	Vincentown
47	126.0	23	36.85	Hornerstown
48	128.5	27	43.25	Hornerstown
49	131.0	29	46.46	Hornerstown
50	133.1	100	160.20	Hornerstown
51	136.0	32	51.26	Hornerstown
52	138.5	39	62.48	Hornerstown
53	141.0	39	62.48	Hornerstown
54	143.5	54	86.51	Navesink
55	146.0	75	120.15	Navesink
56	148.5	70	112.14	Navesink
57	151.0	63	100.93	Navesink
58	153.5	48	76.90	Navesink
59	156.0	64	102.53	Navesink
60	158.5	83	132.97	Navesink
61	161.0	68	108.94	Navesink
62	163.5	85	136.17	Navesink
63	166.0	93	148.99	Mount Laurel
64	168.2	100	160.20	Mount Laurel
65	170.6	100	160.20	Mount Laurel
66	172.6	100	160.20	Mount Laurel

Table RAI-8-12
SPT N_{60} Values with Depth, Boring NB-4 (Sheet 3 of 3)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
67	175.2	100	160.20	Mount Laurel
68	177.6	100	160.20	Mount Laurel
69	180.3	100	160.20	Mount Laurel
70	183.4	100	160.20	Mount Laurel
71	186.0	71	113.74	Mount Laurel
72	188.5	70	112.14	Mount Laurel
73	191.0	65	104.13	Mount Laurel
74	193.5	68	108.94	Mount Laurel
75	196.0	56	89.71	Mount Laurel
76	198.5	78	124.96	Mount Laurel
77	200.9	100	160.20	Mount Laurel

Table RAI-8-13
SPT N_{60} Values with Depth, Boring NB-5 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	44	50.42	Artificial Fill
2	3.6	11	12.61	Artificial Fill
3	6.0	6	6.88	Hydraulic Fill
4	8.5	0	0.00	Hydraulic Fill
5	11.0	0	0.00	Hydraulic Fill
6	13.5	0	0.00	Hydraulic Fill
7	16.0	0	0.00	Hydraulic Fill
8	21.0	0	0.00	Hydraulic Fill
9	25.5	2	2.90	Hydraulic Fill
10	30.5	0	0.00	Hydraulic Fill
11	35.5	8	12.22	Hydraulic Fill
12	40.5	65	99.32	Alluvium
13	45.5	6	9.17	Kirkwood
14	50.5	7	10.70	Kirkwood
15	55.5	9	13.75	Kirkwood
16	60.5	10	15.28	Kirkwood
17	65.5	17	25.98	Kirkwood
18	70.5	65	99.32	Vincentown
19	75.5	30	45.84	Vincentown
20	80.5	16	24.45	Vincentown
21	85.5	16	24.45	Vincentown
22	90.5	31	47.37	Vincentown
23	95.5	19	29.03	Vincentown
24	100.5	67	102.38	Vincentown
25	105.5	43	65.70	Vincentown
26	110.5	25	38.20	Vincentown
27	115.5	24	36.67	Hornerstown
28	120.5	26	39.73	Hornerstown
29	125.5	40	61.12	Hornerstown
30	130.5	29	44.31	Hornerstown
31	135.5	54	82.51	Navesink
32	140.5	70	106.96	Navesink
33	145.5	46	70.29	Navesink

Table RAI-8-13
SPT N_{60} Values with Depth, Boring NB-5 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	150.5	85	129.88	Navesink
35	155.5	65	99.32	Navesink
36	160.4	100	152.80	Mount Laurel
37	164.6	100	152.80	Mount Laurel
38	169.6	100	152.80	Mount Laurel
39	174.7	100	152.80	Mount Laurel
40	180.5	79	120.71	Mount Laurel
41	185.5	55	84.04	Mount Laurel
42	190.5	56	85.57	Mount Laurel
43	195.2	100	152.80	Mount Laurel
44	199.8	100	152.80	Mount Laurel

Table RAI-8-14
SPT N_{60} Values with Depth, Boring NB-6 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	10	11.46	Artificial Fill
2	3.1	2	2.29	Artificial Fill
3	5.7	10	11.46	Artificial Fill
4	8.6	9	10.31	Artificial Fill
5	10.7	3	3.90	Hydraulic Fill
6	14.0	0	0.00	Hydraulic Fill
7	16.0	2	2.60	Hydraulic Fill
8	21.0	3	4.35	Hydraulic Fill
9	25.5	1	1.45	Hydraulic Fill
10	30.6	2	3.06	Hydraulic Fill
11	35.6	0	0.00	Hydraulic Fill
12	40.6	9	13.75	Alluvium
13	45.6	7	10.70	Kirkwood
14	50.6	9	13.75	Kirkwood
15	57.7	11	16.81	Kirkwood
16	65.6	23	35.14	Kirkwood
17	70.6	14	21.39	Kirkwood
18	75.6	39	59.59	Vincentown
19	78.9	19	29.03	Vincentown
20	83.6	24	36.67	Vincentown
21	90.6	22	33.62	Vincentown
22	94.8	100	152.80	Vincentown
23	100.6	30	45.84	Vincentown
24	105.6	25	38.20	Vincentown
25	110.6	38	58.06	Vincentown
26	114.8	100	152.80	Vincentown
27	120.6	44	67.23	Hornerstown
28	125.6	56	85.57	Hornerstown
29	130.6	45	68.76	Hornerstown
30	135.6	81	123.77	Navesink
31	140.6	56	85.57	Navesink
32	145.6	50	76.40	Navesink
33	150.6	67	102.38	Navesink

Table RAI-8-14
SPT N_{60} Values with Depth, Boring NB-6 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	155.6	63	96.26	Navesink
35	160.3	100	152.80	Mount Laurel
36	164.7	100	152.80	Mount Laurel
37	169.7	100	152.80	Mount Laurel
38	175.5	100	152.80	Mount Laurel
39	180.6	83	126.82	Mount Laurel
40	185.6	65	99.32	Mount Laurel
41	190.6	65	99.32	Mount Laurel
42	195.3	100	152.80	Mount Laurel
43	199.8	100	152.80	Mount Laurel

Table RAI-8-15
SPT N_{60} Values with Depth, Boring NB-7 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	26	28.82	Artificial Fill
2	3.5	6	6.65	Artificial Fill
3	5.7	0	0.00	Hydraulic Fill
4	8.5	0	0.00	Hydraulic Fill
5	11.3	2	2.51	Hydraulic Fill
6	13.8	0	0.00	Hydraulic Fill
7	16.3	0	0.00	Hydraulic Fill
8	21.2	6	8.42	Hydraulic Fill
9	26.3	0	0.00	Hydraulic Fill
10	31.2	12	17.74	Alluvium
11	36.2	35	51.73	Alluvium
12	41.0	5	7.39	Vincentown
13	46.0	16	23.65	Vincentown
14	51.0	14	20.69	Vincentown
15	56.0	18	26.60	Vincentown
16	61.0	21	31.04	Vincentown
17	66.1	16	23.65	Vincentown
18	71.0	39	57.64	Vincentown
19	76.0	45	66.51	Vincentown
20	81.0	46	67.99	Vincentown
21	86.2	28	41.38	Vincentown
22	90.9	100	147.80	Vincentown
23	96.2	42	62.08	Vincentown
24	101.0	27	39.91	Vincentown
25	106.1	45	66.51	Vincentown
26	111.1	42	62.08	Vincentown
27	116.0	28	41.38	Vincentown
28	121.0	52	76.86	Hornerstown
29	126.0	24	35.47	Hornerstown

Table RAI-8-15
SPT N_{60} Values with Depth, Boring NB-7 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
30	131.0	25	36.95	Hornerstown
31	136.0	34	50.25	Hornerstown
32	141.0	100	147.80	Navesink
33	146.0	70	103.46	Navesink
34	151.0	71	104.94	Navesink
35	156.1	78	115.28	Navesink
36	160.9	100	147.80	Navesink
37	165.6	100	147.80	Mount Laurel
38	170.2	100	147.80	Mount Laurel
39	175.3	100	147.80	Mount Laurel
40	180.7	100	147.80	Mount Laurel
41	186.0	76	112.33	Mount Laurel
42	191.0	72	106.42	Mount Laurel
43	195.9	100	147.80	Mount Laurel
44	200.9	100	147.80	Mount Laurel

Table RAI-8-16
SPT N_{60} Values with Depth, Boring NB-8 (Sheet 1 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
1	1.0	60	72.09	Artificial Fill
2	3.5	8	9.61	Hydraulic Fill
3	6.0	4	4.81	Hydraulic Fill
4	8.5	14	16.82	Hydraulic Fill
5	11.0	0	0.00	Hydraulic Fill
6	13.2	9	12.26	Hydraulic Fill
7	15.5	0	0.00	Hydraulic Fill
8	21.0	0	0.00	Hydraulic Fill
9	25.5	0	0.00	Hydraulic Fill
10	30.5	0	0.00	Hydraulic Fill
11	35.5	2	3.20	Alluvium
12	40.5	10	16.02	Alluvium
13	45.5	15	24.03	Alluvium
14	50.5	5	8.01	Kirkwood
15	55.5	0	0.00	Kirkwood
16	60.5	0	0.00	Kirkwood
17	65.5	22	35.24	Vincentown
18	70.5	15	24.03	Vincentown
19	75.5	18	28.84	Vincentown
20	80.5	35	56.07	Vincentown
21	85.5	24	38.45	Vincentown
22	89.8	100	160.20	Vincentown
23	95.5	76	121.75	Vincentown
24	100.5	26	41.65	Vincentown
25	105.5	62	99.32	Vincentown
26	109.6	100	160.20	Vincentown
27	115.5	33	52.87	Vincentown
28	120.5	42	67.28	Vincentown
29	125.5	29	46.46	Hornerstown
30	130.5	26	41.65	Hornerstown
31	135.5	56	89.71	Hornerstown
32	140.5	42	67.28	Hornerstown
33	145.5	47	75.29	Navesink

Table RAI-8-16
SPT N_{60} Values with Depth, Boring NB-8 (Sheet 2 of 2)

Entry No.	Depth to SPT N-value (ft)	Field SPT N-value blows per foot (bpf)	SPT N-value Corrected for Field Procedures, N_{60} (bpf)	Formation
34	150.5	61	97.72	Navesink
35	155.5	80	128.16	Navesink
36	160.5	75	120.15	Navesink
37	165.5	79	126.56	Navesink
38	170.4	100	160.20	Mount Laurel
39	174.6	100	160.20	Mount Laurel
40	179.7	100	160.20	Mount Laurel
41	185.1	100	160.20	Mount Laurel
42	190.5	86	137.77	Mount Laurel
43	195.5	74	118.55	Mount Laurel
44	200.5	92	147.38	Mount Laurel
45	210.1	100	160.20	Mount Laurel
46	220.1	100	160.20	Mount Laurel
47	230.2	100	160.20	Mount Laurel
48	240.5	100	160.20	Mount Laurel
49	250.5	92	147.38	Mount Laurel
50	260.5	73	116.95	Mount Laurel
51	270.5	18	28.84	Wenonah
52	280.5	7	11.21	Wenonah
53	290.5	30	48.06	Marshalltown
54	300.5	31	49.66	Marshalltown

PSEG Letter ND-2011-0012, dated March 21, 2011

ENCLOSURE 3

Tables RAI-8-17 through RAI-8-20 in response to part b) of RAI No. 8

Table RAI-8 – 17
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-3 (Sheet 1 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
57.4	390	115	543,214
59.4	480	126	901,565
60.7	340	126	452,348
62.7	350	126	479,348
64.0	600	115	1,285,714
65.6	600	115	1,285,714
67.3	550	115	1,080,357
68.9	550	115	1,080,357
70.5	570	115	1,160,357
72.2	560	115	1,120,000
73.8	580	115	1,201,429
75.5	560	115	1,120,000
77.1	560	115	1,120,000
78.7	560	115	1,120,000
80.4	550	115	1,080,357
82.0	550	115	1,080,357
83.7	570	115	1,160,357
85.3	560	115	1,120,000
86.9	560	115	1,120,000
88.6	600	115	1,285,714
90.2	640	115	1,462,857
91.9	580	115	1,201,429
93.5	480	137	980,273
95.1	430	137	786,686
97.1	410	137	715,208
98.4	450	137	861,568
100.1	500	137	1,063,665
101.7	570	137	1,382,339
103.4	640	137	1,742,708
105.0	640	120	1,526,460
106.6	740	120	2,040,745
108.6	1670	115	9,960,357
109.9	2060	115	15,155,714
111.6	1930	115	13,303,214
113.2	1850	115	12,223,214
114.8	2090	115	15,600,357

Table RAI-8 – 17
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-3 (Sheet 2 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
116.5	2050	115	15,008,929
118.1	2110	115	15,900,357
119.8	2040	115	14,862,857
121.4	2240	115	17,920,000
123.0	2460	115	21,612,857
124.7	2390	115	20,400,357
126.3	2400	115	20,571,429
128.0	2740	115	26,812,857
129.6	2460	115	21,612,857
131.2	2400	115	20,571,429
132.9	2360	115	19,891,429
134.5	2340	115	19,555,714
136.2	2310	115	19,057,500
137.8	2370	115	20,060,357
139.4	2380	115	20,230,000
141.1	2330	115	19,388,929
143.0	2380	115	20,230,000
144.4	2180	120	17,710,807
146.0	2510	120	23,478,634
148.0	2520	120	23,666,087
149.3	2400	120	21,465,839
150.9	2420	120	21,825,093
152.6	2310	120	19,886,087
154.2	2270	120	19,203,354
156.2	2360	120	20,756,273
157.5	2420	120	21,825,093
159.1	2320	120	20,058,634
160.8	2280	120	19,372,919
162.4	2190	120	17,873,665
164.0	2890	132	34,238,422
165.7	2740	132	30,776,497
167.3	2280	132	21,310,211
169.0	2420	132	24,007,602
170.6	2310	132	21,874,696
172.2	2330	132	22,255,118

Table RAI-8 – 17
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-3 (Sheet 3 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
174.2	2340	127	21,596,311
175.5	2190	127	18,916,295
177.2	2220	127	19,438,099
178.8	2260	132	20,937,988
180.5	2160	132	19,126,062
182.1	2160	132	19,126,062
183.7	2210	131	19,870,096
185.4	2410	131	23,629,227
187.3	3050	131	37,845,575
189.0	3640	131	53,903,652
190.3	3660	131	54,497,627
191.9	3830	131	59,677,823
193.6	4300	131	75,223,292
195.2	4520	131	83,117,466
196.9	4520	131	83,117,466
198.5	4290	131	74,873,823
200.1	3790	131	58,437,798
201.8	3570	131	51,850,370
203.4	3430	131	47,863,413
205.1	3140	131	40,112,037
207.0	2790	131	31,668,233
208.3	2700	131	29,658,075
210.0	2580	131	27,080,385
211.6	2520	131	25,835,478
213.3	2470	131	24,820,432
214.9	2470	131	24,820,432
216.5	2420	131	23,825,727
218.2	2400	131	23,433,540
219.8	2510	131	25,630,842
221.5	2550	131	26,454,270
223.1	2710	131	29,878,171
224.7	2700	131	29,658,075
226.4	2730	131	30,320,804
228.0	2950	131	35,404,581
229.7	3100	131	39,096,584
231.3	3100	131	39,096,584

Table RAI-8 – 17
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-3 (Sheet 4 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
232.9	3050	131	37,845,575
234.6	2890	131	33,979,040
236.2	3040	131	37,597,814
237.9	3320	131	44,842,683
239.5	3320	131	44,842,683
241.1	3250	131	42,971,661
242.8	3320	131	44,842,683
244.4	3090	131	38,844,755
246.1	3090	131	38,844,755
247.7	3140	131	40,112,037
249.3	2930	131	34,926,146
251.0	2770	131	31,215,835
252.6	2900	131	34,214,596
254.3	3140	131	40,112,037
255.9	3020	131	37,104,733
257.6	2860	131	33,277,255
259.2	2850	131	33,044,953
260.8	2640	131	28,354,584
262.5	2570	131	26,870,866
264.1	2790	131	31,668,233
265.8	2920	131	34,688,149
267.4	2980	131	36,128,335
269.0	2950	131	35,404,581
270.7	2900	131	34,214,596
272.3	2920	131	34,688,149
274.0	3090	131	38,844,755
275.6	3030	131	37,350,866
277.2	2940	131	35,164,957
278.9	2940	131	35,164,957
280.5	2660	131	28,785,826
282.2	2540	131	26,247,193
283.8	2540	131	26,247,193
285.4	2550	131	26,454,270
287.1	2560	131	26,662,161
288.7	2530	131	26,040,929
290.4	2200	131	19,690,683

Table RAI-8 – 17
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-3 (Sheet 5 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
292.0	1980	131	15,949,453
293.6	2000	131	16,273,292
295.3	2030	131	16,765,152
296.9	1990	125	15,373,059
298.6	2000	125	15,527,950
300.2	2120	125	17,447,205
301.8	2280	125	20,180,124
303.5	2310	125	20,714,674
305.1	2320	125	20,894,410
306.8	2380	125	21,989,130
308.4	2570	125	25,640,140
310.0	2620	125	26,647,516
311.7	2860	125	31,753,106
313.3	3190	125	39,503,494
315.0	3230	125	40,500,388
316.6	3220	125	40,250,000
318.2	3000	125	34,937,888
319.9	2570	125	25,640,140
321.5	2550	125	25,242,624
323.2	2620	125	26,647,516
324.8	2480	125	23,875,776
326.4	2430	125	22,922,748
328.1	2570	125	25,640,140
329.7	2360	125	21,621,118
331.4	2320	125	20,894,410
333.0	2140	125	17,777,950
334.7	1860	125	13,430,124
336.3	1940	125	14,610,248
337.9	2200	125	18,788,820
339.6	2140	125	17,777,950
341.2	1940	125	14,610,248
342.9	1840	125	13,142,857
344.5	1730	125	11,618,401
346.1	1750	125	11,888,587
347.8	1790	125	12,438,276
349.4	1830	125	13,000,388

Table RAI-8 – 17
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-3 (Sheet 6 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
351.1	1800	125	12,577,640
352.7	1770	125	12,161,879
354.3	1770	125	12,161,879
356.0	1810	125	12,717,780
357.6	1840	125	13,142,857
359.3	1780	125	12,299,689
360.9	1740	125	11,753,106
362.5	1720	125	11,484,472
364.2	1700	125	11,218,944
365.8	1790	125	12,438,276
367.5	1870	125	13,574,922
369.1	1830	125	13,000,388
370.7	1700	125	11,218,944
372.4	1660	125	10,697,205
374.0	1680	125	10,956,522
375.7	1770	125	12,161,879
377.3	1750	125	11,888,587
378.9	1730	125	11,618,401
380.6	1720	125	11,484,472
382.2	1740	125	11,753,106
383.9	1800	125	12,577,640
385.5	1930	125	14,460,016
387.1	1940	125	14,610,248
388.8	1780	125	12,299,689
390.4	1680	125	10,956,522
392.1	1630	125	10,314,053
393.7	1630	125	10,314,053
395.3	1640	125	10,440,994
397.0	1630	125	10,314,053
398.6	1630	125	10,314,053
400.3	1580	125	9,690,994
401.9	1580	125	9,690,994
403.5	1620	125	10,187,888
405.2	1630	125	10,314,053
406.8	1620	125	10,187,888
408.5	1610	125	10,062,500

Table RAI-8 – 17
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-3 (Sheet 7 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
410.1	1590	125	9,814,053
411.8	1590	125	9,814,053
413.4	1670	125	10,826,475
415.0	1630	125	10,314,053
416.7	1710	125	11,351,320
418.3	2210	125	18,960,016
420.0	2400	125	22,360,248
421.6	2180	125	18,448,758
423.2	2120	125	17,447,205
424.9	2280	125	20,180,124
426.5	2390	125	22,174,301
428.2	2480	125	23,875,776
429.8	2370	125	21,804,736
431.4	2530	125	24,848,214
433.1	2890	125	32,422,748
434.7	2380	125	21,989,130
436.4	1930	125	14,460,016
438.0	1870	125	13,574,922
439.6	2000	125	15,527,950
441.3	2180	125	18,448,758
442.9	2100	125	17,119,565
444.6	1980	125	15,218,944
446.2	2100	125	17,119,565
447.8	1970	125	15,065,606
449.5	1680	125	10,956,522
451.1	1500	125	8,734,472
452.8	1550	125	9,326,475
454.4	1650	125	10,568,711
456.0	1560	125	9,447,205
457.7	1680	125	10,956,522
459.3	1890	125	13,866,848
461.0	1980	125	15,218,944
462.6	2000	125	15,527,950
464.2	1810	125	12,717,780
465.9	1840	125	13,142,857

Table RAI-8 – 17
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-3 (Sheet 8 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
467.5	1900	125	14,013,975
469.2	2140	125	17,777,950
470.8	2500	125	24,262,422
472.4	2640	125	27,055,901
474.1	2560	125	25,440,994
475.7	2450	125	23,301,630
477.4	2580	125	25,840,062
479.0	3000	125	34,937,888
480.6	3210	125	40,000,388
482.3	2960	125	34,012,422
483.9	2190	125	18,618,401
485.6	2250	125	19,652,562
487.2	2360	125	21,621,118
488.9	2490	125	24,068,711
490.5	3100	125	37,305,901
492.1	3600	125	50,310,559
493.8	3880	125	58,440,994
495.4	3420	125	45,405,280
497.1	2820	125	30,871,118
498.7	2560	125	25,440,994
500.3	2500	125	24,262,422
502.0	2420	125	22,734,472
503.6	2490	125	24,068,711
505.3	2580	125	25,840,062
506.9	2640	125	27,055,901
508.5	2590	125	26,040,761
510.2	2540	125	25,045,031
511.8	2520	125	24,652,174
513.5	2400	125	22,360,248
515.1	2220	125	19,131,988
516.7	2260	125	19,827,640
518.4	2320	125	20,894,410
520.0	2260	125	19,827,640
521.7	2400	125	22,360,248
523.3	2470	125	23,683,618

Table RAI-8 – 17
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-3 (Sheet 9 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
524.9	2430	125	22,922,748
526.6	2480	125	23,875,776
528.2	2460	125	23,492,236
529.9	2430	125	22,922,748
531.5	2310	125	20,714,674
533.1	2230	125	19,304,736
534.8	2350	125	21,438,276
536.4	2500	125	24,262,422
538.1	2490	125	24,068,711
539.7	2530	125	24,848,214
541.3	2290	125	20,357,531
543.0	2100	125	17,119,565
544.6	2300	125	20,535,714
546.3	2560	125	25,440,994
547.9	2500	125	24,262,422
549.5	1990	125	15,373,059
551.2	2100	125	17,119,565
552.8	2090	125	16,956,910
554.5	2050	125	16,314,053
556.1	2070	125	16,633,929
557.7	2450	125	23,301,630
559.4	2790	125	30,217,780
561.0	2680	125	27,881,988
562.7	2530	125	24,848,214
564.3	2480	125	23,875,776
565.9	2500	125	24,262,422
567.6	2770	125	29,786,102
569.2	2710	125	28,509,705
570.9	2340	125	21,256,211
572.5	2120	125	17,447,205
574.2	2140	125	17,777,950
575.8	2210	125	18,960,016
577.4	2270	125	20,003,494
579.1	2320	125	20,894,410
580.7	2190	125	18,618,401

Table RAI-8 – 17
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-3 (Sheet 10 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	**Vs**	**γT**	**G_{max}**
(ft)	(ft/s)	(pcf)	(psf)
582.4	2360	125	21,621,118
584.0	2520	125	24,652,174
585.6	2140	125	17,777,950
587.3	1770	125	12,161,879
588.9	1670	125	10,826,475
590.6	1930	125	14,460,016
592.2	2080	125	16,795,031
593.8	1940	125	14,610,248
595.5	2130	125	17,612,189
597.1	2210	125	18,960,016
598.8	2000	125	15,527,950
600.4	2140	125	17,777,950
602.0	2480	125	23,875,776
603.7	2640	125	27,055,901
605.3	2310	125	20,714,674
607.0	1990	125	15,373,059
608.6	1950	125	14,761,258
610.2	2030	125	15,997,283
611.9	2010	125	15,683,618
613.5	1940	125	14,610,248
615.2	2000	125	15,527,950
616.8	2010	125	15,683,618

Table RAI-8 – 18
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-8G (Sheet 1 of 5)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
11.5	190	93	104,264
13.1	530	93	811,295
14.8	610	132	1,525,379
16.4	370	132	561,205
18.0	150	132	92,236
19.7	280	109	265,391
21.3	340	109	391,317
23.0	330	109	368,637
24.6	310	109	325,307
26.3	360	109	438,708
27.9	390	109	514,873
29.5	520	137	1,150,460
31.2	640	137	1,742,708
32.8	460	137	900,286
34.5	450	75	471,661
36.1	680	75	1,077,019
37.7	700	75	1,141,304
39.4	770	125	2,301,630
41.0	840	125	2,739,130
42.7	750	125	2,183,618
44.3	730	125	2,068,711
45.9	730	126	2,085,261
47.6	700	126	1,917,391
49.2	730	126	2,085,261
50.9	900	126	3,169,565
52.5	810	126	2,567,348
54.1	820	126	2,631,130
55.8	880	126	3,030,261
57.4	820	126	2,631,130
59.1	930	115	3,088,929
60.7	1110	115	4,400,357
62.3	1130	115	4,560,357
64.0	1200	126	5,634,783
65.9	1440	126	8,114,087
67.6	1460	126	8,341,043
69.2	1740	126	11,847,130

Table RAI-8 – 18
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-8G (Sheet 2 of 5)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	**Vs**	**γT**	**G_{max}**
(ft)	(ft/s)	(pcf)	(psf)
70.5	1850	126	13,392,391
72.2	1620	126	10,269,391
73.8	1740	126	11,847,130
75.5	1940	126	14,727,130
77.1	1930	126	14,575,696
78.7	1860	126	13,537,565
80.4	1950	126	14,879,348
82.0	2050	126	16,444,565
83.7	2240	126	19,634,087
85.3	2030	126	16,125,261
86.9	2060	126	16,605,391
88.6	2280	126	20,341,565
90.2	2100	126	17,256,522
91.9	1980	126	15,340,696
93.5	2260	126	19,986,261
95.1	2320	126	21,061,565
96.8	2140	126	17,920,174
98.4	1960	126	15,032,348
100.1	2050	126	16,444,565
101.7	2270	126	20,163,522
103.4	2080	126	16,929,391
105.0	2210	115	17,443,214
106.6	2250	115	18,080,357
108.3	1980	115	14,001,429
109.9	2010	115	14,428,929
111.6	2160	115	16,662,857
113.2	2110	115	15,900,357
115.2	2020	115	14,572,857
116.5	2040	115	14,862,857
118.1	2100	115	15,750,000
120.1	2070	115	15,303,214
121.7	2340	115	19,555,714
123.0	2000	115	14,285,714
124.7	2030	115	14,717,500
126.3	2050	115	15,008,929
128.0	2190	115	17,128,929

Table RAI-8 – 18
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-8G (Sheet 3 of 5)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
129.6	2590	115	23,957,500
131.2	2290	115	18,728,929
132.9	2240	115	17,920,000
134.5	2110	115	15,900,357
136.2	2270	115	18,403,214
138.1	2390	115	20,400,357
139.4	2420	115	20,915,714
141.1	2430	115	21,088,929
142.7	2520	115	22,680,000
144.4	2530	115	22,860,357
146.0	2440	115	21,262,857
147.6	2430	115	21,088,929
149.3	2640	115	24,891,429
150.9	2870	115	29,417,500
152.6	2990	115	31,928,929
154.2	2540	120	24,043,230
155.8	2540	120	24,043,230
157.5	2560	120	24,423,354
159.5	2550	120	24,232,919
161.1	2540	120	24,043,230
162.4	2570	120	24,614,534
164.0	2580	120	24,806,460
165.7	2670	120	26,567,329
167.3	2710	120	27,369,317
169.0	2460	120	22,552,547
170.6	2190	120	17,873,665
172.2	2520	120	23,666,087
173.9	2620	132	28,139,776
175.5	2370	132	23,025,801
177.2	2420	132	24,007,602
178.8	2420	132	24,007,602
180.5	2280	132	21,310,211
182.1	2190	132	19,661,031
183.7	2360	132	22,831,901
185.4	2300	132	21,685,714
187.0	2210	132	20,021,776

Table RAI-8 – 18
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-8G (Sheet 4 of 5)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
188.7	2190	132	19,661,031
190.3	2140	132	18,773,516
191.9	2310	132	21,874,696
193.6	2940	131	35,164,957
195.2	3420	131	47,584,733
196.9	3600	131	52,725,466
198.5	3770	131	57,822,668
200.1	4270	131	74,177,326
201.8	4330	131	76,276,581
203.4	4220	131	72,450,323
205.1	3880	131	61,246,161
206.7	3510	131	50,122,146
208.3	3260	131	43,236,509
210.0	3370	131	46,203,537
211.6	3210	131	41,920,407
213.3	2780	131	31,441,627
214.9	2570	131	26,870,866
216.5	2560	131	26,662,161
218.2	2450	131	24,420,109
219.8	2310	131	21,708,978
221.5	2450	131	24,420,109
223.1	2420	131	23,825,727
224.7	2310	131	21,708,978
226.4	2430	131	24,023,040
228.0	2470	131	24,820,432
229.7	2440	131	24,221,168
231.3	2550	131	26,454,270
232.9	2560	131	26,662,161
234.6	2430	131	24,023,040
236.2	2400	131	23,433,540
237.9	2500	131	25,427,019
239.5	2530	131	26,040,929
241.1	2530	131	26,040,929
242.8	2530	131	26,040,929
244.4	2620	131	27,926,596
246.1	2810	131	32,123,885

Table RAI-8 – 18
Shear Wave Velocity and Shear Modulus with Depth, Boring EB-8G (Sheet 5 of 5)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
247.7	2870	131	33,510,370
249.3	2940	131	35,164,957
251.0	2960	131	35,645,019
252.6	2980	131	36,128,335
254.3	3090	131	38,844,755
255.9	3090	131	38,844,755
257.6	3030	131	37,350,866
259.2	3160	131	40,624,646
260.8	3160	131	40,624,646
262.5	3020	131	37,104,733
264.1	2850	131	33,044,953
265.8	2720	131	30,099,081
267.4	2840	131	32,813,466
269.0	2870	131	33,510,370
270.7	2620	131	27,926,596
272.3	2620	131	27,926,596
274.0	2670	131	29,002,668
275.6	2910	131	34,450,966
277.2	3060	131	38,094,149
278.9	3070	131	38,343,537
280.5	2890	131	33,979,040
282.2	2750	131	30,766,693
283.8	2680	131	29,220,323
285.4	2590	131	27,290,717
287.1	2600	131	27,501,863
288.7	2550	131	26,454,270
290.4	2580	131	27,080,385
292.0	2640	131	28,354,584
293.6	2640	131	28,354,584
295.3	2750	131	30,766,693
296.9	2790	131	31,668,233
298.6	2710	131	29,878,171
300.2	2530	131	26,040,929
301.8	2500	131	25,427,019

Table RAI-8 – 19
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-1 (Sheet 1 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
16.4	410	93	485,506
18.0	460	93	611,143
19.7	310	93	277,556
21.3	280	93	226,435
23.0	320	93	295,752
24.6	310	93	277,556
26.3	330	93	314,525
27.9	360	93	374,311
29.5	430	93	534,028
31.2	400	93	462,112
32.8	650	93	1,220,264
34.5	370	93	395,394
36.1	260	93	195,242
37.7	350	93	353,804
39.4	330	93	314,525
41.0	460	93	611,143
42.7	850	93	2,086,724
44.3	500	120	931,677
45.9	540	120	1,086,708
47.6	520	120	1,007,702
49.2	400	137	680,745
50.9	350	137	521,196
52.5	510	137	1,106,637
54.1	510	115	928,929
55.8	610	115	1,328,929
57.4	570	115	1,160,357
59.1	560	115	1,120,000
60.7	670	115	1,603,214
62.3	670	115	1,603,214
64.0	730	126	2,085,261
65.6	830	126	2,695,696
67.3	710	126	1,972,565
68.9	1080	126	4,564,174
70.5	670	126	1,756,565
72.2	1270	126	6,311,348
73.8	920	126	3,312,000

Table RAI-8 – 19
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-1 (Sheet 2 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
75.5	1930	126	14,575,696
77.1	1680	126	11,044,174
78.7	1970	126	15,186,130
80.4	1930	126	14,575,696
82.0	1770	126	12,259,174
83.7	1760	115	11,062,857
85.3	1940	115	13,441,429
86.9	2150	115	16,508,929
88.6	2530	115	22,860,357
90.2	2030	115	14,717,500
91.9	1840	115	12,091,429
93.8	2160	115	16,662,857
95.1	1850	115	12,223,214
96.8	1920	115	13,165,714
98.4	2000	115	14,285,714
100.1	2080	115	15,451,429
101.7	2270	115	18,403,214
103.4	1760	115	11,062,857
105.0	1940	115	13,441,429
106.6	2650	115	25,080,357
108.3	2180	115	16,972,857
109.9	1760	115	11,062,857
111.6	1950	115	13,580,357
113.2	2460	115	21,612,857
114.8	2250	115	18,080,357
116.5	2240	115	17,920,000
118.1	1840	115	12,091,429
119.8	1810	120	12,209,068
121.4	1840	120	12,617,143
123.0	1930	120	13,881,615
124.7	2060	120	15,814,658
126.3	1710	120	10,897,267
128.0	1720	120	11,025,093
129.6	2160	120	17,387,329
131.2	2280	120	19,372,919
133.2	2220	120	18,366,708

Table RAI-8 – 19
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-1 (Sheet 3 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
134.5	2650	120	26,170,807
136.2	1930	120	13,881,615
137.8	1750	120	11,413,043
139.8	2120	127	17,726,360
141.1	2340	127	21,596,311
142.7	2080	127	17,063,752
144.4	2250	132	20,753,106
146.0	2420	132	24,007,602
147.6	2370	132	23,025,801
149.3	2360	127	21,967,056
150.9	2210	127	19,263,376
152.6	2110	127	17,559,525
154.2	2260	132	20,937,988
155.8	2150	132	18,949,379
157.5	2020	132	16,727,106
159.1	2120	132	18,424,248
160.8	1970	132	15,909,280
162.4	2040	132	17,059,975
164.0	2530	131	26,040,929
165.7	3240	131	42,707,627
167.3	3770	131	57,822,668
169.0	4020	131	65,745,727
170.6	4300	131	75,223,292
172.2	4470	131	81,288,755
173.9	4500	131	82,383,540
175.5	4500	131	82,383,540
177.5	4390	131	78,405,127
178.8	4090	131	68,055,314
180.5	3700	131	55,695,342
182.1	3420	131	47,584,733
183.7	3020	131	37,104,733
185.4	2530	131	26,040,929
187.0	2440	131	24,221,168
188.7	2600	131	27,501,863
190.3	2470	131	24,820,432
191.9	2420	131	23,825,727

Table RAI-8 – 19
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-1 (Sheet 4 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
193.6	2500	131	25,427,019
195.2	2230	131	20,231,363
196.9	2110	131	18,112,581
198.8	2430	131	24,023,040
200.1	2570	131	26,870,866
201.8	2540	131	26,247,193
203.4	2680	131	29,220,323
205.1	2890	131	33,979,040
207.0	3400	131	47,029,814
208.3	3510	131	50,122,146
210.0	3220	131	42,182,000
211.6	3130	131	39,856,953
213.3	3270	131	43,502,171
214.9	3250	131	42,971,661
216.5	3130	131	39,856,953
218.2	3000	131	36,614,907
219.8	2980	131	36,128,335
221.5	2890	131	33,979,040
223.1	2820	131	32,352,932
224.7	2850	131	33,044,953
226.4	2780	131	31,441,627
228.0	2730	131	30,320,804
229.7	2900	131	34,214,596
231.3	3100	131	39,096,584
232.9	3160	131	40,624,646
234.6	3090	131	38,844,755
236.2	2710	131	29,878,171
237.9	2500	131	25,427,019
239.5	2540	131	26,247,193
241.1	2430	131	24,023,040
242.8	2270	131	20,963,661
244.4	2260	131	20,779,366
246.1	2350	131	22,467,314
247.7	2120	131	18,284,671
249.3	1930	131	15,154,096
251.0	1940	131	15,311,540

Table RAI-8 – 19
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-1 (Sheet 5 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
252.6	2080	131	17,601,193
254.3	2000	131	16,273,292
255.9	1790	131	13,035,314
257.6	2060	131	17,264,335
259.2	2270	131	20,963,661
260.8	1930	131	15,154,096
262.5	1930	131	15,154,096
264.1	2210	131	19,870,096
265.8	2350	131	22,467,314
267.4	2420	125	22,734,472
269.0	2150	125	17,944,488
270.7	1980	125	15,218,944
272.3	1980	125	15,218,944
274.0	2110	125	17,282,997
275.6	2420	125	22,734,472
277.2	2750	125	29,357,531
278.9	2530	125	24,848,214
280.5	2170	125	18,279,891
282.2	2560	125	25,440,994
283.8	3240	125	40,751,553
285.4	3300	125	42,274,845
287.1	3140	125	38,274,845
288.7	2980	125	34,473,602
290.4	2580	125	25,840,062
292.0	2560	125	25,440,994
293.6	2650	125	27,261,258
295.3	2570	125	25,640,140
296.9	2540	125	25,045,031
298.6	2520	125	24,652,174
300.2	2440	125	23,111,801
301.8	2430	125	22,922,748
303.5	2450	125	23,301,630
305.1	2060	125	16,473,602
306.8	1810	125	12,717,780
308.4	1870	125	13,574,922
310.0	1870	125	13,574,922

Table RAI-8 – 19
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-1 (Sheet 6 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	**Vs**	**γT**	**G_{max}**
(ft)	(ft/s)	(pcf)	(psf)
311.7	1840	125	13,142,857
313.3	1780	125	12,299,689
315.0	1790	125	12,438,276
316.6	1800	125	12,577,640
318.2	1780	125	12,299,689
319.9	1850	125	13,286,102
321.5	1760	125	12,024,845
323.2	1650	125	10,568,711
324.8	1700	125	11,218,944
326.4	1780	125	12,299,689
328.1	1810	125	12,717,780
329.7	1800	125	12,577,640
331.4	1760	125	12,024,845
333.0	1730	125	11,618,401
334.7	1770	125	12,161,879
336.3	1790	125	12,438,276
337.9	1740	125	11,753,106
339.6	1720	125	11,484,472
341.2	1710	125	11,351,320
342.9	1740	125	11,753,106
344.5	1730	125	11,618,401
346.1	1740	125	11,753,106
347.8	1740	125	11,753,106
349.4	1780	125	12,299,689
351.1	1900	125	14,013,975
352.7	2010	125	15,683,618
354.3	1830	125	13,000,388
356.0	1680	125	10,956,522
357.6	1670	125	10,826,475
359.3	1670	125	10,826,475
360.9	1630	125	10,314,053
362.5	1610	125	10,062,500
364.2	1610	125	10,062,500
365.8	1600	125	9,937,888
367.5	1610	125	10,062,500
369.1	1630	125	10,314,053

Table RAI-8 – 19
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-1 (Sheet 7 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
370.7	1580	125	9,690,994
372.4	1560	125	9,447,205
374.0	1590	125	9,814,053
375.7	1640	125	10,440,994
377.3	1640	125	10,440,994
378.9	1650	125	10,568,711
380.6	1590	125	9,814,053
382.2	1620	125	10,187,888
383.9	1740	125	11,753,106
385.5	1910	125	14,161,879
387.1	2290	125	20,357,531
388.8	2530	125	24,848,214
390.4	2530	125	24,848,214
392.1	2330	125	21,074,922
393.7	2290	125	20,357,531
395.3	2170	125	18,279,891
397.0	2030	125	15,997,283
398.6	2250	125	19,652,562
400.3	2490	125	24,068,711
401.9	2490	125	24,068,711
403.5	2670	125	27,674,301
405.2	2750	125	29,357,531
406.8	2520	125	24,652,174
408.5	2120	125	17,447,205
410.1	2050	125	16,314,053
411.8	2100	125	17,119,565
413.4	2080	125	16,795,031
415.0	2140	125	17,777,950
416.7	2050	125	16,314,053
418.3	1840	125	13,142,857
420.0	1920	125	14,310,559
421.6	2130	125	17,612,189
423.2	1780	125	12,299,689
424.9	1420	125	7,827,640
426.5	1400	125	7,608,696
428.2	1560	125	9,447,205

Table RAI-8 – 19
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-1 (Sheet 8 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
429.8	1680	125	10,956,522
431.4	1650	125	10,568,711
433.1	1710	125	11,351,320
434.7	1930	125	14,460,016
436.4	2310	125	20,714,674
438.0	2590	125	26,040,761
439.6	2720	125	28,720,497
441.3	2370	125	21,804,736
442.9	2340	125	21,256,211
444.6	2660	125	27,467,391
446.2	2800	125	30,434,783
447.8	2780	125	30,001,553
449.5	2560	125	25,440,994
451.1	2360	125	21,621,118
452.8	2360	125	21,621,118
454.4	2410	125	22,546,972
456.0	2010	125	15,683,618
457.7	1830	125	13,000,388
459.3	2070	125	16,633,929
461.0	2440	125	23,111,801
462.6	2600	125	26,242,236
464.2	2580	125	25,840,062
465.9	2540	125	25,045,031
467.5	2430	125	22,922,748
469.2	2090	125	16,956,910
470.8	1850	125	13,286,102
472.4	1740	125	11,753,106
474.1	1770	125	12,161,879
475.7	2100	125	17,119,565
477.4	2580	125	25,840,062
479.0	2550	125	25,242,624
480.6	2360	125	21,621,118
482.3	2210	125	18,960,016
483.9	2190	125	18,618,401
485.6	2360	125	21,621,118
487.2	2520	125	24,652,174

Table RAI-8 – 19
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-1 (Sheet 9 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	**Vs**	**γT**	**G_{max}**
(ft)	(ft/s)	(pcf)	(psf)
488.9	2420	125	22,734,472
490.5	2390	125	22,174,301
492.1	2380	125	21,989,130
494.1	1940	125	14,610,248
495.4	1780	125	12,299,689
497.1	1850	125	13,286,102
498.7	1840	125	13,142,857
500.3	1990	125	15,373,059
502.0	2270	125	20,003,494
503.6	2700	125	28,299,689
505.3	2720	125	28,720,497
506.9	2860	125	31,753,106
508.5	3420	125	45,405,280
510.2	2960	125	34,012,422
511.8	2390	125	22,174,301
513.5	2390	125	22,174,301
515.1	2380	125	21,989,130
516.7	2480	125	23,875,776
518.4	2580	125	25,840,062
520.0	2610	125	26,444,488
521.7	2680	125	27,881,988
523.3	2740	125	29,144,410
524.9	2700	125	28,299,689
526.6	2460	125	23,492,236
528.2	2200	125	18,788,820
529.9	2190	125	18,618,401
531.5	2300	125	20,535,714
533.1	2450	125	23,301,630
534.8	2340	125	21,256,211
536.4	2370	125	21,804,736
538.1	2480	125	23,875,776
539.7	2660	125	27,467,391
541.3	2520	125	24,652,174
543.0	2140	125	17,777,950
544.6	1980	125	15,218,944
546.3	2180	125	18,448,758

Table RAI-8 – 19
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-1 (Sheet 10 of 10)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
547.9	2160	125	18,111,801
549.5	2110	125	17,282,997
551.2	2230	125	19,304,736
552.8	2220	125	19,131,988
554.5	2030	125	15,997,283
556.1	1950	125	14,761,258
557.7	1980	125	15,218,944
559.4	2040	125	16,155,280
561.0	2100	125	17,119,565
562.7	2240	125	19,478,261
564.3	2600	125	26,242,236
565.9	2660	125	27,467,391
567.6	2650	125	27,261,258
569.2	2500	125	24,262,422
570.9	2280	125	20,180,124
572.5	2010	125	15,683,618
574.2	1940	125	14,610,248
575.8	2080	125	16,795,031
577.4	2190	125	18,618,401
579.1	2470	125	23,683,618
580.7	2450	125	23,301,630
582.4	2230	125	19,304,736
584.0	2370	125	21,804,736
585.6	2530	125	24,848,214
587.3	2610	125	26,444,488

Table RAI-8 – 20
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-8 (Sheet 1 of 5)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	**Vs**	**γT**	**G_{max}**
(ft)	(ft/s)	(pcf)	(psf)
11.5	230	93	152,786
13.1	220	93	198,410
14.8	240	93	166,360
16.4	320	93	295,752
18.0	280	93	226,435
19.7	270	93	210,550
21.3	380	93	417,056
23.0	470	93	638,003
24.6	360	93	374,311
26.3	240	93	166,360
27.9	320	93	295,752
29.5	350	93	353,804
31.2	400	93	462,112
32.8	390	93	439,295
34.5	350	75	285,326
36.1	600	75	838,509
37.7	740	75	1,275,466
39.4	830	120	2,567,329
41.0	1090	120	4,427,702
42.7	1420	120	7,514,534
44.3	1440	120	7,727,702
45.9	950	120	3,363,354
47.6	1030	120	3,953,665
49.2	1100	126	4,734,783
50.9	950	126	3,531,522
52.5	870	126	2,961,783
54.1	990	126	3,835,174
55.8	910	126	3,240,391
57.4	1040	126	4,232,348
59.1	950	126	3,531,522
61.0	860	126	2,894,087
62.3	1000	126	3,913,043
64.0	1310	126	6,715,174
65.6	1560	126	9,522,783
67.3	1650	126	10,653,261
68.9	1550	126	9,401,087

Table RAI-8 – 20
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-8 (Sheet 2 of 5)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	**Vs**	**γT**	**G_{max}**
(ft)	(ft/s)	(pcf)	(psf)
70.5	1680	126	11,044,174
72.2	1760	126	12,121,043
73.8	2080	126	16,929,391
75.5	2020	126	15,966,783
77.1	1820	126	12,961,565
78.7	1940	115	13,441,429
80.4	1890	115	12,757,500
82.0	2400	115	20,571,429
83.7	2210	115	17,443,214
85.3	2140	115	16,355,714
86.9	2160	115	16,662,857
88.6	2200	115	17,285,714
90.2	2160	115	16,662,857
91.9	2100	115	15,750,000
93.5	2050	115	15,008,929
95.1	1960	115	13,720,000
96.8	2030	115	14,717,500
98.4	2070	115	15,303,214
100.1	1930	115	13,303,214
101.7	1850	115	12,223,214
103.4	2170	115	16,817,500
105.0	2290	115	18,728,929
106.6	1980	115	14,001,429
108.3	2190	115	17,128,929
109.9	2160	115	16,662,857
111.6	2380	115	20,230,000
113.2	2190	115	17,128,929
114.8	1900	115	12,892,857
116.5	2060	115	15,155,714
118.1	2430	115	21,088,929
119.8	2270	115	18,403,214
121.4	1920	115	13,165,714
123.0	1880	120	13,171,677
124.7	2080	120	16,123,230
126.3	1720	120	11,025,093
128.0	1900	120	13,453,416

Table RAI-8 – 20
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-8 (Sheet 3 of 5)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
129.6	1900	120	13,453,416
131.2	2080	120	16,123,230
132.9	2080	120	16,123,230
134.5	1850	120	12,754,658
136.2	2100	120	16,434,783
137.8	2250	120	18,866,460
139.4	2320	120	20,058,634
141.4	2230	120	18,532,547
142.7	2190	120	17,873,665
144.4	2390	132	23,416,062
146.0	2060	132	17,396,124
147.6	2240	132	20,569,043
149.3	2530	132	26,239,714
150.9	2400	132	23,612,422
152.6	2280	132	21,310,211
154.2	2240	127	19,789,913
156.2	2270	127	20,323,550
157.5	2380	127	22,340,957
159.1	2320	127	21,228,720
160.8	2120	127	17,726,360
162.4	2060	127	16,737,180
164.0	2160	127	18,401,590
165.7	2190	127	18,916,295
167.3	2490	127	24,453,811
169.0	3100	131	39,096,584
170.6	3400	131	47,029,814
172.2	3720	131	56,299,081
173.9	4120	131	69,057,342
175.5	4470	131	81,288,755
177.2	4660	131	88,346,075
178.8	4540	131	83,854,646
180.5	4190	131	71,423,885
182.1	3880	131	61,246,161
183.7	3750	131	57,210,792
185.4	3400	131	47,029,814
187.0	2980	131	36,128,335

Table RAI-8 – 20
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-8 (Sheet 4 of 5)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	Vs	γT	G_{max}
(ft)	(ft/s)	(pcf)	(psf)
188.7	2670	131	29,002,668
190.3	2520	131	25,835,478
191.9	2530	131	26,040,929
193.6	2770	131	31,215,835
195.2	2620	131	27,926,596
196.9	2430	131	24,023,040
198.5	2370	131	22,851,363
200.1	2250	131	20,595,885
201.8	2440	131	24,221,168
203.4	2680	131	29,220,323
205.1	2610	131	27,713,823
206.7	2800	131	31,895,652
208.3	3240	131	42,707,627
210.0	3530	131	50,694,966
211.6	3640	131	53,903,652
213.3	3440	131	48,142,907
214.9	3100	131	39,096,584
216.5	3090	131	38,844,755
218.2	3270	131	43,502,171
219.8	3380	131	46,478,149
221.1	3370	131	46,203,537
223.1	3330	131	45,113,227
224.7	3130	131	39,856,953
226.4	3190	131	41,399,661
228.0	3170	131	40,882,171
229.7	3000	131	36,614,907
231.3	3280	131	43,768,646
232.9	3420	131	47,584,733
234.6	3030	131	37,350,866
236.2	3130	131	39,856,953
237.9	3100	131	39,096,584
239.5	2850	131	33,044,953
241.1	2690	131	29,438,792
242.8	2700	131	29,658,075
244.4	2820	131	32,352,932
246.1	2890	131	33,979,040

Table RAI-8 – 20
Shear Wave Velocity and Shear Modulus with Depth, Boring NB-8 (Sheet 5 of 5)

Depth at	Shear Wave Velocity	Total Unit Weight	Small-Strain Shear Modulus
Midpoint Between Receivers	**Vs**	**γT**	**Gmax**
(ft)	(ft/s)	(pcf)	(psf)
247.7	2780	131	31,441,627
249.3	2710	131	29,878,171
251.0	2530	131	26,040,929
252.6	2420	131	23,825,727
254.3	2360	131	22,658,932
255.9	2180	131	19,334,298
257.6	1980	131	15,949,453
259.2	2020	131	16,600,385
260.8	2060	131	17,264,335
262.5	1980	131	15,949,453
264.1	1980	131	15,949,453
265.8	2200	125	18,788,820
267.4	2150	125	17,944,488
269.0	1910	125	14,161,879
270.7	1940	125	14,610,248
272.3	2180	125	18,448,758
274.0	2180	125	18,448,758
275.6	2160	125	18,111,801
277.2	2400	125	22,360,248
278.9	2360	125	21,621,118
280.5	2120	125	17,447,205
282.2	2240	125	19,478,261
283.8	2660	125	27,467,391
285.4	2490	125	24,068,711
287.1	2450	125	23,301,630
288.7	2980	125	34,473,602
290.4	3270	125	41,509,705
292.0	3140	125	38,274,845
293.6	2960	125	34,012,422
295.3	2660	125	27,467,391
296.9	2560	125	25,440,994
298.6	2700	125	28,299,689
300.2	2610	125	26,444,488
301.8	2460	125	23,492,236

PSEG Letter ND-2011-0012, dated March 21, 2011

ENCLOSURE 4

Tables RAI-8-21 through RAI-8-28 in response to part c) of RAI No. 8

Table RAI-8 – 21
Data for Figure 2.5.4.7-21 (Sheet 1 of 2)

Shear Strain, %	G/Gmax	Standard Deviation	G/Gmax+1 std.dev. (1)	G/Gmax-1 std.dev.
0.00010	0.9965	0.0242	1	0.9722
0.00013	0.9957	0.0253	1	0.9703
0.00016	0.9946	0.0265	1	0.9681
0.00020	0.9934	0.0278	1	0.9656
0.00025	0.9918	0.0293	1	0.9626
0.00032	0.9899	0.0309	1	0.9590
0.00040	0.9876	0.0327	1	0.9549
0.00050	0.9847	0.0346	1	0.9501
0.00063	0.9812	0.0368	1	0.9444
0.00079	0.9768	0.0392	1	0.9377
0.001	0.9715	0.0418	1	0.9298
0.0013	0.9651	0.0446	1	0.9204
0.0016	0.9572	0.0477	1	0.9095
0.0020	0.9476	0.0510	0.9986	0.8966
0.0025	0.9361	0.0546	0.9906	0.8815
0.0032	0.9222	0.0584	0.9806	0.8638
0.0040	0.9055	0.0624	0.9680	0.8431
0.0050	0.8858	0.0666	0.9524	0.8192
0.0063	0.8626	0.0709	0.9335	0.7917
0.0079	0.8356	0.0752	0.9108	0.7603
0.0100	0.8044	0.0795	0.8839	0.7249
0.0126	0.7689	0.0835	0.8525	0.6854
0.0158	0.7292	0.0873	0.8165	0.6420
0.0200	0.6855	0.0905	0.7760	0.5950
0.0251	0.6382	0.0932	0.7314	0.5450
0.0316	0.5881	0.0951	0.6832	0.4930
0.0398	0.5360	0.0962	0.6322	0.4398
0.0501	0.4832	0.0963	0.5795	0.3868
0.0631	0.4307	0.0956	0.5263	0.3351
0.0794	0.3798	0.0940	0.4738	0.2858
0.1000	0.3313	0.0916	0.4229	0.2398
0.1259	0.2862	0.0885	0.3748	0.1977
0.1585	0.2450	0.0849	0.3300	0.1601
0.1995	0.2080	0.0810	0.2890	0.1270
0.2512	0.1753	0.0768	0.2521	0.0985
0.3162	0.1468	0.0725	0.2192	0.0743

(1)Values greater than 1 truncated to 1.

Table RAI-8 – 21
Data for Figure 2.5.4.7-21 (Sheet 2 of 2)

Shear Strain, %	G/Gmax	Standard Deviation	G/Gmax+1 std.dev. [1]	G/Gmax-1 std.dev.
0.3981	0.1222	0.0682	0.1904	0.0540
0.5012	0.1013	0.0639	0.1652	0.0373
0.6310	0.0836	0.0598	0.1434	0.0237
0.7943	0.0687	0.0560	0.1247	0.0128
1.0000	0.0563	0.0523	0.1086	0.0041

[1]Values greater than 1 truncated to 1.

Table RAI-8 – 22
Data for Figure 2.5.4.7-22 (Sheet 1 of 2)

Shear Strain, %	Damping, D, %	Standard Deviation	D + 1 Std. Dev.	D - 1 Std. Dev.
0.00010	1.0898	0.8197	1.9095	0.2700
0.00013	1.0972	0.8225	1.9197	0.2747
0.00016	1.1065	0.8260	1.9325	0.2806
0.00020	1.1183	0.8303	1.9486	0.2880
0.00025	1.1331	0.8357	1.9688	0.2973
0.00032	1.1516	0.8425	1.9941	0.3091
0.00040	1.1750	0.8509	2.0259	0.3240
0.00050	1.2043	0.8614	2.0657	0.3429
0.00063	1.2411	0.8743	2.1154	0.3667
0.00079	1.2872	0.8903	2.1775	0.3969
0.0010	1.3450	0.9099	2.2549	0.4350
0.0013	1.4173	0.9339	2.3512	0.4834
0.0016	1.5076	0.9630	2.4706	0.5446
0.0020	1.6203	0.9981	2.6184	0.6222
0.0025	1.7605	1.0401	2.8006	0.7204
0.0032	1.9344	1.0899	3.0244	0.8445
0.0040	2.1495	1.1485	3.2980	1.0009
0.0050	2.4142	1.2168	3.6310	1.1974
0.0063	2.7383	1.2955	4.0338	1.4428
0.0079	3.1328	1.3852	4.5180	1.7476
0.0100	3.6092	1.4863	5.0955	2.1229
0.0126	4.1793	1.5989	5.7782	2.5805
0.0158	4.8546	1.7227	6.5772	3.1319
0.0200	5.6445	1.8570	7.5015	3.7874
0.0251	6.5556	2.0008	8.5564	4.5548
0.0316	7.5902	2.1524	9.7425	5.4378
0.0398	8.7445	2.3097	11.0542	6.4348
0.0501	10.0081	2.4705	12.4787	7.5376
0.0631	11.3636	2.6321	13.9956	8.7315
0.0794	12.7866	2.7916	15.5782	9.9950
0.1000	14.2479	2.9464	17.1943	11.3015
0.1259	15.7148	3.0941	18.8089	12.6208
0.1585	17.1539	3.2323	20.3862	13.9216
0.1995	18.5334	3.3595	21.8929	15.1739
0.2512	19.8254	3.4744	23.2998	16.3510
0.3162	21.0070	3.5762	24.5832	17.4307
0.3981	22.0616	3.6648	25.7264	18.3969

Table RAI-8 – 22
Data for Figure 2.5.4.7-22 (Sheet 2 of 2)

Shear Strain, %	Damping, D, %	Standard Deviation	D + 1 Std. Dev.	D - 1 Std. Dev.
0.5012	22.9789	3.7400	26.7189	19.2389
0.6310	23.7543	3.8025	27.5567	19.9518
0.7943	24.3883	3.8528	28.2411	20.5355
1.0000	24.8857	3.8918	28.7775	20.9939

Table RAI-8 – 23
Data for Figure 2.5.4.7-23 (Sheet 1 of 2)

Shear Strain, %	G/Gmax	Standard Deviation	G/Gmax+1 std.dev. [(1)]	G/Gmax-1 std.dev.
0.00010	0.9972	0.0232	1	0.9740
0.00013	0.9965	0.0242	1	0.9723
0.00016	0.9957	0.0253	1	0.9704
0.00020	0.9947	0.0264	1	0.9683
0.00025	0.9935	0.0277	1	0.9657
0.00032	0.9919	0.0292	1	0.9627
0.00040	0.9900	0.0308	1	0.9592
0.00050	0.9877	0.0326	1	0.9552
0.00063	0.9849	0.0345	1	0.9504
0.00079	0.9814	0.0367	1	0.9447
0.001	0.9771	0.0390	1	0.9381
0.0013	0.9718	0.0416	1	0.9302
0.0016	0.9654	0.0444	1	0.9210
0.0020	0.9576	0.0475	1	0.9101
0.0025	0.9482	0.0508	0.9990	0.8973
0.0032	0.9367	0.0544	0.9911	0.8823
0.0040	0.9230	0.0582	0.9812	0.8648
0.0050	0.9065	0.0622	0.9687	0.8443
0.0063	0.8870	0.0664	0.9533	0.8206
0.0079	0.8640	0.0707	0.9346	0.7933
0.0100	0.8371	0.0750	0.9121	0.7621
0.0126	0.8062	0.0792	0.8854	0.7269
0.0158	0.7710	0.0833	0.8543	0.6876
0.0200	0.7315	0.0871	0.8186	0.6444
0.0251	0.6879	0.0904	0.7783	0.5976
0.0316	0.6408	0.0931	0.7339	0.5478
0.0398	0.5908	0.0950	0.6858	0.4958
0.0501	0.5388	0.0961	0.6350	0.4427
0.0631	0.4860	0.0963	0.5824	0.3897
0.0794	0.4335	0.0957	0.5292	0.3379
0.1000	0.3825	0.0941	0.4765	0.2884
0.1259	0.3339	0.0917	0.4256	0.2421
0.1585	0.2886	0.0887	0.3773	0.1999
0.1995	0.2471	0.0851	0.3323	0.1620
0.2512	0.2099	0.0812	0.2911	0.1287
0.3162	0.1769	0.0770	0.2540	0.0999

[(1)]Values greater than 1 truncated to 1.

Table RAI-8 – 23
Data for Figure 2.5.4.7-23 (Sheet 2 of 2)

Shear Strain, %	G/Gmax	Standard Deviation	G/Gmax+1 std.dev. [1]	G/Gmax-1 std.dev.
0.3981	0.1482	0.0727	0.2209	0.0755
0.5012	0.1234	0.0684	0.1918	0.0550
0.6310	0.1023	0.0641	0.1664	0.0381
0.7943	0.0844	0.0601	0.1445	0.0244
1.0000	0.0694	0.0562	0.1256	0.0133

[1] Values greater than 1 truncated to 1.

Table RAI-8 – 24
Data for Figure 2.5.4.7-24 (Sheet 1 of 2)

Shear Strain, %	Damping, D, %	Standard Deviation	D + 1 Std. Dev.	D - 1 Std. Dev.
0.00010	0.8901	0.7415	1.6316	0.1486
0.00013	0.8960	0.7439	1.6399	0.1521
0.00016	0.9033	0.7469	1.6502	0.1564
0.00020	0.9125	0.7507	1.6632	0.1618
0.00025	0.9241	0.7554	1.6796	0.1687
0.00032	0.9387	0.7613	1.7000	0.1774
0.00040	0.9571	0.7686	1.7257	0.1884
0.00050	0.9801	0.7778	1.7579	0.2024
0.00063	1.0091	0.7891	1.7982	0.2200
0.00079	1.0454	0.8030	1.8485	0.2424
0.0010	1.0910	0.8202	1.9112	0.2708
0.0013	1.1481	0.8412	1.9893	0.3069
0.0016	1.2195	0.8668	2.0863	0.3527
0.0020	1.3088	0.8977	2.2065	0.4111
0.0025	1.4202	0.9348	2.3550	0.4853
0.0032	1.5587	0.9791	2.5378	0.5797
0.0040	1.7306	1.0313	2.7619	0.6994
0.0050	1.9433	1.0924	3.0356	0.8509
0.0063	2.2050	1.1632	3.3683	1.0418
0.0079	2.5257	1.2445	3.7702	1.2813
0.0100	2.9161	1.3367	4.2528	1.5794
0.0126	3.3878	1.4402	4.8280	1.9476
0.0158	3.9526	1.5551	5.5077	2.3975
0.0200	4.6219	1.6810	6.3029	2.9408
0.0251	5.4054	1.8174	7.2228	3.5880
0.0316	6.3099	1.9631	8.2730	4.3469
0.0398	7.3379	2.1164	9.4543	5.2215
0.0501	8.4860	2.2754	10.7614	6.2105
0.0631	9.7441	2.4378	12.1819	7.3063
0.0794	11.0951	2.6009	13.6960	8.4943
0.1000	12.5153	2.7619	15.2771	9.7534
0.1259	13.9753	2.9182	16.8935	11.0571
0.1585	15.4427	3.0672	18.5100	12.3755
0.1995	16.8842	3.2069	20.0910	13.6773
0.2512	18.2676	3.3354	21.6030	14.9323
0.3162	19.5649	3.4516	23.0165	16.1134
0.3981	20.7530	3.5546	24.3076	17.1984

Table RAI-8 – 24
Data for Figure 2.5.4.7-24 (Sheet 2 of 2)

Shear Strain, %	Damping, D, %	Standard Deviation	D + 1 Std. Dev.	D - 1 Std. Dev.
0.5012	21.8148	3.6442	25.4590	18.1706
0.6310	22.7396	3.7205	26.4602	19.0191
0.7943	23.5227	3.7839	27.3066	19.7387
1.0000	24.1642	3.8351	27.9993	20.3291

Table RAI-8 – 25
Data for Figure 2.5.4.7-25 (Sheet 1 of 2)

Shear Strain, %	G/Gmax	Standard Deviation	G/Gmax+1 std.dev. [(1)]	G/Gmax-1 std.dev.
0.00010	0.9988	0.0203	1	0.9785
0.00013	0.9985	0.0209	1	0.9775
0.00016	0.9981	0.0217	1	0.9765
0.00020	0.9977	0.0224	1	0.9752
0.00025	0.9971	0.0233	1	0.9738
0.00032	0.9964	0.0243	1	0.9721
0.00040	0.9956	0.0254	1	0.9702
0.00050	0.9946	0.0266	1	0.9680
0.00063	0.9933	0.0279	1	0.9654
0.00079	0.9917	0.0294	1	0.9624
0.001	0.9898	0.0310	1	0.9588
0.0013	0.9874	0.0328	1	0.9547
0.0016	0.9845	0.0347	1	0.9498
0.0020	0.9810	0.0369	1	0.9440
0.0025	0.9766	0.0393	1	0.9373
0.0032	0.9712	0.0419	1	0.9293
0.0040	0.9647	0.0448	1	0.9199
0.0050	0.9567	0.0479	1	0.9089
0.0063	0.9470	0.0512	0.9982	0.8958
0.0079	0.9354	0.0548	0.9902	0.8806
0.0100	0.9213	0.0586	0.9800	0.8627
0.0126	0.9046	0.0626	0.9672	0.8419
0.0158	0.8847	0.0668	0.9515	0.8179
0.0200	0.8613	0.0711	0.9324	0.7902
0.0251	0.8340	0.0754	0.9095	0.7586
0.0316	0.8026	0.0797	0.8823	0.7229
0.0398	0.7669	0.0837	0.8507	0.6832
0.0501	0.7270	0.0875	0.8145	0.6395
0.0631	0.6831	0.0907	0.7738	0.5924
0.0794	0.6356	0.0933	0.7289	0.5423
0.1000	0.5853	0.0952	0.6805	0.4901
0.1259	0.5332	0.0962	0.6294	0.4370
0.1585	0.4804	0.0963	0.5767	0.3841
0.1995	0.4280	0.0955	0.5235	0.3324
0.2512	0.3771	0.0939	0.4710	0.2833
0.3162	0.3289	0.0914	0.4203	0.2374

[(1)]Values greater than 1 truncated to 1.

Table RAI-8 – 25
Data for Figure 2.5.4.7-25 (Sheet 2 of 2)

Shear Strain, %	G/Gmax	Standard Deviation	G/Gmax+1 std.dev. [1].	G/Gmax-1 std.dev.
0.3981	0.2839	0.0883	0.3723	0.1956
0.5012	0.2429	0.0847	0.3277	0.1582
0.6310	0.2062	0.0808	0.2869	0.1254
0.7943	0.1737	0.0765	0.2502	0.0971
1.0000	0.1454	0.0722	0.2176	0.0731

[1] Values greater than 1 truncated to 1.

Table RAI-8 – 26
Data for Figure 2.5.4.7-26 (Sheet 1 of 2)

Shear Strain, %	Damping, D, %	Standard Deviation	D + 1 Std. Dev.	D - 1 Std. Dev.
0.00010	1.1008	0.8238	1.9247	0.2770
0.00013	1.1032	0.8247	1.9279	0.2785
0.00016	1.1062	0.8258	1.9320	0.2803
0.00020	1.1100	0.8272	1.9372	0.2827
0.00025	1.1147	0.8290	1.9437	0.2857
0.00032	1.1207	0.8312	1.9519	0.2895
0.00040	1.1282	0.8340	1.9622	0.2943
0.00050	1.1377	0.8374	1.9751	0.3002
0.00063	1.1496	0.8418	1.9913	0.3078
0.00079	1.1645	0.8472	2.0117	0.3174
0.0010	1.1833	0.8539	2.0372	0.3294
0.0013	1.2069	0.8623	2.0693	0.3446
0.0016	1.2366	0.8728	2.1094	0.3638
0.0020	1.2738	0.8857	2.1596	0.3881
0.0025	1.3205	0.9017	2.2222	0.4188
0.0032	1.3790	0.9213	2.3003	0.4577
0.0040	1.4522	0.9452	2.3974	0.5069
0.0050	1.5436	0.9743	2.5179	0.5693
0.0063	1.6576	1.0094	2.6670	0.6482
0.0079	1.7994	1.0514	2.8508	0.7480
0.0100	1.9753	1.1013	3.0766	0.8740
0.0126	2.1928	1.1600	3.3527	1.0328
0.0158	2.4604	1.2283	3.6887	1.2320
0.0200	2.7880	1.3071	4.0951	1.4809
0.0251	3.1865	1.3970	4.5834	1.7895
0.0316	3.6676	1.4982	5.1658	2.1694
0.0398	4.2430	1.6110	5.8540	2.6321
0.0501	4.9241	1.7349	6.6590	3.1892
0.0631	5.7203	1.8694	7.5897	3.8509
0.0794	6.6380	2.0133	8.6513	4.6248
0.1000	7.6791	2.1649	9.8440	5.5142
0.1259	8.8396	2.3222	11.1618	6.5173
0.1585	10.1086	2.4829	12.5914	7.6257
0.1995	11.4682	2.6441	14.1124	8.8241
0.2512	12.8941	2.8033	15.6974	10.0908
0.3162	14.3565	2.9576	17.3142	11.3989
0.3981	15.8228	3.1046	18.9274	12.7181

Table RAI-8 – 26
Data for Figure 2.5.4.7-26 (Sheet 2 of 2)

Shear Strain, %	Damping, D, %	Standard Deviation	D + 1 Std. Dev.	D - 1 Std. Dev.
0.5012	17.2595	3.2422	20.5017	14.0173
0.6310	18.6350	3.3687	22.0037	15.2663
0.7943	19.9216	3.4828	23.4044	16.4388
1.0000	21.0969	3.5839	24.6807	17.5130

Table RAI-8 – 27
Data for Figure 2.5.4.7-27 (Sheet 1 of 2)

Shear Strain, %	G/Gmax	Standard Deviation	G/Gmax+1 std.dev. [(1)]	G/Gmax-1 std.dev.
0.00010	0.9978	0.0222	1	0.9755
0.00013	0.9973	0.0231	1	0.9742
0.00016	0.9966	0.0240	1	0.9726
0.00020	0.9958	0.0251	1	0.9707
0.00025	0.9949	0.0263	1	0.9686
0.00032	0.9936	0.0276	1	0.9661
0.00040	0.9922	0.0290	1	0.9632
0.00050	0.9903	0.0306	1	0.9598
0.00063	0.9881	0.0323	1	0.9558
0.00079	0.9853	0.0342	1	0.9511
0.0010	0.9819	0.0364	1	0.9456
0.0013	0.9778	0.0387	1	0.9391
0.0016	0.9727	0.0412	1	0.9314
0.0020	0.9664	0.0440	1	0.9224
0.0025	0.9588	0.0471	1	0.9118
0.0032	0.9496	0.0503	1.0000	0.8993
0.0040	0.9385	0.0539	0.9924	0.8846
0.0050	0.9251	0.0576	0.9827	0.8674
0.0063	0.9090	0.0616	0.9706	0.8474
0.0079	0.8900	0.0658	0.9557	0.8242
0.0100	0.8675	0.0700	0.9375	0.7974
0.0126	0.8412	0.0744	0.9156	0.7668
0.0158	0.8108	0.0786	0.8895	0.7322
0.0200	0.7762	0.0828	0.8590	0.6935
0.0251	0.7374	0.0866	0.8239	0.6508
0.0316	0.6944	0.0899	0.7843	0.6044
0.0398	0.6477	0.0927	0.7405	0.5550
0.0501	0.5981	0.0948	0.6929	0.5033
0.0631	0.5463	0.0960	0.6424	0.4503
0.0794	0.4936	0.0964	0.5899	0.3972
0.1000	0.4409	0.0958	0.5367	0.3451
0.1259	0.3896	0.0944	0.4840	0.2952
0.1585	0.3406	0.0921	0.4327	0.2485
0.1995	0.2948	0.0892	0.3840	0.2056
0.2512	0.2528	0.0857	0.3385	0.1671

[(1)]Values greater than 1 truncated to 1.

Table RAI-8 – 27
Data for Figure 2.5.4.7-27 (Sheet 2 of 2)

Shear Strain, %	G/Gmax	Standard Deviation	G/Gmax+1 std.dev. [1]	G/Gmax-1 std.dev.
0.3162	0.2149	0.0818	0.2967	0.1332
0.3981	0.1814	0.0776	0.2590	0.1038
0.5012	0.1520	0.0733	0.2254	0.0787
0.6310	0.1267	0.0690	0.1957	0.0577
0.7943	0.1051	0.0647	0.1698	0.0404
1.0000	0.0868	0.0606	0.1474	0.0262

[1]Values greater than 1 truncated to 1.

Table RAI-8 – 28
Data for Figure 2.5.4.7-28 (Sheet 1 of 2)

Shear Strain, %	Damping, D, %	Standard Deviation	D + 1 Std. Dev.	D - 1 Std. Dev.
0.00010	0.7149	0.6652	1.3801	0.0496
0.00013	0.7193	0.6673	1.3866	0.0521
0.00016	0.7250	0.6699	1.3948	0.0551
0.00020	0.7321	0.6731	1.4052	0.0590
0.00025	0.7410	0.6771	1.4182	0.0639
0.00032	0.7523	0.6822	1.4345	0.0700
0.00040	0.7664	0.6885	1.4549	0.0779
0.00050	0.7841	0.6964	1.4805	0.0878
0.00063	0.8065	0.7061	1.5126	0.1003
0.00079	0.8345	0.7182	1.5527	0.1163
0.0010	0.8697	0.7330	1.6027	0.1367
0.0013	0.9138	0.7512	1.6650	0.1626
0.0016	0.9691	0.7734	1.7425	0.1957
0.0020	1.0383	0.8003	1.8386	0.2380
0.0025	1.1248	0.8327	1.9575	0.2921
0.0032	1.2327	0.8714	2.1041	0.3613
0.0040	1.3670	0.9173	2.2843	0.4497
0.0050	1.5338	0.9713	2.5050	0.5625
0.0063	1.7401	1.0341	2.7742	0.7060
0.0079	1.9943	1.1066	3.1009	0.8878
0.0100	2.3060	1.1894	3.4954	1.1166
0.0126	2.6858	1.2831	3.9688	1.4027
0.0158	3.1451	1.3879	4.5330	1.7572
0.0200	3.6960	1.5040	5.1999	2.1920
0.0251	4.3497	1.6310	5.9807	2.7187
0.0316	5.1165	1.7684	6.8848	3.3481
0.0398	6.0035	1.9150	7.9185	4.0886
0.0501	7.0140	2.0693	9.0833	4.9446
0.0631	8.1454	2.2294	10.3748	5.9159
0.0794	9.3887	2.3931	11.7818	6.9956
0.1000	10.7278	2.5576	13.2854	8.1703
0.1259	12.1398	2.7203	14.8600	9.4195
0.1585	13.5961	2.8784	16.4745	10.7177
0.1995	15.0645	3.0295	18.0940	12.0350
0.2512	16.5117	3.1714	19.6830	13.3403
0.3162	17.9052	3.3022	21.2074	14.6030
0.3981	19.2163	3.4207	22.6371	15.7956

Table RAI-8 – 28
Data for Figure 2.5.4.7-28 (Sheet 2 of 2)

Shear Strain, %	Damping, D, %	Standard Deviation	D + 1 Std. Dev.	D - 1 Std. Dev.
0.5012	20.4211	3.5261	23.9472	16.8950
0.6310	21.5017	3.6180	25.1197	17.8837
0.7943	22.4465	3.6965	26.1430	18.7500
1.0000	23.2498	3.7620	27.0117	19.4878

PSEG Letter ND-20110012, dated March 21, 2011

ENCLOSURE 5

Tables RAI-8-29 through RAI-8-36 in response to part d) of RAI No. 8

Table RAI-8 – 29
Total and Effective Overburden Pressures, Boring NB-1 (Sheet 1 of 2)

Sample Number	N-Value Depth (ft)	N-Value Elevation (ft)	USCS Designation	Estimated Total Unit Weight (pcf)	Total Overburden Pressure [(1)] Po (psf)	Effective Overburden Pressure [(1)] Po' (psf)
20	81.0	-68.2	SM	126	8,881	4,576
21	86.0	-73.2	SM	115	9,484	4,866
22	91.0	-78.2	SC-SM	115	10,059	5,129
23	96.0	-83.2	SC-SM	115	10,634	5,392
24	101.0	-88.2	SC-SM	115	11,209	5,655
25	106.0	-93.2	SC-SM	115	11,784	5,918
26	111.0	-98.2	SC-SM	115	12,359	6,181
27	116.0	-103.2	SC-SM	115	12,934	6,444
28	120.7	-107.9	SM	120	13,486	6,703
29	126.0	-113.2	SM	120	14,122	7,008
30	131.0	-118.2	SM	120	14,722	7,296
31	136.0	-123.2	SM	120	15,322	7,584
32	141.0	-128.2	SC	127	15,940	7,890
33	146.0	-133.2	SM	132	16,587	8,225
34	151.0	-138.2	SC	127	17,235	8,561
35	156.0	-143.2	SM	132	17,882	8,896
36	161.0	-148.2	SM	132	18,542	9,244
37	166.0	-153.2	SC	131	19,200	9,590
38	170.2	-157.4	SC	131	19,750	9,878
39	175.2	-162.4	SC	131	20,405	10,221
40	180.2	-167.4	SC	131	21,060	10,564
41	186.0	-173.2	SC	131	21,820	10,962
42	191.0	-178.2	SC	131	22,475	11,305
43	196.0	-183.2	SC	131	23,130	11,648
44	200.8	-188.0	SM	131	23,758	11,977
45	210.6	-197.8	SP-SM	131	25,042	12,649
46	220.6	-207.8	SP-SM	131	26,352	13,335
47	230.7	-217.9	SP-SM	131	27,675	14,028
48	241.0	-228.2	SM	131	29,025	14,735
49	251.0	-238.2	SC	131	30,335	15,421
50	261.0	-248.2	SM	131	31,645	16,107
51	271.0	-258.2	CL	125	-	-
52	281.0	-268.2	SC	125	34,175	17,389
53	291.0	-278.2	SM	125	35,425	18,015
54	301.0	-288.2	SM	125	36,675	18,641
55	311.0	-298.2	SC	125	37,925	19,267
56	320.9	-308.1	CH	125	-	-
57	331.0	-318.2	CH	125	-	-
58	341.0	-328.2	CH	125	-	-

Table RAI-8 – 29
Total and Effective Overburden Pressures, Boring NB-1 (Sheet 2 of 2)

Sample Number	N-Value Depth (ft)	N-Value Elevation (ft)	USCS Designation	Estimated Total Unit Weight (pcf)	Total Overburden Pressure [(1)] Po (psf)	Effective Overburden Pressure [(1)] Po' (psf)
59	351.0	-338.2	CH	125	-	-
60	361.0	-348.2	CH	125	-	-
61	371.0	-358.2	CH	125	-	-
62	381.0	-368.2	CH	125	-	-
63	391.0	-378.2	CL	125	-	-
64	401.0	-388.2	CL	125	-	-
65	411.0	-398.2	CL	125	-	-
66	420.7	-407.9	ML	125	-	-
67	431.0	-418.2	SC	125	52,925	26,779
68	440.7	-427.9	SC	125	54,137	27,386
69	450.8	-438.0	SM	125	55,400	28,018
70	470.3	-457.5	CL	125	-	-
71	490.0	-477.2	SM	125	60,300	30,472
72	509.7	-496.9	SM	125	62,762	31,706
73	529.9	-517.1	SP-SM	125	65,287	32,970
74	600.7	-587.9	CL	125	-	-

[(1)]Liquefaction safety factor is not computed for clayey and silty soils (USCS designations CH, CL, ML, MH); therefore total and effective overburden pressures for soils with these designations are not shown.

NOTE: Depth to water used in analysis was 12.0 ft.
The competent layer is established at elevation -67 ft., Data points above elevation -67 are not included in this evaluation

Table RAI-8 – 30
Total and Effective Overburden Pressures, Boring NB-2 (Sheet 1 of 1)

Sample Number	N-Value Depth (ft)	N-Value Elevation (ft)	USCS Designation	Estimated Total Unit Weight (pcf)	Total Overburden Pressure [(1)] Po (psf)	Effective Overburden Pressure [(1)] Po' (psf)
16	76.3	-68.1	SM	126	[(2)]	[(2)]
17	81.0	-72.8	SM	126	9,062	4,531
18	86.0	-77.8	SM	126	9,692	4,849
19	91.1	-82.9	SM	126	10,334	5,174
20	96.1	-87.9	SM	126	10,964	5,492
21	101.0	-92.8	SM	115	11,555	5,776
22	106.0	-97.8	SM	115	12,130	6,039
23	111.0	-102.8	SM	115	12,705	6,302
24	116.0	-107.8	SM	120	13,292	6,578
25	121.0	-112.8	SM	120	13,892	6,866
26	126.0	-117.8	SM	120	14,492	7,154
27	130.9	-122.7	SM	132	15,110	7,466
28	135.9	-127.7	SM	132	15,770	7,814
29	141.0	-132.8	SM	132	16,443	8,169
30	146.0	-137.8	SM	132	17,103	8,517
31	150.9	-142.7	SM	132	17,750	8,858
32	155.3	-147.1	SC-SM	131	18,328	9,162
33	160.0	-151.8	SC-SM	131	18,944	9,484
34	165.2	-157.0	SC-SM	131	19,625	9,841
35	170.2	-162.0	SC-SM	131	20,280	10,184
36	176.0	-167.8	SC-SM	131	21,040	10,582
37	181.0	-172.8	SC-SM	131	21,695	10,925
38	186.0	-177.8	SC-SM	131	22,350	11,268
39	190.8	-182.6	SM	131	22,979	11,597
40	195.8	-187.6	SM	131	23,634	11,940
41	200.6	-192.4	SM	131	24,262	12,269
42	210.7	-202.5	SM	131	25,586	12,962
43	220.7	-212.5	SM	131	26,896	13,648
44	231.0	-222.8	SM	131	28,245	14,355
45	241.0	-232.8	SM	131	29,555	15,041
46	251.0	-242.8	SM	131	30,865	15,727
47	261.0	-252.8	CL	125	-	-
48	271.0	-262.8	SC-SM	125	33,395	17,009
49	281.0	-272.8	CL	125	-	-
50	291.0	-282.8	SM	125	35,895	18,261
51	301.0	-292.8	CL	125	-	-

(1) Liquefaction safety factor is not computed for clayey and silty soils (USCS designations CH, CL, ML, MH); therefore total and effective overburden pressures for soils with these designations are not shown.

(2) Sample 16 is of the Kirkwood Formation. Materials above the Vincentown Formation will be removed. Therefore total and effective overburden pressure not shown for this sample.

NOTE: Depth to water used in analysis was 8.4 ft. The competent layer is established at elevation -67 ft., Data points above elevation -67 are not included in this evaluation

Table RAI-8 – 31
Total and Effective Overburden Pressures, Boring NB-3 (Sheet 1 of 1)

Sample Number	N-Value Depth (ft)	N-Value Elevation (ft)	USCS Designation	Estimated Total Unit Weight (pcf)	Total Overburden Pressure [(1)] Po (psf)	Effective Overburden Pressure [(1)] Po' (psf)
19	75.6	-68.2	SP-SM	102	8,331	4,088
20	80.6	-73.2	SP-SM	102	8,841	4,286
21	85.6	-78.2	SM	115	9,384	4,517
22	90.6	-83.2	SP-SM	102	9,926	4,747
23	95.6	-88.2	SM	115	10,469	4,978
24	100.6	-93.2	SM	115	11,044	5,241
25	105.6	-98.2	SM	115	11,619	5,504
26	109.9	-102.5	SP-SM	102	12,085	5,702
27	111.6	-104.2	SP-SM	102	12,259	5,769
28	115.6	-108.2	SP-SM	120	12,703	5,964
29	120.6	-113.2	SP-SM	120	13,303	6,252
30	125.6	-118.2	SM	120	13,903	6,540
31	130.6	-123.2	SM	120	14,503	6,828
32	135.6	-128.2	SC	127	15,120	7,133
33	140.6	-133.2	SM	132	15,768	7,469
34	145.6	-138.2	SC	127	16,415	7,804
35	150.6	-143.2	SM	132	17,063	8,140
36	155.6	-148.2	SM	132	17,723	8,488
37	160.5	-153.1	SC	131	18,367	8,826
38	164.8	-157.4	SM	131	18,930	9,121
39	169.7	-162.3	SM	131	19,572	9,457
40	174.8	-167.4	SM	131	20,240	9,807
41	180.6	-173.2	SC	131	21,000	10,205
42	185.6	-178.2	SC	131	21,655	10,548
43	190.6	-183.2	SC	131	22,310	10,891
44	195.3	-187.9	SM	131	22,926	11,213
45	200.2	-192.8	SP-SM	131	23,568	11,550

[(1)] Liquefaction safety factor is not computed for clayey and silty soils (USCS designations CH, CL, ML, MH); therefore total and effective overburden pressures for soils with these designations are not shown.

NOTE: Depth to water used in analysis was 7.6 ft.
The competent layer is established at elevation -67 ft., Data points above elevation -67 are not included in this evaluation

Table RAI-8 – 32
Total and Effective Overburden Pressures, Boring NB-4 (Sheet 1 of 2)

Sample Number	N-Value Depth (ft)	N-Value Elevation (ft)	USCS Designation	Estimated Total Unit Weight (pcf)	Total Overburden Pressure (1) Po (psf)	Effective Overburden Pressure (1) Po' (psf)
30	81.0	-69.5	SM	115	8,844	4,482
31	83.5	-72.0	SM	115	9,131	4,613
32	86.0	-74.5	SM	115	9,419	4,745
33	88.5	-77.0	SM	115	9,706	4,876
34	91.0	-79.5	SM	115	9,994	5,008
35	93.5	-82.0	SM	115	10,281	5,139
36	96.0	-84.5	SM	115	10,569	5,271
37	98.5	-87.0	SM	115	10,856	5,402
38	101.0	-89.5	SM	115	11,144	5,534
39	103.5	-92.0	SM	115	11,431	5,665
40	108.5	-97.0	SM	115	12,006	5,928
41	111.0	-99.5	SM	115	12,294	6,060
42	113.5	-102.0	SM	115	12,581	6,191
43	116.0	-104.5	SM	115	12,869	6,323
44	117.7	-106.2	SP-SM	102	13,053	6,401
45	121.0	-109.5	SM	115	13,411	6,553
46	122.7	-111.2	SM	115	13,607	6,643
47	126.0	-114.5	SM	120	13,995	6,825
48	128.5	-117.0	SP-SM	120	14,295	6,969
49	131.0	-119.5	SP-SM	120	14,595	7,113
50	133.1	-121.6	SM	120	14,847	7,234
51	136.0	-124.5	SP-SM	120	15,195	7,401
52	138.5	-127.0	SP-SM	120	15,495	7,545
53	141.0	-129.5	SP-SM	120	15,795	7,689
54	143.5	-132.0	SC	127	16,103	7,841
55	146.0	-134.5	SM	132	16,427	8,009
56	148.5	-137.0	SM	132	16,757	8,183
57	151.0	-139.5	SM	132	17,087	8,357
58	153.5	-142.0	SC	127	17,411	8,525
59	156.0	-144.5	SC	127	17,728	8,686
60	158.5	-147.0	SM	132	18,052	8,854
61	161.0	-149.5	SC	127	18,376	9,022
62	163.5	-152.0	SC	127	18,693	9,183
63	166.0	-154.5	SC	131	19,016	9,350
64	168.2	-156.7	CL	131	-	-
65	170.6	-159.1	SC	131	19,618	9,666
66	172.6	-161.1	SM	131	19,880	9,803
67	175.2	-163.7	SM	131	20,221	9,981
68	177.6	-166.1	SM	131	20,535	10,146
69	180.3	-168.8	SM	131	20,889	10,331
70	183.4	-171.9	SM	131	21,295	10,544
71	186.0	-174.5	SM	131	21,636	10,722

Table RAI-8 – 32
Total and Effective Overburden Pressures, Boring NB-4 (Sheet 2 of 2)

Sample Number	N-Value Depth (ft)	N-Value Elevation (ft)	USCS Designation	Estimated Total Unit Weight (pcf)	Total Overburden Pressure (1) Po (psf)	Effective Overburden Pressure (1) Po' (psf)
72	188.5	-177.0	SM	131	21,963	10,893
73	191.0	-179.5	SC	131	22,291	11,065
74	193.5	-182.0	SC	131	22,618	11,236
75	196.0	-184.5	SC	131	22,946	11,408
76	198.5	-187.0	SC	131	23,273	11,579
77	200.9	-189.4	SM	131	23,588	11,744

(1) Liquefaction safety factor is not computed for clayey and silty soils (USCS designations CH, CL, ML, MH); therefore total and effective overburden pressures for soils with these designations are not shown.

NOTE: Depth to water used in analysis was 11.1 ft.
The competent layer is established at elevation -67 ft., Data points above elevation -67 are not included in this evaluation

Table RAI-8 – 33
Total and Effective Overburden Pressures, Boring NB-5 (Sheet 1 of 1)

Sample Number	N-Value Depth (ft)	N-Value Elevation (ft)	USCS Designation	Estimated Total Unit Weight (pcf)	Total Overburden Pressure (1) Po (psf)	Effective Overburden Pressure (1) Po' (psf)
19	75.5	-67.7	SM	126	8,224	3,868
20	80.5	-72.7	SM	126	8,854	4,186
21	85.5	-77.7	SM	126	9,484	4,504
22	90.5	-82.7	SM	115	10,086	4,795
23	95.5	-87.7	SP-SC	102	10,629	5,025
24	100.5	-92.7	SP-SM	102	11,139	5,223
25	105.5	-97.7	SP-SM	102	11,649	5,421
26	110.5	-102.7	SP-SM	102	12,159	5,619
27	115.5	-107.7	SM	120	12,714	5,862
28	120.5	-112.7	SM	120	13,314	6,150
29	125.5	-117.7	SM	120	13,914	6,438
30	130.5	-122.7	SM	120	14,514	6,726
31	135.5	-127.7	SP-SM	132	15,144	7,044
32	140.5	-132.7	SP-SM	132	15,804	7,392
33	145.5	-137.7	SC	127	16,451	7,728
34	150.5	-142.7	SP-SM	132	17,099	8,063
35	155.5	-147.7	SP-SM	132	17,759	8,411
36	160.4	-152.6	SC	131	18,403	8,750
37	164.6	-156.8	SC	131	18,953	9,038
38	169.6	-161.8	SC	131	19,608	9,381
39	174.7	-166.9	SC	131	20,276	9,731
40	180.5	-172.7	SC	131	21,036	10,129
41	185.5	-177.7	SC	131	21,691	10,472
42	190.5	-182.7	SC	131	22,346	10,815
43	195.2	-187.4	SC	131	22,962	11,137
44	199.8	-192.0	SC	131	23,564	11,453

(1) Liquefaction safety factor is not computed for clayey and silty soils (USCS designations CH, CL, ML, MH); therefore total and effective overburden pressures for soils with these designations are not shown.

NOTE: Depth to water used in analysis was 5.7 ft.
The competent layer is established at elevation -67 ft., Data points above elevation -67 are not included in this evaluation

Table RAI-8 – 34
Total and Effective Overburden Pressures, Boring NB-6 (Sheet 1 of 1)

Sample Number	N-Value Depth (ft)	N-Value Elevation (ft)	USCS Designation	Estimated Total Unit Weight (pcf)	Total Overburden Pressure [(1)] Po (psf)	Effective Overburden Pressure [(1)] Po' (psf)
19	78.9	-69.6	SP-SM	126	9,243	4,862
20	83.6	-74.3	SP-SM	102	9,778	5,105
21	90.6	-81.3	SP-SM	102	10,492	5,382
22	94.8	-85.5	SM	115	10,948	5,575
23	100.6	-91.3	SM	115	11,615	5,881
24	105.6	-96.3	SM	115	12,190	6,144
25	110.6	-101.3	SM	115	12,765	6,407
26	114.8	-105.5	SP-SM	102	13,221	6,600
27	120.6	-111.3	SP-SM	120	13,865	6,882
28	125.6	-116.3	SP-SM	120	14,465	7,170
29	130.6	-121.3	SP-SM	120	15,065	7,458
30	135.6	-126.3	SM	132	15,695	7,776
31	140.6	-131.3	SM	132	16,355	8,124
32	145.6	-136.3	SM	132	17,015	8,472
33	150.6	-141.3	SM	132	17,675	8,820
34	155.6	-146.3	SC	127	18,322	9,156
35	160.3	-151.0	SC	131	18,928	9,469
36	164.7	-155.4	SC	131	19,505	9,770
37	169.7	-160.4	SC	131	20,160	10,113
38	175.5	-166.2	SC	131	20,920	10,511
39	180.6	-171.3	SM	131	21,588	10,861
40	185.6	-176.3	SC	131	22,243	11,204
41	190.6	-181.3	SM	131	22,898	11,547
42	195.3	-186.0	SM	131	23,513	11,870
43	199.8	-190.5	SM	131	24,103	12,178

[(1)]Liquefaction safety factor is not computed for clayey and silty soils (USCS designations CH, CL, ML, MH); therefore total and effective overburden pressures for soils with these designations are not shown.

NOTE: Depth to water used in analysis was 8.7 ft.
The competent layer is established at elevation -67 ft., Data points above elevation -67 are not included in this evaluation

Table RAI-8 – 35
Total and Effective Overburden Pressures, Boring NB-7 (Sheet 1 of 1)

Sample Number	N-Value Depth (ft)	N-Value Elevation (ft)	USCS Designation	Estimated Total Unit Weight (pcf)	Total Overburden Pressure [(1)] Po (psf)	Effective Overburden Pressure [(1)] Po' (psf)
19	76.0	-69.8	SM	115	8,917	4,511
20	81.0	-74.8	SM	115	9,492	4,774
21	86.2	-80.0	SM	115	10,090	5,048
22	90.9	-84.7	SM	115	10,630	5,295
23	96.2	-90.0	SM	115	11,240	5,574
24	101.0	-94.8	SM	115	11,792	5,826
25	106.1	-99.9	SM	115	12,378	6,094
26	111.1	-104.9	SM	115	12,953	6,357
27	116.0	-109.8	SM	115	13,517	6,615
28	121.0	-114.8	SM	120	14,104	6,891
29	126.0	-119.8	SM	120	14,704	7,179
30	131.0	-124.8	SM	120	15,304	7,467
31	136.0	-129.8	SM	120	15,904	7,755
32	141.0	-134.8	SM	132	16,534	8,073
33	146.0	-139.8	SM	132	17,194	8,421
34	151.0	-144.8	SM	132	17,854	8,769
35	156.1	-149.9	SM	132	18,527	9,124
36	160.9	-154.7	SM	132	19,161	9,458
37	165.6	-159.4	SC	131	19,779	9,782
38	170.2	-164.0	SC	131	20,382	10,098
39	175.3	-169.1	SC	131	21,050	10,448
40	180.7	-174.5	SC	131	21,757	10,818
41	186.0	-179.8	SC	131	22,451	11,182
42	191.0	-184.8	SC	131	23,106	11,525
43	195.9	-189.7	SM	131	23,748	11,861
44	200.9	-194.7	SP-SM	131	24,403	12,204

[(1)] Liquefaction safety factor is not computed for clayey and silty soils (USCS designations CH, CL, ML, MH); therefore total and effective overburden pressures for soils with these designations are not shown.

NOTE: Depth to water used in analysis was 5.4 ft.
The competent layer is established at elevation -67 ft., Data points above elevation -67 are not included in this evaluation

Table RAI-8 – 36
Total and Effective Overburden Pressures, Boring NB-8 (Sheet 1 of 1)

Sample Number	N-Value Depth (ft)	N-Value Elevation (ft)	USCS Designation	Estimated Total Unit Weight (pcf)	Total Overburden Pressure [(1)] Po (psf)	Effective Overburden Pressure [(1)] Po' (psf)
19	75.5	-66.6	SM	126	8,370	4,170
20	80.5	-71.6	SC	115	8,973	4,461
21	85.5	-76.6	SC	115	9,548	4,724
22	89.8	-80.9	SC	115	10,042	4,950
23	95.5	-86.6	SC-SM	115	10,698	5,250
24	100.5	-91.6	SC-SM	115	11,273	5,513
25	105.5	-96.6	SC-SM	115	11,848	5,776
26	109.6	-100.7	SC-SM	115	12,319	5,992
27	115.5	-106.6	SC-SM	115	12,998	6,302
28	120.5	-111.6	SC-SM	115	13,573	6,565
29	125.5	-116.6	SM	120	14,160	6,840
30	130.5	-121.6	SM	120	14,760	7,128
31	135.5	-126.6	SM	120	15,360	7,416
32	140.5	-131.6	SM	120	15,960	7,704
33	145.5	-136.6	SM	132	16,590	8,022
34	150.5	-141.6	SM	132	17,250	8,370
35	155.5	-146.6	SC-SM	127	17,898	8,706
36	160.5	-151.6	SC-SM	127	18,533	9,029
37	165.5	-156.6	SC	127	19,168	9,352
38	170.4	-161.5	CL	131	-	-
39	174.6	-165.7	SC	131	20,350	9,966
40	179.7	-170.8	SC	131	21,018	10,316
41	185.1	-176.2	SM	131	21,725	10,687
42	190.5	-181.6	SC	131	22,433	11,057
43	195.5	-186.6	SC	131	23,088	11,400
44	200.5	-191.6	SC	131	23,743	11,743
45	210.1	-201.2	SP-SM	131	25,000	12,402
46	220.1	-211.2	SP-SM	131	26,310	13,088
47	230.2	-221.3	SP-SM	131	27,633	13,781
48	240.5	-231.6	SP-SM	131	28,983	14,487
49	250.5	-241.6	SP-SM	131	30,293	15,173
50	260.5	-251.6	SM	131	31,603	15,859
51	270.5	-261.6	CH	125	-	-
52	280.5	-271.6	SC	125	34,133	17,141
53	290.5	-281.6	SC	125	35,383	17,767
54	300.5	-291.6	CH	125	-	-

[(1)]Liquefaction safety factor is not computed for clayey and silty soils (USCS designations CH, CL, ML, MH); therefore total and effective overburden pressures for soils with these designations are not shown.

NOTE: Depth to water used in analysis was 8.2 ft.
The competent layer is established at elevation -67 ft., Data points above elevation -67 are not included in this evaluation

PSEG Letter ND-2011-0012, dated March 21, 2011

ENCLOSURE 6

1 CD-ROM containing Excel files

For Tables RAI-8-1 through RAI-8-36

MACTEC

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PSEG ESPA

RAI No. 8 Response

Encl 6
Excel files for
Tables 8-1 to 8-36
MACTEC DCN ESP 1096

PSEG Letter ND-2011-0012, dated March 21, 2011

ENCLOSURE 7
Proposed Revisions
Part 2 - Site Safety Analysis Report

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2.5.4.2.2 Material Engineering Properties

2.5.4.2.2.1 Static Material Properties

Soil parameters obtained during the ESPA exploration (as discussed in Subsection 2.5.4.3.1.2) and laboratory analysis are presented in the following paragraphs for each geotechnical engineering strata. Additionally, pertinent data from the Hope Creek UFSAR (Reference 2.5.4.1-10) are summarized in the following paragraphs. Tables 2.5.4.2-2 through 2.5.4.2-6 present summaries of available data for both data sets.

This presentation of static material properties determined from the exploration of the PSEG Site indicates the uniformity of the various geotechnical engineering strata relative to material properties. The design values presented in Table 2.5.4.2-8 are primarily based on the values determined from the ESPA exploration.

2.5.4.2.2.1.1 Artificial Fill (Mechanically Placed)

Artificial Fill was encountered in all of the borings at the surface and extended to depths up to approximately 10 ft. Laboratory testing was not performed for these materials since they will be removed during construction. Based on visual manual examination, the lithologies were observed to be variable, and generally included clays, silts, sands with varying silt/clay contents, clayey/silty gravels and construction debris. Field Standard Penetration Test (SPT) N-Values range from 2 to 99 blows per foot (bpf). The higher N-values may be inflated due to the presence of rock fragments and other debris within the Artificial Fill.

2.5.4.2.2.1.2 Hydraulic Fill

Hydraulic Fill was encountered underlying the artificial fill in all of the borings performed for the ESPA subsurface investigation. Based on borings performed for the ESPA, hydraulic fill ranges in thickness from 24 to 44 ft. The Hydraulic Fill generally consists of soft, discontinuous lenses of clayey silts, silty sands, and organic clays. This unit represents dredge spoils deposited on the site from dredging conducted in the Delaware River since the early 1900's.

Static laboratory indices were determined for ~~nine~~ 10 SPT samples and one intact sample of Hydraulic Fill collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheet 1 of 18 ~~15~~). Laboratory testing, including sieve analysis with hydrometer (ASTM D 422) (Reference 2.5.4.2-10), sieve analysis (No. 200 wash) (ASTM D 6913) (Reference 2.5.4.2-1), Atterberg limits (ASTM D 4318) (Reference 2.5.4.2-5), specific gravity (ASTM D 854) (Reference 2.5.4.2-6), moisture content (ASTM D 2216) (Reference 2.5.4.2-4) and organic content (ASTM D 2974) (Reference 2.5.4.2-11) were performed to classify and determine engineering properties of the Hydraulic Fill.

Samples of the Hydraulic Fill are generally classified as silt (ML, MH) and clay (CL, CH) and, less commonly, sand (SM, SC-SM), in accordance with the Unified Soil Classification System described in ASTM Standard D 2487 (Reference 2.5.4.2-7). The moisture content of tested samples ranges from 61 to 98 percent with an average of 79 percent and a median value of 77 percent. The percent fines (silt and clay; minus No. 200 sieve) of the Hydraulic Fill ranges from 15 ~~50~~ to 99 percent, with an average of ~~80~~ 73 percent, and a median value of ~~82~~ 76 percent. The liquid limit of tested soils ranges from 18 to 97, with an average of 60, and a median value of 58. The plastic limit ranges from 12 to 44, with an average of 28, and a median value of 29. The plasticity indices range from 6 to 53, with an average of 32, and a median value of 34. A specific gravity test was performed on one soil sample and indicated a value of 2.68. Soil index properties for the individual tests are shown in Table 2.5.4.2-2 (Sheet 1 of ~~15~~ 18).

Soil index properties of the Hydraulic Fill reported in the HCGS UFSAR (Reference 2.5.4.1-10) were reviewed to determine if index properties determined for the ESPA are similar to the reported values in the HCGS UFSAR. Based on a review of the HCGS UFSAR, the liquid limit ranges from 29 to 94, with an average of 69, and a median value of 73. The plasticity indices of the tested samples range from 10 to 58 with an average of 34, and a median value of 37. The natural moisture of the tested samples ranges from 20 to 80 percent, with an average of 56 percent, and a median value of 61 percent. The specific gravity of the tested samples ranges from 2.50 to 2.69, with an average value of 2.58, and a median value of 2.58. Based on review, soil index properties reported in the HCGS UFSAR for the Hydraulic Fill are comparable to soil index properties determined for the ESPA. Soil index values reported in the HCGS UFSAR are shown in Table 2.5.4.2-2 (Sheet 2 of ~~15~~ 18) for comparison purposes. Design values for the soil index properties are presented in Table 2.5.4.2-8.

Field SPT N-values ranged from weight-of-hammer (WOH) to 36 bpf. The average field SPT N-value for this layer is 3 bpf. The median SPT N-value is 0 bpf. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 0 to 43 bpf, with an average value of 3 bpf, and a median value of 0 bpf. The design values for corrected and field N-values are shown on Table 2.5.4.2-8.

An intact sample of the Hydraulic Fill collected during the ESPA subsurface investigation was submitted for strength testing. Strength testing of the Hydraulic Fill included one UU triaxial compression ((ASTM D 2850-03a [2007]) (Reference 2.5.4.2-12) test at confining pressures of 0.756, 1.26 and 2.02 tons per square foot (tsf). Test results indicate undrained shear strength values ranging from 0.365 tsf to 0.507 tsf, with an average of 0.436 tsf. UU test results performed for the ESPA are shown in Table 2.5.4.2-3a.

Results of 22 UU triaxial compression tests are presented in the HCGS UFSAR and shown in Table 2.5.4.2-3b. The undrained shear strength of the Hydraulic Fill reported in the HCGS UFSAR range from 0.075 tsf to 0.560 tsf with an average value of 0.316 tsf and a median value of 0.306 tsf. Undrained shear strengths determined from tests of the Hydraulic Fill for the ESPA are consistent with UU compression tests reported in the HCGS UFSAR. Design values for the undrained shear strength of the Hydraulic Fill are included in Table 2.5.4.2-8.

No consolidation tests (ASTM D 2435-04) (Reference 2.5.4.2-3) were performed on samples from the Hydraulic Fill for the ESPA. Four consolidation tests on samples of Hydraulic Fill were performed for the HCGS UFSAR and the results are included on Table 2.5.4.2-5b. The consolidation test results reported in the HCGS UFSAR indicate a compression index, C_c, ranging from 0.42 to 0.70, with an average of 0.54, and a median of 0.52. Based on the tests, the pre-consolidation pressure, P_c, of the Hydraulic Fill ranges from 0.26 tsf to 1.30 tsf, with an average of 0.69 tsf. The design values for the consolidation properties are shown in Table 2.5.4.2-8.

The total unit weight determined from three portions of the intact sample collected from boring NB-1UD for shear testing was calculated to range from 90.9 to 94.9 pounds per cubic foot (pcf).

Results of individual tests are shown in Table 2.5.4.2-6. A summary of unit weights for the Hydraulic Fill reported in the DMR is presented in Table 2.5.4.2-7. The total unit weight of the 16 samples reported in the DMR for the Hydraulic Fill ranged from 78.2 to 132.3 pcf, with an average of 106.6 pcf and a median value of 100.5 pcf. The two unit weights reported in the DMR that were above 130 pcf were for samples collected within about 5 feet (ft.) of the ground surface and are not considered representative values. If these two unusually high values are ignored, the average and median of the DMR reported total unit weights for the Hydraulic Fill are 103 and 99 pcf, respectively. The design unit weight for the Hydraulic Fill, based on test results of the ESPA and the DMR, is presented in Table 2.5.4.2-8.

2.5.4.2.2.1.3 Alluvium

Alluvium was encountered in all of the borings performed for the ESPA investigation at elevations ranging from -16 to -35 ft. NAVD. Based on borings performed for the ESPA, Alluvium ranges in thickness from 5 to 24 ft. The Alluvium consists of fine to coarse sand and gravel deposits which formerly comprised the bed of the adjacent Delaware River. Layers of peat and other organic rich soils were also observed within this unit. A lower layer of slightly organic to non-organic micaceous silt and clay was locally encountered near the base of this formation in some borings. The Alluvium was overlain by Hydraulic Fill during the initial construction of Artificial Island.

Static laboratory indices were determined for 10 SPT samples of the Alluvium collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheet 3 of 15). Laboratory testing, including sieve analysis (No. 200 wash), Atterberg limits, and moisture content, were performed to determine the soil index properties of the Alluvium.

Samples of the Alluvium are generally classified as silty sands (SM, SP-SM), and occasionally silt (ML) and clay (CL, CH). The moisture content of tested samples ranges from 14 to 55 percent. The fine-grained component of Alluvium samples (silt and clay size fraction) range from 4 to 94 percent. Atterberg limits tests were performed on two samples of alluvial clay. The liquid limits of these two clay samples were 40 and 54. The plastic limits were 24 and 25 the plasticity indices were 16 and 29. Soil index properties for the individual tests are shown in Table 2.5.4.2-2 (Sheet 3 of 15). Design values for the index properties are included in Table 2.5.4.2-8.

Field SPT N-values range from WOH to 65 bpf. The average SPT N-value for this layer is 18 bpf. The median SPT N-value is 12 bpf. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 0 to 99 bpf, with an average value of 20 bpf, and a median value of 18 bpf. The design values for the corrected and field N-values are shown on Table 2.5.4.2-8.

The unit weight of Alluvium was not determined for the ESPA. Based on review of the DMR, the unit weight of one Alluvium sample, classified as SP, was determined to be 136.6 pcf, and is shown in Tables 2.5.4.2-7 and 2.5.4.2-8.

2.5.4.2.2.1.4 Kirkwood Formation

The Kirkwood Formation was encountered in all of the borings performed for the ESPA investigation, except boring NB-7, at elevations ranging from -31 to -49 ft. NAVD. The Kirkwood Formation encountered at the PSEG Site typically consists of two distinct stratigraphic units.

The upper unit is comprised of greenish-gray, silty, fine sand and greenish-gray to brown, organic clay with zones of peat and occasional shell fragments and was encountered at 14 of the 16 exploratory boring locations. The lower unit is comprised of fine to coarse sand and subrounded to subangular gravel, with variable silt and clay content and was encountered at 10 of the 16 exploratory boring locations. Based on borings performed for the ESPA, the upper, fine-grained portion of the Kirkwood Formation ranges in thickness from 8 to 51 ft., and the lower, coarse-grained portion ranges in thickness from 2 to 16 ft.

Static laboratory indices were determined for three SPT samples and one intact sample of the upper, fine-grained portion of the Kirkwood Formation and six SPT samples of the lower, coarse-grained portion of the Kirkwood Formation collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheets 4 and 5 of 15). Laboratory testing, including sieve analysis with hydrometer, sieve analysis (No. 200 wash), Atterberg limits, and moisture content, were performed to determine the soil index properties of the Kirkwood Formation.

Samples of the Kirkwood Formation are generally classified as silt (ML, MH), clay (CL, CH) in the upper portion, and sands (SP, SM, SC-SM) in the lower portion of the unit. The moisture content of samples tested for the ESPA range from 29 to 77 percent for five samples from the upper, fine-grained portion and from 16 to 21 for two samples from the lower, coarse-grained portion. The silt and clay size fraction (percent fines) ranges from 51 to 80 percent for the five samples of the upper, fine-grained portion of the Kirkwood Formation and from 6 to 34 percent for six samples of the lower, coarse-grained portion. The liquid limits for the five ESPA samples from the upper fine grained portion of the Kirkwood Formation range from 27 to 63 with an average of 49 and a median of 52. The plasticity indices for the five ESPA samples from the upper fine grained portion of the Kirkwood Formation range from 11 to 37 with an average of 24 and a median of 23. Soil index properties for the individual tests are shown in Table 2.5.4.2-2 (Sheet 4 and Sheet 5).

Soil index properties of the Kirkwood Formation reported in the HCGS UFSAR were reviewed and compared to results from the ESPA investigation. The liquid limit ranged from 37 to 81, with an average and median value of 58 for 16 samples of the upper, fine-grained portion of the Kirkwood Formation (identified as "Kirkwood Clays" in the HCGS UFSAR). The plasticity indices of the tested samples ranged from 16 to 50, with an average of 29, and a median value of 30. The natural moisture content of the tested samples ranged from 22 to 60 percent, with an average of 47 percent, and a median value of 50 percent. The specific gravity of the tested fine-grained samples ranges from 2.61 to 2.73, with an average value of 2.65, and a median value of 2.63. Void ratios calculated for 100 percent saturation ranged from 0.91 to 1.52. Based on this review, soil index properties reported in the HCGS UFSAR are comparable to soil index properties determined for the ESPA. Soil index values reported in the HCGS UFSAR are shown with the values determined from the ESPA Investigation in Table 2.5.4.2-2 (Sheet 4 and Sheet 5). Design values for the soil index properties are presented in Table 2.5.4.2-8.

An intact sample of the fine-grained portion of the Kirkwood Formation collected during the ESPA subsurface investigation (sample from UD-8 collected at boring NB-1UD) was submitted for strength and consolidation testing. UU triaxial compression testing was performed on a portion of the intact sample having a Unified Soil Classification System (USCS) classification of CL at a confining pressure of 2.52 tsf. The test result indicates an undrained shear strength value of 0.506 tsf (Table 2.5.4.2-3a).

Six UU triaxial compression tests were performed on the fine-grained portion of the Kirkwood Formation ("Kirkwood Clay") for the HCGS UFSAR and the test results are included in Table 2.5.4.2-3b. The undrained shear strength of the Kirkwood Formation clay reported in the HCGS UFSAR ranges from 0.510 tsf to 1.335 tsf with an average value of 0.735 tsf and a median value of 0.582 tsf. The undrained shear strength value determined in the Kirkwood Formation clay for the ESPA is consistent with the results of UU triaxial compression tests performed for the HCGS UFSAR. Design values for the undrained shear strength are included in Table 2.5.4.2-8.

The consolidation test was performed on a portion of the intact sample from UD-8 collected at boring NB-1UD having a USCS classification of MH. The consolidation test results indicated a pre-consolidation pressure, P_c, of 1.40 tsf, a coefficient of compression, C_c, of 0.535 and a coefficient of recompression, C_r, of 0.070 (Table 2.5.4.2-5a).

Five consolidation tests were performed on the fine-grained portion of the Kirkwood Formation for the HCGS UFSAR and the results are included in Table 2.5.4.2-5b. These consolidation test results indicate a compression index, C_c, ranging from 0.17 to 0.79, with an average of 0.44, and a median value of 0.42. Based on the tests, the pre-consolidation pressure, P_c, of the Kirkwood Formation ranges from 1.55 tsf to 8.00 tsf, with an average of 3.19 tsf and a median value of 2.10 tsf. Consolidation properties determined in the ESPA are consistent with the five consolidation tests performed for the HCGS UFSAR. The design values for the consolidation properties, based on tests performed from the ESPA and the HCGS UFSAR, are shown in Table 2.5.4.2-8.

The total unit weight determined for the portions of the intact sample of the fine-grained Kirkwood Formation collected at boring NB-1UD for strength and consolidation testing were 103.9 pcf for the MH portion of the sample, and 122.8 pcf for the CL portion of the sample, as shown in Table 2.5.4.2-6. Unit weights were determined on 11 samples of the upper, fine-grained portion of the Kirkwood Formation and reported in the DMR. The results of the unit weight determinations reported in the DMR are included in Table 2.5.4.2-7. The unit weights of the 11 samples of the fine-grained portion of the Kirkwood Formation ranged from 98.4 to 133.2 pcf, with an average of 111.0 pcf and a median value of 109.5 pcf. Total unit weights calculated for the ESPA are within the range of total unit weights reported in the DMR for the fine-grained portion of the Kirkwood Formation. The design unit weight for the fine-grained portion of the Kirkwood Formation, based on test results of the ESPA and the DMR, is presented in Table 2.5.4.2-8.

Field SPT N-values range from WOH to greater than 100 bpf. The average SPT N-value for this layer is 12 bpf. N-values greater than 100 bpf were treated as equal to 100 bpf for purposes of averaging. The median SPT N-value is 7 bpf. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 0 to 140 bpf, with an average value of 18 bpf, and a median value of ~~11~~ 10 bpf. The design corrected and field N-values are shown on Table 2.5.4.2-8.

2.5.4.2.2.1.5 Vincentown and Hornerstown Formations

For engineering purposes, the Vincentown and Hornerstown formations are combined into one engineering layer due to their similar engineering properties. The field and laboratory test results summarized here are for the Vincentown and Hornerstown formations.

The Vincentown Formation was encountered in all of the borings performed for this ESPA investigation. The Vincentown Formation serves as the bearing stratum for the adjacent Salem and Hope Creek generating stations and will serve as the bearing stratum for the new plant. Based on borings performed for the ESPA, thickness of the Vincentown Formation ranges from 35 to 93 ft. The elevation of the top of the Vincentown Formation ranges from elevation -33 to -91 ft. NAVD in the borings performed for this ESPA. The Vincentown Formation consists primarily of a greenish-gray, fine to medium grained silty sand with some zones of clayey sand. The mineral glauconite, which imparts the greenish color, was observed in most samples. Previous studies indicate that glauconite typically comprises less than 10 percent of the sand fraction of the Vincentown Formation, but can vary up to 20 percent. Based on drilling characteristics and recovered samples, friable to indurated (cemented) zones of 0.1 to 3.0 ft. in thickness are present throughout this formation. Previous studies, including geologic mapping of the HCGS excavation, have described the indurated zones as calcareous sandstone and limestone. An upper weathered or possibly reworked zone was observed in some of the borings. Where encountered, this upper weathered zone generally exhibited a lower degree of induration and was reddish-brown in color (likely due to oxidation).

The Hornerstown Formation was encountered in all of the borings performed for this exploration. Based on the borings, the Hornerstown Formation ranges in thickness from 16 to 22 ft. The Hornerstown Formation conformably underlies the Vincentown Formation and primarily consists of a greenish-gray to dark green silty and clayey, quartz and glauconitic sand with indurated zones, similar to the overlying Vincentown Formation. The contact between the Vincentown and Hornerstown formations was observed to be gradational. This contact was identified due to an increase in fines (silt and clay), and glauconite content.

Static laboratory indices were determined for 40 SPT samples and seven intact samples of the Vincentown and Hornerstown formations collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheet ~~6~~ 9 and ~~7~~ 10 of ~~15~~ 18). Laboratory testing, including sieve analysis with hydrometer, sieve analysis (No. 200 wash), Atterberg limits, specific gravity and moisture content, were performed to determine the soil index properties of the Vincentown and Hornerstown formations.

Samples of the Vincentown and Hornerstown formations are generally classified as silty sands (SM, SP-SM) and, less commonly, clayey sand (SC, SC-SM), silt (ML, MH) and clay (CL). The moisture content of tested samples ranges from 9 to 40 percent, with an average of 30 percent, and a median value of 30 percent. The fine-grained component of the Vincentown and Hornerstown formations (silt and clay; minus 200 sieve) ranges from 9 to 96 percent, with an average of 27 percent, and a median value of 23 percent. A grain size distribution envelope developed from 40 grain size distribution curves performed for the ESP investigation is presented as Figure 2.5.4.2-1.

Nine of the 22 samples submitted for Atterberg limits tests indicate no value for the liquid limit, and non-plastic for the plastic limit. For the remaining samples, the liquid limit ranges from no value to 36. The average value of the liquid limit is 26, and the median value is 25. The plastic limit ranges from non-plastic to 27. The average and median value of the plastic limit are 20 and 19, respectively. The plasticity indices range from non-plastic to 12. The average and median plasticity indices are 6. The average and median value of the liquid limit test, plastic limit test, and the calculated plasticity indices are based on tests having values for the liquid limit and plastic limit. The specific gravity ranges from 2.61 to 2.75, with an average of 2.70, and a median value of 2.70. Soil index properties for the individual tests are shown in Table 2.5.4.2-2 (Sheet ~~6~~ 9 and ~~7~~ 10 of ~~15~~ 18).

Soil index properties of the Vincentown Formation reported in the HCGS UFSAR were reviewed to determine if index properties determined in the ESPA are similar. Based on review of the HCGS UFSAR, the liquid limit ranges from 27 to 47, with an average of 36, and a median value of 35. The plasticity indices of the tested samples range from 6 to 20, with an average and median value of 11. The natural moisture of the tested samples ranges from 21 to 42 percent, with an average and median value of 30 percent. The specific gravity of the tested samples ranges from 2.60 to 2.73, with an average and median value of 2.68. Void ratios calculated for 100 percent saturation ranged from 0.55 to 1.06. Figure 2.5.4.2-1 shows the grain size envelope for the Vincentown and Hornerstown formations determined in the ESPA is consistent with the grain size envelope for the Vincentown Formation reported in the HCGS UFSAR. Based on review, soil index properties reported in the HCGS UFSAR are found to be comparable to soil index properties determined for the ESPA. Soil index values reported in the HCGS UFSAR are shown in Table 2.5.4.2-2 (Sheet ~~8~~ 11 of ~~15~~ 18). Design values for the soil index properties are presented in Table 2.5.4.2-8.

Representative intact samples of the Vincentown and Hornerstown strata collected during the ESPA subsurface investigation were submitted for strength and consolidation testing.

Three CU triaxial compression tests were performed on intact samples of the Vincentown and Hornerstown formations for the ESPA. Tests were performed on soils having an USCS classification of SM. Results of CU tests indicate average shear strength values of c = 1.28 tsf, and $\Phi = 20°$ for total stress, and c' = 0.40 tsf, and $\Phi' = 37°$ for effective stress. Shear strength properties for the individual tests performed for the ESPA are presented on Table 2.5.4.2-4.

Shear strength properties determined for the ESPA were compared with CU tests performed for the HCGS UFSAR. CU test results from the HCGS UFSAR indicate shear strength values ranging from $\Phi = 23°$ to 37° for total stress, and $\Phi' = 31°$ to 43° for effective stress. The CU tests performed for the HCGS UFSAR were one-point tests with the cohesion intercepts, c and c' assumed to be 0. Comparison of the strength test results between the ESPA samples and the HCGS UFSAR is not made due to the difference in test methods. Design shear strength values for the Vincentown and Hornerstown formations determined from CU tests performed for the ESPA are presented in Table 2.5.4.2-8.

The total unit weight determined from 13 intact samples of the Vincentown and Hornerstown formations was calculated to range from 110.9 to 130.2 pcf. The unit weight was calculated from the dry density and moisture content determined from intact samples selected for strength and consolidation testing. Results of individual tests performed for the ESPA investigation are shown in Table 2.5.4.2-6. A summary of unit weights for the Vincentown and Hornerstown formations reported in the DMR is shown in Table 2.5.4.2-7. Based on review of the DMR, unit weights calculated for the ESPA are consistent with unit weights of the Vincentown and Hornerstown formations reported in the DMR. The design unit weight for the Vincentown and Hornerstown formations, based on test results from the ESPA exploration and the DMR, is presented in Table 2.5.4.2-8.

Field SPT N-values range from 5 to greater than 100 bpf. The average SPT N-value for this layer is 47 bpf. The median SPT N-value is 33. N-values greater than 100 bpf were treated as equal to 100 bpf for purposes of averaging. As noted in the ESPA boring logs (Appendix 2AA), cemented layers were encountered in the Vincentown Formation. The higher blow counts may be attributed to the presence of these cemented layers as evidenced by the angular, gravel-sized, cemented pieces recovered in the split-spoon barrel sampler. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 7 to 160 bpf, with an average value of 70 bpf, and a median value of 50 bpf. The design corrected and field N-values are shown on Table 2.5.4.2-8. A histogram of the field N-values for the Vincentown Formation is shown in Figure 2.5.4.1-10, and one for the Hornerstown Formation is shown in Figure 2.5.4.1-9.

2.5.4.2.2.1.6 Navesink Formation

The Navesink Formation was encountered in all of the borings performed for the ESPA subsurface investigation at elevations ranging from -121 to -157 ft. NAVD. Based on the borings, the Navesink ranges in thickness from 19 to 26 ft. The Navesink Formation consists of dark green to greenish-black glauconitic sand, with varying silt and clay content. Fossils, consisting primarily of pelecypod fragments, were observed in many of the recovered samples. Examination of the samples obtained and data from previous studies indicates that glauconite comprises up to 95 percent of the sand fraction of this formation. Due to its unique characteristics, this unit was easily identified in the borings.

Static laboratory indices were determined for eight SPT samples and two intact samples of the Navesink Formation collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheet ~~9~~ 12 of ~~15~~ 18). Laboratory testing, including sieve analysis with hydrometer, Atterberg limits, specific gravity, and moisture content, were performed to determine the soil index properties of the Navesink Formation.

Samples of the Navesink Formation are generally classified as silty and clayey sands (SM, SC-SM, SC). The moisture content for tested samples ranges from 15 to 36 percent, with an average of 22 percent, and a median value of 21 percent. The fine-grained component of Navesink Formation (silt and clay; minus 200 sieve) range from 13 to 40 percent, with an average of 22 percent, and a median value of 19 percent. A grain size distribution envelope developed from nine grain size distribution curves performed for the ESPA investigation is presented as Figure 2.5.4.2-2.

Four of the 10 samples submitted for Atterberg limits tests indicate no value for the liquid limit and non-plastic for the plastic limit. For the remaining samples, the liquid limit ranges from 21 to 37, with an average of 27, and a median value of 24. The plastic limit ranges from 13 to 18, with an average of 16, and a median value of 17. The plasticity indices range from 4 to 23, with an average of 11, and a median value of 8. The average and median value of the liquid limit test, plastic limit test and the calculation of the plasticity indices, are calculated from six tests that have a value for the liquid limit and plastic limit tests. The specific gravity ranges from 2.67 to 2.73, with an average of 2.70, and a median value of 2.71. Void ratios calculated for 100 percent saturation ranged from 0.52 to 0.61. Soil index properties for the individual tests are shown in Table 2.5.4.2-2, Sheet ~~9~~ 12 of ~~15~~ 18. Design values for index properties are included in Table 2.5.4.2-8.

Field SPT N-values range from 38 to greater than 100 bpf. N-values greater than 100 bpf were treated as equal to 100 bpf for purposes of averaging. The average SPT N-value for this layer is

72 bpf. The median SPT N-value is 74 bpf. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 53 to 160 bpf with an average and median value of 108 bpf. The design corrected and field N-values are shown on Table 2.5.4.2-8. A histogram of the field N-values for the Navesink Formation is shown in Figure 2.5.4.1-8.

The total unit weight determined from two intact samples of the Navesink strata were calculated to be 115.5 and 131.8 pcf. The average unit weight for this stratum is 123.6 pcf. Results of individual tests are shown in Table 2.5.4.2-6. Based on review of the DMR, unit weights calculated for the ESPA are consistent with reported unit weights of the Navesink Formation in the DMR. The unit weight was calculated from the dry density and moisture content determined from intact samples selected for strength and consolidation testing. A summary of unit weights for the Navesink Formation reported in the DMR is shown in Table 2.5.4.2-7. The design unit weight for the Navesink Formation, based on test results of the ESPA and the DMR, is presented in Table 2.5.4.2-8.

2.5.4.2.2.1.7 Mount Laurel Formation

The Mount Laurel Formation was encountered in all of the borings performed for the ESP subsurface investigation at elevations ranging from -145 to -177 ft. NAVD, and ranged in thickness from 102 to 112 ft. The Mount Laurel Formation consists of a dense to very dense brownish-gray to dark green fine to coarse-grained sand with varying silt and clay content. The glauconite content in the Mount Laurel was observed to generally decrease with depth. Additionally, the grain size and fines content was also observed to decrease with depth such that the basal portion of the unit is composed of cleaner, finer-grained sand.

Static laboratory indices were determined for 17 SPT samples and three intact samples of the Mount Laurel Formation collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheet ~~10~~ 13 of ~~15~~ 18). Laboratory testing, including sieve analysis with hydrometer, sieve analysis (No. 200 wash), Atterberg limits, specific gravity and moisture content, were performed to determine the soil index properties of the Mount Laurel Formation.

Samples of the Mount Laurel Formation are generally classified as silty and clayey sands (SM, SC-SM, SC). The moisture content for soils tested ranges from 13 to 29 percent, with an average of 20 percent, and a median value of 21 percent. The fine-grained component of the Mount Laurel Formation (silt and clay; minus 200 sieve) ranges from 15 to 38 percent, with an average of 24 percent, and a median value of 21 percent. A grain size distribution envelope developed from 18 grain size distribution curves performed for the ESPA investigation is presented as Figure 2.5.4.2-3.

Four of the 18 samples submitted for Atterberg limits tests indicate no value for the liquid limit, and non-plastic for the plastic limit. For the remaining samples, the liquid limit ranges from 19 to 42, with an average of 27, and a median value of 25. The plastic limit ranges from 13 to 26, with an average of 18, and a median value of 17. The plasticity index ranges from 3 to 19, with an average of 9, and a median value of 8. The average and median values of the liquid limit test, plastic limit test, and the calculation of the plasticity indices, are calculated from the 14 tests having a value for the liquid limit and plastic limit tests. The specific gravity ranges from 2.69 to 2.71, with an average and median value of 2.70. Void ratios calculated for 100 percent saturation ranged from 0.46 to 0.65. Soil index properties for the individual tests are shown in Table 2.5.4.2-2 (Sheet ~~10~~ 13 of ~~15~~ 18). Design soil index values are included in Table 2.5.4.2-8.

Representative intact samples of the Mount Laurel Formation collected during the ESPA subsurface investigation were submitted for strength and consolidation testing. One CU triaxial compression test was performed on a representative intact sample of the Mount Laurel Formation. The representative sample was a silty sand having a USCS classification of SM. Results of the CU tests indicate average shear strength values of c= 7.63 tsf, and Φ =13° for total stress, and c' = 4.81 tsf and Φ' = 20° for effective stress (Table 2.5.4.2-4). Shear strength design values determined from the CU tests in the Mount Laurel Formation are included in Table 2.5.4.2-8.

The total unit weight determined from five intact samples of the Mount Laurel Formation were calculated to range from 129 to 132.5 pcf. Results of individual tests are shown in Table 2.5.4.2-6. The unit weight was calculated from the dry density and the moisture content determined in the consolidation test and the RCTS test. Design unit weight values are shown on Table 2.5.4.2-8.

Field SPT N-values range from 23 to greater than 100 bpf. N-values greater than 100 bpf were treated as equal to 100 bpf for purposes of averaging. The average SPT N-value for this layer is 91 bpf. The median SPT N-value is 100 bpf. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 32 to 160 bpf with an average value of 137 bpf, and a median value of 146 bpf. The design corrected and field N-values are shown on Table 2.5.4.2-8. A histogram of the field N-values for the Mount Laurel Formation is shown in Figure 2.5.4.1-7.

2.5.4.2.2.1.8 Wenonah and Marshalltown Formations

The Wenonah and Marshalltown formations were encountered in five of the borings drilled at the site (EB-1, EB-3, NB-1, NB-2, and NB-8). The top of the Wenonah was encountered in boring EB-8. Due to their similarities, the Wenonah and Marshalltown formations can be considered as one unit for engineering purposes. The top of the Wenonah Formation was encountered at elevations ranging from -250 to -289 ft. NAVD. Based on the borings performed for the ESPA, the Wenonah and Marshalltown formations range in thickness from 39 to 40 ft. The Wenonah and Marshalltown formations were observed to be lithologically similar in the borings. These units lie in conformable relationship to each other and the underlying Englishtown Formation. The Wenonah generally consisted of sandy clay and clayey sand. The Wenonah was distinguished from the overlying Mount Laurel based on changes in color, glauconite content, and lithology, as well as SPT blow counts and reaction to hydrochloric acid. The Marshalltown generally consisted of glauconitic, silty and clayey fine sand. The Marshalltown was distinguished from the overlying Wenonah based on changes in lithology, and by a pronounced natural gamma spike observed in geophysical logs performed in the deep borings NB-1 and EB-3.

Static laboratory indices were determined for six disturbed SPT samples of the Wenonah and Marshalltown formations collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheet ~~11~~ 14 of ~~15~~ 18). Laboratory testing, including sieve analysis with hydrometer, sieve analysis (No. 200 wash), Atterberg limits, specific gravity, and moisture content, were performed to determine the soil index properties of the Wenonah and Marshalltown formations.

Samples of the Wenonah and Marshalltown Formations were generally classified as clayey sands (SC) and, less commonly, silty sand (SM) and clay (CL). The moisture content for tested samples ranges from 21 to 28 percent, with an average of 23 percent, and a median value of 22 percent. The fine-grained component of the Wenonah and Marshalltown formations (silt and clay; minus 200 sieve) ranges from 15 to 51 percent, with an average of 35 percent, and a median value of 39 percent. One of the six samples submitted for Atterberg limits tests indicated no value for the liquid limit and non-plastic for the plastic limit. For the remaining samples, the liquid limit ranges from no value to 42, with an average of 29, and a median value of 30. The plastic limit ranges from non-plastic to 23, with an average of 15, and a median value of 13. The plasticity indices range from non-plastic to 29, with an average of 14, and a median value of 9. The average and median value of the liquid limit test, plastic limit test, and the calculation of the plasticity indices, are calculated from the five tests having a value for the liquid limit and plastic limit tests. A specific gravity test was performed on one sample classified as SC and the specific gravity was determined to be 2.71. The void ratio for this sample was calculated to be 0.73 for 100 percent saturation. Soil index properties for the individual tests are shown in Table 2.5.4.2-2 (Sheet ~~11~~ 14 of ~~15~~ 18). Design values for index properties are included in Table 2.5.4.2-8.

Field SPT N-values range from 7 to greater than 100 bpf. N-values greater than 100 bpf were treated as equal to 100 bpf for purposes of averaging. The average SPT N-value for this layer is 41 bpf. The median SPT N-value is 37 bpf. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 11 to 140 bpf, with an average value of 61 bpf, and a median value of 55 bpf. The design corrected and field N-values are shown on Table 2.5.4.2-8.

The unit weight was not determined for the Wenonah and Marshalltown formations for the ESPA or the HCGS UFSAR. The unit weights of soils for formations below the Mount Laurel were not determined for the ESPA.

2.5.4.2.2.1.9 Englishtown and Woodbury Formations

The Englishtown and Woodbury formations were penetrated in two borings performed for the ESPA investigation (NB-1 and EB-3). The top of the Englishtown was encountered in borings EB-1 and NB-2. Due to their similarities, the Englishtown and Woodbury formations can be considered one unit for engineering purposes. The top of the Englishtown Formation was encountered at elevations ranging from approximately -290 to -319 ft. NAVD. Based on the borings performed for the ESPA, the Englishtown and Woodbury formations were approximately 79 ft. thick at EB-3, and approximately 80 ft. thick at NB-1. The Englishtown and Woodbury formations were also observed to be lithologically similar in the borings. These units lie in conformable relationship to each other and the underlying Merchantville Formation. The Englishtown generally consisted of dark gray to black sandy clay, to clayey sand with shell fragments, grading to black silt and clay, with trace amounts of glauconite and mica. The Englishtown was distinguished from the overlying Marshalltown based on changes in color, occurrence of shell fragments, and increased silt and clay content. The Woodbury generally consisted of black, micaceous, highly plastic clay. The Woodbury was distinguished from the overlying Englishtown based on the increase in clay and mica content. Geophysical logging performed in borings NB-1 and EB-3 indicated a slight decrease in the natural gamma log and a more pronounced increase in the resistivity log at the Englishtown/Woodbury contact.

Static laboratory indices were determined for five SPT samples of the Englishtown and Woodbury formations collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheet ~~12~~ 15 of ~~15~~ 18). Laboratory testing, including sieve analysis (No. 200 wash), Atterberg limits, and moisture content, were performed to determine the soil index properties of the Englishtown and Woodbury formations.

Samples were generally classified as clay (CL, CH), except for one sample which was a clayey sand (SC). The moisture content of tested samples ranges from 25 to 31 percent, with an average and median value of 28 percent. The fine-grained component of the Englishtown and Woodbury formations (silt and clay; minus 200 sieve) ranges from 39 to 94 percent, with an average of 73 percent, and a median value of 79 percent. The liquid limit ranges from 32 to 75, with an average of 53, and a median value of 51. The plastic limit ranges from 16 to 21, with an average of 19, and a median value of 20. The plasticity indices range from 12 to 54, with an average of 34, and a median value of 31. Soil index properties for the individual tests are shown in Table 2.5.4.2-2 (Sheet 12 of 15). Design values for the index properties are included in Table 2.5.4.2-8. 15 18

Field SPT N-values range from 10 to greater than 100 bpf. N-values greater than 100 bpf were treated as equal to 100 bpf for purposes of averaging. The average SPT N-value for this layer is 33 bpf. The median SPT N-value is 26. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 16 to 140 bpf with an average value of 49 bpf and a median value of 38 bpf. The design corrected and field N-values are shown on Table 2.5.4.2-8.

2.5.4.2.2.1.10 Merchantville Formation

The Merchantville Formation was encountered in two of the borings performed for the ESP investigation (NB-1 and EB-3) and consisted primarily of dark greenish-black glauconitic silts and clays with varying sand content. It was distinguished from the overlying Woodbury Formation by the increase in glauconite content, decrease in plasticity and mica content, and change in color. The top of the Merchantville was encountered at an elevation of approximately -372 ft. NAVD in boring NB-1, and at an elevation of approximately -398 ft. NAVD in boring EB-3. Based on borings performed for the ESPA, the Merchantville was approximately 31 ft. thick at EB-3 and approximately 30 ft. thick at NB-1.

Static laboratory indices were determined for two SPT samples of the Merchantville Formation collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheet 13 16 of 15 18). Laboratory testing, including sieve analysis (No. 200 wash), Atterberg limits and moisture content, were performed to determine the soil index properties of the Merchantville Formation.

Samples of the Merchantville Formation were generally classified as clay (CL). The moisture content of tested samples ranges from 25 to 31 percent with an average and median value of 28 percent. The percent fines (silt and clay; minus 200 sieve) for one tested sample is 63 percent. The liquid limit ranges from 36 to 43, with an average and median value of 40. The plastic limit ranges from 18 to 21, with an average and median value of 20. The plasticity indices range from 18 to 22, with an average and median value of 20. Soil index properties for the individual tests are shown in Table 2.5.4.2-2, (Sheet 13 of 15). Design values for the index properties are included in Table 2.5.4.2-8. 16 18

Field SPT N-values range from 31 to 82 bpf. The average SPT N-value for this layer is 50 bpf. The median SPT N-value is 47. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 43 to 131 bpf, with an average value of 76 bpf, and a median value of 71 bpf. The design corrected and field N-values are shown on Table 2.5.4.2-8.

2.5.4.2.2.1.11 Magothy Formation

The Magothy Formation was encountered in two of the borings performed for the ESPA investigation (NB-1 and EB-3) and consists primarily of interbedded gray to dark gray, locally mottled, silts and clays, containing trace amounts of lignite and carbonaceous material. The top of the Magothy Formation was encountered at an elevation of approximately -402 ft. NAVD in boring NB-1, and at an elevation of approximately -429 ft. NAVD in boring EB-3. Based on the borings performed for the ESPA, the Magothy was approximately 55 ft. thick at EB-3, and approximately 52 ft. thick at NB-1. The silts and clays were interbedded with sands containing varying amounts of silt and clay. The interbedding was also indicated by the natural gamma and resistivity signatures on the geophysical logs performed in deep borings NB-1 and EB-3. This formation unconformably overlies the Potomac Formation.

Static laboratory indices were determined for two SPT samples of the Magothy Formation collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheet ~~14~~ 17 of ~~15~~ 18). Laboratory testing, including sieve analysis (No. 200 wash), Atterberg limits, and moisture content, were performed to determine the soil index properties of the Magothy Formation.

Samples of the Magothy Formation were generally classified as clay (CH) and clayey sand (SC). The moisture content of tested samples ranges from 18 to 25 percent, with an average and median value of 21 percent. The percent fines (silt and clay; minus 200 sieve) ranges from 39 to 97 percent. The liquid limit ranges from 30 to 62, with an average and median value of 46. The plastic limit ranges from 14 to 27, with an average and median value of 21. The plasticity indices range from 16 to 35, with an average and median value of 26. Soil index properties for the individual tests are shown in Table 2.5.4.2-2 (Sheet ~~14~~ 17 of ~~15~~ 18). Design values for the index properties are included in Table 2.5.4.2-8.

Field SPT N-values range from 53 to greater than 100 bpf. N-values greater than 100 bpf were treated as equal to 100 bpf for purposes of averaging. The average SPT N-value for this layer is 85 bpf. The median SPT N-value is 100 bpf. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 85 to 140 bpf, with an average value of 121 bpf, and a median value of 140 bpf. The design corrected and field N-values are shown on Table 2.5.4.2-8.

2.5.4.2.2.1.12 Potomac Formation

Soils of the Potomac Formation were encountered in borings NB-1 and EB-3, performed for the ESPA subsurface investigation. The top of the formation was encountered at an elevation of approximately -454 ft. NAVD in boring NB-1, and at an elevation of approximately -484 ft. NAVD in boring EB-3. The Potomac Formation was encountered to the depth of boring termination. The contact between the Potomac Formation and the overlying Magothy was identified from changes in drilling resistance and fluid color, and from the geophysical logs. These showed an increase in the natural gamma log, and a noticeable decrease in the resistivity log. Samples were obtained of the Potomac Formation soils at depths of approximately 600 ft. in boring NB-1, and approximately 630 ft. in boring EB-3. The samples consisted of hard plastic, red, gray, and white mottled clay.

Static laboratory indices were determined for three disturbed SPT samples of the Potomac Formation collected during the ESPA subsurface investigation (Table 2.5.4.2-2, Sheet 15 of 15). Laboratory testing, including sieve analysis (No. 200 wash), Atterberg limits, and moisture content, were performed to determine the soil index properties of the Potomac Formation.

Samples of the Potomac Formation were generally classified as clay (CL). The moisture content of tested samples ranges from 15 to 20 percent, with an average and median value of 18 percent. The percent fines (silt and clay; minus 200 sieve) for one sample tested is 96 percent. The liquid limit ranges from 33 to 38, with an average value of 36, and a median value of 37. The plastic limit ranges from 14 to 16, with an average and median value of 15. The plasticity indices range from 18 to 24, with an average and median value of 21. Soil index properties for the individual tests are shown in Table 2.5.4.2-2 (Sheet 15 of 15). Design values for the index properties are included in Table 2.5.4.2-8.

Field SPT N-values range from 79 to greater than 100 bpf. N-values greater than 100 bpf were treated as equal to 100 bpf for purposes of averaging. The average SPT N-value for this layer is 92 bpf. The median SPT N-value is 100. SPT N-values corrected for field procedures, including hammer energy, (N_{60}) for this stratum range from 112 to 140 bpf, with an average value of 131 bpf, and a median value of 140 bpf. The design corrected and field N-values are shown on Table 2.5.4.2-8.

2.5.4.2.2.2 Dynamic Material Properties

Table 2.5.4.2-9 presents the results of the laboratory RCTS tests. While values for shear wave velocity are presented in the table, these values represent small increments within the soil mass. As described in Subsection 2.5.4.1.1.2, the geologic strata are typically dense and contain cemented layers. Samples for RCTS testing from such materials are susceptible to disturbance. Samples used in the RCTS testing device can not include cemented zones or layers in the tested sample effectively, therefore use of in-situ shear wave velocity measurements as described in Subsection 2.5.4.4 is a more appropriate method to obtain the in-situ shear wave velocity for the overall strata. Subsection 2.5.4.7 discusses the selection of shear wave velocity for the site dynamic profile.

The RCTS testing also provides strain dependent variation of shear modulus and damping. These results from the RCTS testing conducted on samples from the Vincentown, Hornerstown and Navesink formations are shown in Figures 2.5.4.2-4 through 2.5.4.2-7. Results are presented as a function of the cyclic shear strain described by the damping ratio and the modulus reduction ratio (G/G_{max}) (the shear modulus divided by the low strain shear modulus). The data are plotted on depth-dependent modulus reduction and damping ratio curves developed by the Electric Power Research Institute (EPRI) (Reference 2.5.4.2-14). The RCTS data range of shear strains is generally limited to strains less than about 10^{-2} percent and, thus, does not cover the full range of shear strain represented by the EPRI curves. The plotted data are similar to the shape of the EPRI curves within the range of the test strains, but more linear. This is because the presence of the cemented layers within the formations and the dense consistency (Subsections 2.5.4.1.2.2.8, 2.5.4.1.2.3.1, and 2.5.4.1.2.3.2) required use of rotating tube samplers (Pitcher barrel) with potential for causing sample disturbance.

RCTS testing was not performed on samples from formations below the Navesink for the ESPA. Computational methods, discussed in Subsection 2.5.4.7, were used to develop design shear

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Summary of Static Indices Laboratory Analysis for Hydraulic Fill Data from ESPA Investigation[d]

Boring Number	Sample Number	Sample Depth (ft.)	USCS Classification	Gravel[b][f] (%)	Sand[b][f] (%)	Fines[b] (%)	Silt[b] (%)	Clay[b][f] (%)	Natural Moisture[b] (%)	LL[b][e]	PL[b][e]	PI[b][e]	G_s[e]	Void Ratio[c]	Stratum
NB-2	SS-5	19.9 – 21.4	CH	0	5	95	–	–	61	58	28	30	–	–	Hydraulic Fill
NB-3	SS-6	11.8 – 13.3	CH	0	24	76	–	–	98	69	31	38	–	–	Hydraulic Fill
NB-5	SS-7	15.0 – 16.5	MH	0	1	99	–	–	94	72	35	37	–	–	Hydraulic Fill
NB-8	SS-6	12.2 – 13.7	SC-SM	0	50	50	37	13	--	18	12	6	2.68	–	Hydraulic Fill
EB-1	SS-9	25.0 – 26.5	CH[a]	–	–	–	–	–	83	57	14	43	–	–	Hydraulic Fill
EB-2	SS-8	20.0 –21.5	MH	0	2	98	–	–	72	85	41	44	–	–	Hydraulic Fill
EB-7	SS-6	12.5 –14.0	CL	0	29	72	30	42	--	43	24	19	–	–	Hydraulic Fill
EB-8	SS-7A	14.8 –15.4	CH	0	37	63	–	–	71	51	25	26	--	–	Hydraulic Fill
EB-8	SS-9	25.2 – 26.7	ML	0	12	88	–	–	71	49	30	19	–	–	Hydraulic Fill
NB-1UD	UD-3	19.6 – 21.6	MH[a]	–	–	–	–	–	81	97	44	53	–	–	Hydraulic Fill
NB-3	SS-9B	25.6 - 26.6	SM[a]	0	85	15	–	–	–	–	–	–	–	–	Hydraulic Fill

a) Classification is based on quantitative and qualitative (visual inspection) information.
b) Test Results are rounded to the nearest percent.
c) Calculated value not reported in Reference (calculation assumes 100% saturation).
d) "--" Information not available
e) LL= Liquid Limit; PL= Plastic Limit; PI = Plasticity Index; G_s = Specific Gravity
f) Size Ranges: Gravel >2mm; 2mm>Sand>.074mm; .074mm>Silt>.005mm; >.005mm-Clay

Reference: 2.5.4.2-15

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Table 2.5.4.2-2 (Sheet 4 of 18)
Summary of Static Indices Laboratory Analysis for Alluvium Data from the ESPA Investigation[d]

Boring Number	Sample Number	Sample Depth (ft.)	USCS Classification	Gravel[b][f] (%)	Sand[b][f] (%)	Fines[b] (%)	Silt[b][f] (%)	Clay[b][f] (%)	Natural Moisture[b] (%)	LL[b][e]	PL[b][e]	PI[b][e]	G_s[e]	Void Ratio[c]	Stratum
~~NB-3~~	~~SS-9B~~	~~25.6 – 26.6~~	~~SM[a]~~	~~0~~	~~85~~	~~15~~									~~Alluvium~~
NB-3	SS-13	44.7 – 46.2	ML[a]	0	50	50	--	--	--	--	--	--	--	--	Alluvium
~~NB-3~~	~~SS-15~~	~~54.6 – 56.1~~	~~CH~~	~~0~~	~~6~~	~~94~~			~~55~~	~~54~~	~~25~~	~~29~~	~~--~~	~~--~~	~~Alluvium~~
NB-5	SS-12	39.5 – 41.0	SP-SM[a]	37	52	11	--	--	--	--	--	--	--	--	Alluvium
EB-1	SS-13	45.0 – 46.5	SP[a]	1	95	4	--	--	--	--	--	--	--	--	Alluvium
~~EB-1~~	~~SS-17~~	~~65.0 – 66.5~~	~~SP[a]~~	~~0~~	~~96~~	~~4~~							~~--~~	~~--~~	~~Alluvium~~
EB-3	SS-12	40.0 – 41.5	SP-SM[a]	29	65	6	--	--	--	--	--	--	--	--	Alluvium
EB-3	SS-14	50.0 – 51.5	CL	0	20	80	--	--	41	40	24	16	--	--	Alluvium
EB-7	SS-13	45.0 – 46.5	SP-SM[a]	4	90	6	--	--	14	--	--	--	--	--	Alluvium
EB-7	SS-14	50.0 –51.5	SP-SM[a]	25	65	10	--	--	--	--	--	--	--	--	Alluvium

a) Classification is based on quantitative and qualitative (visual inspection) information.
b) Test Results are rounded to the nearest percent.
c) Calculated value not reported in Reference (calculation assumes 100% saturation).
d) "--" Information not available
e) LL= Liquid Limit; PL= Plastic Limit; PI = Plasticity Index; G_s = Specific Gravity
f) Size Ranges: Gravel >2mm; 2mm>Sand>.074mm; .074mm>Silt>.005mm; >.005mm-Clay

References: 2.5.4.1-10 and 2.5.4.2-15

Table 2.5.4.2-2 (Sheet 6 of 18)
Summary of Static Indices Laboratory Analysis
for Upper (fine-grained) Kirkwood Formation Data from the ESPA Investigation[d]

Boring Number	Sample Number	Sample Depth (ft.)	USCS Classification	Gravel[b][f] (%)	Sand[b][f] (%)	Fines[b] (%)	Silt[b][f] (%)	Clay[b][f] (%)	Natural Moisture[b] (%)	LL[b][e]	PL[b][e]	PI[b][e]	G_s[e]	Void Ratio[c]	Formation
EB-1	SS-23	90.0 – 91.0	CH[a]	--	--	--	--	--	31	63	31	32	--	--	Kirkwood
EB-2	SS-18	70.0 – 71.5	CL	0	39	61	--	--	40	48	25	23	--	--	Kirkwood
EB-3	SS-20	80.0 – 81.5	CH	0	20	80	--	--	77.	53	16	37	--	--	Kirkwood
NB-1UD	UD-8 UU	55.8 – 57.8	CL	1	48	51	--	--	29	27	16	11	--	--	Kirkwood
NB-1UD	UD-8	55.8 – 57.8	MH[a]	--	--	--	--	--	50	52	34	18	--	--	Kirkwood
NB-3	SS-15	54.6-56.1	CH	0	6	94	—	—	55	54	25	29	—	—	Kirkwood

a) Classification is based on quantitative and qualitative (visual inspection) information.
b) Test Results are rounded to the nearest percent.
c) Calculated value not reported in Reference (calculation assumes 100% saturation).
d) "–" Information not available
e) LL= Liquid Limit; PL= Plastic Limit; PI = Plasticity Index; G_s = Specific Gravity
f) Size Ranges: Gravel >2mm; 2mm>Sand>.074mm; .074mm>Silt>.005mm; >.005mm-Clay

References: 2.5.4.1-10 and 2.5.4.2-15

Table 2.5.4.2-2 (Sheet 8 of 18)
Summary of Static Indices Laboratory Analysis for Lower (coarse-grained) Kirkwood Formation Data from the ESPA Investigation[d]

Boring Number	Sample Number	Sample Depth(ft.)	USCS Classification	Gravel[b][f] (%)	Sand[b][f] (%)	Fines[b] (%)	Silt[b][f] (%)	Clay[b][f] (%)	Natural Moisture[b] (%)	LL[b][e]	PL[b][e]	PI[b][e]	G_s[e]	Void Ratio[c]	Formation
NB-2	SS-15	70.0 – 71.5	SM[a]	0	86	14	–	–	21	–	–	–	–	–	Kirkwood
EB-2	SS-24	100.0 –101.5	SP-SM[a]	24	70	6	–	–	–	–	–	–	–	–	Kirkwood
EB-3	SS-23	95.0 – 96.5	SP-SM[a]	1	92	7	–	–	–	–	–	–	–	–	Kirkwood
EB-3	SS-24	100.0 – 101.5	SP-SM[a]	0	91	9	–	–	–	–	–	–	–	–	Kirkwood
EB-7	SS-19	75.0 – 76.5	SC-SM	0	66	34	27	7	–	23	19	4	–	–	Kirkwood
EB-8	SS-14	50.8 – 52.3	SC	0	70	30	–	–	16	66	30	36	–	–	Kirkwood
EB-1	SS-17	65.0 – 66.5	SP[a]	0	96	4	–	–	–	–	–	–	–	–	Kirkwood

a) Classification is based on quantitative and qualitative (visual inspection) information.
b) Test Results are rounded to the nearest percent.
c) Calculated value not reported in Reference (calculation assumes 100% saturation).
d) "–" Information not available
e) LL= Liquid Limit; PL= Plastic Limit; PI = Plasticity Index; G_s = Specific Gravity
f) Size Ranges: Gravel >2mm; 2mm>Sand>.074mm; .074mm>Silt>.005mm; >.005mm-Clay

References: 2.5.4.1-10 and 2.5.4.2-15

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Table 2.5.4.2-8 (Sheet 1 of 3)
Design Values for Static Engineering Properties of Subsurface Materials[f]

	Formation			
Parameter	Artificial Fill	Hydraulic Fill	Alluvium	Kirkwood[a]
Range of Thickness, feet	2 to 9.5	24 to 44	5 to 24	12 to 54
Average Thickness, feet	4.2	32.9	15.3	30.4
Range of Top Elevation, feet NAVD[c]	6.2 to 12.8	0 to 11	-35 to -22	-37 to -58
Average Top Elevation, feet NAVD	9	5	-29	-43
USCS Symbol	ND	SM, SC-SM,ML,MH,CL,CH	SP-SM,SP,SM,ML,CL,CH	SP-SM,SP,SM,MH,CL,CH
Natural Moisture , %	ND	79	~~36~~ 28	~~38~~ 47
Unit Weight, (pcf)	ND	100[b]	136.6[b]	(MH) 103.9 (CL) 122.8
Liquid Limit, (LL)	ND	60	~~47~~ 40	~~47~~ 50
Plastic Limit, (PL)	ND	28	~~25~~ 24	~~24~~ 25
Plasticity Index (PI)	ND	32	~~23~~ 16	~~23~~ 25
Field SPT N-value, bpf[d]	22	3	~~18~~ 14	12
N_{60}, bpf[d][e]	25	3	~~20~~ 22	18
Undrained Shear Strength (c_u), tsf	ND	0.436	ND	0.506
Total stress internal friction angle, Φ	ND	NA	ND	ND
Total stress cohesion intercept, c, tsf	ND	ND	ND	ND
Effective stress internal friction angle, Φ'	ND	ND	ND	ND
Effective stress cohesion intercept, c', tsf	ND	ND	ND	ND
Compression Index, C_c	ND	0.54	ND	0.535
Recompression Index, C_r	ND	ND	ND	0.070
Pre-consolidation Pressure, P_c (psf)	ND	1365	ND	2800

PSEG Letter ND-2011-0012 dated March 21, 2011

ENCLOSURE 8
Summary of Regulatory Commitment

ENCLOSURE 8
SUMMARY OF REGULATORY COMMITMENTS

The following table identifies the commitment 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 2.5.4.2 to incorporate the changes in Enclosure 7 in response to NRC RAI No. 8, Question #02.05.04-1	This revision will be included in the next update of the PSEG Site ESP Application SSAR.	Yes	No