PSEG Power L.L.C.
Nuclear Development
P.O. Box 236, MC NDC-7, Hancocks Bridge, NJ 08038

PSEG
Power LLC

ND-2011-0014
March 31, 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. 13, Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters

References:

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

2) RAI No. 13, SRP Subsection: 02.04.13 - Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters, dated March 1, 2011 (eRAI 5471)

3) PSEG Power, LLC letter to USNRC, ND-2010-0092, PSEG Power, LLC, Submittal of Initial Radionuclide Concentrations Used in Radioactive Transport Analysis in Support of Early Site Permit Application for the PSEG Site, NRC Project Number 771, dated July 7, 2010

The purpose of this letter is to respond to the request for additional information (RAI) identified in Reference 2 above. This RAI addresses Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters, as described in Subsection 2.4.13 of the Site Safety Analysis Report (SSAR), as submitted in Part 2 of the PSEG Site Early Site Permit Application, Revision 0.

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Enclosure 1 provides our response for RAI No. 13, Question Nos. 02.04.13-1 and 02.04.13-2. Our response to RAI No. 13, Question Nos. 02.04.13-1 and 02.04.13-2 will result in a revision to the SSAR. Enclosure 2 includes the proposed revisions to the SSAR. Enclosure 3 includes the new regulatory commitment established in this submittal.

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

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 31st day of March, 2011.

Sincerely,

James Mallon
Nuclear Development ESP Project Manager
PSEG Power, LLC

Enclosure 1: Response to NRC Request for Additional Information, RAI No. 13, Question Nos. 02.04.13-1 and 02.04.13-2, SRP Subsection: 02.04.13 - Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters

Enclosure 2: Proposed Revisions Part 2 – Site Safety Analysis Report (SSAR) Section 1.3, Plant Parameter Envelope and Subsection 2.4.13, Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters

Enclosure 3: Summary of Regulatory Commitments

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

PSEG Letter ND-2011-0014, dated March 31, 2011

ENCLOSURE 1

RESPONSE TO RAI No. 13

QUESTION Nos. 02.04.13-1 AND 02.04.13-2

Response to RAI No. 13, Question 02.04.13-1:

In Reference 2, the NRC staff asked PSEG for information regarding Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters, as described in Subsection 2.4.13 of the Site Safety Analysis Report. The specific request for Question 02.04.13-1 was:

> *10 CFR 20 requires all radionuclides to be considered when determining releases to the environment.*
> *In Table 2.4.13-1 of the PSEG ESP Application, the applicant lists 12 radionuclides that they determine to be a potential migration threat.*
>
> *Sections 2.4.13.1.4 and 2.4.13.1.5 state that other radionuclides were removed from consideration for several different factors (including high decay rates, dilution factors, and bounding concentrations that are already less than the ECLs (effluent concentration limits)).*
>
> *In order for the staff to review Table 2.4-13-1 of the PSE&G Application, please provide and list all radionuclides initially considered, and provide how any radionuclides were eliminated from consideration.*

PSEG Response to NRC RAI:

Reference 3 provides an updated SSAR Table 2.4.13-1. The updated table contains the bounding activity concentrations for all the radionuclides initially considered, and identifies the radionuclides eliminated due to short half-life or low activity concentration.

During development of the response to RAI No. 13, discrepancies were identified in the bounding activity concentrations included in the updated SSAR Table 2.4.13-1, as provided in Reference 3. Table RAI-13-1 of this document includes the corrected bounding activity concentrations for Te-129m, Cs-136, Mn-54, and H-3, as well as the half-life of H-3. In a future revision of the SSAR, SSAR Table 2.4.13-1 will be updated to reflect this change. Note that a new bounding H-3 activity concentration impacts SSAR Tables 2.4.13-2 to 2.4.13-5 and will require a change to these tables in a future revision of the SSAR.

Table RAI-13-1
Initial Concentrations of Radionuclides
Te-129m, Cs-136, Mn-54, and H-3

Nuclide	Half-life[6] days	ABWR[1] MBq	ABWR[1] µCi/cc[7]	AP-1000[2] µCi/cc	US-APWR[3] µCi/cc	U.S. EPR[4] µCi/cc	Bounding µCi/cc	ECL[5] µCi/cc	Analysis µCi/cc
Te-129m	3.36E+01	1.80E+03	5.41E-04		2.50E-03	1.50E-03	2.50E-03	7.00E-06	*
Cs-136	1.31E+01	6.00E+02	1.80E-04	1.00E+00	2.50E-01	5.30E-02	1.00E+00	6.00E-06	*
Mn-54	3.13E+02	4.10E+03	1.23E-03		1.10E-03	1.00E-03	1.23E-03	3.00E-05	*
H-3	4.51E+03		1.00E-02	3.50E+00	1.00E+00	1.00E+00	3.50E+00	1.00E-03	3.50E+00

Notes:
* Eliminated because half-life is less than one year.
(1) Data is based on ABWR DCD (Rev. 4) Table 12.2-13a and Subsection 11.1.2.3.
(2) Data is based on AP1000 DCD (Rev. 18) Table 12.2-9 and Subsection 11.1.1.3.
(3) Data is based on US-APWR DCD (Rev. 2) Table 12.2-37 and Subsection 11.1.1.3.
(4) Data is based on U.S. EPR DCD (Rev. 1) Table 11.1-2.
(5) Data is based on 10CFR20 Appendix B, Table 2.
(6) Data for half-lives are based on Table E.1 NUREG/CR-5512 or a Chart of Nuclides.
(7) A conversion factor between MBq (in a $90m^3$ tank) and µCi/cc is:
10^6Bq / 1MBq x 1µCi / $3.7x10^4$Bq x $1m^3$ / 10^6cc x 1 / $90m^3$ = $3x10^{-7}$µCi/cc x m^3/MBq.

Associated PSEG Site ESP Application Revisions:

Reference 3 includes a commitment to revise SSAR Table 2.4.13-1 to include the listing of the initial concentrations of radionuclides used in the analysis of radionuclide transport due to an inadvertent release of contaminated water to the groundwater at the PSEG Site. In response to RAI No. 13, SSAR Table 2.4.13-1 will be updated to change the bounding Te-129m, Cs-136, Mn-54, and H-3 activity concentrations to 2.50E-03 µCi/cc, 1.00E+00 µCi/cc, 1.23E-03 µCi/cc and 3.50E+00 µCi/cc, respectively. SSAR Tables 2.4.13-2 to 2.4.13-5 will be updated to incorporate analysis results associated with a bounding H-3 activity concentration of 3.5 µCi/cc.

SSAR Table 2.4.13-1 will also be updated to change the half-life of H-3 to 4.51E+03 days.

Enclosure 2 includes a markup of the proposed SSAR revision.

RAI No. 13, Question 02.04.13-2:

In Reference 2, the specific request for Question 02.04.13-2 was:

In order to determine the appropriate initial radionuclide concentrations utilized in section 2.4.13.1.2 Accident Scenario, for 10 CFR 20 analysis, the staff requests the following information:

1) *The application currently states, "The hypothetical accident scenario involves instantaneous release (NUREG-0800, 15.7.3, III.1.a, 1981) of 80 percent of the contents of a liquid radioactive waste tank into nearby groundwater." NUREG-0800, 15.7.3 is no longer used as the technical basis to assess this scenario. NRC Branch Technical Position (BTP) 11-6 is the current guidance. Please revise this section using BTP 11-6, or justify why BTP 11-6 was not used.*

2) *Please provide "the four DCDs currently under NRC review" and the source of the public information that was used to determine the hypothetical release.*

3) *Please provide the specified tanks from the four DCDs referenced and their radionuclide concentrations utilized to determine the PPE bounding concentrations.*

4) *Please provide, from the four DCDs referenced, the location of the hypothetical tank used for this accident scenario.*

5) *Please provide the criteria utilized to determine which specified tank from the four DCDs was chosen to represent the accident scenario.*

6) *Please provide information on how the determination was made to utilize 30,000 gallons as the specified tank volume used for this accident scenario.*

Please include the information requested above in the PSEG Site ESP application.

PSEG Response to NRC RAI:

1) SSAR Subsection 2.4.13.1.2 will be revised to incorporate a reference to BTP 11-6. PSEG has not yet chosen the reactor technology for the new plant at the PSEG Site. The ESPA Plant Parameter Envelope (PPE) includes values for ABWR, AP1000, U.S. EPR, and US-APWR. It should be noted that the technical basis for the ABWR and AP1000 is NUREG-800, 15.7.3, while the technical basis for the U.S. EPR and US-APWR is BTP 11-6. The PSEG ESP application is in compliance with the guidance in both documents.

2) PSEG is considering four reactor technologies: ABWR, AP1000, U.S. EPR, and US-APWR. The ABWR has been certified and the information was obtained from the ABWR Design Certification Document (DCD), Rev. 4. The information for the hypothetical accident scenario associated with AP1000 was obtained from AP1000 DCD, Rev. 18. The information for the U.S. EPR was from the U.S. EPR DCD Rev. 1. Liquid release information for the US-APWR is from Revision 2 of the US-APWR DCD.

3) The radionuclide activity concentrations for each reactor technology, as well as the bounding activity concentrations, are listed in Table RAI-13-2 of this document. The associated references to specific DCD sections/tables are also provided in footnotes to Table RAI-13-2 of this document.

   In addition to the bounding radionuclide source term, the capacity of the bounding tank (30,000 gallons) was determined from the DCDs. The capacity of each tank and associated reference is listed in Table RAI-13-3 of this document.

   SSAR Section 1.3 describes the Plant Parameter Envelope and will be updated to include a new table (SSAR Table 1.3-9) containing tank capacities and activity concentrations for each reactor technology, as well as the bounding activity concentrations. SSAR Subsection 2.4.13.1.2 will be updated to include a reference to the new SSAR Table 1.3-9.

4) As stated in SSAR Subsection 2.4.13.1.2, the final technology and plant layout have not yet been determined. Therefore, the point of release of the hypothetical tank failure is conservatively assumed to occur at the western edge of the proposed power block (see SSAR Figure 2.4.13-1).

5) The radwaste tank with the largest volume was chosen for the accident scenario. This approach was used in order to obtain the largest volume (most conservative) of the liquid released into the environment. As stated in Table RAI-13-3 of this document, the capacity of the largest tank (US-APWR) is 30,000 gallons.

6) Condensate tanks and refueling water storage tanks frequently have higher volumes, but also have much lower radionuclide activities. The radwaste tank with the largest volume was chosen for the accident scenario. This approach was used in order to obtain the largest volume (most conservative) of the liquid released into the environment. As stated in Table RAI-13-3 of this document, the capacity of the largest tank (US-APWR) is 30,000 gallons.

Table RAI-13-2
Initial Concentrations of Radionuclides

Nuclide	Half-life[6] (days)	GE-ABWR[1] (MBq)	GE-ABWR[1] (µCi/cc[7])	AP-1000[2] (µCi/cc)	US-APWR[3] (µCi/cc)	U.S. EPR[4] (µCi/cc)	Bounding (µCi/cc)	ECL[5] (µCi/cc)	Analysis (µCi/cc)
Br-82	1.47E+00				3.50E-03		3.50E-03	4.00E-05	*
Br-83	9.96E-02				2.40E-02	3.20E-02	3.20E-02	9.00E-04	*
Br-84	2.21E-02				1.10E-02	1.70E-02	1.70E-02	4.00E-04	*
Br-85	1.99E-03					2.00E-03	2.00E-03		*
Rb-86m	6.94E-04					3.00E-07	3.00E-07		*
Rb-86	1.87E+01				1.10E-02	1.90E-03	1.10E-02	7.00E-06	*
Rb-88	1.24E-02			1.50E+00	1.40E+00	1.00E+00	1.50E+00	4.00E-04	*
Rb-89	1.06E-02	2.80E+02	8.41E-05	6.90E-02	2.50E-02	4.70E-02	6.90E-02	9.00E-04	*
Sr-89	5.05E+01	5.10E+03	1.53E-03	1.10E-04	8.30E-04	6.40E-04	1.53E-03	8.00E-06	*
Sr-90	1.06E+04	4.20E+02	1.26E-04		5.40E-05	3.30E-05	1.26E-04	5.00E-07	1.26E-04
Sr-91	3.96E-01	7.00E+03	2.10E-03		4.70E-04	1.00E-03	2.10E-03	2.00E-05	*
Sr-92	1.13E-01	5.30E+03	1.59E-03		2.20E-04	1.70E-04	1.59E-03	4.00E-05	*
Y-90	2.67E+00	4.20E+02	1.26E-04		1.80E-04	7.70E-06	1.80E-04	7.00E-06	*
Y-91m	3.45E-02				2.70E-04	5.20E-04	5.20E-04	2.00E-03	*
Y-91	5.85E+01	2.00E+03	6.01E-04		1.30E-04	8.10E-05	6.01E-04	8.00E-06	*
Y-92	1.48E-01	4.10E+03	1.23E-03		2.10E-04	1.40E-04	1.23E-03	4.00E-05	*
Y-93	4.21E-01	6.80E+03	2.04E-03		9.00E-05	6.50E-05	2.04E-03	2.00E-05	*
Zr-95	6.40E+01	4.10E+02	1.23E-04		1.60E-04	9.30E-05	1.60E-04	2.00E-05	*
Zr-97	7.04E-01					6.70E-05	6.70E-05	9.00E-06	*
Nb-95	3.52E+01	3.70E+02	1.11E-04		1.80E-04	9.40E-05	1.80E-04	3.00E-05	*
Mo-99	2.75E+00	2.00E+04	6.01E-03	2.10E-01	1.80E-01	1.10E-01	2.10E-01	2.00E-05	*
Mo-101	1.01E-02				5.00E-03		5.00E-03	7.00E-04	*
Tc-99m	2.51E-01	2.00E+04	6.01E-03		1.10E-01	4.60E-02	1.10E-01	1.00E-03	*
Ru-103	3.93E+01	9.70E+02	2.91E-04		1.30E-04	7.80E-05	2.91E-04	3.00E-05	*
Ru-105	1.85E-01					9.50E-05	9.50E-05	7.00E-05	*
Ru-106	3.68E+02	1.80E+02	5.41E-05		4.70E-05	2.70E-05	5.41E-05	3.00E-06	5.41E-05
Rh-103m	3.90E-02	9.70E+02	2.91E-04			6.80E-05	2.91E-04	6.00E-03	*
Rh-105	1.47E+00					4.40E-05	4.40E-05	5.00E-05	*
Rh-106	3.46E-04	1.80E+02	5.41E-05			2.70E-05	5.41E-05		*

Table RAI-13-2
Initial Concentrations of Radionuclides

Nuclide	Half-life[6] (days)	GE-ABWR[1] (MBq)	GE-ABWR[1] (µCi/cc[7])	AP-1000[2] (µCi/cc)	US-APWR[3] (µCi/cc)	U.S. EPR[4] (µCi/cc)	Bounding (µCi/cc)	ECL[5] (µCi/cc)	Analysis (µCi/cc)
Ag-110m	2.50E+02	5.80E+01	1.74E-05		4.30E-07	2.00E-07	1.74E-05	6.00E-06	*
Ag-110	2.85E-04					1.10E-08	1.10E-08		*
Sb-125	1.01E+03					8.00E-07	8.00E-07	3.00E-05	**
Sb-127	3.85E+00					5.00E-06	5.00E-06	1.00E-05	*,**
Sb-129	1.85E-01					6.80E-06	6.80E-06	4.00E-05	*
Te-125m	5.80E+01				1.90E-04		1.90E-04	2.00E-05	*
Te-127m	1.09E+02				7.50E-04	4.40E-04	7.50E-04	9.00E-06	*
Te-127	3.90E-01					2.20E-03	2.20E-03	1.00E-04	*
Te-129m	3.36E+01	1.80E+03	5.41E-04		2.50E-03	1.50E-03	2.50E-03	7.00E-06	*
Te-129	4.83E-02				2.00E-03	2.40E-03	2.40E-03	4.00E-04	*
Te-131m	1.25E+00	4.60E+02	1.38E-04		6.30E-03	3.70E-03	6.30E-03	8.00E-06	*
Te-131	1.74E-02				2.20E-03	2.60E-03	2.60E-03	8.00E-05	*
Te-132	3.26E+00	1.10E+02	3.30E-05		7.00E-02	4.10E-02	7.00E-02	9.00E-06	*
Te-133m	3.85E-02				4.30E-03		4.30E-03	9.00E-05	*
Te-134	2.90E-02				7.60E-03	6.70E-03	7.60E-03	3.00E-04	*
I-129	5.73E+09					4.60E-08	4.60E-08	2.00E-07	**
I-130	5.15E-01				2.70E-02	5.00E-02	5.00E-02	2.00E-05	*
I-131	8.04E+00	1.20E+05	3.60E-02	7.10E-02	6.70E-01	7.40E-01	7.40E-01	1.00E-06	*
I-132	9.58E-02	1.70E+04	5.11E-03	9.30E-02	2.90E-01	3.70E-01	3.70E-01	1.00E-04	*
I-133	8.67E-01	1.10E+05	3.30E-02	1.30E-01	1.10E+00	1.30E+00	1.30E+00	7.00E-06	*
I-134	3.65E-02	1.10E+04	3.30E-03	2.20E-02	1.50E-01	2.40E-01	2.40E-01	4.00E-04	*
I-135	2.75E-01	5.20E+04	1.56E-02	7.80E-02	6.40E-01	7.90E-01	7.90E-01	3.00E-05	*
Cs-132	6.48E+00				2.20E-03		2.20E-03	4.00E-05	*
Cs-134	7.53E+02	1.60E+03	4.80E-04	6.90E-01	2.00E+00	1.70E-01	2.00E+00	9.00E-07	2.00E+00
Cs-135m	3.68E-02				2.40E-03		2.40E-03	1.00E-03	*
Cs-136	1.31E+01	6.00E+02	1.80E-04	1.00E+00	2.50E-01	5.30E-02	1.00E+00	6.00E-06	*
Cs-137	1.10E+04	4.40E+03	1.32E-03	5.00E-01	1.20E+00	1.10E-01	1.20E+00	1.00E-06	1.20E+00
Cs-138	2.24E-02	1.20E+03	3.60E-04	3.70E-01	2.60E-01	2.20E-01	3.70E-01	4.00E-04	*
Ba-137m	1.77E-03			5.00E-01	8.00E+00	1.00E-01	8.00E+00		*

Table RAI-13-2
Initial Concentrations of Radionuclides

Nuclide	Half-life[6] (days)	GE-ABWR[1] (MBq)	GE-ABWR[1] (µCi/cc[7])	AP-1000[2] (µCi/cc)	US-APWR[3] (µCi/cc)	U.S. EPR[4] (µCi/cc)	Bounding (µCi/cc)	ECL[5] (µCi/cc)	Analysis (µCi/cc)
Ba-139	5.74E-02					2.20E-02	2.20E-02	2.00E-04	*
Ba-140	1.27E+01	1.30E+04	3.90E-03		9.80E-04	6.20E-04	3.90E-03	8.00E-06	*
La-140	1.68E+00	1.30E+04	3.90E-03		4.20E-04	1.60E-04	3.90E-03	9.00E-06	*
La-141	1.64E-01					5.30E-05	5.30E-05	5.00E-05	*
La-142	6.42E-02					3.10E-05	3.10E-05	1.00E-04	*
Ce-141	3.25E+01	1.40E+03	4.20E-04		1.50E-04	8.90E-05	4.20E-04	3.00E-05	*
Ce-143	1.38E+00				1.20E-04	7.60E-05	1.20E-04	2.00E-05	*
Ce-144	2.84E+02	1.70E+02	5.11E-05		1.20E-04	6.90E-05	1.20E-04	3.00E-06	*
Pr-143	1.36E+01	1.00E+02	3.00E-05			8.80E-05	8.80E-05	2.00E-05	*
Pr-144	1.20E-02				2.90E-03	6.90E-05	2.90E-03	6.00E-04	*
Pm-147	9.58E+02				1.30E-05		1.30E-05	7.00E-05	**
Nd-147	1.10E+01					3.40E-05	3.40E-05	2.00E-05	*
Eu-154	3.21E+03				1.20E-06		1.20E-06	7.00E-06	**
Np-239	2.36E+00	6.80E+04	2.04E-02			8.70E-04	2.04E-02	2.00E-05	*
Pu-238	3.20E+04					2.00E-07	2.00E-07	2.00E-08	2.00E-07
Pu-239	8.79E+06					2.00E-08	2.00E-08	2.00E-08	*
Pu-240	2.39E+06					2.80E-08	2.80E-08	2.00E-08	2.80E-08
Pu-241	5.26E+03					6.90E-06	6.90E-06	1.00E-06	6.90E-06
Am-241	1.58E+05					7.80E-09	7.80E-09	2.00E-08	**
Cm-242	1.63E+02					1.90E-06	1.90E-06	7.00E-07	1.90E-06
Cm-244	6.61E+03					1.00E-07	1.00E-07	3.00E-08	1.00E-07
Na-24	6.25E-01	2.50E+04	7.51E-03		1.50E-02	3.70E-02	3.70E-02	5.00E-04	*
P-32	1.43E+01	6.90E+03	2.07E-03				2.07E-03	9.00E-06	*
Cr-51	2.77E+01	2.70E+05	8.11E-02		1.60E-03	2.00E-03	8.11E-02	5.00E-04	*
Mn-54	3.13E+02	4.10E+03	1.23E-03		1.10E-03	1.00E-03	1.23E-03	3.00E-05	*
Mn-56	1.07E-01	2.50E+04	7.51E-03	1.70E-02	4.00E-02		4.00E-02	7.00E-05	*
Fe-55	9.86E+02	6.00E+04	1.80E-02		1.10E-03	7.60E-04	1.80E-02	1.00E-04	1.80E-02
Fe-59	4.45E+01	1.50E+03	4.50E-04		1.90E-04	1.90E-04	4.50E-04	1.00E-05	*

Table RAI-13-2
Initial Concentrations of Radionuclides

Nuclide	Half-life[6] (days)	GE-ABWR[1] (MBq)	GE-ABWR[1] (µCi/cc[7])	AP-1000[2] (µCi/cc)	US-APWR[3] (µCi/cc)	U.S. EPR[4] (µCi/cc)	Bounding (µCi/cc)	ECL[5] (µCi/cc)	Analysis (µCi/cc)
Co-58	7.08E+01	1.10E+04	3.30E-03		2.60E-03	2.90E-03	3.30E-03	2.00E-05	*
Co-60	1.93E+03	2.40E+04	7.21E-03		3.90E-04	3.40E-04	7.21E-03	3.00E-06	7.21E-03
Ni-63	3.51E+04	6.00E+01	1.80E-05				1.80E-05	1.00E-04	**
Cu-64	5.29E-01	6.40E+04	1.92E-02				1.92E-02	2.00E-04	*
Zn-65	2.44E+02	1.20E+04	3.60E-03		3.20E-04	3.20E-04	3.60E-03	5.00E-06	*
W-187	9.96E-01	1.10E+03	3.30E-04			1.80E-03	1.80E-03	3.00E-05	*
H-3	4.51E+03		1.00E-02	3.50E+00	1.00E+00	1.00E+00	3.50E+00	1.00E-03	3.50E+00

Notes:
* Eliminated because half-life is less than one year.
** Eliminated because activity is below ECL.
(1) Data is based on ABWR DCD (Rev. 4) Table 12.2-13a and Subsection 11.1.2.3.
(2) Data is based on AP1000 DCD (Rev. 18) Table 12.2-9 and Subsection 11.1.1.3.
(3) Data is based on US-APWR DCD (Rev. 2) Table 12.2-37 and Subsection 11.1.1.3.
(4) Data is based on U.S. EPR DCD (Rev. 1) Table 11.1-2.
(5) Data is based on 10CFR20 Appendix B, Table 2.
(6) Data for half-lives are based on Table E.1 NUREG/CR-5512 or a Chart of Nuclides.
(7) A conversion factor between MBq (in a $90m^3$ tank) and µCi/cc is:
10^6Bq / 1MBq x 1µCi / $3.7x10^4$Bq x $1m^3$ / 10^6cc x 1 / $90m^3$ = $3x10^{-7}$µCi/cc x m^3/MBq.

Table RAI-13-3
Tank Capacities

Reactor Technology	Tank Capacity (m^3)	Tank Capacity (gallons)	Reference
ABWR	90	23,778	ABWR DCD (Rev. 4), Table 12.2-13a
AP1000	-	28,000	AP1000 DCD (Rev. 18), Table 12.2-9
US-APWR	-	30,000	US-APWR DCD (Rev. 2), Table 11.2-3
U.S. EPR	-	19,600	U.S. EPR DCD (Rev. 1), Table 11.2-2
Bounding (US-APWR)		30,000	

Associated PSEG Site ESP Application Revisions:

SSAR Section 1.3 and Subsection 2.4.13.1.2 will be revised as specified in Enclosure 2 of this document.

PSEG Letter ND-2011-0014, dated March 31, 2011

ENCLOSURE 2

Proposed Revisions

Part 2 – Site Safety Analysis Report (SSAR)

Section 1.3 Plant Parameter Envelope and Subsection 2.4.13 Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters

Marked-up Pages

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1.3-17
Table 1.3-9 (3 pages)*
2.4-203 (Table 2.4.13-1)*
2.4-204 (Table 2.4.13-1)*
2.4-205 (Table 2.4.13-1)*
2.4-204 (Table 2.4.13-2)*
2.4-205 (Table 2.4.13-3)*
2.4-206 (Table 2.4.13-4)*
2.4-207 (Table 2.4.13-5)*
2.4-208 (Table 2.4.13-5)*
2.4-195*

- - these pages will be renumbered in Revision 1 to the SSAR

LIST OF TABLES

Number	Title
1.1-1	Acronyms and Abbreviations Used in the SSAR
1.3-1	Plant Parameter Envelope
1.3-2	Blowdown Constituents and Concentrations
1.3-3	Single Unit Principal Radionuclides in Solid Radwaste
1.3-4	Emissions from Auxiliary Boilers
1.3-5	Emissions from Standby Diesel Generators
1.3-6	Standby Power System Gas Turbine Flue Gas Effluents
1.3-7	Single Unit Composite Average Annual Normal Gaseous Release
1.3-8	Single Unit Composite Average Annual Normal Liquid Release
1.9-1	Regulatory Conformance Matrix
1.9-2	Regulatory Conformance Matrix Clarifications
1.3-9	Liquid-Containing Tank Failure Radionuclide Concentrations

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Table 1.3-1 (Sheet 14 of 14)
Plant Parameter Envelope

PPE Item		Design Parameter	Definition
17.7	Plant Operating Cycle	18 or 24 months	The normal plant operating cycle length.
18	**Construction**		
18.2	**Acreage**		
18.2.1	Laydown Area	128 ac.	The land area required to provide space for construction support facilities.
18.2.2	Temporary Construction Facilities	77 ac.	
18.3	**Construction**		
18.3.1	Noise	102 dBA at 50 ft.	The maximum expected sound level due to construction activities, measured in feet from the noise source.
18.4	**Plant Population**		
18.4.1	Construction	3950 to 4100 people	Number of workers on-site for construction of the new plant.
19	**Miscellaneous Parameters**		
19.7	Maximum Fuel Enrichment	5 percent wt.	Concentration of U-235 in the fuel.
19.8	Maximum Average Assembly Burnup	54,200 MWD/MTU	Maximum assembly average burnup at end of assembly life.
19.9	Peak Fuel Rod Burnup	62,000 MWD/MTU	Peak fuel rod exposure at end of life.
19.11	Rated Thermal Power	4590 MWt (single unit) 6800 MWt (dual unit)	Maximum core thermal power.
19.12	Liquid-Containing Tank Failure Radionuclide Concentrations	See Table 1.3-9	The concentrations of radionuclides and associated tank volumes for the analysis of liquid-containing tank failure.

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Table 1.3-9 (Sheet 1 of 3)
Liquid-Containing Tank Failure Radionuclide Concentrations

Radionuclide	ABWR[1] (MBq)	ABWR[1] (µCi/cc[5])	AP-1000[2] (µCi/cc)	US-APWR[3] (µCi/cc)	U.S. EPR[4] (µCi/cc)	Bounding Value (µCi/cc)
Br-82				3.50E-03		3.50E-03
Br-83				2.40E-02	3.20E-02	3.20E-02
Br-84				1.10E-02	1.70E-02	1.70E-02
Br-85					2.00E-03	2.00E-03
Rb-86m					3.00E-07	3.00E-07
Rb-86				1.10E-02	1.90E-03	1.10E-02
Rb-88			1.50E+00	1.40E+00	1.00E+00	1.50E+00
Rb-89	2.80E+02	8.41E-05	6.90E-02	2.50E-02	4.70E-02	6.90E-02
Sr-89	5.10E+03	1.53E-03	1.10E-04	8.30E-04	6.40E-04	1.53E-03
Sr-90	4.20E+02	1.26E-04		5.40E-05	3.30E-05	1.26E-04
Sr-91	7.00E+03	2.10E-03		4.70E-04	1.00E-03	2.10E-03
Sr-92	5.30E+03	1.59E-03		2.20E-04	1.70E-04	1.59E-03
Y-90	4.20E+02	1.26E-04		1.80E-04	7.70E-06	1.80E-04
Y-91m				2.70E-04	5.20E-04	5.20E-04
Y-91	2.00E+03	6.01E-04		1.30E-04	8.10E-05	6.01E-04
Y-92	4.10E+03	1.23E-03		2.10E-04	1.40E-04	1.23E-03
Y-93	6.80E+03	2.04E-03		9.00E-05	6.50E-05	2.04E-03
Zr-95	4.10E+02	1.23E-04		1.60E-04	9.30E-05	1.60E-04
Zr-97					6.70E-05	6.70E-05
Nb-95	3.70E+02	1.11E-04		1.80E-04	9.40E-05	1.80E-04
Mo-99	2.00E+04	6.01E-03	2.10E-01	1.80E-01	1.10E-01	2.10E-01
Mo-101				5.00E-03		5.00E-03
Tc-99m	2.00E+04	6.01E-03		1.10E-01	4.60E-02	1.10E-01
Ru-103	9.70E+02	2.91E-04		1.30E-04	7.80E-05	2.91E-04
Ru-105					9.50E-05	9.50E-05
Ru-106	1.80E+02	5.41E-05		4.70E-05	2.70E-05	5.41E-05
Rh-103m	9.70E+02	2.91E-04			6.80E-05	2.91E-04
Rh-105					4.40E-05	4.40E-05
Rh-106	1.80E+02	5.41E-05			2.70E-05	5.41E-05
Ag-110m	5.80E+01	1.74E-05		4.30E-07	2.00E-07	1.74E-05
Ag-110					1.10E-08	1.10E-08
Sb-125					8.00E-07	8.00E-07
Sb-127					5.00E-06	5.00E-06
Sb-129					6.80E-06	6.80E-06
Te-125m				1.90E-04		1.90E-04
Te-127m				7.50E-04	4.40E-04	7.50E-04
Te-127					2.20E-03	2.20E-03
Te-129m	1.80E+03	5.41E-04		2.50E-03	1.50E-03	2.50E-03
Te-129				2.00E-03	2.40E-03	2.40E-03
Te-131m	4.60E+02	1.38E-04		6.30E-03	3.70E-03	6.30E-03

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Table 1.3-9 (Sheet 2 of 3)
Liquid-Containing Tank Failure Radionuclide Concentrations

Radionuclide	ABWR[1] (MBq)	ABWR[1] (µCi/cc[5])	AP-1000[2] (µCi/cc)	US-APWR[3] (µCi/cc)	U.S. EPR[4] (µCi/cc)	Bounding Value (µCi/cc)
Te-131				2.20E-03	2.60E-03	2.60E-03
Te-132	1.10E+02	3.30E-05		7.00E-02	4.10E-02	7.00E-02
Te-133m				4.30E-03		4.30E-03
Te-134				7.60E-03	6.70E-03	7.60E-03
I-129					4.60E-08	4.60E-08
I-130				2.70E-02	5.00E-02	5.00E-02
I-131	1.20E+05	3.60E-02	7.10E-02	6.70E-01	7.40E-01	7.40E-01
I-132	1.70E+04	5.11E-03	9.30E-02	2.90E-01	3.70E-01	3.70E-01
I-133	1.10E+05	3.30E-02	1.30E-01	1.10E+00	1.30E+00	1.30E+00
I-134	1.10E+04	3.30E-03	2.20E-02	1.50E-01	2.40E-01	2.40E-01
I-135	5.20E+04	1.56E-02	7.80E-02	6.40E-01	7.90E-01	7.90E-01
Cs-132				2.20E-03		2.20E-03
Cs-134	1.60E+03	4.80E-04	6.90E-01	2.00E+00	1.70E-01	2.00E+00
Cs-135m				2.40E-03		2.40E-03
Cs-136	6.00E+02	1.80E-04	1.00E+00	2.50E-01	5.30E-02	1.00E+00
Cs-137	4.40E+03	1.32E-03	5.00E-01	1.20E+00	1.10E-01	1.20E+00
Cs-138	1.20E+03	3.60E-04	3.70E-01	2.60E-01	2.20E-01	3.70E-01
Ba-137m			5.00E-01	8.00E+00	1.00E-01	8.00E+00
Ba-139					2.20E-02	2.20E-02
Ba-140	1.30E+04	3.90E-03		9.80E-04	6.20E-04	3.90E-03
La-140	1.30E+04	3.90E-03		4.20E-04	1.60E-04	3.90E-03
La-141					5.30E-05	5.30E-05
La-142					3.10E-05	3.10E-05
Ce-141	1.40E+03	4.20E-04		1.50E-04	8.90E-05	4.20E-04
Ce-143				1.20E-04	7.60E-05	1.20E-04
Ce-144	1.70E+02	5.11E-05		1.20E-04	6.90E-05	1.20E-04
Pr-143	1.00E+02	3.00E-05			8.80E-05	8.80E-05
Pr-144				2.90E-03	6.90E-05	2.90E-03
Pm-147				1.30E-05		1.30E-05
Nd-147					3.40E-05	3.40E-05
Eu-154				1.20E-06		1.20E-06
Np-239	6.80E+04	2.04E-02			8.70E-04	2.04E-02
Pu-238					2.00E-07	2.00E-07
Pu-239					2.00E-08	2.00E-08
Pu-240					2.80E-08	2.80E-08
Pu-241					6.90E-06	6.90E-06
Am-241					7.80E-09	7.80E-09
Cm-242					1.90E-06	1.90E-06
Cm-244					1.00E-07	1.00E-07
Na-24	2.50E+04	7.51E-03		1.50E-02	3.70E-02	3.70E-02

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Table 1.3-9 (Sheet 3 of 3)
Liquid-Containing Tank Failure Radionuclide Concentrations

Radionuclide	ABWR[1] (MBq)	ABWR[1] (µCi/cc[5])	AP-1000[2] (µCi/cc)	US-APWR[3] (µCi/cc)	U.S. EPR[4] (µCi/cc)	Bounding Value (µCi/cc)
P-32	6.90E+03	2.07E-03				2.07E-03
Cr-51	2.70E+05	8.11E-02		1.60E-03	2.00E-03	8.11E-02
Mn-54	4.10E+03	1.23E-03		1.10E-03	1.00E-03	1.23E-03
Mn-56	2.50E+04	7.51E-03	1.70E-02	4.00E-02		4.00E-02
Fe-55	6.00E+04	1.80E-02		1.10E-03	7.60E-04	1.80E-02
Fe-59	1.50E+03	4.50E-04		1.90E-04	1.90E-04	4.50E-04
Co-58	1.10E+04	3.30E-03		2.60E-03	2.90E-03	3.30E-03
Co-60	2.40E+04	7.21E-03		3.90E-04	3.40E-04	7.21E-03
Ni-63	6.00E+01	1.80E-05				1.80E-05
Cu-64	6.40E+04	1.92E-02				1.92E-02
Zn-65	1.20E+04	3.60E-03		3.20E-04	3.20E-04	3.60E-03
W-187	1.10E+03	3.30E-04			1.80E-03	1.80E-03
H-3		1.00E-02	3.50E+00	1.00E+00	1.00E+00	3.50E+00

Notes:
1) Data is based on ABWR DCD (Rev. 4) Table 12.2-13a and Section 11.1.2.3. The associated tank size is 90 m^3 (23,778 gallons) per Table 12.2-13a of the ABWR DCD.
2) Data is based on AP1000 DCD (Rev. 18) Table 12.2-9 and Section 11.1.1.3. The associated tank size is 28,000 gallons per Table 12.2-9 of the AP1000 DCD.
3) Data is based on US-APWR DCD (Rev. 2) Table 12.2-37 and Section 11.1.1.3. The associated tank size is 30,000 gallons per Table 11.2-3 of the US-APWR DCD.
4) Data is based on U.S. EPR DCD (Rev. 1) Table 11.1-2. The associated tank size is 19,600 gallons per Table 11.2-2 of the U.S. EPR DCD.
5) A conversion factor between MBq (in a 90 m^3 tank) and µCi/cc is:
10^6 Bq / 1 MBq x 1 µCi / 3.7×10^4 Bq x 1 m^3 / 10^6 cc x 1 / 90 m^3 = 3×10^{-7} µCi/cc x m^3/MBq.

PSEG Letter (No. ND-2010-0092) to USNRC

Table 2.4.13-1 (Sheet 1 of 3)
Initial Concentrations of Radionuclides

Radio-nuclide	Progeny	Bounding (uCi/cc)	Half-life (d)[a]	Analysis (uCi/cc)
Br-82		3.50E-03	1.47E+00	*
Br-83		3.20E-02	9.96E-02	*
Br-84		1.70E-02	2.21E-02	*
Br-85		2.00E-03	1.99E-03	*
Rb-86m		3.00E-07	6.94E-04	*
Rb-86		1.10E-02	1.87E+01	*
Rb-88		1.50E+00	1.24E-02	*
Rb-89		6.90E-02	1.06E-02	*
Sr-89		1.53E-03	5.05E+01	*
Sr-90	Y-90	1.26E-04	1.06E+04	1.26E-04
Sr-91		2.10E-03	3.96E-01	*
Sr-92		1.59E-03	1.13E-01	*
Y-90		1.80E-04	2.67E+00	*
Y-91m		5.20E-04	3.45E-02	*
Y-91		6.01E-04	5.85E+01	*
Y-92		1.23E-03	1.48E-01	*
Y-93		2.04E-03	4.21E-01	*
Zr-95		1.60E-04	6.40E+01	*
Zr-97		6.70E-05	7.04E-01	*
Nb-95		1.80E-04	3.52E+01	*
Mo-99		2.10E-01	2.75E+00	*
Mo-101		5.00E-03	1.01E-02	*
Tc-99m		1.10E-01	2.51E-01	*
Ru-103		2.91E-04	3.93E+01	*
Ru-105		9.50E-05	1.85E-01	*
Ru-106	Rh-106	5.41E-05	3.68E+02	5.41E-05
Rh-103m		2.91E-04	3.90E-02	*
Rh-105		4.40E-05	1.47E+00	*
Rh-106		5.41E-05	3.46E-04	*
Ag-110m		1.74E-05	2.50E+02	*
Ag-110		1.10E-08	2.85E-04	*
Sb-125		8.00E-07	1.01E+03	**
Sb-127		5.00E-06	3.85E+00	* **
Sb-129		6.80E-06	1.85E-01	*
Te-125m		1.90E-04	5.80E+01	*
Te-127m		7.50E-04	1.09E+02	*
Te-127		2.20E-03	3.90E-01	*
Te-129m		~~5.80E-03~~	3.36E+01	*
Te-129		2.40E-03	4.83E-02	*
Te-131m		6.30E-03	1.25E+00	*
Te-131		2.60E-03	1.74E-02	*
Te-132		7.00E-02	3.26E+00	*

RAI 02.04.13-1 → 2.50E-03

PSEG Letter (No. ND-2010-0092) to USNRC

Table 2.4.13-1 (Sheet 2 of 3)
Initial Concentrations of Radionuclides

Radio-nuclide	Progeny	Bounding (uCi/cc)	Half-life (d)[a]	Analysis (uCi/cc)
Te-133m		4.30E-03	3.85E-02	*
Te-134		7.60E-03	2.90E-02	*
I-129		4.60E-08	5.73E+09	**
I-130		5.00E-02	5.15E-01	*
I-131		7.40E-01	8.04E+00	*
I-132		3.70E-01	9.58E-02	*
I-133		1.30E+00	8.67E-01	*
I-134		2.40E-01	3.65E-02	*
I-135		7.90E-01	2.75E-01	*
Cs-132		2.20E-03	6.48E+00	*
Cs-134		2.00E+00	7.53E+02	2.00E+00
Cs-135m		2.40E-03	3.68E-02	*
Cs-136		~~1.00E+06~~	1.31E+01	*
Cs-137	Ba-137m	1.20E+00	1.10E+04	1.20E+00
Cs-138		3.70E-01	2.24E-02	*
Ba-137m		8.00E+00	1.77E-03	*
Ba-139		2.20E-02	5.74E-02	*
Ba-140		3.90E-03	1.27E+01	*
La-140		3.90E-03	1.68E+00	*
La-141		5.30E-05	1.64E-01	*
La-142		3.10E-05	6.42E-02	*
Ce-141		4.20E-04	3.25E+01	*
Ce-143		1.20E-04	1.38E+00	*
Ce-144		1.20E-04	2.84E+02	*
Pr-143		8.80E-05	1.36E+01	*
Pr-144		2.90E-03	1.20E-02	*
Pm-147		1.30E-05	9.58E+02	**
Nd-147		3.40E-05	1.10E+01	*
Eu-154		1.20E-06	3.21E+03	**
Np-239		2.04E-02	2.36E+00	*
Pu-238	U-234	2.00E-07	3.20E+04	2.00E-07
Pu-239		2.00E-08	8.79E+06	*
Pu-240		2.80E-08	2.39E+06	2.80E-08
Pu-241	Am-241	6.90E-06	5.26E+03	6.90E-06
Am-241		7.80E-09	1.58E+05	**
Cm-242		1.90E-06	1.63E+02	1.90E-06
Cm-244		1.00E-07	6.61E+03	1.00E-07
Na-24		3.70E-02	6.25E-01	*
P-32	1.00E+00	2.07E-03	1.43E+01	*
Cr-51		8.11E-02	2.77E+01	*
Mn-54		~~1.70E-02~~	3.13E+02	*
Mn-56		4.00E-02	1.07E-01	*
Fe-55		1.80E-02	9.86E+02	1.80E-02

RAI 02.04.13-1 → 1.23E-03

PSEG Letter (No. ND-2010-0092) to USNRC

Table 2.4.13-1 (Sheet 3 of 3)
Initial Concentrations of Radionuclides

Radio-nuclide	Progeny	Bounding (uCi/cc)	Half-life (d)[a]	Analysis (uCi/cc)
Fe-59		4.50E-04	4.45E+01	*
Co-58		3.30E-03	7.08E+01	*
Co-60		7.21E-03	1.93E+03	7.21E-03
Ni-63		1.80E-05	3.51E+04	**
Cu-64		1.92E-02	5.29E-01	*
Zn-65		3.60E-03	2.44E+02	*
W-187		1.80E-03	9.96E-01	*
H-3		~~3.40E+00~~	~~4.15E+03~~	~~3.40E+00~~

a) Half-lives from Table E.1 NUREG/CR-5512 or Chart of Nuclides
* Eliminated because half life is less than one year
** Eliminated because activity is below ECL

4.51E+03

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3.50E+00

Table 2.4.13-2
Radionuclide Concentrations - Advection and Decay Only
Average Groundwater Flow Rate Conditions[f]

Radionuclide	Progeny	Bounding (uCi/cc)	Half-life (days) [a]	Decay Rate (1/day)	d12[b]	d23[c]	At Receptor Location (uCi/cc)	ECL[e] (uCi/cc)	Ratio[d]
Sr-90	Y-90	1.26E-04	10,600	6.54E-05	1		1.18E-05	5.00E-07	2.37E+01
Ru-106	Rh-106	5.41E-05	368	1.88E-03	1		1.36E-34	3.00E-06	4.55E-29
Cs-134		2.00E+00	753	9.20E-04			6.86E-15	9.00E-07	7.62E-09
Cs-137	Ba-137m	1.20E+00	11,000	6.3E-05	0.946		1.23E-01	1.00E-06	1.23E+05
Pu-241	Am-241	6.90E-06	5260	1.32E-04			5.86E-08	1.00E-06	5.86E-02
Cm-242		1.90E-06	163	4.25E-03	1		2.86E-73	7.00E-07	4.08E-67
	Pu-238 > U-234	2.00E-07	32,000	2.17E-05		1	9.58E-08	2.00E-08	4.79E+00
Cm-244		1.00E-07	6610	1.05E-04	1		2.25E-09	3.00E-08	7.50E-02
	Pu-240	2.80E-08	2,390,000	2.90E-07		1	2.80E-08	2.00E-08	1.40E+00
Fe-55		1.80E-02	986	7.03E-04			1.62E-13	1.00E-04	1.62E-09
Co-60		7.21E-03	1930	3.59E-04			1.64E-08	3.00E-06	5.46E-03
H-3		~~3.40E+00~~	4510	1.54E-04			~~1.31E-02~~	1.00E-03	~~1.31E+01~~
								SUM =	1.23E+05

3.50E+00

1.35E-02

1.35E+01

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a) Half lives from Table E.1 in NUREG/CR5512
b) d12 = fraction of parent decay to first progeny
c) d23 = fraction of first progeny to second
d) Ratio = the fraction receptor concentration divided by the ECL
e) ECL = Effluent Concentration Limit
f) Other Input Parameters.
Hydraulic Conductivity (K) = 3.75 ft/day.
Hydraulic Gradient (i) = 0.00042.
effective porosity (neff) =0.2 (dim).
Groundwater Velocity (V) 0.007875 ft/day.
Receptor Distance = 285 ft.
Advective Time = 36,190.48 days, 99.084 years.

Table 2.4.13-3
Radionuclide Concentrations - Advection, Decay and Dilution
Average Groundwater Flow Rate Conditions[(a)(b)(c)(d)(e)(g)(h)(i)]

Radionuclide	Receptor Concentration[(f)]	Diluted	ECL	Ratio
Sr-90	1.18253E-05	1.84584E-16	5.00E-07	3.69E-10
Ru-106	1.36485E-34	2.13041E-45	3.00E-06	7.10E-40
Cs-134	6.85618E-15	1.07019E-25	9.00E-07	1.19E-19
Cs-137	1.22741048E-01	1.91589E-12	1.00E-06	1.92E-06
Pu-241	5.86282E-08	9.15138E-19	1.00E-06	9.15E-13
Cm-242	2.85772E-73	4.46067E-84	7.00E-07	6.37E-78
Pu-238	9.57806E-08	1.49506E-18	2.00E-08	7.48E-11
Cm-244	2.24997E-09	3.51202E-20	3.00E-08	1.17E-12
Pu-240	2.79759E-08	4.36681E-19	2.00E-08	2.18E-11
Fe-55	1.61626E-13	2.52285E-24	1.00E-04	2.52E-20
Co-60	1.63816E-08	2.55704E-19	3.00E-06	8.52E-14
H-3	~~01.3073079E-02~~	~~2.0406E-13~~	1.00E-03	~~2.04E-10~~
			SUM =	1.92E-06

1.34576E-02

2.10062E-13

2.10E-10

a) The release volume is 80 percent of the tank volume.
b) The release volume displaces aquifer space.
c) The shape of the displacement is assumed to be square.
d) The flux rate is the area of the displacement times the specific discharge.
e) Average flow in the river is assumed to be 2/3 of the estimated maximum tidal flow past the site, i.e., 0.6667*800,000 cfs.
f) The receptor concentration is taken from the results for advection and decay.
g) No dispersion of the initial displacement is assumed.
h) Retardation is not considered in this scenario.
i) Input Parameters

Tank Volume = 30,000 gallons
Release volume = 24,000 gallons (3208.556 ft^3)
Aquifer thickness = 13 feet
Effective porosity = 0.2 (dimensionless)
Area displaced = 1234.06 ft^2
Flow in river = 533,333 cfs (46,079,971,200 ft^3/day)
Hydraulic gradient = 0.00042 ft/ft

GW flow rate = 0.72 ft^3/day
Aquifer K = 3.75 ft/day
Dilution Factor = 64,064,898,234

Square side = 35.13 ft

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Table 2.4.13-4
Radionuclide Concentrations Advection and Decay Only
Maximum Groundwater Flow Rate Conditions[f]

Radionuclide	Progeny	Bounding (uCi/cc)	Half-life (in days) [a]	decay rate, 1/d	d12[b]	d23[c]	Concentration at Receptor Location (uCi/cc)	ECL[e] (uCi/cc)	Ratio[d]
Sr-90	Y-90	1.26E-04	10600	6.54E-05	1		1.03E-04	5.00E-07	2.07E+02
Ru-106	Rh-106	5.41E-05	368	1.88E-03	1		1.79E-07	3.00E-06	5.98E-02
Cs-134		2.00E+00	753	9.20E-04			1.23E-01	9.00E-07	1.36E+05
Cs-137	Ba-137m	1.20E+00	11000	6.3E-05	0.946		9.91E-01	1.00E-06	9.91E+05
Pu-241	Am-241	6.90E-06	5260	1.32E-04			4.63E-06	1.00E-06	4.63E+00
Cm-242		1.90E-06	163	4.25E-03	1		4.79E-12	7.00E-07	6.85E-06
	Pu-238 > U-234	2.00E-07	32000	2.17E-05		1	1.96E-07	2.00E-08	9.82E+00
Cm-244		1.00E-07	6610	1.05E-04	1		7.28E-08	3.00E-08	2.43E+00
	Pu-240	2.80E-08	2390000	2.90E-07		1	2.81E-08	2.00E-08	1.40E+00
Fe-55		1.80E-02	986	7.03E-04			2.14E-03	1.00E-04	2.14E+01
Co-60		7.21E-03	1930	3.59E-04			2.43E-03	3.00E-06	8.09E+02
H-3		~~3.40E+00~~	4510	1.54E-04			~~2.13~~	1.00E-03	~~2.13E+03~~
								SUM =	1.13E+06

3.50E+00

2.19E+00

2.19E+03

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a) Half-lives from Table E.1 in NUREG/CR-5512.
b) d12 = fraction of parent decay to first progeny.
c) d23 = fraction of first progeny to second.
d) Ratio = the fraction receptor concentration divided by the ECL.
e) ECL = Effluent Concentration Limit.
f) Other Input Parameters.
K = hydraulic conductivity = 8 feet per day.
i = hydraulic gradient = 0.00235 feet per foot.
neff = effective porosity - 0.2 (dimensionless).
GW vel = groundwater velocity = 0.094 feet per day.
Receptor distance = 285 feet.
Advective time = 3032 days = 8.3 years.

Table 2.4.13-5 (Sheet 1 of 2)
Radionuclide Concentrations – Advection, Decay, and Dilution
Maximum Groundwater Flow Rate Conditions[a][b][c][e][g][h]

Radionuclide	Receptor Concentration[d]	Diluted	ECL[f]	Ratio
Sr-90	1.03E-04	1.93E-14	5.00E-07	3.85E-08
Ru-106	1.79E-07	3.34E-17	3.00E-06	1.11E-11
Cs-134	1.23E-01	2.29E-11	9.00E-07	2.54E-05
Cs-137	9.91E-01	1.85E-10	1.00E-06	1.85E-04
Pu-241	4.63E-06	8.62E-16	1.00E-06	8.62E-10
Cm-242	4.79E-12	8.93E-22	7.00E-07	1.28E-15
Pu-238	1.96E-07	3.66E-17	2.00E-08	1.83E-09
Cm-244	7.28E-08	1.36E-17	3.00E-08	4.52E-10
Pu-240	2.81E-08	5.23E-18	2.00E-08	2.61E-10
Fe-55	2.14E-03	3.98E-13	1.00E-04	3.98E-09
Co-60	2.43E-03	4.52E-13	3.00E-06	1.51E-07
H-3	~~2.13~~ 2.19E+00	~~3.98E-10~~ 4.10E-10	1.00E-03	~~3.98E-07~~ 4.10E-07
			SUM =	2.11E-04

a) The shape of the displacement is assumed to be square.
b) The flux rate is the area of the displacement times the specific discharge.
c) Average flow in the river is assumed to be 2/3 of the estimated maximum tidal flow past the site (Subsection 2.4.13.1.7).
d) The receptor concentration is taken from the results for advection and decay.
e) No dispersion of the initial displacement is assumed.
f) ECL = Effluent Concentration Limits.
g) Concentrations in microcuries per liter.

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Table 2.4.13-5 (Sheet 2 of 2)
Radionuclide Concentrations – Advection, Retardation, Decay, and Dilution
Maximum Groundwater Flow Rate Conditions

(a)(b)(c)(e)(g)(h)

h) Input Parameter Values:
- Tank Volume = 30,000 gallons
- Release volume = 24,000 gallons (3208.56 ft^3)
- Aquifer thickness = 13 feet
- Effective porosity = 0.2 (dimensionless)
- Area displaced = 1234.06 ft^2
- Square side = 35.13 ft
- Aquifer K = 8 ft/day
- Hydraulic gradient = 0.00235 ft/ft
- GW flow rate = 8.59 ft^3/day
- Flow in river = 533,333 cfs (46,076,971,200 ft^3/day)
- Dilution factor = 5,367,139,081

for the ABWR and AP1000, and Branch Technical Position [BTP] 11-6 for the U.S. EPR and US-APWR

(ABWR, AP1000, US-APWR, and U.S. EPR DCDs)

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2.4.13.1.2 Accident Scenario

The hypothetical accident scenario involves instantaneous release (NUREG-0800, 15.7.3, III.1.a, 1981) of 80 percent of the contents of a liquid radioactive waste tank into nearby groundwater. This represents the most conservative results of that release on groundwater and potentially affected groundwater receptors.

The final technology and plant layout have not yet been determined. Therefore, the point of release of the hypothetical tank failure is conservatively assumed to occur at the western edge of the proposed power block. The distance along the postulated flow path to the Delaware River (the nearest probable receptor of the contaminated groundwater) is 285 feet (ft.) (Figure 2.4.13-1). The proposed tank size is 30,000 gallons, so a release of 24,000 gallons of liquid radioactive effluent is postulated. Concentrations of radionuclides contained in this hypothetical release are specified as the bounding concentrations for the four DCDs ~~currently under NRC review~~, as is the 30,000 gallons specified for the tank volume.

Potential migration of an accidental release into deeper aquifers is discussed in Subsection 2.4.13.1.9.

Table 2.4.13-1 contains the initial list of radionuclides considered and their bounding concentrations.

2.4.13.1.3 Conceptual Model and Hydrogeologic Inputs

The hydrogeologic setting consists of low permeable fill (mainly hydraulic fill materials historically dredged from the Delaware River) placed over more permeable alluvial deposits. It is expected that natural recharge within the fill materials results in vertical migration into the Alluvium which overlie the Kirkwood Formation confining layer. Migration within the alluvial deposits in the new plant location is primarily laterally west toward the Delaware River. The top of the Alluvium aquifer has an elevation ranging from -22 to -35 ft. North America Vertical Datum 1988 (NAVD) through the northern portion of the PSEG Site, and an average thickness of 13 ft. The river immediately adjacent to the site is not dredged an[illegible] deep). This corresponds to an elevation of -7 to -11 ft. NAV[illegible] the Alluvium aquifer to the river most likely occurs at some [illegible] support new plant construction, the river bottom will be dred[illegible] 15 to -18 ft. NAVD. At these dredging locations, the discharg[illegible] could be nearer the shoreline than under existing conditions. As a conservative estimate, the migration pathway is assumed to be the distance from the postulated release point to the river shoreline.

The initial list of radionuclides considered, the associated bounding concentrations, and the bounding tank volume is obtained from SSAR Table 1.3-9.

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While structural fill with potentially higher hydraulic conductivity may be placed as foundation support material, the migration pathway between the power block and the river will remain within the lower permeability Alluvium. This evaluation assumes that the release occurs at the western boundary of the proposed power block, a distance of 285 ft. from the Delaware River, because a reactor technology has not been selected, nor the specific building layout determined (Figure 2.4.13-1). Also, conservatively, the release is assumed to occur directly into the Alluvium aquifer, and no time for decay is provided by the vertical migration through the hydraulic fills or the structural fill to the aquifer.

Water-level data have been collected from the observation wells installed for this ESPA at the new plant location (Subsection 2.4.12.1.3). Calculated horizontal hydraulic gradients, based on these water-level measurements and the interpreted probable migration pathway, indicate an

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ENCLOSURE 3

Summary of Regulatory Commitments

ENCLOSURE 3

SUMMARY OF REGULATORY COMMITMENTS

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

COMMITMENT	COMMITTED DATE	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	Programmatic (Yes/No)
PSEG will revise SSAR Sections 1.3 and 2.4.13 to incorporate the changes in Enclosure 2 in response to NRC RAI #13, Questions 02.04.13-1 and 02.04.13-2.	This revision will be included in the next update of the PSEG Site ESP application SSAR.	Yes	No