APPENDIX A

2012 REMP SAMPLE COLLECTION, ANALYSIS TYPE, ANALYTICAL METHODS, PROGRAM CHANGES AND EXCEPTIONS

REMP Sample Collection, Analyses and Methods

An independent consulting group, Ecology III, working at Susquehanna's Environmental Laboratory, located approximately ¾ miles east of the SSES, collects and prepares the samples (except for environmental dosimeters which are handled by HP). Samples are brought to the laboratory, stored, and shipped to an outside independent analytical laboratory. The following table summarizes the REMP sample collection/analyses performed by Teledyne Brown Engineering, the independent radio analytical laboratory for 2012. Note that TBE represents Teledyne Brown Engineering and E-III represents Ecology III, Inc.

TABLE A1
Page 1 of 2
SOURCE OF REMP DATA FOR MONITORING YEAR 2011

Sample Medium	Analysis	Analysis Frequency	Collection Procedure Number	Analytical Procedure Number
Ambient Radiation	Dosimeter	Quarterly	SSES, HP-TP-205	SSES,HP-TP-159 & 190
Air	Gross Beta	Weekly	E-III, Appendix 2	TBE-2008 Gross Alpha and/or Beta Activity in Various Matrices
Air	I-131	Weekly	E-III, Appendix 2	TBE-2012 Radioiodine in Various Matrices
Air	Gamma	Quarterly	E-III, Appendix 2	TBE-2007 Gamma Emitting Radioisotope Analysis
Drinking Water	Gross Beta	Monthly	E-III, Appendix 5	TBE-2008 Gross Alpha and/or Beta Activity in Various Matrices
Surface & Drinking Water	Tritium	Monthly (LTAW, 4S7, 5S12, and 7S12 Quarterly)	E-III, Appendix 3, 4, 5, 6, &7	TBE-2010 Tritium and Carbon-14 Analysis by Liquid Scintillation
Surface & Drinking Water	Gamma	Monthly (LTAW, 4S7, 5S12, and 7S12 Quarterly)	E-III, Appendix 3, 4, 5, 6, & 7	TBE-2007 Gamma Emitting Radioisotope Analysis

TABLE A1
(Page 2 of 2)

Sample Medium	Analysis	Analysis Frequency	Collection Procedure Number	Analytical Procedure Number
Ground Water	Tritium	Quarterly	E-III, Appendix 8	TBE-2010 Tritium and Carbon-14 Analysis by Liquid Scintillation
Ground Water	Gamma	Quarterly	E-III, Appendix 8	TBE-2007 Gamma Emitting Radioisotope Analysis
Precipitation	Tritium	Monthly (Apr-Nov) / Quarterly	E-III, Appendix 10	TBE-2010 Tritium and Carbon-14 Analysis by Liquid Scintillation
Milk	Gamma	Monthly/ Bi-weekly	E-III, Appendix 9	TBE-2007 Gamma Emitting Radioisotope Analysis
Milk	I-131	Monthly/ Bi-weekly	E-III, Appendix 9	TBE-2012 Radioiodine in Various Matrices
Fish	Gamma	Semi-Annually (Spring/Fall)	E-III, Appendix 11	TBE-2007 gamma Emitting Radioisotope Analysis
Sediment	Gamma	Semi-Annually (Spring/Fall)	E-III, Appendix 12	TBE-2007 gamma Emitting Radioisotope Analysis
Fruits & Vegetables	Gamma	In Season (when irrigated)	E-III, Appendix 13	TBE-2007 gamma Emitting Radioisotope Analysis
Soil	Gamma	Annually	E-III, Appendix 14	TBE-2007 Gamma Emitting Radioisotope Analysis

PROGRAM CHANGES:

Direct Radiation Monitoring

Susquehanna changed from in house processing of thermo luminescence dosimeters (TLD's) to contracting with Landauer Dosimetry Laboratory in Glenwood, IL for processing of optically stimulated luminescence (OSL) dosimeters in 2012 as part of the REMP program.

The new OSL dosimeters used for monitoring ambient radiation levels in the environment was implemented beginning with the first quarter in 2012. The results from the "new" style of dosimeters are lower across all locations when compared to the previous year's data using the "older" style dosimeter. The difference is due to the method in how background correction was applied by the PPL Dosimetry Lab in-house processing of TLDs as compared to the method used by the new OSL dosimetry vendor. In addition, there are expected differences between dosimeter processing systems because the OSL technology is newer than the dated TLD technology.

Air Monitoring

No changes in 2012.

Surface Water and Drinking Water Monitoring

Drinking water pathway dose was less than 1 mrem/year for each month of the quarter for 2012. Based on dose, the bi-weekly composite I-131 analysis was not required. Therefore, Table I-3 "Iodine-131 Analyses of Surface Water" in Appendix I of this report was intentionally left blank.

Milk

No changes in 2012.

Ground Water Monitoring

No changes in 2012.

Fruits & Vegetables

Only collected samples from irrigated crops in 2012.

Soil Monitoring

No changes in 2012.

Sediment Monitoring

No changes in 2012.

Fish Monitoring

No changes in 2012.

Precipitation Monitoring

Precipitation sampling is not required per the Susquehanna Off Site Dose Calculation Manual (ODCM) however, rainwater is being sampled and analyzed for tritium for purposes of trending and evaluation of tritium washout from station airborne routine effluent releases.

PROGRAM EXCEPTIONS

The following are sampling and analysis exceptions for 2012.

TABLE A2
TRM SAMPLING DEVIATIONS
(Page 1 of 2)

Sample Type	Date	Location	Explanation
Air (Particulate & Iodine)	January	3S2	Power outage to sampler during sample period 1/4/12 to 1/11/12 for approximately 2.3 hours as determined by timer box reading (discovered on 1/11/12), resulting in non-continuous operation for sampling period. Air monitor resumed normal operation when power was restored. Corrective action taken on 1/11/12, verified air monitoring station operability upon restoration of power. Valid sample collected for sampling period 1/04/12 to 1/11/12. Actions to prevent recurrence are not applicable.
	February	3S2	Power outage to sampler on 2/02/12 for approximately 1 hour as determined by timer box reading, resulting in non-continuous operation for sampling period 2/01/12 to 2/08/12. Air monitor resumed normal operation when power was restored. Corrective action taken on 2/02/12, verified air monitoring station operability upon restoration of power. Valid sample collected for sampling period 2/01/12 to 2/08/12. Actions to prevent recurrence are not applicable.
	May	3S2	Power outage to sampler during sample period 5/2/12 to 5/9/12 (discovered on 5/08/12), resulting in non-continuous operation for sampling period. Corrective action taken on 5/09/12, discovered loose wire connection and restored sampler to operation. Low sample volume for sample period 5/02/12 to 5/09/12. On 5/23/12, air monitor out of service from 0806 to 1038 for additional electrical maintenance and restored to service at 1038. Operability verified. Valid sample collected for sampling period 5/23/12 to 5/30/12. Electrical repairs performed to prevent recurrence.

TABLE A2
TRM SAMPLING DEVIATIONS
(Page 2 of 2)

Sample Type	Date	Location	Explanation
Air (Particulate & Iodine)continued	June	6G1	Planned power outage to sampler on 6/11/12 and 6/15/12 for approximately 8.1 and 5 hours, respectively. Pre-notification received by PPL Electric Utilities of power outage. Corrective action taken on 6/13/12 and 6/15/12, verified air monitoring station operability upon restoration of power. Valid sample collected for sampling periods 6/6/12 to 6/13/12 and 6/13/12 to 6/20/12, respectively. Planned maintenance performed, actions to prevent recurrence are not applicable.
		3S2	Brief power outage to sampler on 6/15/12 for approximately 0.7 hours. Corrective action taken on 6/15/12, verified air monitoring station operability upon restoration of power. Valid sample collected for sampling period 6/13/12 to 6/20/12.
	July	13S6Q/13S6Q	Power outage to sampler from 7/15/12 to 7/18/12 as determined by timer box reading (discovered on 7/18/12). Non-continuous operation for sampling period 7/11/12 to 7/18/12 resulting in low sample volume at both monitors. Corrective action taken on 7/18/15, contacted PPL Bloomsburg Service Center to report no power condition. Verified air monitoring station operability upon restoration of power on 7/19/12. Actions to prevent recurrence are not applicable.
	August	13S6/13S6Q	Power outage to samplers for sample period 7/25/12 to 8/1/12 for approximately 1.8 hours as determined by timer boxes (discovered on 8/1/12), resulting in non-continuous operation for sampling period. Corrective action taken on 8/1/12, verified air monitoring station operability upon restoration of power. Valid sample collected for sampling period 7/25/12 to 8/1/12. Actions to prevent recurrence are not applicable.
	September	13S6/13S6Q	Power outage to samplers for sampling period 9/5/12 to 9/12/12 for approximately 2.7 hours as determined by timer boxes (discovered on 9/12/12), resulting in. non-continuous operation for sampling period. Corrective action taken on 9/12/12, verified air monitoring station operability upon restoration of power. Valid sample collected for sampling period 9/5/12 to 9/12/12. Actions to prevent recurrence are not applicable.

TABLE A3*
NON-TRM SAMPLING OCCURRENCES
(PAGE 1 of 4)

Sample Type	Date	Location	Explanation
Air (particulate & iodine)	January	13S6Q	Timer box malfunction discovered on 1/11/12, digits would not reset to zero. No interference with continuous sampler operation for 1/4/12 to 1/11/12. Timer ran properly over sample period, but would not reset for next sample period. Corrective action taken, replaced the timer box. Operability verified on 1/11/12. Actions to prevent recurrence are not applicable.
	January	12E1	Timer box malfunction discovered on 1/25/12, digits failed to advance properly. No interference with continuous sampler operation for 1/18/12 to 1/25/12. Corrective action taken, replaced the timer box. Operability verified on 1/25/12. Actions to prevent recurrence are not applicable.
	January	12E1	Discovered sampler power cord with cracked insulation on 2/1/12, exposing one terminal bare wiring. No interruption in sampler operation during sampling period 1/25/12 to 2/1/12. Corrective action taken, installed new plug on sampler power cord. Operability verified on 2/1/12. Actions to prevent recurrence are not applicable.
	March	13S6Q	Timer box malfunction discovered on 3/28/12, digits would not reset to zero. No interference with continuous sampler operation for 3/21/12 to 3/28/12. Timer ran properly over sample period, but would not reset for next sample period. Corrective action taken, replaced the timer box. Operability verified on 3/28/12. Actions to prevent recurrence are not applicable.
	April	3S2	Timer box malfunction discovered on 4/25/12, digits failed to advance properly. No interference with continuous sampler operation for 4/18/12 to 4/25/12. Corrective action taken, replaced the timer box and installed new sampler power cord. Operability verified on 4/25/12. Actions to prevent recurrence are not applicable.

TABLE A3*
NON-TRM SAMPLING OCCURRENCES
(PAGE 2 of 4)

Sample Type	Date	Location	Explanation
Air (particulate & iodine) cont.	May	13S6	Timer box malfunction discovered on 5/9/12, digits failed to advance properly. No interference with continuous sampler operation for 5/2/12 to 5/9/12. Corrective action taken, replaced the timer box. Operability verified on 5/9/12. Actions to prevent recurrence are not applicable.
	May	13S6/13S6Q	Planned maintenance performed on 5/23/12 from 1102 to 1315 to install new wiring and weatherproof conduit to improve reliability of power supply. Operability verified at 1315 on 5/23/12.
	May	12S1	Planned maintenance performed on 5/24/12 from 0804 to 1042 to install new wiring and weatherproof conduit to improve reliability of power supply. Operability verified at 1042 on 5/24/12.
	October	13S6Q	On 10/24/12 discovered diminished sample flow rate below ideal range. Corrective action taken, adjusted flow to within ideal range. Adequate sample volume was collected for period 10/17/12 to 10/24/12. Actions to prevent recurrence are not applicable.
Surface Water	April	6S6	On 4/3/12 discovered diminished sample flow below ideal range. Corrective action taken, maintenance cleaning performed on 4/4/12. Adequate sample volume collected for period 3/27/12 to 4/3/12. Operability verified on 4/9/12. Actions to prevent recurrence are not applicable.
	May	6S6	Discovered sample composite container overflowing on 5/8/12. Grab samples collected to represent weeks 2-5 May composite (5/1/12 to 5/29/12). Corrective action taken, maintenance performed on 5/31/12. Verified operability when sampler restored to service on 6/1/12. Actions to prevent recurrence are not applicable.

TABLE A3*
NON-TRM SAMPLING OCCURRENCES
(PAGE 3 of 4)

Sample Type	Date	Location	Explanation
Surface Water continued	June	6S6	On 6/1/12, auto composite sampler delayed start for week 1 June composite due to sampler maintenance. Operability verified. Upon completion of maintenance sampler resumed weekly composite collection.
	June	2S7	On 6/12/12, discovered sampler composite container overflowing for sampling period 6/5/12 to 6/12/12. Additionally, blowdown isolated from 6/7/12 @ 1100 through 6/8/12 @ 1715 for planned maintenance. Corrective action taken, obtained a grab sample for week 2 June composite. Replaced pump tubing and recalibrated sampler. Verified sampler operability on 6/12/12. Actions to prevent recurrence are not applicable.
	June	2S7	On 6/19/12, discovered sampler composite container overflowing for sampling period 6/12/12 to 6/19/12. Corrective action taken, obtained a grab sample for week 3 June composite. Recalibrated sampler and resumed normal operation. New liquid sensing detector ordered and installed on 7/5/12. Actions to prevent recurrence are not applicable.
	September	6S6	On 9/4/12, discovered diminished sampler flow rate below ideal range. On 9/7/12 found sample composite container overflowing. Maintenance performed on 9/7/12. Restored to service resulting in delayed start of week 2 September composite.
	October	2S7	On 10/9/12, discovered sampler liquid detector malfunction (no liquid detected even though unit was sampling liquid. On 10/11/12 sampler taken out of service for maintenance. Reinitialized and reprogramed the sampling unit. Unit resumed normal operation upon reset of the unit.

TABLE A3
NON-TRM SAMPLING OCCURRENCES
Page 4 of 4

Sample Type	Date	Location	Explanation
Groundwater	August	2S8 (MW-7)	On 8/16/13, unable to collect water sample from well due to pump failure. Corrective action taken, ordered new pump and installed on 8/31/12. Normal sample collected.
Ambient Radiation	2012	All dosimeter monitoring locations	Susquehanna changed from in house processing of thermoluminescence dosimeters (TLD) to optically stimulated luminescence (OSL) dosimeters in 2012 as part of the REMP program. The results from the "new" style of dosimeters are lower across all locations when compared to the previous year's data using the "older" style dosimeter. The difference is due to the method in how background correction was applied by the PPL Dosimetry Lab in-house processing of TLDs as compared to the method used by the new OSL dosimetry vendor. In addition, there are expected differences between dosimetry processing systems because the OSL technology is newer than the dated TLD technology.

*A nonconformance (NCR 13-07) reported by Teledyne Brown Engineering Laboratory involved using an incorrect minimum detectable concentration (MDC) multiplier for gamma isotopes counted on a new measurement system (Detector 08) that was placed into service in January 2012. The nonconformance involved reporting lower MDC values affecting surface water, groundwater, potable water, air particulate and milk sampling media. All activity and counting uncertainties for the 2012 reported results are correct and unaffected by this condition. NCR 13-07 was generated by Teledyne to investigate and condition has been corrected.

In 2012 the SSES REMP overall performance was as follows:

Sample Collection

	# of Samples Collected
Primary	914
Replicate	28
Split/Duplicate	142
Total	1084

OSLD Direct Radiation Measurements

228 of 228 OSLDs placed in the field were recovered and analyzed for 100 % data recovery.

Equipment Operability Trending

Table A4 below depicts trending of REMP continuous air and automatic water composite sampling equipment operability on a year by year basis. Each discrepancy was reviewed to understand the causes of the program exception. It should be noted that deviations from continuous sampling are permitted for routine maintenance or equipment malfunctions for periods not to exceed 4 hours. Occasional equipment power outages/breakdowns were unavoidable.

Table A4
EQUIPMENT OPERABILITY TRENDING
(Page 1 of 1)

Sampling Medium	Sample Location	Description	Percent (%) Operability		
			2010	2011	2012
Air Particulate & Charcoal	3S2	SSES Backup Met. Tower	99.9	99.3	98.9
	12S1	West Building	99.9	100	99.9
	13S6	Former Laydown Area, West of Confers Lane	100	99.7	99.1
	12E1	Berwick Hospital	100	100	99.9
	6G1	Freeland Substation	100	100	99.9
Air Particulate & Charcoal	8G1	PPL Sys. Facilities Cntr, Humboldt Industrial Park	99.7	100	99.8
Drinking Water	12H2	Danville Water Company	100	100	100
Surface Water	2S7	Cooling Tower Blowdown Discharge Line	98	99.1	98.1
	6S6	River Water Intake Line	100	95.5	93.4

APPENDIX B

2012 REMP MONITORING SCHEDULE (SAMPLING AND ANALYSIS)

TABLE B1
(Page 1 of 2)

Annual Analytical Schedule for the PPL Susquehanna Steam Electric Station Radiological Environmental Monitoring Program – 2012

Media	No. of Locations	Sample Freq.(a)	Analyses Required	Analysis Freq. (a)
Airborne Particulates	6	W QC	Gross Beta (b) Gamma Spectrometry	W Q
Airborne Iodine	6	W	I-131	W
Sediment	3	SA	Gamma Spectrometry	SA
Fish	2 1	SA A	Gamma Spectrometry (on edible portion)	SA A
Surface Water (c)	7	W for MC	Gamma Spectrometry Tritium	M, Q LTAW/4S7/5S12/7S12 M, Q LTAW/4S7/5S12/7S12
Ground Water (Well)	16	Q	Gamma Spectrometry Tritium	Q Q
Drinking Water (d)	1	W for MC	Gross Beta Gamma Spectrometry Tritium	M M M
Cow Milk	4(e)	M, BW(e)	I-131 Gamma Spectrometry	M, BW M, BW
Food Products (f)	2	A	Gamma Spectrometry	A
Soil	2	A	Gamma Spectrometry	A
Direct Radiation	57	Q	OSLD	Q
Precipitation	4 3	W for MC(g) W for QC	Tritium	M (Sites 1, 2, 3, 4) Q (3S2, 12S1, 8G1)

(a) W = weekly, BW = bi-weekly, M = monthly, SM = semi-monthly, Q = quarterly, QC = quarterly composite , SA = semi-annually, A = annually, MC = monthly composite.

(b) If the gross beta activity were greater than 10 times the yearly mean of the control sample, gamma analysis would be performed on the individual filter. Gross beta analysis performed 24 hours or more following filter change to allow for radon and thorium daughter decay.

(c) Locations 6S6 and 2S7 are automatic composite samplers and time-proportional sampling was performed at these locations the entire year. Samples are collected weekly for monthly composite samples. Location 6S5 is a sample from the Susquehanna River downriver of the SSES discharge diffuser. Station 6S5 was grab sampled weekly. Locations 4S7, 5S12, 7S12, and LTAW were grab sampled quarterly.

(d) Water from location 12H2 was retrieved weekly. Composite samples of the weekly collections at this location were made monthly (MC) for analysis. Sampling at 12H2 was performed using an automatic composite sampler (ACS) that was operated in the time-proportional mode.

(e) Locations 5E2, 10D3, 10G1, and 13E3 were sampled bi-weekly from April through October when cows are on pasture, monthly otherwise.

(f) Two farms irrigated crops using Susquehanna River water downstream from the Susquehanna SES in 2012.

- Zehner Farm (11D1) – cabbage, pumpkins and soy beans
- Lupini Farm – Mifflinville Field (12F7) potato and field corn

(g) Precipitation from Sites 1, 2, 3, 4 are collected weekly and composited monthly, April through November.

APPENDIX C

2012
REMP MONITORING LOCATION DESCRIPTIONS

TABLE C 1
(Page 1 of 5)

OSLD Locations for the SSES
Radiological Environmental Monitoring Program – 2012

Less Than One Mile from the SSES - See Figure 2

Location Code[a]	Distance[a] (miles)	Direction Latitude / Longitude	Description
1S2	0.2	N (41.09566° / -76.146121°)	Perimeter Fence
2S2	0.9	NNE (41.10207° / -76.141192°)	Thomas Road
2S3	0.2	NNE (41.09486° / -76.144101°)	Perimeter Fence
3S2	0.5	NE (41.09574° / -76.140086°)	SSES Backup Met Tower
3S3	0.9	NE (41.10183° / -76.133127°)	Riverlands Garden (Abandoned)
4S3	0.2	ENE (41.09322° / -76.141934°)	Post, West of SSES APF
4S6	0.7	ENE (41.09687° / -76.133807°)	Riverlands
5S4	0.8	E (41.09286° / -76.131604°)	West of Environmental Laboratory
5S7	0.3	E (41.09199° / -76.141165°)	Perimeter Fence
6S4	0.2	ESE (41.09132° / -76.142616°)	Perimeter Fence (north)
6S9	0.2	ESE (41.09067° / -76.142966°)	Perimeter Fence (south)
7S6	0.2	SE (41.08972° / -76.14359°)	PPL Pole No. 44271
7S7	0.4	SE (41.08745° / -76.142033°)	End of Kline's Road
8S2	0.2	SSE (41.08907° / -76.14437°)	Speed Limit Sign Post
9S2	0.2	S (41.08952° / -76.14322°)	Between Security Vehicle Exit and Entrance Gates
10S1	0.4	SSW (41.08663° / -76.150082°)	Post - south of switching station
10S2	0.2	SSW (41.08894° / -76.147881°)	Security Fence
11S7	0.4	SW (41.08832° / -76.15297°)	SSES Access Road Gate #50
12S1	0.4	WSW (41.0887° / -76.154112°)	West Building (Performance Improvement Center)

TABLE C 1
(Page 2 of 5)

OSLD Locations for the SSES
Radiological Environmental Monitoring Program – 2012

Less Than One Mile from the SSES - See Figure 2

Location Code[(a)]	Distance[(a)] (miles)	Direction Latitude / Longitude	Description
12S3	0.4	WSW (41.08968° / -76.153192°)	Confer's Lane (east side)
13S2	0.4	W (41.09198° / -76.153166°)	Perimeter Fence
13S5	0.4	W (41.09179° / -76.153167°)	Perimeter Fence
13S6	0.4	W (41.09177° / -76.154073°)	Former Laydown Area - west of Confer's Lane
14S5	0.5	WNW (41.09503° / -76.153787°)	Beach Grove Road/Confer's Lane
15S5	0.4	NW (41.09576° / -76.15103°)	Perimeter Fence
16S1	0.3	NNW (41.09611° / -76.147388°)	Perimeter Fence (east)
16S2	0.3	NNW (41.09599° / -76.148922°)	Perimeter Fence (west)
6A4*	0.6	ESE (41.08791° / -76.136795°)	Restaurant (U.S. Route 11)
8A3	0.9	SSE (41.07982° / -76.139078°)	PPL Wetlands Sign (U. S. Route 11)
15A3*	0.9	NW (41.10003° / -76.1585°)	Hosler Residence
16A2*	0.8	NNW (41.1025° / -76.151595°)	Benkinney Residence

TABLE C 1
(Page 3 of 5)

OSLD Locations for the SSES
Radiological Environmental Monitoring Program – 2012

From One to Five Miles from the SSES - See Figure 3

Location Code[(a)]	Distance[(a)] (miles)	Direction Latitude / Longitude	Description
12S7	1.1	WSW (41.08621° / -76.165914°)	Former Kisner Property
8B2*	1.4	SSE (41.07483° / -76.130724°)	Lawall Residence
9B1	1.3	S (41.07356° / -76.147874°)	Transmission Line - east of Route 11
10B3*	1.7	SSW (41.07064° / -76.156646°)	Castek Inc.
1D5	4.0	N (41.14936° / -76.144346°)	Shickshinny/Mocanaqua Sewage Treatment Plt.
8D3	4.0	SSE (41.03824° / -76.121683°)	Mowry Residence
9D4	3.6	S (41.04015° / -76.144529°)	Country Folk Store
10D1	3.0	SSW (41.05446° / -76.175026°)	R. & C. Ryman Farm
12D2	3.7	WSW (41.07363° / -76.213306°)	Dagostin Residence
14D1	3.6	WNW (41.10706° / -76.211891°)	Moore's Hill/Mingle Inn Roads Intersection
3E1	4.7	NE (41.13953° / -76.082398°)	Webb Residence - Lilly Lake
4E2	4.7	ENE (41.12157° / -76.064115°)	Ruckles Hill/Pond Hill Roads Intersection
5E2	4.5	E (41.08539° / -76.060486°)	Bloss Farm
6E1	4.7	ESE (41.07275° / -76.059529°)	St. James Church
7E1	4.2	SE (41.04891° / -76.090309°)	Harwood Transmission Line Pole #2
11E1	4.7	SW (41.05188° / -76.218713°)	Thomas Residence
12E1*	4.7	WSW (41.0725° / -76.230331°)	Berwick Hospital
13E4	4.1	W (41.08962° / -76.223726°)	Kessler Farm

TABLE C 1
(Page 4 of 5)

OSLD Locations for the SSES
Radiological Environmental Monitoring Program – 2012

Greater than Five Miles from the SSES - See Figure 4

Location Code[(a)]	Distance[(a)] (miles)	Direction Latitude / Longitude	Description
2F1	5.9	NNE (41.16796° / -76.09146°)	St. Adalberts Cemetery
15F1	5.4	NW (41.15595° / -76.202506°)	Zawatski Farm
16F1	7.8	NNW (41.18985° / -76.229283°)	Hidlay Residence
3G4**	17	NE (41.23431° / -76.869061°)	Wilkes Barre Service Center
4G1**	14	ENE (41.13898° / -75.885121°)	Mountaintop - Crestwood Industrial Park
7G1**	14	SE (40.94636° / -75.974184°)	Hazleton PP&L Complex
12G1**	15	WSW (41.0262° / -76.411566°)	PPL Service Center, Bloomsburg
12G4**	10	WSW (41.03868° / -76.327731°)	Naus Residence

TABLE C 1
(Page 5 of 5)

OSLD Locations for the SSES
Radiological Environmental Monitoring Program – 2012

a) All distances from the SSES to monitoring locations are measured from the standby gas treatment vent at 44200/N34117 (Pa. Grid System). The location codes are based on both distance and direction from the SSES. The letters in the location codes indicate if the monitoring locations are on site (within the site boundary) or, if they are not on site, the approximate distances of the locations from the SSES as described below:

S - on site	E - 4-5 miles
A - <1 mile	F - 5-10 miles
B - 1-2 miles	G - 10-20 miles
C - 2-3 miles	H - >20 miles
D - 3-4 miles	*- Special interest areas (other than controls)
	** - Control OSLDs

The numbers preceding the letters in the location codes provide the directions of the monitoring locations from the SSES by indicating the sectors in which they are located. A total of 16 sectors (numbered 1 through 16) equally divide an imaginary circle on a map of the SSES and its vicinity, with the SSES at the center of the circle. The middle of sector 1 is directed due north (N). Moving clockwise from sector 1, the sector immediately adjacent to sector 1 is sector 2, the middle of which is directed due north, northeast (NNE). Continuing to move clockwise, the sector numbers increase to 16, which is the north, northwest sector.

The numbers following the letters in the location codes are used to differentiate sampling locations found in the same sectors at approximately the same distances from the SSES.

TABLE C 2
(Page 1 of 5)

Sampling Locations for the SSES Radiological Environmental Monitoring Program – 2012

Less Than One Mile from the SSES - See Figure 5

Location Code[(a)]	Distance[(a)] (miles)	Direction Latitude / Longitude	Description
SURFACE WATER			
2S7	0.1	NNE (41.093540° / - 76.144773°)	Cooling Tower Blowdown Line
5S9	0.8	E (41.093292° / -76.130472°)	Environmental Lab Boat Ramp (alternate for 6S6)
5S12	0.4	E (41.092540° / -76.138704°)	C-1 Pond
7S12	0.3	SE (41.088507° / -76.143270°)	S-2 Pond
6S5	0.9	ESE (41.084639° / -76.130642°)	Outfall Area
6S6*	0.8	ESE (41.088115° / -76131637°)	River Water Intake Line
LTAW	0.7	NE (41.098356° / -76.135401°)	Lake Took-A-While (on site)
4S7	0.4	ENE (41.094418° / -76.138326°)	Peach Stand Pond
FISH			
LTAW	0.7	NE – ESE (41.098356° / -76.135401°)	Lake Took-A-While (on site)
AIR			
12S1	0.4	WSW (41.088436° / -76.154314°)	SSES West Building
13S6	0.4	W (41.091771° / -76.153869°)	Former Laydown Area, West of Confers Lane
3S2	0.5	NE (41.095716° / -76.140207°)	Back-up Meteorological Tower
SOIL			
12S1	0.4	WSW (41.088436° / -76.154314°)	West Building (Performance Improvement Center)

TABLE C 2
(Page 2 of 5)

Sampling Locations for the SSES
Radiological Environmental Monitoring Program – 2012

Less Than One Mile from the SSES - See Figure 5

Location Code[(a)]	Distance[(a)] (miles)	Direction Latitude / Longitude	Description
GROUND WATER			
2S8	0.1	NNE (41.094991° / -76.144207)°	MW-7 (NE of S&A Bldg. along rail road tracks)
2S2	0.9	NNE (41.102243° / -76.136702)°	SSES Energy Information Center
4S4	0.5	ENE (41.095471° / -76.138798°)	SSES Learning Center
6S10	0.4	ESE (41.090511° / -76.137802°)	Sewage Treatment Plant (STP) Well
6S11A	0.4	ESE (41.083448 ° / -76.133412°)	MW-8A (S of STP)
6S11B	0.4	ESE (41.083448° / -76.133411°)	MW-8B (S of STP)
6S12	0.8	ESE (41.083411° / -76.116935°)	MW-9 Near River Intake Bldg
7S11	0.3	SE (41.083527° / -76.133513°)	MW-10 (N of S-2 Pond)
11S2	0.4	SW (41.088816° / -76.152793°)	Tower's Club (Well)
1S3	0.1	N (41.093640° / -76.146076°)	MW-1 (N of Radwaste Bldg.)
4S8	0.1	ENE (41.092306° / -76.144283°)	MW-2 (SE of E. Diesel Generator Bldg)
4S9	0.3	E (41.093292° / -76.130472°)	MW-3 (N of Access Processing Facility)
8S4	0.1	SSE (41.091424° / -76.145531°)	MW-4 (E of Unit 2 CST)
7S10	0.3	SE (41.089736° / -76.142783°)	MW-5 (N of S-2 Pond)
13S7	0.2	W (41.091236° / -76.149647°)	MW-6 (Laydown area behind cooling towers)
PRECIPITATION			
3S2	0.5	NE (41.095716° / -76.140207°)	Back-up Met Tower
12S1	0.4	WSW (41.088436° / -76.154314°)	West Building (Performance Improvement Center)
Site 1	0.1	ESE (41.092275° / -76.145022°)	On-site – SW of E Diesel Bldg.
Site 2	0.1	SSE (41.091309 ° / -76.145708°)	On-site – E of Unit 2 CST
Site 3	0.1	WSW (41.091243° / -76.147345°)	On-site – S of Circ Water Pumphouse
Site 4	0.1	NW (41.093321° / -76.147316°)	On-site – N of Circ Water Pumphouse

TABLE C 2
(Page 3 of 5)

Sampling Locations for the SSES Radiological Environmental Monitoring Program – 2012

From One to Five Miles From the SSES – See Figure 6

		FISH[b]	
IND	0.9 – 1.4	ESE (41.085141° / -76.130174° to 41.075618° / -76.132682°)	At or Below the SSES Discharge Diffuser
		SEDIMENT[c]	
2B*	1.6	NNE (41.112441° / -76.134758°)	Gould Island
7B	1.2	SE (41.078924° / -76.131548°)	Bell Bend
		AIR	
12E1	4.7	WSW (41.072418° / -76.230554°)	Berwick Hospital
		MILK	
5E2	4.5	E (41.085184° / -76.061099°)	Bloss Farm
10D3	3.5	SSW (41.045449° / -76.171899°)	Kevin & Charles Drasher
13E3	5.0	W (41.100259° / -76.241102°)	Dent Farm
		FRUITS/VEGETABLES	
11D1	3.3	SW (41.055212° / -76.186797°)	Zehner Farm

Greater than Five Miles from the SSES - See Figure 7

Location Code[a]	Distance[a] (miles)	Direction Latitude / Longitude	Description
		DRINKING WATER	
12H2	26	WSW (40.947192° / -76.604524°)	Danville Water Co. (treated)
		FISH	
2H*	30	NNE (41.459508° / -75.853096°)	Near Falls, Pa.
		SEDIMENT[c]	
12F	6.9	WSW (41.041323° / -76.255396°)	Old Berwick Test Track
		AIR	
6G1*	13.5	ESE (41.018989° / -75.906515°)	Freeland Substation
8G1*	12	SSE (40.928886° / -76.055092°)	PPL SFC - Humboldt Industrial Park
		SOIL	
8G1*	12	SSE (40.928886° / -76.055092°)	PPL SFC - Humboldt Industrial Park

TABLE C 2
(Page 4 of 5)

Sampling Locations for the SSES
Radiological Environmental Monitoring Program – 2012

MILK			
10G1*	14	SSW (40.934847° / -76.284449°)	Davis Farm
GROUND WATER			
12F3*	5.2	WSW (41.054491° / -76.232176°)	Berwick Water Company
FRUITS/VEGETABLES			
12F7	8.3	WSW (41.036689° / -76.286776°)	Lupini Farm - Mifflinville
PRECIPITATION			
8G1	12	SSE (40.928886 ° / -76.055092°)	PPL System Facilities Center – Humboldt Industrial Park

TABLE C 2
(Page 5 of 5)

Sampling Locations for the SSES
Radiological Environmental Monitoring Program – 2012

a) All distances from the SSES to monitoring locations are measured from the standby gas treatment vent at 44200/N34117 (Pa. Grid System). The location codes are based on both distance and direction from the SSES. The letters in the location codes indicate if the monitoring locations are on site (within the site boundary) or, if they are not on site, the approximate distances of the locations from the SSES as described below:

S - on site	E - 4-5 miles
A - <1 mile	F - 5-10 miles
B - 1-2 miles	G - 10-20 miles
C - 2-3 miles	H - >20 miles
D - 3-4 miles	* - Control locations

The numbers preceding the letters in the location codes provide the directions of the monitoring locations from the SSES by indicating the sectors in which they are located. A total of 16 sectors (numbered 1 through 16) equally divide an imaginary circle on a map of the SSES and its vicinity, with the SSES at the center of the circle. The middle of sector 1 is directed due north (N). Moving clockwise from sector 1, the sector immediately adjacent to sector 1 is sector 2, the middle of which is directed due north, northeast (NNE). Continuing to move clockwise, the sector numbers increase to 16, which is the north, northwest sector.

The numbers following the letters in the location codes are used to differentiate sampling locations found in the same sectors at approximately the same distances from the SSES.

b) No actual location is indicated since fish are sampled from the Susquehanna River at or below the SSES discharge diffuser.

c) No permanent locations exist; samples are taken based on availability. Consequently, it is not necessary to assign a number following the letter in the location code.

APPENDIX D

2012
LAND USE CENSUS RESULTS

2012 LAND USE CENSUS RESULTS

Ecology III, Inc. conducted a Land Use Census, during the 2012 growing season around the SSES, to comply with the Offsite Dose Calculation Manual. The purpose of the survey was to document the nearest milk animal, residence, and garden greater than 50 m^2 (approx. 500 ft^2) producing broad leaf vegetation within a distance of 8 km (approx. 5 miles) in each of the 16 meteorological sectors surrounding the SSES.

SUMMARY OF CHANGES FROM 2011 TO 2012

Since the 2011 census, there were two changes in the nearest residence, two changes in the nearest garden, no change in the nearest residence; and no changes in dairy farms within the 5 mile radius.

Residence Census:
The residence census was conducted from 22 August through 22 September 2012. Distances of the nearest residences from the Susquehanna SES in the 16 different sectors ranged from 0.5 (R. Panetta, Sector 6 and J. Futoma, Sector 7) to 2.1 miles (B. Ditkosky/R. Knight, Sector 4), with an average of approximately 1.0 miles.

Two of the residences censused were also nearest sites in the garden census (F. Michael, Sector 12 and F. Hummel, Sector 13). Four residences (W. Tuggle, Sector 3, B. Ditkosky/R. Knight, Sector 4, S. Slusser, Sector 9, and G. John, Sector 16) had gardens smaller than 500 square feet.

Garden Census:
The garden census was conducted from 29 August through 22 September 2012. Distances of the nearest gardens from the Susquehanna SES in the 16 different sectors ranged from 0.6 miles (T. Scholl, Sector 7) to 4.0 miles (P. Culver, Sector 16), with an average of 2.2 miles. Tomatoes were grown in all of the gardens; cucumbers, sweet corn, peppers, beans, and onions were grown in at least half the gardens. Apples were the most frequently grown fruit. More than 40 types of vegetables, fruits, and herbs were recorded in the census.

Changes from the 2011 census included:

- Sector 6 – B. Hoffman replaced B. Smith
- Sector 10 – S. Bodnar (son) replaced S. Bodnar (father)

Livestock, poultry, and eggs were also produced at three garden sites: R. Chapin (sector 2) had beef cattle, chickens, and eggs; G. Dennis (sector 4) had ducks, chickens and eggs; D. Goff (sector 15) had chickens and eggs.

Dairy Animal Census:
Five dairy animal sites were identified in the census conducted on 9 and 20 July 2012. The Davis farm (sector 10) was included in the dairy census (although the distance from the farm to the Susquehanna SES exceeds 5 miles) because they participated as a milk sampling control location. Cows were present at all sites; no dairy goats found.

There were no changes in dairy farm locations from 2011 to 2012.

As in 2010 and 2011, no dairy goats were located during the 2012 census. Three dairy farms also grew fruits or garden vegetables: W. Bloss (5E2), K. Davis (10G1), and T. and M. Berger (12B2). K. and C. Drasher (sector 10) had beef cattle and the remainder of the dairies reported that they occasionally butcher a cow for home use.

Irrigation Census:
Two farms irrigated crops using Susquehanna River water downriver from the Susquehanna SES in 2012: Zehner Farm (location 11D1, 3.3 miles SW) irrigated cabbage, pumpkins and soy beans and Lupini Farm-Mifflinville Field (location 12F7, 8.3 miles WSW) irrigated potato and field corn.

It is noted that cabbage, pumpkins and soybean samples were not collected during 2012, due to Zehner Farm wishes not to participate, upon request for samples. Potato and field corn samples were collected from the Lupini Farm. No control samples were collected during the 2012 growing season because no irrigation with river water had taken place at the control site.

All irrigators were contacted during the 2012 growing season; no other crops or fields were irrigated because soil moisture was adequate.

Overall results of the survey are summarized below:

TABLE D1
(Page 1 of 1)
Nearest residence, garden, and dairy animal in each of the 16 meteorological sectors within a 5-mile radius of the Susquehanna Steam Electric Station, 2012.

SECTOR	DIRECTION	NEAREST RESIDENCE	NEAREST GARDEN	NEAREST DAIRY ANIMAL
1	N	1.3 mi	3.2 mi	>5.0 mi
2	NNE	1.0 mi	2.3 mi [i,a,c]	>5.0 mi
3	NE	0.9 mi	2.7 mi	>5.0 mi
4	ENE	2.1 mi	2.4 mi [a,b,c]	>5.0 mi
5	E	1.4 mi	1.8 mi	4.5 mi. [g]
6	ESE	0.5 mi	3.1 mi	>5.0 mi
7	SE	0.5 mi	0.6 mi	>5.0 mi

8	SSE	0.6 mi	2.9 mi	>5.0 mi
9	S	1.0 mi	2.7 mi	>5.0 mi
10	SSW	0.9 mi	1.3 mi	3.5 mi [g,i]
11	SW	1.5 mi	1.9 mi	>5.0 mi
12	WSW	1.3 mi	1.3 mi	1.7 mi [g]
13	W	1.2 mi	1.2 mi	5.0 mi
14	WNW	0.8 mi	1.3 mi	>5.0 mi
15	NW	0.7 mi	1.8 mi [a,c]	>5.0 mi
16	NNW	0.6 mi	4.0 mi	>5.0 mi

[a] Chickens raised for consumption at this location.
[b] Ducks raised for consumption at this location.*
[c] Eggs consumed from chickens at this location.
[d] Geese raised for consumption at this location.*
[e] Pigs raised for consumption at this location.*
[f] Turkeys raised for consumption at this location.*
[g] Fruits/vegetables raised for consumption at this location.
[h] Rabbits raised for consumption at this location.*
[i] Beef cattle raised for consumption at this location.
[j] Goats (no milk)raised for consumption at this location.*
[k] Pheasants raised for consumption at this location.*
[l] Sheep raised for consumption at this location.
[m] Guinea hen raised for consumption at this location.*

*No locations were identified as raising rabbits, dairy goats, pheasants, geese, sheep, turkeys, pigs, and guinea hens during 2012.

APPENDIX E

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APPENDIX F

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APPENDIX G

2012 SSES REMP SUMMARY OF DATA

The averages for indicator and control locations reported in the Summary of Data Table, which summarizes the entire year's results for the SSES REMP, were calculated using all measured values, when available, whether or not they were reported in Appendix I tables. Values below the MDCs, even zeroes and negatives, were part of the averaging process for these analysis results. When no measured results are available in these cases, "LLD" is reported.

Preferably, the averages reported in the Summary of Data table for sample media that are normally collected continuously are determined using only results from continuously collected samples. Occasionally, grab samples are taken for these media when equipment malfunctions or other anomalies preclude or otherwise perturb routine continuous sampling. These grab samples are taken to minimize the time periods when no sampling is being performed, or, in some instances, when continuous sampling is considered to be nonrepresentative.

Because grab samples are snapshots of the media over brief periods, it is preferable not to average the analysis results of these samples with those for continuously collected composite samples. However, when equipment malfunctions are protracted, relatively large periods of time could be entirely unrepresented by averages if the results from grab sample analyses are not considered.

Allowing analysis results for grab samples to be weighted equally with those representing relatively large periods of time would tend to bias the resulting averages unjustifiably towards the conditions at the times that the grabs are obtained. Averages obtained in this way might less accurately reflect the conditions for the combined period of continuous sampling and grab sampling than if only the results from continuous sampling were used. On the other hand, using weighting factors for the analysis results of grab samples derived from the actual time it takes to collect those samples would lead to the grab sample analysis results having a negligible effect on the overall average and not justifying the effort involved.

Grab samples collected in lieu of normal continuous sampling are typically obtained at regular intervals corresponding to the intervals (weekly) at which the continuously collected samples would usually be retrieved for eventual compositing. For example, grab samples are collected once a week but may be composited monthly in place of continuously collected samples that would normally be retrieved weekly and composited monthly. Since each grab sample is used to represent an entire week, albeit imperfect, it is reasonable to weight the analysis results the same. Thus, the results of one weekly grab are given approximately one-fourth the weight of the results for a monthly composite sample collected continuously for each of the four weeks in a month. Similarly, the analysis results of a composite of four weekly grab samples would carry the same weight as the analysis results for a composite of four weeks of continuously collected sample.

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA 2012

Reporting Period: December 28, 2011 to January 10, 2013

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICIATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASURMENTS(4)
Ambient Radiation (mR/std. qtr.)	OSL	228	N/A	1.66E+01 (208/208) (9.10E+00 - 4.07E+01)	9S2 0.2 MILES S	3.71E+01 (4/4) (2.89E+01 - 4.07E+01)	1.42E+01 (20/20) (9.50E+00 - 1.79E+01)	0
Surface Water (pCi/l)	H-3	54	2000	1.090E+03 (41/41) (-1.960E+01 - 1.240E+04)	2S7 0.1 MILES NNE	3.366E+03 (13/13) (1.440E+02 - 1.240E+04)	5.279E+01 (13/13) (-2.970E+01 - 1.260E+02)	0
	GAMMA	54						
	K-40	54	N/A	1.914E+01 (41/41) (-9.207E+01 - 1.028E+02)	7S12 0.3 MILES SE	5.048E+01 (4/4) (1.059E+01 - 1.028E+02)	6.159E+00 (13/13) (-4.509E+01 - 2.739E+01)	0
	MN-54	54	15	-2.689E-01 (41/41) (-4.690E+00 - 1.816E+00)	5S12 0.4 MILES E	4.122E-01 (4/4) (-1.883E+00 - 1.816E+00)	-1.550E-01 (13/13) (-8.363E-01 - 4.409E-01)	0
	CO-58	54	15	-3.309E-01 (41/41) (-3.800E+00 - 1.931E+00)	7S12 0.3 MILES SE	6.590E-01 (4/4) (-1.237E+00 - 1.931E+00)	-3.526E-03 (13/13) (-5.902E-01 - 8.284E-01)	0
	FE-59	54	30	6.082E-01 (41/41) (-1.010E+01 - 6.936E+00)	2S7 0.1 MILES NNE	2.004E+00 (13/13) (-1.085E+00 - 6.936E+00)	6.857E-01 (13/13) (-2.907E+00 - 3.869E+00)	0
	CO-60	54	15	9.062E-02 (41/41) (-2.377E+00 - 2.279E+00)	LTAW 0.7 MILES NE	5.927E-01 (4/4) (-3.019E-01 - 2.279E+00)	-2.566E-01 (13/13) (-9.505E-01 - 6.175E-01)	0
	ZN-65	54	30	-3.224E+00 (41/41) (-1.411E+01 - 2.086E+00)	6S5 0.9 MILES ESE	-2.213E+00 (12/12) (-5.734E+00 - 5.916E-01)	-2.257E+00 (13/13) (-5.241E+00 - 9.477E-01)	0
	NB-95	54	15	4.216E-01 (41/41) (-2.413E+00 - 5.369E+00)	5S12 0.4 MILES E	1.362E+00 (4/4) (6.938E-01 - 2.572E+00)	3.092E-01 (13/13) (-8.724E-01 - 1.620E+00)	0
	ZR-95	54	30	3.685E-01 (41/41) (-5.271E+00 - 5.327E+00)	4S7 0.4 MILES ENE	2.156E+00 (4/4) (-1.193E+00 - 5.327E+00)	4.733E-01 (13/13) (-8.023E-01 - 1.727E+00)	0
	I-131	56	60	-4.139E-01 (44/44) (-6.550E+00 - 6.538E+00)	7S12 0.3 MILES SE	5.699E-01 (5/5) (-1.083E+00 - 3.970E+00)	2.559E-01 (12/12) (-4.183E+00 - 2.588E+00)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA 2012

Reporting Period: December 28, 2011 to January 10, 2013

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICIATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASURMENTS(4)
Surface Water (cont'd) (pCi/l)	CS-134	54	15	-1.218E+00 (41/41) (-6.945E+00 - 3.412E+00)	7S12 0.3 MILES SE	6.178E-01 (4/4) (-4.261E+00 - 3.412E+00)	-1.625E+00 (13/13) (-6.749E+00 - 6.188E-01)	0
	CS-137	54	18	-5.245E-02 (41/41) (-2.895E+00 - 2.480E+00)	4S7 0.4 MILES ENE	5.943E-01 (4/4) (-4.375E-01 - 1.563E+00)	-2.984E-01 (13/13) (-1.047E+00 - 7.703E-01)	0
	BA-140	54	60	7.539E-01 (41/41) (-1.267E+01 - 1.635E+01)	6S6 0.8 MILES ESE	3.315E+00 (13/13) (-4.624E+00 - 1.266E+01)	3.315E+00 (13/13) (-4.624E+00 - 1.266E+01)	0
	LA-140	54	15	-7.042E-01 (41/41) (-2.084E+01 - 3.504E+00)	LTAW 0.7 MILES NE	1.753E+00 (4/4) (-1.020E-01 - 3.504E+00)	-6.644E-02 (13/13) (-3.809E+00 - 3.512E+00)	0
	RA-226	54	N/A	-2.158E-01 (41/41) (-7.266E+01 - 1.144E+02)	2S7 0.1 MILES NNE	1.180E+01 (13/13) (-3.832E+00 - 2.806E+01)	1.079E+01 (13/13) (-4.466E+01 - 8.818E+01)	0
	AC-228	54	N/A	6.272E-01 (41/41) (-1.035E+01 - 1.203E+01)	4S7 0.4 MILES ENE	5.418E+00 (4/4) (2.763E+00 - 1.203E+01)	-7.760E-01 (13/13) (-3.115E+00 - 6.637E+00)	0
	TH-228	54	N/A	6.641E-01 (41/41) (-7.815E+00 - 1.148E+01)	LTAW 0.7 MILES NE	2.669E+00 (4/4) (-3.087E+00 - 1.148E+01)	7.369E-01 (13/13) (-3.075E+00 - 4.026E+00)	0
Potable Water (pCi/l)	GR-B	12	4	1.896E+00 (12/12) (-7.260E-01 - 3.810E+00)	12H2 26 MILES WSW	1.896E+00 (12/12) (-7.260E-01 - 3.810E+00)	Only indicator stations sampled for this medium.	0
	H-3	12	2000	6.963E+01 (12/12) (3.630E+01 - 1.380E+02)	12H2 26 MILES WSW	6.963E+01 (12/12) (3.630E+01 - 1.380E+02)		0
	GAMMA K-40	12 12	N/A	3.936E+00 (12/12) (-4.014E+01 - 2.634E+01)	12H2 26 MILES WSW	3.936E+00 (12/12) (-4.014E+01 - 2.634E+01)		0
	MN-54	12	15	-1.520E-01 (12/12) (-1.067E+00 - 4.327E-01)	12H2 26 MILES WSW	-1.520E-01 (12/12) (-1.067E+00 - 4.327E-01)		0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA 2012

Reporting Period: December 28, 2011 to January 10, 2013

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICIATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASURMENTS(4)
Potable Water (cont'd) (pCi/l)	CO-58 12	15	1.566E-01 (12/12) (-1.051E+00 - 1.525E+00)	12H2 26 MILES WSW	1.566E-01 (12/12) (-1.051E+00 - 1.525E+00)	Only indicator stations sampled for this medium.	0
	FE-59 12	30	6.727E-01 (12/12) (-3.825E+00 - 5.667E+00)	12H2 26 MILES WSW	6.727E-01 (12/12) (-3.825E+00 - 5.667E+00)		0
	CO-60 12	15	3.570E-02 (12/12) (-9.068E-01 - 1.519E+00)	12H2 26 MILES WSW	3.570E-02 (12/12) (-9.068E-01 - 1.519E+00)		0
	ZN-65 12	30	-3.609E-01 (12/12) (-1.726E+00 - 1.156E+00)	12H2 26 MILES WSW	-3.609E-01 (12/12) (-1.726E+00 - 1.156E+00)		0
	NB-95 12	15	3.643E-01 (12/12) (-1.161E+00 - 1.349E+00)	12H2 26 MILES WSW	3.643E-01 (12/12) (-1.161E+00 - 1.349E+00)		0
	ZR-95 12	30	-2.034E-01 (12/12) (-2.648E+00 - 1.007E+00)	12H2 26 MILES WSW	-2.034E-01 (12/12) (-2.648E+00 - 1.007E+00)		0
	I-131 12	60	3.278E-01 (12/12) (-6.301E+00 - 7.056E+00)	12H2 26 MILES WSW	3.278E-01 (12/12) (-6.301E+00 - 7.056E+00)		0
	CS-134 12	15	-3.138E-01 (12/12) (-4.276E+00 - 1.157E+00)	12H2 26 MILES WSW	-3.138E-01 (12/12) (-4.276E+00 - 1.157E+00)		0
	CS-137 12	18	7.656E-02 (12/12) (-2.631E-01 - 6.484E-01)	12H2 26 MILES WSW	7.656E-02 (12/12) (-2.631E-01 - 6.484E-01)		0
	BA-140 12	60	2.973E+00 (12/12) (-8.019E+00 - 1.417E+01)	12H2 26 MILES WSW	2.973E+00 (12/12) (-8.019E+00 - 1.417E+01)		0
	LA-140 12	15	-1.489E+00 (12/12) (-4.840E+00 - 1.658E+00)	12H2 26 MILES WSW	-1.489E+00 (12/12) (-4.840E+00 - 1.658E+00)		0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA 2012

Reporting Period: December 28, 2011 to January 10, 2013

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICIATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASURMENTS(4)
Potable Water (cont'd) (pCi/l)	RA-226	12	N/A	-8.070E+00 (12/12) (-9.468E+01 - 2.960E+01)	12H2 26 MILES WSW	-8.070E+00 (12/12) (-9.468E+01 - 2.960E+01)	Only indicator stations sampled for this medium.	0
	AC-228	12	N/A	-1.393E+00 (12/12) (-4.144E+00 - 2.971E+00)	12H2 26 MILES WSW	-1.393E+00 (12/12) (-4.144E+00 - 2.971E+00)		0
	TH-228	12	N/A	8.368E-01 (12/12) (-2.150E+00 - 4.757E+00)	12H2 26 MILES WSW	8.368E-01 (12/12) (-2.150E+00 - 4.757E+00)		0
Fish (pCi/kg wet)	GAMMA	14						
	K-40	14	N/A	4.348E+03 (8/8) (3.605E+03 - 5.299E+03)	LTAW 0.7 MILES NE	4.468E+03 (2/2) (4.450E+03 - 4.486E+03)	4.184E+03 (6/6) (3.042E+03 - 5.356E+03)	0
	MN-54	14	130	7.737E-01 (8/8) (-1.389E+01 - 1.460E+01)	LTAW 0.7 MILES NE	4.831E+00 (2/2) (-4.938E+00 - 1.460E+01)	-5.558E+00 (6/6) (-3.230E+01 - 3.925E+01)	0
	CO-58	14	130	-1.101E+01 (8/8) (-3.764E+01 - 1.682E+01)	LTAW 0.7 MILES NE	2.197E+00 (2/2) (-3.949E+00 - 8.343E+00)	-7.469E+00 (6/6) (-2.768E+01 - 1.446E+01)	0
	FE-59	14	260	2.436E+01 (8/8) (-2.802E+01 - 8.919E+01)	IND 0.9-1.4 MILES ESE	3.237E+01 (6/6) (-2.802E+01 - 8.919E+01)	-6.668E+00 (6/6) (-4.852E+01 - 5.987E+01)	0
	CO-60	14	130	1.551E-01 (8/8) (-1.497E+01 - 1.459E+01)	LTAW 0.7 MILES NE	5.336E+00 (2/2) (-3.918E+00 - 1.459E+01)	-7.643E+00 (6/6) (-2.475E+01 - 1.087E+01)	0
	ZN-65	14	260	-4.342E+01 (8/8) (-1.416E+02 - 1.827E+01)	2H 30 MILES NNE	-1.570E+01 (6/6) (-8.627E+01 - 3.692E+01)	-1.570E+01 (6/6) (-8.627E+01 - 3.692E+01)	0
	NB-95	14	N/A	2.113E+00 (8/8) (-1.966E+01 - 5.142E+01)	2H 30 MILES NNE	2.424E+01 (6/6) (-5.567E-01 - 5.449E+01)	2.424E+01 (6/6) (-5.567E-01 - 5.449E+01)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA 2012

Reporting Period: December 28, 2011 to January 10, 2013

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICIATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASURMENTS(4)
Fish (cont'd) (pCi/kg wet)	ZR-95 14	N/A	6.210E+00 (8/8) (-2.394E+01 - 4.178E+01)	IND 0.9-1.4 MILES ESE	1.056E+01 (6/6) (-2.050E+01 - 4.178E+01)	-4.149E+00 (6/6) (-2.286E+01 - 3.939E+01)	0
	CS-134 14	130	-2.025E+01 (8/8) (-7.925E+01 - 3.050E+01)	2H 30 MILES NNE	-1.880E+00 (6/6) (-3.289E+01 - 4.071E+01)	-1.880E+00 (6/6) (-3.289E+01 - 4.071E+01)	0
	CS-137 14	150	-2.966E+00 (8/8) (-2.135E+01 - 1.561E+01)	2H 30 MILES NNE	2.758E+00 (6/6) (-2.482E+01 - 3.637E+01)	2.758E+00 (6/6) (-2.482E+01 - 3.637E+01)	0
	BA-140 14	N/A	4.776E+00 (8/8) (-2.500E+02 - 1.949E+02)	LTAW 0.7 MILES NE	2.386E+01 (2/2) (-3.133E+01 - 7.905E+01)	1.126E+01 (6/6) (-1.059E+02 - 1.070E+02)	0
	LA-140 14	N/A	1.051E+00 (8/8) (-3.683E+01 - 3.892E+01)	IND 0.9-1.4 MILES ESE	1.016E+01 (6/6) (-3.683E+01 - 3.892E+01)	2.892E+00 (6/6) (-2.526E+01 - 4.397E+01)	0
	RA-226 14	N/A	-1.683E+02 (8/8) (-9.555E+02 - 2.057E+02)	IND 0.9-1.4 MILES ESE	1.418E+01 (6/6) (-3.314E+02 - 2.057E+02)	-2.052E+02 (6/6) (-1.044E+03 - 4.858E+02)	0
	TH-228 14	N/A	2.978E+01 (8/8) (-3.627E+01 - 1.129E+02)	LTAW 0.7 MILES NE	3.776E+01 (2/2) (2.009E+01 - 5.542E+01)	1.467E+01 (6/6) (-6.121E+01 - 7.782E+01)	0
	AC-228 14	N/A	-3.561E+01 (8/8) (-1.404E+02 - 1.817E+01)	2H 30 MILES NNE	2.878E+01 (6/6) (-6.797E+01 - 8.899E+01)	2.878E+01 (6/6) (-6.797E+01 - 8.899E+01)	0
Sediment (pCi/kg dry)	GAMMA 6						
	BE-7 6	N/A	8.126E+02 (4/4) (-5.336E+01 - 2.757E+03)	12F 6.9 MILES WSW	1.352E+03 (2/2) (-5.336E+01 - 2.757E+03)	1.573E+02 (2/2) (1.389E+02 - 1.756E+02)	0
	K-40 6	N/A	1.243E+04 (4/4) (7.777E+03 - 1.684E+04)	2B 1.6 MILES NNE	1.724E+04 (2/2) (1.602E+04 - 1.845E+04)	1.724E+04 (2/2) (1.602E+04 - 1.845E+04)	0
	MN-54 6	N/A	8.396E+00 (4/4) (6.925E-02 - 1.381E+01)	7B 1.2 MILES SE	9.853E+00 (2/2) (9.326E+00 - 1.038E+01)	7.041E+00 (2/2) (3.742E+00 - 1.034E+01)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA 2012

Reporting Period: December 28, 2011 to January 10, 2013

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICIATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASURMENTS(4)
Sediment (cont'd) (pCi/kg dry)	CO-58	6	N/A	-7.949E+00 (4/4) (-2.739E+01 - 1.885E+01)	12F 6.9 MILES WSW	-4.270E+00 (2/2) (-2.739E+01 - 1.885E+01)	-2.599E+01 (2/2) (-5.303E+01 - 1.046E+00)	0
	FE-59	6	N/A	7.156E+00 (4/4) (-2.265E+01 - 2.745E+01)	2B 1.6 MILES NNE	2.451E+01 (2/2) (-3.309E+00 - 5.233E+01)	2.451E+01 (2/2) (-3.309E+00 - 5.233E+01)	0
	CO-60	6	N/A	-9.430E-01 (4/4) (-1.260E+01 - 1.374E+01)	12F 6.9 MILES WSW	5.700E-01 (2/2) (-1.260E+01 - 1.374E+01)	-1.558E+00 (2/2) (-6.767E+00 - 3.652E+00)	0
	ZN-65	6	N/A	-2.619E+01 (4/4) (-6.704E+01 - 1.722E+00)	7B 1.2 MILES SE	-9.969E+00 (2/2) (-2.166E+01 - 1.722E+00)	-3.452E+01 (2/2) (-8.190E+01 - 1.287E+01)	0
	NB-95	6	N/A	2.533E+01 (4/4) (-1.443E+00 - 7.955E+01)	12F 6.9 MILES WSW	3.905E+01 (2/2) (-1.443E+00 - 7.955E+01)	3.179E+01 (2/2) (-6.439E+00 - 7.001E+01)	0
	ZR-95	6	N/A	2.370E+01 (4/4) (5.022E+00 - 4.784E+01)	7B 1.2 MILES SE	3.158E+01 (2/2) (1.531E+01 - 4.784E+01)	-1.922E+01 (2/2) (-2.129E+01 - -1.714E+01)	0
	CS-134	6	150	-1.244E+00 (4/4) (-1.149E+01 - 1.251E+01)	7B 1.2 MILES SE	5.100E-01 (2/2) (-1.149E+01 - 1.251E+01)	-9.698E-01 (2/2) (-2.302E+00 - 3.625E-01)	0
	CS-137	6	180	4.589E+01 (4/4) (1.893E+01 - 6.605E+01)	2B 1.6 MILES NNE	1.167E+02 (2/2) (7.684E+01 - 1.566E+02)	1.167E+02 (2/2) (7.684E+01 - 1.566E+02)	0
	BA-140	6	N/A	-1.249E+02 (4/4) (-3.316E+02 - -1.548E+01)	12F 6.9 MILES WSW	-7.621E+01 (2/2) (-8.959E+01 - -6.283E+01)	-7.845E+01 (2/2) (-1.715E+02 - 1.461E+01)	0
	LA-140	6	N/A	-2.869E+01 (4/4) (-4.343E+01 - -1.140E+01)	2B 1.6 MILES NNE	3.860E+01 (2/2) (-2.192E+01 - 9.911E+01)	3.860E+01 (2/2) (-2.192E+01 - 9.911E+01)	0
	RA-226	6	N/A	2.202E+03 (4/4) (9.385E+02 - 3.445E+03)	2B 1.6 MILES NNE	2.815E+03 (2/2) (2.647E+03 - 2.982E+03)	2.815E+03 (2/2) (2.647E+03 - 2.982E+03)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA 2012

Reporting Period: December 28, 2011 to January 10, 2013

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICIATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASURMENTS(4)
Sediment (cont'd) (pCi/kg dry)	AC-228 6	N/A	1.107E+03 (4/4) (7.169E+02 - 1.516E+03)	2B 1.6 MILES NNE	1.380E+03 (2/2) (1.283E+03 - 1.476E+03)	1.380E+03 (2/2) (1.283E+03 - 1.476E+03)	0
	TH-228 6	N/A	1.210E+03 (4/4) (7.505E+02 - 1.496E+03)	2B 1.6 MILES NNE	1.511E+03 (2/2) (1.450E+03 - 1.572E+03)	1.511E+03 (2/2) (1.450E+03 - 1.572E+03)	0
Ground Water (pCi/l)	H-3 60	2000	5.844E+01 (56/56) (-9.290E+01 - 2.590E+02)	1S3 0.1 MILES N	1.644E+02 (4/4) (7.070E+01 - 2.590E+02)	-5.870E+00 (4/4) (-1.260E+02 - 9.040E+01)	0
	GAMMA 60						
	BE-7 60	N/A	5.448E-01 (56/56) (-2.300E+01 - 2.626E+01)	7S11	7.785E+00 (4/4) (-1.804E+00 - 2.497E+01)	-1.785E+01 (4/4) (-2.745E+01 - -1.007E+01)	0
	K-40 60	N/A	6.391E+00 (56/56) (-7.665E+01 - 8.754E+01)	12F3 5.2 MILES WSW	2.996E+01 (4/4) (5.555E+00 - 5.073E+01)	2.996E+01 (4/4) (5.555E+00 - 5.073E+01)	0
	MN-54 60	15	4.205E-02 (56/56) (-2.860E+00 - 2.792E+00)	11S2 0.4 MILES SW	1.472E+00 (4/4) (5.141E-01 - 2.749E+00)	-6.688E-01 (4/4) (-2.422E+00 - 9.668E-01)	0
	CO-58 60	15	-2.186E-01 (56/56) (-5.861E+00 - 5.396E+00)	6S10 0.4 MILES ESE	1.077E+00 (4/4) (-1.516E+00 - 5.396E+00)	-6.426E-01 (4/4) (-5.590E+00 - 2.296E+00)	0
	FE-59 60	30	2.562E-01 (56/56) (-9.320E+00 - 8.594E+00)	7S11	3.271E+00 (4/4) (7.425E-01 - 5.942E+00)	-1.283E+00 (4/4) (-4.769E+00 - 9.972E-01)	0
	CO-60 60	15	-7.992E-02 (56/56) (-2.555E+00 - 5.128E+00)	11S2 0.4 MILES SW	1.663E+00 (4/4) (-3.268E-01 - 5.128E+00)	1.314E-01 (4/4) (-1.316E+00 - 2.236E+00)	0
	ZN-65 60	30	-3.858E+00 (56/56) (-1.783E+01 - 4.325E+00)	6S12	-1.634E+00 (4/4) (-3.786E+00 - 2.509E-01)	-3.655E+00 (4/4) (-6.624E+00 - -1.165E+00)	0

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SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
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Reporting Period: December 28, 2011 to January 10, 2013

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICIATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASURMENTS(4)
Ground Water (cont'd) (pCi/l)	NB-95	60	15	9.375E-01 (56/56) (-5.998E+00 - 4.363E+00)	12F3 5.2 MILES WSW	2.651E+00 (4/4) (5.075E-01 - 6.947E+00)	2.651E+00 (4/4) (5.075E-01 - 6.947E+00)	0
	ZR-95	60	30	6.558E-01 (56/56) (-4.614E+00 - 7.669E+00)	4S4 0.5 MILES ENE	2.073E+00 (4/4) (-2.452E-01 - 3.678E+00)	6.958E-02 (4/4) (-2.519E+00 - 2.729E+00)	0
	I-131	60	60	-7.432E-01 (56/56) (-9.414E+00 - 6.231E+00)	7S11	1.826E+00 (4/4) (-3.711E+00 - 6.231E+00)	-5.911E-01 (4/4) (-2.766E+00 - 3.538E-01)	0
	CS-134	60	15	-1.391E+00 (56/56) (-1.359E+01 - 4.537E+00)	6S12	1.283E+00 (4/4) (-1.491E+00 - 4.537E+00)	-1.991E+00 (4/4) (-4.175E+00 - 3.803E-02)	0
	CS-137	60	18	-3.326E-01 (56/56) (-5.547E+00 - 3.280E+00)	6S11A	8.714E-01 (4/4) (-4.057E-01 - 3.280E+00)	-2.205E-01 (4/4) (-2.992E+00 - 1.488E+00)	0
	BA-140	60	60	-6.507E-01 (56/56) (-1.585E+01 - 1.470E+01)	8S4 0.1 MILES SSE	2.230E+00 (4/4) (-1.503E+00 - 4.525E+00)	-1.331E+00 (4/4) (-4.595E+00 - 3.024E+00)	0
	LA-140	60	15	8.982E-02 (56/56) (-7.549E+00 - 6.737E+00)	4S4 0.5 MILES ENE	1.804E+00 (4/4) (-1.522E+00 - 3.845E+00)	9.094E-01 (4/4) (-2.305E+00 - 3.567E+00)	0
	RA-226	60	N/A	4.086E+00 (56/56) (-6.237E+01 - 1.124E+02)	2S8	3.604E+01 (4/4) (1.697E-02 - 9.576E+01)	1.645E+01 (4/4) (-1.635E+01 - 5.104E+01)	0
	AC-228	60	N/A	7.255E-01 (56/56) (-1.266E+01 - 4.473E+01)	7S11	1.199E+01 (4/4) (-2.750E+00 - 4.473E+01)	-1.981E+00 (4/4) (-1.394E+01 - 4.826E+00)	0
	TH-228	60	N/A	2.972E+00 (56/56) (-6.899E+00 - 3.477E+01)	4S4 0.5 MILES ENE	9.446E+00 (4/4) (-1.237E+00 - 3.477E+01)	4.991E+00 (4/4) (-1.099E+00 - 1.028E+01)	0
Air Particulates (E-3 pCi/m^3)	GR-B	312	10	1.447E+01 (208/208) (4.410E+00 - 2.660E+01)	3S2 0.5 MILES NE	1.504E+01 (52/52) (4.410E+00 - 2.650E+01)	1.358E+01 (104/104) (5.190E+00 - 2.560E+01)	0

TABLE G
SUMMARY OF DATA FOR SSES
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LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA 2012

Reporting Period: December 28, 2011 to January 10, 2013

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICIATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASURMENTS(4)
Air Iodine	GAMMA	312						
(E-3 pCi/m^3)	I-131	312	70	1.541E-01 (208/208) (-9.456E+00 - 9.589E+00)	12S1 0.4 MILES WSW	3.612E-01 (52/52) (-8.576E+00 - 9.323E+00)	-3.867E-01 (104/104) (-9.688E+00 - 7.832E+00)	0
Air Particulates	GAMMA	24						
(E-3 pCi/m^3)	BE-7	24	N/A	1.037E+02 (16/16) (7.314E+01 - 1.455E+02)	3S2 0.5 MILES NE	1.156E+02 (4/4) (9.827E+01 - 1.455E+02)	1.035E+02 (8/8) (5.544E+01 - 1.473E+02)	0
	K-40	24	N/A	3.290E+00 (16/16) (-2.589E+00 - 1.688E+01)	8G1 12 MILES SSE	5.723E+00 (4/4) (-1.705E+00 - 1.128E+01)	4.206E+00 (8/8) (-2.532E+00 - 1.128E+01)	0
	MN-54	24	N/A	9.238E-02 (16/16) (-4.086E-01 - 6.144E-01)	13S6 0.4 MILES W	2.992E-01 (4/4) (1.277E-01 - 5.942E-01)	-1.072E-02 (8/8) (-3.344E-01 - 2.857E-01)	0
	CO-58	24	N/A	6.898E-02 (16/16) (-9.905E-01 - 1.454E+00)	13S6 0.4 MILES W	4.451E-01 (4/4) (-5.518E-01 - 1.454E+00)	3.297E-01 (8/8) (-1.403E+00 - 1.465E+00)	0
	FE-59	24	N/A	7.555E-01 (16/16) (-5.063E+00 - 4.652E+00)	13S6 0.4 MILES W	2.995E+00 (4/4) (1.986E+00 - 4.213E+00)	-1.838E+00 (8/8) (-3.775E+00 - 7.077E-01)	0
	CO-60	24	N/A	3.463E-03 (16/16) (-7.676E-01 - 4.794E-01)	8G1 12 MILES SSE	2.390E-01 (4/4) (8.487E-02 - 3.528E-01)	-9.554E-03 (8/8) (-6.824E-01 - 5.088E-01)	0
	ZN-65	24	N/A	4.371E-01 (16/16) (-1.972E+00 - 2.515E+00)	8G1 12 MILES SSE	9.603E-01 (4/4) (-1.007E+00 - 2.136E+00)	4.221E-01 (8/8) (-1.126E+00 - 2.136E+00)	0
	NB-95	24	N/A	2.807E-01 (16/16) (-1.018E+00 - 1.349E+00)	13S6 0.4 MILES W	6.836E-01 (4/4) (6.640E-02 - 1.349E+00)	4.100E-01 (8/8) (-1.621E-01 - 1.127E+00)	0
	ZR-95	24	N/A	-4.023E-01 (16/16) (-3.212E+00 - 1.381E+00)	12E1 4.7 MILES WSW	5.212E-01 (4/4) (-2.941E-02 - 9.215E-01)	-2.123E-01 (8/8) (-2.954E+00 - 1.057E+00)	0

TABLE G
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NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
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Reporting Period: December 28, 2011 to January 10, 2013

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICIATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASURMENTS(4)
Air Particulates (cont'd) (E-3 pCi/m^3)	CS-134	24	50	5.203E-01 (16/16) (-4.158E-01 - 1.157E+00)	12S1 0.4 MILES WSW	6.717E-01 (4/4) (3.503E-01 - 8.879E-01)	1.709E-01 (8/8) (-7.652E-01 - 8.963E-01)	0
	CS-137	24	60	-1.395E-02 (16/16) (-8.912E-01 - 5.645E-01)	12E1 4.7 MILES WSW	1.686E-01 (4/4) (-5.880E-02 - 5.466E-01)	5.219E-02 (8/8) (-5.780E-01 - 4.081E-01)	0
	BA-140	24	N/A	1.515E+01 (16/16) (-1.240E+02 - 1.538E+02)	12E1 4.7 MILES WSW	5.283E+01 (4/4) (-8.569E+00 - 1.538E+02)	-6.649E+00 (8/8) (-5.886E+01 - 6.620E+01)	0
	LA-140	24	N/A	2.178E+00 (16/16) (-2.465E+01 - 8.838E+01)	13S6 0.4 MILES W	1.998E+01 (4/4) (-1.409E+01 - 8.838E+01)	1.082E+01 (8/8) (-1.680E+01 - 3.298E+01)	0
	RA-226	24	N/A	-2.817E-01 (16/16) (-9.292E+00 - 8.965E+00)	6G1 13.5 MILES ESE	2.674E+00 (4/4) (-1.609E+01 - 2.815E+01)	1.419E+00 (8/8) (-1.609E+01 - 2.815E+01)	0
	AC-228	24	N/A	-2.821E-01 (16/16) (-2.251E+00 - 1.593E+00)	6G1 13.5 MILES ESE	1.031E+00 (4/4) (5.721E-02 - 2.801E+00)	5.113E-01 (8/8) (-6.720E-01 - 2.801E+00)	0
	TH-228	24	N/A	5.172E-01 (16/16) (-6.673E-01 - 2.114E+00)	3S2 0.5 MILES NE	7.591E-01 (4/4) (-6.673E-01 - 2.114E+00)	3.120E-01 (8/8) (-4.019E-01 - 1.073E+00)	0
Milk (pCi/l)	I-131	84	1	-3.714E-02 (63/63) (-5.010E-01 - 4.690E-01)	10D3 3.5 MILES SSW	2.053E-03 (21/21) (-2.590E-01 - 3.080E-01)	-8.387E-02 (21/21) (-3.990E-01 - 4.980E-01)	0
	GAMMA	84						
	K-40	84	N/A	1.311E+03 (63/63) (1.114E+03 - 1.487E+03)	13E3 5.0 MILES W	1.341E+03 (21/21) (1.190E+03 - 1.465E+03)	1.313E+03 (21/21) (1.151E+03 - 1.820E+03)	0
	MN-54	84	N/A	1.005E-01 (63/63) (-4.539E+00 - 5.355E+00)	5E2 4.5 MILES E	8.090E-01 (21/21) (-2.430E+00 - 4.934E+00)	6.336E-01 (21/21) (-2.950E+00 - 2.948E+00)	0
	CO-58	84	N/A	-6.741E-02 (63/63) (-7.084E+00 - 5.033E+00)	10D3 3.5 MILES SSW	3.611E-01 (21/21) (-2.352E+00 - 5.033E+00)	-3.340E-01 (21/21) (-5.567E+00 - 3.609E+00)	0

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Milk (cont'd) (pCi/l)	FE-59	84	N/A	1.370E-01 (63/63) (-1.224E+01 - 1.250E+01)	5E2 4.5 MILES E	1.522E+00 (21/21) (-1.083E+01 - 1.250E+01)	-6.563E-01 (21/21) (-1.604E+01 - 9.192E+00)	0
	CO-60	84	N/A	2.677E-01 (63/63) (-3.868E+00 - 4.130E+00)	10G1 14 MILES SSW	1.314E+00 (21/21) (-1.579E+00 - 5.852E+00)	1.314E+00 (21/21) (-1.579E+00 - 5.852E+00)	0
	ZN-65	84	N/A	-4.086E+00 (63/63) (-2.211E+01 - 1.268E+01)	5E2 4.5 MILES E	-2.215E+00 (21/21) (-1.251E+01 - 1.081E+01)	-2.584E+00 (21/21) (-1.391E+01 - 9.250E+00)	0
	NB-95	84	N/A	-1.955E-01 (63/63) (-4.573E+00 - 3.408E+00)	10G1 14 MILES SSW	1.048E+00 (21/21) (-3.652E+00 - 8.494E+00)	1.048E+00 (21/21) (-3.652E+00 - 8.494E+00)	0
	ZR-95	84	N/A	-1.382E-01 (63/63) (-9.027E+00 - 9.499E+00)	10D3 3.5 MILES SSW	5.253E-01 (21/21) (-2.895E+00 - 9.262E+00)	-1.691E-01 (21/21) (-6.162E+00 - 1.068E+01)	0
	CS-134	84	15	-2.137E+00 (63/63) (-1.889E+01 - 3.391E+00)	13E3 5.0 MILES W	-6.308E-01 (21/21) (-1.060E+01 - 2.648E+00)	-2.198E+00 (21/21) (-9.550E+00 - 4.616E+00)	0
	CS-137	84	18	8.591E-02 (63/63) (-3.367E+00 - 6.196E+00)	13E3 5.0 MILES W	6.324E-01 (21/21) (-2.865E+00 - 6.196E+00)	5.286E-01 (21/21) (-1.784E+00 - 3.241E+00)	0
	BA-140	84	60	2.574E+00 (63/63) (-2.423E+01 - 2.107E+01)	10D3 3.5 MILES SSW	3.038E+00 (21/21) (-1.885E+01 - 1.860E+01)	5.326E-01 (21/21) (-3.575E+01 - 1.693E+01)	0
	LA-140	84	15	3.356E-01 (63/63) (-1.246E+01 - 8.542E+00)	13E3 5.0 MILES W	8.961E-01 (21/21) (-3.749E+00 - 8.542E+00)	-1.367E+00 (21/21) (-5.957E+00 - 4.830E+00)	0
	RA-226	84	N/A	1.951E+00 (63/63) (-1.450E+02 - 1.603E+02)	13E3 5.0 MILES W	8.927E+00 (21/21) (-9.744E+01 - 1.603E+02)	5.670E+00 (21/21) (-9.391E+01 - 8.392E+01)	0
	AC-228	84	N/A	-2.290E-01 (63/63) (-2.159E+01 - 1.706E+01)	10D3 3.5 MILES SSW	2.172E+00 (21/21) (-8.295E+00 - 1.706E+01)	2.121E+00 (21/21) (-2.095E+01 - 2.156E+01)	0

TABLE G
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Reporting Period: December 28, 2011 to January 10, 2013

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Milk (cont'd) (pCi/l)	TH-228	84	N/A	2.218E+00 (63/63) (-8.970E+00 - 3.047E+01)	13E3 5.0 MILES W	3.593E+00 (21/21) (-7.898E+00 - 3.047E+01)	1.936E+00 (21/21) (-9.647E+00 - 2.711E+01)	0
Soil (pCi/kg dry)	GAMMA	4						
	K-40	4	N/A	1.312E+04 (2/2) (1.261E+04 - 1.362E+04)	12S1 0.4 MILES WSW	1.312E+04 (2/2) (1.261E+04 - 1.362E+04)	9.033E+03 (2/2) (8.447E+03 - 9.619E+03)	0
	MN-54	4	N/A	-1.328E+00 (2/2) (-9.366E+00 - 6.710E+00)	8G1 12 MILES SSE	5.280E+00 (2/2) (-1.029E+01 - 2.085E+01)	5.280E+00 (2/2) (-1.029E+01 - 2.085E+01)	0
	CO-58	4	N/A	-1.085E+01 (2/2) (-2.742E+01 - 5.716E+00)	8G1 12 MILES SSE	-8.100E-01 (2/2) (-1.961E+01 - 1.799E+01)	-8.100E-01 (2/2) (-1.961E+01 - 1.799E+01)	0
	FE-59	4	N/A	-2.040E+01 (2/2) (-2.816E+01 - -1.263E+01)	8G1 12 MILES SSE	4.197E+01 (2/2) (2.440E-02 - 8.391E+01)	4.197E+01 (2/2) (2.440E-02 - 8.391E+01)	0
	CO-60	4	N/A	-2.949E+01 (2/2) (-4.586E+01 - -1.312E+01)	8G1 12 MILES SSE	-4.192E+00 (2/2) (-4.769E+00 - -3.615E+00)	-4.192E+00 (2/2) (-4.769E+00 - -3.615E+00)	0
	ZN-65	4	N/A	-5.968E+01 (2/2) (-9.725E+01 - -2.210E+01)	8G1 12 MILES SSE	3.235E-01 (2/2) (-4.634E+00 - 5.281E+00)	3.235E-01 (2/2) (-4.634E+00 - 5.281E+00)	0
	NB-95	4	N/A	2.752E+01 (2/2) (2.146E+01 - 3.358E+01)	8G1 12 MILES SSE	3.626E+01 (2/2) (2.940E+01 - 4.311E+01)	3.626E+01 (2/2) (2.940E+01 - 4.311E+01)	0
	ZR-95	4	N/A	2.374E+01 (2/2) (3.519E+00 - 4.396E+01)	12S1 0.4 MILES WSW	2.374E+01 (2/2) (3.519E+00 - 4.396E+01)	2.193E+01 (2/2) (-1.390E+01 - 5.776E+01)	0
	CS-134	4	150	2.382E+01 (2/2) (1.992E+01 - 2.771E+01)	12S1 0.4 MILES WSW	2.382E+01 (2/2) (1.992E+01 - 2.771E+01)	4.004E+00 (2/2) (-4.872E+00 - 1.288E+01)	0

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Soil (cont'd) (pCi/kg dry)	CS-137	4	180	6.476E+01 (2/2) (5.596E+01 - 7.356E+01)	8G1 12 MILES SSE	8.895E+01 (2/2) (6.739E+01 - 1.105E+02)	8.895E+01 (2/2) (6.739E+01 - 1.105E+02)	0
	BA-140	4	N/A	-8.988E+01 (2/2) (-1.597E+02 - -2.005E+01)	8G1 12 MILES SSE	-8.880E+01 (2/2) (-1.236E+02 - -5.400E+01)	-8.880E+01 (2/2) (-1.236E+02 - -5.400E+01)	0
	LA-140	4	N/A	-2.468E+01 (2/2) (-3.133E+01 - -1.802E+01)	8G1 12 MILES SSE	-9.840E+00 (2/2) (-7.148E+01 - 5.180E+01)	-9.840E+00 (2/2) (-7.148E+01 - 5.180E+01)	0
	RA-226	4	N/A	1.969E+03 (2/2) (1.520E+03 - 2.418E+03)	8G1 12 MILES SSE	2.397E+03 (2/2) (2.305E+03 - 2.488E+03)	2.397E+03 (2/2) (2.305E+03 - 2.488E+03)	0
	AC-228	4	N/A	9.388E+02 (2/2) (8.446E+02 - 1.033E+03)	12S1 0.4 MILES WSW	9.388E+02 (2/2) (8.446E+02 - 1.033E+03)	7.947E+02 (2/2) (6.463E+02 - 9.430E+02)	0
	TH-228	4	N/A	9.157E+02 (2/2) (9.119E+02 - 9.194E+02)	12S1 0.4 MILES WSW	9.157E+02 (2/2) (9.119E+02 - 9.194E+02)	8.769E+02 (2/2) (7.237E+02 - 1.030E+03)	0
Food/Garden Crops (pCi/kg wet)	GAMMA	2						
	BE-7	2	N/A	-4.820E+01 (2/2) (-1.210E+02 - 2.460E+01)	12F7 8.3 MILES WSW	-4.820E+01 (2/2) (-1.210E+02 - 2.460E+01)	Only indicator stations sampled for this medium.	0
	K-40	2	N/A	4.003E+03 (2/2) (2.802E+03 - 5.204E+03)	12F7 8.3 MILES WSW	4.003E+03 (2/2) (2.802E+03 - 5.204E+03)		0
	MN-54	2	N/A	6.016E+00 (2/2) (4.927E-01 - 1.154E+01)	12F7 8.3 MILES WSW	6.016E+00 (2/2) (4.927E-01 - 1.154E+01)		0
	CO-58	2	N/A	4.181E+00 (2/2) (-3.734E-01 - 8.736E+00)	12F7 8.3 MILES WSW	4.181E+00 (2/2) (-3.734E-01 - 8.736E+00)		0

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Food/Garden Crops (cont'd) (pCi/kg wet)	FE-59	2	N/A	-4.995E+00 (2/2) (-5.856E+00 - -4.134E+00)	12F7 8.3 MILES WSW	-4.995E+00 (2/2) (-5.856E+00 - -4.134E+00)	Only indicator stations sampled for this medium.	0
	CO-60	2	N/A	-1.596E+00 (2/2) (-3.525E+00 - 3.332E-01)	12F7 8.3 MILES WSW	-1.596E+00 (2/2) (-3.525E+00 - 3.332E-01)		0
	ZN-65	2	N/A	-2.428E+01 (2/2) (-4.745E+01 - -1.107E+00)	12F7 8.3 MILES WSW	-2.428E+01 (2/2) (-4.745E+01 - -1.107E+00)		0
	NB-95	2	N/A	2.279E+00 (2/2) (1.485E+00 - 3.072E+00)	12F7 8.3 MILES WSW	2.279E+00 (2/2) (1.485E+00 - 3.072E+00)		0
	ZR-95	2	N/A	2.630E+00 (2/2) (2.947E-01 - 4.965E+00)	12F7 8.3 MILES WSW	2.630E+00 (2/2) (2.947E-01 - 4.965E+00)		0
	I-131	2	60	3.795E+00 (2/2) (2.671E+00 - 4.919E+00)	12F7 8.3 MILES WSW	3.795E+00 (2/2) (2.671E+00 - 4.919E+00)		0
	CS-134	2	60	1.173E+00 (2/2) (-1.322E+00 - 3.667E+00)	12F7 8.3 MILES WSW	1.173E+00 (2/2) (-1.322E+00 - 3.667E+00)		0
	CS-137	2	80	4.977E+00 (2/2) (4.106E+00 - 5.847E+00)	12F7 8.3 MILES WSW	4.977E+00 (2/2) (4.106E+00 - 5.847E+00)		0
	BA-140	2	N/A	6.432E+00 (2/2) (3.705E+00 - 9.158E+00)	12F7 8.3 MILES WSW	6.432E+00 (2/2) (3.705E+00 - 9.158E+00)		0
	LA-140	2	N/A	1.203E+00 (2/2) (-1.835E+00 - 4.241E+00)	12F7 8.3 MILES WSW	1.203E+00 (2/2) (-1.835E+00 - 4.241E+00)		0
	AC-228	2	N/A	8.193E+00 (2/2) (-7.575E+00 - 2.396E+01)	12F7 8.3 MILES WSW	8.193E+00 (2/2) (-7.575E+00 - 2.396E+01)		0

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Food/Garden Crops (cont'd) (pCi/kg wet)	TH-228 2	N/A	2.009E+01 (2/2) (1.034E+01 - 2.984E+01)	12F7 8.3 MILES WSW	2.009E+01 (2/2) (1.034E+01 - 2.984E+01)	Only indicator stations sampled for this medium.	0

1. The total number of analyses does not include duplicates, splits, or repeated analyses.
2. The Technical Requirement LLD's are shown when applicable.
3. The mean and range are based on all available measured results. The ratio indicted in parentheses is the total number of results used to calculate the mean to the total number of samples.
4. USNRC Reporting Levels are specified in the Technical Requirements (i.e.: when Reporting Levels in Technical Requirements are exceeded.

APPENDIX H

COMPARISON OF INDICATOR AND CONTROL 2012 REMP ANNUAL MEANS FOR SELECTED MEDIA ANALYSIS RESULTS WITH MEANS FROM PREOPERATIONAL AND PRIOR OPERATIONAL PERIODS

The data presented in the following tables were included if specific analysis results routinely exceeded the applicable MDCs in 2012 and/or routinely may have done so in previous years. The comparisons may be useful for observing any step changes that may occur in the environment over a long period. However, the importance attached to these comparisons should be tempered by the understanding that changes in methods of analysis, typical MDCs achieved by the analyses, and averaging methods over the years may tend to blur the picture in some cases.

AMBIENT RADIATION MONITORING

TABLE H 1

AMBIENT RADIATION LEVELS AS MEASURED BY OSLDS (mR/STD QTR)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-11**	**2012**	**1978-81**	**1982-11**	**2012**
Range	18.5-19.2	14.7-24.3	--	15.0-17.9	14.8-23.1	--
Mean	18.9	19.3	16.6	16.3	18.7	14.2

AQUATIC PATHWAY MONITORING

TABLE H 3

SURFACE WATER IODINE-131 ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979-81	**1982-07**	**2008***	**1979-81**	**1982-07**	**2008***
Range	0.24-0.37	0.06-1.00	--	0.29-0.43	0.03-1.0	--
Mean	0.29	0.39	0.48	0.36	0.34	0.34

* Iodine-131 analysis discontinued in 2009.

TABLE H 4

SURFACE WATER TRITIUM ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-11***	**2012**	**1978-81**	**1982-11***	**2012**
Range	101-122	126-2104	--	119-319	-239 - 212	--
Mean	109	799	1090	171	41	52.8

*1990 results were not averaged with 1982-07 data because the validity of the 1990 values is questionable in some instances. Laboratory analysis error is suspected. See the 1990 Annual Report.

TABLE H 6

DRINKING WATER GROSS BETA ACTIVITIES (pCi/l)			
Period	**Preoperational**	**Operational**	
	1977 - 81	**1982-11**	**2012**
Range	2.2 - 3.2	1.9 - 5.4	--
Mean	2.7	2.9	1.9

TABLE H 7

DRINKING WATER TRITIUM ACTIVITIES (pCi/l)			
Period	**Preoperational**	**Operational**	
	1977 - 81	**1982-11**	**2012**
Range	101 – 194	-247 - 220	--
Mean	132	54	69.6

TABLE H 8

FISH POTASSIUM-40 ACTIVITIES (pCi/g wet)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1977-81	**1982-11**	**2012**	**1977-81**	**1982-11**	**2012**
Range	2.7 - 3.5	3.1 - 5.3	--	2.8 - 3.6	2.7 - 4.2	--
Mean	3.2	3.7	4.3	3.2	3.5	4.2

TABLE H 9

SEDIMENT POTASSIUM-40 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-11**	**2012**	**1978-81**	**1982-11**	**2012**
Range	8.6-10.4	7.4-13.8	--	7.5-11.0	6.2-15.7	--
Mean	9.3	11.1	12.4	7.7	11.5	17.2

TABLE H 10

SEDIMENT RADIUM-226 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-11**	**2012**	**1978-81**	**1982-11**	**2012**
Range	0.5-0.7	0.5-3.2	--	0.6-1.9	0.4-2.9	--
Mean	0.6	1.8	2.2	0.7	1.7	2.8

TABLE H 11

SEDIMENT THORIUM-228 ACTIVITIES (pCi/g dry)				
Location	**Indicator**		**Control**	
Period	**1984 – 11***	**2012**	**1984 - 11***	**2012**
Range	0.9 – 3.2	--	0.8 – 3.1	--
Mean	1.3	1.2	1.3	1.5

*Th-232 was reported instead of Th-228 in 1990.

TABLE H 12

SEDIMENT CESIUM-137 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-11**	**2012**	**1978-81**	**1982-11**	**2012**
Range	0.08-0.15	0.02-0.17	--	0.08-0.21	0.04-0.21	--
Mean	0.10	0.07	0.05	0.11	0.10	0.12

ATMOSPHERIC PATHWAY MONITORING

TABLE H 13

AIR PARTICULATE GROSS BETA ACTIVITIES (E-3 pCi/m3)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-11**	**2012**	**1978-81**	**1982-11**	**2012**
Range	24 - 97	13 – 28.8	--	24 - 102	12 – 27.7	--
Mean	61	15.8	14.5	62	15.0	13.6

TABLE H 14

AIR PARTICULATE BERYLLIUM-7 ACTIVITIES (E-3 pCi/m3)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-11***	**2012**	**1978-81**	**1982-11***	**2012**
Range	69 - 81	50 - 137	--	59 - 85	49 - 134	--
Mean	76	101	104	72	95	104

*1990 results were not averaged with 1982-07 data because the validity of the 1990 values is questionable in some instances. Laboratory analysis error is suspected. See the 1990 Annual Report.

TERRESTRIAL PATHWAY MONITORING

TABLE H 15

SOIL POTASSIUM-40 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1984-11**	**2012**	**1979&81**	**1984-11**	**2012**
Range	9.2 - 9.7	9.4-15.3	--	9.1-11.0	7.4-14.1	--
Mean	9.5	11.9	13.1	10.1	10.3	9.0

TABLE H 16

SOIL RADIUM-226 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1984-11***	**2012**	**1979&81**	**1984-11***	**2012**
Range	0.8 - 1.3	0.8 – 3.1	--	0.8 - 1.2	1.0 - 2.2	--
Mean	1.1	1.62	2.0	1.0	1.8	2.4

* Radium-226 was not detected (ND) in 2002, 2003, 2004, or 2005.

TABLE H 17

SOIL THORIUM-228 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1984-11**	**2012**	**1979&81**	**1984-11**	**2012**
Range	0.9 - 1.3	0.8 – 2.0	--	--	0.7 – 2.4	--
Mean	1.1	1.0	0.9	1.0	1.0	0.9

TABLE H 18

SOIL CESIUM-137 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1982-11**	**2012**	**1979&81**	**1982-11**	**2012**
Range	0.5 - 0.7	0.02 - 0.45	--	0.2 - 1.2	0.07 - 1.2	--
Mean	0.6	0.18	0.06	0.7	0.3	0.09

TABLE H 19

MILK POTASSIUM-40 ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1985-11**	**2012**	**1978-81**	**1985-11**	**2012**
Range	1222-1500	1241-1422	--	1273-1500	1247-1472	--
Mean	1325	1328	1311	1390	1336	1313

TABLE H 20

GROUND WATER TRITIUM ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1980-81	**1982-11**	**2012**	**1980-81**	**1982-11**	**2012**
Range	94-109	-206 - +180	--	117 - 119	-206 - +260	--
Mean	101	57.8	58.4	118	47.0	-5.87

APPENDIX I

SPECIFIC ANALYSIS RESULTS TABULATED BY MEDIA AND SAMPLING PERIOD

Results of analyses are generally reported in the following tables to two significant figures. Random uncertainties of counting are reported to the same decimal place as the result.

Calculated values for analysis results are reported with the random uncertainty of counting at two standard deviations (2S), determined by considering both the sample and background count rates. The uncertainty of an activity is influenced by the volume or mass of the sample, the background count rate, the count times, the method used to round off the value obtained to reflect its degree of significance, and other factors. The uncertainties of activities determined by gamma spectrometric analyses are also influenced by the relative concentrations of the radionuclides in the sample, the energies and intensities of the gammas emitted by those radionuclides, and the assumptions used in selecting the radionuclides to be quantitatively determined.

Results reported as less than (<) in these tables are below the minimum detectable concentrations (MDCs). The MDC is an estimate of the detection capabilities of the overall measurement method, taking into account not only the counting system, but also the characteristics of the sample being counted. When the MDC is used as the level to decide whether or not to enter a measured value into a table, there is a 50% chance that the value will be entered when the actual sample activity is equivalent to the MDC. There is only a five percent chance that a value representing a fluctuation in background activity will be entered as sample activity in such an instance.

Measured values for the activities of specific radionuclides, such as the man-made gamma-emitting radionuclides iodine-131 and cesium-137, only appear in the following tables for each specific medium when the levels that are measured exceed the MDC values for those measurements and those radionuclides are actually identified as present in the samples. Measured values for the analyses that are not radionuclide specific, such as gross alpha and beta analyses, also are presented in the tables for specific media only when the levels that are measured actually exceed the MDCs.

TABLE I-1
ENVIRONMENTAL OPTICALLY STIMULATED LUMINESCENCE DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION, 2012

Results (1) are in mR/std. qtr (2) ± 2S (3)

Location	First Quarter 1/18/2012 to 4/17/2012	Second Quarter 4/16/2012 to 7/12/2012	Third Quarter 7/10/2012 to 10/4/2012	Fourth Quarter 10/3/2012 to 1/10/2013
ONSITE				
1S2	20.8 ± 0.5	19.7 ± 0.4	23.2 ± 0.5	18.3 ± 0.4
2S2	12.1 ± 1.7	15.6 ± 0.1	14.5 ± 1.0	13.0 ± 1.2
2S3	18.9 ± 1.2	18.6 ± 1.2	20.9 ± 1.4	15.9 ± 1.5
3S2	12.2 ± 0.0	16.5 ± 1.2	13.3 ± 3.0	11.5 ± 1.3
3S3	10.5 ± 1.3	13.4 ± 1.8	13.1 ± 0.9	11.5 ± 0.3
4S3	17.4 ± 0.4	22.3 ± 1.5	21.9 ± 0.2	19.1 ± 1.0
4S6	13.5 ± 0.6	15.2 ± 0.6	13.8 ± 1.0	13.0 ± 0.1
5S4	9.9 ± 0.5	13.2 ± 0.4	12.1 ± 0.2	11.7 ± 1.0
5S7	13.2 ± 1.3	16.0 ± 0.6	17.1 ± 3.3	13.9 ± 0.2
6S4	22.8 ± 0.9	24.9 ± 0.7	24.0 ± 0.1	21.1 ± 0.7
6S9	22.6 ± 2.5	25.3 ± 0.7	22.4 ± 3.0	21.1 ± 0,3
7S6	19.6 ± 0.1	22.1 ± 1.3	21.2 ± 1.0	17.5 ± 1.3
7S7	11.6 ± 0.8	13.0 ± 0.3	14.9 ± 2.2	11.6 ± 0.6
8S2	20.9 ± 0.1	24.8 ± 1.2	24.0 ± 1.2	19.6 ± 0.6
9S2	40.7 ± 0.4	38.6 ± 1.7	40.2 ± 0.1	28.9 ± 0.5
10S1	12.4 ± 0.3	14.9 ± 3.2	14.6 ± 0.6	12.8 ± 0.3
10S2	31.1 ± 2.1	32.6 ± 1.0	29.5 ± 3.3	24.6 ± 3.1
11S7	12.6 ± 0.4	17.1 ± 0.7	15.1 ± 0.6	9.7 ± 0.9
12S1	14.8 ± 0.6	18.4 ± 1.2	15.2 ± 0.2	14.2 ± 1.9
12S3	14.9 ± 0.9	20.8 ± 0.1	19.4 ± 1.6	16.6 ± 1.9
12S7	12.2 ± 0.6	14.5 ± 2.1	13.6 ± 0.3	11.9 ± 1.4
13S2	23.7 ± 2.6	28.9 ± 5.6	25.8 ± 2.7	22.8 ± 0.1
13S5	23.0 ± 1.3	27.7 ± 0.9	24.5 ± 2.7	23.0 ± 1.3
13S6	18.1 ± 1.1	22.7 ± 0.7	17.5 ± 0.0	18.3 ± 1.0
14S5	18.2 ± 1.3	21.3 ± 1.7	18.6 ± 1.8	18.7 ± 1.4
15S5	14.1 ± 0.9	20.4 ± 0.8	14.3 ± 3.6	15.3 ± 0.2
16S1	17.9 ± 1.6	16.7 ± 1.1	21.6 ± 1.4	18.1 ± 0.2
16S2	18.6 ± 2.7	21.6 ± 0.7	22.2 ± 0.6	19.2 ± 0.8

See the comments at the end of this table.

TABLE I-1
ENVIRONMENTAL OPTICALLY STIMULATED LUMINESCENCE DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION, 2012

Results (1) are in mR/std. qtr (2) ± 2S (3)

Location	First Quarter 1/18/2012 to 4/17/2012	Second Quarter 4/16/2012 to 7/12/2012	Third Quarter 7/10/2012 to 10/4/2012	Fourth Quarter 10/3/2012 to 1/10/2013
ONSITE				
0-1 MILE OFFSITE				
6A4	14.0 ± 0.0	17.9 ± 2.2	15.1 ± 0.1	16.2 ± 0.3
8A3	11.0 ± 0.0	13.4 ± 0.1	12.7 ± 0.3	11.1 ± 0.8
15A3	11.2 ± 1.6	12.8 ± 0.6	11.9 ± 0.8	11.8 ± 0.6
16A2	10.8 ± 0.0	12.9 ± 0.1	12.3 ± 0.5	11.0 ± 0.1
1-2 MILES OFFSITE				
8B2	11.2 ± 0.6	11.5 ± 1.4	10.9 ± 0.7	11.8 ± 1.5
9B1	14.3 ± 1.9	21.2 ± 4.3	16.5 ± 0.3	18.6 ± 1.4
10B3	10.6 ± 0.4	15.0 ± 2.2	12.0 ± 0.3	12.2 ± 0.3
2-4 MILES OFFSITE				
1D5	13.9 ± 1.1	16.0 ± 2.9	15.8 ± 0.1	15.1 ± 1.2
8D3	13.3 ± 0.4	14.0 ± 1.2	14.5 ± 0.7	13.9 ± 0.8
9D4	13.7 ± 1.0	17.0 ± 0.1	13.5 ± 0.4	15.2 ± 0.6
10D1	13.2 ± 0.0	13.5 ± 1.1	14.3 ± 1.2	14.0 ± 1.0
12D2	13.3 ± 0.1	15.2 ± 1.0	16.8 ± 0.3	14.2 ± 0.5
14D1	12.9 ± 0.8	17.6 ± 1.8	14.8 ± 1.3	14.7 ± 0.7
4-5 MILES OFFSITE				
3E1	9.8 ± 0.9	10.6 ± 0.6	12.2 ± 2.0	11.2 ± 1.8
4E2	14.1 ± 0.1	14.8 ± 0.4	16.7 ± 0.8	15.1 ± 1.2
5E2	12.4 ± 0.6	14.2 ± 0.6	13.8 ± 0.5	14.1 ± 1.8
6E1	14.3 ± 0.9	17.4 ± 0.9	14.9 ± 3.8	15.3 ± 0.1
7E1	16.0 ± 1.1	15.2 ± 0.4	13.9 ± 0.0	16.5 ± 0.3
11E1	9.1 ± 1.0	11.8 ± 0.4	9.5 ± 1.3	11.1 ± 0.2
12E1	12.2 ± 1.3	16.3 ± 1.8	11.6 ± 0.7	12.8 ± 0.1
13E4	15.7 ± 1.2	19.2 ± 1.9	16.0 ± 1.3	15.6 ± 0.1

See the comments at the end of this table.

TABLE I-1
ENVIRONMENTAL OPTICALLY STIMULATED LUMINESCENCE DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results (1) are in mR/std. qtr (2) ± 2S (3)

Location	First Quarter 1/18/2012 to 4/17/2012	Second Quarter 4/16/2012 to 7/12/2012	Third Quarter 7/10/2012 to 10/4/2012	Fourth Quarter 10/3/2012 to 1/10/2013
ONSITE				
5-10 MILES OFFSITE				
2F1	12.6 ± 0.4	14.3 ± 0.9	14.4 ± 1.2	13.2 ± 0.1
15F1	15.0 ± 0.0	20.5 ± 1.3	18.1 ± 1.3	15.9 ± 0.8
16F1	18.2 ± 1.1	20.1 ± 1.2	18.1 ± 2.2	14.4 ± 2.9
10-20 MILES OFFSITE				
3G4	15.8 ± 1.6	17.7 ± 1.0	14.8 ± 0.7	16.4 ± 0.8
4G1	15.5 ± 0.1	16.2 ± 1.7	17.9 ± 1.9	17.6 ± 0.2
7G1	13.1 ± 0.9	14.5 ± 0.4	14.6 ± 1.1	14.0 ± 1.4
12G1	10.4 ± 0.1	9.5 ± 0.4	11.4 ± 0.3	12.1 ± 1.4
12G4	12.1 ± 1.1	13.8 ± 0.1	12.9 ± 0.1	14.1 ± 0.5

See the comments at the end of this table.

Location				
INDICATOR				
Average (5)	15.6 ± 7.8	18.3 ± 11.3	17.1 ± 11.1	15.5 ± 7.9
CONTROL				
Average (5)	13.4 ± 2.1	14.4 ± 2.1	14.3 ± 2.3	14.8 ± 2.2

COMMENTS

(1) Individual monitor location results are normally the average of the elemental doses of four elements from the two OSLs assigned to each monitoring location.

(2) A standard (std.) quarter (qtr.) is considered to be 91.25 days. Results obtained for monitoring periods of other durations are normalized by multiplying them by 91.25/x, where x is the actual duration in days of the period.

(3) Uncertainties for individual monitoring location results are two standard deviations of the elemental doses of four elements from the two OSLs assigned to each monitoring location, representing the variability between the elemental doses of each of the four OSL elements.

(4) No measurement could be made at this location because the OSLs were lost, stolen, or damaged. Refer to Appendix A of the Annual Radiological Environmental Operating Report for an explanation of program exceptions to REMP.

(5) Uncertainties associated with quarterly indicator and control averages are two standard deviations, representing the variability between the results of the individual monitoring locations.

TABLE I-2
TRITIUM AND GAMMA SPECTROSCOPIC ANALYSES OF SURFACE WATER
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	H-3	OTHER ACTIVITY		COMMENTS
6S6	12/27/11 - 01/24/12	< 121			
2S7	12/27/11 - 01/24/12	1450 ± 175			
6S5	01/03/12 - 01/24/12	< 130	K-40	54 ± 34	
6S6	01/24/12 - 02/28/12	< 135	RA-226	88 ± 49	
2S7	01/24/12 - 02/28/12	801 ± 117			
6S5	01/31/12 - 02/28/12	< 133			
4S7-GRAB	02/13/12 - 02/13/12	160 ± 89	K-40	73 ± 47	
LTAW-GRAB	02/13/12 - 02/13/12	< 137			
5S12-GRAB	02/13/12 - 02/13/12	< 137			
7S12-GRAB	02/13/12 - 02/13/12	< 137			
6S6	02/28/12 - 03/27/12	< 128			
2S7	02/28/12 - 03/27/12	463 ± 99	TH-228	5 ± 3	
6S5	03/06/12 - 03/27/12	< 127			
6S6	03/27/12 - 04/24/12	< 145			
2S7	03/27/12 - 04/24/12	4540 ± 401			
6S5	04/03/12 - 04/24/12	187 ± 105			
6S6	04/24/12 - 05/01/12	< 137			
2S7	04/24/12 - 05/29/12	4590 ± 402			
6S5	05/01/12 - 05/29/12	< 138			
4S7-GRAB	05/07/12 - 05/07/12	< 142			
LTAW-GRAB	05/07/12 - 05/07/12	< 145			
5S12-GRAB	05/07/12 - 05/07/12	< 145			
7S12-GRAB	05/07/12 - 05/07/12	< 142			
6S6	05/08/12 - 05/29/12	< 140			
2S7	05/29/12 - 06/26/12	8520 ± 716	TH-228	7 ± 3	
6S6	06/01/12 - 06/26/12	< 133	TH-228	4 ± 3	
6S5	06/05/12 - 06/26/12	< 135			
2S7	06/12/12 - 06/19/12	144 ± 89			

TABLE I-2
TRITIUM AND GAMMA SPECTROSCOPIC ANALYSES OF SURFACE WATER
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	H-3	OTHER ACTIVITY		COMMENTS
6S6	06/26/12 - 07/24/12	< 135			
2S7	06/26/12 - 07/24/12	3380 ± 307			
6S5	07/03/12 - 07/24/12	< 139			
6S6	07/24/12 - 08/28/12	< 119			
2S7	07/24/12 - 08/28/12	1510 ± 155			
6S5	07/31/12 - 08/28/12	178 ± 81			
4S7- GRAB	08/10/12 - 08/10/12	286 ± 101			
LTAW-GRAB	08/10/12 - 08/10/12	195 ± 97			
5S12-GRAB	08/10/12 - 08/10/12	< 148			
7S12-GRAB	08/10/12 - 08/10/12	< 124			
6S6	08/28/12 - 09/25/12	< 137			
2S7	08/28/12 - 09/25/12	495 ± 104			
6S5	09/04/12 - 09/25/12	< 134			
6S6	09/25/12 - 10/23/12	< 144	TH-228	3 ± 2	
2S7	09/25/12 - 10/23/12	472 ± 117			
6S5	10/02/12 - 10/23/12	< 144	TH-228	6 ± 3	
4S7- GRAB	10/29/12 - 10/29/12	290 ± 102			
LTAW-GRAB	10/29/12 - 10/29/12	190 ± 99			
5S12-GRAB	10/29/12 - 10/29/12	< 149			
7S12-GRAB	10/29/12 - 10/29/12	< 128			

TABLE I-2
TRITIUM AND GAMMA SPECTROSCOPIC ANALYSES OF SURFACE WATER
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	H-3	OTHER ACTIVITY		COMMENTS
6S6	10/23/12 - 11/27/12	< 150			
2S7	10/23/12 - 11/27/12	3630 ± 331			
6S5	10/30/12 - 11/27/12	< 140	K-40	41 ± 25	
6S6	11/27/12 - 12/24/12	< 135			
2S7	11/27/12 - 12/24/12	12400 ± 1030			
6S5	12/04/12 - 12/24/12	< 136			

TABLE I-3
IODINE-131 ANALYSES OF SURFACE WATER
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	COMMENTS
		INTENTIONALLY LEFT BLANK	DISCONTINUED I-131 ANALYSIS IN 2009

TABLE I-4
GROSS BETA,TRITIUM, GAMMA SPECTROSCOPIC ANALYSES OF DRINKING WATER
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	Gr-B	H-3	OTHER ACTIVITY	COMMENTS
12H2	12/27/2011 - 1/24/2012	1.5 ± 0.9	< 117		
12H2	1/24/2012 - 2/28/2012	< 2.2	< 131		
12H2	2/28/2012 - 3/27/2012	< 3.0	< 126		
12H2	3/27/2012 - 4/24/2012	3.7 ± 1.3	< 136		
12H2	4/24/2012 - 5/29/2012	< 2.1	< 136		
12H2	5/29/2012 - 6/26/2012	< 2.8	< 134		
12H2	6/26/2012 - 7/24/2012	< 2.5	< 132		
12H2	7/24/2012 - 8/28/2012	< 2.1	< 122		
12H2	8/28/2012 - 9/25/2012	3.7 ± 1.1	< 133		
12H2	9/25/2012 - 10/23/2012	< 2.7	< 139		
12H2	10/23/2012 - 11/27/2012	< 2.8	< 148		
12H2	11/27/2012 - 12/24/2012	3.8 ± 2.2	< 143		

TABLE I-5
GAMMA SPECTROSCOPIC ANALYSIS OF FISH
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/kg (wet) ± 2S

LOCATION	SAMPLE TYPE	COLLECTION DATE	K-40	OTHER ACTIVITY	COMMENTS
IND	smallmouth bass	5/23/2012 - 5/23/2012	3922 ± 744		
IND	channel catfish	5/23/2012 - 5/23/2012	5299 ± 1044		
IND	shorthead redhorse	5/25/2012 - 5/25/2012	4234 ± 926		
2H	smallmouth bass	5/30/2012 - 5/30/2012	4924 ± 949		
2H	channel catfish	5/30/2012 - 5/30/2012	5356 ± 996		
2H	shorthead redhorse	5/30/2012 - 5/30/2012	4477 ± 1230		
IND	smallmouth bass	10/10/2012 - 10/10/2012	4600 ± 1036		
IND	channel catfish	10/11/2012 - 10/11/2012	4185 ± 965		
IND	shorthead redhorse	10/11/2012 - 10/11/2012	3605 ± 757		
2H	smallmouth bass	10/17/2012 - 10/17/2012	3855 ± 1018		
2H	channel catfish	10/17/2012 - 10/17/2012	3042 ± 834		
2H	shorthead redhorse	10/17/2012 - 10/17/2012	3450 ± 679		
LTAW	largemouth bass	10/18/2012 - 10/18/2012	4486 ± 1057		
LTAW	rainbow trout	10/18/2012 - 10/18/2012	4450 ± 951		

TABLE I-6
GAMMA SPECTROSCOPIC ANALYSES OF SHORELINE SEDIMENT
SUSQUEHANNA STEAM ELECTRIC STATION, 2011
Results in pCi/kg (dry) ± 2S

LOCATION	COLLECTION DATE	K-40	Cs-137	Ra-226	Th-228	OTHER ACTIVITY		
2B	4/18/2012	18450 ± 1059	77 ± 39	2982 ± 955	1572 ± 80	AC-228	1283 ± 216	
2B	10/26/2012	16020 ± 1116	157 ± 73	2647 ± 928	1450 ± 84	AC-228	1476 ± 230	
7B	4/18/2012	7777 ± 555	65 ± 33	1692 ± 555	751 ± 43	AC-228	717 ± 121	
7B	10/26/2012	16840 ± 1068		3445 ± 1079	1496 ± 90	AC-228	1516 ± 222	
12F	4/18/2012	15480 ± 1313		2733 ± 1375	1461 ± 101	AC-228	1302 ± 277	BE-7 2757 ± 547
12F	10/26/2012	9635 ± 1004			1132 ± 91	AC-228	892 ± 230	

TABLE I-7
TRITIUM AND GAMMA SPECTROSCOPIC ANALYSES OF GROUND WATER
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	H-3	OTHER ACTIVITY	
12F3	02/13/12	< 135		
2S2	02/13/12	< 133		
4S4	02/13/12	< 134	TH-228	35 ± 21
6S10	02/13/12	< 135		
11S2	02/13/12	< 137		
6S11A	02/14/12	128 ± 80		
6S12	02/14/12	< 123		
7S10	02/14/12	156 ± 81		
7S11	02/14/12	< 124		
4S9	02/15/12	166 ± 82		
13S7	02/16/12	226 ± 86		
1S3	02/16/12	241 ± 85		
4S8	02/16/12	222 ± 84	TH-228	27 ± 17
8S4	02/16/12	146 ± 76	K-40	88 ± 56
2S8	02/17/12	< 133		
12F3	05/07/12	< 141		
2S2	05/07/12	< 144		
4S4	05/07/12	< 140		
6S10	05/07/12	< 141		
11S2	05/07/12	< 141		
13S7	05/08/12	< 143		
1S3	05/08/12	< 143		
4S8	05/08/12	< 142		
8S4	05/08/12	< 136		
4S9	05/09/12	< 141		
6S12	05/09/12	< 141		
2S8	05/10/12	< 142		
6S11A	05/10/12	< 143		
7S10	05/10/12	< 143		
7S11	05/10/12	< 143	AC-228	45 ± 15

TABLE I-7
TRITIUM AND GAMMA SPECTROSCOPIC ANALYSES OF GROUND WATER
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	H-3	OTHER ACTIVITY	
12F3	08/10/12	< 119		
2S2	08/10/12	< 119		
4S4	08/10/12	< 118		
6S10	08/10/12	< 120		
11S2	08/10/12	< 119		
4S9	08/14/12	< 146		
7S10	08/14/12	< 146		
7S11	08/14/12	< 146		
13S7	08/15/12	< 150		
1S3	08/15/12	< 146		
4S8	08/15/12	< 148		
8S4	08/15/12	< 144		
6S11A	08/16/12	< 144		
6S12	08/16/12	< 145		
2S8	08/31/12	< 106		
12F3	10/29/12	< 144		
2S2	10/29/12	< 142		
4S4	10/29/12	< 145		
6S10	10/29/12	< 142		
11S2	10/29/12	< 144		
4S9	10/31/12	< 149		
6S12	10/31/12	< 144		
7S10	10/31/12	< 145	TH-228	6 ± 3
7S11	10/31/12	< 148		
13S7	11/01/12	< 146		
1S3	11/01/12	259 ± 99	TH-228	5 ± 2
4S8	11/01/12	201 ± 100		
8S4	11/01/12	< 139		
2S8	11/02/12	< 143		
6S11A	11/02/12	< 149		

TABLE I-8
GROSS BETA ANALYSES OF AIR PARTICULATE FILTERS
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in E-03 pCi/cu.m. ± 2S

MONTH	COLLECTION DATE	3S2	6G1	8G1	12E1	12S1	13S6
JAN	12/28/11 - 01/04/12	14.5 ± 2.2	12.6 ± 2.1	12.9 ± 2.4	13.0 ± 2.1	12.7 ± 2.2	14.3 ± 2.2
JAN	01/04/12 - 01/11/12	17.1 ± 2.6	12.2 ± 2.2	17.7 ± 2.6	12.0 ± 2.1	14.6 ± 2.4	13.9 ± 2.3
JAN	01/11/12 - 01/18/12	10.3 ± 2.1	10.6 ± 2.0	11.4 ± 2.3	10.4 ± 1.9	11.2 ± 2.1	12.4 ± 2.1
JAN	01/18/12 - 01/25/12	13.7 ± 2.2	10.7 ± 1.9	12.5 ± 2.2	11.4 ± 2.1	13.9 ± 2.1	12.5 ± 2.0
JAN	01/25/12 - 02/01/12	14.4 ± 2.4	15.0 ± 2.3	11.3 ± 2.2	11.1 ± 2.2	12.1 ± 2.2	15.7 ± 2.4
FEB	02/01/12 - 02/08/12	12.8 ± 2.3	13.4 ± 2.2	11.2 ± 2.2	13.3 ± 2.4	10.2 ± 2.1	11.9 ± 2.2
FEB	02/08/12 - 02/15/12	11.3 ± 2.2	11.0 ± 2.1	10.8 ± 2.2	8.5 ± 2.1	10.0 ± 2.1	10.9 ± 2.1
FEB	02/15/12 - 02/22/12	14.0 ± 2.5	11.2 ± 2.2	11.9 ± 2.3	9.8 ± 2.2	10.8 ± 2.2	14.7 ± 2.4
FEB	02/22/12 - 02/28/12	12.3 ± 2.4	11.2 ± 2.2	12.8 ± 2.4	12.5 ± 2.5	13.0 ± 2.4	13.1 ± 2.4
MAR	02/28/12 - 03/07/12	10.8 ± 2.2	11.9 ± 2.1	11.8 ± 2.2	12.2 ± 2.3	12.6 ± 2.2	11.5 ± 2.1
MAR	03/07/12 - 03/14/12	13.3 ± 2.5	12.2 ± 2.3	15.5 ± 2.6	14.5 ± 2.6	13.8 ± 2.5	14.9 ± 2.4
MAR	03/14/12 - 03/21/12	16.6 ± 2.9	11.7 ± 2.4	16.5 ± 2.8	14.0 ± 2.8	16.1 ± 2.8	17.1 ± 2.8
MAR	03/21/12 - 03/28/12	14.1 ± 2.7	10.2 ± 2.3	13.7 ± 2.6	12.0 ± 2.6	12.7 ± 2.5	12.5 ± 2.4
APR	03/28/12 - 04/04/12	11.4 ± 2.3	8.9 ± 2.0	12.6 ± 2.3	9.7 ± 2.2	11.1 ± 2.2	13.0 ± 2.3
APR	04/04/12 - 04/11/12	10.8 ± 2.2	9.5 ± 2.0	12.9 ± 2.3	10.1 ± 2.2	10.4 ± 2.1	10.2 ± 2.0
APR	04/11/12 - 04/18/12	14.6 ± 2.8	13.1 ± 2.5	10.8 ± 2.5	11.5 ± 2.6	11.2 ± 2.5	11.8 ± 2.5
APR	04/18/12 - 04/25/12	9.5 ± 2.1	9.3 ± 1.9	12.1 ± 2.2	11.9 ± 2.3	8.7 ± 1.9	9.9 ± 2.0
APR	04/25/12 - 05/02/12	14.4 ± 2.4	13.9 ± 2.2	14.3 ± 2.4	12.5 ± 2.3	15.0 ± 2.4	15.6 ± 2.3
MAY	05/02/12 - 05/09/12	4.4 ± 3.9	5.2 ± 1.7	6.8 ± 2.0	6.7 ± 2.1	6.7 ± 1.9	7.3 ± 2.0
MAY	05/09/12 - 05/16/12	11.8 ± 2.5	11.0 ± 2.1	11.3 ± 2.3	9.6 ± 2.3	11.4 ± 2.3	11.4 ± 2.2
MAY	05/16/12 - 05/23/12	10.3 ± 2.2	7.4 ± 1.8	10.1 ± 2.0	9.2 ± 2.1	10.7 ± 2.2	11.6 ± 2.2
MAY	05/23/12 - 05/30/12	18.1 ± 2.6	14.9 ± 2.2	13.5 ± 2.2	13.2 ± 2.3	13.1 ± 2.3	13.8 ± 2.3
JUN	05/30/12 - 06/06/12	9.2 ± 2.1	8.2 ± 1.9	9.0 ± 1.9	9.1 ± 2.0	10.4 ± 2.2	8.6 ± 2.0
JUN	06/06/12 - 06/13/12	14.8 ± 2.4	12.6 ± 2.1	11.9 ± 2.0	11.4 ± 2.2	11.0 ± 2.2	12.3 ± 2.2
JUN	06/13/12 - 06/20/12	11.3 ± 2.1	9.8 ± 1.9	9.4 ± 1.9	10.5 ± 2.1	10.2 ± 2.0	10.1 ± 1.9
JUN	06/20/12 - 06/27/12	17.7 ± 2.8	14.5 ± 2.5	13.8 ± 2.5	14.7 ± 2.7	14.8 ± 2.7	16.7 ± 2.7

TABLE I-8
GROSS BETA ANALYSES OF AIR PARTICULATE FILTERS
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in E-03 pCi/cu.m. ± 2S

MONTH	COLLECTION DATE	3S2	6G1	8G1	12E1	12S1	13S6
JUL	06/27/12 - 07/05/12	21.5 ± 2.6	16.4 ± 2.2	17.9 ± 2.3	18.6 ± 2.4	19.4 ± 2.5	20.9 ± 2.5
JUL	07/05/12 - 07/11/12	16.6 ± 2.9	15.9 ± 2.7	14.9 ± 2.7	13.7 ± 2.7	15.3 ± 2.6	13.9 ± 2.7
JUL	07/11/12 - 07/18/12	20.1 ± 2.8	19.4 ± 2.6	18.0 ± 2.6	18.0 ± 2.6	18.1 ± 2.7	14.4 ± 3.5
JUL	07/18/12 - 07/25/12	12.2 ± 2.2	12.9 ± 2.1	13.0 ± 2.2	12.1 ± 1.9	13.7 ± 2.3	11.6 ± 2.2
JUL	07/25/12 - 08/01/12	10.7 ± 2.3	10.1 ± 2.1	9.3 ± 2.3	8.9 ± 2.3	10.7 ± 2.2	10.2 ± 2.2
AUG	08/01/12 - 08/08/12	16.3 ± 2.5	17.3 ± 2.4	17.9 ± 2.7	18.4 ± 2.5	16.0 ± 2.4	19.0 ± 2.6
AUG	08/08/12 - 08/15/12	15.5 ± 2.4	13.3 ± 2.1	14.8 ± 2.4	17.2 ± 2.4	15.3 ± 2.4	15.1 ± 2.4
AUG	08/15/12 - 08/22/12	17.4 ± 2.5	15.3 ± 2.2	13.8 ± 2.4	15.8 ± 2.3	13.5 ± 2.2	15.3 ± 2.4
AUG	08/22/12 - 08/29/12	22.4 ± 2.9	21.8 ± 2.9	19.8 ± 2.8	25.0 ± 3.0	22.0 ± 2.9	25.9 ± 3.1
SEP	08/29/12 - 09/05/12	22.5 ± 3.0	20.4 ± 2.9	23.1 ± 3.0	20.2 ± 2.8	22.2 ± 2.9	23.2 ± 3.0
SEP	09/05/12 - 09/12/12	15.4 ± 2.4	13.7 ± 2.4	12.3 ± 2.2	14.2 ± 2.3	12.7 ± 2.2	13.9 ± 2.3
SEP	09/12/12 - 09/19/12	15.3 ± 2.5	14.5 ± 2.6	14.3 ± 2.5	14.5 ± 2.2	16.6 ± 2.6	16.1 ± 2.5
SEP	09/19/12 - 09/26/12	10.9 ± 2.1	13.5 ± 2.3	12.9 ± 2.2	13.9 ± 2.5	13.2 ± 2.2	13.0 ± 2.3
OCT	09/26/12 - 10/03/12	15.4 ± 2.5	13.1 ± 2.4	14.4 ± 2.4	11.8 ± 2.2	16.2 ± 2.5	15.6 ± 2.5
OCT	10/03/12 - 10/10/12	16.4 ± 2.6	21.7 ± 2.9	19.3 ± 2.7	19.1 ± 2.7	16.4 ± 2.6	19.7 ± 2.8
OCT	10/10/12 - 10/17/12	15.7 ± 2.5	13.6 ± 2.4	15.6 ± 2.4	15.1 ± 2.4	15.3 ± 2.7	16.1 ± 2.5
OCT	10/17/12 - 10/24/12	18.0 ± 2.5	19.1 ± 2.6	18.2 ± 2.4	16.8 ± 2.3	16.7 ± 2.4	17.3 ± 2.4
OCT	10/24/12 - 10/31/12	20.7 ± 2.7	13.7 ± 2.3	19.8 ± 2.5	13.9 ± 2.2	20.5 ± 2.6	16.8 ± 2.5
NOV	10/31/12 - 11/07/12	6.3 ± 1.7	6.3 ± 1.7	5.4 ± 1.7	5.2 ± 1.6	5.3 ± 1.6	4.6 ± 1.6
NOV	11/07/12 - 11/14/12	19.7 ± 2.8	20.9 ± 2.8	21.5 ± 2.9	19.3 ± 2.8	19.3 ± 2.7	17.8 ± 2.8
NOV	11/14/12 - 11/20/12	22.4 ± 3.1	17.7 ± 2.9	19.5 ± 2.9	19.3 ± 2.9	20.1 ± 2.9	16.6 ± 2.9
NOV	11/20/12 - 11/28/12	23.3 ± 2.7	20.1 ± 2.6	20.9 ± 2.6	18.2 ± 2.5	21.5 ± 2.6	19.0 ± 2.6
DEC	11/28/12 - 12/05/12	26.5 ± 3.2	25.6 ± 3.0	24.1 ± 2.9	22.7 ± 3.0	26.6 ± 3.0	22.8 ± 2.9
DEC	12/05/12 - 12/12/12	8.9 ± 2.3	7.0 ± 2.0	8.9 ± 2.0	10.6 ± 2.2	9.7 ± 2.1	10.3 ± 2.2
DEC	12/12/12 - 12/19/12	22.0 ± 2.9	18.9 ± 2.7	16.9 ± 2.6	16.2 ± 2.6	22.0 ± 2.8	15.2 ± 2.5
DEC	12/19/12 - 12/26/12	16.6 ± 2.7	11.9 ± 2.4	14.7 ± 2.6	12.6 ± 2.5	12.9 ± 2.5	15.9 ± 2.6

TABLE I-9
GAMMA SPECTROSCOPIC ANALYSES OF COMPOSITED AIR PARTICULATE FILTERS
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in E-03 pCi/cu.m. ± 2S

LOCATION	COLLECTION DATE	Be-7	OTHER ACTIVITY
6G1	12/28/2011 - 3/28/2012	87 ± 21	
8G1	12/28/2011 - 3/28/2012	89 ± 24	
3S2	12/28/2011 - 3/28/2012	98 ± 20	
12E1	12/28/2011 - 3/28/2012	102 ± 22	
12S1	12/28/2011 - 3/28/2012	102 ± 20	
13S6	12/28/2011 - 3/28/2012	93 ± 25	
6G1	3/28/2012 - 6/27/2012	112 ± 23	
8G1	3/28/2012 - 6/27/2012	147 ± 22	
3S2	3/28/2012 - 6/27/2012	146 ± 21	
12E1	3/28/2012 - 6/27/2012	119 ± 19	
12S1	3/28/2012 - 6/27/2012	125 ± 22	
13S6	3/28/2012 - 6/27/2012	120 ± 22	
6G1	6/27/2012 - 9/26/2012	129 ± 22	
8G1	6/27/2012 - 9/26/2012	143 ± 23	
3S2	6/27/2012 - 9/26/2012	116 ± 23	
12E1	6/27/2012 - 9/26/2012	100 ± 21	
12S1	6/27/2012 - 9/26/2012	117 ± 20	
13S6	6/27/2012 - 9/26/2012	96 ± 24	
6G1	9/26/2012 - 12/26/2012	66 ± 16	
8G1	9/26/2012 - 12/26/2012	55 ± 19	
3S2	9/26/2012 - 12/26/2012	103 ± 32	
12E1	9/26/2012 - 12/26/2012	73 ± 21	
12S1	9/26/2012 - 12/26/2012	75 ± 18	
13S6	9/26/2012 - 12/26/2012	75 ± 29	

TABLE I-10
IODINE-131 AND GAMMA SPECTROSCOPIC ANALYSES OF MILK
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	K-40	OTHER ACTIVITY	COMMENTS
10G1	01/09/12	< 0.5	1280 ± 177		
13E3	01/09/12	< 0.5	1465 ± 192		
10D3	01/09/12	< 0.5	1128 ± 175		
5E2	01/09/12	< 0.5	1341 ± 149		
10G1	02/06/12	< 0.4	1234 ± 142		
13E3	02/06/12	< 0.4	1279 ± 131		
10D3	02/06/12	< 0.5	1157 ± 150		
5E2	02/06/12	< 0.5	1205 ± 147		
10G1	03/05/12	< 0.9	1274 ± 145		
13E3	03/05/12	< 0.6	1298 ± 138		
10D3	03/05/12	< 0.7	1295 ± 116		
5E2	03/05/12	< 0.6	1331 ± 156		
10G1	04/02/12	< 0.3	1296 ± 146		
13E3	04/02/12	< 0.3	1279 ± 141		
10D3	04/02/12	< 0.3	1411 ± 153		
5E2	04/02/12	< 0.3	1114 ± 143		
10G1	04/16/12	< 0.4	1261 ± 179		
13E3	04/16/12	< 0.5	1377 ± 122		
10D3	04/16/12	< 0.4	1409 ± 176		
5E2	04/16/12	< 0.3	1222 ± 131		
10G1	04/30/12	< 0.4	1280 ± 118		
13E3	04/30/12	< 0.4	1279 ± 138		
10D3	04/30/12	< 0.3	1453 ± 130		
5E2	04/30/12	< 0.4	1148 ± 127		

TABLE I-10
IODINE-131 AND GAMMA SPECTROSCOPIC ANALYSES OF MILK
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	K-40	OTHER ACTIVITY	COMMENTS
10G1	05/14/12	< 0.5	1291 ± 134		
13E3	05/14/12	< 0.4	1367 ± 143	TH-228	30 ± 16
10D3	05/14/12	< 0.4	1479 ± 151		
5E2	05/14/12	< 0.5	1326 ± 160		
10G1	05/29/12	< 0.4	1179 ± 152		
13E3	05/29/12	< 0.3	1386 ± 197		
10D3	05/29/12	< 0.3	1238 ± 165		
5E2	05/29/12	< 0.4	1316 ± 129		
10G1	06/11/12	< 0.7	1320 ± 171		
13E3	06/11/12	< 0.6	1336 ± 162		
10D3	06/11/12	< 0.5	1307 ± 179		
5E2	06/11/12	< 0.5	1148 ± 173		
10G1	06/25/12	< 0.5	1467 ± 128		
13E3	06/25/12	< 0.6	1412 ± 137		
10D3	06/25/12	< 0.9	1300 ± 138		
5E2	06/25/12	< 0.5	1343 ± 150		
10G1	07/09/12	< 0.8	1319 ± 114		
13E3	07/09/12	< 0.8	1327 ± 150		
10D3	07/09/12	< 0.7	1366 ± 101	TH-228	14 ± 8
5E2	07/09/12	< 0.7	1330 ± 105		
10G1	07/23/12	< 0.7	1233 ± 145		
13E3	07/23/12	< 0.7	1454 ± 224		
10D3	07/23/12	< 0.3	1280 ± 133		
5E2	07/23/12	< 0.7	1242 ± 145		

TABLE I-10
IODINE-131 AND GAMMA SPECTROSCOPIC ANALYSES OF MILK
SUSQUEHANNA STEAM ELECTRIC STATION, 2012

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	K-40	OTHER ACTIVITY	COMMENTS
10G1	08/06/12	< 0.6	1279 ± 115		
13E3	08/06/12	< 0.5	1327 ± 99		
10D3	08/06/12	< 0.5	1347 ± 104		
5E2	08/06/12	< 0.6	1346 ± 108		
10G1	08/20/12	< 0.4	1820 ± 155	TH-228 27 ± 14	
13E3	08/20/12	< 0.5	1292 ± 171		
10D3	08/20/12	< 0.5	1182 ± 165		
5E2	08/20/12	< 0.4	1313 ± 144		
10G1	09/03/12	< 0.5	1278 ± 153		
13E3	09/03/12	< 0.8	1304 ± 214		
10D3	09/03/12	< 0.4	1256 ± 161		
5E2	09/03/12	< 0.4	1379 ± 144		
10G1	09/17/12	< 0.7	1251 ± 166		
13E3	09/17/12	< 0.6	1190 ± 171		
10D3	09/17/12	< 0.5	1436 ± 159		
5E2	09/17/12	< 0.6	1400 ± 144		
10G1	10/01/12	< 0.7	1151 ± 180		
13E3	10/01/12	< 0.7	1246 ± 151		
10D3	10/01/12	< 0.6	1208 ± 164		
5E2	10/01/12	< 0.7	1302 ± 179		
10G1	10/15/12	< 0.5	1331 ± 132		
13E3	10/15/12	< 0.5	1341 ± 134		
10D3	10/15/12	< 0.5	1265 ± 102		
5E2	10/15/12	< 0.5	1248 ± 127		
10G1	10/29/12	< 0.5	1378 ± 131		
13E3	10/29/12	< 0.5	1367 ± 167		
10D3	10/29/12	< 0.5	1262 ± 124		
5E2	10/29/12	< 0.5	1331 ± 123		

TABLE I-10
IODINE-131 AND GAMMA SPECTROSCOPIC ANALYSES OF MILK
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	K-40	OTHER ACTIVITY		COMMENTS
10G1	11/12/12	< 0.5	1243 ± 117			
13E3	11/12/12	< 0.8	1398 ± 123	TH-228	12 ± 8	
10D3	11/12/12	< 0.7	1300 ± 104			
5E2	11/12/12	< 0.6	1309 ± 153			
10G1	12/10/12	< 0.6	1406 ± 132			
13E3	12/10/12	< 0.7	1444 ± 150			
10D3	12/10/12	< 0.4	1168 ± 98			
5E2	12/10/12	< 0.4	1487 ± 140			

TABLE I-11
GAMMA SPECTROSCOPIC ANALYSES OF SOIL
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/kg (dry) ± 2S

LOCATION	COLLECTION DATE	K-40	Cs-137	Th-228	OTHER ACTIVITY			
8G1	9/12/2012	9619 ± 1212		1030 ± 95	RA-226	2305 ± 1131	AC-228	943 ± 272
8G1	9/12/2012	8447 ± 966	111 ± 42	724 ± 86	RA-226	2488 ± 1084	AC-228	646 ± 219
12S1	9/12/2012	12610 ± 1815		912 ± 127	AC-228	1033 ± 390		
12S1	9/12/2012	13620 ± 1249		919 ± 88	RA-226	2418 ± 976	AC-228	845 ± 220

TABLE I-12
GAMMA SPECTROSCOPIC ANALYSES OF FOOD PRODUCTS (FRUITS AND VEGETABLES)
SUSQUEHANNA STEAM ELECTRIC STATION, 2012
Results in pCi/kg (wet) ± 2S

LOCATION	SAMPLE TYPE	COLLECTION DATE	K-40	OTHER ACTIVITY
12F7	potatoes	12/10/2012	5204 ± 483	
12F7	corn	12/28/2012	2802 ± 132	

TABLE I-13
TYPICAL MINIMUM DETECTABLE CONCENTRATIONS OF NUCLIDES SEARCHED FOR BUT NOT FOUND BY GAMMA SPECTROMETRY IN THE VICINITY OF SUSQUEHANNA STEAM ELECTRIC STATION, 2012

Nuclide	Fish (pCi/kg wet)	Sediment (pCi/kg dry)	Surface Water (pCi/l)	Ground Water (pCi/l)	Potable Water (pCi/l)	Air Particulate (E-3 pCi/m^3)	Milk (pCi/l)	Fruit/Veg (pCi/kg wet)	Soil (pCi/kg dry)	Air Iodine (E-3 pCi/m^3)
MN-54	52.37	99.98	2.60	4.31	1.69	1.32	6.11	14.43	61.94	
CO-58	54.96	89.35	2.81	4.43	1.94	2.08	6.27	13.71	57.54	
FE-59	168.14	254.38	8.01	11.98	5.67	8.30	18.75	44.11	169.30	
CO-60	51.51	93.18	2.75	4.45	1.67	1.16	6.63	12.98	60.05	
ZN-65	116.16	202.82	5.34	8.89	3.47	3.18	14.44	35.04	132.97	
NB-95	63.73	103.27	3.05	4.87	2.09	2.24	6.43	14.57	76.02	
ZR-95	105.42	165.49	5.05	8.13	3.41	3.75	11.00	25.83	114.11	
I-131	210.76	170.77	10.88	10.07	12.05	430.56	11.43	30.84	118.25	11.69
CS-134	52.70	89.31	2.49	4.09	1.58	1.33	5.73	13.42	55.96	
CS-137	55.80	118.42	2.81	4.59	1.76	1.10	6.47	13.59	78.55	
BA-140	413.46	426.09	21.31	24.95	19.39	157.95	31.13	71.92	296.82	
LA-140	127.44	123.95	6.74	8.08	6.03	60.47	8.88	21.41	86.75	

APPENDIX J

PERFORMANCE SUMMARY FOR THE RADIOANALYSES OF SPIKED ENVIRONMENTAL SAMPLE MEDIA – 2012

TELEDYNE BROWN ENGINEERING

The data in the tables that follow show how well Teledyne Brown Engineering Environmental Services (TBE) performed in the analysis of radioactively spiked media. Tables J-1 through J-4 provide the performance results for TBE. In addition to the Analytics' spikes analyzed as part of PPL's REMP Laboratory Spike Program (Table J-3), TBE analyzed spikes procured independently from Analytics as part of their respective Quality Control Spike Programs (Table J-2), as well as spikes prepared as part of the following programs:

1. The Proficiency Testing Program of Environmental Resource Associates (Table J-1)

2. The Mixed Analyte Performance Evaluation Program (MAPEP) of the DOE (Table J-4)

It should be noted that program #1 above only provides spiked water for analyses. No other media are included in the spikes provided by this program. The following characteristics are important for the spiked environmental media:

1. When practical, the level of activity in, at least, some of the spiked environmental media should be within the range between required analysis sensitivities for the SSES REMP and the Reporting Levels, if applicable, of the NRC.

2. The spikes should be preserved in a manner as similar as possible to the way that actual samples of those media are prepared.

3. The variety of radionuclides with which environmental media are spiked should be as extensive as practical, including as many of the activation and fission products that could be detected in the vicinity of the SSES as reasonable.

The spiked environmental media prepared by Analytics according to the requirements of PPL's REMP Laboratory Spike Program are intended to incorporate characteristics #1, #2, and #3 to the greatest degree that is practical.

The criteria for the acceptability of the analyses results for the spikes prepared as part of the PPL REMP Laboratory Spike Program (Table J-3) has been established by PPL. They are based on criteria that were originally developed by the NRC. The NRC bases these criteria on an empirical relationship that combines prior experience and accuracy needs. As the resolution of the measurement process improves (relative measurement uncertainty becomes smaller), the criteria for determining acceptability become tighter. Conversely, as the resolution of the process becomes poorer (relative measurement uncertainty becomes bigger), the criteria are widened.

The criteria for acceptability of DOE (MAPEP) program – Table J-4 is based on control limits based on percentiles of historic data distributions.

Note that comment numbers at the extreme right side of the tables denote unacceptable results in Tables J-1 through J-4. Discussions relevant to these comment numbers follow the presentations of the data, as applicable.

TABLE J-1
ENVIRONMENTAL RESOURCE ASSOCIATES (ERA) - 2012
PROFICIENCY TESTING PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2012	RAD-89	Water	Sr-89	pCi/L	63.4	58.5	46.9 - 66.3	A
			Sr-90	pCi/L	33.5	37.4	27.4 - 43.1	A
			Ba-133	pCi/L	89.2	82.3	69.1 - 90.5	A
			Cs-134	pCi/L	66.5	74.2	60.6 - 81.6	A
			Cs-137	pCi/L	152	155	140 - 172	A
			Co-60	pCi/L	73.3	72.9	65.6 - 82.6	A
			Zn-65	pCi/L	109	105	94.5 - 125	A
			Gr-A	pCi/L	82.4	62.9	33.0 - 78.0	N (1)
			Gr-B	pCi/L	43.6	44.2	29.6 - 51.5	A
			I-131	pCi/L	25.9	27.1	22.5 - 31.9	A
			H-3	pCi/L	15433	15800	13800 - 17400	A
	MRAD-16	Filter	Gr-A	pCi/filter	39.5	77.8	26.1 - 121	A
November, 2012	RAD-91	Water	Sr-89	pCi/L	46.5	39.1	29.7 - 46.1	N (2)
			Sr-90	pCi/L	16.6	20.1	14.4 - 23.8	A
			Ba-133	pCi/L	85.2	84.8	71.3 - 93.3	A
			Cs-134	pCi/L	76.9	76.6	62.6 - 84.3	A
			Cs-137	pCi/L	177	183	165 - 203	A
			Co-60	pCi/L	77.4	78.3	70.5 - 88.5	A
			Zn-65	pCi/L	209	204	184 - 240	A
			Gr-A	pCi/L	50.6	58.6	30.6 - 72.9	A
			Gr-B	pCi/L	59.3	39.2	26.0 - 46.7	N (2)
			I-131	pCi/L	22.9	24.8	20.6 - 29.4	A
			H-3	pCi/L	5020	4890	4190 - 5380	A
	MRAD-17	Filter	Gr-A	pCi/filter	59.6	87.5	29.3 - 136	A

(1) Detector G1 is slightly biased high for Th-230 based measurements used only for ERA Gross Alpha samples. NCR 12-05

(2) The Sr-89 found to known ratio was 1.19, which TBE considers acceptable. It appears the aliquot was entered incorrectly for the Gross Beta NCR 12-13

(a) Teledyne Brown Engineering reported result.

(b) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) ERA evaluation: A=acceptable. Reported result falls within the Warning Limits. NA=not acceptable. Reported result falls outside of the Control Limits. CE=check for Error. Reported result falls within the Control Limits and outside of the Warning Limit.

TABLE J-2
ANALYTICS ENVIRONMENTAL RADIOACTIVTY CROSS CHECK PROGRAM - 2012
TELEDYNE QUALITY CONTROL SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2012	E10066	Milk	Sr-89	pCi/L	101	94.8	1.07	A
			Sr-90	pCi/L	11.7	13.5	0.87	A
	E10067	Milk	I-131	pCi/L	87.5	92.5	0.95	A
			Ce-141	pCi/L	247	260	0.95	A
			Cr-51	pCi/L	435	436	1.00	A
			Cs-134	pCi/L	133	149	0.89	A
			Cs-137	pCi/L	156	159	0.98	A
			Co-58	pCi/L	127	132	0.96	A
			Mn-54	pCi/L	190	195	0.97	A
			Fe-59	pCi/L	179	168	1.07	A
			Zn-65	pCi/L	327	333	0.98	A
			Co-60	pCi/L	274	279	0.98	A
	E10069	AP	Ce-141	pCi	167	164	1.02	A
			Cr-51	pCi	310	276	1.12	A
			Cs-134	pCi	107	94.5	1.13	A
			Cs-137	pCi	109	101	1.08	A
			Co-58	pCi	87.6	83.5	1.05	A
			Mn-54	pCi	133	123	1.08	A
			Fe-59	pCi	113	106	1.07	A
			Zn-65	pCi	226	210	1.08	A
			Co-60	pCi	185	176	1.05	A
	E10068	Charcoal	I-131	pCi	92.8	94.2	0.99	A
	E10070	Water	Fe-55	pCi/L	1800	1570	1.15	A
June 2012	E10198	Milk	Sr-89	pCi/L	86.1	99.8	0.86	A
			Sr-90	pCi/L	9.2	12.7	0.72	W
	E10199	Milk	I-131	pCi/L	88.9	99.7	0.89	A
			Ce-141	pCi/L	72.8	82.2	0.89	A
			Cr-51	pCi/L	394	402	0.98	A
			Cs-134	pCi/L	159	174	0.91	A
			Cs-137	pCi/L	206	212	0.97	A
			Co-58	pCi/L	89.5	92.3	0.97	A
			Mn-54	pCi/L	129	132	0.98	A
			Fe-59	pCi/L	129	128	1.01	A
			Zn-65	pCi/L	193	199	0.97	A
			Co-60	pCi/L	342	355	0.96	A
	E10201	AP	Ce-141	pCi	73.2	75.1	0.97	A
			Cr-51	pCi	367	366	1.00	A
			Cs-134	pCi	165	159	1.04	A
			Cs-137	pCi	205	193	1.06	A
			Co-58	pCi	84.7	84.2	1.01	A
			Mn-54	pCi	118	121	0.98	A
			Fe-59	pCi	125	117	1.07	A
			Zn-65	pCi	181	182	0.99	A
			Co-60	pCi	338	324	1.04	A

TABLE J-2
ANALYTICS ENVIRONMENTAL RADIOACTIVTY CROSS CHECK PROGRAM - 2012
TELEDYNE QUALITY CONTROL SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
	E10200	Charcoal	I-131	pCi	101	96.6	1.05	A
June 2012	E10202	Water	Fe-55	pCi/L	1890	1580	1.20	A
September 2012	E10296	Milk	Sr-89	pCi/L	106	99.6	1.06	A
			Sr-90	pCi/L	13.6	16.0	0.85	A
	E10297	Milk	I-131	pCi/L	89.8	99.6	0.90	A
			Ce-141	pCi/L	160	164	0.98	A
			Cr-51	pCi/L	230	248	0.93	A
			Cs-134	pCi/L	101	108	0.94	A
			Cs-137	pCi/L	174	174	1.00	A
			Co-58	pCi/L	97.2	100	0.97	A
			Mn-54	pCi/L	188	196	0.96	A
			Fe-59	pCi/L	159	152	1.05	A
			Zn-65	pCi/L	195	192	1.02	A
			Co-60	pCi/L	155	152	1.02	A
	E10299	AP	Ce-141	pCi	145	135	1.07	A
			Cr-51	pCi	219	205	1.07	A
			Cs-134	pCi	94.1	89.4	1.05	A
			Cs-137	pCi	140	144	0.97	A
			Co-58	pCi	88.3	83.0	1.06	A
			Mn-54	pCi	173	162	1.07	A
			Fe-59	pCi	136	125	1.09	A
			Zn-65	pCi	165	159	1.04	A
			Co-60	pCi	133	125	1.06	A
	E10298	Charcoal	I-131	pCi	95.5	97.2	0.98	A
	E10300	Water	Fe-55	pCi/L	1630	1900	0.86	A
December 2012	E10334	Milk	Sr-89	pCi/L	101	96.6	1.05	A
			Sr-90	pCi/L	11.3	13.8	0.82	A
	E10335	Milk	I-131	pCi/L	93.1	90.0	1.03	A
			Ce-141	pCi/L	52.5	51.0	1.03	A
			Cr-51	pCi/L	373	348	1.07	A
			Cs-134	pCi/L	157	165	0.95	A
			Cs-137	pCi/L	113	117	0.97	A
			Co-58	pCi/L	94.1	98.5	0.96	A
			Mn-54	pCi/L	116	116	1.00	A
			Fe-59	pCi/L	124	116	1.07	A
			Zn-65	pCi/L	190	186	1.02	A
			Co-60	pCi/L	172	170	1.01	A

TABLE J-2
ANALYTICS ENVIRONMENTAL RADIOACTIVTY CROSS CHECK PROGRAM - 2012
TELEDYNE QUALITY CONTROL SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2012	E10337A	AP	Ce-141	pCi	51.8	49.6	1.04	A
			Cr-51	pCi	372	338	1.10	A
			Cs-134	pCi	165	161	1.02	A
			Cs-137	pCi	113	114	0.99	A
			Co-58	pCi	96.5	95.8	1.01	A
			Mn-54	pCi	118	112	1.05	A
			Fe-59	pCi	105	112	0.94	A
			Zn-65	pCi	166	181	0.92	A
			Co-60	pCi	179	165	1.08	A
	E10336	Charcoal	I-131	pCi	73.1	72.7	1.01	A
	E10333	Water	Fe-55	pCi/L	1550	1750	0.89	A

(a) Teledyne Brown Engineering reported result.

(b) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) Ratio of Teledyne Brown Engineering to Analytics results.

(d) Analytics evaluation based on TBE internal QC limits: A= Acceptable. Reported result falls within ratio limits of 0.80-1.20. W-Acceptable with warning. Reported result falls within 0.70-0.80 or 1.20-1.30. N = Not Acceptable. Reported result falls outside the ratio limits of < 0.70 and > 1.30.

TABLE J-3
PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVTY CROSS CHECK PROGRAM - 2012
QUALITY CONTROL SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification Number	Matrix	Nuclide	Units	Analytics Calculated Results (a)	TBE Results (a)	TBE/Analytics Ratio	
June 2012	E10210	Soil	Ce-141	pCi/kg	137 ± 5	182 ± 25	1.33	(1)
			Cr-51	pCi/kg	671 ± 22	788 ± 144	1.17	
			Cs-134	pCi/kg	292 ± 10	279 ± 11	0.96	
			Cs-137	pCi/kg	441 ± 15	461 ± 20	1.05	
			Co-58	pCi/kg	154 ± 5	157 ± 15	1.02	
			Mn-54	pCi/kg	221 ± 7	237 ± 16	1.07	
			Fe-59	pCi/kg	213 ± 7	236 ± 27	1.11	
			Zn-65	pCi/kg	333 ± 11	368 ± 30	1.11	
			Co-60	pCi/kg	594 ± 20	615 ± 17	1.04	
December 2012	E10370	Soil	Ce-141	pCi/kg	148 ± 5	168 ± 22	1.14	
			Cr-51	pCi/kg	1010 ± 34	1050 ± 175	1.04	
			Cs-134	pCi/kg	481 ± 16	484 ± 16	1.01	
			Cs-137	pCi/kg	426 ± 14	456 ± 25	1.07	
			Co-58	pCi/kg	286 ± 10	287 ± 24	1.00	
			Mn-54	pCi/kg	336 ± 11	363 ± 23	1.08	
			Fe-59	pCi/kg	336 ± 11	370 ± 33	1.10	
			Zn-65	pCi/kg	540 ± 18	558 ± 41	1.03	
			Co-60	pCi/kg	494 ± 17	528 ± 19	1.07	
March 2012	E10021	Milk	I-131	pCi/L	99.6 ± 3	82 ± 5	0.82	
			Ce-141	pCi/L	269 ± 9	255 ± 12	0.95	
			Cr-51	pCi/L	450 ± 15	427 ± 55	0.95	
			Cs-134	pCi/L	154 ± 5	142 ± 6	0.92	
			Cs-137	pCi/L	164 ± 5	162 ± 9	0.99	
			Co-58	pCi/L	136 ± 5	133 ± 9	0.98	
			Mn-54	pCi/L	202 ± 7	195 ± 9	0.97	
			Fe-59	pCi/L	173 ± 6	182 ± 15	1.05	
			Zn-65	pCi/L	344 ± 12	329 ± 20	0.96	
			Co-60	pCi/L	288 ± 10	278 ± 8	0.97	
June 2012	E10204	Milk	I-131	pCi/L	89 ± 3	72 ± 2	0.81	
			Ce-141	pCi/L	114 ± 4	30 ± 9	0.26	(1)
			Cr-51	pCi/L	558 ± 19	519 ± 67	0.93	
			Cs-134	pCi/L	242 ± 8	219 ± 8	0.90	
			Cs-137	pCi/L	294 ± 10	287 ± 11	0.98	
			Co-58	pCi/L	128 ± 4	116 ± 9	0.91	
			Mn-54	pCi/L	184 ± 6	78 ± 9	0.42	(1)
			Fe-59	pCi/L	178 ± 6	126 ± 14	0.71	(1)
			Zn-65	pCi/L	277 ± 9	151 ± 19	0.55	(1)
			Co-60	pCi/L	494 ± 17	433 ± 10	0.88	

(a) Counting error is two standard deviations.

(1) NCR 13-03 was initiated to address the failure.

TABLE J-3
PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVTY CROSS CHECK PROGRAM - 2012
QUALITY CONTROL SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification Number	Matrix	Nuclide	Units	Analytics Calculated Results (a)	TBE Results (a)	TBE/Analytics Ratio	
September 2012	E10250	Milk	I-131	pCi/L	99.6 ± 3	79 ± 3	0.79	(1)
			Ce-141	pCi/L	2630 ± 88	1470 ± 18	0.56	(1)
			Cr-51	pCi/L	3980 ± 133	3520 ± 154	0.88	
			Cs-134	pCi/L	1740 ± 58	1570 ± 15	0.90	
			Cs-137	pCi/L	2790 ± 93	2600 ± 25	0.93	
			Co-58	pCi/L	1610 ± 54	1420 ± 22	0.88	
			Mn-54	pCi/L	3140 ± 105	2380 ± 25	0.76	(1)
			Fe-59	pCi/L	2440 ± 81	1980 ± 30	0.81	
			Zn-65	pCi/L	3090 ± 103	2190 ± 41	0.71	(1)
			Co-60	pCi/L	2440 ± 81	2230 ± 17	0.91	
December 2012	E10366	Milk	I-131	pCi/L	89 ± 3	88 ± 4	0.99	
			Ce-141	pCi/L	513 ± 17	532 ± 22	1.04	
			Cr-51	pCi/L	3500 ± 117	3630 ± 133	1.04	
			Cs-134	pCi/L	1670 ± 56	1580 ± 16	0.95	
			Cs-137	pCi/L	1180 ± 39	1190 ± 21	1.01	
			Co-58	pCi/L	991 ± 33	991 ± 19	1.00	
			Mn-54	pCi/L	1160 ± 39	1220 ± 21	1.05	
			Fe-59	pCi/L	1160 ± 39	1240 ± 26	1.07	
			Zn-65	pCi/L	1870 ± 62	1920 ± 42	1.03	
			Co-60	pCi/L	1710 ± 57	1790 ± 16	1.05	
June 2012	E10205	Ap Filter	Ce-141	pCi	80.6 ± 3	87 ± 21	1.08	
			Cr-51	pCi	394 ± 14	437 ± 135	1.11	
			Cs-134	pCi	171 ± 6	168 ± 9	0.98	
			Cs-137	pCi	208 ± 7	204 ± 16	0.98	
			Co-58	pCi	91 ± 3	81 ± 15	0.89	
			Mn-54	pCi	130 ± 5	128 ± 15	0.98	
			Fe-59	pCi	125 ± 4	137 ± 24	1.10	
			Zn-65	pCi	195 ± 7	222 ± 16	1.14	
			Co-60	pCi	349 ± 12	348 ± 14	1.00	
	E10206	Ap Filter	Ce-141	pCi	62.1 ± 2	85 ± 25	1.37	(1)
			Cr-51	pCi	304 ± 11	311 ± 169	1.02	
			Cs-134	pCi	132 ± 5	138 ± 12	1.05	
			Cs-137	pCi	160 ± 6	163 ± 17	1.02	
			Co-58	pCi	70 ± 2	72 ± 19	1.03	
			Mn-54	pCi	100 ± 4	111 ± 16	1.11	
			Fe-59	pCi	96.6 ± 3	81 ± 32	0.84	
			Zn-65	pCi	151 ± 5	159 ± 28	1.05	
			Co-60	pCi	269 ± 9	276 ± 14	1.03	

(a) Counting error is two standard deviations.

(1) NCR 13-03 was initiated to address the failure.

TABLE J-3
PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVTY CROSS CHECK PROGRAM - 2012
QUALITY CONTROL SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification Number	Matrix	Nuclide	Units	Analytics Calculated Results (a)	TBE Results (a)	TBE/Analytics Ratio
June 2012	E10207	Ap Filter	Ce-141	pCi	50.8 ± 2	55 ± 8	1.08
			Cr-51	pCi	248 ± 9	261 ± 73	1.05
			Cs-134	pCi	108 ± 4	111 ± 6	1.03
			Cs-137	pCi	131 ± 5	129 ± 10	0.98
			Co-58	pCi	57 ± 2	54 ± 11	0.95
			Mn-54	pCi	81.8 ± 3	79 ± 11	0.97
			Fe-59	pCi	79 ± 3	82 ± 17	1.04
			Zn-65	pCi	123 ± 4	131 ± 18	1.07
			Co-60	pCi	220 ± 8	231 ± 10	1.05
September 2012	E10251	Ap Filter	Ce-141	pCi	134 ± 5	156 ± 17	1.16
			Cr-51	pCi	203 ± 7	250 ± 116	1.23
			Cs-134	pCi	88.8 ± 3	96 ± 8	1.08
			Cs-137	pCi	143 ± 5	148 ± 14	1.03
			Co-58	pCi	82 ± 3	92 ± 11	1.12
			Mn-54	pCi	161 ± 6	180 ± 12	1.12
			Fe-59	pCi	125 ± 4	142 ± 20	1.14
			Zn-65	pCi	158 ± 6	171 ± 18	1.08
			Co-60	pCi	125 ± 4	133 ± 10	1.06
September 2012	E10252	Ap Filter	Ce-141	pCi	132 ± 5	156 ± 24	1.18
			Cr-51	pCi	199 ± 7	246 ± 125	1.24
			Cs-134	pCi	87.1 ± 3	95 ± 8	1.09
			Cs-137	pCi	140 ± 5	150 ± 12	1.07
			Co-58	pCi	81 ± 3	73 ± 13	0.90
			Mn-54	pCi	157 ± 5	167 ± 12	1.06
			Fe-59	pCi	122 ± 4	123 ± 27	1.01
			Zn-65	pCi	155 ± 5	170 ± 26	1.10
			Co-60	pCi	122 ± 4	131 ± 10	1.07
September 2012	E10253	Ap Filter	Ce-141	pCi	124 ± 4	129 ± 12	1.04
			Cr-51	pCi	187 ± 7	194 ± 98	1.04
			Cs-134	pCi	81.8 ± 3	87 ± 6	1.06
			Cs-137	pCi	132 ± 5	136 ± 14	1.03
			Co-58	pCi	76 ± 3	84 ± 11	1.11
			Mn-54	pCi	148 ± 5	155 ± 14	1.05
			Fe-59	pCi	115 ± 4	120 ± 24	1.04
			Zn-65	pCi	145 ± 5	167 ± 22	1.15
			Co-60	pCi	115 ± 4	126 ± 8	1.10
March 2012	E10022	Water	H-3	pCi/L	4470 ± 149	4450 ± 391	1.00
June 2012	E10211	Water	H-3	pCi/L	4970 ± 166	4650 ± 503	0.94

(a) Counting error is two standard deviations.

TABLE J-3
PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVTY CROSS CHECK PROGRAM - 2012
QUALITY CONTROL SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification Number	Matrix	Nuclide	Units	Analytics Calculated Results (a)	TBE Results (a)	TBE/Analytics Ratio
December 2012	E10371	Water	H-3	pCi/L	580 ± 19	622 ± 119	1.07
March 2012	E10020	Charcoal	I-131	pCi	94.8 ± 3	96 ± 10	1.01
March 2012	E10034	Charcoal	I-131	pCi	93.8 ± 3	88 ± 10	0.94
March 2012	E10035	Charcoal	I-131	pCi	94.9 ± 3	89 ± 10	0.94
June 2012	E10203	Charcoal	I-131	pCi	96.9 ± 3	88 ± 5	0.91
June 2012	E10208	Charcoal	I-131	pCi	96.5 ± 3	90 ± 4	0.93
June 2012	E10209	Charcoal	I-131	pCi	97.2 ± 3	90 ± 6	0.93
December 2012	E10367	Charcoal	I-131	pCi	73 ± 2	73 ± 2	1.00
December 2012	E10368	Charcoal	I-131	pCi	73 ± 2	74 ± 2	1.01
December 2012	E10369	Charcoal	I-131	pCi	73 ± 2	68 ± 4	0.93

(a) Counting error is two standard deviations.

TABLE J-4

DOE - MAPEP - 2012

MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2012	12-MaW26	Water	Cs-134	Bq/L	-0.0045		(1)	A
			Cs-137	Bq/L	37.5	39.9	27.9 - 51.9	A
			Co-57	Bq/L	30.8	32.9	23.0 - 42.8	A
			Co-60	Bq/L	22.4	23.72	16.60 - 30.84	A
			H-3	Bq/L	456	437	306 - 568	A
			Mn-54	Bq/L	31.0	31.8	22.3 - 41.3	A
			K-40	Bq/L	144	142	99 - 185	A
			Sr-90	Bq/L	-0.0084		(1)	A
			Zn-65	Bq/L	-0.369		(1)	A
	12-GrW26	Water	Gr-A	Bq/L	2.06	2.14	0.64 - 3.64	A
			Gr-B	Bq/L	7.48	6.36	3.18 - 9.54	A
	12-MaS26	Soil	Cs-134	Bq/kg	831	828	580 - 1076	A
			Cs-137	Bq/kg	0.145		(1)	A
			Co-57	Bq/kg	1270	1179	825 - 1533	A
			Co-60	Bq/kg	7.61	1.56	(2)	N (3)
			Mn-54	Bq/kg	634	558	391 - 725	A
			K-40	Bq/kg	1690	1491	1044 - 1938	A
			Sr-90	Bq/kg	328	392	274 - 540	A
			Zn-65	Bq/kg	753	642	449 - 835	A
	12-RdF26	AP	Cs-134	Bq/sample	2.31	2.38	1.67 - 3.09	A
			Cs-137	Bq/sample	2.15	1.79	1.25 - 2.33	W
			Co-57	Bq/sample	-0.0701		(1)	A
			Co-60	Bq/sample	2.62	2.182	1.527 - 2.837	W
			Mn-54	Bq/sample	4.13	3.24	2.27 - 4.21	W
			Sr-90	Bq/sample	0.0185		(1)	A
			Zn-65	Bq/sample	4.19	2.99	2.09 - 3.89	N (3)
	12-GrF26	AP	Gr-A	Bq/sample	0.365	1.2	0.4 - 2.0	A
			Gr-B	Bq/sample	2.31	2.4	1.2 - 3.6	A
	12-RdV26	Vegetation	Cs-134	Bq/sample	8.72	8.43	5.90 - 10.96	A
			Cs-137	Bq/sample	0.0424		(1)	A
			Co-57	Bq/sample	15.5	12.0	8.4 - 15.6	W
			Co-60	Bq/sample	6.80	6.05	4.24 - 7.87	A
			Mn-54	Bq/sample	0.0057		(1)	A
			Sr-90	Bq/sample	2.24	2.11	1.48 - 2.74	A
			Zn-65	Bq/sample	10.5	8.90	6.23 - 11.57	A
September 2012	12-MaW27	Water	Cs-134	Bq/L	21.4	23.2	16.2 - 30.2	A
			Cs-137	Bq/L	17.0	16.7	11.7 - 21.7	A
			Co-57	Bq/L	28.7	29.3	20.5 - 38.1	A
			Co-60	Bq/L	0.179		(1)	A
			H-3	Bq/L	387	334	234 - 434	A
			Mn-54	Bq/L	18.1	17.8	12.5 - 23.1	A
			K-40	Bq/L	139	134	94 - 174	A
			Sr-90	Bq/L	19.6	12.2	8.5 - 15.9	N (4)
			Zn-65	Bq/L	27.2	25.9	18.1 - 33.7	A

TABLE J-4
DOE - MAPEP - 2012
MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)
(PAGE 2 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2012	12-GrW27	Water	Gr-A	Bq/L	0.966	1.79	0.54 - 3.04	A
			Gr-B	Bq/L	10.0	9.1	4.6 - 13.7	A
	12-MaS27	Soil	Cs-134	Bq/kg	880	939	657 - 1221	A
			Cs-137	Bq/kg	1220	1150	805 - 1495	A
			Co-57	Bq/kg	1330	1316	921 - 1711	A
			Co-60	Bq/kg	552	531	372 - 690	A
			Mn-54	Bq/kg	1000	920	644 - 1196	A
			K-40	Bq/kg	674	632	442 - 822	A
			Sr-90	Bq/kg	528	508	356 - 660	A
			Zn-65	Bq/kg	665	606	424 - 788	A
	12-RdF27	AP	Cs-134	Bq/sample	2.760	2.74	1.92 - 3.56	A
			Cs-137	Bq/sample	0.0415		(1)	A
			Co-57	Bq/sample	2.00	191.00	1.34 - 2.48	A
			Co-60	Bq/sample	1.78	1.728	1.210 - 2.246	A
			Mn-54	Bq/sample	2.40	2.36	1.65 - 3.07	A
			Sr-90	Bq/sample	0.931	1.03	0.72 - 1.34	A
			Zn-65	Bq/sample	-0.688		(1)	A
	12-GrF27	AP	Gr-A	Bq/sample	0.434	0.97	0.29 - 1.65	A
			Gr-B	Bq/sample	1.927	1.92	0.96 - 2.88	A
	12-RdV27	Vegetation	Cs-134	Bq/sample	6.28	6.51	4.56 - 8.46	A
			Cs-137	Bq/sample	4.62	4.38	3.07 - 5.69	A
			Co-57	Bq/sample	6.51	5.66	3.96 - 7.36	A
			Co-60	Bq/sample	5.32	5.12	3.58 - 6.66	A
			Mn-54	Bq/sample	3.59	3.27	2.29 - 4.25	A
			Sr-90	Bq/sample	0.0012		(1)	A
			Zn-65	Bq/sample	-0.046		(1)	A

(1) False positive test.

(2) Sensitivity evaluation

(3) No cause was found for the failed high soil Co-60 sensitivity test or the high Zn-65 in AP, which TBE considers an anomaly. NCR 12-08

(4) Sr-90 in water high due to incorrect aliquot entered in LIMS. 12-11

(a) Teledyne Brown Engineering reported result.

(b) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) DOE/MAPEP evaluation: A=acceptable, W=acceptable with warning, N=not acceptable.