APPENDIX A

2002 REMP CHANGES

REMP Sample Analyses

All primary analyses (beta & I-131 weekly and gamma quarterly) of air samples during the periods of January through September 2002 were conducted by PPL Susquehanna LLC's Corporate Environmental Radioactivity Measurements Laboratory (CERML). In addition, CERML was the primary laboratory during the periods of January through September 2002 for the following analyses: alpha, beta, and tritium analyses of drinking water; beta and tritium analyses of surface water; gamma analyses of fish and sediment samples in the spring; and gamma analyses of fruits and vegetables. Teledyne Brown Engineering laboratory replaced CERML as the primary analyses laboratory for all analysis and media as outlined above for the period of October through December 2002. The following table summarizes the REMP sample analyses for which different laboratories were responsible during 2002. Note that TBE represents Teledyne Brown Engineering and E-LAB represents Framatome ANP. Framatome ANP purchased Duke Engineering & Services Environmental Laboratory on May 1, 2002.

SOURCE OF REMP DATA FOR MONITORING YEAR 2002

Sample Medium	Analysis Type	Sample/Analysis Frequency	Data Period	Lab
Air	Gross Beta	Weekly	1st, 2nd, 3rd Quarter	CERML
Air	Gross Beta	Weekly	4th Quarter	TBE
Air	I-131	Weekly	1st, 2nd, 3rd Quarter	CERML
Air	I-131	Weekly	4th Quarter	TBE
Air	Gamma	Quarterly	1st, 2nd, 3rd Quarter	CERML
Air	Gamma	Quarterly	4th Quarter	TBE
Surface Water	Gross Beta	Monthly	1st, 2nd, 3rd Quarter	CERML
Surface Water	Gross Beta	Monthly	4th Quarter	TBE
Drinking Water	Gross Beta & Gross Alpha	Monthly	1st, 2nd, 3rd Quarter	CERML
Drinking Water	Gross Beta & Gross Alpha	Monthly	4th Quarter	TBE

SOURCE OF REMP DATA FOR MONITORING YEAR 2002 (continued)				
Sample Medium	**Analysis Type**	**Sample/Analysis Frequency**	**Data Period**	**Lab**
All Water	Tritium	Monthly	1st, 2nd, 3rd Quarter	CERML
All Water	Tritium	Monthly	4th Quarter	TBE
Surface & Drinking Water	Gamma	Monthly	All Year	E-LAB
Surface Water (LTAW)	I-131	Monthly	All Year	E-LAB
Ground Water	Gamma	Monthly	All Year	E-LAB
Surface & Drinking Water	I-131	Bi/weekly	All Year	E-LAB
Milk	Gamma	Monthly/ Semi-Monthly	All Year	E-LAB
Milk	I-131	Monthly/ Semi-Monthly	All Year	E-LAB
Fish	Gamma	Semi-Annually	Spring	CERML
Fish	Gamma	Semi-Annually	Fall	TBE
Sediment	Gamma	Semi-Annually	Spring	CERML
Sediment	Gamma	Semi-Annually	Fall	TBE
Fruits & Vegetables	Gamma	In Season	All Year	CERML /TBE*
Soil	Gamma	Annually	All Year	E-LAB

*TBE data for pumpkin sample irrigated with Susquehanna River water collected from 13G2 and 11D1 on 10/16/02.

Direct Radiation Monitoring

The only change to direct radiation monitoring was the change in the name of TLD location 12B4 from the "Shultz Farm" to the "Berger Farm" and the change in the name of TLD location 2B3 from "Durabond Corporation" to "Leggett and Platt".

Air Monitoring

There were no changes to the air monitoring program during 2002.

Milk Monitoring

Milk monitoring at the Drasher Farm (REMP location 10D3) was discontinued in July 2002 and replaced by the Berger Farm (REMP location 12B2). During the period of April through June 2002, duplicate milk monitoring occurred at the Drasher and Berger Farms. The Berger Farm is closer to the SSES (1.7 miles) than the Drasher Farm (3.5 miles).

Ground Water Monitoring

There were no changes to the ground water monitoring program during 2002.

Fruits & Vegetables

There were no changes to the fruit and vegetable monitoring program during 2002. Because of the milk monitoring that is performed, there is no requirement to sample from gardens that have a potential for the deposition of activity by way of the airborne pathway. Fruits and vegetables are sampled from locations that irrigate with water taken from the Susquehanna River downstream from the SSES diffuser.

APPENDIX B

2002 REMP MONITORING SCHEDULE (SAMPLING AND ANALYSIS)

TABLE 1
(Page 1 of 2)

Annual Analytical Schedule for the PP&L Susquehanna Steam Electric Station Radiological Environmental Monitoring Program - 2002

Media & Code	No. of Locations	Sample Freq.(a)	Analyses Required	Analysis Freq. (b)
Airborne Particulates	6	W	Gross Beta (c) Gamma Spectrometry	W QC
Airborne Iodine	6	W	I-131	W
Sediment	4	SA	Gamma Spectrometry	SA
Fish	2 1	SA A	Gamma Spectrometry (on edible portion)	SA
Surface Water (d)	5	MC, M, or BWC	Gross Beta I-131 Gamma Spectroscopy Tritium	M BW M M
Well (ground) Water	3	M	Gamma Spectroscopy Tritium	M M
Drinking Water (e)	1	MC, BWC	Gross Alpha Gross Beta I-131 Gamma Spectrometry Tritium	M M BW M M
Cow Milk	4(f) 5(f)	M, SM(f)	I-131 Gamma Spectrometry	SM, M SM, M
Food Products (Various Fruits and Vegetables)	3	A	Gamma Spectrometry	A
Soil	4	A	Gamma Spectrometry	A
Direct Radiation	84	Q	TLD	Q

Note: See footnotes at end of table.

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

(b) Codes are the same as for sample frequency.

(c) 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 was performed 24 hours or more following filter change to allow for radon and thoron daughter decay.

(d) Locations 6S6, 6S7, and 2S7 were checked at least weekly to ensure that the automatic composite samplers were operational. Time proportional sampling was performed at locations 6S6, 6S7 and 2S7 the entire year. Station 6S5 was grab sampled weekly. Individual composites of the weekly samples were made both monthly (MC) and biweekly (BWC) for analysis.

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

(f) Locations 10D1, 10D2, 10G1, and 12B2 were sampled semi-monthly from April through October. Location 10D3 was sampled semi-monthly from April through June then discontinued.

APPENDIX C

2002
REMP MONITORING LOCATION DESCRIPTIONS

TABLE C 1
(Page 1 of 5)

TLD Locations for the SSES
Radiological Environmental Monitoring Program – 2002

Less Than One Mile from the SSES[a] - See Figure 2

Location Code(b)	Distance (miles)	Direction	Description
1S2	0.2	N	Perimeter Fence
2S2	0.9	NNE	Energy Information Center
2S3	0.2	NNE	Perimeter Fence
3S2	0.5	NE	SSES Backup Met Tower
3S3	0.9	NE	ANSP Riverlands Garden
3S4	0.3	NE	Perimeter Fence
4S3	0.2	ENE	Post, West of SSES APF
4S6	0.7	ENE	Riverlands
5S4	0.8	E	West of Environmental Laboratory
5S7	0.3	E	Perimeter Fence
6S4	0.2	ESE	Perimeter Fence (north)
6S9	0.2	ESE	Perimeter Fence (south)
7S6	0.2	SE	Perimeter Fence
7S7	0.4	SE	End of Kline's Road
8S2	0.2	SSE	Perimeter Fence
9S2	0.2	S	Security Fence
10S1	0.4	SSW	Post - south of switching station
10S2	0.2	SSW	Security Fence
10S3	0.6	SSW	Confer's Lane – east of Confer's Lane, south of Towers Club
11S3	0.3	SW	Security Fence
11S7	0.4	SW	SSES Access Road Gate #50
12S1	0.4	WSW	SSES West Building

TABLE C 1
(Page 2 of 5)

TLD Locations for the SSES
Radiological Environmental Monitoring Program – 2002

Less Than One Mile from the SSES[a] - See Figure 2

Location Code (b)	Distance (miles)	Direction	Description
12S3	0.4	WSW	Perimeter Fence
12S4	0.4	WSW	Perimeter Fence
12S5	0.4	WSW	Perimeter Fence
12S6	0.4	WSW	Perimeter Fence
13S2	0.4	W	Perimeter Fence
13S4	0.4	W	Perimeter Fence
13S5	0.4	W	Perimeter Fence
13S6	0.4	W	Former Laydown Area - west of Confer's Lane
14S5	0.5	WNW	Beach Grove Road/Confer's Lane
14S6	0.7	WNW	Beach Grove Road (pole)
15S5	0.4	NW	Perimeter Fence
16S1	0.3	NNW	Perimeter Fence (east)
16S2	0.3	NNW	Perimeter Fence (west)
6A4	0.6	ESE	Restaurant (U.S. Route 11)
8A3	0.9	SSE	PPL Wetlands Sign (U. S. Route 11)
15A3	0.9	NW	Hosler Residence
16A2	0.8	NNW	Benkinney Residence

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

12S7	1.1	WSW	Kisner Residence
1B1	1.4	N	Mingle Inn Road
2B3	1.3	NNE	Leggett & Platt
2B4	1.4	NNE	U.S. Route 11/Mingle Inn Road Intersection
5B3	1.6	E	PPL Switchyard
7B2	1.5	SE	Heller's Orchard Store
8B2	1.4	SSE	Lawall Residence

TABLE C 1
(Page 3 of 5)

TLD Locations for the SSES
Radiological Environmental Monitoring Program – 2002

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

Location Code (b)	Distance (miles)	Direction	Description
9B1	1.3	S	Transmission Line - east of Route 11
10B2	2.0	SSW	Algatt Residence
10B3	1.7	SSW	Castek Inc.
10B4	1.4	SSW	U. S. Route 11/River Road Intersection
12B4	1.7	WSW	Berger Farm
13B1	1.3	W	Walker Run Creek (Tele. Pole #36)
14B3	1.3	WNW	Moskaluk Residence
15B1	1.7	NW	Country Estates Trailer Park
16B2	1.7	NNW	Walton Power Line
11C1	2.0	SW	Salem Township Fire Company
1D5	4.0	N	Shickshinny/Mocanaqua Sewage Treatment Plt.
6D1	3.5	ESE	St. Peters Church – Hobbie
8D3	4.0	SSE	Mowry Residence
9D4	3.6	S	Country Folk Store
10D1	3.0	SSW	R. & C. Ryman Farm
12D2	3.7	WSW	Dagostin Residence
14D1	3.6	WNW	Moore's Hill/Mingle Inn Roads Intersection
3E1	4.7	NE	Webb Residence - Lilly Lake
4E2	4.7	ENE	Ruckles Hill/Pond Hill Roads Intersection
5E2	4.5	E	Bloss Farm
6E1	4.7	ESE	St. James Church

TABLE C 1
(Page 4 of 5)

TLD Locations for the SSES
Radiological Environmental Monitoring Program – 2002

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

Location Code (b)	Distance (miles)	Direction	Description
7E1	4.2	SE	Harwood Transmission Line Pole #2
11E1	4.7	SW	Thomas Residence
12E1	4.7	WSW	Berwick Hospital
13E4	4.1	W	Kessler Farm

Greater than Five Miles from the SSES[a] - See Figure 4

2F1	5.9	NNE	St. Adalberts Cemetery
8F2	8.5	SSE	Huff Residence
12F2	5.2	WSW	Berwick Substation
15F1	5.4	NW	Zawatski Farm
16F1	7.8	NNW	Hidlay Residence
3G4	17	NE	Wilkes Barre Service Center
4G1	14	ENE	Mountaintop - Crestwood Industrial Park
6G1	13.5	ESE	Freeland Substation
7G1	14	SE	Hazleton PP&L Complex
7G2	12	SE	Hazleton Cemetery - 14th Street
8G1	12	SSE	PPL SFC - Humbolt Industrial Park
12G1	15	WSW	PPL Service Center, Bloomsburg
12G4	10	WSW	Naus Residence

TABLE C 1
(Page 5 of 5)

TLD Locations for the SSES
Radiological Environmental Monitoring Program – 2002

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	

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 4)

Sampling Locations for the SSES
Radiological Environmental Monitoring Program – 2002

Less Than One Mile from the SSES[a] - See Figure 5

Location Code	Distance (miles)	Direction	Description
			SURFACE WATER
2S7	0.1	NNE	Cooling Tower Blowdown Line
6S5	0.9	ESE	Outfall Area
6S6	0.8	ESE	River Water Intake Line
6S7	0.4	ESE	Cooling Tower Blowdown Line (alternate for 2S7)
LTAW		NE - ESE	Lake Took-A-While (on site)
			FISH
LTAW		NE - ESE	Lake Took-A-While (on site)
			SEDIMENT(c)
LTAW		NE - ESE	Lake Took-A-While (on site)
			AIR
3S2	0.5	NE	SSES Backup Meteorological Tower
12S1	0.4	WSW	SSES West Building
13S6	0.4	W	Former Laydown Area, West of Confers Lane
			SOIL
3S2	0.5	NE	SSES Backup Meteorological Tower
12S1	0.4	WSW	SSES West Building
13S6	0.4	W	Former Laydown Area, West of Confers Lane

TABLE C 2
(Page 2 of 4)

Sampling Locations for the SSES
Radiological Environmental Monitoring Program – 2002

Less Than One Mile from the SSES[a] - See Figure 5

Location Code	Distance (miles)	Direction	Description
			GROUND WATER
2S2	0.9	NNE	Energy Information Center
4S4	0.5	ENE	Training Center
From One to Five Miles From the SSES - See Figure 6			
			FISH[b]
IND	0.9 - 1.4	ESE	At or Below the SSES Discharge Diffuser
			SEDIMENT[c]
2B	1.6	NNE	Gould Island
7B	1.2	SE	Bell Bend
			AIR
12E1	4.7	WSW	Berwick Hospital
			MILK
10D1	3.0	SSW	R. & C. Ryman Farm
10D2	3.1	SSW	Raymond Ryman Farm
10D3	3.5	SSW	C. & K. Drasher Farm
12B2	1.7	WSW	Berger Farm
			FRUITS/VEGETABLES
11D1	3.3	SW	Zehner Farm

TABLE C 2
(Page 3 of 4)

Sampling Locations for the SSES
Radiological Environmental Monitoring Program – 2002

Greater than Five Miles from the SSES[a] - See Figure 7

Location Code	Distance (miles)	Direction	Description
			DRINKING WATER
12H2	26	WSW	Danville Water Co. (treated)
			FISH[b]
2H	30	NNE	Near Falls, Pa.
			SEDIMENT[c]
12F	6.9	WSW	Old Berwick Test Track
			AIR
6G1	13.5	ESE	Freeland Substation
8G1	12	SSE	PPL SFC - Humbolt Industrial Park
			SOIL
8G1	12	SSE	PPL SFC - Humbolt Industrial Park
			MILK
10G1	14	SSW	Davis Farm
			FRUITS/VEGETABLES
12F7	8.3	WSW	Lupini Farm
13G2	16	W	Kile Farm
			GROUND WATER
12F3	5.2	WSW	Berwick Water Company

TABLE C 2
(Page 4 of 4)

Sampling Locations for the SSES
Radiological Environmental Monitoring Program – 2002

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	

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 over an area which extends through 3 sectors (5, 6, 7) near the outfall area.

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

2002
LAND USE CENSUS RESULTS

2002 LAND USE CENSUS RESULTS

The SSES Technical Requirements require that a census be conducted annually during the growing season to determine the location of 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. To comply with this requirement, a land-use census was conducted for the SSES during 2002.

A comparison of the 2001 and 2002 Land Use Census results for the Susquehanna SES indicates the changes listed in the tables below. Tables 1 and 2 display the changes in the nearest dairy animal and nearest gardens from 2001 to 2002. It should be noted that milk sampling at the Berger farm (Table 1, REMP location 12B2) began in the spring of 2002. Milk monitoring at the Drasher farm (REMP location 10D3) was discontinued in July 2002 and replaced by the Berger farm. During the period of April through June 2002, duplicate milk monitoring occurred at the Drasher and Berger farms. The Berger farm is closer to the SSES (1.7 miles) than the Drasher farm (3.5 miles).
The Berger farm is identified by the REMP location designation code 12B2.

Table 3 identifies the changes in the other foods produced at the nearest gardens in certain sectors and the nearest residence in one sector from 2001 to 2002. Table 4 identifies the only change in irrigated foods from 2001 to 2002.

TABLE 1
CHANGE FROM 2001 TO 2002 IN NEAREST DAIRY ANIMALS AS DETERMINED BY THE 2002 LAND USE CENSUS

	2001		2002	
Sector/ Direction	Owner's Name	Distance from SSES (mi.)	Owner's Name	Distance from SSES (mi.)
12/WSW	None	N/A	Berger*	1.7

*Note that the meat of cows may be consumed at this location.

TABLE 2
CHANGE FROM 2001 TO 2002 IN NEAREST GARDENS AS DETERMINED BY THE 2002 LAND USE CENSUS

	2001		2002	
Sector/ Direction	Owner's Name	Distance from SSES (mi.)	Owner's Name	Distance from SSES (mi.)
4/ENE	Glova	3.6	Dennis	2.4
8/SSE	Roinick	2.6	Dawson	1.5

TABLE 3
CHANGE FROM 2001 TO 2002 IN ADDITIONAL FOODS PRODUCED AT NEAREST GARDENS AND RESIDENCES FOR CONSUMPTION DURING 2002 AS DETERMINED BY THE 2002 LAND USE CENSUS

Sector/ Direction	Census Category	Owner	Distance from SSES (mi.)	2001 Food Items	2002 Food Items
4/ENE	Garden	Dennis	2.4	None	Sheep, Geese, Chickens, Eggs, & Turkeys
5/E	Residence/ Garden	Koslowski & Witts	1.4	None	Steer & Chickens
15/NW	Garden	Goff	1.8	None	Sheep

These changes in gardens had no impact on the intended sampling of fruits and vegetables during 2002. Because of the milk monitoring that is performed, there is no requirement to sample from gardens that have a potential for the deposition of activity by way of the airborne pathway.

TABLE 4
CHANGE FROM 2001 TO 2002 IN ADDITIONAL VEGETABLES IRRIGATED WITH SUSQUEHANNA RIVER WATER FROM DOWNSTREAM OF THE SSES DISCHARGE DURING 2002

Sector/Direction	Owner	Distance from SSES (mi.)	2001	2002
12F7/WSW	Lupini Farm	8.3	Potatoes	Potatoes & Beans

Monitoring of two indicator locations did take place during 2002. Irrigation was identified as having been performed at a field where pumpkins were grown at the Zehner farm (REMP location 11D1) and at a field where potatoes and beans were grown at the Lupini farm (REMP location 12F7).

TABLE 5

Nearest residence, garden, and dairy animal in each of the 16 meteorological sectors within a 5-mile radius of the Susquehanna Steam Electric Station, 2002.

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	>5.0 mi
3	NE	0.9 mi	2.7 mi	>5.0 mi
4	ENE	2.1 mi	2.4 mi [a,c,d,f,l]	>5.0 mi
5	E	1.4 mi	1.4 mi [a,i]	4.5 mi [g,i]
6	ESE	0.5 mi	2.5 mi	2.7 mi
7	SE	0.5 mi	0.6 mi	>5.0 mi
8	SSE	0.6 mi	1.5 mi	>5.0 mi
9	S	1.0 mi	1.1 mi	>5.0 mi
10	SSW	0.9 mi	1.2 mi	3.0 mi [a,b,c,d,e,g]
11	SW	1.5 mi	1.9 mi	>5.0 mi
12	WSW	1.1 mi	1.1 mi	1.7 mi
13	W	1.2 mi	1.2 mi	5.0 mi [g]
14	WNW	0.8 mi	1.3 mi	>5.0 mi
15	NW	0.8 mi	1.8 mi [l]	>5.0 mi
16	NNW	0.6 mi	4.0 mi	4.2 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 raised for consumption at this location.*
[k] Pheasants raised for consumption at this location.*
[l] Sheep raised for consumption at this location.

*No locations were identified as raising rabbits, goats, and pheasants during 2002.

APPENDIX E

SUMMARY DESCRIPTION OF SSES REMP ANALYTICAL METHODS

TLD MEASUREMENTS

The PPL dosimetry system used for monitoring ambient radiation levels in the environment consists of Panasonic 710A readers and Panasonic UD-814 TLDs. The UD-814 TLD badges each contain four elements. Elements 2, 3, and 4 in each badge are made of calcium sulfate with 800 mg/cm^2 of filtering and element 1 is composed of lithium tetraborate with filtering of 25 mg/cm^2. Only the calcium sulfate elements are normally used for environmental measurements because of their higher light output per unit of radiation exposure relative to the lithium tetraborate and, consequently, greater sensitivity for the detection and measurement of radiation.

Note: Element 1 would be of value in the event of an unusually large release of noble gases, especially xenon, that would produce relatively low-energy X-ray or gamma emissions. This is because the lithium tetraborate does not over-respond to such low-energy emissions as does the calcium sulfate.

The TLD element manufacturers' attempt to make each element as similar as possible to each of the other elements in each batch that is produced. Nevertheless, each element ends up somewhat different in its response to radiation. In order to minimize the effect of these inherent differences when comparing actual monitoring results for different elements, Element Correction Factors (ECFs) are determined for each element. The ECFs are used to effectively normalize the readings of the field elements placed at particular monitoring locations for given monitoring periods to the average of the readings that would be expected if so-called reference elements were to be placed simultaneously at those individual locations. Reference elements are elements that have been demonstrated to display superior measurement performance.

The selection process for reference elements involves repeatedly irradiating a large set of elements, processing them, calculating the mean response for each set of elements, and evaluating the deviation of each individual element response from the mean response. After this process has been repeated at least several times, the elements with the least variability in their responses and with mean responses nearest to the mean response of the entire population of elements are chosen as reference elements.

To determine ECFs for individual field elements, the elements are first exposed to known amounts of radiation (100 mR) and processed, a minimum of three times each. Each element reading is then divided by the mean of the readings obtained from reference elements (typically 30 to 35) that were exposed to the same amounts of radiation as the elements for which the ECFs are being determined and that were processed at the same time as these elements. The mean quotient (ratio) is then calculated for each element by summing the quotients obtained for each processing and then dividing by the total number of the processings performed.

The following equation shows how ECFs are calculated:

$$ECF = \left[\frac{\sum_{i=1}^{n} \frac{E_i}{\overline{E}_{ref}}}{n} \right]$$

where

E_i an uncorrected exposure reading for the element.

n = the total number of individual element exposures averaged.

$\overline{E}_{ref}$ = the mean of the ECF-corrected exposure readings of the reference elements.

Irradiated control TLDs are processed (read) with the batches of TLDs from the field to provide both processing calibration information and quality control. Field control TLDs, which accompany the field TLDs when they are being taken to their monitoring locations and subsequently retrieved from these locations, and cave control TLDs, which are stored with the field TLDs for the periods between annealing and field distribution and between retrieval from the field and processing, are also read with the field TLDs to provide checks on the exposures that the field TLDs might receive on their way to and from their monitoring locations and while in storage, respectively.

The raw data from the field TLD processings is Run Calibration Factor (RCF) corrected using the irradiated control TLD data. The irradiated control TLDs are exposed to 100 mR from a cesium-137 source at the University of Michigan. The irradiated TLDs are accompanied enroute to and from the University of Michigan by transit control TLDs. An estimate of the exposures received by the irradiated TLDs in-transit is obtained by processing the transit controls and determining the transit control mean by the following equation:

$$\overline{E}_{tc} = \frac{\sum_{i=1}^{n} \left[\frac{E_i}{ECF_i} \right]_{tc}}{n}$$

where

$\overline{E}_{tc}$ = the mean of the elementally corrected exposure readings of all the transit control elements.

E_i = the uncorrected exposure reading of each individual transit control element.

ECF_i = the elemental correction factor of each individual transit control element.

n = the total number of individual element exposures averaged.

The mean of the transit control exposures is then subtracted from each of the elementally corrected exposures of the irradiated elements to obtain the net exposures for each element resulting from the irradiation. The mean of these net exposures is then divided by the known exposure (100 mR) from the irradiation to determine the RCF. The following equation describes the calculations performed:

$$RCF = \frac{\left[\frac{\sum_{i=1}^{n}\left(\frac{E_i}{ECF_i} - \overline{E}_{ic}\right)_{ic}}{n}\right]}{KE_{ic}}$$

where

RCF = the run correction factor for an individual field monitoring element.

E_i = the exposure reading of each individual irradiated control element.

ECF_i = the elemental correction factor of each individual irradiated control element.

n = the total number of individual element exposures averaged.

KE_{ic} = the known exposure for each of the irradiated control elements.

Exposure readings for individual field monitoring elements are corrected using the appropriate mean transit exposure and the elemental and run correction factors as follows:

$$CE_x = \frac{UE_x - \overline{E}_{TC}}{ECF_x \times RCF_x}$$

where

CE_x = the corrected exposure reading for field monitoring element x.

UE_x = the uncorrected exposure reading for field monitoring element x.

ECF_x = the elemental correction factor for field monitoring element x.

$\overline{E}_{TC}$ = mean transit exposure

RCF_x = the run correction factor for field monitoring element x.

NOTE: The mean transit exposure is determined from the elements of the TLDs that accompany the field TLDs during transportation to and from the field locations.

The exposure representing each environmental monitoring location and monitoring period is normally the mean of the corrected exposure readings for a total of six calcium sulfate elements, three from each of two different TLDs at each location. The following equation shows the calculation of this exposure:

$$\overline{E}_c = \frac{\sum_{i=1}^{n} CE_i}{n}$$

where

$\overline{E}_c$ = the mean of the corrected exposure readings for a given monitoring location and period.

CE_i = the corrected exposure reading of an individual element for a given monitoring location and period.

n = the total number of individual element exposures averaged.

The mean of the corrected exposure readings for a given location and period may be calculated using less than the six calcium sulfate elements if the reading from one of the elements is more than two standard deviations from the mean. In this situation, the mean would be recalculated with only five element readings, excluding the element reading that was more than two standard deviations from the originally calculated mean. The mean may be automatically calculated by the dosimetry software with as few as four element readings before the data is flagged. The following calculation is used to determine the standard deviation of the corrected elemental exposure readings:

$$S_{ce} = \sqrt{\frac{\sum_{i=1}^{n}\left(CE_i - \overline{E}_c\right)^2}{n-1}}$$

where

S_{ce} = the standard deviation of the corrected exposure readings from a given monitoring location and period for (n-1) degrees of freedom.

$\overline{E}_c$ = the mean of the corrected exposure readings for a given monitoring location and period.

CE_i = the corrected exposure reading of an individual element for a given monitoring location and period.

n = the total number of individual element exposures averaged.

The standard monitoring period for the reporting of TLD exposures is the calendar quarter. The calendar quarter is defined as a period of 91.25 days. The actual monitoring periods for TLDs in the field are often for times other than 91.25 days. The means of the corrected exposures for these nonstandard periods must be normalized to the standard calendar quarter. The following equation shows how the normalization is performed:

$$NE = \frac{\overline{E}_c \times 91.25}{MP}$$

where

NE = mean corrected exposure normalized to a standard calendar quarter of 91.25 days.

$\overline{E}_c$ = the mean of the corrected exposure readings for a given monitoring location and period.

MP = the actual TLD monitoring period (time in the field) in days.

TLD DATA INTERPRETATION

Pre-operational and operational data are compared for the purpose of determining whether or not TLD data may indicate a dose contribution from SSES operation. Between 1979 and 1994, both TLD types and TLD processing systems changed more than once. In order to avoid possible confusion in data interpretation as a result of these changes, ratios of TLD doses for specific indicator locations to the average of the TLD doses for control locations from operational periods compared to their counterparts from the preoperational period. Comparison of these ratios is performed in lieu of comparing the actual operational and preoperational doses. The following equation shows how these ratios are calculated:

$$r_i = d_i \div \bar{d}_c$$

where

r_i = the indicator-to-control-average dose ratio for a particular location and calendar quarter,

d_i = the quarterly dose for a particular indicator location, and

$\bar{d}_c$ = the average quarterly dose for certain control locations.

Note:

The r_i are the quotients of the indicator doses to the average doses of the following control locations: 3G4, 4G1, 7G1, 12G1, and 12G4. Only these control locations are used because they were the only ones existing during the preoperational period.

Operational r_i for indicator locations that do not have preoperational histories are compared with the range of preoperational control-to-control-average dose ratios (r_c) experienced at control locations. It can be safely assumed that the preoperational range of these r_c at control locations are the result of variations in the levels of background radiation at those locations. Any operational indicator r_i for an indicator location without a preoperational history that is above the uppermost range expected at control locations based on preoperational data is assumed to suggest a possible contribution from the SSES operation. The following equation shows how r_c is calculated:

$$r_c = d_c \div \bar{d}_c$$

where

r_c - is the control-to-control-average dose ratio for a particular location and calendar quarter,

d_c - is the quarterly dose for a particular control location, and

$\bar{d}_c$ - is the average quarterly dose for certain control locations.

Flagging Environmental TLD Measurements for Possible Non-Natural Dose Contributions

Confidence ranges, within which 95% of environmental TLD doses resulting from natural, background radiation are expected to be, have been derived for each location with a preoperational history by multiplying the standard deviation (S) of the r_i for the location by the appropriate t score (t) based on the applicable degrees of freedom for each location. (Degrees of freedom (df) are equal to the number of ratios that were averaged less one.) The product of the t score and the standard deviation (tS) was then subtracted from the mean ($\bar{x}$) to determine the lower end of the 95% confidence range (R) and added to the mean to obtain the upper end of the range (R) as indicated by the following equation:

$$R = \left(\bar{x} - t*S\right) to \left(\bar{x} + t*S\right)$$

The following t scores were used in the range calculations:

t SCORES	
df	$t_{0.05}$
1	12.706
2	4.303
3	3.182
4	2.776
5	2.571
6	2.447
7	2.365

For indicator locations with no preoperational history, TLD results are flagged for potential non-natural dose contributions to TLD measurements based on comparisons to the maximum expected variation in control-to-control-average dose ratios (r_c) for control locations. The expected ranges of r_c for each control location for each calendar quarter during the 1980-81 preoperational period have been calculated. The highest expected r_c for all the preoperational control locations is 1.22.

Ratios for indicator locations greater than 1.22 are flagged for possible SSES direct radiation dose contributions.

Calculation of SSES Attributable Direct Radiation Dose based on Onsite Indicator TLD Measurements

For TLD locations where direct radiation dose contributions from the SSES are indicated, these calendar quarter doses are estimated based on the amounts referred to as the excess ratios. Excess ratio for each location's r_i for a particular calendar quarter is the amount by which that r_i exceeds the high end of its range of preoperational r_i . The excess ratio at a specific location is multiplied times both the average dose for control locations measured during that calendar quarter and an occupancy factor based on a reasonable estimate of the portion of the calendar quarter that a MEMBER OF THE PUBLIC might spend near an onsite TLD location. The following is a table of occupancy factors that are used:

Environmental TLD Monitoring Locations	Occupancy Factors
Onsite	4.56E-4
Offsite (other than Private Residences)	3.65E-3
Private Residences	1

The following equation is used for obtaining direct radiation doses attributable to the SSES at indicator TLD locations when preoperational data exists for those locations:

$$D_{SSES}=(r_i-r_u)\times D_{CA}\times OF$$

where

D_{SSES} = the dose attributable to SSES fuel cycle operations,

r_i = the indicator-to-control average ratio for a particular location and calendar quarter,

r_u = the indicator-to-control average ratio corresponding to the upper end of the 95% confidence range for a particular location for the preoperational period, and

D_{CA} = the average quarterly dose for control locations.

OF = the occupancy factor.

The equation below is used for obtaining direct radiation doses attributable to the SSES at indicator locations when preoperational data **does not** exist for those locations:

$$D_{SSES}=(r_i-1.22)\times D_{CA}\times OF$$

where

D_{SSES} = the dose attributable to SSES fuel cycle operations,

r_i = the indicator-to-control average ratio for a particular location and calendar quarter,

1.22 = the highest expected r_c for control locations due to variations in natural radiation levels based on preoperational data. Refer to location 12G4 in Attachment 1.

D_{CA} = the average quarterly dose for control locations.

OF = the occupancy factor.

Each year, the SSES attributable doses calculated for each calendar quarter are summed for all calendar quarters at each location to obtain annual doses by location.

DETERMINATION OF GROSS ALPHA AND/OR GROSS BETA ACTIVITY

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES & PPL'S CORPORATE ENVIRONMENTAL RADIOACTIVITY MEASUREMENTS LABORATORY

Aliquots of water samples are evaporated to near dryness in beakers. The remaining volumes (approximately five milliliters or less) are transferred to stainless steel planchets and evaporated to dryness.

All planchets are counted in low background gas-flow proportional counters. Calculations of both gross alpha and beta activities include the use of empirical self-absorption correction curves to account for changes in effective counting efficiency occurring as a result of changes in the masses of residue being counted.

Weekly air particulate filters are placed into planchets as received and counted in low background gas-flow proportional counters. No corrections are made for beta self-absorption when calculating the gross beta activities of the air particulate filters because of the impracticality of weighing the deposit and because the penetration depth of the deposit into the filter is unknown.

CALCULATION OF THE SAMPLE ACTIVITY

$$\frac{pCi}{unit\ volume\ or\ mass} = \underbrace{\frac{\left[\frac{C}{t} - R_b\right]}{2.22\,(V)(E)}}_{\textbf{net activity}} \pm \underbrace{\frac{2\sqrt{\frac{\frac{C}{t} + R_b}{t}}}{2.22\,(V)\,(E)}}_{\textbf{random uncertainty}}$$

where: C = total counts for sample

t = count time for sample/background (minutes)

R_b = background count rate of counter (cpm)

2.22 = $\frac{\text{dpm}}{\text{pCi}}$

V(M) = volume or mass of sample analyzed

E = efficiency of the counter (cpm/dpm)

4.66 = sigma level

Calculation of the Minimum Detectable Concentration (MDC) Value

$$MDC = \frac{4.66\sqrt{\frac{R_b}{t}}}{2.22\,(V)\,(E)}$$

RADIOCHEMICAL DETERMINATION OF I-131 IN CHARCOAL AND VEGETATION SAMPLES

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Radioiodine is separated from the sample matrix to periodate solution.

Charcoal filters are opened and the exposed charcoal is emptied into a refluxing flask, iodide carrier is added, and the mixture is refluxed in sodium hydroxide to remove the iodine absorbed on the charcoal and bringing it into solution. The resulting iodide solution is oxidized with hypochlorite to periodate.
Vegetation samples are chopped, iodide carrier added, the mixture evaporated to dryness, leached with sodium hydroxide, and fused in a muffle furnace. The resulting melt is dissolved in distilled water and filtered. The resulting iodide solution is oxidized with hypochlorite to periodate.

The periodate solution is reduced to iodine with hydroxylamine hydrochloride, and extracted into toluene as free iodine. The iodine is back extracted into distilled water through reduction to iodide with aqueous sodium bisulfite and is ultimately precipitated as palladium iodide. The precipitate is weighed for chemical yield and is mounted on a nylon planchet for low level beta counting.

The dried precipitate is beta counted on a low-level counter.

CALCULATION OF THE SAMPLE ACTIVITY

$$A = \frac{\left[\frac{C}{t} - R_b\right]}{2.22(V)(y)(DF)(E)} \pm \frac{2\sqrt{\frac{C}{t} + R_b}}{2.22(V)(y)(DF)(E)}$$

net activity — random uncertainty

where:

A	=	activity concentration (pCi/l)
C	=	total counts from sample
t	=	counting time for sample (min)
R_b	=	background count rate of counter (cpm)
2.22	=	$\frac{\text{dpm}}{\text{pCi}}$

V = volume of sample analyzed (liters)

y = chemical yield of the mount or sample counted

DF = decay factor from the collection (milk/vegetables) or midpoint of compositing period (water/charcoal cartridges) to the mid-count time

E = efficiency of the counter for the I-131 betas.

4.66 = sigma level

Note: Efficiency is determined by counting an I-131 standard.

Calculation of the MDC

$$MDC = \frac{4.66\sqrt{\frac{R_b}{t}}}{2.22(V)(y)(DF)(E)}$$

RADIOCHEMICAL DETERMINATION OF I-131 IN MILK AND WATER SAMPLES

FRAMATOME ANP
ENVIRONMENTAL LABORATORY

First, iodide carrier is added to either a two-kilogram sample aliquot of milk or water. For water, the next step is to add sodium hypochlorite, followed by hydroxylamine hydrochoride, and finally sodium bisulfite to convert all of the iodine in the sample to iodide. After sufficient time for equilibration of the stable iodide carrier, anion exchange resin is added to the sample to extract the iodide from the sample aliquot. The iodide ion is subsequently removed from the resin using sodium hypochlorite. It is then reduced to elemental iodine and transferred from the aqueous phase to the toluene. The iodine is then reduced to iodide using sodium bisulfite and back extracted into the aqueous phase. Once in the aqueous phase, the iodide is precipitated as cuprous iodide following the addition of cuprous chloride.

Another aliquot of sample may be used, if activity is detected in the sample, to determine the original stable iodide content of the sample using a specific-ion electrode. This information would then be used to correct the chemical yield determined from the mass of the dried precipitate.

The dried precipitate is then counted using a beta/gamma coincidence counter.

CALCULATION OF SAMPLE ACTIVITY

$$A = \frac{\left(\frac{G}{t} - B\right) * \lambda * t}{\left(1 - e^{-\lambda t}\right) * 2.22 * V * y * D * E} \pm \frac{2 * \lambda * t * \sqrt{\frac{\left(\frac{G}{t} + B\right)}{t}}}{\left(1 - e^{-\lambda t}\right) * 2.22 * V * y * D * E}$$

Where:

A = activity concentration (pCi/l)
G = gross count at the end of the sample counting interval (t)
t = sample counting interval
B = background count rate (cpm)
λ = decay constant for I-131 (5.987E-5 min^{-1})
2.22 = dpm/pCi
V = volume of sample (l)
y = chemical yield (recovery) of the iodide

D = decay factor ($e^{-\lambda T}$) where λ is the decay constant for I-131 and T is the decay period from sample collection (milk) or the mid-point of the sample compositing period (water) to the mid-point of the counting interval

E = is the I-131 beta/gamma counting efficiency (cpm/dpm)

CALCULATION OF MDC

$$MDC = \frac{4.66 * \lambda * t * \sqrt{\frac{B}{t}}}{(1 - e^{-\lambda t}) * 2.22 * V * y * D * E}$$

Where:

MDC = minimum detectable activity concentration (pCi/l)

DETERMINATION OF TRITIUM IN WATER BY LIQUID SCINTILLATION COUNTING

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES & PPL'S CORPORATE ENVIRONMENTAL RADIOACTIVITY MEASUREMENTS LABORATORY

Ten milliliters of water is mixed with liquid scintillation material and counted for typically 200 minutes to determine its activity.

CALCULATION OF THE SAMPLE ACTIVITY FOR TRITIUM

$$\frac{pCi}{\ell} = \frac{\left[\frac{C}{t} - R_b\right]}{2.22(V)(E)^*} \pm \frac{2\sqrt{\frac{\frac{C}{t} + R_b}{t}}}{2.22(V)(E)^*}$$

net activity random uncertainty

where:
- C = total counts from sample
- t = count time for sample (minutes)
- R_b = background count rate of counter (cpm)
- 2.22 = $\frac{\text{dpm}}{\text{pCi}}$
- V = initial volume before enrichment (liters)
- E = efficiency of the counter for tritium (cpm/dpm)

Calculation of the MDC

$$MDC = \frac{4.66\sqrt{\frac{R_b}{t}}}{(2.22)(V)(E)^*}$$

*Note that PPL's Corporate Environmental Radioactivity Measurements Laboratory incorporates a decay factor (D) in the denominators of these expressions to account for the small amount of radioactive decay between sample collection and sample counting.

DETERMINATION OF GAMMA EMITTING RADIOISOTOPES

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES & FRAMATOME ANP ENVIRONMENTAL LABORATORY & PPL'S CORPORATE ENVIRONMENTAL RADIOACTIVITY MEASUREMENTS LABORATORY

Gamma emitting radionuclides are determined with the use of a lithium-drifted germanium (Ge(Li)) and high purity germanium detectors with high resolution spectrometry in specific media, such as, air particulate filters, charcoal filters, milk, water, vegetation, soil/sediments, biological media, etc. Each sample is prepared and counted in standard geometries such as one liter or four liter wrap-around Marinelli containers, 300 ml or 150 ml bottles, two-inch filter paper source geometries, etc.

The analysis of each sample consists of calculating the specific activities of all detected* radionuclides as well as the minimum detectable concentration for a standard list of nuclides. The germanium detection systems are calibrated for each standard geometry using certified radionuclide standards traceable to the National Institute of Standards and Technology.

CALCULATION OF THE SAMPLE ACTIVITY

$$Net\ pCi/vol\ or\ mass = \frac{[C-B]}{2.22(V)(E)(GA)DF)(t)} \pm \frac{2\sqrt{C+B}}{2.22(V)(E)(GA)(DF)(t)}$$

net activity — random uncertainty

where: C = area, in counts, of a spectral region containing a gamma emission of the nuclide of interest

Note (1): If the detector exhibits a peak in this region when counting a blank, the counts from that peak are subtracted from C before using the above equation.

Note (2): If no peaks are exhibited, the counts in the channels where the predominant peaks for gammas from selected radionuclides would be expected are summed for C and used in the calculation of "net" activity.

B = background counts in the region of interest, calculated by fitting a straight line across the region connecting the two adjacent regions.

Note: If no peak exists in a region from which a "net" activity is being calculated, background is represented by the average of the counts in one channel from each side of that region.

t = counting interval of sample (minutes)

2.22 = dpm/pCi

V = volume or mass of sample analyzed

E = efficiency of counter at the energy region of interest

GA = gamma abundance of the nuclide at the gamma emission energy under consideration

DF = decay factor from sample collection time or midpoint of sample collection (air I-131) to midpoint of the counting interval

Calculation of the MDC

$$MDC(\ pCi\ /\ vol\ or\ mass\ ) = \frac{4.66\sqrt{B}}{2.22(V)(E)(GA)(DF)(t)}$$

The width of the region around the energy where an emission is expected is calculated differently for MDCs than it is for the width of a peak that is actually identified. Consequently, the value of B used in the two equations may differ.

*The analyst's judgment is exercised in the decision to report an activity. The agreement between various spectral lines of the same nuclide, and possible interference from other nuclides, are considered in this decision.

APPENDIX F

2002 EXCEPTIONS TO THE SSES TECHNICAL REQUIREMENTS SAMPLE SCHEDULE, METHODS AND ANALYSIS SENSITIVITIES

Exceptions to the SSES Technical Requirements occurred in the monitoring of the following media: drinking water, surface water, air, fruits & vegetables and ambient radiation monitoring. These exceptions involved sample collections that did not take place for the required periods due to sampling equipment problems and various environmental conditions (drought, Canadian forest fires, snow) that impacted sample collection.

These exceptions are discussed in this appendix and specifically documented in the tables of Appendix I.

Drinking Water

Sampling at the Danville Municipal Water Facility, monitoring location 12H2, proceeded flawlessly during almost the entire year of 2002, with only one exception. The single exception occurred during the week of July 29 through August 5, the first week of the August compositing period. Inadequate sample volume was found in the ACS collection tank at the end of this weekly sampling interval. The reason for the inadequate volume was due to a Danville Water Co. "treated water line" valve malfunction. It is not known when the valve malfunctioned during the referenced week. A grab sample was collected for analysis to represent the weekly composite. The Danville Water Co. notified SSES that the treated line valve was repaired and operable at 1000 hours on August 6, 2002. ACS operability was verified on August 6, 2002 at 1632. Technically, there were no malfunctions of the ACS at this location during 2002. Sampling at this location was routine (as expected) for 98% of the year.

Surface Water

Monitoring at control location 6S6, the SSES River Water Intake Structure, and indicator location 2S7 or its alternate location 6S7, the SSES Cooling Tower Blowdown Discharge (CTBD) to the Susquehanna River, are the only environmental surveillance's of surface water required by SSES Technical Specifications. The other SSES REMP routine indicator surface water monitoring location on the Susquehanna River, which is downstream from the SSES discharge to the river, and the monitoring location at LTAW are not required. They have been monitored to provide added assurance that the environment is not being compromised by radiological releases resulting from the SSES operation.

Sampling at locations 6S6 and 2S7 or 6S7 is required to be performed by the collection of aliquots at time intervals that are small compared to the compositing period. Composite samples from these locations are required to be analyzed monthly and are expected to be representative of the streams from which they are collected.

Problems occurred in 2002 with the automatic composite sampler (ACS) at sampling location 6S6 during portions of the following collection periods: February 4, through February 25, 2002 and May 6, through May 20, 2002. Sample collectors discovered

low flow through the ACS due to rising river level causing debris and silt build-up on intake screens. Initially, the ACS sample flow rate was adjusted to insure sufficient volume was collected. Preventive maintenance was performed on the ACS (cleaned lines) and the sample flow rates were reset to 1.5 gpm.

Analysis could not be performed on the biweekly composite sample from sample location 6S6 (control) for the monitoring period March 25, through April 8, 2002. The referenced sample bottle leaked during shipment to the analysis laboratory, resulting in inadequate volume for analysis. The ACS at monitoring location 6S6 operated routinely (as expected) for approximately 96% of 2002. No malfunctions of the ACS at monitoring location 6S6 required the collection of grab samples during 2002.

Surface water samples could not be taken at ACS location 2S7 on November 28, 2002 from 0011 to 1133 due to frozen sample lines. The heat trace on the sample lines failed due to an electrical breaker trip. The heat trace problem was corrected and the sample collection was resumed at 1133 hours. There was adequate volume for sample requirements. The ACS at monitoring location 2S7 operated routinely (as expected) for approximately 98.8% of 2002.

Air

Reasons for exceptions to REMP air sampling during 2002 included the following: loss of electrical power to air sampling stations, air sample equipment problems (timers, ball valves) and environmental impacts (Canadian forest fires, winter storm).

Electrical power to the air sampling station at monitoring location 3S2 was interrupted for about 2 hours on July 16, 2002, during the monitoring period from July 10 through July 17, 2002. There was a wide area power outage during the referenced time period. Power was restored to the air sampling equipment and adequate sample volume was achieved for the monitoring period.

Electrical power to the air sampling station at monitoring location 13S6 was lost on December 25, 2002 due to a winter storm. Power was restored to the air sampling equipment on December 27, 2002 at 1254. Adequate sample volume was collected during the monitoring period.

The sample pump at monitoring station 12E1 experienced a ball valve misalignment during the monitoring period from February 13 through February 20, 2002. Low sample volume was obtained during the sample period due to the ball valve misalignment. The ball valve was reset and the airflow was verified to be satisfactory following the reset.

The sample pump timer box failed at monitoring station 12S1 during the monitoring period from March 20 through March 27, 2002. The timer box was replaced. The monitoring hours were calculated based on the sample start and stop times.

The sample pump at monitoring location 12S1 was unable to obtain >1.9 cfm during the monitoring period from July 31 through August 7, 2002. The sample pump was replaced and sample flow was adjusted to 2.2 cfm. Adequate sample volume was obtained during the referenced monitoring period.

During the monitoring period of October 23 through October 30, 2002, the sample pump timer at monitoring location 12S1 failed to record the time from the previous sample period. The timer was replaced. Adequate volume was collected during the sample period.

Allowable sample period durations were exceeded at monitoring locations 6G1 and 8G1 (control locations) during the monitoring period of December 18 through December 25, 2002. The cause of the delay in sample collection was unsafe road conditions due to a winter storm. The sample at monitoring location 6G1 was collected on December 27, 2002 at 1043 and the sample at 8G1 was collected on December 27, 2002 at 0959.

All stations were impacted during the monitoring period of July 3 through July 10, 2002 due to the Canadian forest fires. The forest fires resulted in excess loading of the particulate filters resulting in low airflow. Adequate sample volume was obtained at all monitoring stations during the referenced monitoring period.

Collectively, the air sampling equipment at the six air monitoring locations operated routinely (as expected) for more than 99% of 2002 in spite of the exceptions noted above.

Fruits & Vegetables

Due to the drought conditions in August 2002, only 600 grams of green beans were obtained from the control sample location 13G2. This quantity was an insufficient sample size to send to both the Primary analysis laboratory (PPL Susquehanna, LLC Corporate Environmental Radiological Monitoring Laboratory) and the interlaboratory split analysis laboratory (Framatome ANP). Following discussions between PPL Susquehanna, LLC and Framatome ANP personnel, the sample was sent to Framatome ANP for analysis.

Ambient Radiation Monitoring

Exceptions occurred to the monitoring of ambient radiation during each quarterly monitoring period of 2002. The first quarterly monitoring period was January 14 through April 18, 2002. The TLD's at location 2B4 were missing during the collection for the referenced monitoring period. The second quarterly monitoring period was April 17 through July 18, 2002. The TLD's at location 12E1 were wet and unable to process. The third quarterly monitoring period was July 16 through October 17, 2002. The TLD's at location 7G2 were wet and unable to process. The fourth quarterly monitoring period was October 15, 2002 through January 31, 2003. The TLD's at location 3G4 were wet and unable to process.

APPENDIX G

2002 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. It should be noted that all measured results were not available for primary gamma analyses performed by PPL's CERML. This lab's gamma spectrometric software does not permit measured results less than the MDCs to be reported. 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 - 2002

NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION

LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Ambient Radiation (mR/std. qtr.)	TLD 332		1.90E+01 (302 / 302) (1.29E+01 - 4.03E+01)	9S2 0.2 mi S	3.85E+01 (4 / 4) (3.67E+01 - 4.03E+01)	1.81E+01 (30 / 30) (1.43E+01 - 2.16E+01)	0
Surface Water (pCi/l)	Gross Beta 48	4	5.39E+00 (36 / 36) (1.03E+00 - 1.82E+01)	2S7 0.1 mi NNE	9.56E+00 (12 / 12) (5.35E+00 - 1.82E+01)	2.93E+00 (12 / 12) (2.81E-01 - 8.14E+00)	0
	Tritium 48	2000	1.36E+03 (36 / 36) (-5.38E+01 - 1.03E+04)	2S7 0.1 mi NNE	3.89E+03 (12 / 12) (8.04E+01 - 1.03E+04)	3.58E+01 (12 / 12) (-2.60E+00 - 1.14E+02)	0
	Iodine-131 86	1	6.21E-01 (62 / 62) (-1.70E-01 - 4.70E+00)	2S7 0.1 mi NNE	1.06E+00 (25 / 25) (7.00E-02 - 4.70E+00)	4.55E-01 (24 / 24) (-2.70E-01 - 2.32E+00)	0
	Gamma Spec						
	K-40 48		-5.64E-01 (36 / 36) (-2.80E+01 - 3.60E+01)	LTAW on site NE-ESE	4.08E+00 (12 / 12) (-2.30E+01 - 3.60E+01)	-3.27E+00 (12 / 12) (-3.60E+01 - 2.40E+01)	0
	Mn-54 48	15	-2.19E-01 (36 / 36) (-4.60E+00 - 3.30E+00)	6S6 0.8 mi ESE	-1.02E-01 (12 / 12) (-1.20E+00 - 1.10E+00)	-1.02E-01 (12 / 12) (-1.20E+00 - 1.10E+00)	0
	Co-58 48	15	-2.52E-01 (36 / 36) (-2.20E+00 - 1.60E+00)	2S7 0.1 mi NNE	8.75E-02 (12 / 12) (-9.00E-01 - 1.60E+00)	-8.46E-01 (12 / 12) (-2.10E+00 - 1.20E+00)	0
	Fe-59 48	30	2.44E-01 (36 / 36) (-5.40E+00 - 4.60E+00)	2S7 0.1 mi NNE	9.60E-01 (12 / 12) (-4.40E+00 - 2.90E+00)	-2.85E-01 (12 / 12) (-4.30E+00 - 3.00E+00)	0
	Co-60 48	15	2.24E-01 (36 / 36) (-4.90E+00 - 3.00E+00)	2S7 0.1 mi NNE	4.82E-01 (12 / 12) (-3.00E-01 - 1.80E+00)	2.53E-01 (12 / 12) (-1.10E+00 - 9.00E-01)	0
	Zn-65 48	30	-1.24E+00 (36 / 36) (-1.42E+01 - 8.00E+00)	6S6 0.8 mi ESE	-7.90E-01 (12 / 12) (-5.00E+00 - 3.20E+00)	-7.90E-01 (12 / 12) (-5.00E+00 - 3.20E+00)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2002
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Surface Water (cont.) (pCi/l)	Zr-95	48	30	1.68E-01 (36 / 36) (-4.30E+00 - 3.90E+00)	LTAW on site NE-ESE	4.17E-01 (12 / 12) (-2.90E+00 - 3.20E+00)	1.69E-01 (12 / 12) -(2.20E+00 - 2.00E+00)	0
	Nb-95	48	15	-8.10E-02 (36 / 36) (-3.40E+00 - 3.00E+00)	6S5 (9.00E-01 mi ESE	3.92E-01 (12 / 12) (-1.20E+00 - 2.10E+00)	1.98E-01 (12 / 12) -(1.40E+00 - 2.30E+00)	0
	Cs-134	48	15	-4.92E-02 (36 / 36) (-1.70E+00 - 1.60E+00)	6S5 (9.00E-01 mi ESE	3.18E-01 (12 / 12) (-2.00E-01 - 1.10E+00)	6.54E-02 (12 / 12) -(1.50E+00 - 1.90E+00)	0
	Cs-137	48	18	-2.02E-01 (36 / 36) (-2.70E+00 - 2.00E+00)	6S5 (9.00E-01 mi ESE	-8.17E-02 (12 / 12) (-2.00E+00 - 1.80E+00)	-2.79E-01 (12 / 12) -(1.90E+00 - 1.40E+00)	0
	Ba-140	48	60	5.12E-02 (36 / 36) (-4.00E+00 - 5.40E+00)	6S6 (8.00E-01 mi ESE	6.65E-01 (12 / 12) (-2.10E+00 - 5.40E+00)	6.65E-01 (12 / 12) -(2.10E+00 - 5.40E+00)	0
	La-140	48	15	5.23E-02 (36 / 36) (-4.70E+00 - 6.20E+00)	6S6 (8.00E-01 mi ESE	7.67E-01 (12 / 12) (-2.40E+00 - 6.20E+00)	7.67E-01 (12 / 12) -(2.40E+00 - 6.20E+00)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2002
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Potable Water (pCi/l)	Gross Alpha 13		2.42E-01 (13 / 13) (-4.88E-01 - 1.11E+00)	12H2 26 mi WSW	2.42E-01 (13 / 13) (-4.88E-01 - 1.11E+00)	Only indicator stations sampled for this medium.	0
	Gross Beta 13	4	2.75E+00 (13 / 13) (9.54E-01 - 4.56E+00)	12H2 26 mi WSW	2.75E+00 (13 / 13) (9.54E-01 - 4.56E+00)		0
	Iodine-131 26	1	2.21E-01 (26 / 26) (-3.30E-01 - 7.70E-01)	12H2 26 mi WSW	2.21E-01 (26 / 26) (-3.30E-01 - 7.70E-01)		0
	Tritium 13	2000	5.57E+01 (13 / 13) (-2.69E+01 - 4.66E+02)	12H2 26 mi WSW	5.57E+01 (13 / 13) (-2.69E+01 - 4.66E+02)		0
	Gamma Spec K-40 13		-2.98E+00 (13 / 13) (-3.30E+01 - 1.30E+01)	12H2 26 mi WSW	-2.98E+00 (13 / 13) (-3.30E+01 - 1.30E+01)		0
	Mn-54 13	15	-2.95E-01 (13 / 13) (-2.10E+00 - 7.40E-01)	12H2 26 mi WSW	-2.95E-01 (13 / 13) (-2.10E+00 - 7.40E-01)		0
	Co-58 13	15	-5.67E-01 (13 / 13) (-2.20E+00 - 3.00E-01)	12H2 26 mi WSW	-5.67E-01 (13 / 13) (-2.20E+00 - 3.00E-01)		0
	Fe-59 13	30	3.65E-01 (13 / 13) (-2.90E+00 - 2.80E+00)	12H2 26 mi WSW	3.65E-01 (13 / 13) (-2.90E+00 - 2.80E+00)		0
	Co-60 13	15	-2.28E-02 (13 / 13) (-2.10E+00 - 1.00E+00)	12H2 26 mi WSW	-2.28E-02 (13 / 13) (-2.10E+00 - 1.00E+00)		0
	Zn-65 13	30	-1.17E+00 (13 / 13) (-4.70E+00 - 3.10E+00)	12H2 26 mi WSW	-1.17E+00 (13 / 13) (-4.70E+00 - 3.10E+00)		0
	Zr-95 13	30	-3.61E-01 (13 / 13) (-4.50E+00 - 2.90E+00)	12H2 26 mi WSW	-3.61E-01 (13 / 13) (-4.50E+00 - 2.90E+00)		0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2002
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Potable Water (cont) (pCi/l)	Nb-95	12	15	2.35E-01 (12 / 12) (-1.10E+00 - 2.30E+00)	12H2 26 mi WSW	2.35E-01 (12 / 12) (-1.10E+00 - 2.30E+00)	Only indicator stations sampled for this medium.	0
	Cs-134	12	15	1.91E-01 (12 / 12) (-1.10E+00 - 1.40E+00)	12H2 26 mi WSW	1.91E-01 (12 / 12) (-1.10E+00 - 1.40E+00)		0
	Cs-137	12	18	-4.53E-01 (12 / 12) (-1.60E+00 - 7.00E-01)	12H2 26 mi WSW	-4.53E-01 (12 / 12) (-1.60E+00 - 7.00E-01)		0
	Ba-140	12	60	-1.24E+00 (12 / 12) (-5.10E+00 - 1.70E+00)	12H2 26 mi WSW	-1.24E+00 (12 / 12) (-5.10E+00 - 1.70E+00)		0
	La-140	12	15	-1.44E+00 (12 / 12) (-5.90E+00 - 2.00E+00)	12H2 26 mi WSW	-1.44E+00 (12 / 12) (-5.90E+00 - 2.00E+00)		0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2002
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Fish	Gamma Spec						
(pCi/kg wet)	K-40	15	3.64E+03 (8 / 8) (3.15E+03 - 4.37E+03)	LTAW on site NE-ESE	3.90E+03 (1 / 1) (3.90E+03 - 3.90E+03)	3.78E+03 (7 / 7) (3.04E+03 - 4.83E+03)	0
	Mn-54	15	130 2.15E-01 (5 / 8) (-1.15E+01 - 5.98E+00)	2H 30 mi NNE	4.14E+00 (4 / 7) (-1.98E+00 - 1.07E+01)	4.14E+00 (4 / 7) (-1.98E+00 - 1.07E+01)	0
	Co-58	15	130 -7.77E+00 (5 / 8) (-1.78E+01 - 1.15E+00)	LTAW on site NE-ESE	-3.57E+00 (1 / 1) (-3.57E+00 - -3.57E+00)	-3.82E+00 (4 / 7) (-1.57E+01 - 3.40E+00)	0
	Fe-59	15	260 -5.00E-01 (5 / 8) (-1.65E+01 - 2.22E+01)	IND 0.9-1.4 mi ESE	3.50E+00 (4 / 7) (-5.70E+00 - 2.22E+01)	-1.24E+01 (4 / 7) (-4.74E+01 - 1.04E+01)	0
	Co-60	15	130 4.90E-01 (5 / 8) (-9.70E+00 - 4.99E+00)	2H 30 mi NNE	2.88E+00 (4 / 7) (-5.21E+00 - 1.10E+01)	2.88E+00 (4 / 7) (-5.21E+00 - 1.10E+01)	0
	Zn-65	15	260 -1.30E+01 (5 / 8) (-4.12E+01 - 0.00E+00)	LTAW on site NE-ESE	-4.17E+00 (1 / 1) (-4.17E+00 - -4.17E+00)	-2.42E+01 (4 / 7) (-4.84E+01 - 1.07E+00)	0
	Zr-95	15	-3.08E+00 (5 / 8) (-9.33E+00 - 9.58E+00)	LTAW on site NE-ESE	9.58E+00 (1 / 1) (9.58E+00 - 9.58E+00)	3.87E+00 (4 / 7) (-3.53E+00 - 1.17E+01)	0
	Nb-95	6	<LLD (0 / 3)			<LLD (0 / 3)	0
	Cs-134	15	130 -1.50E+00 (5 / 8) (-1.12E+01 - 2.89E+00)	LTAW on site NE-ESE	-1.09E+00 (1 / 1) (-1.09E+00 - -1.09E+00)	-2.17E+01 (4 / 7) (-6.78E+01 - 7.59E-01)	0
	Cs-137	15	150 -4.16E+00 (5 / 8) (-1.40E+01 - 4.21E+00)	LTAW on site NE-ESE	4.21E+00 (1 / 1) (4.21E+00 - 4.21E+00)	1.73E+00 (4 / 7) (-9.66E+00 - 9.23E+00)	0
	Ba-140	15	-1.27E+01 (5 / 8) (-1.27E+02 - 5.43E+01)	LTAW on site NE-ESE	5.43E+01 (1 / 1) (5.43E+01 - 5.43E+01)	4.99E+01 (4 / 7) (2.41E+00 - 1.26E+02)	0
	La-140	15	-1.71E+01 (5 / 8) (-2.87E+01 - -8.36E+00)	IND 0.9-1.4 mi ESE	-1.60E+01 (4 / 7) (-2.87E+01 - -8.36E+00)	-2.79E+01 (4 / 7) (-1.14E+02 - 6.25E+01)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2002
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Sediment	Gamma Spec						
(pCi/kg dry)	Be-7	6	5.03E+01 (4 / 4) (8.90E-02 - 2.00E+02)	2B 1.6 mi NNE	4.41E+02 (2 / 2) (1.63E+00 - 8.81E+02)	4.41E+02 (2 / 2) (1.63E+00 - 8.81E+02)	0
	K-40	6	4.35E+03 (3 / 4) (1.03E+01 - 1.30E+04)	7B 1.2 mi SE	1.30E+04 (1 / 2) (1.30E+04 - 1.30E+04)	9.61E+03 (2 / 2) (1.52E+01 - 1.92E+04)	0
	Mn-54	6	2.76E+00 (4 / 4) (1.41E-06 - 1.10E+01)	7B 1.2 mi SE	5.50E+00 (2 / 2) (1.41E-06 - 1.10E+01)	-6.59E+00 (2 / 2) (-1.32E+01 - 1.43E-02)	0
	Co-58	6	-4.50E+00 (4 / 4) (-1.80E+01 - 9.58E-03)	LTAW on site NE-ESE	8.37E-04 (1 / 1) (1.41E-06 - 8.37E-04)	-1.94E+01 (2 / 2) (-3.89E+01 - 1.15E-02)	0
	Fe-59	6	5.51E+00 (4 / 4) (3.15E-04 - 2.20E+01)	7B 1.2 mi SE	1.10E+01 (2 / 2) (5.85E-04 - 2.20E+01)	-2.66E+01 (2 / 2) (-5.32E+01 - 2.94E-02)	0
	Co-60	6	-7.47E-01 (4 / 4) (-3.00E+00 - 7.68E-03)	2B 1.6 mi NNE	6.85E+00 (2 / 2) (6.93E-03 - 1.37E+01)	6.85E+00 (2 / 2) (6.93E-03 - 1.37E+01)	0
	Zn-65	6	2.00E+01 (4 / 4) (3.18E-02 - 8.00E+01)	7B 1.2 mi SE	4.00E+01 (2 / 2) (3.18E-02 - 8.00E+01)	4.90E-02 (2 / 2) (4.59E-02 - 5.21E-02)	0
	Zr-95	5	6.27E+00 (4 / 4) (6.47E-04 - 2.50E+01)	7B 1.2 mi SE	1.25E+01 (2 / 2) (6.47E-04 - 2.50E+01)	2.24E-02 (1 / 1) (2.24E-02 - 2.24E-02)	0
	Nb-95	6	-5.23E+00 (4 / 4) (-2.10E+01 - 4.23E-02)	LTAW on site NE-ESE	4.23E-02 (1 / 1) (4.23E-02 - 4.23E-02)	1.59E-02 (2 / 2) (0.00E+00 - 3.17E-02)	0
	Cs-134	6 150	4.26E+00 (4 / 4) (1.63E-02 - 1.70E+01)	7B 1.2 mi SE	8.51E+00 (2 / 2) (1.63E-02 - 1.70E+01)	5.06E+00 (2 / 2) (2.78E-02 - 1.01E+01)	0
	Cs-137	6 180	1.88E+01 (4 / 4) (1.23E-02 - 7.50E+01)	2B 1.6 mi NNE	6.96E+01 (2 / 2) (1.14E-01 - 1.39E+02)	6.96E+01 (2 / 2) (1.14E-01 - 1.39E+02)	0
	Ba-140	6	2.75E+01 (4 / 4) (1.60E-03 - 1.10E+02)	7B 1.2 mi SE	5.50E+01 (2 / 2) (4.54E-02 - 1.10E+02)	2.41E+01 (2 / 2) (1.61E-03 - 4.82E+01)	0

TABLE G
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OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2002
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Sediment (cont) (pCi/kg dry)	La-140	6	-1.48E+01 (3 / 4) (-4.60E+01 - 1.32E+00)	12F 6.9 mi WSW	1.32E+00 (1 / 1) (1.32E+00 - 1.32E+00)	-4.90E+01 (2 / 2) (-9.90E+01 - 9.58E-01)	0
	Ra-226	5	1.56E+00 (3 / 3) (1.55E+00 - 1.57E+00)	2B 1.6 mi NNE	1.64E+03 (2 / 2) (1.51E+00 - 3.28E+03)	1.64E+03 (2 / 2) (1.51E+00 - 3.28E+03)	0
	Th-228	5	1.83E+00 (3 / 3) (5.12E-05 - 4.31E+00)	2B 1.6 mi NNE	7.41E+02 (2 / 2) (2.73E+00 - 1.48E+03)	7.41E+02 (2 / 2) (2.73E+00 - 1.48E+03)	0
Ground Water (pCi/l)	Gamma Spec						
	K-40	36	3.33E+00 (24 / 24) (-2.20E+01 - 4.70E+01)	2S2 0.9 mi NNE	4.25E+00 (12 / 12) (-1.90E+01 - 4.70E+01)	8.33E-02 (12 / 12) (-1.90E+01 - 3.70E+01)	0
	Mn-54	36	15 -2.21E-01 (24 / 24) (-2.70E+00 - 1.90E+00)	12F3 5.2 mi WSW	3.58E-01 (12 / 12) (-1.50E+00 - 2.30E+00)	3.58E-01 (12 / 12) (-1.50E+00 - 2.30E+00)	0
	Co-58	36	15 -3.29E-01 (24 / 24) (-2.90E+00 - 1.60E+00)	2S2 0.9 mi NNE	1.33E-01 (12 / 12) (-1.00E+00 - 1.60E+00)	-2.83E-01 (12 / 12) (-3.30E+00 - 2.20E+00)	0
	Fe-59	36	30 -7.50E-02 (24 / 24) (-4.90E+00 - 3.50E+00)	4S4 0.5 mi ENE	4.00E-01 (12 / 12) (-3.60E+00 - 3.50E+00)	-6.17E-01 (12 / 12) (-4.40E+00 - 2.50E+00)	0
	Co-60	36	15 1.83E-01 (24 / 24) (-2.20E+00 - 2.20E+00)	2S2 0.9 mi NNE	4.92E-01 (12 / 12) (-1.10E+00 - 2.20E+00)	-3.50E-01 (12 / 12) (-3.60E+00 - 2.50E+00)	0
	Zn-65	36	30 -1.39E+00 (24 / 24) (-1.00E+01 - 9.00E+00)	12F3 5.2 mi WSW	1.28E+00 (12 / 12) (-6.00E+00 - 2.00E+01)	1.28E+00 (12 / 12) (-3.60E+00 - 2.00E+01)	0
	Zr-95	36	30 1.33E-01 (24 / 24) (-5.70E+00 - 5.80E+00)	4S4 0.5 mi ENE	7.17E-01 (12 / 12) (-1.60E+00 - 5.80E+00)	-9.08E-01 (12 / 12) (-5.20E+00 - 3.10E+00)	0
	Nb-95	36	15 -4.92E-01 (24 / 24) (-3.40E+00 - 1.90E+00)	12F3 5.2 mi WSW	1.17E-01 (12 / 12) (-3.20E+00 - 2.80E+00)	1.17E-01 (12 / 12) (-3.20E+00 - 2.80E+00)	0
	Cs-134	36	15 2.17E-01 (24 / 24) (-2.50E+00 - 2.60E+00)	12F3 5.2 mi WSW	3.00E-01 (12 / 12) (-1.30E+00 - 2.60E+00)	3.00E-01 (12 / 12) (-1.30E+00 - 2.60E+00)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2002
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	NAME DISTANCE AND DIRECTION	LOCATION WITH HIGHEST MEAN MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Ground Water (cont) (pCi/l)	Cs-137	36	18	-5.08E-01 (24 / 24) (-2.50E+00 - 1.70E+00)	2S2 0.9 mi NNE	-1.75E-01 (12 / 12) (-1.20E+00 - 1.70E+00)	-5.00E-01 (12 / 12) (-2.60E+00 - 2.10E+00)	0
	Ba-140	36	60	-5.00E-02 (24 / 24) (-7.30E+00 - 4.30E+00)	12F3 5.2 mi WSW	1.15E+00 (12 / 12) (-1.80E+00 - 3.80E+00)	1.15E+00 (12 / 12) (-1.80E+00 - 3.80E+00)	0
	La-140	36	15	-5.83E-02 (24 / 24) (-8.40E+00 - 4.90E+00)	12F3 5.2 mi WSW	1.33E+00 (12 / 12) (-2.00E+00 - 4.40E+00)	1.33E+00 (12 / 12) (-2.00E+00 - 4.40E+00)	0
	H-3	36	2000	7.77E+01 (24 / 24) (-6.29E+01 - 2.83E+02)	4S4 0.5 mi ENE	1.17E+02 (12 / 12) (0.00E+00 - 2.83E+02)	6.26E+01 (12 / 12) (-4.27E+01 - 2.07E+02)	0
Air Particulates (E-03 pCi/m3)	Gross Beta	306	10	1.56E+01 (204 / 204) (1.00E+00 - 3.04E+01)	3S2 0.5 mi NE	1.66E+01 (51 / 51) (5.10E+01 - 6.60E+00)	1.36E+01 (102 / 102) (5.00E-01 - 2.69E+01)	0
Air Iodine (E-03 pCi/m3)	I-131	318	70	2.23E-04 (52 / 212) (-4.67E-03 - 1.01E-02)	6G1 13.5 mi ESE	6.60E-04 (13 / 53) (5.30E+01 - -1.96E-03)	4.42E-04 (26 / 106) (-2.08E-03 - 6.99E-03)	0
Air Particulates	Gamma Spec							
Quarterly Composite (E-03 pCi/m3)	Be-7	24		1.37E+02 (16 / 16) (7.00E+01 - 7.28E+02)	13S6 0.4 mi W	2.57E+02 (4 / 4) (9.17E+01 - 7.28E+02)	9.37E+01 (8 / 8) (7.54E+01 - 1.23E+02)	0
	K-40	24		-7.60E-02 (4 / 16) (-8.31E+00 - 9.29E+00)	13S6 0.4 mi W	9.29E+00 (1 / 4) (9.29E+00 - 9.29E+00)	1.50E+00 (3 / 8) (2.16E-01 - 2.86E+00)	0
	Mn-54	24		1.85E-01 (4 / 16) (4.25E-02 - 3.28E-01)	12S1 0.4 mi WSW	3.28E-01 (1 / 4) (3.28E-01 - 3.28E-01)	-8.98E-02 (2 / 8) (-1.37E-01 - -4.26E-02)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2002
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	NAME DISTANCE AND DIRECTION	LOCATION WITH HIGHEST MEAN MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Air Particulates (cont)								
Quarterly Composite (E-03 pCi/m3)	Co-58	24		-4.64E-02 (4 / 16) (-1.53E-01 - 4.65E-02)	3S2 0.5 mi NE	4.65E-02 (1 / 4) (4.65E-02 - 4.65E-02)	-7.35E-03 (2 / 8) (-2.72E-02 - 1.25E-02)	0
	Fe-59	24		-9.70E-02 (4 / 16) (-1.17E+00 - 9.74E-01)	3S2 0.5 mi NE	9.74E-01 (1 / 4) (9.74E-01 - 1)	-5.84E-02 (2 / 8) (-8.89E-02 - -2.78E-02)	0
	Co-60	24		6.98E-02 (4 / 16) (-3.15E-02 - 1.49E-01)	13S6 0.4 mi W	1.49E-01 (1 / 4) (1.49E-01 - 1.49E-01)	5.35E-02 (2 / 8) (4.52E-02 - 6.18E-02)	0
	Zn-65	24		-1.97E-01 (4 / 16) (-3.94E-01 - 2.84E-02)	12E1 4.7 mi WSW	2.84E-02 (1 / 4) (2.84E-02 - 2.84E-02)	-1.92E-01 (2 / 8) (-3.26E-01 - -5.76E-02)	0
	Zr-95	18		<LLD (0 / 12)			<LLD (0 / 6)	0
	Nb-95	24		0.00E+00 (4 / 16) (0.00E+00 - 0.00E+00)	6G1 13.5 mi ESE	0.00E+00 (1 / 4) (0.00E+00 - 0.00E+00)	0.00E+00 (2 / 8) (0.00E+00 - 0.00E+00)	0
	Cs-134	24	50	0.00E+00 (4 / 16) (-5.76E+00 - 5.48E-02)	12E1 4.7 mi WSW	5.48E-02 (1 / 4) (5.48E-02 - 5.48E-02)	1.36E-02 (2 / 8) (-2.08E-02 - 4.79E-02)	0
	Cs-137	24	60	-1.09E+00 (4 / 16) (-4.47E+00 - 6.04E-02)	12E1 4.7 mi WSW	6.04E-02 (1 / 4) (6.04E-02 - 6.04E-02)	1.01E-02 (2 / 8) (-2.28E-02 - 4.30E-02)	0
	Ba-140	24		-3.80E+01 (4 / 16) (-1.71E+02 - 2.02E+01)	12E1 4.7 mi WSW	2.02E+01 (1 / 4) (2.02E+01 - 2.02E+01)	-3.76E+00 (2 / 8) (-6.50E+00 - -1.02E+00)	0
	La-140	24		-1.55E+01 (4 / 16) (-5.30E+01 - -1.40E+00)	12S1 0.4 mi WSW	-1.40E+00 (1 / 4) (-1.40E+00 - -1.40E+00)	-3.71E+00 (2 / 8) (-5.03E+00 - -2.38E+00)	0

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Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Milk (pCi/l)	I-131	76	1	-9.95E-02 (58 / 58) (-4.90E+00 - 2.60E+00)	10D2 3.1 mi SSW	1.92E-01 (18 / 18) (-1.00E+00 - 2.60E+00)	1.68E-02 (18 / 18) (-2.20E-01 - 1.80E-01)	0
	Gamma Spec							
	K-40	76		1.40E+03 (58 / 58) (1.24E+03 - 1.60E+03)	10D1 3 mi SSW	1.43E+03 (18 / 18) (1.30E+03 - 1.60E+03)	1.34E+03 (18 / 18) (1.19E+03 - 1.47E+03)	0
	Mn-54	76		-1.21E-01 (58 / 58) (-4.60E+00 - 3.70E+00)	10D3 3.5 mi SSW	-3.75E-02 (8 / 8) (-1.60E+00 - 2.40E+00)	-3.11E-01 (18 / 18) (-2.20E+00 - 2.50E+00)	0
	Co-58	76		-3.95E-01 (58 / 58) (-4.20E+00 - 5.50E+00)	10D3 3.5 mi SSW	-1.75E-01 (8 / 8) (-3.10E+00 - 2.30E+00)	-6.00E-01 (18 / 18) (-4.30E+00 - 2.00E+00)	0
	Fe-59	76		6.78E-01 (58 / 58) (-1.30E+01 - 1.20E+01)	10D2 3.1 mi SSW	1.42E+00 (18 / 18) (-1.30E+01 - 1.20E+01)	2.22E-01 (18 / 18) (-7.00E+00 - 7.40E+00)	0
	Co-60	76		4.31E-02 (58 / 58) (-4.70E+00 - 4.00E+00)	12B2 1.7 mi WSW	8.29E-01 (14 / 14) (-1.50E+00 - 4.00E+00)	-6.11E-02 (18 / 18) (-2.80E+00 - 2.40E+00)	0
	Zn-65	76		-6.45E-01 (58 / 58) (-9.00E+00 - 1.40E+01)	10G1 14 mi SSW	9.83E-01 (18 / 18) (-8.00E+00 - 1.30E+01)	9.83E-01 (18 / 18) (-8.00E+00 - 1.30E+01)	0
	Zr-95	76		3.02E-01 (58 / 58) (-7.10E+00 - 6.90E+00)	12B2 1.7 mi WSW	7.93E-01 (14 / 14) (-4.40E+00 - 5.70E+00)	2.22E-01 (18 / 18) (-4.50E+00 - 3.90E+00)	0
	Nb-95	76		-3.48E-01 (58 / 58) (-4.50E+00 - 2.70E+00)	10G1 14 mi SSW	8.33E-02 (18 / 18) (-1.70E+00 - 3.20E+00)	8.33E-02 (18 / 18) (-1.70E+00 - 3.20E+00)	0
	Cs-134	76	15	1.45E-01 (58 / 58) (-3.90E+00 - 3.60E+00)	10G1 14 mi SSW	6.67E-01 (18 / 18) (-2.80E+00 - 3.80E+00)	6.67E-01 (18 / 18) (-2.80E+00 - 3.80E+00)	0
	Cs-137	76	18	4.34E-01 (58 / 58) (-3.20E+00 - 4.00E+00)	10D1 3 mi SSW	9.28E-01 (18 / 18) (-1.60E+00 - 4.00E+00)	5.61E-01 (18 / 18) (-2.40E+00 - 3.20E+00)	0
	Ba-140	76	60	2.43E-01 (58 / 58) (-3.70E+00 - 5.30E+00)	10D2 3.1 mi SSW	5.28E-01 (18 / 18) (-3.60E+00 - 5.30E+00)	-3.83E-01 (18 / 18) (-4.50E+00 - 2.60E+00)	0
	La-140	76	15	2.71E-01 (58 / 58) (-4.20E+00 - 6.10E+00)	10D2 3.1 mi SSW	6.06E-01 (18 / 18) (-4.20E+00 - 6.10E+00)	-4.28E-01 (18 / 18) (-5.10E+00 - 3.00E+00)	0

TABLE G
SUMMARY OF DATA FOR SSES
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NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
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Reporting Period: December 26, 2001 to January 31, 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Soil	Gamma Spec						
(pCi/kg dry)	K-40	8	1.33E+04 (6 / 6) (1.05E+04 - 1.76E+04)	13S6 0.4 mi W	1.65E+04 (2 / 2) (1.54E+04 - 1.76E+04)	8.32E+03 (2 / 2) (7.43E+03 - 9.20E+03)	0
	Mn-54	8	6.83E+00 (6 / 6) (-9.00E+00 - 2.60E+01)	12S1 0.4 mi WSW	2.40E+01 (2 / 2) (2.20E+01 - 2.60E+01)	-1.35E+01 (2 / 2) (-2.90E+01 - 2.00E+00)	0
	Co-58	8	-3.17E+00 (6 / 6) (-1.10E+01 - 2.30E+01)	12S1 0.4 mi WSW	7.50E+00 (2 / 2) (-8.00E+00 - 2.30E+01)	-1.85E+01 (2 / 2) (-2.00E+01 - -1.70E+01)	0
	Fe-59	8	-2.08E+01 (6 / 6) (-1.10E+02 - 1.00E+01)	3S2 0.5 mi NE	6.00E+00 (2 / 2) (2.00E+00 - 1.00E+01)	-3.45E+01 (2 / 2) (-8.00E+01 - 1.10E+01)	0
	Co-60	8	5.00E-01 (6 / 6) (-1.20E+01 - 1.40E+01)	8G1 12 mi SSE	1.20E+01 (2 / 2) (6.00E+00 - 1.80E+01)	1.20E+01 (2 / 2) (6.00E+00 - 1.80E+01)	0
	Zn-65	8	1.33E+00 (6 / 6) (-5.00E+01 - 1.10E+02)	13S6 0.4 mi W	4.50E+01 (2 / 2) (-2.00E+01 - 1.10E+02)	-2.25E+01 (2 / 2) (-2.50E+01 - -2.00E+01)	0
	Zr-95	8	5.50E+00 (6 / 6) (-4.10E+01 - 3.80E+01)	13S6 0.4 mi W	1.75E+01 (2 / 2) (1.20E+01 - 2.30E+01)	1.20E+01 (2 / 2) (9.00E+00 - 1.50E+01)	0
	Nb-95	8	-1.55E+01 (6 / 6) (-6.20E+01 - 8.00E+00)	12S1 0.4 mi WSW	6.00E+00 (2 / 2) (4.00E+00 - 8.00E+00)	-1.90E+01 (2 / 2) (-2.80E+01 - -1.00E+01)	0
	Cs-134	8	-1.43E+01 (6 / 6) (-2.70E+01 - -1.00E+00)	13S6 0.4 mi W	-3.00E+00 (2 / 2) (-5.00E+00 - -1.00E+00)	-4.50E+00 (2 / 2) (-8.00E+00 - -1.00E+00)	0
	Cs-137	8	1.87E+01 (6 / 6) (-5.00E+00 - 4.90E+01)	8G1 12 mi SSE	8.65E+01 (2 / 2) (8.20E+01 - 9.10E+01)	8.65E+01 (2 / 2) (8.20E+01 - 9.10E+01)	0
	Ba-140	8	-4.67E+01 (6 / 6) (-1.50E+02 - 0.00E+00)	13S6 0.4 mi W	-2.50E+01 (2 / 2) (-5.00E+01 - 0.00E+00)	-3.00E+01 (2 / 2) (-9.00E+01 - 3.00E+01)	0
	La-140	8	1.37E+01 (6 / 6) -(6.10E+01 - 1.40E+02)	12S1 0.4 mi WSW	8.00E+01 (2 / 2) (2.00E+01 - 1.40E+02)	6.00E+01 (2 / 2) (5.00E+01 - 7.00E+01)	0

TABLE G
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Soil (cont) (pCi/kg dry)	Ra-226 0						0
	Th-228 8		7.76E+02 (6 / 6) (6.30E+02 - 9.34E+02)	13S6 0.4 mi W	9.31E+02 (2 / 2) (9.28E+02 - 9.34E+02)	6.79E+02 (2 / 2) (6.08E+02 - 7.50E+02)	0
Food/Garden Crops (pCi/kg wet)	Gamma Spec						
	Be-7 5		8.47E+00 (1 / 3) (8.47E+00 - 8.47E+00)	13G2 16 mi W	8.49E+00 (1 2) (8.49E+00 - 8.49E+00)	8.49E+00 (1 / 2) (8.49E+00 - 8.49E+00)	0
	K-40 5		2.55E+03 (3 / 3) (1.64E+03 - 3.94E+03)	13G2 16 mi W	3.03E+03 (2 / 2) (2.62E+03 - 3.43E+03)	3.03E+03 (2 / 2) (2.62E+03 - 3.43E+03)	0
	Mn-54 5		1.02E+00 (1 / 3) (1.02E+00 - 1.02E+00)	13G2 16 mi W	3.12E+00 (1 / 2) (3.12E+00 - 3.12E+00)	3.12E+00 (1 / 2) (3.12E+00 - 3.12E+00)	0
	Co-58 5		8.52E-01 (1 / 3) (8.52E-01 - 8.52E-01)	11D1 3.3 mi SW	8.52E-01 (1 / 1) (8.52E-01 - 8.52E-01)	-1.90E+00 (1 / 2) (-1.90E+00 - -1.90E+00)	0
	Fe-59 5		-1.06E+00 (1 / 3) (-1.06E+00 - -1.06E+00)	13G2 16 mi W	4.08E-01 (1 / 2) (4.08E-01 - 4.08E-01)	4.08E-01 (1 / 2) (4.08E-01 - 4.08E-01)	0
	Co-60 5		2.08E+00 (1 / 3) (2.08E+00 - 2.08E+00)	11D1 3.3 mi SW	2.08E+00 (1 / 1) (2.08E+00 - 2.08E+00)	6.29E-01 (1 / 2) (6.29E-01 - 6.29E-01)	0
	Zn-65 5		-8.07E+00 (1 / 3) (-8.07E+00 - -8.07E+00)	13G2 16 mi W	-2.61E+00 (1 / 2) (-2.61E+00 - -2.61E+00)	-2.61E+00 (1 / 2) (-2.61E+00 - -2.61E+00)	0
	Zr-95 5		-1.57E-01 (1 / 3) (-1.57E-01 - -1.57E-01)	13G2 16 mi W	9.27E-01 (1 / 2) (9.27E-01 - 9.27E-01)	9.27E-01 (1 / 2) (9.27E-01 - 9.27E-01)	0
	Nb-95 5		0.00E+00 (1 / 3) (0.00E+00 - 0.00E+00)	13G2 16 mi W	0.00E+00 (1 / 2) (0.00E+00 - 0.00E+00)	0.00E+00 (1 / 2) (0.00E+00 - 0.00E+00)	0
	I-131 5		-8.29E+00 (1 / 3) (-8.29E+00 - -8.29E+00)	13G2 16 mi W	4.17E+00 (1 / 2) (4.17E+00 - 4.17E+00)	4.17E+00 (1 / 2) (4.17E+00 - 4.17E+00)	0

TABLE G
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Food/Garden Crops (cont)							
(pCi/kg wet)	Cs-134	5	1.60E+00 (1 / 3) (1.60E+00 - 1.60E+00)	11D1 3.3 mi SW	1.60E+00 (1 / 1) (1.60E+00 - 1.60E+00)	1.04E+00 (1 / 2) (1.04E+00 - 1.04E+00)	0
	Cs-137	5	-2.45E-01 (1 / 3) (-2.45E-01 - -2.45E-01)	13G2 16 mi W	1.16E+00 (1 / 2) (1.16E+00 - 1.16E+00)	1.16E+00 (1 / 2) (1.16E+00 - 1.16E+00)	0
	Ba-140	5	-1.39E+01 (1 / 3) (-1.39E+01 - -1.39E+01)	13G2 16 mi W	1.59E+01 (1 / 2) (1.59E+01 - 1.59E+01)	1.59E+01 (1 / 2) (1.59E+01 - 1.59E+01)	0
	La-140	5	-5.55E+00 (1 / 3) (-5.55E+00 - -5.55E+00)	13G2 16 mi W	2.23E+00 (1 / 2) (2.23E+00 - 2.23E+00)	2.23E+00 (1 / 2) (2.23E+00 - 2.23E+00)	0

1. The total number of analysis does not include duplicates, splits, or repeated analyses.
2. The Technical Requirement LLD's are shown when applicable.
3. The means are based on all available measured results. When possible, this includes those below the MDCs as well as those above them.
4. USNRC reporting levels are specified in the Technical Requirements.

APPENDIX H

COMPARISON OF INDICATOR AND CONTROL 2002 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 2002 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 wide area. 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 TLDS (mR/STD QTR)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-01**	**2002**	**1978-81**	**1982-01**	**2002**
Range	18.5-19.2	14.7-20.8	--	15.0-17.9	14.8-20.8	--
Mean	18.9	18.1	19.0	16.3	17.9	18.1

AQUATIC PATHWAY MONITORING

TABLE H 2

SURFACE WATER GROSS BETA ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-01**	**2002**	**1978-81**	**1982-01**	**2002**
Range	3.2-4.9	3.0-7.7	--	2.9-5.2	2.8-6.7	--
Mean	3.8	5.6	5.4	4.0	3.8	2.9

TABLE H 3

SURFACE WATER IODINE-131 ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979-81	**1982-01**	**2002**	**1979-81**	**1982-01**	**2002**
Range	0.24-0.37	0.06-0.60	--	0.29-0.43	0.03-1.0	--
Mean	0.29	0.30	0.61	0.36	0.31	0.43

TABLE H 4

SURFACE WATER TRITIUM ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-01***	**2002**	**1978-81**	**1982-01***	**2002**
Range	101-122	126-1217	--	119-319	-239 - +212	--
Mean	109	531	1,363	171	53	36.1

*1990 results were not averaged with 1982-01 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 5

DRINKING WATER GROSS ALPHA ACTIVITIES (pCi/l)			
Period	**Preoperational**	**Operational**	
	1980 - 81	**1982 – 01**	**2002**
Range	--	0.1 – 10.0	--
Mean	1.3	1.5	0.24

TABLE H 6

DRINKING WATER GROSS BETA ACTIVITIES (pCi/l)			
Period	**Preoperational**	**Operational**	
	1977 - 81	**1982 - 01**	**2002**
Range	2.2 - 3.2	2.4 - 5.4	--
Mean	2.7	3.1	2.8

TABLE H 7

DRINKING WATER TRITIUM ACTIVITIES (pCi/l)			
Period	**Preoperational**	**Operational**	
	1977 – 81	**1982 - 01**	**2002**
Range	101 – 194	-247 - +220	--
Mean	132	63	48

TABLE H 8

FISH POTASSIUM-40 ACTIVITIES (pCi/g wet)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1977-81	**1982-01**	**2002**	**1977-81**	**1982-01**	**2002**
Range	2.7 - 3.5	3.1 - 5.3	--	2.8 - 3.6	3.1 - 4.2	--
Mean	3.2	3.8	3.6	3.2	3.6	3.2

TABLE H 9

SEDIMENT POTASSIUM-40 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-01**	**2002**	**1978-81**	**1982-01**	**2002**
Range	8.6-10.4	7.4-13.5	--	7.5-11.0	6.2-13.0	--
Mean	9.3	10.6	13.6	7.7	10.6	10.3

TABLE H 10

SEDIMENT RADIUM-226 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-01**	**2002**	**1978-81**	**1982-01**	**2002**
Range	0.5-0.7	0.5-1.9	--	0.6-1.9	0.4-2.1	--
Mean	0.6	1.5	2.0	0.7	1.5	2.1

TABLE H 11

SEDIMENT THORIUM-228 ACTIVITIES (pCi/g dry)				
Location	**Indicator**		**Control**	
Period	**1984 - 01***	**2002**	**1984 - 01***	**2002**
Range	0.9 - 1.7	--	0.8 - 1.4	--
Mean	1.1	1.6	1.1	2.1

*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	**1982-01**	**2002**	**1978-81**	**1982-01**	**2002**
Range	0.08-0.15	0.04-0.17	--	0.08-0.21	0.06-0.21	--
Mean	0.10	0.09	0.06	0.11	0.11	0.13

ATMOSPHERIC PATHWAY MONITORING

TABLE H 13

AIR PARTICULATE GROSS BETA ACTIVITIES (E-3 pCi/m^3)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-01**	**2002**	**1978-81**	**1982-01**	**2002**
Range	24 - 97	13 - 29	--	24 - 102	12 – 28	--
Mean	61	16	16	62	16	14

TABLE H 14

AIR PARTICULATE BERYLLIUM-7 ACTIVITIES (E-3 pCi/m^3)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-01***	**2002**	**1978-81**	**1982-01***	**2002**
Range	69 - 81	50 - 132	--	59 - 85	49 - 126	--
Mean	76	93	137	72	88	94

*1990 results were not averaged with 1982-01 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	**1984-01**	**2002**	**1979&81**	**1984-01**	**2002**
Range	9.2 - 9.7	9.4-14.3	--	9.1-11.0	7.4-14.1	--
Mean	9.5	11.6	13.3	10.1	10.6	8.3

TABLE H 16

SOIL RADIUM-226 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1984-01**	**2002**	**1979&81**	**1984-01**	**2002**
Range	0.8 - 1.3	0.8 - 2.5	--	0.8 - 1.2	1.0 - 2.2	--
Mean	1.1	1.6	0	1.0	1.7	0

TABLE H 17

SOIL THORIUM-228 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1984-01**	**2002**	**1979&81**	**1984-01**	**2002**
Range	0.9 - 1.3	0.8 – 2.0	--	--	0.7 – 2.4	--
Mean	1.1	1.0	0.8	1.0	1.1	0.7

TABLE H 18

SOIL CESIUM-137 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1982-01**	**2002**	**1979&81**	**1982-01**	**2002**
Range	0.5 - 0.7	0.05 - 0.5	--	0.2 - 1.2	0.1 - 1.2	--
Mean	0.6	0.2	0.02	0.7	0.4	0.09

TABLE H 19

MILK POTASSIUM-40 ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1985-01**	**2002**	**1978-81**	**1985-01**	**2002**
Range	1222-1500	1241-1422	--	1273-1500	1247-1472	--
Mean	1325	1329	1403	1390	1331	1338

TABLE H 20

FRUITS/VEGETABLES POTASSIUM-40 ACTIVITIES (pCi/g wet)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1980-81	**1982-01***	**2002**	**1980-81**	**1982-01***	**2002**
Range	2.5 - 3.0	2.0-4.2	--	3.0 - 3.1	1.9 – 3.4	--
Mean	2.8	2.7	2.6	3.1	2.5	3.0

*1990 results were not averaged with 1982-01 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 21

GROUND WATER TRITIUM ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1980-81	**1982-01**	**2002**	**1980-81**	**1982-01**	**2002**
Range	94-109	-206 - +180	--	117 - 119	-206 - +260	--
Mean	101	58	78	118	68	63

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 beryllium-7 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 THERMOLUMINESCENT DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION - 2002

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

Location	First Quarter 01/14/02 to 04/18/02	Second Quarter 04/17/02 to 07/18/02	Third Quarter 07/16/02 to 10/17/02	Fourth Quarter 10/15/02 to 01/31/03
ONSITE				
1S2 +	20.4 ± 1.0	23.7 ± 1.6	21.9 ± 1.2	21.6 ± 1.0
2S2	16.9 ± 1.0	16.5 ± 1.0	16.6 ± 1.2	15.6 ± 0.7
2S3 +	18.6 ± 1.0	21.5 ± 1.2	20.7 ± 1.4	19.6 ± 1.0
3S2	17.0 ± 1.6	16.9 ± 0.8	16.5 ± 1.2	16.2 ± 1.6
3S3	16.5 ± 0.8	16.4 ± 1.4	16.8 ± 1.4	15.3 ± 0.3
3S4 +	16.4 ± 1.0	16.7 ± 0.6	16.2 ± 0.8	15.8 ± 0.7
4S3 +	21.0 ± 1.6	21.8 ± 1.4	20.9 ± 1.4	20.4 ± 1.2
4S6	17.7 ± 0.4	16.8 ± 0.8	17.4 ± 0.8	16.1 ± 1.0
5S4	15.9 ± 0.8	16.0 ± 1.4	15.2 ± 2.9	14.8 ± 0.9
5S7 +	16.9 ± 0.8	17.4 ± 0.4	16.1 ± 1.4	15.4 ± 0.7
6S4 +	24.9 ± 2.0	25.2 ± 1.4	24.8 ± 0.8	24.2 ± 2.2
6S9 +	23.5 ± 2.0	24.1 ± 1.8	23.5 ± 2.6	23.4 ± 0.7
7S6 +	22.0 ± 2.2	23.8 ± 1.4	21.8 ± 1.2	22.9 ± 1.7
7S7	17.1 ± 1.6	16.8 ± 0.6	16.5 ± 1.2	16.0 ± 0.7
8S2 +	21.3 ± 1.0	21.6 ± 0.6	22.8 ± 2.2	24.0 ± 2.1
9S2 +	37.7 ± 3.3	39.3 ± 3.4	36.7 ± 3.2	40.3 ± 2.1
10S1 +	16.1 ± 1.2	16.2 ± 0.6	16.7 ± 0.6	15.5 ± 1.0
10S2	28.5 ± 2.2	29.8 ± 1.0	29.2 ± 1.4	28.2 ± 2.8
10S3	15.8 ± 1.0	16.0 ± 1.0	16.0 ± 1.0	15.0 ± 0.5
11S3 +	24.9 ± 2.6	25.9 ± 0.8	24.8 ± 1.6	23.8 ± 1.4
11S7	18.4 ± 1.2	18.0 ± 1.2	18.0 ± 1.0	17.5 ± 1.2

TABLE I-1
ENVIRONMENTAL THERMOLUMINESCENT DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results (1) are in mR/std. qtr (2) ± 2S (3)

Location	First Quarter 01/14/02 to 04/18/02	Second Quarter 04/17/02 to 07/18/02	Third Quarter 07/16/02 to 10/17/02	Fourth Quarter 10/15/02 to 01/31/03
12S1	18.4 ± 1.4	19.0 ± 0.8	17.9 ± 1.2	17.7 ± 0.9
12S3 +	22.4 ± 2.0	22.3 ± 1.2	22.2 ± 1.4	21.5 ± 1.0
12S4	22.7 ± 2.2	22.8 ± 1.0	22.7 ± 1.4	22.0 ± 1.2
12S5	20.0 ± 1.6	20.5 ± 0.8	20.1 ± 1.0	19.0 ± 1.0
12S6	21.4 ± 1.0	21.3 ± 1.8	21.0 ± 1.4	19.6 ± 1.0
12S7	15.8 ± 1.0	15.5 ± 1.0	16.3 ± 0.8	15.2 ± 0.5
13S2 +	21.8 ± 1.0	23.2 ± 1.6	23.1 ± 1.4	23.6 ± 1.4
13S4	22.8 ± 2.0	22.0 ± 0.8	22.0 ± 1.6	21.8 ± 0.7
13S5	24.5 ± 1.4	24.0 ± 1.0	23.8 ± 0.4	23.2 ± 1.0
13S6	21.6 ± 2.2	21.5 ± 1.0	20.7 ± 1.2	20.5 ± 1.0
14S5 +	20.8 ± 1.4	21.7 ± 0.8	21.4 ± 2.2	19.4 ± 1.7
14S6	19.7 ± 1.6	20.5 ± 1.4	19.1 ± 1.4	18.8 ± 0.9
15S5 +	19.0 ± 1.4	19.8 ± 0.8	19.0 ± 0.4	17.8 ± 1.0
16S1 +	20.1 ± 1.8	22.5 ± 1.4	21.2 ± 1.6	20.6 ± 1.2
16S2 +	21.5 ± 1.4	22.7 ± 1.0	21.4 ± 1.8	21.7 ± 1.5

See the comments at the end of this table.

TABLE I-1

ENVIRONMENTAL THERMOLUMINESCENT DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION - 2002

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

Location	First Quarter 01/14/02 to 04/18/02	Second Quarter 04/17/02 to 07/18/02	Third Quarter 07/16/02 to 10/17/02	Fourth Quarter 10/15/02 to 01/31/03
0-1 MILE OFFSITE				
6A4 +	20.2 ± 2.0	19.3 ± 1.6	19.1 ± 1.4	18.6 ± 0.7
8A3	16.4 ± 0.8	16.1 ± 0.8	16.0 ± 1.0	15.4 ± 1.2
15A3	18.2 ± 1.0	18.8 ± 1.4	18.3 ± 1.2	17.0 ± 0.5
16A2	15.9 ± 1.4	16.2 ± 1.0	16.0 ± 1.0	15.2 ± 0.7
1-2 MILES OFFSITE				
1B1	17.5 ± 1.2	17.1 ± 1.0	16.6 ± 1.4	15.6 ± 1.0
2B3 +	17.6 ± 1.2	17.2 ± 1.0	16.8 ± 1.0	16.4 ± 0.7
2B4	(5)	17.3 ± 0.6	17.2 ± 1.2	16.3 ± 0.5
5B3	15.7 ± 1.2	15.2 ± 1.2	15.4 ± 0.6	15.5 ± 0.7
7B2	16.6 ± 1.6	16.1 ± 0.8	16.1 ± 0.8	16.0 ± 0.9
8B2 +	17.2 ± 1.2	16.5 ± 1.2	16.3 ± 1.4	15.6 ± 0.7
9B1	16.6 ± 1.0	16.1 ± 1.0	15.5 ± 1.2	15.0 ± 0.7
10B2	14.0 ± 1.0	13.4 ± 1.0	13.5 ± 1.4	12.9 ± 0.9
10B3	16.5 ± 1.4	16.5 ± 3.0	15.5 ± 1.2	15.2 ± 1.9
10B4	18.6 ± 2.0	18.3 ± 1.2	17.9 ± 2.0	16.5 ± 0.7
12B4	17.4 ± 0.8	17.0 ± 0.4	16.5 ± 1.4	15.7 ± 0.2
13B1	17.6 ± 1.8	17.0 ± 1.4	17.4 ± 1.4	16.4 ± 0.9
14B3 +	18.4 ± 1.2	17.2 ± 1.0	17.6 ± 1.0	16.6 ± 0.9
15B1	17.3 ± 1.4	16.8 ± 0.4	17.2 ± 1.2	15.9 ± 1.2
16B2	15.9 ± 1.4	15.9 ± 1.0	16.4 ± 2.0	14.9 ± 1.2
2-3 MILES OFFSITE				
11C1	21.1 ± 1.2	19.9 ± 0.8	20.2 ± 1.4	18.8 ± 1.0

See the comments at the end of this table.

TABLE I-1
ENVIRONMENTAL THERMOLUMINESCENT DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results (1) are in mR/std. qtr (2) ± 2S (3)

Location	First Quarter 01/14/02 to 04/18/02	Second Quarter 04/17/02 to 07/18/02	Third Quarter 07/16/02 to 10/17/02	Fourth Quarter 10/15/02 to 01/31/03
3-4 MILES OFFSITE				
1D5 +	20.2 ± 2.0	18.7 ± 1.4	19.2 ± 1.8	17.6 ± 0.5
6D1	20.1 ± 1.4	19.3 ± 1.6	19.2 ± 1.2	17.9 ± 1.4
8D3 +	18.3 ± 1.8	17.4 ± 0.8	18.2 ± 1.0	16.6 ± 0.7
9D4 +	19.1 ± 1.0	18.0 ± 1.2	18.8 ± 1.0	17.1 ± 1.0
10D1 +	18.8 ± 1.8	17.5 ± 0.6	17.2 ± 1.0	17.0 ± 0.9
12D2	21.0 ± 4.2	19.9 ± 1.2	20.0 ± 1.2	19.0 ± 0.5
14D1	19.4 ± 1.2	18.9 ± 0.8	19.5 ± 1.0	17.1 ± 1.4
4-5 MILES OFFSITE				
3E1	16.8 ± 1.0	15.2 ± 0.8	16.2 ± 1.2	14.5 ± 1.0
4E2	19.5 ± 2.2	18.5 ± 2.4	18.8 ± 0.6	18.3 ± 1.0
5E2 +	18.5 ± 1.0	17.5 ± 1.0	17.8 ± 1.8	17.1 ± 1.7
6E1 +	20.4 ± 1.4	21.5 ± 1.2	19.7 ± 1.4	19.4 ± 1.4
7E1 +	19.2 ± 1.4	18.6 ± 0.8	18.7 ± 1.4	17.8 ± 0.7
11E1 +	16.0 ± 0.8	15.5 ± 0.8	15.0 ± 1.0	14.1 ± 0.5
12E1 +	16.6 ± 1.2	(5)	16.8 ± 0.8	15.8 ± 0.9
13E4 +	21.0 ± 1.2	20.7 ± 1.0	20.6 ± 2.6	19.2 ± 0.5
5-10 MILES OFFSITE				
2F1 +	17.8 ± 1.4	17.6 ± 0.8	17.7 ± 0.6	16.7 ± 1.0
8F2	17.0 ± 2.2	16.4 ± 1.4	17.0 ± 1.2	16.3 ± 0.5
12F2	18.7 ± 1.0	18.4 ± 1.4	18.4 ± 1.0	17.2 ± 1.2
15F1 +	19.7 ± 1.0	19.4 ± 0.8	19.7 ± 1.0	18.1 ± 0.5
16F1 +	20.8 ± 1.4	20.0 ± 1.0	20.4 ± 1.6	19.2 ± 1.4

See the comments at the end of this table.

TABLE I-1

ENVIRONMENTAL THERMOLUMINESCENT DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION - 2002

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

Location	First Quarter 01/14/02 to 04/18/02	Second Quarter 04/17/02 to 07/18/02	Third Quarter 07/16/02 to 10/17/02	Fourth Quarter 10/15/02 to 01/31/03
10-20 MILES				
3G4	20.2 ± 1.4	18.7 ± 1.0	18.1 ± 1.0	(5)
4G1 +	21.4 ± 1.8	20.7 ± 1.6	19.9 ± 1.6	18.9 ± 0.5
6G1	21.6 ± 1.4	21.0 ± 0.8	20.1 ± 0.8	19.7 ± 1.0
7G1 +	17.5 ± 1.4	16.9 ± 0.8	17.2 ± 1.6	16.3 ± 1.0
7G2	19.1 ± 1.2	17.7 ± 0.6	(5)	16.4 ± 0.7
8G1	15.6 ± 1.4	15.2 ± 1.2	14.9 ± 0.2	14.3 ± 0.9
12G1 +	16.0 ± 0.6	15.7 ± 1.4	16.1 ± 1.4	15.5 ± 0.7
12G4	19.4 ± 0.6	19.1 ± 1.0	19.7 ± 1.6	18.3 ± 1.5

See the comments at the end of this table.

Location				
Indicator				
Average (6)	19.3 ± 13.4	19.3 ± 10.3	19.0 ± 12.1	18.3 ± 9.6
Control				
Average (6)	18.9 ± 3.6	18.1 ± 3.1	18.0 ± 3.4	17.1 ± 2.5

COMMENTS

(1) Individual monitor location results are normally the average of the elemental doses of six calcium elements from the two TLDs 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 six calcium elements from the two TLDs assigned to each monitoring location, representing the variability between the elemental doses of each of the six TLD elements.

(4) TLDs were not in the field at this monitoring location during this quarter. Refer to Appendix A of this report for an explanation of program changes to the REMP.

(5) No measurement could be made because the TLDs were lost, stolen, or damaged.

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

(7) Data were invalidated for this period because of an unacceptably high coefficient of variation among element readings.

\+ ODCM -listed locations.

TABLE I-2
GROSS BETA, TRITIUM, AND GAMMA SPECTROSCOPIC ANALYSES OF SURFACE WATER
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE		TRITIUM	GR-BETA	OTHER ACTIVITY	COMMENTS
6S6	12/31/01	02/04/02	<99	3.1 ± 0.6		
2S7	12/31/01	02/04/02	188 ± 63	5.4 ± 1.0		
6S5	01/07/02	02/04/02	<99	1.5 ± 0.7		
LTAW	01/14/02		246 ± 62	2.1 ± 0.7		
6S6	02/04/02	03/04/02	<95	8.1 ± 1.0		*
2S7	02/04/02	03/04/02	<95	10.2 ± 0.8		
6S5	02/11/02	03/04/02	<95	2.3 ± 0.6		
LTAW	02/11/02		159 ± 64	2.1 ± 0.6		
6S6	03/04/02	04/01/02	<96	0.3 ± 0.6		*
2S7	03/04/02	04/01/02	4468 ± 100	7.5 ± 0.8		
6S5	03/11/02	04/01/02	<96	2.2 ± 0.6		
LTAW	03/11/02		219 ± 60	2.9 ± 0.7		
6S6	04/01/02	04/29/02	<93	2.1 ± 0.6		*
6S7	04/01/02	04/29/02	9955 ± 134	5.6 ± 0.8		
6S5	04/08/02	04/29/02	161 ± 59	3.0 ± 0.6		
LTAW	04/15/02		187 ± 60	1.0 ± 0.7		
6S6	04/29/02	06/03/02	<96	2.2 ± 0.7		*
2S7	04/29/02	06/03/02	262 ± 61.2	7.1 ± 0.8		
6S5	05/06/02	06/03/02	105 ± 59	1.4 ± 0.8		
LTAW	05/13/02		190 ± 59	2.1 ± 0.6		
6S6	06/03/02	07/01/02	<97	4.0 ± 0.9		
2S7	06/03/02	07/01/02	4241 ± 98	7.0 ± 0.8		
6S5	06/10/02	07/01/02	<97	3.4 ± 0.6		
LTAW	06/10/02		134 ± 61	3.5 ± 0.6		

Comments:

*Refer to Appendix F of this report for additional details regarding exceptions to SSES Technical Requirements for sampling and analyses.

TABLE I-2

GROSS BETA, TRITIUM, AND GAMMA SPECTROSCOPIC ANALYSES OF SURFACE WATER

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE		TRITIUM	GR-BETA	OTHER ACTIVITY	COMMENTS
6S6	07/01/02	07/29/02	<97	2.2 ± 0.6		
2S7	07/01/02	07/29/02	3425 ± 91	8.2 ± 0.8		
6S5	07/08/02	07/29/02	<97	3.5 ± 0.7		
LTAW	07/15/02		154 ± 59	5.1 ± 0.7		
6S6	07/29/02	08/26/02	<106	3.4 ± 0.5		
2S7	07/29/02	08/26/02	2156 ± 88	11.9 ± 0.5		
6S5	08/05/02	08/26/02	207 ± 67	8.7 ± 0.5		
LTAW	08/12/02		207 ± 60	4.2 ± 0.7		
6S6	08/26/02	09/30/02	<97	3.4 ± 0.9		
2S7	08/26/02	09/02/02	2343 ± 83	11.0 ± 1.4		
6S5	09/02/02	09/30/02	<97	3.5 ± 0.7		
LTAW	09/09/02		105 ± 62	5.1 ± 0.5		
6S6	09/30/02	10/28/02	12 ± 75	2.4 ± 1.3		
2S7	09/30/02	10/28/02	925 ± 24	11.0 ± 2.4		
6S5	10/07/02	10/28/02	13 ± 70	3.1 ± 1.3		
LTAW	10/14/02		61 ± 89	3.1 ± 1.8		
6S6	10/28/02	12/02/02	-2.6 ± 90	2.2 ± 1.2		*
2S7	10/28/02	12/02/02	1030 ± 245	18.0 ± 2.8		
6S5	11/04/02	12/02/02	9.4 ± 81	2.0 ± 1.2		
LTAW	11/11/02		117 ± 86	5.7 ± 1.6		
6S6	12/02/02	12/30/02	114 ± 82	1.8 ± 1.3		
2S7	12/02/02	12/30/02	179 ± 97	11.0 ± 2.5		
6S5	12/09/02	12/30/02	122 ± 83	3.0 ± 1.4		
LTAW	12/16/02		90 ± 87	4.9 ± 1.6		

Comments:

*Refer to Appendix F of this report for additional details regarding exceptions to SSES Technical Requirements for sampling and analyses.

TABLE I-3
IODINE-131 ANALYSES OF SURFACE WATER
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	COMMENTS
6S6	12/31/01-01/14/02	-.01 ± .18	
2S7	12/31/01-01/14/02	.21 ± .28	
6S5	01/07/02-01/14/02	.09 ± .17	
6S6	01/14/02-01/28/02	.04 ± .33	
6S7	01/14/02-01/28/02	.19 ± .24	
6S5	01/21/02-01/28/02	.22 ± .18	
LTAW	1/14/2002	.04 ± .11	
6S6	01/28/02-02/11/02	.23 ± .27	*
2S7	01/28/02-02/11/02	.39 ± .32	
6S5	02/04/02-02/11/02	.32 ± .26	
LTAW	2/11/2002	-.02 ± .18	
6S6	02/11/02-02/25/02	.24 ± .28	*
2S7	02/11/02-02/25/02	.02 ± 0.3	
6S5	02/18/02-02/25/02	.15 ± .21	
6S6	02/25/02-03/11/02	.38 ± .33	*
2S7	02/25/02-03/11/02	.36 ± .34	
6S5	03/04/02-03/11/02	.41 ± .30	
LTAW	3/11/2002	.08 ± .17	
6S6	03/11/02-03/25/02	.16 ± .28	
2S7	03/11/02-03/25/02	.11 ± .26	
6S5	03/18/02-03/25/02	.24 ± .27	
6S6	03/25/02-04/08/02	.38 ± .28	*
6S7	03/25/02-04/08/02	.13 ± .23	
6S5	04/01/02-04/08/02	.41 ± .33	
LTAW	4/15/2002	-.01 ± .17	

Comments:

*Refer to Appendix F of this report for additional details regarding exceptions to SSES Technical Requirements for sampling and analyses.

TABLE I-3

IODINE-131 ANALYSES OF SURFACE WATER

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	COMMENTS
6S6	04/08/02-04/22/02	.01 ± .21	
2S7	04/08/02-04/22/02	.07 ± .19	
6S5	04/15/02-04/22/02	-.06 ± .13	
6S6	04/22/02-05/06/02	.19 ± .29	
2S7	04/22/02-05/06/02	1.2 ± .29	
6S5	04/29/02-05/06/02	.16 ± .25	
LTAW	5/13/2002	-.17 ± .23	
6S6	05/06/02-05/20/02	-.27 ± .42	*
2S7	05/06/02-05/20/02	.28 ± 0.4	
6S5	05/13/02-05/20/02	0.0 ± .24	
6S6	05/20/02-06/03/02	.63 ± .63	
2S7	05/20/02-06/03/02	.33 ± .52	
6S5	05/27/02-06/03/02	.02 ± .47	
6S6	06/03/02-06/17/02	.19 ± .25	
6S7	06/03/02-06/17/02	1.1 ± .37	
6S5	06/10/02-06/17/02	.24 ± .28	
LTAW	6/10/2002	.02 ± .23	
6S6	06/17/02-07/01/02	.06 ± .28	
2S7	06/17/02-07/01/02	.38 ± .31	
6S5	06/24/02-07/01/02	.32 ± .31	
6S6	07/01/02-07/15/02	.76 ± .35	
2S7	07/01/02-07/15/02	1.0 ± .39	
6S5	07/08/02-07/15/02	.32 ± .32	
LTAW	7/15/20021	0.1 ± .25	

Comments:

*Refer to Appendix F of this report for additional details regarding exceptions to SSES Technical Requirements for sampling and analyses.

TABLE I-3
IODINE-131 ANALYSES OF SURFACE WATER
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	COMMENTS
6S6	07/15/02-07/29/02	-.08 ± .25	
2S7	07/15/02-07/29/02	.92 ± .37	
6S5	07/22/02-07/29/02	2.3 ± .52	
6S6	07/29/02-08/12/02	.67 ± .32	
2S7	07/29/02-08/12/02	1.5 ± 0.4	
6S5	08/05/02-08/12/02	.98 ± .43	
LTAW	8/12/2002	.15 ± .21	
6S6	08/12/02-08/26/02	1.1 ± .46	
2S7	08/12/02-08/26/02	3.2 ± .74	
6S5	08/19/02-08/26/02	1.5 ± .61	
6S6	08/26/02-09/09/02	0.9 ± .44	
2S7	08/26/02-09/09/02	2.6 ± 0.7	
6S5	09/02/02-09/09/02	2.4 ± .63	
LTAW	9/9/2002	0.0 ± .18	
6S6	09/09/02-09/23/02	2.3 ± 0.8	
2S7	09/09/02-09/23/02	4.7 ± 1.2	
6S5	09/16/02-09/23/02	3.9 ± 1.1	
6S6	09/23/02-10/07/02	0.9 ± .46	
2S7	09/23/02-10/07/02	2.6 ± .66	
6S5	09/30/02-10/07/02	1.0 ± .55	
6S6	10/07/02-10/21/02	.67 ± .37	
2S7	10/07/02-10/21/02	1.2 ± .44	
6S5	10/14/02-10/21/02	.53 ± .35	
LTAW	10/14/2002	.16 ± .28	

Comments:

*Refer to Appendix F of this report for additional details regarding exceptions to SSES Technical Requirements for sampling and analyses.

TABLE I-3

IODINE-131 ANALYSES OF SURFACE WATER

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	COMMENTS
6S6	10/21/02-11/04/02	.12 ± .26	
2S7	10/21/02-11/04/02	.51 ± .34	
6S5	10/28/02-11/04/02	.84 ± 0.4	
LTAW	11/11/2002	.24 ± .28	
6S6	11/04/02-11/18/02	.78 ± .47	
2S7	11/04/02-11/18/02	1.3 ± .52	
6S5	11/11/02-11/18/02	1.2 ± .58	
6S6	11/18/02-12/02/02	.07 ± .18	
2S7	11/18/02-12/02/02	0.8 ± .42	*
6S5	11/25/02-12/02/02	.29 ± .31	
6S6	12/02/02-12/16/02	.45 ± .32	
2S7	12/02/02-12/16/02	.82 ± .38	
6S5	12/09/02-12/16/02	.43 ± .38	
LTAW	12/16/2002	0.4 ± .36	
6S6	12/16/02-12/30/02	.14 ± 0.2	
2S7	12/16/02-12/30/02	.36 ± .25	
6S5	12/23/02-12/30/02	.09 ± 0.2	

Comments:

*Refer to Appendix F of this report for additional details regarding exceptions to SSES Technical Requirements for sampling and analyses.

TABLE I-4

GROSS ALPHA, GROSS BETA, TRITIUM, IODINE-131 GAMMA* SPECTROSCOPIC ANALYSES OF DRINKING WATER

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	GR-ALPHA	GR-BETA	TRITIUM	OTHER ACTIVITY	COMMENTS
12H2	12/31/01 - 02/04/02	.14 ± 0.5	3.3 ± 0.7	<99		
12H2	02/4/02 - 03/04/02	0.5 ± 0.5	1.8 ± 0.6	<95		
12H2	03/04/02 - 04/01/02	0.2 ± 0.5		<96		
12H2	04/01/02 - 04/29/02	1.1 ± 0.6	2.6 ± 0.9	<93		
12H2	04/29/02 - 06/03/02	-0.5 ± 0.4	2.2 ± 0.6	<96		
12H2	06/03/02 - 07/01/02	0.8 ± 0.7	3.5 ± 0.9	<97		
12H2	07/01/02 - 07/29/02	0.2 ± 0.6	3.9 ± 0.7	<97		
12H2	8/5/2002	0.4 ± 0.7	4.6 ± 0.9	466 ± 63		*
12H2	8/6/02 - 8/26/02	0.3 ± 0.6	3.5 ± 0.7	<106		
12H2	08/26/02 - 09/30/02	.06 ± 0.6	3.9 ± 0.7	<97		
12H2	09/30/02 - 10/28/02	.00 ± 0.8	2.0 ± 1.3	-6.9 ± 78		
12H2	10/28/02 - 12/02/02	-.32 ± .78	.95 ± 1.4	270 ± 90		
12H2	12/02/02 - 12/30/02	.72 ± 1.0	2.3 ± 1.2	34 ± 79		

Comments:

* Refer to Appendix F of this report for additional details regarding exceptions to SSES Technical Requirements for sampling and analyses.

TABLE I-5

GROSS BETA AND GAMMA* SPECTROSCOPIC ANALYSES OF FISH

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in pCi/gm (wet) ± 2S

LOCATION	SAMPLE TYPE	COLLECTION DATE	K-40	COMMENTS
IND	Channel Catfish	04/15/02 - 04/16/02	3.4 ± 0.1	
IND	Smallmouth Bass	04/18/02 - 04/18/02	3.1 ± .08	
IND	Shorthead Redhorse	04/18/02 - 04/18/02	3.2 ± .08	
2H	Smallmouth Bass	04/24/02 - 04/24/02	3.5 ± .09	
2H	Shorthead Redhorse	04/24/02 - 04/24/02	3.1 ± 0.1	
2H	Channel Catfish	04/24/02 - 04/24/02	3.1 ± .08	
IND	Smallmouth Bass	10/23/02 - 10/23/02	4.5 ± 0.4	
IND	Channel Catfish	10/23/02 - 10/23/02	4.3 ± 0.4	
IND	Shorthead Redhorse	10/23/02 - 10/23/02	3.0 ± .45	
IND	Shorthead Redhorse	10/23/02 - 10/23/02	4.8 ± 0.6	
2H	Smallmouth Bass	10/10/02 - 10/11/02	4.4 ± .26	
2H	Channel Catfish	10/10/02 - 10/11/02	3.7 ± .06	
2H	Shorthead Redhorse	10/10/02 - 10/11/02	3.5 ± .44	
2H	Shorthead Redhorse	10/10/02 - 10/11/02	3.9 ± .27	
LTAW	Largemouth Bass	10/15/02 - 10/15/02	3.9 ± .26	

TABLE I-6
GAMMA* SPECTROSCOPIC ANALYSES OF SHORELINE SEDIMENT
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results in pCi/gm (dry) ± 2S

LOCATION	COLLECTION DATE	K-40	Cs-137	Ra-226	TH-228	OTHER ACTIVITY
2B	4/11/2002	15.2 ± .20	.11 ± .008	1.5 ± .16	2.7 ± 1.0	
7B	4/11/2002	12.8 ± .18	.08 ± .006	1.5 ± .12	<1.0	
12F	4/11/2002	10 ± 0.18	.05 ± .007	1.6 ± .13	2.2 ± 0.9	
LTAW	4/11/2002	15 ± .16	<.01	1.6 ± .13	<.00005	
2B	10/22/2002	19 ± 1.0	.13 ± .04	3.3 ± 0.9	1.5 ± .16	
7B	10/22/2002	16 ± 0.8	.75 ± .05	3.4 ± 0.8	1.3 ± .15	
12F	10/22/2002	14 ± 0.9	.09 ± .04	2.4 ± 0.8	1.4 ± .16	
LTAW	10/22/2002	16 ± 0.6	.007 ± .01	2.3 ± 0.5	1.3 ± .86	

TABLE I-7

TRITIUM AND GAMMA* SPECTROSCOPIC ANALYSES OF GROUND WATER

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	TRITIUM	OTHER ACTIVITY
12F3	1/14/2002	123 ± 60	K-40: 69 ± 39
2S2	1/14/2002	123 ± 60	K-40: 68 ± 27
4S4 Treated	1/14/2002	154 ± 60	
12F3	2/11/2002	<102	
2S2	2/11/2002	<102	
4S4 Treated	2/11/2002	<102	
12F3	3/11/2002	110 ± 59	
2S2	3/11/2002	<94	
4S4 Treated	3/11/2002	137 ± 59	
12F3	4/15/2002	<95	
2S2	4/15/2002	<95	
4S4 Treated	4/15/2002	160 ± 60	
12F3	5/13/2002	<93	
2S2	5/13/2002	109 ± 58	
4S4 Treated	5/13/2002	136 ± 58	
12F3	6/10/2002	<97	
2S2	6/10/2002	<97	
4S4 Treated	6/10/2002	<97	
12F3	7/15/2002	103 ± 59	
2S2	7/15/2002	232 ± 60	
4S4 Treated	7/15/2002	282 ± 61	
12F3	8/12/2002	207 ± 60	
2S2	8/12/2002	155 ± 60	
4S4 Treated	8/12/2002	129 ± 59	

TABLE I-7
TRITIUM AND GAMMA* SPECTROSCOPIC ANALYSES OF GROUND WATER
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	TRITIUM	OTHER ACTIVITY
12F3	9/9/2002	<101	
2S2	9/9/2002	<100	
4S4 Treated	9/9/2002	<101	
12F3	10/14/2002	-42.7 ± 84	
2S2	10/14/2002	-53 ± 85	
4S4 Treated	10/14/2002	59 ± 86	
12F3	11/11/2002	52 ± 82	
2S2	11/11/2002	-63 ± 85	
4S4 Treated	11/11/2002	83 ± 77	
12F3	12/16/2002	40 ± 83	
2S2	12/16/2002	-43 ± 81	
4S4 Treated	12/16/2002	82 ± 84	

TABLE E I-8

GROSS BETA ANALYSES OF AIR PARTICULATE FILTERS

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in E-03 pCi/Cu. M. ± 2S

MONTH	COLLECTION DATE	6G1	8G1	3S2	12E1	12S1	13S6	COMMENTS
JAN	12/26/01 - 01/02/02	14 ± 0.5	16 ± 0.5	19 ± 0.5	17 ± .05	19 ± 0.5	19 ± 1.0	
	01/02/02 - 01/09/02	15 ± 0.5	16 ± 0.5	20 ± 0.5	18 ± 0.5	20 ± 0.5	18 ± 1.0	
	01/09/02 - 01/16/02	13 ± 0.5	14 ± 0.5	14 ± 0.5	12 ± 0.5	15 ± 0.5	15 ± 0.5	
	01/16/02 - 01/23/02	14 ± 0.5	16 ± 0.5	19 ± 0.5	18 ± 0.5	19 ± 0.5	17 ± 0.5	
	01/23/02 - 01/30/02	14 ± 1.0	15 ± 0.5	24 ± 0.5	23 ± 1.0	19 ± 0.5	17 ± 1.0	
FEB	01/30/02 - 02/06/02	14 ± 0.5	15 ± 0.5	21 ± 0.5	20 ± 0.5	10 ± 0.5	7 ± 0.5	
	02/06/02 - 02/13/02	16 ± 1.0	17 ± 0.5	22 ± 0.5	21 ± 0.5	22 ± 0.5	18 ± 1.0	
	02/13/02 - 02/20/02	10 ± 0.5	12 ± 0.5	14 ± 0.5	14 ± 1.0	14 ± 0.5	11 ± 0.5	*
	02/20/02 - 02/27/02	13 ± 0.5	13 ± 0.5	17 ± 0.5	16 ± 0.5	15 ± 0.5	13 ± 0.5	
	02/27/02 - 03/06/02	15 ± 1.0	16 ± 0.5	23 ± 1.0	22 ± 0.5	18 ± 0.5	16 ± 0.5	
MAR	03/06/02 - 03/13/02	20 ± 1.0	20 ± 0.5	28 ± 1.0	24 ± 0.5	24 ± 1.0	22 ± 1.0	
	03/13/02 - 03/20/02	6 ± 0.5	9 ± 0.5	13 ± 0.5	11 ± 0.5	12 ± 0.5	9 ± 0.5	
	03/20/02 - 03/27/02	10 ± 0.5	12 ± 0.5	16 ± 0.5	14 ± 0.5	16 ± 0.5	12 ± 0.5	*
	03/27/02 - 04/03/02	12 ± 0.5	15 ± 0.5	18 ± 0.5	15 ± 0.5	15 ± 0.5	12 ± 0.5	
APR	04/03/02 - 04/10/02	10 ± 0.5	12 ± 0.5	15 ± 0.5	14 ± 0.5	13 ± 0.5	11 ± 0.5	
	04/10/02 - 04/17/02	10 ± 0.5	13 ± 0.5	22 ± 1.0	21 ± 1.0	14 ± 0.5	11 ± 0.5	
	04/17/02 - 04/24/02	12 ± 0.5	14 ± 0.5	16 ± 0.5	16 ± 0.5	16 ± 0.5	12 ± 0.5	
	04/24/02 - 05/01/02	10 ± 0.5	10 ± 0.5	15 ± 0.5	14 ± 0.5	12 ± 0.5	10 ± 0.5	
MAY	05/01/02 - 05/08/02	6 ± 0.5	12 ± 0.5	12 ± 0.5	12 ± 0.5	12 ± 0.5	5 ± 0.5	
	05/08/02 - 05/15/02	9 ± 0.5	11 ± 0.5	11 ± 0.5	29 ± 0.5	11 ± 0.5	11 ± 0.5	
	05/15/02 - 05/22/02	10 ± 0.5	4 ± 0.5	10 ± 0.5	10 ± 0.5	10 ± 0.5	3 ± 0.5	
	05/22/02 - 05/29/02	13 ± 0.5	13 ± 0.5	13 ± 0.5	8 ± 0.5	13 ± 0.5	13 ± 0.5	
JUN	05/29/02 - 06/05/02	8 ± 0.5	13 ± 0.5	13 ± 0.5	13 ± 0.5	14 ± 0.5	7.0 ± 0.5	
	06/05/02 - 06/12/02	11 ± 0.5	17 ± 0.5	15 ± 0.5	10 ± 0.5	15 ± 0.5	15 ± 0.5	
	06/12/02 - 06/19/02	0.5 ± 0.5	6 ± 0.5	7 ± 0.5	7 ± 0.5	8 ± 0.5	1.0 ± 0.5	
	06/19/02 - 06/26/02	24 ± 0.5	23 ± 0.5	23 ± 0.5	26 ± 0.7	23 ± 0.5	24 ± 0.5	
	06/26/02 - 07/03/02	18 ± 0.5	18 ± 0.5	11.3 ± 0.5	20 ± 0.5	13 ± 1.0	18 ± 0.5	

Comments:

*Refer to Appendix F of this report for additional details regarding exceptions to SSES Technical Requirements for sampling and analyses.

TABLE I-8
GROSS BETA ANALYSES OF AIR PARTICULATE FILTERS
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results in E-03 pCi/Cu. M. ± 2S

MONTH	COLLECTION DATE	6G1	8G1	3S2	12E1	12S1	13S6	COMMENTS
JUL	07/03/02 - 07/10/02	20 ± 0.5	9 ± 0.5	16 ± 0.5	15 ± 0.5	17 ± 0.5	20 ± 0.5	*
	07/10/02 - 07/17/02	12 ± 0.5	12 ± 0.5	9 ± 0.5	13 ± 0.5	6 ± 0.5	24 ± 0.5	*
	07/17/02 - 07/24/02	27 ± 0.5	18 ± 0.5	14 ± 0.5	24 ± 0.5	25 ± 0.5	27 ± 0.5	
	07/24/02 - 07/31/02	13 ± 0.5	12 ± 0.5	7 ± 0.5	14 ± 0.5	7 ± 0.5	14 ± 0.5	
AUG	07/31/02 - 08/07/02	14 ± 0.5	18 ± 0.5	21 ± 0.5	19 ± 0.5	22 ± 0.5	15 ± 0.5	*
	08/07/02 - 08/14/02	17 ± 0.5	20 ± 0.5	30 ± 0.5	30 ± 0.5	21 ± 0.5	15 ± 0.5	
	08/14/02 - 08/21/02	13 ± 0.5	18 ± 0.5	26 ± 0.5	24 ± 0.5	21 ± 0.5	14 ± 0.5	
	08/21/02 - 08/28/02	13 ± 0.5	16 ± 0.5	14 ± 0.5	10 ± 0.5	13 ± 0.5	14 ± 0.5	
SEP	08/28/02 - 09/04/02	5 ± 0.5	9 ± 0.5	9 ± 0.5	8 ± 0.5	10 ± 0.5	4 ± 0.5	
	09/04/02 - 09/11/02	16 ± 0.5	18 ± 0.5	20 ± 0.5	18 ± 0.5	20 ± 0.5	16 ± 0.5	
	09/11/02 - 09/18/02	7 ± 0.5	12 ± 0.5	14 ± 0.5	14 ± 0.5	14 ± 0.5	8 ± 0.5	
	09/18/02 - 09/25/02	13 ± 0.5	18 ± 0.5	20 ± 0.5	18 ± 0.5	21 ± 1.0	14 ± 0.5	
	09/25/02 - 10/02/02	12 ± 0.6	20 ± 0.5	21 ± 0.5	20 ± 0.5	21 ± 0.5	15 ± 0.5	
OCT	10/02/02 - 10/09/02	15 ± 1.7	15 ± 1.7	16 ± 1.7	18 ± 1.8	17 ± 1.7	17 ± 1.8	
	10/09/02 - 10/16/02	6 ± 1.0	6 ± 1.0	8 ± 1.5	6 ± 1.0	11 ± 1.6	8 ± 1.0	
	10/16/02 - 10/23/02	14 ± 1.6	14 ± 1.6	14 ± 2.0	15 ± 1.7	15 ± 1.7	14 ± 1.6	
	10/23/02 - 10/30/02	8 ± 2.0	12 ± 2.0	14 ± 2.0	11 ± 2.0	13 ± 2.0	11 ± 2.0	*
NOV	10/30/02 - 11/06/02	19 ± 2.5	19 ± 2.5	20 ± 2.6	22 ± 2.6	21 ± 2.7	20 ± 2.6	
	11/06/02 - 11/13/02	19 ± 2.6	21 ± 2.7	22 ± 2.8	21 ± 2.8	24 ± 3.0	23 ± 2.8	
	11/13/02 - 11/20/02	13 ± 2.0	14 ± 2.0	13 ± 2.3	12 ± 2.2	13 ± 2.3	14 ± 2.2	
	11/20/02 - 11/26/02	16 ± 2.4	24 ± 2.9	19 ± 2.8	20 ± 2.6	20 ± 2.8	20 ± 2.7	
DEC	11/26/02 - 12/04/02	12 ± 1.9	4 ± 2.0	12 ± 2.0	13 ± 2.0	14 ± 2.0	15 ± 2.0	
	12/04/02 - 12/11/02	15 ± 2.0	14 ± 2.0	19 ± 2.6	19 ± 2.5	20 ± 2.6	18 ± 2.4	
	12/11/02 - 12/18/02	15 ± 2.5	15 ± 2.5	14 ± 2.3	14 ± 2.1	14 ± 2.3	13 ± 2.1	
	12/18/02 - 12/26/02	11 ± 1.8	11 ± 1.8	12 ± 2.2	13 ± 2.0	13 ± 2.1	13 ± 2.2	*
	12/26/02 - 01/02/02	18 ± 2.8	19 ± 2.8	20 ± 2.9	24 ± 2.8	22 ± 2.8	23 ± 3.0	

Comments:

*Refer to Appendix F of this report for additional details regarding exceptions to SSES Technical Requirements for sampling and analyses.

TABLE I-9

GAMMA* SPECTROSCOPIC ANALYSES OF COMPOSITED AIR PARTICULATE FILTERS

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in E-03 pCi/Cu. M. ± 2S

LOCATION	COLLECTION DATE	Be-7	K-40	OTHER ACTIVITY
6G1	01/03/02 - 3/28/02	80 ±.3.0		
8G1	01/03/02 - 3/28/02	91 ± 3.0		
3S2	01/03/02 - 3/28/02	102 ± 3.0		
12E1	01/03/02 - 3/28/02	87 ± 2.8		
12S1	01/03/02 - 3/28/02	101 ± 3.0		
13S6	01/03/02 - 3/28/02	92 ± 3.0		
6G1	3/30/02 - 7/03/02	108 ± 3.6		
8G1	3/30/02 - 7/03/02	92 ± 3.6		
3S2	3/30/02 - 7/03/02	102 ± 3.7		
12E1	3/30/02 - 7/03/02	121 ± 4.6		
12S1	3/30/02 - 7/03/02	97 ± 3.7		
13S6	3/30/02 - 7/03/02	110 ± 4.7		
6G1	7/03/02 - 10/02/02	104 ± 3.2		
8G1	7/03/02 - 10/02/02	123 ± 3.8		
3S2	7/03/02 - 10/02/02	123 ± 3.5		
12E1	7/03/02 - 10/02/02	109 ± 3.7		
12S1	7/03/02 - 10/02/02	90 ± 3.7		
13S6	7/03/02 - 10/02/02	99 ± 3.6		
6G1	10/02/02 - 1/02/03	76 ± 4.6		
8G1	10/02/02 - 1/02/03	76 ± 6.2		
3S2	10/02/02 - 1/02/03	72 ± 3.6		
12E1	10/02/02 - 1/02/03	70 ± 4.7		
12S1	10/02/02 - 1/02/03	94 ± 3.1		Mn-54 0.33 ± 0.1
13S6	10/02/02 - 1/02/03	728 ± 40		

TABLE I-10
IODINE-131, AND GAMMA* SPECTROSCOPIC ANALYSES OF MILK
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	K-40	OTHER ACTIVITY	COMMENTS
10G1	01/08/02	1400 ± 110		
10D1	01/08/02	1400 ± 110		
10D2	01/08/02	1290 ± 110		
10D3	01/08/02	1420 ± 100		
10G1	02/05/02	1400 ± 110		
10D1	02/05/02	1470 ± 130		
10D2	02/05/02	1330 ± 140		
10D3	02/05/02	1460 ± 150		
10G1	03/04/02	1290 ± 140		
10D1	03/04/02	1410 ± 100		
10D2	03/04/02	1400 ± 100		
10D3	03/04/02	1240 ± 120		
10G1	04/08/02	1330 ± 110		
10D1	04/08/02	1200 ± 130		
10D2	04/08/02	1340 ± 150		
10D3	04/08/02	1310 ± 120		
10G1	04/22/02	1370 ± 110		
10D1	04/22/02	1520 ± 160		
10D2	04/22/02	1320 ± 150		
10D3	04/22/02	1400 ± 110		
12B2	04/22/02	1420 ± 110		
10G1	05/06/02	1300 ± 110		
10D1	05/06/02	1300 ± 130		
10D2	05/06/02	1360 ± 150		
10D3	05/06/02	1480 ± 160		
12B2	05/06/02	1420 ± 110		

TABLE I-10

IODINE-131, AND GAMMA* SPECTROSCOPIC ANALYSES OF MILK

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	K-40	OTHER ACTIVITY	COMMENTS
10G1	05/20/02	1260 ± 110		
10D1	05/20/02	1370 ± 130		
10D2	05/20/02	1330 ± 150		
10D3	05/20/02	1350 ± 150		
12B2	05/20/02	1320 ± 110		
10G1	06/05/02	1350 ± 150		
10D1	06/05/02	1420 ± 91		
10D2	06/05/02	1560 ± 110		
10D3	06/05/02	1340 ± 130		
12B2	06/05/02	1360 ± 110		
10G1	06/20/02	1300 ± 110		
10D1	06/20/02	1600 ± 160		
10D2	06/20/02	1480 ± 150		
10D3	06/20/02	1360 ± 150		
12B2	06/20/02	1510 ± 110		
10G1	07/07/02	1380 ± 110		
10D1	07/07/02	1330 ± 150		
10D2	07/07/02	1320 ± 150		
12B2	07/07/02	1340 ± 110		
10G1	07/22/02	1190 ± 140		
10D1	07/22/02	1420 ± 150		
10D2	07/22/02	1340 ± 150		
12B2	07/22/02	1350 ± 110		

TABLE I-10
IODINE-131, AND GAMMA* SPECTROSCOPIC ANALYSES OF MILK
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	K-40	OTHER ACTIVITY	COMMENTS
10G1	08/05/02	1360 ± 110		
10D1	08/05/02	1510 ± 130		
10D2	08/05/02	1370 ± 150		
12B2	08/05/02	1370 ± 150		
10G1	08/19/02	1208 ± 96		
10D1	08/19/02	1390 ± 110		
10D2	08/19/02	1500 ± 110		
12B2	08/19/02	1470 ± 110		
10G1	09/04/02	1360 ± 120		
10D1	09/04/02	1410 ± 160		
10D2	09/04/02	1470 ± 170		
12B2	09/04/02	1380 ± 120		
10G1	09/19/02	1410 ± 110		
10D1	09/19/02	1390 ± 110		
10D2	09/19/02	1400 ± 110		
12B2	09/19/02	1390 ± 130		
10G1	10/06/02	1325 ± 90		
10D1	10/06/02	1520 ± 160		
10D2	10/06/02	1391 ± 84		
12B2	10/06/02	1449 ± 84		

TABLE I-10

IODINE-131, AND GAMMA* SPECTROSCOPIC ANALYSES OF MILK

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	K-40	OTHER ACTIVITY	COMMENTS
10G1	10/21/02	1470 ± 110		
10D1	10/21/02	1430 ± 120		
10D2	10/21/02	1400 ± 160		
12b2	10/21/02	1350 ± 110		
10G1	11/04/02	1340 ± 130		
10D1	11/04/02	1410 ± 110		
10D2	11/04/02	1380 ± 100		
12B2	11/04/02	1320 ± 110		
10G1	12/09/02	1370 ± 120		
10D1	12/09/02	1410 ± 110		
10D2	12/09/02	1380 ± 110		
12B2	12/09/02	1480 ± 120		

TABLE I-11
GAMMA* SPECTROSCOPIC ANALYSES OF SOIL
SUSQUEHANNA STEAM ELECTRIC STATION - 2002
Results in pCi/gm (dry) ± 2S

LOCATION	COLLECTION DATE	K-40	Cs-137	Ra-226	Th-228
8G1 TOP	09/18/02	9.2 ± 1.1	.08 ± .053		.75 ± .140
8G1 BOT	09/18/02	7.4 ± .64	.09 ± .03		.61 ± .090
3S2 TOP	09/18/02	11.6 ± 0.8	.02 ± .08		.71 ± .085
3S2 BOT	09/18/02	13.4 ± 0.7	-.005 ± .02		.81 ± .076
12S1 TOP	09/18/02	10.5 ± 1.2	.04 ± .05		.63 ± .130
12S1 BOT	09/18/02	11.5 ± 1.1	.05 ± .04		.65 ± .120
13S6 TOP	09/18/02	17.6 ± 1.0	.001 ± .02		.93 ± .092
13S6 BOT	09/18/02	15.4 ± 1.0	.005 ± .03		.93 ± .099

TABLE I-12

GAMMA* SPECTROSCOPIC ANALYSES OF FOOD PRODUCTS (FRUITS AND VEGETABLES)

SUSQUEHANNA STEAM ELECTRIC STATION - 2002

Results in pCi/gm (wet) ± 2S

LOCATION	SAMPLE TYPE	COLLECTION DATE	K-40	OTHER ACTIVITY
12F7	Green Beans	08/14/02	2.1 ± .08	*
12F7	Potato	08/21/02	3.9 ± 0.09	
13G2	Potato	09/10/02	3.4 ± 0.2	
13G2	Pumpkin	10/16/02	2.6 ± 0.11	

Comments:

* Refer to Appendix F of this report for additional details regarding exceptions to SSES Technical Requirements for sampling and analyses.

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, 2002

Nuclide	Fish (pCi/g wet)	Sediment (pCi/g dry)	Surface Water (pCi/l)	Ground Water (pCi/l)	Potable Water (pCi/l)
Mn-54	0.019	0.088	3.8	4.3	3.0
Co-58	0.023				
Fe-59	0.043				
Co-60	0.019				
Zn-65	0.046				
Zr-95	0.039				
Nb-95	0.023				
Ru-103	0.026				
I-131	0.075				
Cs-134	0.021				
Cs-137	0.024				
Ba-140	0.100			20.0	
La-140	0.040				
Ce-14	0.036				

Nuclide	Air Particulate (10-3 pCi/m3)	Milk (pCi/l)	Fruit/Veg. (pCi/g wet)	Soil (pCi/g dry)
Mn-54	0.32	4.7	0.009	0.037
Co-58				
Fe-59				
Co-60				
Zn-65				
Zr-95				
Nb-95				
Ru-103				
I-131				
Cs-134				
Cs-137				
Ba-140				
La-140				
Ce-14				

APPENDIX J

PERFORMANCE SUMMARY FOR THE RADIOANALYSES OF SPIKED ENVIRONMENTAL SAMPLE MEDIA – 2002

FRAMATOME ANP ENV. LABORATORY, TELEDYNE BROWN ENGINEERING & PPL CORPORATION CORPORATE ENVIRONMENTAL RADIOACTIVITY MEASUREMENTS LABORATORY RESULTS

The data in the tables that follow show how well Framatome ANP Environmental Laboratory, Teledyne Brown Engineering Environmental Services (TBE) and PPL's Corporate Environmental Radioactivity Measurements Laboratory (CERML) performed in the analysis of radioactively spiked media. PPL's CERML terminated REMP sample analysis after the third quarter of 2002. TBE replaced PPL's CERML for all REMP fourth quarter sample analysis. The fourth quarter was the only time period TBE provided REMP sample analysis in 2002. Tables J-1 through J-5 provide the performance results for Framatome ANP. Tables J-7 through J-11 provide the performance results for TBE. In addition to the Analytics' spikes analyzed as part of PPL's REMP Laboratory Spike Program (Tables J-3 and J-9), Framatome ANP and TBE analyzed spikes procured independently from Analytics as part of their respective Quality Control Spike Programs (Tables J-2 and J-8), as well as spikes prepared as part of the following programs:

1. The Proficiency Testing Program of Environmental Resource Associates (Tables J-1 and J-7)

2. The Quality Assessment Program of DOE's Environmental Measurements Laboratory (Tables J-4 and J-10)

3. The Mixed Analyte Performance Evaluation Program (MAPEP) of the DOE (Tables J-5 and J-11)

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. Also, it should be noted that the levels of activity in spikes of different media prepared for program #2 tend to be relatively high. They are relatively high compared to the levels of activity in the spikes prepared by Analytics as part of its Environmental Cross Check Program and for PPL's REMP Laboratory Spike 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 as 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.

Table J-6 provides the results of PPL's CERML in the analyses of spiked environmental media prepared by Analytics as part of PPL's REMP Laboratory Spike Program. Note that CERML does not analyze spikes as part of any other program.

The criterion for the acceptability of the analyses results for the spikes prepared as part of the PPL REMP Laboratory Spike Program (Tables J-3 & J-9) have 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 becomes 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 programs (EML's and MAPEP's programs – Tables J-4, J-5, J-10 and J-11) are based on control limits based on percentiles of historic data distributions.

Note that comment numbers at the extreme right side of the tables denotes unacceptable results in Tables J-1 through J-11. Discussions relevant to these comment numbers follow the presentations of the data, as applicable.

TABLE J-1

ENVIRONMENTAL RESOURCE ASSOCIATES (ERA)
PROFICIENCY TESTING PROGRAM - 2002
FRAMATOME ANP ENVIRONMENTAL SERVICES LABORATORY

Month/Year	Identification No.	Medium	Units	Nuclide	ERA Known Result (a)	Framatome Results (a)	Framatome/ERA Ratio	
January-02	12030105	Water	pCi/l	Sr-89	43.7	72.1	1.65	(1)
			pCi/l	Sr-90	25.2	27.6	1.10	
			pCi/l	Gr. Alpha	45.7	58.4	1.28	
			pCi/l	Gr. Beta	16.3	16.9	1.04	
May-02	Rad-49	Water	pCi/l	I-131	14.7	19.5	1.33	(2)
			pCi/l	Co-60	39.1	39.5	1.01	
			pCi/l	Cs-134	17.1	17.1	1.00	
			pCi/l	Cs-137	52.1	53.6	1.03	
			pCi/l	H-3	17400.0	17100.0	0.98	
			pCi/l	Gr. Alpha	22.8	26.8	1.18	
			pCi/l	Gr. Beta	189.0	174.0	0.92	
			pCi/l	Sr-89	31.7	31.1	0.98	
			pCi/l	Sr-90	28.3	28.6	1.01	
August-02	Rad-50	Water	pCi/l	Ba-133	80.0	74.9	0.94	
			pCi/l	Co-60	23.3	24.5	1.05	
			pCi/l	Cs-134	71.7	73.0	1.02	
			pCi/l	Cs-137	214.0	228.0	1.07	(3)
			pCi/l	Zn-65	95.7	95.6	1.00	
			pCi/l	Gr. Alpha	58.8	69.9	1.19	
			pCi/l	Gr. Beta	21.9	23.1	1.05	
			pCi/l	Sr-89	29.0	26.3	0.91	
			pCi/l	Sr-90	36.4	33.3	0.91	
November-02	Rad-51	Water	pCi/l	H-3	10200.0	10100.0	0.99	
			pCi/l	I-131	6.76	6.83	1.01	

(a) Results are the average of three measurements, reported in units of pCi/l.
(b) Per guidelines of the EPA'S National Standards for Water Proficiency Testing Criteria Document, December 1998.

COMMENTS

1 The equations used to calculate the sample activity were all independently verified to be correct. No problems were identified with sample documentation. The chemists were trained to process strontium samples expeditiously and to utilize the full 15-day yttrium-90 in-growth period.

2 Equipment problem with iodide probe identified. When sample was re-analyzed with new iodide probe, mean result was 14.5 pCi/L, a bias of -1.4%.

3 No problems identifed via test data evaluation using internal calibrations. The grand mean of the RAD-50 test compared favorably (1% bias) with the Framatome ANP result yet indicated a significant bias from the ERA stated known. No actions were taken based on the favorable QC history for Cs-137.

TABLE J-2

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002

FRAMATOME ANP QUALITY CONTROL SPIKE PROGRAM

FRAMATOME ANP ENVIRONMENTAL LABORATORY

(Page 1 of 5)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results	Framatome Results	Framatome/Analytics Ratio
March-02	E3096-186	Milk	pCi/l	I-131 LL *	90	99	1.10
			pCi/l	Ce-141	29	32	1.10
			pCi/l	Cr-51	241	262	1.09
			pCi/l	Cs-134	110	103	0.94
			pCi/l	Cs-137	240	248	1.03
			pCi/l	Mn-54	202	224	1.11
			pCi/l	Fe-59	104	112	1.08
			pCi/l	Zn-65	199	215	1.08
			pCi/l	Co-60	142	144	1.01
March-02	E3097-186	Charcoal	pCi/Filter	I-131	77	74	0.96
	E3098-186	Charcoal	pCi/Filter	I-131	69	65	0.94
	E3099-186	Charcoal	pCi/Filter	I-131	87	91	1.05
March-02	E3023-162	Water	pCi/l	Gr. Alpha	53	56.7	1.07
	E3023-162	Water	pCi/l	Gr. Beta	313	310.3	0.99
	E3024-162	Water	pCi/l	I-131	61	54.5	0.89
			pCi/l	I-131 LL *	61	63.4	1.04
			pCi/l	Ce-141	242	239.4	0.99
			pCi/l	Cr-51	198	175.7	0.89
			pCi/l	Cs-134	91	87.8	0.96
			pCi/l	Cs-137	197	197.7	1.00
			pCi/l	Mn-54	166	168.5	1.02
			pCi/l	Fe-59	86	87.6	1.02
			pCi/l	Zn-65	164	157.2	0.96
			pCi/l	Co-60	117	114.6	0.98

* I-131 LL = radiochemical seperation analysis

TABLE J-2
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002
FRAMATOME ANP QUALITY CONTROL SPIKE PROGRAM
FRAMATOME ANP ENVIRONMENTAL LABORATORY

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results	Framatome Results	Framatome/Analytics Ratio	
March-02	E3025-162	Soil	pCi/kg	Ce-141	383	350.7	0.92	
			pCi/kg	AcTh-228	-	448.3		(1)
			pCi/kg	Cr-51	314	274	0.87	
			pCi/kg	Cs-134	143	136.6	0.96	
			pCi/kg	Cs-137	439	405.7	0.92	
			pCi/kg	Mn-54	263	245.8	0.93	
			pCi/kg	Fe-59	136	140.2	1.03	
			pCi/kg	Zn-65	259	248.1	0.96	
			pCi/kg	Co-60	185	168.1	0.91	
March-02	E3026-162	AP Filter	pCi	Gr. Alpha	23	21.8	0.95	
			pCi	Gr. Beta	136	149	1.10	
March-02	E3027-162	Milk	pCi/l	I-131	92	87.9	0.96	
			pCi/l	I-131 LL *	92	93	1.01	
			pCi/l	Ce-141	326	317.8	0.97	
			pCi/l	Cr-51	267	277	1.04	
			pCi/l	Cs-134	122	119	0.98	
			pCi/l	Cs-137	266	271.2	1.02	
			pCi/l	Mn-54	224	231.2	1.03	
			pCi/l	Fe-59	116	123.6	1.07	
			pCi/l	Zn-65	221	225.9	1.02	
			pCi/l	Co-60	158	152.9	0.97	

* I-131 LL = radiochemical seperation analysis

TABLE J-2

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002
FRAMATOME ANP QUALITY CONTROL SPIKE PROGRAM
FRAMATOME ANP ENVIRONMENTAL LABORATORY
(Page 3 of 5)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results	Framatome Results	Framatome/Analytics Ratio	
March-02	E3028-162	Milk	pCi/l	Sr-89	83	79.9	0.96	
			pCi/l	Sr-90	27	24.7	0.91	
June-02	E3148-162	Water	pCi/l	H-3	6970	6970	1.00	
June-02	E3149-162	Water	pCi/l	Sr-89	64	42	0.66	(2)
		Water	pCi/l	Sr-90	39	36	0.92	
June-02	E3150-162	AP Filter	pCi	Gr. Alpha				(3)
			pCi	Gr. Beta				(3)
June-02	E3151-162	AP Filter	pCi	Ce-141	61	59	0.97	
			pCi	Cr-51	160	165	1.03	
			pCi	Cs-134	82	77	0.94	
			pCi	Cs-137	62	64	1.03	
			pCi	Co-58	68	68	1.00	
			pCi	Mn-54	65	69	1.06	
			pCi	Fe-59	55	62	1.13	
			pCi	Zn-65	122	131	1.07	
			pCi	Co-60	85	82	0.96	
June-02	E3152-162	AP Filter	pCi	Sr-90	48	41	0.85	

* I-131 LL = radiochemical seperation analysis

TABLE J-2
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002
FRAMATOME ANP QUALITY CONTROL SPIKE PROGRAM
FRAMATOME ANP ENVIRONMENTAL LABORATORY
(Page 4 of 5)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results	Framatome Results	Framatome/Analytics Ratio
June-02	E3153-162	Milk	pCi/l	I-131	87	88	1.01
			pCi/l	I-131 LL *	87	85	0.98
			pCi/l	Ce-141	90	86	0.96
			pCi/l	Cr-51	235	230	0.98
			pCi/l	Cs-134	120	121	1.01
			pCi/l	Cs-137	91	89	0.98
			pCi/l	Co-58	100	100	1.00
			pCi/l	Mn-54	95	97	1.02
			pCi/l	Fe-59	81	83	1.02
			pCi/l	Zn-65	180	179	0.99
			pCi/l	Co-60	125	127	1.02
September-02	E3288-162	Water	pCi/l	Gr. Alpha	92	73	0.79
September-02	E3288-162	Water	pCi/l	Gr. Beta	239	204	0.85
September-02	E3289-162	Water	pCi/l	I-131	79	68	0.86
			pCi/l	I-131 LL *	79	77	0.97
			pCi/l	Ce-141	214	209	0.98
			pCi/l	Cr-51	304	289	0.95
			pCi/l	Cs-134	176	169	0.96
			pCi/l	Cs-137	169	167	0.99
			pCi/l	C0-58	130	129	0.99
			pCi/l	Mn-54	204	206	1.01
			pCi/l	Fe-59	119	118	0.99
			pCi/l	Zn-65	251	251	1.00
			pCi/l	Co-60	199	187	0.94

* I-131 LL = radiochemical seperation analysis

TABLE J-2

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002
FRAMATOME ANP QUALITY CONTROL SPIKE PROGRAM
FRAMATOME ANP ENVIRONMENTAL LABORATORY
(Page 5 of 5)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results	Framatome Results	Framatome/Analytics Ratio
September-02	E3291-162	AP Filter	pCi	Gr. Alpha	59	58	0.98
			pCi	Gr. Beta	155	144	0.93
September-02	E3292-162	Milk	pCi/l	I-131	80	79	0.99
			pCi/l	I-131 LL *	80	77	0.96
			pCi/l	Ce-141	160	156	0.98
			pCi/l	Cr-51	227	231	1.02
			pCi/l	Cs-134	132	128	0.97
			pCi/l	Cs-137	127	122	0.96
			pCi/l	Co-58	97	95	0.98
			pCi/l	Mn-54	152	151	0.99
			pCi/l	Fe-59	89	94	1.06
			pCi/l	Zn-65	187	180	0.96
			pCi/l	Co-60	149	142	0.95
September-02	E3293-162	Milk	pCi/l	Sr-89	92	84	0.91
			pCi/l	Sr-90	39	36	0.92

* I-131 LL = radiochemical seperation analysis

COMMENTS

1 Analysis not performed by Analytics.

2 Investigation performed due to failure for Sr-89. The activity ratios or Sr-89 and Sr-90 were lower than normally provided. Analytics has been contacted to ensure the ratios are in the normal expected ranges.
This sample was not processed in the normal time frame, causing an excessive decay correction to the Sr-89 data. The processing staff has been reminded of the need to address client and QC samples expeditiously. The Sr-89/Sr-90 QC samples are now being processed during non-peak REMP times (ie; between late fall and early spring).

3 Filters damaged during sample preparation. No results issued.

TABLE J-3

PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002
FRAMATOME ANP ENVIRONMENTAL LABORATORY

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	Framatome Results (a)	Framatome/Analytics Ratio
March-02	E3100-186	Sediment	pCi/kg	Ce-141	383 ± 13	407 ± 76	1.06
			pCi/kg	Cr-51	314 ± 11	342 ± 540	1.09
			pCi/kg	Cs-134	143 ± 5	129 ± 20	0.90
			pCi/kg	Cs-137	439 ± 15	425 ± 28	0.97
			pCi/kg	Mn-54	263 ± 9	254 ± 55	0.97
			pCi/kg	Fe-59	136 ± 5	152 ± 69	1.12
			pCi/kg	Zn-65	259 ± 9	250 ± 43	0.97
			pCi/kg	Co-60	185 ± 6	174 ± 17	0.94
March-02	E3096-186	Milk	pCi/l	I-131	90 ± 3	99 ± 4	1.09
			pCi/l	Ce-141	294 ± 10	322 ± 7	1.10
			pCi/l	Cr-51	241 ± 8	262 ± 28	1.09
			pCi/l	Cs-134	110 ± 4	104 ± 4	0.95
			pCi/l	Cs-137	240 ± 8	248 ± 6	1.03
			pCi/l	Mn-54	202 ± 7	224 ± 5	1.11
			pCi/l	Fe-59	104 ± 3	112 ± 6	1.08
			pCi/l	Zn-65	199 ± 7	215 ± 9	1.08
			pCi/l	Co-60	142 ± 5	144 ± 3	1.01
March-02	E3097-186	Charcoal Filter	pCi	I-131	77 ± 3	74 ± 6	0.96
	E3098-186	Charcoal Filter	pCi	I-131	68 ± 2	65 ± 7	0.96
	E3099-186	Charcoal Filter	pCi	I-131	87 ± 3	91 ± 7	1.05

(a) Counting error is two standard deviations.

TABLE J-3
PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002
FRAMATOME ANP ENVIRONMENTAL LABORATORY
(Page 2 of 4)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	Framatome Results (a)	Framatome/Analytics Ratio
June-02	E3138-186	AP Filter	pCi	Ce-141	75 ± 3	67 ± 4	0.89
			pCi	Cr-51	198 ± 7	205 ± 34	1.04
			pCi	Cs134	101 ± 4	87 ± 3	0.86
			pCi	Cs-137	76 ± 3	72 ± 3	0.95
			pCi	Co-58	84 ± 1	80 ± 4	0.95
			pCi	Mn-54	80 ± 3	82 ± 4	1.03
			pCi	Fe-59	67 ± 2	72 ± 7	1.07
			pCi	Zn-65	150 ± 5	143 ± 8	0.95
			pCi	Co-60	104 ± 4	94 ± 3	0.90
June-02	E3139-186	AP Filter	pCi	Ce-141	81 ± 2	75 ± 3	0.93
			pCi	Cr-51	211 ± 6	204 ± 13	0.97
			pCi	Cs134	108 ± 3	102 ± 2	0.94
			pCi	Cs-137	82 ± 3	84 ± 4	1.02
			pCi	Co-58	90 ± 1	89 ± 4	0.99
			pCi	Mn-54	85 ± 2	91 ± 4	1.07
			pCi	Fe-59	72 ± 2	79 ± 6	1.10
			pCi	Zn-65	161 ± 4	172 ± 8	1.07
			pCi	Co-60	111 ± 4	106 ± 3	0.95
June-02	E3140-186	AP Filter	pCi	Ce-141	78 ± 2	67 ± 4	0.86
			pCi	Cr-51	203 ± 5	194 ± 33	0.96
			pCi	Cs134	104 ± 3	93 ± 3	0.89
			pCi	Cs-137	79 ± 3	78 ± 4	0.99
			pCi	Co-58	86 ± 1	83 ± 4	0.97
			pCi	Mn-54	82 ± 2	90 ± 4	1.10
			pCi	Fe-59	69 ± 2	74 ± 6	1.07
			pCi	Zn-65	155 ± 4	163 ± 9	1.05
			pCi	Co-60	107 ± 4	98 ± 3	0.92

(a) Counting error is two standard deviations.

TABLE J-3

PPL REMP LABORATORY SPIKE PROGRAM

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002

FRAMATOME ANP ENVIRONMENTAL LABORATORY

(Page 3 of 4)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	Framatome Results (a)	Framatome/Analytics Ratio
June-02	E3141-186	Charcoal Filter	pCi	I-131	94 ± 3	96 ± 9	1.02
	E3142-186	Charcoal Filter	pCi	I-131	85 ± 3	92 ± 9	1.08
	E3143-186	Charcoal Filter	pCi	I-131	99 ± 3	104 ± 9	1.05
September-02	E3388-186	Milk	pCi/l	I-131	78 ± 4	76 ± 4	0.97
			pCi/l	Ce-141	216 ± 11	216 ± 7	1.00
			pCi/l	Cr-51	307 ± 15	306 ± 31	1.00
			pCi/l	Cs-134	178 ± 9	174 ± 5	0.98
			pCi/l	Cs-137	171 ± 9	171 ± 5	1.00
			pCi/l	Co-58	131 ± 7	133 ± 5	1.02
			pCi/l	Mn-54	206 ± 10	207 ± 6	1.00
			pCi/l	Fe-59	120 ± 6	118 ± 6	0.98
			pCi/l	Zn-65	254 ± 13	260 ± 10	1.02
			pCi/l	Co-60	201 ± 10	193 ± 4	0.96
December-02	E3515-186	Milk	pCi/l	I-131	92 ± 5	99 ± 8	1.08
			pCi/l	Ce-141	126 ± 6	129 ± 7	1.02
			pCi/l	Cr-51	391 ± 20	424 ± 35	1.08
			pCi/l	Cs-134	112 ± 6	106 ± 5	0.95
			pCi/l	Cs-137	248 ± 12	251 ± 6	1.01
			pCi/l	Co-58	157 ± 8	156 ± 5	0.99
			pCi/l	Mn-54	160 ± 8	161 ± 5	1.01

(a) Counting error is two standard deviations.

TABLE J-3

PPL REMP LABORATORY SPIKE PROGRAM

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002

FRAMATOME ANP ENVIRONMENTAL LABORATORY

(Page 4 of 4)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	Framatome Results (a)	Framatome/Analytics Ratio	
December-02	E3515-186	Milk	pCi/l	Fe-59	81 ± 4	88 ± 5	1.09	
			pCi/l	Zn-65	202 ± 10	203 ± 9	1.00	
			pCi/l	Co-60	186 ± 9	184 ± 4	0.99	
December-02	E3516-186	Charcoal Filter	pCi	I-131	89 ± 4	±		(1)
	E3517-186	Charcoal Filter	pCi	I-131	96 ± 5	±		(1)
	E3518-186	Charcoal Filter	pCi	I-131	84 ± 4	±		(1)

(a) Counting error is two standard deviations.

COMMENTS

1 Framatome ANP unable to analyze samples. Charcoal cartridges damaged during shipment from Analytics.

TABLE J-4
DOE - ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)
QUALITY ASSESSMENT PROGRAM (QAP)
FRAMATOME ANP ENVIRONMENTAL LABORATORY
(Page 1 of 3)

Month/Year	Identification No.	Medium	Units	Nuclide	EML Known Results	Framatome Results	Framatome/EML Ratio
March-02	QAP 56	AP Filter	Bq	Am-241	0.088	0.094	1.07
			Bq	Co-60	30.520	29.700	0.97
			Bq	Cs-137	28.230	28.400	1.01
			Bq	Gr. Alpha	0.534	0.504	0.94
			Bq	Gross Beta	1.300	1.174	0.90
			Bq	Mn-54	38.530	38.700	1.00
			Bq	Pu-238	0.057	0.056	0.98
			Bq	Pu-239	0.187	0.183	0.98
			Bq	Sr-90	4.832	4.100	0.85
March-02	QAP 56	Soil	Bq/kg	AcTh-228	51.167	46.700	0.91
			Bq/kg	Am-241	10.927	13.000	1.19
			Bq/kg	Cs-137	1326.670	1321.600	1.00
			Bq/kg	K-40	621.670	586.500	0.94
			Bq/kg	Pu-239	19.098	20.860	1.09
			Bq/kg	Sr-90	53.756	50.700	0.94
			Bq/kg	U-234	93.885	87.200	0.93
			Bq/kg	U-238	96.778	91.700	0.95
March-02	QAP 56	Vegetation	Bq/kg	Am-241	2.228	2.230	1.00
			Bq/kg	Cm-244	1.320	1.190	0.90
			Bq/kg	Co-60	11.230	10.650	0.95
			Bq/kg	Cs-137	313.667	317.100	1.01
			Bq/kg	K-40	864.330	855.000	0.99
			Bq/kg	Pu-239	3.543	3.310	0.93
			Bq/kg	Sr-90	586.280	517.000	0.88

TABLE J-4

DOE - ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)
QUALITY ASSESSMENT PROGRAM (QAP)
FRAMATOME ANP ENVIRONMENTAL LABORATORY
(Page 2 of 3)

Month/Year	Identification No.	Medium	Units	Nuclide	EML Known Results	Framatome Results	Framatome/EML Ratio	
March-02	QAP 56	Water	Bq/l	Am-241	1.474	1.507	1.02	
			Bq/l	Co-60	347.330	350.300	1.01	
			Bq/l	Cs-137	56.067	55.300	0.99	
			Bq/l	Gr. Alpha	375.000	281.000	0.75	(1)
			Bq/l	Gr. Beta	1030.000	951.000	0.92	
			Bq/l	H-3	283.700	309.000	1.09	
			Bq/l	Pu-238	0.490	0.676	1.38	(2)
March-02	QAP 56	Water	Bq/l	Sr-90	7.579	6.260	0.83	(3)
			Bq/l	U-234	1.402	1.310	0.93	
			Bq/l	U-238	1.381	1.310	0.95	
September-02	QAP 57	AP Filters	Bq	Co-60	23	23.195	1.01	
			Bq	Cs-137	32.5	33.4	1.03	
			Bq	Gr. Alpha	0.287	0.269	0.94	
			Bq	Gr. Beta	0.871	0.785	0.90	
			Bq	Mn-54	52.2	51.68	0.99	
			Bq	Sr-90	5.561	4.82	0.87	
September-02	QAP 57	Soil	Bq/kg	AcTh-228	42.3	41	0.97	
			Bq/kg	Am-241	6.767	6.43	0.95	
			Bq/kg	Cs-137	829.33	857	1.03	
			Bq/kg	K-40	637.7	628.8	0.99	
			Bq/kg	Pu-238	19.203	17.21	0.90	
			Bq/kg	Pu-239	12.903	12.47	0.97	

TABLE J-4
DOE - ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)
QUALITY ASSESSMENT PROGRAM (QAP)
FRAMATOME ANP ENVIRONMENTAL LABORATORY
(Page 3 of 3)

Month/Year	Identification No.	Medium	Units	Nuclide	EML Known Results	Framatome Results	Framatome/EML Ratio	
September-02	QAP 57	Vegetation	Bq/l	Co-60	9.66	10.74	1.11	
			Bq/l	Cs-137	300.67	314.4	1.05	
			Bq/l	K-40	1480	1555	1.05	
September-02	QAP 57	Water	Bq/l	Am-241	3.043	2.842	0.93	
			Bq/l	Co-60	268.57	257.2	0.96	
			Bq/l	Cs-134	60.2	60.7	1.01	
			Bq/l	Cs-137	81.43	79.7	0.98	
			Bq/l	Gr. Alpha	210	156.7	0.75	(4)
			Bq/l	Gr. Beta	900	808.7	0.90	
			Bq/l	H-3	227.3	252.1	1.11	
			Bq/l	Pu-238	4.331	3.981	0.92	
			Bq/l	Pu-239	2.07	2.008	0.97	
			Bq/l	Sr-90	8.69	7.77	0.89	

COMMENTS

1 Low bias evaluated and determined there were no noted deficiencies.

2 High bias identified. The Pu-239 in the sample was evaluated as "Acceptable." The sample documentation is being reviewed to identify the potential presence of a contaminant in the Pu-238 spectral region.

3 Low bias identified. Over 25% of the laboratories participating in this test received a "Warning" evaluation. No deficiencies in the processing documentation could be identified.

4 Low bias identified. A review of the special DOE calibration (single point, Th-230) is being performed due to the second consecutive "Warning" evaluation.

TABLE J-5
DOE - MAPEP
MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM
FRAMATOME ANP ENVIRONMENTAL LABORATORY
(Page 1 of 1)

Month/Year	Identification No.	Medium	Units	Nuclide	MAPEP Known Results	Framatome Results	Framatome/MAPEP Ratio	Evaluation	
March-02	01-W9	Water	Bq/Kg	Mn-54	246	247.33	1.01	Agreement	
			Bq/Kg	Co-57	143	137.52	0.96	Agreement	
			Bq/Kg	Co-60	141	142.08	1.01	Agreement	
			Bq/Kg	Cs-134	28.5	28.26	0.99	Agreement	
			Bq/Kg	Cs-137	286	270.23	0.94	Agreement	
			Bq/Kg	Am-241	1.19	1.152	0.97	Agreement	
			Bq/Kg	Ni-63	88.3	123.85	1.40	Not Acceptable	(1)
			Bq/Kg	Pu-238		0.0456		False Positive	(2)
			Bq/Kg	Pu-239/40	2.99	2.944	0.98	Agreement	
			Bq/Kg	Sr-90	4.8	3.83	0.80	Warning	(3)
			Bq/Kg	U-233/34	0.98	1.014	1.03	Agreement	
			Bq/Kg	U-238	7.8	7.89	1.01	Agreement	
			Bq/Kg	Zn-65	67.3	70.58	1.05	Agreement	
	02-S9	Soil	Bq/Kg	Am-241	43.5	43.48	1.00	Agreement	
			Bq/Kg	Cs-134	862	929.8	1.08	Agreement	
			Bq/Kg	Cs-137	111	113.8	1.03	Agreement	
			Bq/Kg	Co-57	246	258.6	1.05	Agreement	
			Bq/Kg	Co-60	87.5	96.3	1.10	Agreement	
			Bq/Kg	Mn-54	546	596.4	1.09	Agreement	
			Bq/Kg	Pu-238	33.3	34.43	1.03	Agreement	
			Bq/Kg	Pu-239/40	72.9	73.96	1.01	Agreement	
			Bq/Kg	K-40	652	661	1.01	Agreement	
			Bq/Kg	Zn-65	809	878.9	1.09	Agreement	
	01-W9	Water	Bq/Kg	Ni-63	88.3	83.9	0.95	Agreement	(1)
			Bq/Kg	Pu-238	False Pos. Check	Non-Positive		Agreement	(2)
			Bq/Kg	Pu-239/40	3	3	0.94	Agreement	(2)

COMMENTS

1 High bias identified. A Framatome internal process check was analyzed in August 2002 and resulted in acceptable bias of <-2%. A re-performance of the MAPEP sample was also successfully performed. Results identified below sample 02-S9.

2 Review of alpha spectrum revealed slight contamination breakthrough of other sample analytes. Measurements personnel have been re-trained on spectral review requirements. The MAPEP sample was re-processed successfully. Results identified below sample 02-S9.

3 Low bias identified. Only one analysis result was available for this sample due to an error in processing by the chemist. No problems were noted with the documentation of this sample that would explain a low bias.

TABLE J-6

PPL REMP LABORATORY SPIKE PROGRAM

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002

PPL'S CORPORATE ENVIRONMENTAL RADIOACTIVITY MEASUREMENTS LABORATORY

(Page 1 of 3)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	CERML Results (a)	CERML/Analytics Ratio
March-02	E3095-186	Water	pCi/l	H-3	10026 ± 334	9736 ± 133	0.97
March-02	E3091-186	Charcoal Filter	pCi	I-131	77 ± 3	74 ± 2	0.96
	E3092-186	Charcoal Filter	pCi	I-131	68 ± 2	65 ± 2	0.96
	E3093-186	Charcoal Filter	pCi	I-131	87 ± 3	81 ± 2	0.93
March-02	E3094-186	Soil	pCi/kg	Ce-141	383 ± 13	369 ± 9	0.96
			pCi/kg	Cr-51	314 ± 11	302 ± 42	0.96
			pCi/kg	Cs-134	143 ± 5	127 ± 7	0.89
			pCi/kg	Cs-137	439 ± 15	456 ± 8	1.04
			pCi/kg	Mn-54	263 ± 9	280 ± 7	1.06
			pCi/kg	Fe-59	136 ± 5	138 ± 9	1.01
			pCi/kg	Zn-65	259 ± 9	277 ± 15	1.07
			pCi/kg	Co-60	185 ± 6	175 ± 5	0.95
March-01	E3090-186	Milk	pCi/l	I-131	90 ± 3	93 ± 10	1.03
				Ce-141	294 ± 10	249 ± 8	0.85
				Cr-51	241 ± 8	208 ± 35	0.86
				Cs-134	110 ± 4	92 ± 5	0.84
				Cs-137	240 ± 8	237 ± 7	0.99
				Mn-54	202 ± 7	209 ± 6	1.03
				Fe-59	104 ± 3	116 ± 9	1.12
				Zn-65	199 ± 7	208 ± 11	1.05
				Co-60	142 ± 5	143 ± 6	1.01

(a) Counting error is two standard deviations.

TABLE J-6

PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002
PPL'S CORPORATE ENVIRONMENTAL RADIOACTIVITY MEASUREMENTS LABORATORY
(Page 2 of 3)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	CERML Results (a)	CERML/Analytics Ratio	
June-02	E3132-186	AP Filter	pCi	Ce-141	87 ± 2	81 ± 2	0.93	
			pCi	Cr-51	228 ± 6	213 ± 16	0.93	
			pCi	Cs134	117 ± 3	92 ± 2	0.79	(1)
			pCi	Cs-137	88 ± 3	92 ± 2	1.05	
			pCi	Co-58	97 ± 1	98 ± 3	1.01	
			pCi	Mn-54	92 ± 3	96 ± 3	1.04	
			pCi	Fe-59	78 ± 2	89 ± 4	1.14	
			pCi	Zn-65	174 ± 5	193 ± 6	1.11	
			pCi	Co-60	121 ± 4	116 ± 2	0.96	
June-02	E3133-186	AP Filter	pCi	Ce-141	93 ± 2	82 ± 2	0.88	
			pCi	Cr-51	244 ± 4	214 ± 16	0.88	
			pCi	Cs134	125 ± 2	94 ± 2	0.75	(2)
			pCi	Cs-137	95 ± 2	92 ± 2	0.97	
			pCi	Co-58	104 ± 1	98 ± 3	0.94	
			pCi	Mn-54	99 ± 2	95 ± 3	0.96	
			pCi	Fe-59	84 ± 1	92 ± 5	1.10	
			pCi	Zn-65	186 ± 3	193 ± 6	1.04	
			pCi	Co-60	129 ± 3	123 ± 3	0.95	
June-02	E3134-186	AP Filter	pCi	Ce-141	57 ± 3	53 ± 2	0.93	
			pCi	Cr-51	150 ± 8	150 ± 15	1.00	
			pCi	Cs134	77 ± 4	60 ± 2	0.78	(3)
			pCi	Cs-137	58 ± 3	61 ± 2	1.05	
			pCi	Co-58	64 ± 2	65 ± 2	1.02	
			pCi	Mn-54	61 ± 3	67 ± 2	1.10	
			pCi	Fe-59	51 ± 3	65 ± 4	1.27	
			pCi	Zn-65	114 ± 6	130 ± 5	1.14	
			pCi	Co-60	79 ± 5	82 ± 2	1.04	

(a) Counting error is two standard deviations.

TABLE J-6
PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002
PPL'S CORPORATE ENVIRONMENTAL RADIOACTIVITY MEASUREMENTS LABORATORY
(Page 3 of 3)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	CERML Results (a)	CERML/Analytics Ratio
June-02	E3135-186	Charcoal Filter	pCi	I-131	98 ± 3	95 ± 3	0.97
	E3136-186	Charcoal Filter	pCi	I-131	94 ± 3	90 ± 3	0.96
	E3137-186	Charcoal Filter	pCi	I-131	93 ± 3	89 ± 3	0.96
September-02	E3386-186	Milk	pCi/l	I-131	78 ± 4	78 ± 3	1.00
			pCi/l	Ce-141	216 ± 11	203 ± 10	0.94
			pCi/l	Cr-51	307 ± 15	318 ± 14	1.04
			pCi/l	Cs-134	178 ± 9	156 ± 9	0.88
			pCi/l	Cs-137	171 ± 9	178 ± 8	1.04
			pCi/l	Co-58	131 ± 7	141 ± 7	1.08
			pCi/l	Mn-54	206 ± 10	233 ± 9	1.13
			pCi/l	Fe-59	120 ± 6	136 ± 5	1.13
			pCi/l	Zn-65	254 ± 13	270 ± 13	1.06
			pCi/l	Co-60	201 ± 10	203 ± 10	1.01
September-02	E3387-186	Water	pCi/l	H-3	12000 ± 600	12034 ± 145	1.00

(a) Counting error is two standard deviations.

COMMENTS

1 An unacceptably low level of Cs-134 was reported for the analysis of this spiked air particulate filter. This exception was reported to CERML's Manager by email on August 9, 2002. An investigation of this occurrence was requested. Under-reporting for Cs-134 in multiple environmental media by both TBE and CERML has been recognized before. Procedural steps have been established to compensate for under reporting of actual sample analysis results if Cs-134 is identified at levels in excess of analysis MDCs.

2 An unacceptably low level of Cs-134 was reported for the analysis of this spiked air particulate filter. This exception was reported to CERML's Manager by email on August 9, 2002. An investigation of this occurrence was requested. Under-reporting for Cs-134 in multiple environmental media by both TBE and CERML has been recognized before. Procedural steps have been established to compensate for under reporting of actual sample analysis results if Cs-134 is identified at levels in excess of analysis MDCs.

3 An unacceptably high level of Cs-134 was reported for the analysis of this spiked air particulate filter. This exception was reported to CERML's Manager by email on August 9, 2002. An investigation of this occurrence was requested. Procedural steps have been established to compensate for under reporting of actual sample analysis results if Cs-134 is identified at levels in excess of analysis MDCs.

TABLE J-7
ENVIRONMENTAL RESOURCE ASSOCIATES (ERA)
PROFICIENCY TESTING PROGRAM - 2002
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification No.	Medium	Units	Nuclide	ERA Known Result (a)	TBE Results (a)	TBE/ERA Ratio
May-02	Rad-49	Water	pCi/l	Gr-Beta	189	162	0.86
			pCi/l	Co-60	39.1	39.3	1.01
			pCi/l	Cs-134	17.1	15.5	0.91
			pCi/l	Cs-137	52.1	52.2	1.00
			pCi/l	Sr-89	31.7	27.2	0.86
			pCi/l	Sr-90	28.3	25.1	0.89
			pCi/l	I-131	14.7	13.35	0.91
			pCi/l	H-3	17400	14600	0.84
November-02	Rad-51	Water	pCi/l	H-3	10200	10100	0.99
			pCi/l	I-131	6.76	7.94	1.17
			pCi/l	Gr-Beta	330	280	0.85
			pCi/l	Sr-89	47.6	41.7	0.88
			pCi/l	Sr-90	7.56	6.75	0.89
			pCi/l	Co-60	104	122	1.17
			pCi/l	Cs-134	55.5	60.0	1.08
			pCi/l	Cs-137	117	140	1.20

(a) Results are the average of three measurements, reported in units of pCi/l.

TABLE J-8

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002

TELEDYNE QUALITY CONTROL SPIKE PROGRAM

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

(Page 1 of 2)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results	TBE Results	TBE/Analytics Ratio
August-02	A16018-55	Water	pCi/l	Sr-89	4.99E-03	4.12E-03	0.83
			pCi/l	Sr-90	2.64E-04	2.43E-04	0.92
	A16020-55	Water	pCi/l	H-3	2.00E-03	1.93E-03	0.97
September-02	A15989-148	Water	pCi/l	Sr-89	4.99E-03	4.02E-03	0.81
			pCi/l	Sr-90	2.64E-04	2.49E-04	0.94
September-02	E3324-396	Milk	pCi/l	Sr-89	92	106	1.15
			pCi/l	Sr-90	39	39	1.00
September-02	E3325-396	Milk	pCi/l	I-131	80	84	1.05
			pCi/l	Ce-141	160	168	1.05
			pCi/l	Cr-51	227	210.5	0.93
			pCi/l	Cs-134	132	127	0.96
			pCi/l	Cs-137	127	136	1.07
			pCi/l	Co-58	97	93	0.96
			pCi/l	Mn-54	152	165	1.09
			pCi/l	Fe-59	89	90	1.01
			pCi/l	Zn-65	187	196	1.05
			pCi/l	Co-60	149	147	0.99
September-02	E-3327-396	AP Filter	pCi	Ce-141	110	115	1.05
			pCi	Cr-51	156	163.6	1.05
			pCi	Cs-134	90	79	0.88
			pCi	Cs-137	87	95	1.09
			pCi	Co-58	67	71	1.06
			pCi	Mn-54	104	118	1.13
			pCi	Fe-59	61	76	1.25
			pCi	Zn-65	130	155	1.19
			pCi	Co-60	102	108	1.06

TABLE J-8
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002
TELEDYNE QUALITY CONTROL SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(Page 2 of 2)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results	TBE Results	TBE/Analytics Ratio	
September-02	E3326-396	Charcoal Filter	pCi	I-131	85	73	0.86	
December-02	E3520-396	Milk	pCi/l	Sr-89	68	88	1.29	(1)
			pCi/l	Sr-90	38	40	1.05	
December-02	E3521-396	Milk	pCi/l	I-131	86	97	1.13	
			pCi/l	Ce-141	111	136	1.23	(1)
			pCi/l	Cr-51	346	347	1.00	
			pCi/l	Cs-134	99	97	0.98	
			pCi/l	Cs-137	220	229	1.04	
			pCi/l	Co-58	139	143	1.03	
			pCi/l	Mn-54	142	162	1.14	
			pCi/l	Fe-59	72	80	1.11	
			pCi/l	Zn-65	178	217	1.22	(1)
			pCi/l	Co-60	164	172	1.05	
December-02	E3523-396	AP Filter	pCi	Ce-141	128	108	0.84	
			pCi	Cr-51	398	370	0.93	
			pCi	Cs-134	114	79	0.69	(2)
			pCi	Cs-137	253	226	0.89	
			pCi	Co-58	160	141	0.88	
			pCi	Mn-54	163	152	0.93	
			pCi	Fe-59	83	89	1.07	
			pCi	Zn-65	206	196	0.95	
			pCi	Co-60	189	170	0.90	
December-02	E3522-396	Charcoal Filter	pCi	I-131	96	84	0.88	

COMMENTS

1 High bias identified. Evaluation of results requested by PPL via email on April 29, 2003.

2 Coincidental summing resulted in low Cesium-134 activity. Elimination of the coincidental summing resulted in an activity of 110 pCi. No further action required.

TABLE J-9
PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2002
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	TBE Results (a)	TBE/Analytics Ratio	
December-02	E3511-186	Milk	pCi/l	I-131	92 ± 5	91 ± 8	0.99	
			pCi/l	Ce-141	126 ± 6	±		(1)
			pCi/l	Cr-51	391 ± 20	±		(1)
			pCi/l	Cs-134	112 ± 6	103 ± 5	0.92	
			pCi/l	Cs-137	248 ± 12	264 ± 9	1.06	
			pCi/l	Co-58	157 ± 8	157 ± 7	1.00	
			pCi/l	Mn-54	160 ± 8	168 ± 7	1.05	
			pCi/l	Fe-59	81 ± 4	94 ± 14	1.16	
			pCi/l	Zn-65	202 ± 10	236 ± 13	1.17	
			pCi/l	Co-60	186 ± 9	201 ± 8	1.08	
December-02	E3512-186	Charcoal Filter	pCi	I-131	89 ± 4	94 ± 4	1.06	
	E3513-186	Charcoal Filter	pCi	I-131	84 ± 4	91 ± 3	1.08	
	E3514-186	Charcoal Filter	pCi	I-131	96 ± 5	97 ± 3	1.01	

(a) counting error is two standard deviations

COMMENTS

1 No results were reported for Ce-141 or Cr-51 for the analysis of this spiked milk on the TBE analysis sheets.
This exception was reported to TBE via email from PPL on April 22, 2003. An investigation of this occurrence was requested.

TABLE J-10
DOE - ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)
QUALITY ASSESSMENT PROGRAM (QAP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(Page 1 of 2)

Month/Year	Identification No.	Medium	Units	Nuclide	EML Known Result (a)	TBE Results (a)	TBE/EML Ratio	
June-02	QAP-56	AP Filter	Bq	Co-60	30.52	31.7	1.04	
			Bq	Cs-137	28.23	30.4	1.08	
			Bq	Gr-Beta	1.30	1.21	0.93	
			Bq	Mn-54	38.53	38.3	0.99	
			Bq	Sr-90	4.832	4.68	0.97	
June-02	QAP-56	Soil	Bq/kg	Ac-228	51.167	50	0.98	
			Bq/kg	Bi-212	53.43	35.9	0.67	(1)
			Bq/kg	Bi-214	53.933	46.3	0.86	
			Bq/kg	Cs-137	1326.67	1300	0.98	
			Bq/kg	K-40	621.67	608	0.98	
			Bq/kg	Pb-212	51.1	49.4	0.97	
			Bq/kg	Pb-214	54.367	49.1	0.90	
			Bq/kg	Sr-90	53.756	46.6	0.87	
June-02	QAP-56	Vegetation	Bq/kg	Co-60	11.23	11.7	1.04	
			Bq/kg	Cs-137	313.667	346	1.10	
			Bq/kg	K-40	864.33	952	1.10	
			Bq/kg	Sr-90	586.28	477	0.81	
June-02	QAP-56	Water	Bq/l	Co-60	347.33	367	1.06	
			Bq/l	Cs-134	3.357	2.93	0.87	
			Bq/l	Cs-137	56.067	59.6	1.06	
			Bq/l	Gr-Beta	1030	895	0.87	
			Bq/l	H-3	283.7	285	1.00	
			Bq/l	Sr-90	7.579	5.78	0.76	(1)

TABLE J-10

DOE - ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)
QUALITY ASSESSMENT PROGRAM (QAP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(Page 1 of 2)

Month/Year	Identification No.	Medium	Units	Nuclide	EML Known Result (a)	TBE Results (a)	TBE/EML Ratio	
June-02	QAP-56	AP Filter	Bq	Co-60	30.52	31.7	1.04	
			Bq	Cs-137	28.23	30.4	1.08	
			Bq	Gr-Beta	1.30	1.21	0.93	
			Bq	Mn-54	38.53	38.3	0.99	
			Bq	Sr-90	4.832	4.68	0.97	
June-02	QAP-56	Soil	Bq/kg	Ac-228	51.167	50	0.98	
			Bq/kg	Bi-212	53.43	35.9	0.67	(1)
			Bq/kg	Bi-214	53.933	46.3	0.86	
			Bq/kg	Cs-137	1326.67	1300	0.98	
			Bq/kg	K-40	621.67	608	0.98	
			Bq/kg	Pb-212	51.1	49.4	0.97	
			Bq/kg	Pb-214	54.367	49.1	0.90	
			Bq/kg	Sr-90	53.756	46.6	0.87	
June-02	QAP-56	Vegetation	Bq/kg	Co-60	11.23	11.7	1.04	
			Bq/kg	Cs-137	313.667	346	1.10	
			Bq/kg	K-40	864.33	952	1.10	
			Bq/kg	Sr-90	586.28	477	0.81	
June-02	QAP-56	Water	Bq/l	Co-60	347.33	367	1.06	
			Bq/l	Cs-134	3.357	2.93	0.87	
			Bq/l	Cs-137	56.067	59.6	1.06	
			Bq/l	Gr-Beta	1030	895	0.87	
			Bq/l	H-3	283.7	285	1.00	
			Bq/l	Sr-90	7.579	5.78	0.76	(1)

TABLE J-10
DOE - ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)
QUALITY ASSESSMENT PROGRAM (QAP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(Page 2 of 2)

Month/Year	Identification No.	Medium	Units	Nuclide	EML Known Result (a)	TBE Results (a)	TBE/EML Ratio	
December-02	QAP 57	AP Filter	Bq	Co-60	23.0	24.1	1.05	
			Bq	Cs-137	32.5	36.1	1.11	
			Bq	Gr-Beta	0.871	0.813	0.93	
			Bq	Mn-54	52.2	58.3	1.12	
			Bq	Sr-90	5.561	5.86	1.05	
December-02	QAP 57	Soil	Bq/kg	Bi-212	45.93	23.2	0.51	(1)
			Bq/kg	Bi-214	33.63	32.4	0.96	
			Bq/kg	Cs-137	829.33	835	1.01	
			Bq/kg	K-40	637.67	671	1.05	
			Bq/kg	Pb-212	43.43	42.00	0.97	
			Bq/kg	Pb-214	35.2	44.46	1.26	
			Bq/kg	Sr-90	41.16	41.00	1.00	
December-02	QAP 57	Vegetation	Bq/kg	Co-60	9.66	11.5	1.19	
			Bq/kg	Cs-137	300.67	345	1.15	
			Bq/kg	K-40	1480	1690	1.14	
			Bq/kg	Sr-90	476.26	457	0.96	
December-02	QAP 57	Water	Bq/l	Am-241	3.043	2.89	0.95	
			Bq/l	Co-60	268.67	303	1.13	
			Bq/l	Cs-134	60.2	59	0.98	
			Bq/l	Cs-137	81.43	85.8	1.05	
			Bq/l	Gr-Beta	900	817	0.91	
			Bq/l	H-3	227.3	353	1.55	(2)
			Bq/l	Sr-90	8.69	8.58	0.99	

COMMENTS

1 Low bias identified. Evaluation of results requested by PPL via email on April 29, 2003.

2 High bias identified. Evaluation of results requested by PPL via email on April 29, 2003.

TABLE J-11
DOE - MAPEP
MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)
(Page 1 of 1)

Month/Year	Identification No.	Medium	Units	Nuclide	MAPEP Known Result (a)	TBE Results (a)	TBE/MAPEP Ratio	Evaluation	
March-02	01-W9	Water	pCi/l	Mn-54	246	253	1.03	Agreement	
			pCi/l	Co-57	143	141	0.99	Agreement	
			pCi/l	Co-60	141	143	1.01	Agreement	
			pCi/l	Cs-134	28.5	26.0	0.91	Agreement	
			pCi/l	Cs-137	286	270	0.94	Agreement	
			pCi/l	Sr-90	4.8	4.71	0.98	Agreement	
August-02	02-S9	Soil	pCi/kg	Mn-54	546	679	1.24	Warning	(1)
			pCi/kg	Co-57	246	289	1.17	Agreement	
			pCi/kg	Co-60	87.5	109	1.25	Warning	(1)
			pCi/kg	Cs-134	862	948	1.10	Agreement	
			pCi/kg	Cs-137	111	131	1.18	Agreement	
			pCi/kg	Zn-65	809	1020	1.26	Warning	(1)
			pCi/kg	K-40	652	722	1.11	Agreement	

COMMENTS

1 High bias identified. Evaluation of results requested by PPL via email on April 29, 2003.