

SECTION 3

METEOROLOGICAL DATA AND DISPERSION ESTIMATES

METEOROLOGY AND DISPERSION DATA

Meteorological data have been collected at the PPL Susquehanna, LLC site since the early 1970s. At the present time, the meteorological system is based on a 300-foot high tower located approximately 1,000 feet to the southeast of the plant. Wind sensors are mounted at the 10m and 60m elevations on this tower. Vertical temperature differential is measured with redundant sensor pairs between the 10m and 60m levels. Sigma theta (the standard deviation of horizontal wind direction) is calculated from wind direction at both levels. Dew point and ambient temperature sensors are present at the 10m level. Precipitation is measured at ground level.

A back-up meteorological tower was erected in 1982. It is a 10m tower providing alternate measurements of wind speed, wind direction, and sigma theta. A 10m downriver meteorological tower is also available. This tower measures wind speed, wind direction, sigma theta, temperature and dew point.

Meteorological data are transmitted to the plant Control Room, Technical Support Center, Emergency Operations Facility for emergency response availability, and ABSG Consulting, Inc. ABSG Consulting, Inc., located in Rockville, Maryland, provides meteorological consulting services to PPL Susquehanna, LLC.

Regulatory Guide 1.23 (Safety Guide 23) requires at least 90% data recovery for meteorological instrumentation. During 2012, all meteorological instrumentation met the 90% data recovery requirement. Table 3-1 lists the percent valid data recovery values for the parameters monitored as part of the PPL Susquehanna Meteorological Monitoring Program.

Dispersion modeling for effluents from normal operation is done using the MIDAS system XDCALC program, a straight-line Gaussian plume model designed to estimate average relative concentration. The model was developed in accordance with Regulatory Guide 1.111. For periods when the wind speed is calm, the actual wind direction that last occurred is used.

XDCALC and the XQINTR program that interpolates X/Q values to exact locations both use terrain correction factors to account for the temporal and spatial variations in the airflow in the region. A straight-line trajectory model assumes that a constant mean wind transports and diffuses effluents in the direction of airflow at the release point within the entire region of interest. The terrain correction factors were taken from FSAR Table 2.3-128.

Tables 3-2 and 3-3 provide the joint frequency distribution of wind speed and direction (as a function of delta temperature) at the 10 and 60 meter elevations of the primary meteorological tower. Table 3-4 lists no decay, undepleted X/Q values at various distances from the site. Table 3-5 lists 2.26 day decay, undepleted X/Q values at various distances from the site. Table 3-6 lists 8-day decay, depleted X/Q values at various distances from the site and Table 3-7 is a listing of D/Q (relative deposition) values at various distances from the site.

TABLE 3-1

METEOROLOGICAL DATA RECOVERY FOR 2012

Parameter	Percent Valid Data Recovery
Wind Speed 10m - Primary (1)	99.8
Wind Speed 60m - Primary	99.8
Wind Speed 10m - Backup (2)	98.5
Wind Speed 10m - Downriver (3)	99.9
Wind Direction 10m - Primary	99.8
Wind Direction 60m - Primary	99.8
Wind Direction 10m - Backup	98.5
Wind Direction 10m - Downriver	99.7
Temperature 10m - Primary	100.0
Dew Point 10m - Primary	100.0
Delta Temperature 60m - Primary	99.6
Sigma Theta 10m - Primary	99.8
Sigma Theta 60m - Primary	99.8
Sigma Theta 10m - Backup	98.5
Sigma Theta 10m - Downriver	99.7
Precipitation - Primary	100.0
Composite Parameters	
Wind Speed and Direction 10m, Delta Temperature 60-10m	99.6
Wind Speed and Direction 60m, Delta Temperature 60-10m	99.6
(1) SSES "Primary" meteorological tower	
(2) SSES "Backup" meteorological tower	
(3) SSES "Downriver" meteorological tower	

TABLE 3-2

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 10m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Total Period
 1/1/2012 00:00 - 12/31/2012 23:00
 Elevation: Speed: 10_SPD Direction: 10_WD Lapse: DT60-10A
 Stability Class A Delta Temperature Extremely Unstable

<u>Wind Direction</u>	<u>Wind Speed (mph)</u>						<u>Total</u>
	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	
N	1	0	0	0	0	0	1
NNE	0	2	1	0	0	0	3
NE	1	1	0	0	0	0	2
ENE	0	0	0	0	0	0	0
E	7	0	0	0	0	0	7
ESE	1	0	0	0	0	0	1
SE	4	1	0	0	0	0	5
SSE	1	0	0	0	0	0	1
S	2	0	4	0	0	0	6
SSW	3	3	7	0	0	0	13
SW	1	5	21	3	0	0	30
WSW	3	0	1	0	0	0	4
W	0	0	1	0	0	0	1
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Total	24	12	35	3	0	0	74

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	37
Valid Hours for this Stability Class for:	Total Period	74
Total Hours for Period		8784

TABLE 3-2
(Continued)

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 10m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

<u>Wind Direction</u>	<u>Wind Speed (mph)</u>						<u>Total</u>	
	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>		
N	1	1	6	2	0	0	10	
NNE	0	3	5	1	0	0	9	
NE	1	6	0	0	0	0	7	
ENE	4	1	1	0	0	0	6	
E	3	2	0	0	0	0	5	
ESE	2	1	0	0	0	0	3	
SE	1	4	0	0	0	0	5	
SSE	1	2	1	0	0	0	4	
S	1	4	8	0	0	0	13	
SSW	3	17	6	0	0	0	26	
SW	0	19	45	1	0	0	65	
WSW	0	6	21	2	0	0	29	
W	0	1	2	0	0	0	3	
WNW	1	0	0	0	0	0	1	
NW	0	0	0	1	0	0	1	
NNW	0	0	5	1	0	0	6	
Total	18	67	100	8	0	0	193	
Calm Hours not Included above for :							Total Period	0
Variable Direction Hours for:							Total Period	0
Invalid Hours for:							Total Period	37
Valid Hours for this Stability Class for:							Total Period	193
Total Hours for Period								8784

TABLE 3-2
(Continued)

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 10m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Total Period
1/1/2012 00:00 - 12/31/2012 23:00
Elevation: Speed: 10_SPD Direction: 10_WD Lapse: DT60-10A
Stability Class C Delta Temperature Slightly Unstable

<u>Wind Direction</u>	<u>Wind Speed (mph)</u>						<u>Total</u>
	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	
N	1	12	19	7	0	0	39
NNE	1	17	10	0	0	0	28
NE	4	26	1	0	0	0	31
ENE	13	8	0	0	0	0	21
E	6	4	3	0	0	0	13
ESE	2	6	1	0	0	0	9
SE	0	10	5	0	0	0	15
SSE	1	8	8	0	0	0	17
S	1	9	18	0	0	0	28
SSW	2	31	9	0	0	0	42
SW	0	58	64	4	0	0	126
WSW	0	13	36	4	0	0	53
W	0	5	12	2	0	0	19
WNW	2	6	8	0	0	0	16
NW	0	3	8	7	0	0	18
NNW	0	4	12	8	0	0	24
Total	33	220	214	32	0	0	499

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	37
Valid Hours for this Stability Class for:	Total Period	499
Total Hours for Period		8784

TABLE 3-2
(Continued)

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 10m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Total Period
 Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
 Elevation: Speed: 10_SPD Direction: 10_WD Lapse: DT60-10A
 Stability Class D Delta Temperature Neutral

Wind Direction	Wind Speed (mph)						Total
	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	
N	24	168	99	8	0	0	299
NNE	59	172	41	3	0	0	275
NE	122	160	24	0	0	0	306
ENE	133	75	9	0	2	0	219
E	125	62	5	2	2	0	196
ESE	99	74	23	8	2	0	206
SE	96	104	24	1	0	0	225
SSE	88	133	37	0	0	0	258
S	98	146	41	4	0	0	289
SSW	71	188	30	0	0	0	289
SW	61	276	177	23	0	0	537
WSW	28	122	143	65	4	0	362
W	11	70	80	20	0	0	181
WNW	11	66	65	18	0	0	160
NW	4	70	160	18	0	0	252
NNW	6	98	177	26	0	0	307
Total	1036	1984	1135	196	10	0	4361

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	37
Valid Hours for this Stability Class for:	Total Period	4361
Total Hours for Period		8784

TABLE 3-2
(Continued)

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 10m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

<u>Wind Direction</u>	<u>Wind Speed (mph)</u>						<u>Total</u>	
	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>> 25</u>		
N	21	37	2	1	0	0	61	
NNE	81	60	2	2	3	0	148	
NE	135	49	1	3	0	0	188	
ENE	286	32	0	0	0	0	318	
E	193	10	0	0	0	0	203	
ESE	112	11	3	0	0	0	126	
SE	117	15	2	0	0	0	134	
SSE	93	25	1	0	0	0	119	
S	153	107	8	1	0	0	269	
SSW	77	141	11	0	0	0	229	
SW	38	90	9	0	0	0	137	
WSW	20	26	5	1	0	0	52	
W	12	12	3	1	0	0	28	
WNW	3	11	2	0	0	0	16	
NW	4	12	3	0	0	0	19	
NNW	8	31	1	0	0	0	40	
Total	1353	669	53	9	3	0	2087	
Calm Hours not Included above for :							Total Period	0
Variable Direction Hours for:							Total Period	0
Invalid Hours for:							Total Period	37
Valid Hours for this Stability Class for:							Total Period	2087
Total Hours for Period								8784

TABLE 3-2
(Continued)

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 10m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Total Period
 1/1/2012 00:00 - 12/31/2012 23:00
 Elevation: Speed: 10_SPD Direction: 10_WD Lapse: DT60-10A
 Stability Class F Delta Temperature Moderately Stable

<u>Wind Direction</u>	<u>Wind Speed (mph)</u>						<u>Total</u>
	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	
N	7	1	0	0	0	0	8
NNE	26	4	0	0	0	0	30
NE	100	12	0	0	0	0	112
ENE	437	39	0	0	0	0	476
E	146	5	0	0	0	0	151
ESE	40	2	0	0	0	0	42
SE	20	1	0	0	0	0	21
SSE	27	2	0	0	0	0	29
S	27	7	0	0	0	0	34
SSW	18	3	0	0	0	0	21
SW	3	2	0	0	0	0	5
WSW	3	0	0	0	0	0	3
W	1	2	0	0	0	0	3
WNW	2	0	0	0	0	0	2
NW	2	0	0	0	0	0	2
NNW	2	1	0	0	0	0	3
Total	861	81	0	0	0	0	942

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	37
Valid Hours for this Stability Class for:	Total Period	942
Total Hours for Period		8784

TABLE 3-2
(Continued)

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 10m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Total Period
 1/1/2012 00:00 - 12/31/2012 23:00
 Elevation: Speed: 10_SPD Direction: 10_WD Lapse: DT60-10A
 Stability Class G Delta Temperature Extremely Stable

<u>Wind Direction</u>	<u>Wind Speed (mph)</u>						<u>Total</u>
	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	
N	2	2	0	0	0	0	4
NNE	11	0	0	0	0	0	11
NE	82	6	0	0	0	0	88
ENE	336	31	0	0	0	0	367
E	68	8	0	0	0	0	76
ESE	20	0	0	0	0	0	20
SE	10	0	0	0	0	0	10
SSE	6	1	0	0	0	0	7
S	4	1	0	0	0	0	5
SSW	2	0	0	0	0	0	2
SW	0	1	0	0	0	0	1
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Total	541	50	0	0	0	0	591

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	37
Valid Hours for this Stability Class for:	Total Period	591
Total Hours for Period		8784

**TABLE 3-2
(Continued)**

**SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND
DIRECTION 10m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF
JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)**

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Summary of All Stability Classes

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: Speed: 10_SPD Direction: 10_WD Lapse: DT60-10A

Delta Temperature

Wind Speed (mph)

<u>Wind Direction</u>	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	<u>Total</u>
N	57	221	126	18	0	0	422
NNE	178	258	59	6	3	0	504
NE	445	260	26	3	0	0	734
ENE	1209	186	10	0	2	0	1407
E	548	91	8	2	2	0	651
ESE	276	94	27	8	2	0	407
SE	248	135	31	1	0	0	415
SSE	217	171	47	0	0	0	435
S	286	274	79	5	0	0	644
SSW	176	383	63	0	0	0	622
SW	103	451	316	31	0	0	901
WSW	54	167	206	72	4	0	503
W	24	90	98	23	0	0	235
WNW	19	83	75	18	0	0	195
NW	10	85	171	26	0	0	292
NNW	16	134	195	35	0	0	380
Total	3866	3083	1537	248	13	0	8747

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	37
Valid Hours for this Stability Class for:	Total Period	8747
Total Hours for Period		8784

TABLE 3-3

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 60m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Total Period
 1/1/2012 00:00 - 12/31/2012 23:00
 Period of Record =
 Elevation: Speed: 60_SPD Direction: 60_WD Lapse: DT60-10A
 Stability Class A Delta Temperature Extremely Unstable

<u>Wind Direction</u>	<u>Wind Speed (mph)</u>						<u>Total</u>
	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	
N	1	0	0	1	0	0	2
NNE	1	1	2	0	0	0	4
NE	2	0	1	0	0	0	3
ENE	3	0	0	0	0	0	3
E	1	0	0	0	0	0	1
ESE	1	1	0	0	0	0	2
SE	5	0	0	0	0	0	5
SSE	1	0	0	0	0	0	1
S	1	0	1	2	1	0	5
SSW	3	4	3	3	0	0	13
SW	0	1	11	16	2	0	30
WSW	1	0	0	1	1	0	3
W	1	0	1	0	0	0	2
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Total	21	7	19	23	4	0	74

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	38
Valid Hours for this Stability Class for:	Total Period	74
Total Hours for Period		8784

**TABLE 3-3
(Continued)**

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 60m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Total Period
 1/1/2012 00:00 - 12/31/2012 23:00
 Elevation: Speed: 60_SPD Direction: 60_WD Lapse: DT60-10A
 Stability Class B Delta Temperature Moderately Unstable

<u>Wind Direction</u>	<u>Wind Speed (mph)</u>						<u>Total</u>
	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	
N	0	0	5	4	0	0	9
NNE	0	4	4	2	0	0	10
NE	3	3	2	0	0	0	8
ENE	3	0	0	0	0	0	3
E	0	1	0	0	0	0	1
ESE	4	0	1	0	0	0	5
SE	2	0	2	0	0	0	4
SSE	0	0	3	1	0	0	4
S	1	0	3	3	1	0	8
SSW	1	2	11	2	1	0	17
SW	1	3	54	15	1	0	74
WSW	1	1	14	14	3	0	33
W	0	0	2	1	0	0	3
WNW	0	0	1	0	0	0	1
NW	0	0	0	2	0	0	2
NNW	1	1	6	1	0	0	9
Total	17	15	108	45	6	0	191

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	38
Valid Hours for this Stability Class for:	Total Period	191
Total Hours for Period		8784

TABLE 3-3
(Continued)

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 60m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Total Period
 1/1/2012 00:00 - 12/31/2012 23:00
 Elevation: Speed: 60_SPD Direction: 60_WD Lapse: DT60-10A
 Stability Class C Delta Temperature Slightly Unstable

Wind Speed (mph)

<u>Wind Direction</u>	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	<u>Total</u>
N	0	3	22	7	1	0	33
NNE	1	19	19	4	0	0	43
NE	7	14	5	0	0	0	26
ENE	6	5	2	0	0	0	13
E	2	5	0	1	0	0	8
ESE	0	1	1	2	0	0	4
SE	2	5	7	1	0	0	15
SSE	0	3	7	1	0	0	11
S	0	1	16	6	0	0	23
SSW	0	11	14	9	2	0	36
SW	2	30	81	19	4	0	136
WSW	1	4	33	24	2	1	65
W	1	3	16	4	0	0	24
WNW	1	2	8	6	0	0	17
NW	0	1	3	11	1	0	16
NNW	0	4	9	11	4	0	28
Total	23	111	243	106	14	1	498

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	38
Valid Hours for this Stability Class for:	Total Period	498
Total Hours for Period		8784

TABLE 3-3
(Continued)

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 60m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

		Total Period						
Period of Record =		1/1/2012 00:00 - 12/31/2012 23:00						
Elevation: Speed:	60_SPD	Direction: 60_WD		Lapse: DT60-10A				
Stability Class	D	Delta Temperature		Neutral				
Wind Speed (mph)								
<u>Wind Direction</u>	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	<u>Total</u>	
N	16	75	133	32	5	0	261	
NNE	50	147	123	35	3	0	358	
NE	89	119	48	12	1	1	270	
ENE	58	56	10	3	0	2	129	
E	54	85	29	4	1	2	175	
ESE	32	48	42	21	8	6	157	
SE	43	73	69	14	1	0	200	
SSE	45	68	57	12	1	0	183	
S	60	64	83	27	5	0	239	
SSW	68	123	70	22	8	0	291	
SW	36	221	216	89	8	1	571	
WSW	17	108	175	161	61	15	537	
W	2	33	106	70	16	0	227	
WNW	5	23	98	69	5	0	200	
NW	4	32	150	73	1	0	260	
NNW	8	53	168	72	4	0	305	
Total	587	1328	1577	716	128	27	4363	
Calm Hours not Included above for :							Total Period	0
Variable Direction Hours for:							Total Period	0
Invalid Hours for:							Total Period	38
Valid Hours for this Stability Class for:							Total Period	4363
Total Hours for Period								8784

**TABLE 3-3
(Continued)**

**SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND
DIRECTION 60m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF
JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)**

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Period of Record =	Total Period		
	1/1/2012 00:00 - 12/31/2012 23:00		
Elevation: Speed: 60_SPD	Direction: 60_WD	Lapse: DT60-10A	
Stability Class E	Delta Temperature	Slightly Stable	

Wind Speed (mph)

<u>Wind Direction</u>	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	<u>Total</u>
N	29	86	25	0	2	1	143
NNE	96	207	35	2	2	3	345
NE	88	58	11	1	0	1	159
ENE	56	43	1	1	0	0	101
E	42	25	7	0	0	0	74
ESE	47	19	8	2	0	0	76
SE	43	31	13	1	0	0	88
SSE	47	33	13	0	0	0	93
S	45	59	44	10	4	1	163
SSW	49	79	76	36	1	0	241
SW	22	105	117	18	1	0	263
WSW	12	43	98	28	1	0	182
W	7	25	11	4	1	0	48
WNW	6	15	11	0	0	0	32
NW	3	21	26	1	0	0	51
NNW	6	10	11	1	0	0	28
Total	598	859	507	105	12	6	2087

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	38
Valid Hours for this Stability Class for:	Total Period	2087
Total Hours for Period		8784

**TABLE 3-3
(Continued)**

**SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND
DIRECTION 60m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF
JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)**

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Total Period
 Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
 Elevation: Speed: 60_SPD Direction: 60_WD Lapse: DT60-10A
 Stability Class F Delta Temperature Moderately Stable

<u>Wind Direction</u>	<u>Wind Speed (mph)</u>						<u>Total</u>
	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	
N	13	101	2	0	0	0	116
NNE	70	206	11	0	0	0	287
NE	78	54	1	0	0	0	133
ENE	43	9	1	0	0	0	53
E	34	7	0	0	0	0	41
ESE	26	4	0	0	0	0	30
SE	25	7	0	0	0	0	32
SSE	19	11	2	0	0	0	32
S	21	23	6	0	0	0	50
SSW	11	47	7	1	0	0	66
SW	4	26	16	1	0	0	47
WSW	5	8	10	0	0	0	23
W	5	2	2	0	0	0	9
WNW	3	6	1	0	0	0	10
NW	0	5	1	0	0	0	6
NNW	3	3	1	0	0	0	7
Total	360	519	61	2	0	0	942

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	38
Valid Hours for this Stability Class for:	Total Period	942
Total Hours for Period		8784

TABLE 3-3
(Continued)

SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND DIRECTION 60m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Period of Record =	Total Period
Elevation: Speed: 60_SPD	1/1/2012 00:00 - 12/31/2012 23:00
Stability Class G	Direction: 60_WD Lapse: DT60-10A
	Delta Temperature Extremely Stable

<u>Wind Direction</u>	<u>Wind Speed (mph)</u>						<u>Total</u>
	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	
N	7	56	5	0	0	0	68
NNE	34	143	4	0	0	0	181
NE	47	41	0	0	0	0	88
ENE	28	6	1	0	0	0	35
E	20	7	0	0	0	0	27
ESE	20	4	0	0	0	0	24
SE	23	3	0	0	0	0	26
SSE	13	10	0	0	0	0	23
S	14	16	5	0	0	0	35
SSW	4	19	3	1	0	0	27
SW	5	18	6	0	0	0	29
WSW	0	5	3	1	0	0	9
W	2	3	1	0	0	0	6
WNW	3	4	0	0	0	0	7
NW	0	2	0	0	0	0	2
NNW	2	2	0	0	0	0	4
Total	222	339	28	2	0	0	591

Calm Hours not Included above for:	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	38
Valid Hours for this Stability Class for:	Total Period	591
Total Hours for Period		8784

**TABLE 3-3
(Continued)**

**SSES JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND WIND
DIRECTION 60m VERSUS DELTA TEMPERATURE 60-10m FOR THE PERIOD OF
JANUARY 1, 2012 THROUGH DECEMBER 31, 2012 (Continued)**

Joint Frequency Distribution

Hours at Each Wind Speed and Direction

Summary of All Stability Classes

Total Period
 Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
 Elevation: Speed: 60_SPD Direction: 60_WD Lapse: DT60-10A

Delta Temperature

Wind Speed (mph)

<u>Wind Direction</u>	<u>1 - 4</u>	<u>4 - 8</u>	<u>8 - 13</u>	<u>13 - 19</u>	<u>19 - 25</u>	<u>≥ 25</u>	<u>Total</u>
N	66	321	192	44	8	1	632
NNE	252	727	198	43	5	3	1228
NE	314	289	68	13	1	2	687
ENE	197	119	15	4	0	2	337
E	153	130	36	5	1	2	327
ESE	130	77	52	25	8	6	298
SE	143	119	91	16	1	0	370
SSE	125	125	82	14	1	0	347
S	142	163	158	48	11	1	523
SSW	136	285	184	74	12	0	691
SW	70	404	501	158	16	1	1150
WSW	37	169	333	229	68	16	852
W	18	66	139	79	17	0	319
WNW	18	50	119	75	5	0	267
NW	7	61	180	87	2	0	337
NNW	20	73	195	85	8	0	381
Total	1828	3178	2543	999	164	34	8746

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	38
Valid Hours for this Stability Class for:	Total Period	8746
Total Hours for Period		8784

TABLE 3-4

2012 SSES Annual Relative Concentrations - No Decay, Undepleted X/Q (sec/m³)

Miles										
Direction From	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 10	10 - 20	20 - 30	30 - 40	40 - 50
N	3.74E-06	6.93E-07	2.86E-07	1.50E-07	9.62E-08	3.52E-08	9.52E-09	4.58E-09	2.86E-09	2.01E-09
NNE	6.70E-06	1.33E-06	5.93E-07	3.20E-07	2.07E-07	7.67E-08	2.11E-08	1.04E-08	6.58E-09	4.71E-09
NE	1.55E-05	2.86E-06	1.30E-06	7.40E-07	4.90E-07	1.93E-07	5.86E-08	2.94E-08	1.89E-08	1.37E-08
ENE	4.64E-05	8.64E-06	4.21E-06	2.48E-06	1.66E-06	6.54E-07	1.90E-07	9.19E-08	5.95E-08	4.37E-08
E	1.92E-05	3.52E-06	1.54E-06	8.64E-07	5.76E-07	2.33E-07	7.31E-08	3.68E-08	2.37E-08	1.73E-08
ESE	9.99E-06	1.94E-06	8.63E-07	4.77E-07	3.15E-07	1.26E-07	3.43E-08	1.49E-08	9.51E-09	6.85E-09
SE	1.01E-05	2.00E-06	8.97E-07	4.98E-07	3.28E-07	1.32E-07	3.22E-08	1.17E-08	7.42E-09	5.29E-09
SSE	8.95E-06	1.74E-06	7.62E-07	4.24E-07	2.82E-07	1.20E-07	3.07E-08	1.09E-08	6.87E-09	4.90E-09
S	7.85E-06	1.67E-06	8.03E-07	4.61E-07	3.15E-07	1.45E-07	3.95E-08	1.35E-08	8.53E-09	6.08E-09
SSW	7.40E-06	1.48E-06	6.74E-07	3.79E-07	2.50E-07	1.03E-07	2.63E-08	9.94E-09	6.28E-09	4.46E-09
SW	6.16E-06	1.22E-06	5.69E-07	3.22E-07	2.14E-07	9.19E-08	2.30E-08	7.58E-09	4.72E-09	3.30E-09
WSW	3.49E-06	6.73E-07	3.11E-07	1.82E-07	1.24E-07	5.81E-08	1.79E-08	6.66E-09	3.39E-09	1.84E-09
W	1.47E-06	2.79E-07	1.20E-07	6.56E-08	4.29E-08	1.74E-08	4.67E-09	1.88E-09	1.16E-09	8.07E-10
WNW	1.35E-06	2.42E-07	9.72E-08	5.10E-08	3.24E-08	1.18E-08	3.18E-09	1.50E-09	9.27E-10	6.42E-10
NW	1.80E-06	3.29E-07	1.31E-07	6.63E-08	4.18E-08	1.49E-08	3.84E-09	1.79E-09	1.10E-09	7.53E-10
NNW	2.59E-06	4.86E-07	2.04E-07	1.08E-07	6.75E-08	2.33E-08	5.72E-09	2.69E-09	1.66E-09	1.15E-09

TABLE 3-5

2012 SSES Annual Relative Concentrations - 2.26-Day Decay, Undepleted X/Q (sec/m³)

Miles										
Direction From	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 10	10 - 20	20 - 30	30 - 40	40 - 50
N	3.73E-06	6.89E-07	2.84E-07	1.49E-07	9.47E-08	3.43E-08	9.02E-09	4.18E-09	2.52E-09	1.71E-09
NNE	6.68E-06	1.32E-06	5.86E-07	3.14E-07	2.02E-07	7.39E-08	1.96E-08	9.14E-09	5.51E-09	3.75E-09
NE	1.55E-05	2.83E-06	1.28E-06	7.25E-07	4.77E-07	1.85E-07	5.35E-08	2.53E-08	1.53E-08	1.05E-08
ENE	4.63E-05	8.57E-06	4.15E-06	2.43E-06	1.61E-06	6.25E-07	1.73E-07	7.92E-08	4.83E-08	3.34E-08
E	1.91E-05	3.48E-06	1.51E-06	8.43E-07	5.58E-07	2.21E-07	6.56E-08	3.08E-08	1.85E-08	1.25E-08
ESE	9.96E-06	1.92E-06	8.49E-07	4.66E-07	3.06E-07	1.20E-07	3.10E-08	1.26E-08	7.51E-09	5.05E-09
SE	1.01E-05	1.98E-06	8.83E-07	4.87E-07	3.18E-07	1.26E-07	2.92E-08	9.98E-09	5.93E-09	3.97E-09
SSE	8.93E-06	1.72E-06	7.51E-07	4.15E-07	2.75E-07	1.14E-07	2.80E-08	9.32E-09	5.56E-09	3.73E-09
S	7.83E-06	1.66E-06	7.94E-07	4.54E-07	3.08E-07	1.40E-07	3.68E-08	1.20E-08	7.24E-09	4.93E-09
SSW	7.38E-06	1.47E-06	6.67E-07	3.74E-07	2.45E-07	9.96E-08	2.48E-08	8.98E-09	5.45E-09	3.72E-09
SW	6.15E-06	1.21E-06	5.65E-07	3.19E-07	2.11E-07	8.98E-08	2.19E-08	7.00E-09	4.23E-09	2.87E-09
WSW	3.49E-06	6.70E-07	3.09E-07	1.80E-07	1.23E-07	5.69E-08	1.71E-08	6.18E-09	3.05E-09	1.60E-09
W	1.47E-06	2.78E-07	1.19E-07	6.50E-08	4.24E-08	1.71E-08	4.48E-09	1.75E-09	1.05E-09	7.12E-10
WNW	1.35E-06	2.41E-07	9.65E-08	5.04E-08	3.19E-08	1.16E-08	3.04E-09	1.39E-09	8.29E-10	5.56E-10
NW	1.80E-06	3.28E-07	1.30E-07	6.57E-08	4.14E-08	1.46E-08	3.71E-09	1.69E-09	1.01E-09	6.78E-10
NNW	2.58E-06	4.84E-07	2.02E-07	1.07E-07	6.68E-08	2.29E-08	5.52E-09	2.53E-09	1.52E-09	1.03E-09

TABLE 3-6

2012 SSES Annual Relative Concentrations - 8-Day Decay, Depleted X/Q (sec/m³)

Direction From	Miles									
	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 10	10 - 20	20 - 30	30 - 40	40 - 50
N	3.42E-06	5.87E-07	2.31E-07	1.17E-07	7.21E-08	2.45E-08	5.87E-09	2.46E-09	1.38E-09	8.83E-10
NNE	6.12E-06	1.12E-06	4.79E-07	2.47E-07	1.55E-07	5.32E-08	1.29E-08	5.53E-09	3.13E-09	2.03E-09
NE	1.42E-05	2.42E-06	1.05E-06	5.72E-07	3.66E-07	1.34E-07	3.58E-08	1.56E-08	8.91E-09	5.84E-09
ENE	4.24E-05	7.31E-06	3.40E-06	1.92E-06	1.24E-06	4.53E-07	1.16E-07	4.87E-08	2.81E-08	1.86E-08
E	1.75E-05	2.97E-06	1.24E-06	6.67E-07	4.30E-07	1.61E-07	4.44E-08	1.94E-08	1.11E-08	7.24E-09
ESE	9.13E-06	1.64E-06	6.97E-07	3.68E-07	2.35E-07	8.69E-08	2.09E-08	7.86E-09	4.46E-09	2.89E-09
SE	9.23E-06	1.69E-06	7.24E-07	3.85E-07	2.45E-07	9.11E-08	1.96E-08	6.19E-09	3.49E-09	2.24E-09
SSE	8.18E-06	1.47E-06	6.16E-07	3.27E-07	2.11E-07	8.29E-08	1.87E-08	5.74E-09	3.24E-09	2.08E-09
S	7.17E-06	1.41E-06	6.49E-07	3.57E-07	2.36E-07	1.01E-07	2.43E-08	7.20E-09	4.08E-09	2.63E-09
SSW	6.76E-06	1.25E-06	5.45E-07	2.93E-07	1.87E-07	7.14E-08	1.62E-08	5.34E-09	3.02E-09	1.94E-09
SW	5.63E-06	1.03E-06	4.61E-07	2.50E-07	1.60E-07	6.40E-08	1.42E-08	4.09E-09	2.29E-09	1.46E-09
WSW	3.19E-06	5.70E-07	2.52E-07	1.41E-07	9.31E-08	4.05E-08	1.11E-08	3.60E-09	1.64E-09	8.12E-10
W	1.34E-06	2.36E-07	9.71E-08	5.09E-08	3.22E-08	1.22E-08	2.89E-09	1.02E-09	5.66E-10	3.58E-10
WNW	1.24E-06	2.05E-07	7.86E-08	3.95E-08	2.43E-08	8.23E-09	1.97E-09	8.11E-10	4.50E-10	2.83E-10
NW	1.64E-06	2.79E-07	1.06E-07	5.14E-08	3.14E-08	1.04E-08	2.38E-09	9.73E-10	5.37E-10	3.36E-10
NNW	2.36E-06	4.12E-07	1.65E-07	8.35E-08	5.07E-08	1.63E-08	3.55E-09	1.46E-09	8.11E-10	5.11E-10

TABLE 3-7

2012 SSES Annual Relative Concentrations - D/Q (m-2)

Direction From	Miles									
	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 10	10 - 20	20 - 30	30 - 40	40 - 50
N	2.41E-08	3.55E-09	1.46E-09	6.91E-10	4.08E-10	1.29E-10	3.09E-11	1.14E-11	6.08E-12	3.82E-12
NNE	2.72E-08	4.22E-09	1.83E-09	8.70E-10	5.12E-10	1.59E-10	3.72E-11	1.37E-11	7.31E-12	4.59E-12
NE	3.68E-08	5.55E-09	2.37E-09	1.15E-09	6.82E-10	2.20E-10	5.38E-11	1.98E-11	1.06E-11	6.65E-12
ENE	7.52E-08	1.17E-08	5.20E-09	2.54E-09	1.50E-09	4.75E-10	1.08E-10	3.80E-11	2.03E-11	1.27E-11
E	3.37E-08	4.93E-09	2.01E-09	9.58E-10	5.72E-10	1.89E-10	4.77E-11	1.76E-11	9.38E-12	5.89E-12
ESE	2.43E-08	3.67E-09	1.57E-09	7.56E-10	4.52E-10	1.50E-10	3.40E-11	1.10E-11	5.87E-12	3.68E-12
SE	2.96E-08	4.50E-09	1.96E-09	9.70E-10	5.82E-10	1.97E-10	4.09E-11	1.12E-11	5.98E-12	3.76E-12
SSE	2.94E-08	4.39E-09	1.87E-09	9.23E-10	5.63E-10	2.01E-10	4.42E-11	1.17E-11	6.27E-12	3.94E-12
S	3.11E-08	4.99E-09	2.34E-09	1.20E-09	7.50E-10	2.90E-10	6.78E-11	1.74E-11	9.28E-12	5.83E-12
SSW	3.61E-08	5.52E-09	2.48E-09	1.25E-09	7.59E-10	2.65E-10	5.88E-11	1.68E-11	8.96E-12	5.63E-12
SW	4.71E-08	7.48E-09	3.52E-09	1.82E-09	1.12E-09	4.23E-10	9.55E-11	2.43E-11	1.30E-11	8.16E-12
WSW	3.00E-08	4.63E-09	2.16E-09	1.16E-09	7.36E-10	3.03E-10	8.54E-11	2.47E-11	1.08E-11	5.30E-12
W	1.17E-08	1.76E-09	7.62E-10	3.80E-10	2.32E-10	8.30E-11	2.03E-11	6.34E-12	3.39E-12	2.13E-12
WNW	1.08E-08	1.56E-09	6.29E-10	3.01E-10	1.79E-10	5.79E-11	1.43E-11	5.26E-12	2.81E-12	1.77E-12
NW	1.74E-08	2.55E-09	1.02E-09	4.76E-10	2.81E-10	8.93E-11	2.14E-11	7.88E-12	4.21E-12	2.64E-12
NNW	2.30E-08	3.42E-09	1.45E-09	6.99E-10	4.09E-10	1.25E-10	2.81E-11	1.03E-11	5.52E-12	3.47E-12

TABLE 3-8

**2012 ATMOSPHERIC DISPERSION ESTIMATES
FOR RETDAS INPUT AT SELECTED LOCATIONS**

AFFECTED SECTOR	LOCATION	MILES	X/Q ⁽¹⁾	X/Q DEC ⁽²⁾	X/Q DEC+ DEP ⁽³⁾	DEPOSITION ⁽⁴⁾
11/SW	Maximum (X/Q) Site Boundary	0.61	1.14E-05	1.14E-05	1.03E-05	2.62E-08
9/S	Closest (X/Q) Site Boundary	0.38	5.70E-06	5.69E-06	5.30E-06	3.89E-08
12 / WSW	Maximum (X/Q) Residence	1.3	1.08E-05	1.07E-05	9.20E-06	1.49E-08
16 / NNW	Maximum (D/Q) Residence	0.6	6.81E-06	6.79E-06	6.14E-06	2.14E-08
12 / WSW	Maximum (D/Q) Garden	1.3	1.08E-05	1.07E-05	9.20E-06	1.49E-08
12 / WSW	Maximum (D/Q) Dairy	1.7	7.26E-06	7.18E-06	6.07E-06	9.59E-09
12 / WSW	Maximum (D/Q) Meat Producer	1.7	7.26E-06	7.18E-06	6.07E-06	9.59E-09
3 / NE	Riverlands / EIC	0.7	3.75E-06	3.74E-06	3.35E-06	2.68E-08
12 / WSW	Tower's Club	0.5	4.64E-05	4.62E-05	4.23E-05	7.50E-08

NEAREST RESIDENCE WITHIN A 5-MILE RADIUS BY SECTOR

SECTOR NUMBER	AFFECTED SECTOR	NAME	MILES	X/Q	X/Q DEC	X/Q DEC +DEP	DEPOSITION
1	N	H. Burd	1.3	2.04E-06	2.03E-06	1.75E-06	6.34E-09
2	NNE	E. Ashbridge III	1	2.68E-06	2.67E-06	2.33E-06	1.11E-08
3	NE	W. Tuggle	0.9	2.59E-06	2.58E-06	2.27E-06	1.76E-08
4	ENE	R. Dickosky/R. Knight	2.1	4.05E-07	4.02E-07	3.33E-07	2.80E-09
5	E	L.Kozlowski/M. Witts	1.4	3.10E-07	3.09E-07	2.64E-07	1.99E-09
6	ESE	R. Panetta	0.5	1.35E-06	1.35E-06	1.24E-06	1.08E-08
7	SE	J. Futoma	0.5	1.80E-06	1.80E-06	1.64E-06	1.74E-08
8	SSE	M. Naunczek	0.6	1.96E-06	1.96E-06	1.77E-06	1.68E-08
9	S	S. Slusser	1	1.29E-06	1.29E-06	1.12E-06	7.20E-09
10	SSW	S. Molnar	0.9	2.82E-06	2.80E-06	2.47E-06	1.00E-08
11	SW	F. Michael	1.5	2.86E-06	2.84E-06	2.42E-06	5.56E-09
12	WSW	F. Michael	1.3	1.08E-05	1.07E-05	9.20E-06	1.49E-08
13	W	F. Hummel	1.2	4.97E-06	4.92E-06	4.27E-06	7.28E-09
14	WNW	R. Orlando	0.8	4.95E-06	4.92E-06	4.38E-06	1.08E-08
15	NW	B. Kramer	0.7	6.15E-06	6.12E-06	5.49E-06	1.66E-08
16	NNW	G. John	0.6	6.81E-06	6.79E-06	6.14E-06	2.14E-08

NEAREST GARDEN WITHIN A 5-MILE RADIUS BY SECTOR

SECTOR NUMBER	AFFECTED SECTOR	NAME	MILES	X/Q	X/Q DEC	X/Q DEC +DEP	DEPOSITION
1	N	B. J. Wojcik	3.2	5.35E-07	5.27E-07	4.19E-07	1.44E-09
2	NNE	R. Chapin	2.3	7.66E-07	7.59E-07	6.24E-07	2.82E-09
3	NE	M. Welch	2.7	5.00E-07	4.96E-07	4.00E-07	3.03E-09
4	ENE	G. Dennis	2.4	3.31E-07	3.29E-07	2.69E-07	2.30E-09
5	E	W. Daily	1.8	2.07E-07	2.06E-07	1.72E-07	1.31E-09
6	ESE	B. Hoffman	3.1	6.43E-08	6.37E-08	5.06E-08	3.92E-10
7	SE	T. Scholl	0.6	1.36E-06	1.35E-06	1.22E-06	1.27E-08
8	SSE	H. Roinick	2.9	1.54E-07	1.53E-07	1.22E-07	1.05E-09
9	S	T. Stenrich	2.7	2.47E-07	2.44E-07	1.98E-07	1.23E-09
10	SSW	S. Bodnar	1.3	1.64E-06	1.63E-06	1.40E-06	5.38E-09
11	SW	R. Broody	1.9	1.99E-06	1.96E-06	1.65E-06	3.75E-09
12	WSW	F. Michael	1.3	1.08E-05	1.07E-05	9.20E-06	1.49E-08
13	W	F. Hummel	1.2	4.97E-06	4.92E-06	4.27E-06	7.28E-09
14	WNW	P. Moskaluk	1.3	2.40E-06	2.38E-06	2.05E-06	4.70E-09
15	NW	D Goff	1.8	1.50E-06	1.49E-06	1.25E-06	3.35E-09
16	NNW	P. Culver	4	3.41E-07	3.33E-07	2.59E-07	7.09E-10

**TABLE 3-8
(Continued)**

**NEAREST ANIMAL RAISED FOR MEAT CONSUMPTION
WITHIN A 5-MILE RADIUS BY SECTOR**

SECTOR NUMBER	AFFECTED SECTOR	NAME	MILES	X/Q	X/Q DEC	X/Q DEC+DEP	DEPOSITION
2	NNE	R. Chapin	2.3	7.66E-07	7.59E-07	6.24E-07	2.82E-09
4	ENE	G. Dennis	2.4	3.31E-07	3.29E-07	2.69E-07	2.30E-09
5	E	W. Bloss	4.5	4.28E-08	4.23E-08	3.21E-08	2.32E-10
10	SSW	K. & C. Drasher	3.5	3.19E-07	3.14E-07	2.47E-07	8.69E-10
12	WSW	T. & M. Berger	1.7	7.26E-06	7.18E-06	6.07E-06	9.59E-09
13	W	J. & N. Dent	5	4.77E-07	4.60E-07	3.50E-07	4.54E-10
15	NW	D. Goff	1.8	1.50E-06	1.49E-06	1.25E-06	3.35E-09

ALL DAIRY LOCATIONS

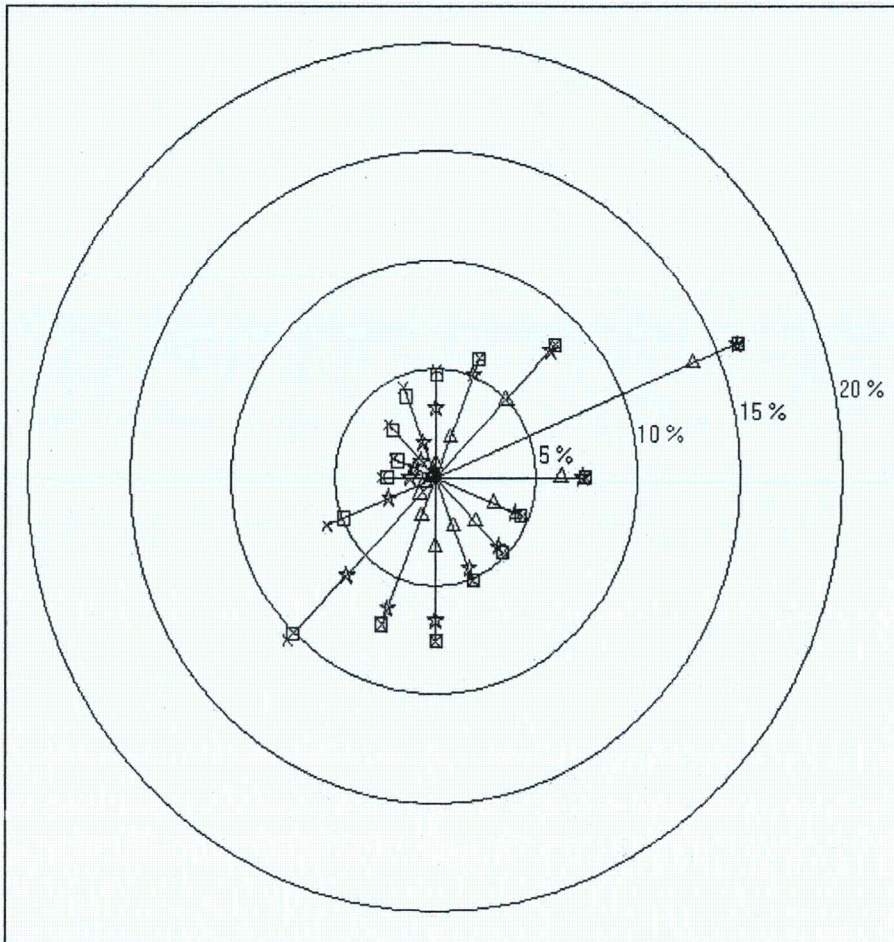
SECTOR NUMBER	AFFECTED SECTOR	NAME	MILES	X/Q	X/Q DEC	X/Q DEC+DEP	DEPOSITION
5	E	W.Bloss	4.5	4.28E-08	4.23E-08	3.21E-08	2.32E-10
10	SSW	K. & C. Drasher	3.5	3.19E-07	3.14E-07	2.47E-07	8.69E-10
10	SSW	K.Davis	14	2.40E-08	2.23E-08	1.49E-08	4.29E-11
12	WSW	T. & M. Berger	1.7	7.26E-06	7.18E-06	6.07E-06	9.59E-09
13	W	J. & N. Dent	5	4.77E-07	4.60E-07	3.50E-07	4.54E-10

1	X/Q	RELATIVE CONCENTRATION (SEC/M ³)
2	X/Q DEC	DECAYED AND UNDEPLETED, HALF-LIFE 2.26 DAYS (SEC/M ³)
3	X/Q DEC+DEP	DECAYED AND DEPLETED, HALF-LIFE 8 DAYS (SEC/M ³)
4	DEPOSITION	RELATIVE DEPOSITION RATE (1/M ²)

FIGURE 3-1

2012 ANNUAL WIND ROSE 10M LEVEL – PRIMARY TOWER

Run Date: 1/25/2013 11:14:20



WIND ROSE

(WINDS FROM)

N



0.00% PERCENT CALMS

(NOT INCLUDED IN PLOT)

Start Date: 1/1/2012 00:00

End Date: 12/31/2012 23:00

Sensors Selected

10_SPD

10_WD

Legend

△ WIND SPEED LESS THAN 3.5 MPH

☆ WIND SPEED LESS THAN 7.5 MPH

□ WIND SPEED LESS THAN 12.5 MPH

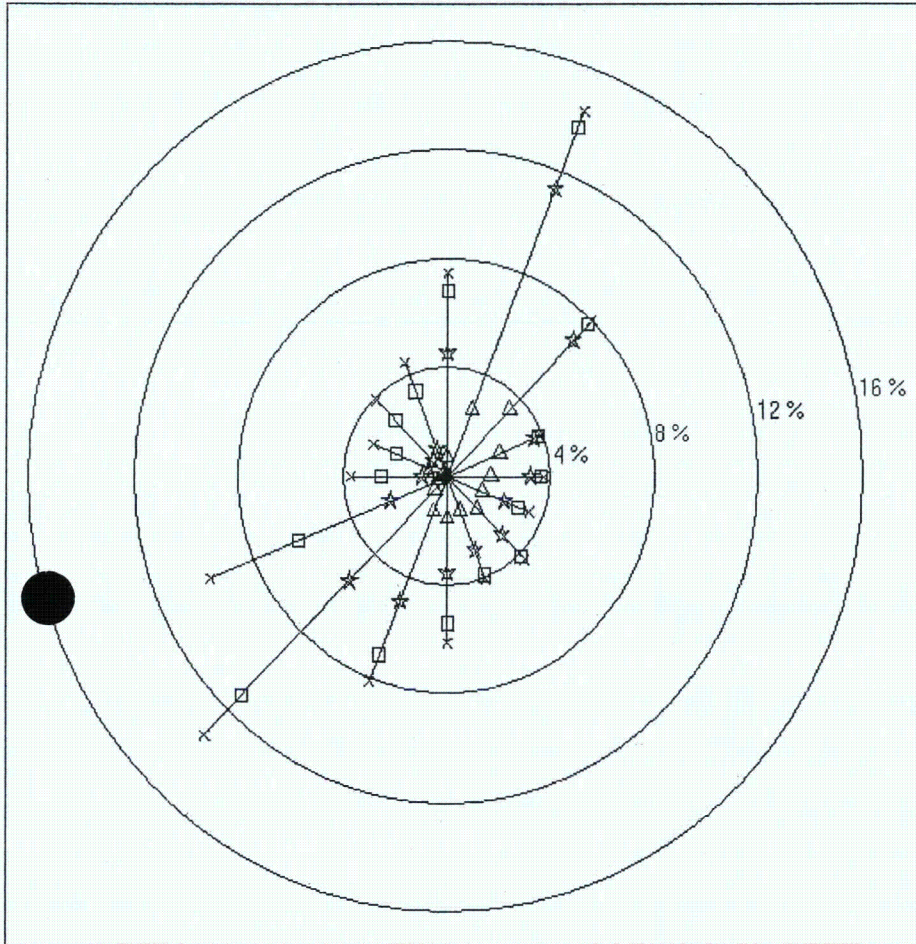
× WIND SPEED GREATER THAN 12.5 MPH

This wind rose displays the frequency of hourly average wind direction from a given sector. In 2012, the predominant wind direction occurred 16.1 % of the time from the ENE sector. The average wind speed was 5.0 mph and the average wind speed for the predominant sector (ENE) was 2.7 mph. The sector with the highest average wind speed was NW (8.8 mph).

FIGURE 3-2

2012 ANNUAL WIND ROSE 60M LEVEL – PRIMARY TOWER

Run Date: 1/25/2013 11:15:17



WIND ROSE

(WINDS FROM)

N



0.00% PERCENT CALMS
(NOT INCLUDED IN PLOT)

Start Date: 1/1/2012 00:00

End Date: 12/31/2012 23:00

Sensors Selected

60_SPD
60_WD

Legend

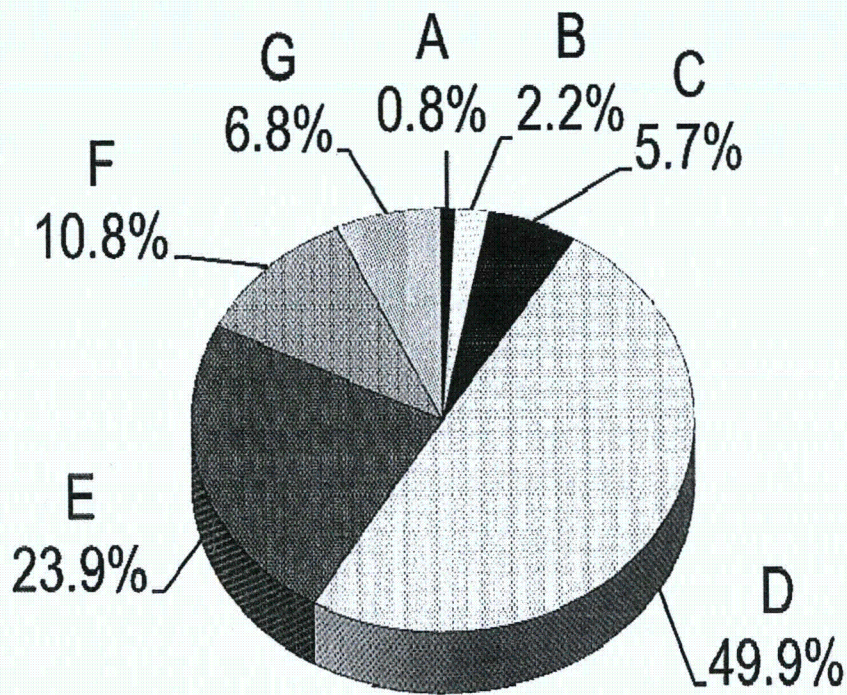
- △ WIND SPEED LESS THAN 3.5 MPH
- ☆ WIND SPEED LESS THAN 7.5 MPH
- WIND SPEED LESS THAN 12.5 MPH
- × WIND SPEED GREATER THAN 12.5 MPH

This wind rose displays the frequency of hourly average wind direction from a given sector. In 2012, the predominant wind direction occurred 14.0 % of the time from the NNE sector. The average wind speed was 7.5 mph and the average wind speed for the predominant sector (NNE) was 5.8 mph. The sector with the highest average wind speed was WSW (11.4 mph.).

FIGURE 3-3

PASQUIL STABILITY CLASS PREVALENCES DATA
Period: 2012

Joint Frequency Distributions at 10 Meters
Wind Speed and Direction 10M vs. Delta Temperature 60-10M
(Based on 8,747 Valid Hours)



SECTION 4

DOSE MEASUREMENTS AND ASSESSMENTS

Radiological Impact on Man

Sampling and analysis of airborne and waterborne effluents were performed in accordance with the frequencies, types of analysis, and Lower Limit of Detection (LLD) outlined in the PPL Susquehanna, LLC Technical Requirements Manual.

Radioactive material was detected in some of the airborne and waterborne effluent samples analyzed. Dose calculations using measured and calculated effluent activity levels, meteorological data from the current reporting period and average river flow dilution factors resulted in estimated doses to individuals at levels below 10 CFR 20 and 10 CFR 50, Appendix I limits. Direct radiation resulting from plant operation (reported in the 2012 Annual Radiological Environmental Operating Report) contributed a maximum of 7.21E-1 mrem (measured at TLD Location 9S2 and based on an occupancy time by a member of the public of 20 hours per quarter) at the Protected Area Boundary south of the plant. Based on airborne effluent sample data, the maximum organ (including thyroid)/total body dose is 7.43E-2 mrem (CHILD, LUNG Table 4-4). The maximum organ/total body dose from all liquid effluent is 2.16E-3 mrem (ADULT, GILLI Table 4-2). Conservatively adding the maximum organ/total body dose from liquid and gaseous effluent and the maximum total body dose determined from direct radiation results in a dose of 7.97E-1 mrem, which is 3.2% of the 40CFR190 limit of 25 mrem to total body/organ (except thyroid) and 1.1% of the 40CFR190 limit of 75 mrem to the thyroid.

Doses to a maximally exposed member of the public from waterborne effluents are calculated for fish ingestion and shoreline exposure at the plant outfall, and drinking water ingestion at Danville, PA. Site specific parameters used in the calculations for the Danville receiver, specific for actual average blowdown and river level for the entire year are shown in Table 4-1.

TABLE 4-1
SITE-SPECIFIC PARAMETERS USED FOR RETDAS CALCULATIONS
(DANVILLE RECEIVER)
FOR 2012

PARAMETER	ENTIRE YEAR
Cooling Tower Blowdown (CFS)	25.4
Average Net River Level (ft.)	6.1
Dilution Factor at Danville ⁽¹⁾	315.9
Transit time to Danville (hr.) ⁽¹⁾	29

⁽¹⁾From ODCM-QA-005, Att. E

Summaries of maximum individual doses resulting from airborne and waterborne radioactive effluent releases from each unit are given in Table 4-2. Meteorological data from Section 3 were used to calculate the dose from airborne effluents.

The Radioactive Effluent Release Report includes an assessment of the radiation dose from radioactive effluents to members of the public within the site boundary. Within the Site Boundary there are several areas frequented by members of the public. There are no significant exposure pathways from waterborne effluents in these areas. Doses from airborne effluent are calculated for members of the public for the following locations: Riverlands Energy Information Center, the Towers Club, and residence with the maximum X/Q value; the garden, dairy and meat producing farm with the maximum D/Q value; and the site boundary with the maximum X/Q value. Summaries of the calculated maximum doses within the site boundary and selected locations beyond the site boundary resulting from airborne effluents are presented in Table 4-4. The above referenced locations are shown on Figure 4-1.

In the area comprising the Riverlands recreation area, which surrounds the Energy Information Center, three pathways of radiation exposure can be identified: plume, ground, and inhalation. There are no significant exposure pathways from waterborne effluents in this area. There are approximately 100,000 visitors to the Riverlands/Energy Information Center complex each year. For dose calculations, it is assumed the visitor stays in the area for one hour. The calculated dose rate and collective dose for visitors to the Riverlands/Energy Information Center during 2012 are shown on Table 4-3.

Use of the RETDAS code yields calculated doses for the Riverlands area for the report period. These doses assume an occupancy factor of 100% for a member of the public during 2012. These calculated dose values are shown on Table 4-4.

In Regulatory Guide 1.21, Revision 2, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste", the NRC has recommended that U.S. nuclear power plants evaluate whether Carbon-14 (C-14) is a "principal radionuclide", and if so, report the amount of C-14 released. Radioactive effluent releases of C-14 have not increased but the decline in releases of other radionuclides has resulted in C-14 possibly becoming more prominent, specifically in airborne effluents. This regulatory guidance has led to an industry initiative to evaluate and report C-14 in the Annual Radioactive Effluent Release Report.

Information for C-14 dose impact is included as supplemental information in this report. Reportable values for dose impact do not include C-14 contribution. C-14, with a half-life of 5730 years, is a naturally occurring isotope of carbon produced by cosmic ray interactions in the atmosphere. Nuclear weapons testing in the 1950s and 1960s significantly increased the amount of C-14 in the atmosphere. C-14 is also produced in commercial nuclear reactors, but the amounts produced are much less than those produced naturally or from weapons testing.

In December 2010 the Electric Power Research Institute (EPRI) published Report 1021106, "Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents", which provides conservative technical guidance to support the calculation of C-14 released in radioactive effluents. In a BWR the majority of C-14 is generated in the reactor core by neutron activation of reactor coolant, specifically $^{17}\text{O}(n,\alpha)^{14}\text{C}$. Thus C-14 generation is directly proportional to reactor power. As documented in the EPRI report (for a BWR), approximately 99% of the C-14 produced in the reactor core is discharged as gaseous effluent (primarily as CO_2) through the offgas system. The remaining 1% is released in the form of solid radwaste. There is minimal (<1%) C-14 released in the liquid effluent pathway.

In October of 2012 PPL Susquehanna, in conjunction with an offsite lab, performed sampling and analysis for airborne effluent C-14 released from the station via each units offgas system.

Since both Susquehanna units are essentially identical in reactor design, a single value for the C-14 release rate (in the CO_2 form from the offgas system sample results) is used in the calculation of C-14 released from each unit. The release rate value is corrected to 100% power then scaled to the fraction of full power year for each unit. The fraction of a full power year is calculated as the Effective Full Power Days for the year in question divided by 365 to get the fraction of effective vs full year operation.

Based on the above outlined methodology, approximately 38 Curies of C-14 were released in gaseous effluents in 2012.

The airborne effluent pathway with the highest offsite dose potential (for C-14 releases) is the vegetation ingestion pathway. The maximum expected annual dose from C-14 released from Susquehanna Unit-1 ($3.00\text{E}-1$ mrem) and Unit-2 ($3.57\text{E}-1$ mrem) has been calculated based on methodology in Regulatory Guide 1.109 and includes site specific parameters (e.g., nearest garden with highest X/Q value, producing both broad leaf and non-broad leaf vegetation). The maximum organ dose from airborne effluent C-14 released from the Susquehanna station in 2012 is well below the 10CFR50, Appendix I, ALARA design objective (i.e., 15 mrem/yr per unit). The annual dose to the maximally exposed individual from all gaseous releases of C-14 (calculated by the above referenced methodology) is $6.57\text{E}-1$ mrem to the critical organ (bone) and $1.31\text{E}-1$ mrem to the total body.

Conservatively adding the maximum dose (calculated based on liquid and gaseous effluent sample results combined with direct radiation results) referenced on page 4-2 to the maximum dose due to the calculated release of C-14 ($6.57\text{E}-1$ mrem, CHILD, BONE) bounds the dose that any member of the public receives from station operations to 1.45 mrem, which is 6% of the 40CFR190 limit of 25 mrem to total body/organ (except thyroid) and 2% of the 40CFR190 limit of 75 mrem to the thyroid.

TABLE 4-2

SUMMARY OF MAXIMUM INDIVIDUAL DOSES
TO MEMBERS OF THE PUBLIC ⁽⁴⁾
DATA PERIOD: 1/1/12 TO 12/31/12

UNIT	EFFLUENT	AGE GROUP	APPLICABLE ORGAN	ESTIMATED MAXIMUM DOSE (MREM/MRAD)	LOCATION		PERCENT OF LIMIT	LIMIT (MREM/MRAD) ⁽²⁾
					DIST (MILES)	AFFECTED SECTOR		
1	Liquid ⁽¹⁾	Child	Total Body	8.60E-04	(3)		0.03	3
1	Liquid ⁽¹⁾	Adult	GILLI	1.08E-03	(3)		0.01	10
1	Noble Gas	N/A	Air Dose (Gamma-MRAD)	0	0.5	WSW	0	10
1	Noble Gas	N/A	Air Dose (Beta-MRAD)	0	0.5	WSW	0	20
1	Airborne Iodine, Tritium and Particulates	Child	Lung	6.17E-02	0.5	WSW	0.41	15
2	Liquid ⁽¹⁾	Child	Total Body	8.60E-04	(3)		0.03	3
2	Liquid ⁽¹⁾	Adult	GILLI	1.08E-03	(3)		0.01	10
2	Noble Gas	N/A	Air Dose (Gamma-MRAD)	0	0.5	WSW	0	10
2	Noble Gas	N/A	Air Dose (Beta-MRAD)	0	0.5	WSW	0	20
2	Airborne Iodine, Tritium and Particulates	Child	Lung	1.26E-02	0.5	WSW	0.08	15

⁽¹⁾Estimated dose is based on a site total activity release equally divided between Unit 1 and Unit 2.

⁽²⁾10 CFR 50, Appendix I limits are in terms of mrad or mrem/reactor-year for airborne and waterborne effluent from each unit.

⁽³⁾Doses from liquid effluent are estimated from fish ingestion and shoreline exposure at the site outfall and from the drinking water pathway at Danville, PA.

⁽⁴⁾Dose due to calculated release of C-14 not included.

TABLE 4-3

**CALCULATED COLLECTIVE DOSES TO MEMBERS OF THE PUBLIC WITHIN THE
RIVERLANDS/ENERGY INFORMATION CENTER COMPLEX
DATA PERIOD: 1/1/12 TO 12/31/12**

EFFLUENT	AGE GROUP	APPLICABLE ORGAN	DOSE RATE⁽¹⁾ (MREM/HR)	COLLECTIVE DOSE⁽²⁾ (PERSON-REM)
Noble Gas	N/A	Total Body	0	0
Noble Gas	N/A	Skin	0	0
Iodine, Tritium and Particulates ⁽³⁾	Child	GI-LLI	7.84E-07	7.84E-05

⁽¹⁾Estimated dose and dose rate is based on annual site total activity release.

⁽²⁾Collective dose is based on 100,000 person-hours.

⁽³⁾Dose due to calculated release of C-14 not included.

TABLE 4-4

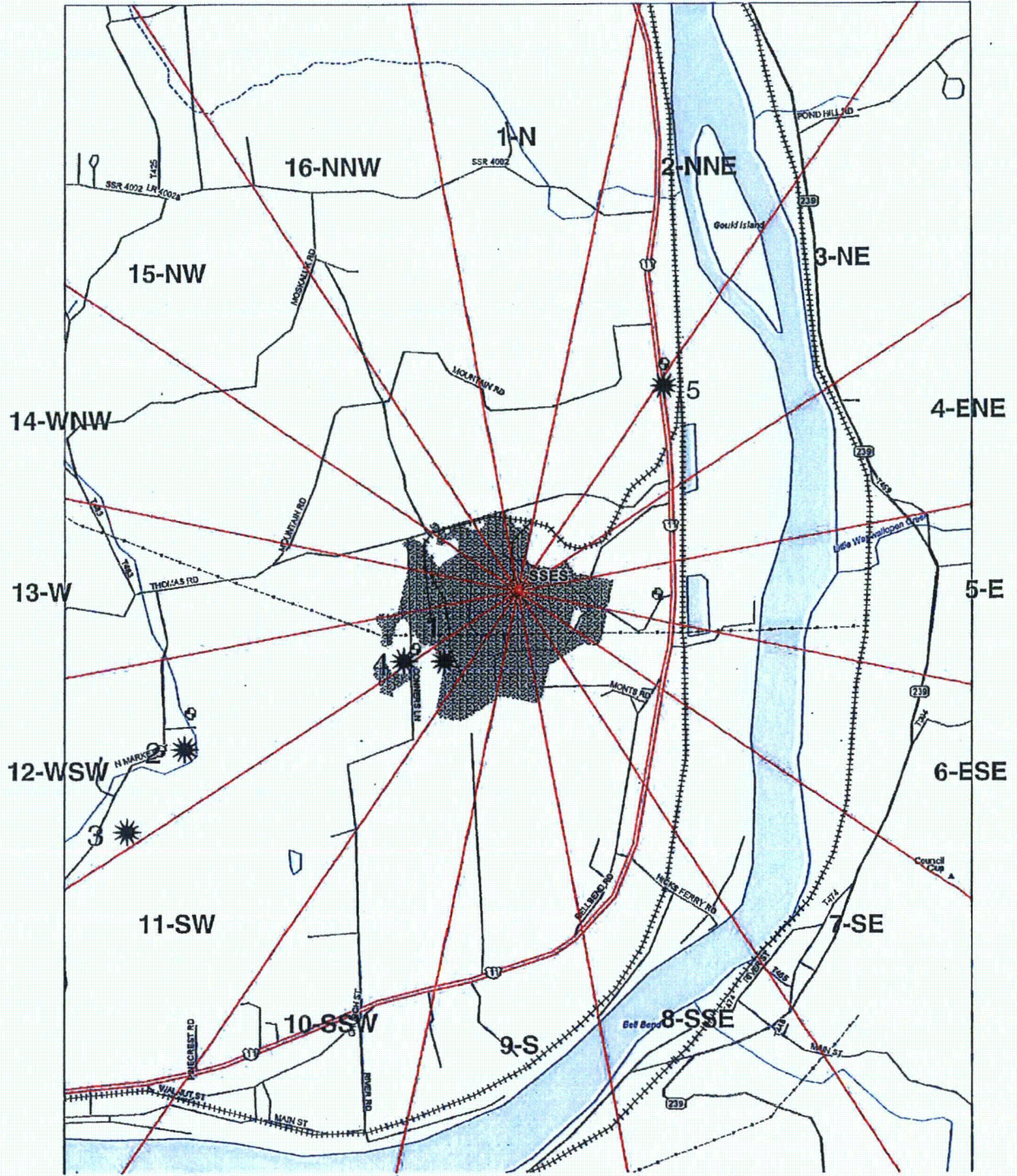
SUMMARY OF MAXIMUM INDIVIDUAL DOSES FROM AIRBORNE EFFLUENT

LOCATION	PATHWAY	MAXIMUM TOTAL BODY DOSE (MREM)		MAXIMUM ORGAN DOSE (MREM)		MAXIMUM THYROID DOSE (MREM)	
1. Maximum site boundary X/Q	Total (All)	1.85E-02	(CHILD)	1.86E-02	(CHILD, LUNG)	1.84E-02	(CHILD)
2. Maximum X/Q Residence Maximum D/Q Garden	Total (All)	1.71E-02	(CHILD)	1.72E-02	(CHILD, LUNG)	1.71E-02	(CHILD)
3. Maximum D/Q Dairy + Maximum D/Q Meat	Total (All)	1.15E-02	(CHILD)	1.15E-02	(CHILD, LUNG)	1.15E-02	(CHILD)
4. Tower's Club	Total (All)	7.39E-02	(CHILD)	7.43E-02	(CHILD, LUNG)	7.37E-02	(CHILD)
5. Riverland/EIC	Total (All)	6.83E-03	(CHILD)	6.89E-03	(CHILD, GI-LLI)	6.76E-03	(CHILD)

Note: The doses shown above are based on 100% occupancy at the indicated locations. They are based on a composite of all pathways resulting in a total dose to the maximally exposed individual due to airborne effluents from both Unit-1 and Unit-2 operations. Dose due to calculated release of C-14 not included.

FIGURE 4-1

AIRBORNE-DOSE CALCULATION LOCATIONS



★ Indicates airborne-dose calculation location per Table 4-4

SECTION 5

**CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM),
TECHNICAL REQUIREMENTS MANUAL (TRM)
AND THE SOLID RADIOACTIVE WASTE PROCESS CONTROL PROGRAM**

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

The PPL Susquehanna, LLC ODCM consists of nine (9) individual procedures.

ODCM-QA-008, Radiological Environmental Monitoring Program, was revised in 2012. Revision 15 was issued July 30, 2012. The revision updated the following to support transition from a TLD (Thermoluminescence Dosimeter) type dosimeter to an OSL (Optically Stimulated Luminescence) type dosimeter: 1) Title of Attachments A, B and C to replace "TLD" with "Direct Radiation" and 2) Attachment G to replace "TLD" with "dosimetry".

CHANGES TO THE TECHNICAL REQUIREMENTS MANUAL

Section 3.11 and 3.6.1 of the Unit-1 and Unit-2 Technical Requirements Manual (TRM) by reference are part of the ODCM. The following limits and requirements are contained in Section 3.11: liquid and gaseous effluent dose limits, liquid and gaseous effluent treatment system operability criteria (based on effluent dose), liquid and gaseous effluent treatment system operability criteria and the conduct of the Radiological Environmental Monitoring Program. Section 3.6.1 contains requirements for venting or purging of primary containment.

Section 3.11.1.4 of the Unit-1 and Unit-2 TRM was revised on October 9, 2012. The revision updated TRO 3.11.1.4 Required Action B.4 Completion Time, and Required Action F.1. Specifically, Required Action B.4 Completion Time was updated from 14 days to 30 days and Required Action F.1 was updated to include guidance that liquid effluent releases may continue (beyond 30 days but not longer than 45 days) as long as Required Actions B.1, B.2, B.3 and D.1 are performed as applicable.

PROCESS CONTROL PROGRAM CHANGES

The following changes were made to the Process Control Program and implementing procedures during 2012. None of the changes reduce the overall conformance of the solidified waste product to existing criteria for solid wastes. All changes were reviewed and approved (as necessary) by the Plant Operations Review Committee (PORC) as documented on the attached summary of procedure changes. The following procedures were changed:

1. CH-TP-055 Solid Radwaste CFR61 Correlation Factor Determination – Sample Collection and Preparation
2. WM-PS-356 Use of the 8-120B (USA/9168/B(U)) Shipping Package

NDAP-QA-0646 continues to fully implement the requirements and intent of the following:

1. Sections 11.4 and 13.5 of the FSAR
2. Section 3.7.4 of the Technical Requirements Manual
3. 10 CFR 20, 10 CFR 61, 10 CFR 71, 49 CFR 100-177, and 40 CFR 261

Compliance with all applicable regulatory requirements listed above continues to be met as the result of these changes to the program. These changes to the Process Control Program will not reduce the overall conformance of the solidified waste product to existing criteria for solid wastes.

PROCEDURE REVISION SUMMARIES

CH-TP-055 SOLID RADWASTE 10CFR61 CORRELATION FACTOR DETERMINATION – SAMPLE COLLECTION AND PREPARATION

- 1) This is complete rewrite to place procedure in new required format and content to reduce human performance errors per CRA 1496616, "Upgrade all SSES Procedures," IAW the following:
 - NDAP-QA-002, Procedure Program
 - NDAP-QA-004, Procedure Change Process
 - NDAP-QA-008, Procedure Format and Content
 - NDAP-QA-0029, Procedure and Work Instructions Use and Adherence
- 2) Added step to contact Health Physicist - Radwaste if sample material is not available per AR-1588000.
- 3) Added prerequisite for providing Chemistry personnel FORM NDAP-QA-0646-2, Dewatering Record Sheet to complete sampling and analysis, as required. Attachment A, FORM CH-TP-55-1, Composite Solid Radwaste Sample Log requires this form to complete record.

WM-PS-356 USE OF THE 8-120B (USA/9168/B(U)) SHIPPING PACKAGE

- 1) Incorporated PCAF 2005-1404
- 2) Changed adherence level to Information Use
- 3) Deleted reference to cask CNSI
- 4) Updated C of C expiration Date to 2015
- 5) Updated Revision for Reference 2.1 to Revision 17
- 6) Added Step 4.8 for Vacuum grease or petroleum jelly
- 7) Added Note to 6.7.3 " use of impact wrenches"
- 8) Added note to 6.7.5 " bolts not being left in lid"
- 9) Added note to 6.14 " use of Impact wrenches"
- 10) Added the torque requirements to 6.14.5 and 6.16
- 11) Revised form WM-PS-356-1 and WM-PS-356-2
- 12) Deleted Attachment B, relabeled Attachment C as Attachment B.
- 13) Various minor formatting changes

SECTION 6

**MISCELLANEOUS TECHNICAL REQUIREMENTS MANUAL (TRM),
FSAR, 40CFR190 AND NEI GROUNDWATER PROTECTION INITIATIVE
REPORTING**

1. TRM Action 3.11.1.4.F.2 requires the reporting of Liquid Radwaste Effluent Monitoring Instrumentation inoperability not corrected in a timely manner.

None to report for 2012.

2. TRM Action 3.11.1.5.C.1 requires the reporting of Radioactive Liquid Process Effluent Monitoring Instrumentation inoperability not corrected in a timely manner.

None to report for 2012.

3. TRM Action 3.11.2.6.K requires an explanation for Radioactive Gaseous Effluent Monitoring Instrumentation required actions and completion times not met.

None to report for 2012.

4. TRM Action 3.11.4.1.F.2 requires reporting the cause of the unavailability of milk or fresh leafy vegetable samples and identify the new locations for obtaining replacements.

None to report for 2012.

5. TRM Action 3.11.4.2.A requires reporting when land use census identifies a new location which yields a calculated dose or dose commitment greater than the values currently being calculated in Requirement 3.11.2.3 (Gaseous Effluent Dose due to Iodine, Tritium, and Radionuclides in Particulate Form).

None to report for 2012.

6. TRM Action 3.11.4.2.B requires reporting when land use census identifies locations that yield a calculated dose or dose commitment (via the same exposure pathway) 20 percent greater than at a location from which samples are currently being obtained in accordance with Requirement 3.11.4.1 (Radiological Environmental Monitoring Program).

None to report for 2012.

7. The limits outlined in 40CFR190.10 (Environmental Standards for the Uranium Fuel Cycle-Standards for Normal Operations) were not exceeded by station operations during 2012. Refer to Section 2 and Section 4 for specific values.

8. FSAR Section 11.6.11 requires the reporting of airborne radioactivity detected in the Low Level Radwaste Holding Facility.

Only naturally occurring airborne radioactivity was detected above analysis MDC's in air samples from the Low Level Radwaste Holding Facility during 2012.

9. The PPL Susquehanna station has implemented an Action Plan in response to the NEI Initiative on Groundwater Protection. Part of the Action Plan includes the assessment of the current groundwater monitoring program. Groundwater is sampled and analyzed quarterly as part of the Radiological Environmental Monitoring Program (REMP). REMP groundwater sampling locations are defined in ODCM-QA-008 Attachment G. In August 2006, additional groundwater sampling was initiated at locations which are not listed in the ODCM. The additional locations are three manholes which collect water from a perimeter drain system. The perimeter drain system consists of perforated piping installed just above the footing along the exterior base of the vertical walls of the reactor, turbine and radwaste buildings. Outlined in Table 6-1 are the tritium analysis results from sampling of the perimeter drain system. No nuclear by-product gamma emitting radionuclides were identified above analysis MDC's for the perimeter drain samples in 2012. The tritium results reported in Table 6-1 did not exceed any Reporting Level thresholds in the PPL Susquehanna Technical Requirements Manual or any reporting criteria established in response to the NEI Groundwater Protection Initiative. Figure 6-1 is a trend graph of airborne and waterborne effluent tritium releases from the PPL Susquehanna Station starting in 1982.

TABLE 6-1

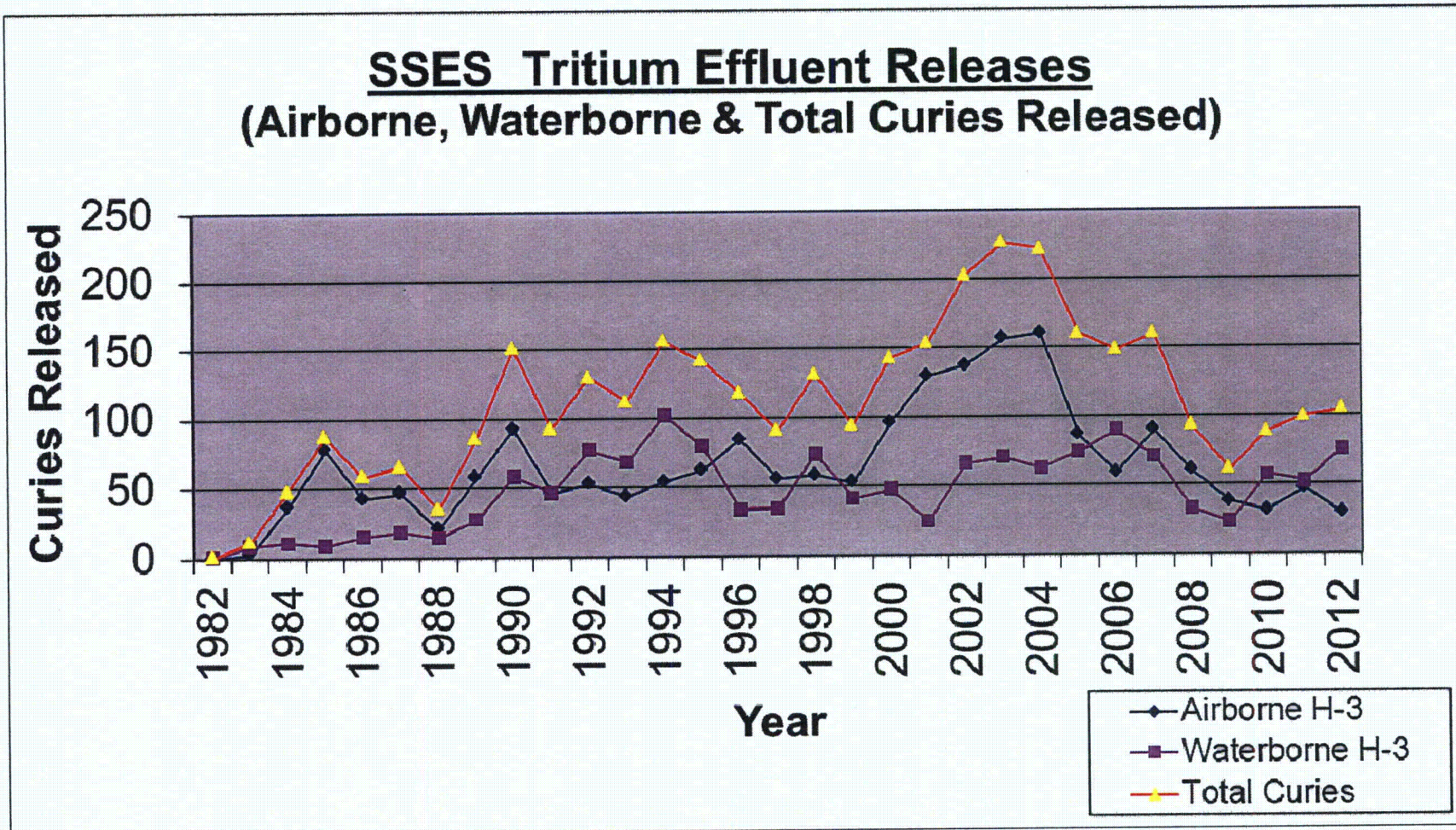
NEI Ground Water Protection Initiative Reporting

Perimeter Drain Sampling Results: 2012

	<u>Manhole FD-1</u> (7S9 - E of U2 CST)	<u>Manhole FD-2</u> (16S3- NW corner of RW Bldg.)	<u>Manhole FD-3</u> (9S3 - I/S RCA @ U2 HP Cont. Pt. Closet)
<u>Date</u>	<u>Tritium (pCi/liter)</u>	<u>Tritium (pCi/liter)</u>	<u>Tritium (pCi/liter)</u>
02/13/2012	270	289	186
05/21/2012	160	237	151
08/20/2012	192	167	<MDC
11/19/2012	<MDC	153	<MDC

<MDC = Less than Minimum Detectable Concentration

Figure 6-1



SECTION 7

**CORRECTIONS TO PREVIOUS
RADIOACTIVE EFFLUENT RELEASE REPORTS**

**CORRECTIONS TO PREVIOUS
RADIOACTIVE EFFLUENT RELEASE REPORTS**

No corrections to previous Radioactive Effluent Release Reports are submitted for this report period.

SECTION 8

***EFFLUENT FROM SYSTEMS CLASSIFIED AS
INSIGNIFICANT EFFLUENT PATHWAYS***

EFFLUENT FROM SYSTEMS CLASSIFIED AS INSIGNIFICANT EFFLUENT PATHWAYS

Insignificant Effluent Pathways are: 1) evaporation from the Unit 1 and Unit 2 Condensate Storage Tanks (CST's); 2) evaporation from the common Refueling Water Storage Tank (RWST); 3) gaseous effluent from the Hydrogen Seal Oil, Main Turbine and RFPT lubrication oil mist eliminators which vent to the turbine building roofs.

These pathways are not continuously monitored. The CSTs and RWST are sampled monthly to determine the concentration of radionuclides present in these tanks. Tritium analysis on these samples is performed quarterly. Airborne release to the environment from the tanks is estimated based on conservative estimates of the evaporation rates from each of the tanks using a modified method established within Chapter 7 of EPA AP-42. A conservative carry-over fraction of radionuclides from the water to the evaporated liquid is then assumed. Airborne release to the environment from the demisters conservatively assumes the maximum moisture (condensate) concentration of the lubrication oil as measured via sampling during 2012. The calculation also assumes immediate removal of 100% of the water by the oil mist eliminators as it passes through the turbines.

The annual release of tritium, iodines and particulates with half-lives greater than 8 days was calculated based on the conservative assumptions outlined above. The calculated releases are shown in Table 8-1. All nuclides, except for tritium, released from insignificant effluent pathways are negligible compared to the airborne release data shown in Tables 2-1 and 2-2. The maximum dose to the public from a release of 2.89 Ci of tritium is calculated to be $8.37E-3$ mrem (child). This is a small fraction of the maximum dose from airborne effluent reported in Section 4.

TABLE 8-1

**ANNUAL RELEASE FROM SYSTEMS CLASSIFIED AS
INSIGNIFICANT EFFLUENT PATHWAYS**

<u>Nuclide</u>	<u>RWST</u> (Ci)	<u>U1-CST and</u> <u>Main Turbine/RFPT</u> <u>Lube Oil Systems</u> (Ci)	<u>U2-CST and</u> <u>Main Turbine/RFPT</u> <u>Lube Oil Systems</u> (Ci)	<u>Total</u> (Ci)
H-3	3.97E-02	1.37E+00	1.48E+00	2.89E+00
Mn-54	3.42E-09	4.35E-06	3.38E-08	4.39E-06
Co-60	1.68E-08	1.37E-05	9.60E-08	1.38E-05
Co-58	8.47E-10	7.92E-06	4.24E-08	7.96E-06
Zn-65	6.12E-10	7.07E-07	4.20E-09	7.12E-07
Xe-135	0.00E+00	0.00E+00	9.51E-11	9.51E-11