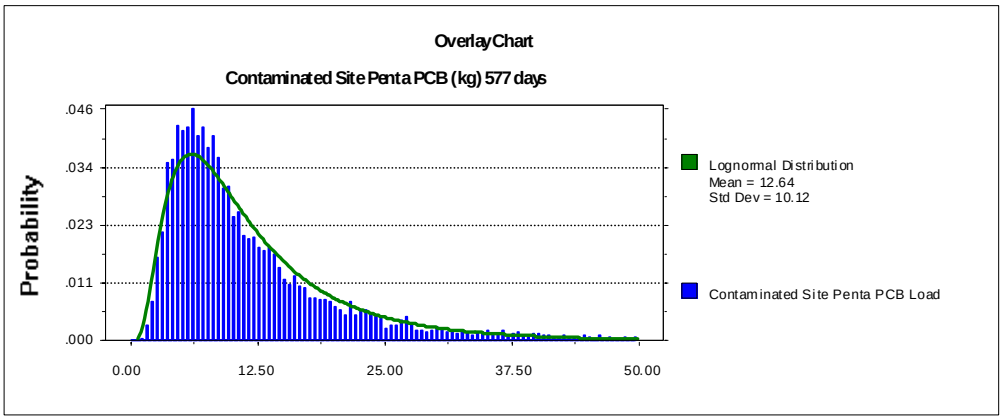
CALIBRATION OF THE PCB
WATER QUALITY MODEL FOR THE DELAWARE ESTUARY
FOR PENTA-PCBs AND CARBON

APPENDIX F
LOADING UNCERTAINTY ANALYSIS:
RESULTS AND SELECTED ASSUMPTIONS

Crystal Ball Report
Simulation started on 8/29/03 at 14:31:59
Simulation stopped on 8/29/03 at 14:34:42

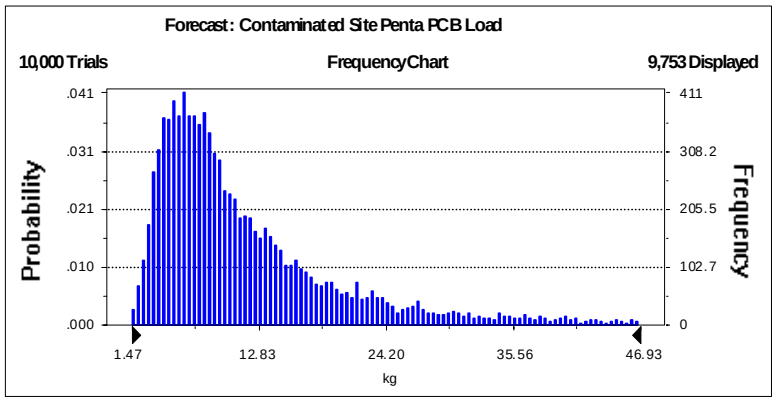


Forecast: Contaminated Site Penta PCB Load **Cell: M79**

Summary:

Display Range is from 1.47 to 46.93 kg
Entire Range is from 1.37 to 175.13 kg
After 10,000 Trials, the Std. Error of the Mean is 0.13

Statistics:	Value
Trials	10000
Mean	13.03
Median	9.19
Mode	---
Standard Deviation	12.72
Variance	161.81
Skewness	4.22
Kurtosis	32.89
Coeff. of Variability	0.98
Range Minimum	1.37
Range Maximum	175.13
Range Width	173.75
Mean Std. Error	0.13



Forecast: Contaminated Site Penta PCB Load (cont'd) **Cell: M79**

Percentiles:

Percentile	kg
0%	1.37
10%	4.23
20%	5.45
30%	6.60
40%	7.85
50%	9.19
60%	11.06
70%	13.62
80%	17.38
90%	24.94
100%	175.13

End of Forecast

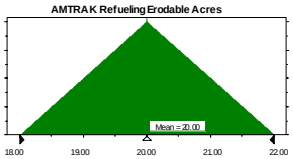
Assumptions

Assumption: AMTRAK Refueling Erodable Acres **Cell: G6**

Triangular distribution with parameters:

Minimum	18.00
Likeliest	20.00
Maximum	22.00

Selected range is from 18.00 to 22.00

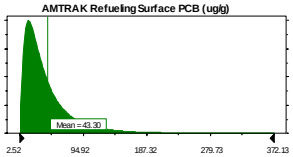


Assumption: AMTRAK Refueling Surface PCB (ug/g) **Cell: I6**

Lognormal distribution with parameters:

Mean	43.30
Standard Dev.	43.30

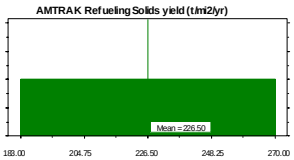
Selected range is from 0.00 to +Infinity



Assumption: AMTRAK Refueling Solids yield (t/mi2/yr) **Cell: K6**

Uniform distribution with parameters:

Minimum	183.00
Maximum	270.00

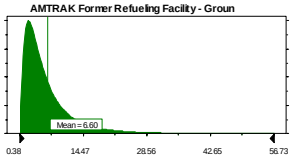


Assumption: AMTRAK Former Refueling Facility - Groun **Cell: N6**

Lognormal distribution with parameters:

Mean	6.60
Standard Dev.	6.60

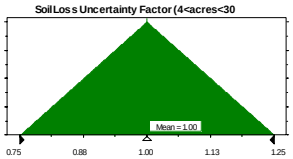
Selected range is from 0.00 to +Infinity



Assumption: Soil Loss Uncertainty Factor (4<acres<30 **Cell: G75**

Triangular distribution with parameters:

Minimum	0.75
Likeliest	1.00
Maximum	1.25

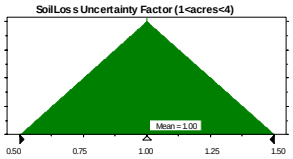


Selected range is from 0.75 to 1.25

Assumption: Soil Loss Uncertainty Factor (1<acres<4) **Cell: G76**

Triangular distribution with parameters:

Minimum	0.50
Likeliest	1.00
Maximum	1.50

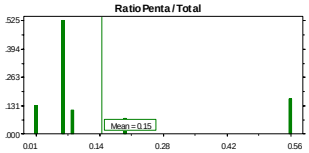


Selected range is from 0.50 to 1.50

Assumption: Ratio Penta / Total **Cell: I53**

Custom distribution with parameters:

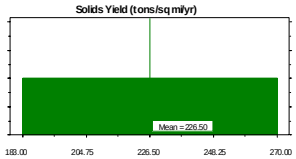
		Relative Prob.
Single point	0.01	0.131313
Single point	0.06	0.525253
Single point	0.09	0.111111
Single point	0.20	0.070707
Single point	0.56	0.161616
Total Relative Probability		1.000000



Assumption: Solids Yield (tons/sq mi/yr) **Cell: Q84**

Uniform distribution with parameters:

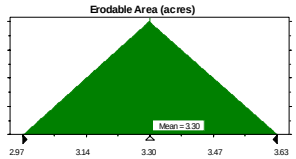
Minimum	183.00
Maximum	270.00



Assumption: Erodable Area (acres) **Cell: O84**

Triangular distribution with parameters:

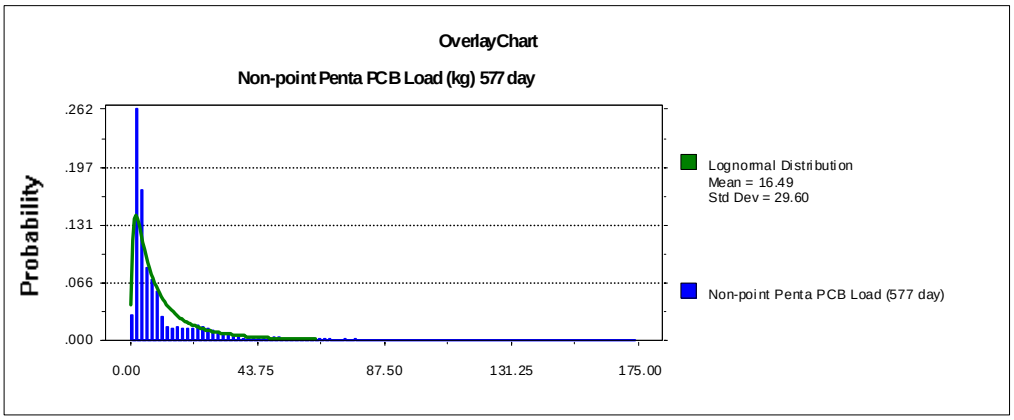
Minimum	2.97
Likeliest	3.30
Maximum	3.63



Selected range is from 2.97 to 3.63

End of Assumptions

Crystal Ball Report
Simulation started on 8/27/03 at 13:33:15
Simulation stopped on 8/27/03 at 13:35:01

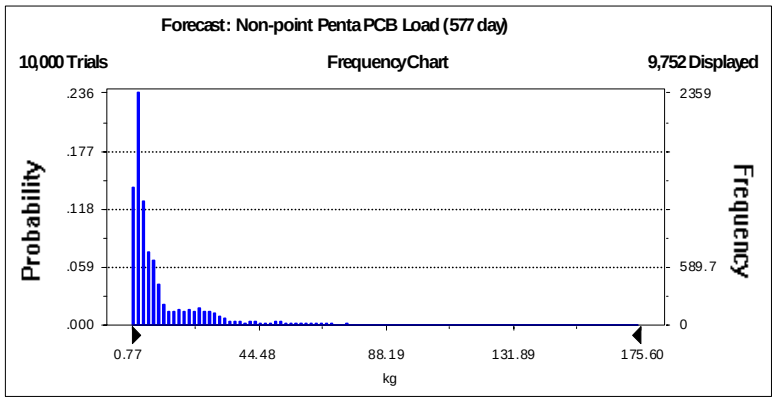


Forecast: Non-point Penta PCB Load (577 day) **Cell: L30**

Summary:

Display Range is from 0.77 to 175.60 kg
Entire Range is from 0.77 to 834.81 kg
After 10,000 Trials, the Std. Error of the Mean is 0.57

Statistics:	Value
Trials	10000
Mean	21.91
Median	5.94
Mode	---
Standard Deviation	57.23
Variance	3,275.15
Skewness	7.09
Kurtosis	67.74
Coeff. of Variability	2.61
Range Minimum	0.77
Range Maximum	834.81
Range Width	834.04
Mean Std. Error	0.57



Forecast: Non-point Penta PCB Load (577 day) (cont'd) **Cell: L30**

Percentiles:

Percentile	kg
0%	0.77
10%	2.28
20%	2.85
30%	3.56
40%	4.48
50%	5.94
60%	8.35
70%	12.26
80%	23.59
90%	44.82
100%	834.81

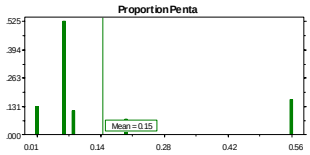
End of Forecast

Assumptions

Assumption: Proportion Penta **Cell: E7**

Custom distribution with parameters:

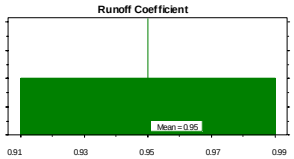
		Relative Prob.
Single point	0.01	0.131313
Single point	0.06	0.525253
Single point	0.09	0.111111
Single point	0.20	0.070707
Single point	0.56	0.161616
Total Relative Probability		1.000000



Assumption: Runoff Coefficient **Cell: E4**

Uniform distribution with parameters:

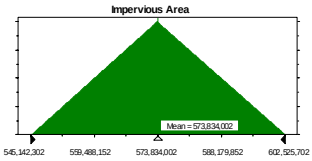
Minimum	0.91
Maximum	0.99



Assumption: Impervious Area **Cell: E3**

Triangular distribution with parameters:

Minimum	545,142,302
Likeliest	573,834,002
Maximum	602,525,702



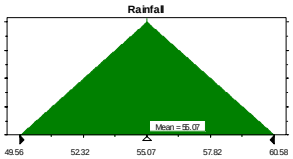
Selected range is from 545,142,302 to 602,525,702

Assumption: Rainfall **Cell: E2**

Triangular distribution with parameters:

Minimum	49.56
Likeliest	55.07
Maximum	60.58

Selected range is from 49.56 to 60.58

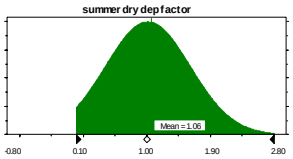


Assumption: summer dry dep factor **Cell: B13**

Normal distribution with parameters:

Mean	1.00
Standard Dev.	0.60

Selected range is from 0.00 to +Infinity

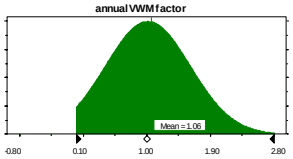


Assumption: annual VWM factor **Cell: F13**

Normal distribution with parameters:

Mean	1.00
Standard Dev.	0.60

Selected range is from 0.00 to +Infinity

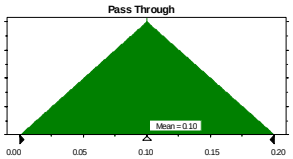


Assumption: Pass Through **Cell: J16**

Triangular distribution with parameters:

Minimum	0.00
Likeliest	0.10
Maximum	0.20

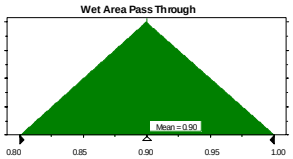
Selected range is from 0.00 to 0.20



Assumption: Wet Area Pass Through **Cell: O16**

Triangular distribution with parameters:

Minimum	0.80
Likeliest	0.90
Maximum	1.00

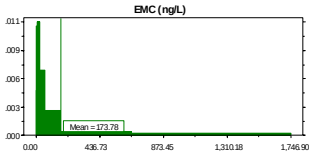


Selected range is from 0.80 to 1.00

Assumption: EMC (ng/L) **Cell: E5**

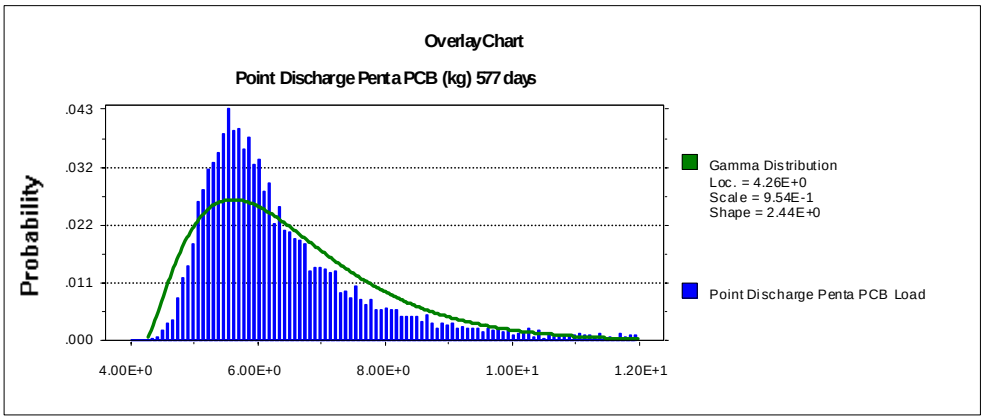
Custom distribution with parameters:

				Relative Prob.
Continuous range	0.00	to	2.20	0.010101
Continuous range	2.20	to	5.85	0.040404
Continuous range	5.85	to	23.55	0.202020
Continuous range	23.55	to	61.99	0.252525
Continuous range	61.99	to	163.20	0.252525
Continuous range	163.20	to	656.93	0.202020
Continuous range	656.93	to	1,746.90	0.040404
Total Relative Probability				1.000000



End of Assumptions

Crystal Ball Report
Simulation started on 8/28/03 at 16:10:34
Simulation stopped on 8/28/03 at 17:18:34

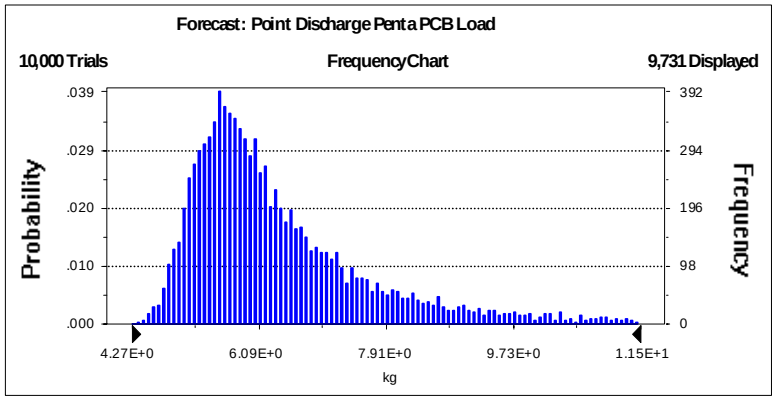


Forecast: Point Discharge Penta PCB Load **Cell: E1781**

Summary:

Filtered outside of interval from 0.00E+0 to +Infinity kg
Display Range is from 4.27E+0 to 1.15E+1 kg
Entire Range is from 4.27E+0 to 3.77E+1 kg
After 10,000 Trials, the Std. Error of the Mean is 1.94E-2

Statistics:	Value
Trials	10000
Mean	6.59E+00
Median	6.04E+00
Mode	---
Standard Deviation	1.94E+00
Variance	3.76E+00
Skewness	3.95
Kurtosis	31.83
Coeff. of Variability	0.29
Range Minimum	4.27E+00
Range Maximum	3.77E+01
Range Width	3.34E+01
Mean Std. Error	1.94E-02



Forecast: Point Discharge Penta PCB Load (cont'd) **Cell: E1781**

Percentiles:

Percentile	kg
0%	4.27E+00
10%	5.16E+00
20%	5.40E+00
30%	5.61E+00
40%	5.81E+00
50%	6.04E+00
60%	6.33E+00
70%	6.73E+00
80%	7.31E+00
90%	8.53E+00
100%	3.77E+01

End of Forecast

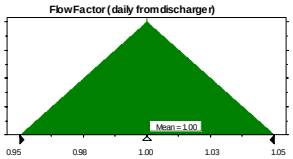
Assumptions

Assumption: Flow Factor (daily from discharger) **Cell: B590**

Triangular distribution with parameters:

Minimum	0.95
Likeliest	1.00
Maximum	1.05

Selected range is from 0.95 to 1.05

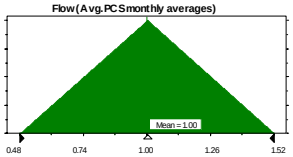


Assumption: Flow (Avg. PCS monthly averages) **Cell: B596**

Triangular distribution with parameters:

Minimum	0.48
Likeliest	1.00
Maximum	1.52

Selected range is from 0.48 to 1.52

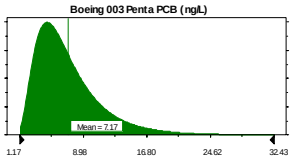


Assumption: Boeing 003 Penta PCB (ng/L) **Cell: O1186**

Lognormal distribution with parameters:

Mean	7.17
Standard Dev.	4.30

Selected range is from 0.00 to +Infinity

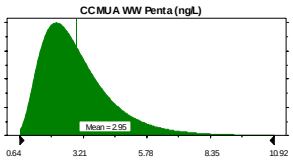


Assumption: CCMUA WW Penta (ng/L) **Cell: Z1186**

Lognormal distribution with parameters:

Mean	2.95
Standard Dev.	1.48

Selected range is from 0.00 to +Infinity

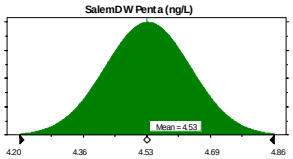


Assumption: Salem DW Penta (ng/L) **Cell: AE1187**

Normal distribution with parameters:

Mean	4.53
Standard Dev.	0.11

Selected range is from -Infinity to +Infinity

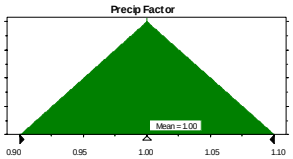


Assumption: Precip Factor **Cell: F1796**

Triangular distribution with parameters:

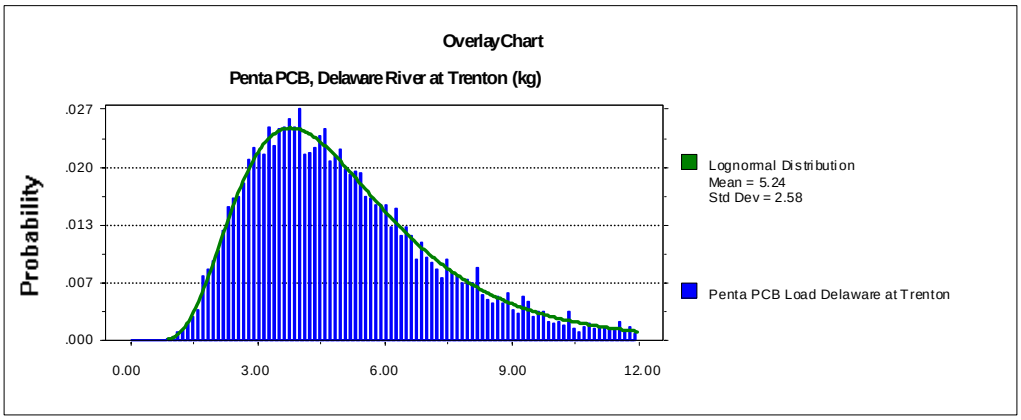
Minimum	0.90
Likeliest	1.00
Maximum	1.10

Selected range is from 0.90 to 1.10



End of Assumptions

Crystal Ball Report
Simulation started on 8/27/03 at 12:25:53
Simulation stopped on 8/27/03 at 12:26:54

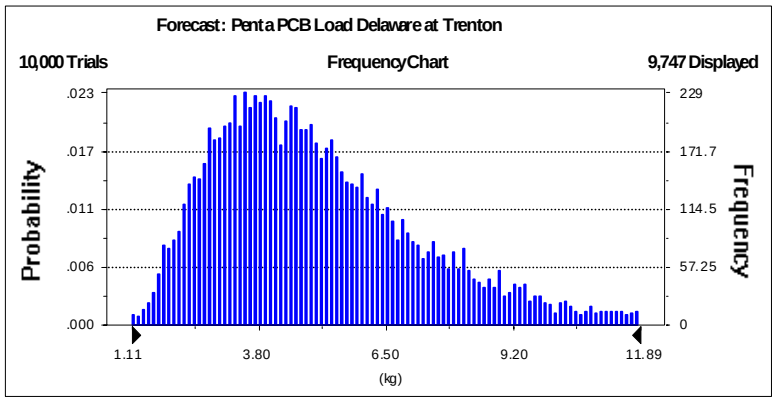


Forecast: Penta PCB Load Delaware at Trenton **Cell: O588**

Summary:

Display Range is from 1.11 to 11.89 (kg)
Entire Range is from 0.90 to 27.98 (kg)
After 10,000 Trials, the Std. Error of the Mean is 0.03

Statistics:	Value
Trials	10000
Mean	5.24
Median	4.70
Mode	---
Standard Deviation	2.60
Variance	6.75
Skewness	1.64
Kurtosis	7.91
Coeff. of Variability	0.50
Range Minimum	0.90
Range Maximum	27.98
Range Width	27.08
Mean Std. Error	0.03



Forecast: Penta PCB Load Delaware at Trenton (cont'd) **Cell: O588**

Percentiles:

Percentile	(kg)
0%	0.90
10%	2.59
20%	3.18
30%	3.68
40%	4.18
50%	4.70
60%	5.29
70%	5.99
80%	6.93
90%	8.52
100%	27.98

End of Forecast

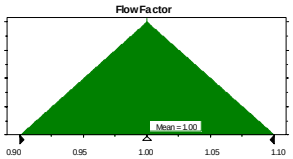
Assumptions

Assumption: Flow Factor **Cell: G7**

Triangular distribution with parameters:

Minimum	0.90
Likeliest	1.00
Maximum	1.10

Selected range is from 0.90 to 1.10

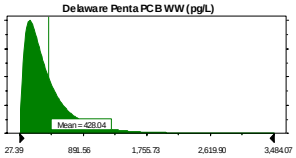


Assumption: Delaware Penta PCB WW (pg/L) **Cell: I7**

Lognormal distribution with parameters:

Mean	428.04
Standard Dev.	410.53

Selected range is from 0.00 to +Infinity

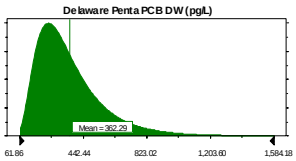


Assumption: Delaware Penta PCB DW (pg/L) **Cell: I8**

Lognormal distribution with parameters:

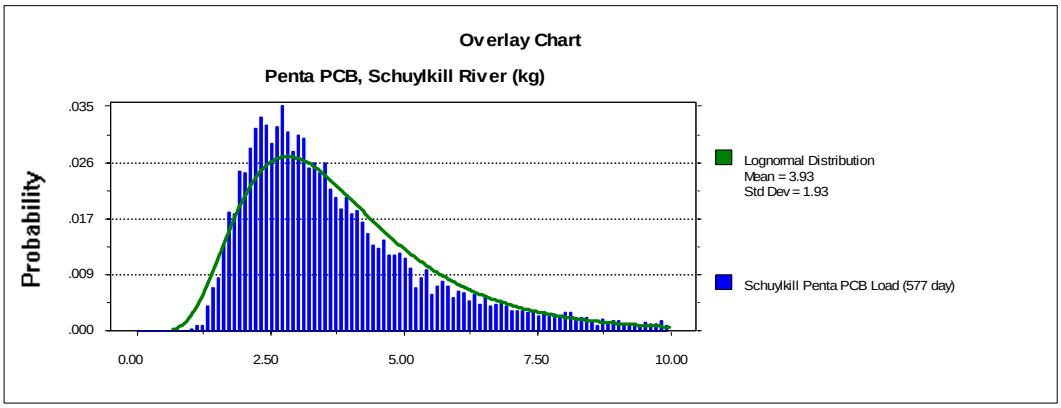
Mean	362.29
Standard Dev.	211.02

Selected range is from 0.00 to +Infinity



End of Assumptions

Crystal Ball Report
Simulation started on 8/27/03 at 12:52:42
Simulation stopped on 8/27/03 at 12:53:43

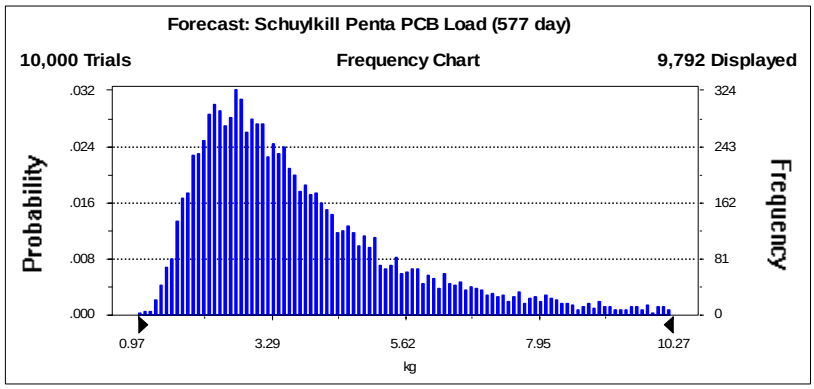


Forecast: Schuylkill Penta PCB Load (577 day) **Cell: P588**

Summary:

Display Range is from 0.97 to 10.27 kg
Entire Range is from 0.78 to 34.30 kg
After 10,000 Trials, the Std. Error of the Mean is 0.02

Statistics:	Value
Trials	10000
Mean	3.97
Median	3.35
Mode	---
Standard Deviation	2.28
Variance	5.19
Skewness	2.83
Kurtosis	18.39
Coeff. of Variability	0.57
Range Minimum	0.78
Range Maximum	34.30
Range Width	33.52
Mean Std. Error	0.02



Forecast: Schuylkill Penta PCB Load (577 day) (cont'd) **Cell: P588**

Percentiles:

Percentile	kg
0%	0.78
10%	2.01
20%	2.36
30%	2.68
40%	3.00
50%	3.35
60%	3.78
70%	4.32
80%	5.10
90%	6.61
100%	34.30

End of Forecast

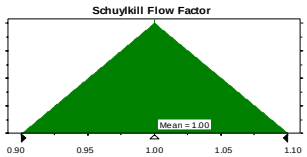
Assumptions

Assumption: Schuylkill Flow Factor **Cell: H7**

Triangular distribution with parameters:

Minimum	0.90
Likeliest	1.00
Maximum	1.10

Selected range is from 0.90 to 1.10

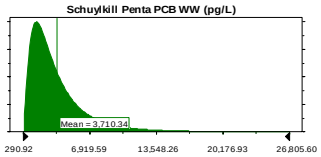


Assumption: Schuylkill Penta PCB WW (pg/L) **Cell: J7**

Lognormal distribution with parameters:

Mean	3,710.34
Standard Dev.	3,245.95

Selected range is from 0.00 to +Infinity

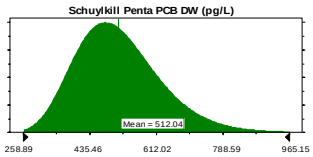


Assumption: Schuylkill Penta PCB DW (pg/L) **Cell: J8**

Lognormal distribution with parameters:

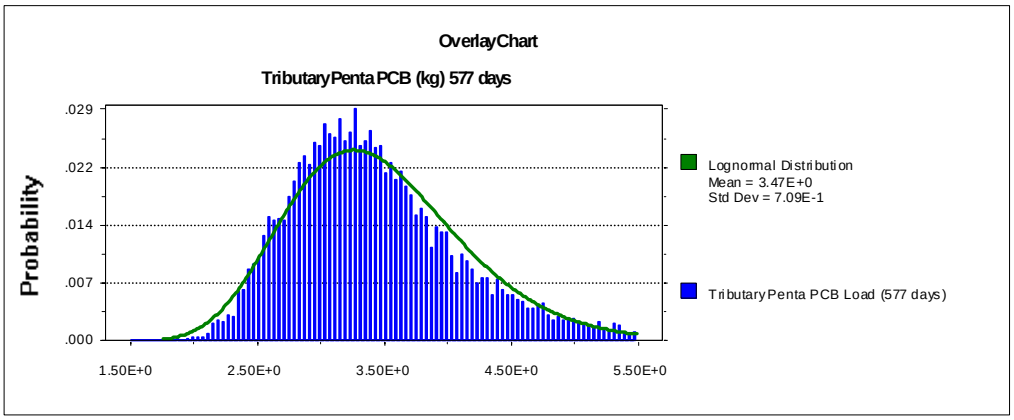
Mean	512.04
Standard Dev.	113.66

Selected range is from 0.00 to +Infinity



End of Assumptions

Crystal Ball Report
Simulation started on 8/28/03 at 7:58:35
Simulation stopped on 8/28/03 at 8:08:09

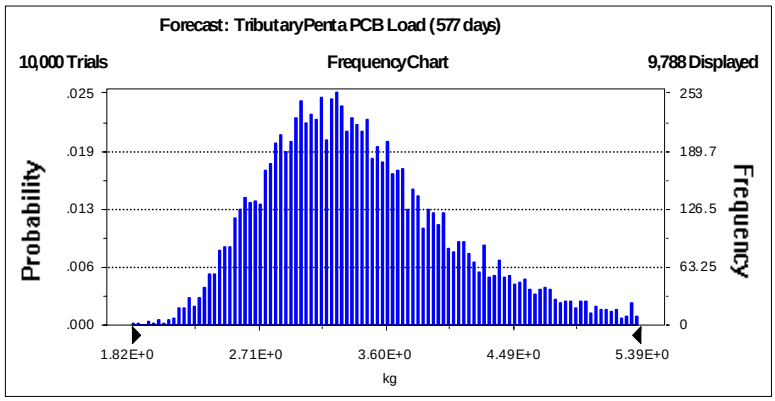


Forecast: Tributary Penta PCB Load (577 days) **Cell: BP591**

Summary:

Display Range is from 1.82E+0 to 5.39E+0 kg
Entire Range is from 1.82E+0 to 1.43E+1 kg
After 10,000 Trials, the Std. Error of the Mean is 7.57E-3

Statistics:	Value
Trials	10000
Mean	3.47E+00
Median	3.35E+00
Mode	---
Standard Deviation	7.57E-01
Variance	5.74E-01
Skewness	1.61
Kurtosis	10.70
Coeff. of Variability	0.22
Range Minimum	1.82E+00
Range Maximum	1.43E+01
Range Width	1.25E+01
Mean Std. Error	7.57E-03



Forecast: Tributary Penta PCB Load (577 days) (cont'd) **Cell: BP591**

Percentiles:

Percentile	kg
0%	1.82E+00
10%	2.66E+00
20%	2.87E+00
30%	3.04E+00
40%	3.20E+00
50%	3.35E+00
60%	3.51E+00
70%	3.71E+00
80%	3.98E+00
90%	4.42E+00
100%	1.43E+01

End of Forecast

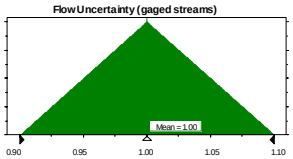
Assumptions

Assumption: Flow Uncertainty (gaged streams) **Cell: E8**

Triangular distribution with parameters:

Minimum	0.90
Likeliest	1.00
Maximum	1.10

Selected range is from 0.90 to 1.10

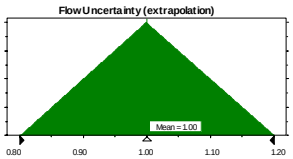


Assumption: Flow Uncertainty (extrapolation) **Cell: H8**

Triangular distribution with parameters:

Minimum	0.80
Likeliest	1.00
Maximum	1.20

Selected range is from 0.80 to 1.20

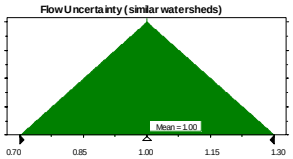


Assumption: Flow Uncertainty (similar watersheds) **Cell: I8**

Triangular distribution with parameters:

Minimum	0.70
Likeliest	1.00
Maximum	1.30

Selected range is from 0.70 to 1.30

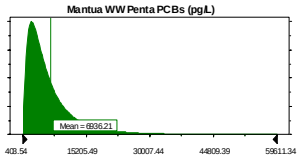


Assumption: Mantua WW Penta PCBs (pg/L) **Cell: AY4**

Lognormal distribution with parameters:

Mean	6936.21
Standard Dev.	6936.21

Selected range is from 0.00 to +Infinity

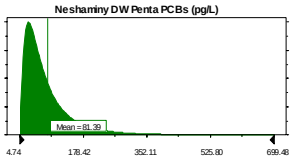


Assumption: Neshaminy DW Penta PCBs (pg/L) **Cell: AJ5**

Lognormal distribution with parameters:

Mean	81.39
Standard Dev.	81.39

Selected range is from 0.00 to +Infinity

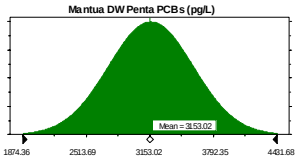


Assumption: Mantua DW Penta PCBs (pg/L) **Cell: AY5**

Normal distribution with parameters:

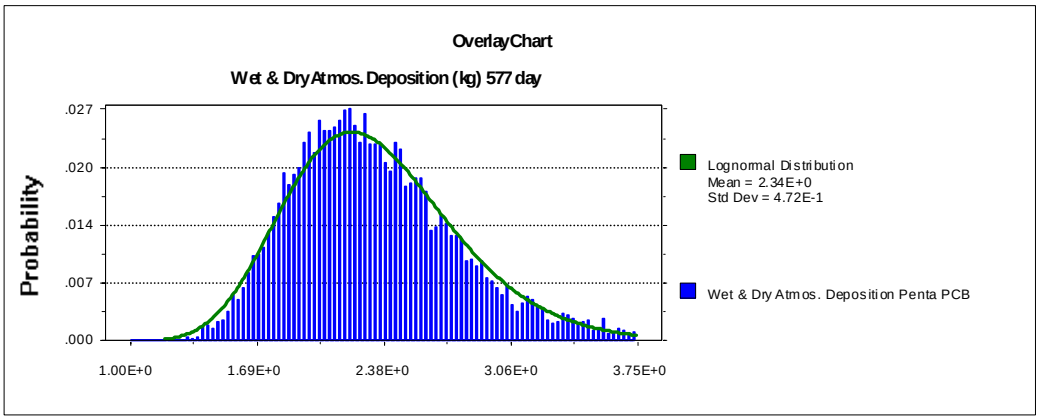
Mean	3153.02
Standard Dev.	426.22

Selected range is from -Infinity to +Infinity



End of Assumptions

Crystal Ball Report
Simulation started on 8/27/03 at 13:55:22
Simulation stopped on 8/27/03 at 13:59:29

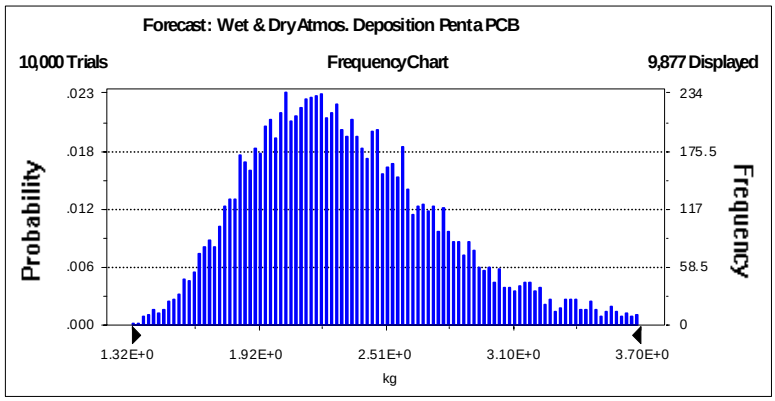


Forecast: Wet & Dry Atmos. Deposition Penta PCB **Cell: BC598**

Summary:

Display Range is from 1.32E+0 to 3.70E+0 kg
Entire Range is from 1.20E+0 to 5.47E+0 kg
After 10,000 Trials, the Std. Error of the Mean is 4.74E-3

Statistics:	Value
Trials	10000
Mean	2.34E+00
Median	2.27E+00
Mode	---
Standard Deviation	4.74E-01
Variance	2.25E-01
Skewness	0.94
Kurtosis	4.73
Coeff. of Variability	0.20
Range Minimum	1.20E+00
Range Maximum	5.47E+00
Range Width	4.27E+00
Mean Std. Error	4.74E-03



Forecast: Wet & Dry Atmos. Deposition Penta PCB (cont'd) **Cell: BC598**

Percentiles:

Percentile	kg
0%	1.20E+00
10%	1.80E+00
20%	1.95E+00
30%	2.06E+00
40%	2.17E+00
50%	2.27E+00
60%	2.39E+00
70%	2.53E+00
80%	2.69E+00
90%	2.95E+00
100%	5.47E+00

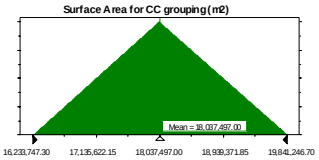
End of Forecast

Assumptions

Assumption: Surface Area for CC grouping (m2) **Cell: AX3**

Triangular distribution with parameters:

Minimum	16,233,747.30
Likeliest	18,037,497.00
Maximum	19,841,246.70

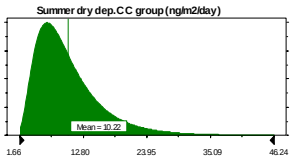


Selected range is from 16,233,747.30 to 19,841,246.70

Assumption: Summer dry dep. CC group (ng/m2/day) **Cell: AY3**

Lognormal distribution with parameters:

Mean	10.22
Standard Dev.	6.13

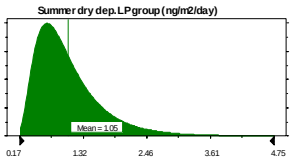


Selected range is from 0.00 to +Infinity

Assumption: Summer dry dep. LP group (ng/m2/day) **Cell: AY5**

Lognormal distribution with parameters:

Mean	1.05
Standard Dev.	0.63

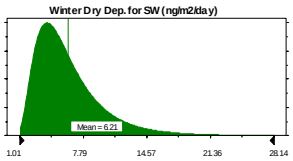


Selected range is from 0.00 to +Infinity

Assumption: Winter Dry Dep. for SW (ng/m2/day) **Cell: BA7**

Lognormal distribution with parameters:

Mean	6.21
Standard Dev.	3.73



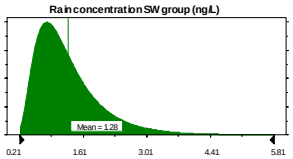
Selected range is from 0.00 to +Infinity

Assumption: Rain concentration SW group (ng/L) **Cell: BC7**

Lognormal distribution with parameters:

Mean	1.28
Standard Dev.	0.77

Selected range is from 0.00 to +Infinity

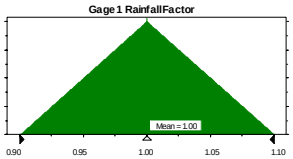


Assumption: Gage 1 Rainfall Factor **Cell: AU16**

Triangular distribution with parameters:

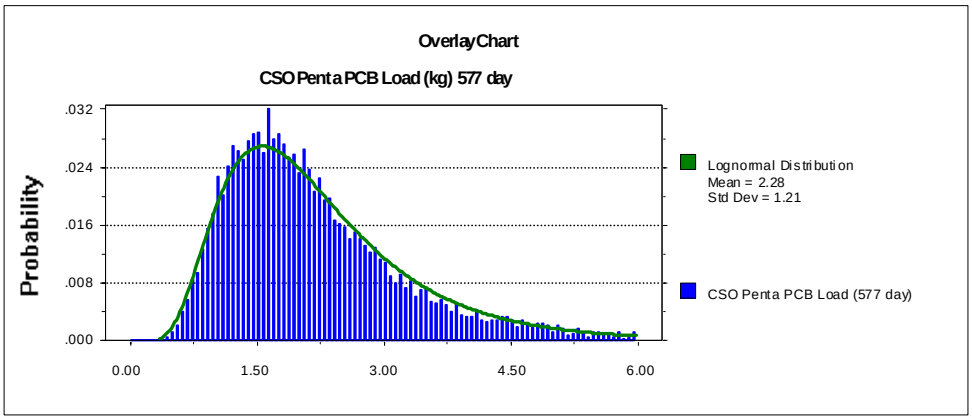
Minimum	0.90
Likeliest	1.00
Maximum	1.10

Selected range is from 0.90 to 1.10



End of Assumptions

Crystal Ball Report
Simulation started on 8/27/03 at 14:07:19
Simulation stopped on 8/27/03 at 14:08:06

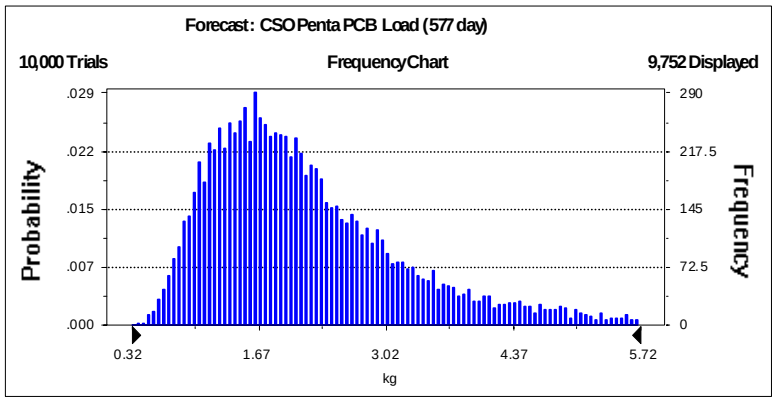


Forecast: CSO Penta PCB Load (577 day) **Cell: I9**

Summary:

Display Range is from 0.32 to 5.72 kg
Entire Range is from 0.32 to 22.18 kg
After 10,000 Trials, the Std. Error of the Mean is 0.01

Statistics:	Value
Trials	10000
Mean	2.29
Median	1.97
Mode	---
Standard Deviation	1.36
Variance	1.86
Skewness	2.94
Kurtosis	21.10
Coeff. of Variability	0.59
Range Minimum	0.32
Range Maximum	22.18
Range Width	21.86
Mean Std. Error	0.01



Forecast: CSO Penta PCB Load (577 day) (cont'd) **Cell: I9**

Percentiles:

Percentile	kg
0%	0.32
10%	1.08
20%	1.32
30%	1.54
40%	1.75
50%	1.97
60%	2.22
70%	2.54
80%	2.99
90%	3.82
100%	22.18

End of Forecast

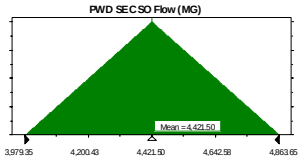
Assumptions

Assumption: PWD SE CSO Flow (MG) **Cell: D3**

Triangular distribution with parameters:

Minimum	3,979.35
Likeliest	4,421.50
Maximum	4,863.65

Selected range is from 3,979.35 to 4,863.65

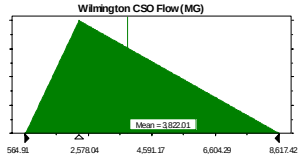


Assumption: Wilmington CSO Flow (MG) **Cell: D7**

Triangular distribution with parameters:

Minimum	564.91
Likeliest	2,283.70
Maximum	8,617.42

Selected range is from 564.91 to 8,617.42

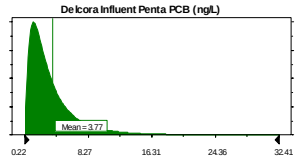


Assumption: Delcora Influent Penta PCB (ng/L) **Cell: H6**

Lognormal distribution with parameters:

Mean	3.77
Standard Dev.	3.77

Selected range is from 0.00 to +Infinity



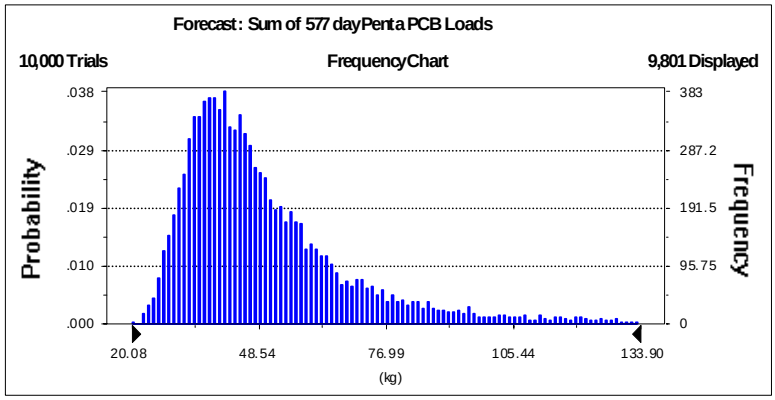
End of Assumptions

Crystal Ball Report
Simulation started on 9/2/03 at 9:41:03
Simulation stopped on 9/2/03 at 9:42:58

Forecast: Sum of 577 day Penta PCB Loads **Cell: D14**

Summary:
Display Range is from 20.08 to 133.90 (kg)
Entire Range is from 20.08 to 701.80 (kg)
After 10,000 Trials, the Std. Error of the Mean is 0.30

Statistics:	Value
Trials	10000
Mean	52.85
Median	45.35
Mode	---
Standard Deviation	29.66
Variance	879.59
Skewness	5.44
Kurtosis	61.76
Coeff. of Variability	0.56
Range Minimum	20.08
Range Maximum	701.80
Range Width	681.71
Mean Std. Error	0.30



Forecast: Sum of 577 day Penta PCB Loads (cont'd) **Cell: D14**

Percentiles:

Percentile	(kg)
0%	20.08
10%	32.17
20%	35.70
30%	38.79
40%	41.93
50%	45.35
60%	49.39
70%	55.00
80%	62.76
90%	78.52
100%	701.80

End of Forecast

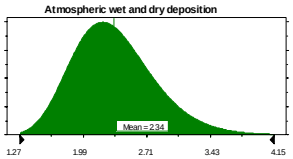
Assumptions

Assumption: Atmospheric wet and dry deposition **Cell: D9**

Lognormal distribution with parameters:

Mean	2.34
Standard Dev.	0.47

Selected range is from 0.00 to +Infinity

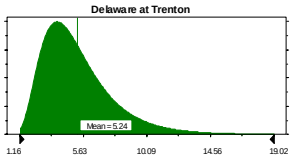


Assumption: Delaware at Trenton **Cell: D6**

Lognormal distribution with parameters:

Mean	5.24
Standard Dev.	2.58

Selected range is from 0.00 to +Infinity

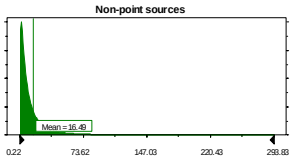


Assumption: Non-point sources **Cell: D4**

Lognormal distribution with parameters:

Mean	16.49
Standard Dev.	29.60

Selected range is from 0.00 to +Infinity

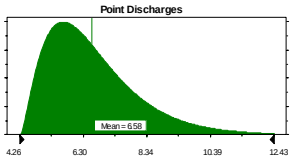


Assumption: Point Discharges **Cell: D5**

Gamma distribution with parameters:

Location	4.26
Scale	0.95
Shape	2.44

Selected range is from 4.26 to +Infinity

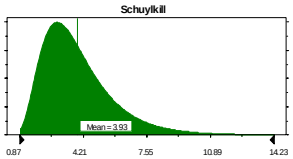


Assumption: Schuylkill **Cell: D7**

Lognormal distribution with parameters:

Mean	3.93
Standard Dev.	1.93

Selected range is from 0.00 to +Infinity

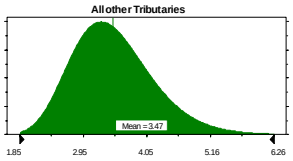


Assumption: All other Tributaries **Cell: D8**

Lognormal distribution with parameters:

Mean	3.47
Standard Dev.	0.71

Selected range is from 0.00 to +Infinity

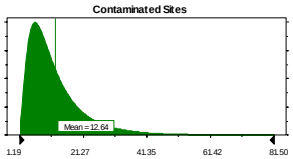


Assumption: Contaminated Sites **Cell: D3**

Lognormal distribution with parameters:

Mean	12.64
Standard Dev.	10.12

Selected range is from 0.00 to +Infinity

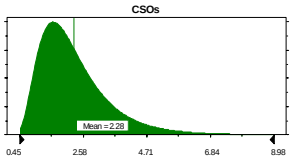


Assumption: CSOs **Cell: D10**

Lognormal distribution with parameters:

Mean	2.28
Standard Dev.	1.21

Selected range is from 0.00 to +Infinity



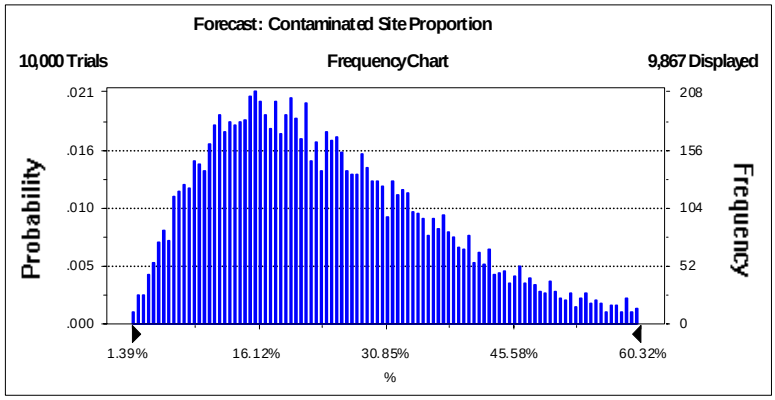
End of Assumptions

Crystal Ball Report
Simulation started on 9/2/03 at 9:53:46
Simulation stopped on 9/2/03 at 9:55:45

Forecast: Contaminated Site Proportion **Cell: F3**

Summary:
Display Range is from 1.39% to 60.32% %
Entire Range is from 0.64% to 84.40% %
After 10,000 Trials, the Std. Error of the Mean is 0.13%

Statistics:	Value
Trials	10000
Mean	24.29%
Median	21.95%
Mode	---
Standard Deviation	13.31%
Variance	1.77%
Skewness	0.81
Kurtosis	3.46
Coeff. of Variability	0.55
Range Minimum	0.64%
Range Maximum	84.40%
Range Width	83.76%
Mean Std. Error	0.13%



Forecast: Contaminated Site Proportion (cont'd) **Cell: F3**

Percentiles:

Percentile	%
0%	0.64%
10%	8.92%
20%	12.55%
30%	15.70%
40%	18.79%
50%	21.95%
60%	25.65%
70%	29.89%
80%	35.00%
90%	42.70%
100%	84.40%

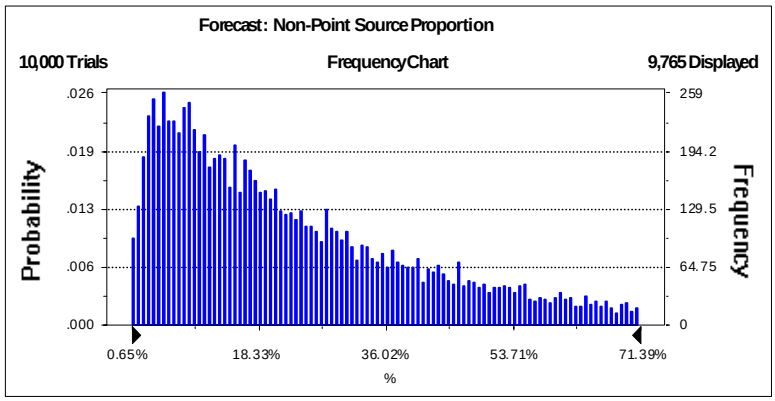
End of Forecast

Forecast: Non-Point Source Proportion **Cell: F4**

Summary:

Display Range is from 0.65% to 71.39% %
Entire Range is from 0.33% to 97.28% %
After 10,000 Trials, the Std. Error of the Mean is 0.19%

Statistics:	Value
Trials	10000
Mean	23.88%
Median	18.52%
Mode	---
Standard Deviation	18.80%
Variance	3.53%
Skewness	1.06
Kurtosis	3.55
Coeff. of Variability	0.79
Range Minimum	0.33%
Range Maximum	97.28%
Range Width	96.95%
Mean Std. Error	0.19%



Forecast: Non-Point Source Proportion (cont'd) **Cell: F4**

Percentiles:

Percentile	%
0%	0.33%
10%	4.39%
20%	7.44%
30%	10.61%
40%	14.39%
50%	18.52%
60%	23.77%
70%	30.17%
80%	39.10%
90%	52.33%
100%	97.28%

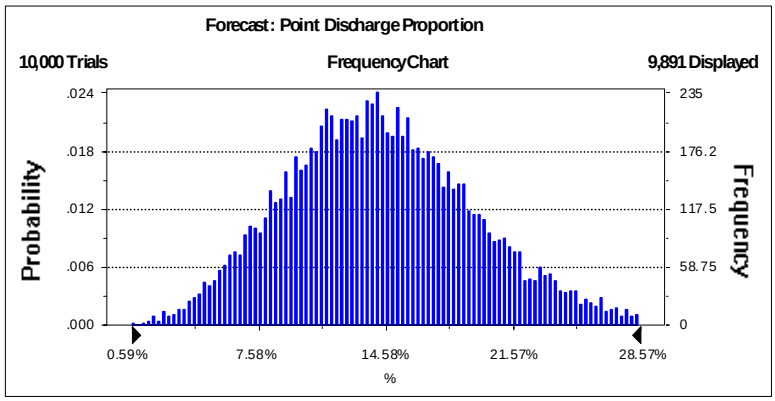
End of Forecast

Forecast: Point Discharge Proportion **Cell: F5**

Summary:

Display Range is from 0.59% to 28.57% %
Entire Range is from 0.59% to 39.00% %
After 10,000 Trials, the Std. Error of the Mean is 0.05%

Statistics:	Value
Trials	10000
Mean	14.43%
Median	14.08%
Mode	---
Standard Deviation	5.38%
Variance	0.29%
Skewness	0.45
Kurtosis	3.39
Coeff. of Variability	0.37
Range Minimum	0.59%
Range Maximum	39.00%
Range Width	38.41%
Mean Std. Error	0.05%



Forecast: Point Discharge Proportion (cont'd) **Cell: F5**

Percentiles:

Percentile	%
0%	0.59%
10%	7.77%
20%	9.85%
30%	11.40%
40%	12.78%
50%	14.08%
60%	15.41%
70%	16.92%
80%	18.73%
90%	21.44%
100%	39.00%

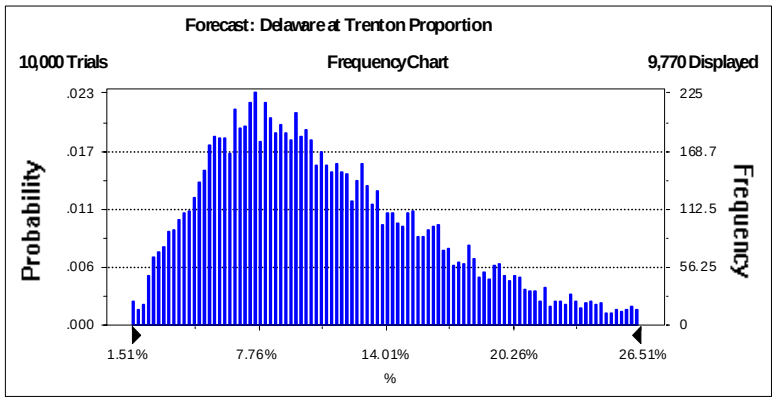
End of Forecast

Forecast: Delaware at Trenton Proportion **Cell: F6**

Summary:

Display Range is from 1.51% to 26.51% %
Entire Range is from 0.35% to 48.15% %
After 10,000 Trials, the Std. Error of the Mean is 0.06%

Statistics:	Value
Trials	10000
Mean	11.21%
Median	10.09%
Mode	---
Standard Deviation	5.89%
Variance	0.35%
Skewness	1.06
Kurtosis	4.60
Coeff. of Variability	0.53
Range Minimum	0.35%
Range Maximum	48.15%
Range Width	47.80%
Mean Std. Error	0.06%



Forecast: Delaware at Trenton Proportion (cont'd) **Cell: F6**

Percentiles:

Percentile	%
0%	0.35%
10%	4.74%
20%	6.25%
30%	7.53%
40%	8.77%
50%	10.09%
60%	11.59%
70%	13.37%
80%	15.72%
90%	19.25%
100%	48.15%

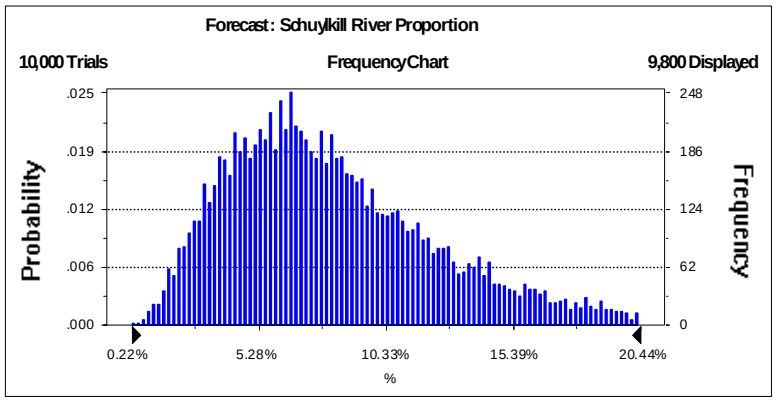
End of Forecast

Forecast: Schuylkill River Proportion **Cell: F7**

Summary:

Display Range is from 0.22% to 20.44% %
Entire Range is from 0.22% to 35.28% %
After 10,000 Trials, the Std. Error of the Mean is 0.05%

Statistics:	Value
Trials	10000
Mean	8.44%
Median	7.58%
Mode	---
Standard Deviation	4.58%
Variance	0.21%
Skewness	1.16
Kurtosis	4.90
Coeff. of Variability	0.54
Range Minimum	0.22%
Range Maximum	35.28%
Range Width	35.06%
Mean Std. Error	0.05%



Forecast: Schuylkill River Proportion (cont'd) **Cell: F7**

Percentiles:

Percentile	%
0%	0.22%
10%	3.46%
20%	4.61%
30%	5.65%
40%	6.58%
50%	7.58%
60%	8.65%
70%	9.98%
80%	11.76%
90%	14.56%
100%	35.28%

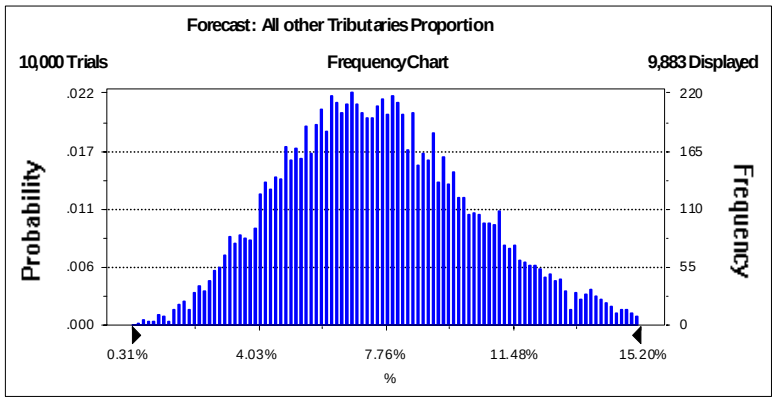
End of Forecast

Forecast: All other Tributaries Proportion **Cell: F8**

Summary:

Display Range is from 0.31% to 15.20% %
Entire Range is from 0.31% to 26.95% %
After 10,000 Trials, the Std. Error of the Mean is 0.03%

Statistics:	Value
Trials	10000
Mean	7.64%
Median	7.41%
Mode	---
Standard Deviation	2.91%
Variance	0.08%
Skewness	0.54
Kurtosis	3.62
Coeff. of Variability	0.38
Range Minimum	0.31%
Range Maximum	26.95%
Range Width	26.64%
Mean Std. Error	0.03%



Forecast: All other Tributaries Proportion (cont'd) **Cell: F8**

Percentiles:

Percentile	%
0%	0.31%
10%	4.10%
20%	5.13%
30%	5.96%
40%	6.69%
50%	7.41%
60%	8.12%
70%	8.96%
80%	9.97%
90%	11.45%
100%	26.95%

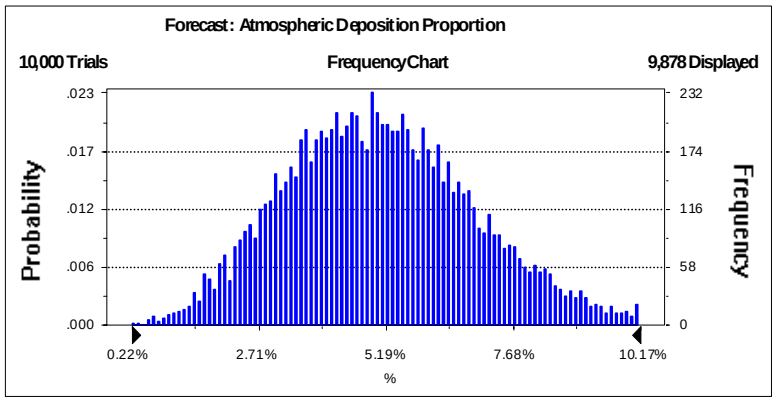
End of Forecast

Forecast: Atmospheric Deposition Proportion **Cell: F9**

Summary:

Display Range is from 0.22% to 10.17% %
Entire Range is from 0.22% to 15.71% %
After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	5.15%
Median	5.02%
Mode	---
Standard Deviation	1.94%
Variance	0.04%
Skewness	0.51
Kurtosis	3.54
Coeff. of Variability	0.38
Range Minimum	0.22%
Range Maximum	15.71%
Range Width	15.50%
Mean Std. Error	0.02%



Forecast: Atmospheric Deposition Proportion (cont'd) **Cell: F9**

Percentiles:

Percentile	%
0%	0.22%
10%	2.77%
20%	3.48%
30%	4.03%
40%	4.53%
50%	5.02%
60%	5.52%
70%	6.05%
80%	6.70%
90%	7.67%
100%	15.71%

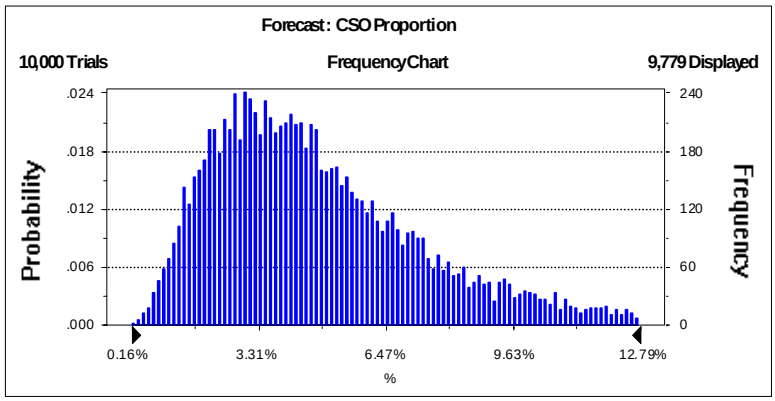
End of Forecast

Forecast: CSO Proportion **Cell: F10**

Summary:

Display Range is from 0.16% to 12.79% %
Entire Range is from 0.07% to 31.64% %
After 10,000 Trials, the Std. Error of the Mean is 0.03%

Statistics:	Value
Trials	10000
Mean	4.97%
Median	4.33%
Mode	---
Standard Deviation	3.00%
Variance	0.09%
Skewness	1.59
Kurtosis	7.48
Coeff. of Variability	0.60
Range Minimum	0.07%
Range Maximum	31.64%
Range Width	31.57%
Mean Std. Error	0.03%



Forecast: CSO Proportion (cont'd) **Cell: F10**

Percentiles:

Percentile	%
0%	0.07%
10%	1.91%
20%	2.56%
30%	3.14%
40%	3.72%
50%	4.33%
60%	4.99%
70%	5.83%
80%	6.98%
90%	8.88%
100%	31.64%

End of Forecast

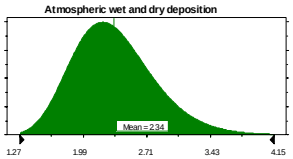
Assumptions

Assumption: Atmospheric wet and dry deposition **Cell: D9**

Lognormal distribution with parameters:

Mean	2.34
Standard Dev.	0.47

Selected range is from 0.00 to +Infinity

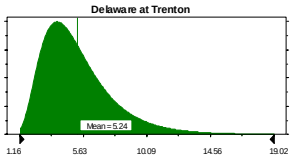


Assumption: Delaware at Trenton **Cell: D6**

Lognormal distribution with parameters:

Mean	5.24
Standard Dev.	2.58

Selected range is from 0.00 to +Infinity

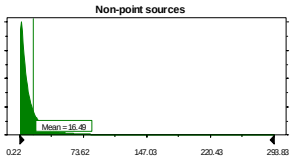


Assumption: Non-point sources **Cell: D4**

Lognormal distribution with parameters:

Mean	16.49
Standard Dev.	29.60

Selected range is from 0.00 to +Infinity

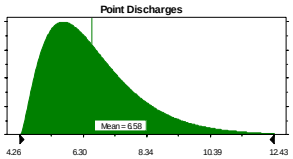


Assumption: Point Discharges **Cell: D5**

Gamma distribution with parameters:

Location	4.26
Scale	0.95
Shape	2.44

Selected range is from 4.26 to +Infinity

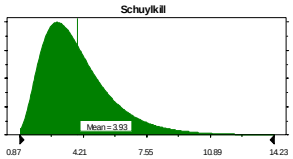


Assumption: Schuylkill **Cell: D7**

Lognormal distribution with parameters:

Mean	3.93
Standard Dev.	1.93

Selected range is from 0.00 to +Infinity

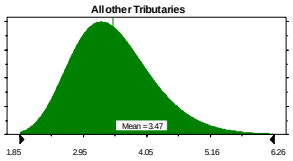


Assumption: All other Tributaries **Cell: D8**

Lognormal distribution with parameters:

Mean	3.47
Standard Dev.	0.71

Selected range is from 0.00 to +Infinity

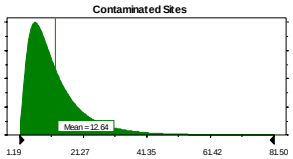


Assumption: Contaminated Sites **Cell: D3**

Lognormal distribution with parameters:

Mean	12.64
Standard Dev.	10.12

Selected range is from 0.00 to +Infinity

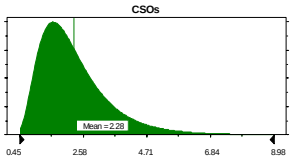


Assumption: CSOs **Cell: D10**

Lognormal distribution with parameters:

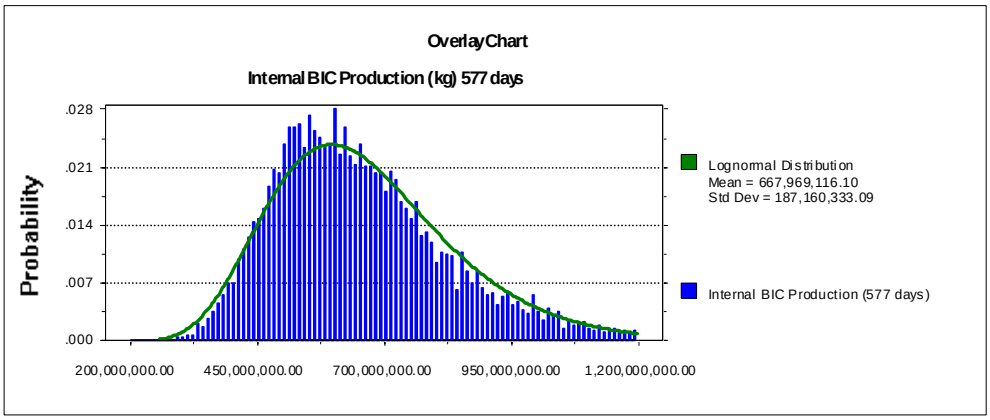
Mean	2.28
Standard Dev.	1.21

Selected range is from 0.00 to +Infinity



End of Assumptions

Crystal Ball Report
Simulation started on 8/27/03 at 15:31:45
Simulation stopped on 8/27/03 at 16:27:04

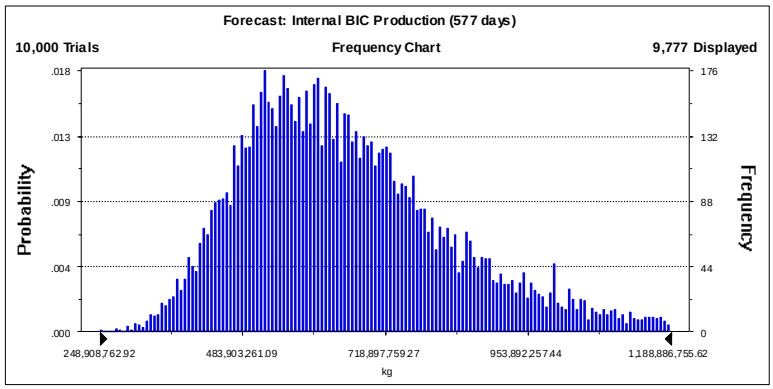


Forecast: Internal BIC Production (577 days) **Cell: I50230**

Summary:

Display Range is from 248,908,762.92 to 1,188,886,755.62 kg
Entire Range is from 248,908,762.92 to 2,413,700,004.89 kg
After 10,000 Trials, the Std. Error of the Mean is 1,999,676.15

Statistics:	Value
Trials	10000
Mean	668,970,956.34
Median	632,824,727.14
Mode	---
Standard Deviation	199,967,615.11
Variance	4.00E+16
Skewness	1.56
Kurtosis	7.97
Coeff. of Variability	0.30
Range Minimum	248,908,762.92
Range Maximum	2,413,700,004.89
Range Width	2,164,791,241.98
Mean Std. Error	1,999,676.15



Forecast: Internal BIC Production (577 days) (cont'd) **Cell: I50230**

Percentiles:

Percentile	kg
0%	248,908,762.92
10%	460,688,887.14
20%	511,360,279.98
30%	551,156,678.13
40%	591,617,198.34
50%	632,824,727.14
60%	678,332,598.90
70%	729,704,035.61
80%	799,055,364.68
90%	919,647,083.68
100%	2,413,700,004.89

End of Forecast

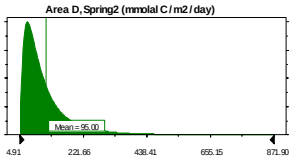
Assumptions

Assumption: Area D, Spring2 (mmolal C / m2 / day) **Cell: W6**

Lognormal distribution with parameters:

Mean	95.00
Standard Dev.	99.92

Selected range is from 0.00 to +Infinity

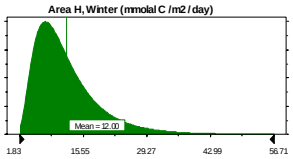


Assumption: Area H, Winter (mmolal C / m2 / day) **Cell: V10**

Lognormal distribution with parameters:

Mean	12.00
Standard Dev.	7.47

Selected range is from 0.00 to +Infinity

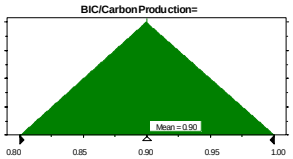


Assumption: BIC/Carbon Production= **Cell: I26**

Triangular distribution with parameters:

Minimum	0.80
Likeliest	0.90
Maximum	1.00

Selected range is from 0.80 to 1.00

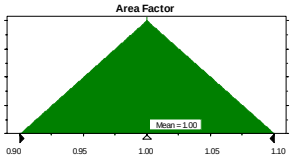


Assumption: Area Factor **Cell: C27**

Triangular distribution with parameters:

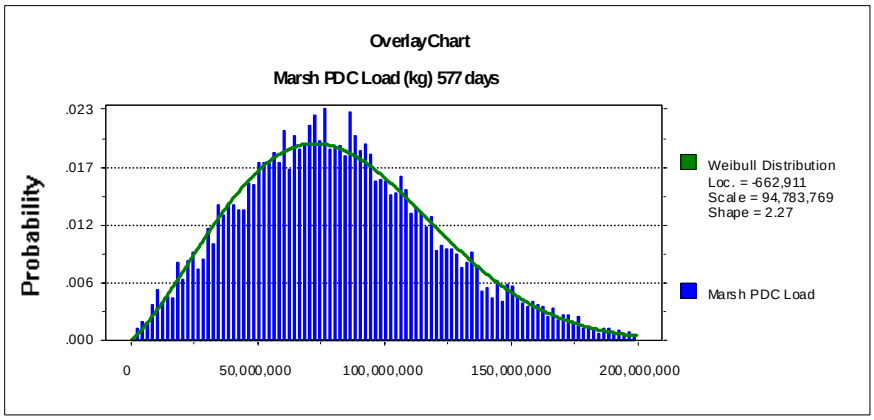
Minimum	0.90
Likeliest	1.00
Maximum	1.10

Selected range is from 0.90 to 1.10



End of Assumptions

Crystal Ball Report
Simulation started on 8/28/03 at 7:47:37
Simulation stopped on 8/28/03 at 7:48:12

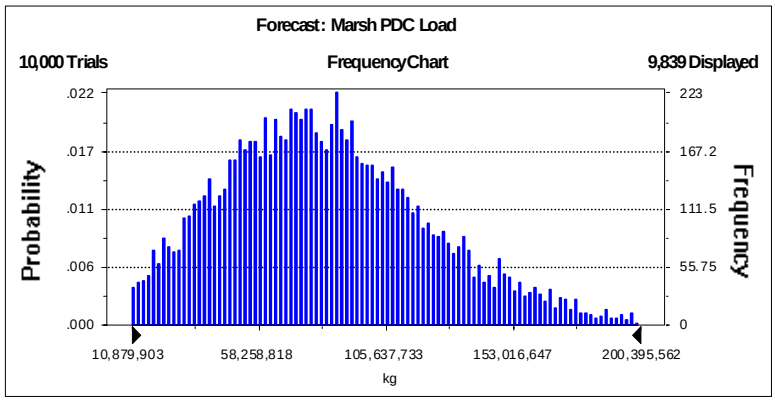


Forecast: Marsh PDC Load **Cell: B10**

Summary:

Display Range is from 10,879,903 to 200,395,562 kg
Entire Range is from 853,824 to 245,732,559 kg
After 10,000 Trials, the Std. Error of the Mean is 391,527

Statistics:	Value
Trials	10000
Mean	83,296,494
Median	79,932,519
Mode	---
Standard Deviation	39,152,675
Variance	2E+15
Skewness	0.50
Kurtosis	3.09
Coeff. of Variability	0.47
Range Minimum	853,824
Range Maximum	245,732,559
Range Width	244,878,735
Mean Std. Error	391,526.75



Forecast: Marsh PDC Load (cont'd) **Cell: B10**

Percentiles:

Percentile	kg
0%	853,824
10%	34,795,659
20%	49,342,687
30%	60,365,484
40%	70,465,766
50%	79,932,519
60%	89,880,499
70%	101,124,051
80%	114,775,120
90%	135,611,596
100%	245,732,559

End of Forecast

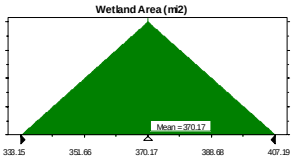
Assumptions

Assumption: Wetland Area (mi2) **Cell: B2**

Triangular distribution with parameters:

Minimum	333.15
Likeliest	370.17
Maximum	407.19

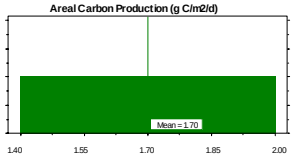
Selected range is from 333.15 to 407.19



Assumption: Areal Carbon Production (g C/m2/d) **Cell: B4**

Uniform distribution with parameters:

Minimum	1.40
Maximum	2.00

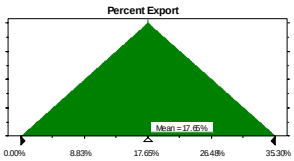


Assumption: Percent Export **Cell: B5**

Triangular distribution with parameters:

Minimum	0.00%
Likeliest	17.65%
Maximum	35.30%

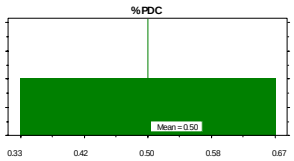
Selected range is from 0.00% to 35.30%



Assumption: % PDC **Cell: B7**

Uniform distribution with parameters:

Minimum	0.33
Maximum	0.67



End of Assumptions