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WARZYN

PROJECT
6072100

VOLUME III OF III

REVISED
REMEDIAL INVESTIGATION REPORT

BLACKWELL LANDFILL NPL SITE
DUPAGE COUNTY, ILLINOIS

DECEMBER
1994

PREPARED FOR:
FOREST PRESERVE DISTRICT
DUPAGE COUNTY, ILLINOIS

• • •

PREPARED BY:
WARZYN INC.
PHILADELPHIA, PENNSYLVANIA

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G

HYDRAULIC CONDUCTIVITY TEST DATA

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>

A Q T E S O L V   R E S U L T S

02/15/92 17:41:21

PROBLEM DEFINITION

Problem title: G126 Hydraulic Conductivity Test

Knowns and Constants:
- No. of data points............... 34
- Radius of well casing............ 0.17
- Radius of well................... 0.17
- Aquifer saturated thickness...... 3.55
- Well screen length............... 10
- Static height of water in well... 3.55
- Log(Re/Rw)....................... 2.427

ESTIMATION RESULTS

Analytical method: Bouwer and Rice (unconfined aquifer slug test)

PARAMETER ESTIMATES

	Estimate		Std. Error
K =	5.2826E-002	+/-	8.5464E-004
y0 =	2.0652E+000	+/-	1.8592E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 27
- Number of estimated parameters.... 2
- Degrees of freedom................ 25
- Residual mean..................... 0.006057
- Residual standard deviation....... 0.02306
- Residual variance................. 0.0005318

Model Residuals:

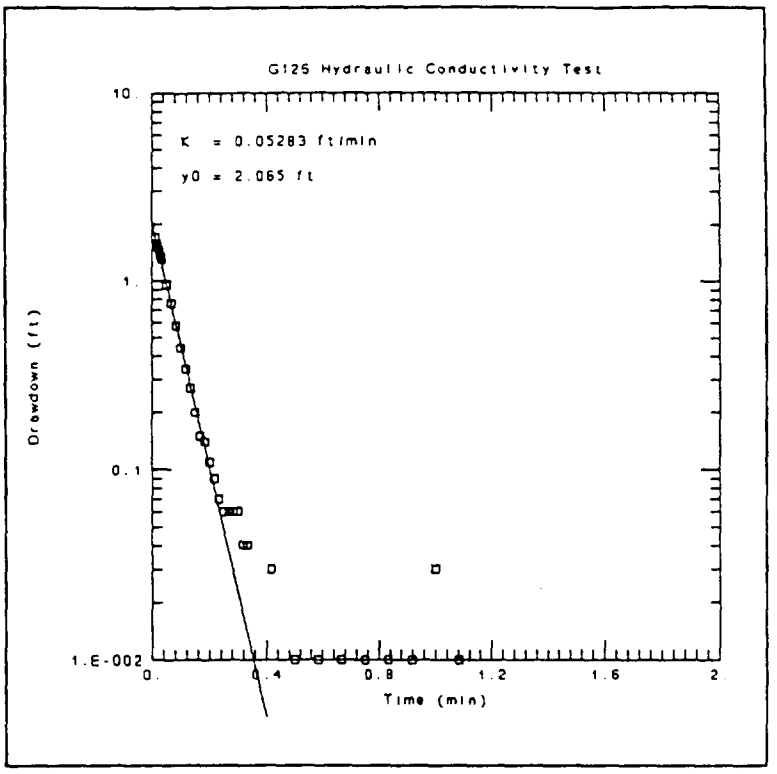
Time	Observed	Calculated	Residual	Weight
0.0133	1.7	1.6902	0.009808	1
0.0166	1.57	1.6082	-0.038219	1
0.02	1.5	1.5279	-0.027917	1
0.0233	1.46	1.4538	0.0061856	1
0.0266	1.39	1.3833	0.0066947	1
0.03	1.35	1.3142	0.035766	1
0.0333	1.3	1.2505	0.049505	1
0.05	0.95	0.97234	-0.022341	1
0.0666	0.76	0.7572	0.0028015	1
0.0833	0.58	0.58877	-0.0087712	1
0.1	0.44	0.45781	-0.017808	1
0.1166	0.34	0.35651	-0.016512	1
0.1333	0.27	0.27721	-0.0072115	1
0.15	0.2	0.21555	-0.01555	1

0.1666	0.15	0.16786	-0.017857	1
0.1833	0.14	0.13052	0.0094804	1
0.2	0.11	0.10149	0.0085125	1
0.2166	0.09	0.079032	0.010968	1
0.2333	0.07	0.061453	0.0085474	1
0.25	0.06	0.047783	0.012217	1
0.2666	0.06	0.037211	0.022789	1
0.2833	0.06	0.028934	0.031066	1
0.3	0.06	0.022498	0.037502	1
0.3166	0.04	0.01752	0.02248	1
0.3333	0.04	0.013623	0.026377	1
0.4167	0.03	0.003878	0.026122	1
0.5	0.01	0.0011056	0.0088944	1

TYPE CURVE DATA

K = 5.28258E-002
y0 = 2.06516E+000

Time	Drawdown	Time	Drawdown	Time	Drawdown
0.000E+000	2.065E+000	2.000E+000	1.696E-013		


G125 Hydraulic Conductivity Test
K = 0.05283 ft/min
y0 = 2.065 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.4
0.8
1.2
1.6
2
Time (min)

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A Q T E S O L V   R E S U L T S

02/15/92 15:21:30

PROBLEM DEFINITION

Problem title: G130 hydraulic conductivity test

Knowns and Constants:
- No. of data points............... 26
- Radius of well casing............ 0.17
- Radius of well................... 0.17
- Aquifer saturated thickness...... 5.74
- Well screen length............... 10
- Static height of water in well... 5.74
- Log(Re/Rw)....................... 2.757

ESTIMATION RESULTS

Analytical method: Bouwer and Rice (unconfined aquifer slug test)

PARAMETER ESTIMATES

	Estimate		Std. Error
K =	8.7297E-002	+/-	5.8888E-003
y0 =	2.3863E+000	+/-	9.6154E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 26
- Number of estimated parameters.... 2
- Degrees of freedom................ 24
- Residual mean..................... -0.008286
- Residual standard deviation....... 0.1051
- Residual variance................. 0.01104

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0099	1.85	1.9422	-0.09218	1
0.0133	1.43	1.8124	-0.38245	1
0.0166	1.84	1.6948	0.14517	1
0.02	1.79	1.5816	0.20838	1
0.0233	1.6	1.479	0.12102	1
0.0266	1.46	1.383	0.077005	1
0.03	1.35	1.2906	0.059384	1
0.0333	1.25	1.2069	0.043141	1
0.05	0.84	0.85938	-0.019384	1
0.0666	0.57	0.6132	-0.043199	1
0.0833	0.38	0.43665	-0.056649	1
0.1	0.25	0.31093	-0.060931	1
0.1166	0.17	0.22186	-0.051859	1
0.1333	0.09	0.15798	-0.067982	1

0.15	0.07	0.1125	-0.042497	1
0.1666	0.06	0.08027	-0.02027	1
0.1833	0.03	0.057159	-0.027159	1
0.2	0.03	0.040702	-0.010702	1
0.2166	0.03	0.029042	0.00095775	1
0.2333	0.01	0.020681	-0.010681	1
0.25	0.01	0.014726	-0.0047263	1
0.2666	0.01	0.010508	-0.00050767	1
0.2833	0.01	0.0074823	0.0025177	1
0.3	0.01	0.0053281	0.0046719	1
0.3166	0.01	0.0038017	0.0061983	1
0.3333	0.01	0.0027072	0.0072928	1

TYPE CURVE DATA

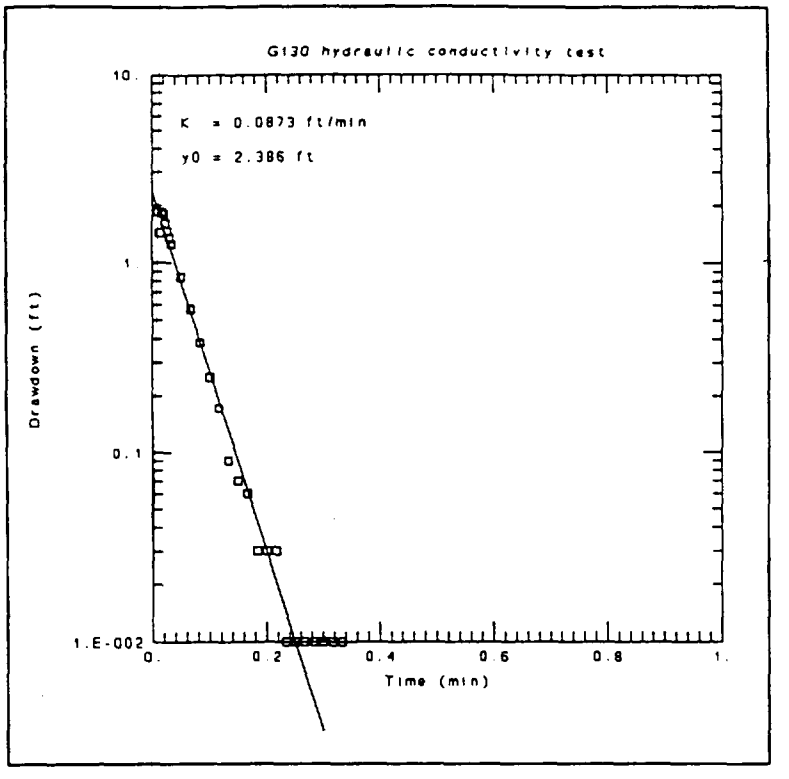
K = 8.72971E-002
y0 = 2.38633E+000

Time	Drawdown	Time	Drawdown	Time	Drawdown
0.000E+000	2.386E+000	1.000E+000	7.282E-010		

TYPE CURVE DATA

K = 8.72971E-002
y0 = 2.38633E+000

Time	Drawdown	Time	Drawdown	Time	Drawdown
0.000E+000	2.386E+000	1.000E+000	7.282E-010		


G130 hydraulic conductivity test
K = 0.0873 ft/min
y0 = 2.386 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.2
0.4
0.6
0.8
1.
Time (min)

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A Q T E S O L V   R E S U L T S

02/15/92 16:47:39

PROBLEM DEFINITION

Problem title: g136 hydraulic conductivity test

Knowns and Constants:
- No. of data points............... 83
- Radius of well casing............ 0.17
- Radius of well................... 0.17
- Aquifer saturated thickness...... 40
- Well screen length............... 30
- Static height of water in well... 77.8
- Log(Re/Rw)....................... 4.634

ESTIMATION RESULTS

Analytical method: Bouwer and Rice (unconfined aquifer slug test)

PARAMETER ESTIMATES

	Estimate		Std. Error
K =	1.3969E-005	+/-	8.6041E-007
y0 =	1.7995E+000	+/-	1.1045E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals................ 83
- Number of estimated parameters.... 2
- Degrees of freedom................ 81
- Residual mean..................... 1.523E-005
- Residual standard deviation....... 0.08134
- Residual variance................. 0.006617

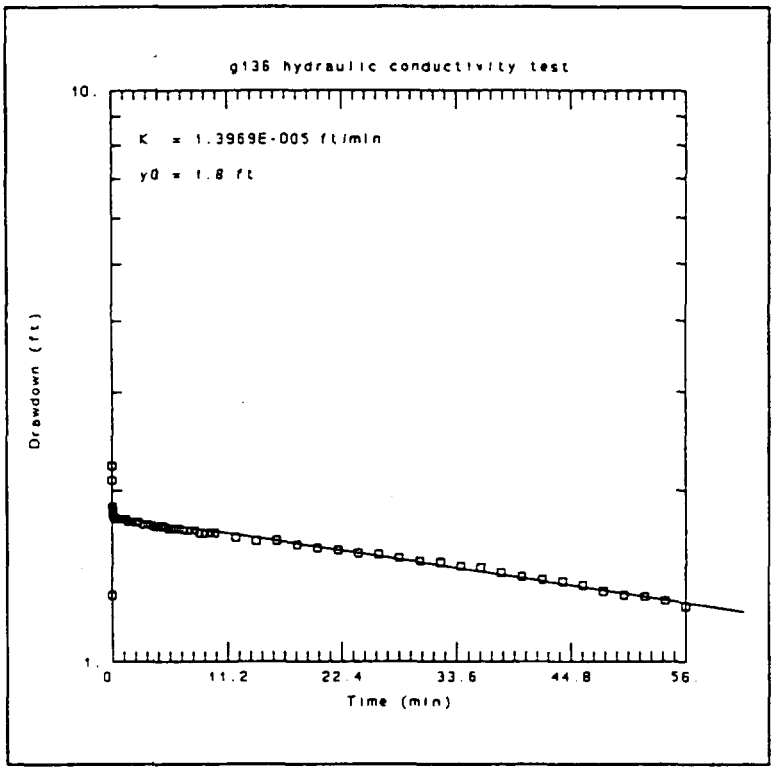
Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0166	2.22	1.7993	0.42068	1
0.02	1.31	1.7993	-0.48928	1
0.0233	2.09	1.7992	0.29075	1
0.0266	1.82	1.7992	0.020791	1
0.03	1.87	1.7992	0.070829	1
0.0333	1.85	1.7991	0.050866	1
0.05	1.81	1.7989	0.011054	1
0.0666	1.87	1.7988	0.071241	1
0.0833	1.82	1.7986	0.021429	1
0.1	1.87	1.7984	0.071617	1
0.1166	1.79	1.7982	-0.0081963	1
0.1333	1.84	1.798	0.041992	1
0.15	1.79	1.7978	-0.0078205	1
0.1666	1.81	1.7976	0.012366	1

0.1833	1.78	1.7974	-0.017446	1
0.2	1.79	1.7973	-0.007258	1
0.2166	1.79	1.7971	-0.0070713	1
0.2333	1.79	1.7969	-0.0068835	1
0.25	1.79	1.7967	-0.0066957	1
0.2666	1.79	1.7965	-0.0065091	1
0.2833	1.79	1.7963	-0.0063213	1
0.3	1.79	1.7961	-0.0061336	1
0.3166	1.79	1.7959	-0.005947	1
0.3333	1.79	1.7958	-0.0057593	1
0.4167	1.79	1.7948	-0.0048223	1
0.5	1.78	1.7939	-0.013887	1
0.5833	1.78	1.793	-0.012952	1
0.6667	1.78	1.792	-0.012016	1
0.75	1.78	1.7911	-0.011082	1
0.8333	1.78	1.7901	-0.010149	1
0.9167	1.78	1.7892	-0.0092148	1
1	1.78	1.7883	-0.0082823	1
1.0833	1.78	1.7874	-0.0073503	1
1.1667	1.78	1.7864	-0.0064176	1
1.25	1.78	1.7855	-0.0054866	1
1.3333	1.78	1.7846	-0.004556	1
1.4166	1.78	1.7836	-0.0036259	1
1.5	1.76	1.7827	-0.022695	1
1.5833	1.76	1.7818	-0.021766	1
1.6667	1.76	1.7808	-0.020836	1
1.75	1.76	1.7799	-0.019908	1
1.8333	1.76	1.779	-0.018981	1
1.9167	1.76	1.7781	-0.018052	1
2	1.76	1.7771	-0.017126	1
2.5	1.76	1.7716	-0.011573	1
3	1.74	1.766	-0.026039	1
3.5	1.74	1.7605	-0.020521	1
4	1.73	1.755	-0.025021	1
4.5	1.73	1.7495	-0.019537	1
5	1.73	1.7441	-0.014071	1
5.5	1.71	1.7386	-0.028623	1
6	1.71	1.7332	-0.023191	1
6.5	1.71	1.7278	-0.017776	1
7	1.7	1.7224	-0.022378	1
7.5	1.7	1.717	-0.016996	1
8	1.7	1.7116	-0.011632	1
8.5	1.68	1.7063	-0.026285	1
9	1.68	1.701	-0.020954	1
9.5	1.68	1.6956	-0.015639	1
10	1.68	1.6903	-0.010342	1
12	1.65	1.6693	-0.019316	1
14	1.63	1.6486	-0.018552	1
16	1.63	1.628	0.0019534	1
18	1.6	1.6078	-0.007796	1
20	1.58	1.5878	-0.0077972	1
22	1.57	1.568	0.0019528	1
24	1.55	1.5485	0.0014571	1
26	1.54	1.5293	0.010719	1
28	1.52	1.5103	0.0097409	1
30	1.5	1.4915	0.0085265	1
32	1.49	1.4729	0.017078	1
34	1.47	1.4546	0.015399	1
36	1.46	1.4365	0.023493	1
38	1.43	1.4186	0.011361	1
40	1.41	1.401	0.0090067	1
42	1.39	1.3836	0.0064331	1
44	1.38	1.3664	0.013643	1
46	1.36	1.3494	0.010638	1
48	1.33	1.3326	-0.0025775	1
50	1.31	1.316	-0.0060021	1

G136

52	1.3	1.2996	0.00036716	1
54	1.28	1.2835	-0.0034672	1
56	1.25	1.2675	-0.017503	1


g136 hydraulic conductivity test
K = 1.3969E-005 ft/min
y0 = 1.8 ft
10.
1.
Drawdown (ft)
0
11.2
22.4
33.6
44.8
56.
Time (min)

G-40S
p. 1 of 3

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A Q T E S O L V   R E S U L T S

02/15/92 16:16:

PROBLEM DEFINITION

Problem title: G140S Hydraulic Conductivity Test

Knowns and Constants:
- No. of data points............... 45
- Radius of well casing............ 0.08
- Radius of well................... 0.08
- Aquifer saturated thickness...... 16.2
- Well screen length............... 5
- Static height of water in well... 16.2
- Log(Re/Rw)....................... 3.901

ESTIMATION RESULTS

Analytical method: Bouwer and Rice (unconfined aquifer slug test)

PARAMETER ESTIMATES

	Estimate		Std. Error
K =	2.7562E-002	+/-	9.6917E-005
y0 =	9.9426E-001	+/-	2.4485E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 25
- Number of estimated parameters.... 2
- Degrees of freedom................ 23
- Residual mean..................... 8.195E-005
- Residual standard deviation....... 0.07625
- Residual variance................. 0.005815

Model Residuals:

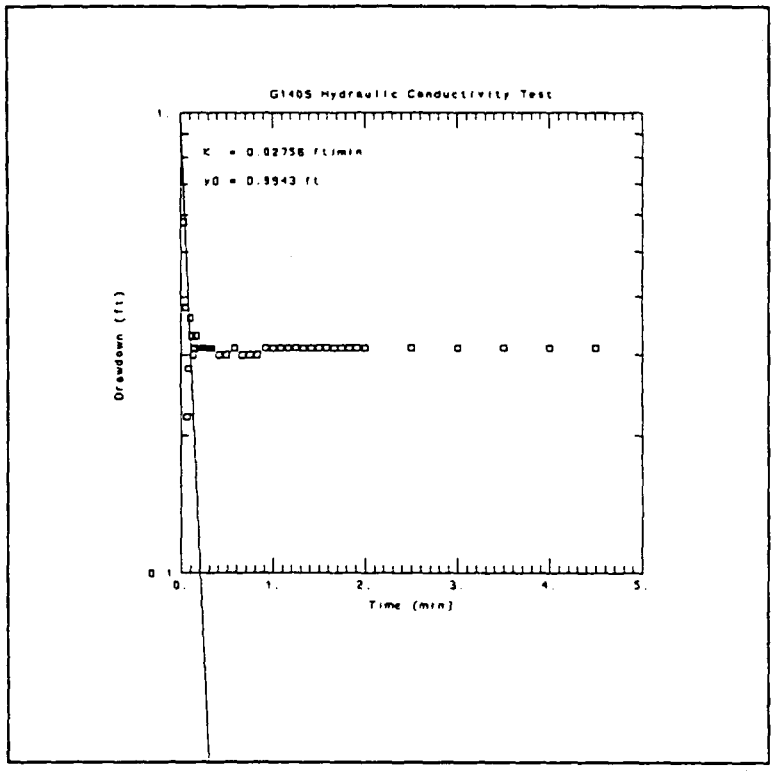
Time	Observed	Calculated	Residual	Weight
0.03	0.58	0.36389	0.21611	1
0.0333	0.58	0.36381	0.21619	1
0.05	0.38	0.3634	0.016595	1
0.0666	0.22	0.363	-0.143	1
0.0833	0.28	0.3626	-0.082601	1
0.1	0.36	0.3622	-0.0021982	1
0.1166	0.33	0.3618	-0.031799	1
0.1333	0.3	0.3614	-0.061397	1
1.0833	0.31	0.33927	-0.029271	1
1.1667	0.31	0.33739	-0.027395	1
1.25	0.31	0.33553	-0.025531	1
1.3333	0.31	0.33368	-0.023677	1
1.4166	0.31	0.33183	-0.021834	1
1.5	0.31	0.33	-0.019999	1

1.5833	0.31	0.32818	-0.018176	1
1.6667	0.31	0.32636	-0.01636	1
1.75	0.31	0.32456	-0.014558	1
1.8333	0.31	0.32276	-0.012765	1
1.9167	0.31	0.32098	-0.010979	1
2	0.31	0.31921	-0.0092062	1
2.5	0.31	0.30877	0.0012333	1
3	0.31	0.29867	0.011331	1
3.5	0.31	0.2889	0.021099	1
4	0.31	0.27945	0.030547	1
4.5	0.31	0.27031	0.039687	1

TYPE CURVE DATA

K = 2.75621E-002
y0 = 9.94260E-001

Time	Drawdown	Time	Drawdown	Time	Drawdown
0.000E+000	9.943E-001	5.000E+000	1.058E-024		


G140S Hydraulic Conductivity Test
K = 0.02756 ft/min
y0 = 0.9943 ft
Drawdown (ft)
1.
0.1
0.
1.
2.
3.
4.
5.
Time (min)

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A Q T E S O L V   R E S U L T S

02/15/92 16:27:23

PROBLEM DEFINITION

Problem title: G141D Hydraulic Conductivity Test

Knowns and Constants:
- No. of data points............... 27
- Radius of well casing............ 0.08
- Radius of well................... 0.08
- Aquifer saturated thickness...... 19.3
- Well screen length............... 10
- Static height of water in well... 44.3
- Log(Re/Rw)....................... 4.656

ESTIMATION RESULTS

Analytical method: Bouwer and Rice (unconfined aquifer slug test)

PARAMETER ESTIMATES

	Estimate		Std. Error
K =	1.1632E-002	+/-	3.3564E-004
y0 =	1.6226E+001	+/-	2.2850E-001

ANALYSIS OF MODEL RESIDUALS

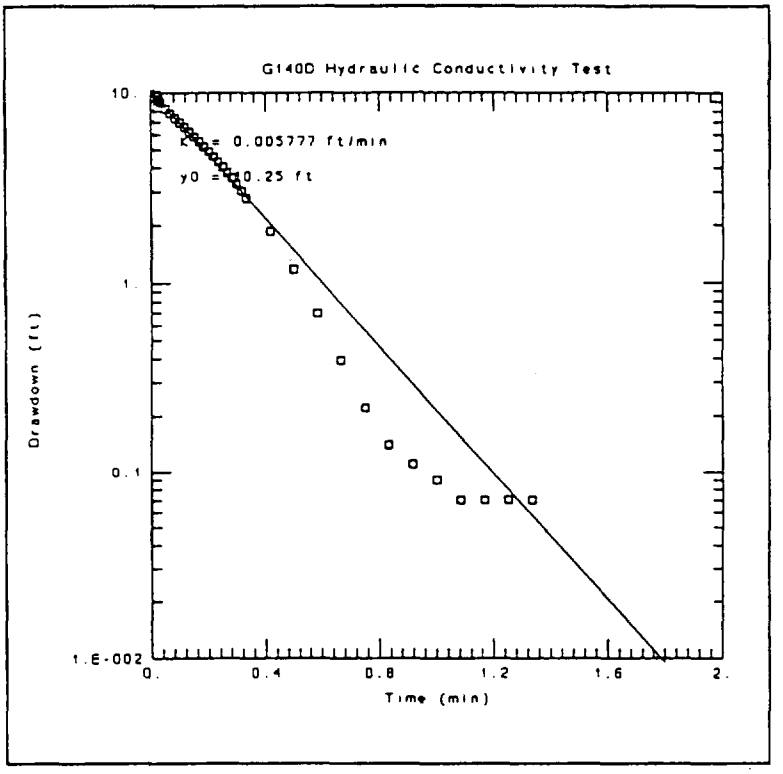
residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 27
- Number of estimated parameters.... 2
- Degrees of freedom................ 25
- Residual mean..................... -0.05703
- Residual standard deviation....... 0.4725
- Residual variance................. 0.2233

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0099	16	15.02	0.98033	1
0.0133	15.3	14.626	0.67373	1
0.0166	14.1	14.254	-0.15429	1
0.02	13.6	13.881	-0.28093	1
0.0233	12.9	13.528	-0.62791	1
0.0266	12.6	13.184	-0.58387	1
0.03	12.3	12.839	-0.53855	1
0.0333	12	12.512	-0.51204	1
0.05	10.8	10.983	-0.18274	1
0.0666	9.75	9.6479	0.10212	1
0.0833	8.77	8.4687	0.30134	1
0.1	7.86	7.4336	0.42644	1
0.1166	7	6.5301	0.46992	1
0.1333	6.21	5.7319	0.47807	1

0.15	5.48	5.0313	0.44866	1
0.1666	4.79	4.4198	0.37017	1
0.1833	4.16	3.8796	0.28039	1
0.2	3.57	3.4054	0.16458	1
0.2166	2.95	2.9915	-0.041519	1
0.2333	2.49	2.6259	-0.13588	1
0.25	2.06	2.3049	-0.24492	1
0.2666	1.7	2.0248	-0.32478	1
0.2833	1.36	1.7773	-0.4173	1
0.3	1.08	1.5601	-0.48007	1
0.3166	0.82	1.3705	-0.55045	1
0.3333	0.61	1.2029	-0.59295	1
0.4167	0.06	0.62733	-0.56733	1


G140D Hydraulic Conductivity Test
K = 0.005777 ft/min
y0 = 0.25 ft
10.
1.
0.1
1.E-002
Drawdown (ft)
0.
0.4
0.8
1.2
1.6
2.
Time (min)

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A Q T E S O L V   R E S U L T S

02/15/92 16:45:16

PROBLEM DEFINITION

Problem title: G140D Hydraulic Conductivity Test

Knowns and Constants:
- No. of data points............... 35
- Radius of well casing............ 0.08
- Radius of well................... 0.08
- Aquifer saturated thickness...... 17.6
- Well screen length............... 10
- Static height of water in well... 44.05
- Log(Re/Rw)....................... 4.653

ESTIMATION RESULTS

Analytical method: Bouwer and Rice (unconfined aquifer slug test)

PARAMETER ESTIMATES

	Estimate		Std. Error
K =	5.7767E-003	+/-	9.6997E-005
y0 =	1.0247E+001	+/-	8.5207E-002

ANALYSIS OF MODEL RESIDUALS

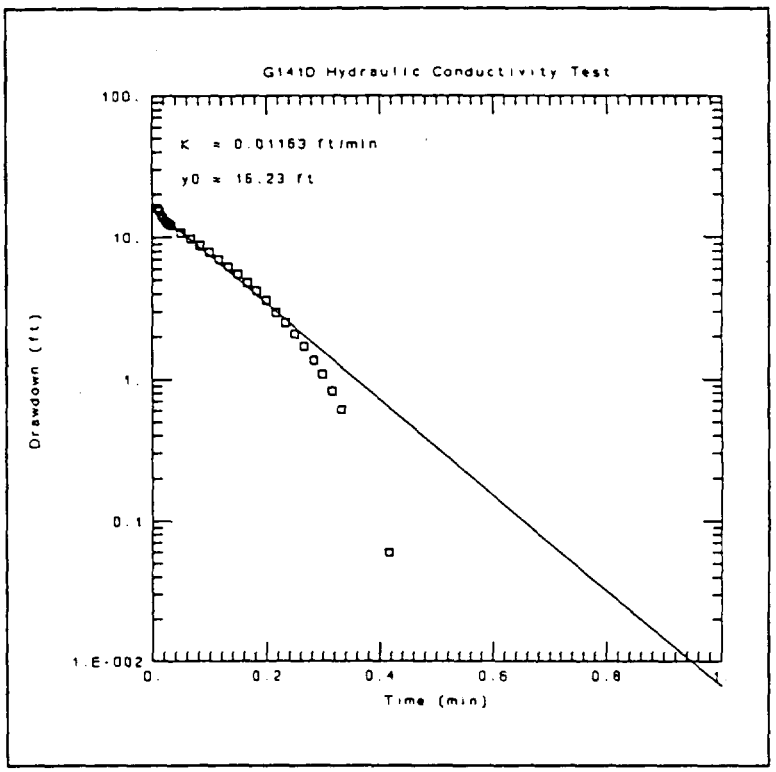
residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals.............. 35
- Number of estimated parameters.... 2
- Degrees of freedom............... 33
- Residual mean.................... -0.03942
- Residual standard deviation....... 0.1795
- Residual variance................ 0.03222

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.02	9.75	9.482	0.268	1
0.0233	9.23	9.3614	-0.13137	1
0.0266	9.1	9.2423	-0.14228	1
0.03	9.05	9.1212	-0.071166	1
0.0333	8.86	9.0051	-0.14513	1
0.05	8.26	8.4402	-0.18018	1
0.0666	7.78	7.9137	-0.13373	1
0.0833	7.35	7.4172	-0.067248	1
0.1	6.96	6.9519	0.0080888	1
0.1166	6.57	6.5183	0.051703	1
0.1333	6.19	6.1094	0.080642	1
0.15	5.84	5.7261	0.11393	1
0.1666	5.51	5.3689	0.14108	1
0.1833	5.19	5.0321	0.15791	1

0.2	4.89	4.7164	0.17361	1
0.2166	4.59	4.4222	0.16779	1
0.2333	4.3	4.1448	0.15522	1
0.25	4.05	3.8847	0.16526	1
0.2666	3.78	3.6424	0.13756	1
0.2833	3.54	3.4139	0.12608	1
0.3	3.27	3.1997	0.070256	1
0.3166	3	3.0002	-0.00016497	1
0.3333	2.76	2.8119	-0.051943	1
0.4167	1.85	2.0346	-0.18461	1
0.5	1.17	1.4727	-0.30274	1
0.5833	0.69	1.066	-0.37603	1
0.6667	0.39	0.77134	-0.38134	1
0.75	0.22	0.55833	-0.33833	1
0.8333	0.14	0.40414	-0.26414	1
0.9167	0.11	0.29242	-0.18242	1
1	0.09	0.21167	-0.12167	1
1.0833	0.07	0.15321	-0.083214	1
1.1667	0.07	0.11086	-0.04086	1
1.25	0.07	0.080245	-0.010245	1
1.3333	0.07	0.058085	0.011915	1


G141D Hydraulic Conductivity Test
K = 0.01163 ft/min
y0 = 15.23 ft
100.
10.
1.
0.1
1.E-002
Drawdown (ft)
0.
0.2
0.4
0.6
0.8
1.
Time (min)

A Q T E S O L V   R E S U L T S

02/17/92 19:47

PROBLEM DEFINITION

Problem title: G133D Hydraulic Conductivity Test

Knowns and Constants:
- No. of data points............... 61
- Radius of well casing............ 0.17
- Radius of well................... 0.17
- Aquifer saturated thickness...... 12.2
- Well screen length............... 10
- Static height of water in well... 35.3
- Log(Re/Rw)....................... 3.902

ESTIMATION RESULTS

Analytical method: Bouwer and Rice (unconfined aquifer slug test)

PARAMETER ESTIMATES

	Estimate		Std. Error
K =	5.8596E-002	+/-	1.1448E-003
y0 =	1.2409E+001	+/-	1.3765E-001

ANALYSIS OF MODEL RESIDUALS

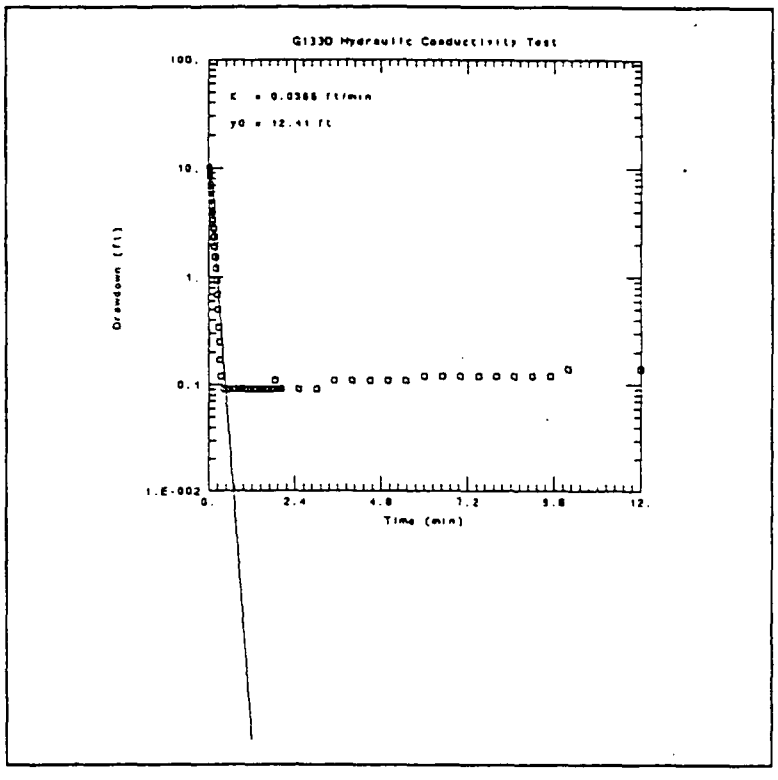
residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals.............. 28
- Number of estimated parameters.... 2
- Degrees of freedom............... 26
- Residual mean.................... -0.03708
- Residual standard deviation....... 0.202
- Residual variance................ 0.04082

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0166	10.17	10.443	-0.27253	1
0.02	10.09	10.08	0.009999	1
0.0233	9.94	9.7402	0.19982	1
0.0266	9.64	9.4118	0.22819	1
0.03	9.13	9.0851	0.044935	1
0.0333	8.48	8.7788	-0.29878	1
0.05	7.16	7.3801	-0.22011	1
0.0666	6.21	6.2107	-0.00073521	1
0.0833	5.32	5.2212	0.098784	1
0.1	4.57	4.3894	0.18065	1
0.1166	3.94	3.6939	0.24614	1
0.1333	3.35	3.1053	0.24466	1
0.15	2.81	2.6106	0.19942	1
0.1666	2.33	2.1969	0.13306	1

0.1833	1.9	1.8469	0.053087	1
0.2	1.54	1.5527	-0.012656	1
0.2166	1.2	1.3066	-0.10664	1
0.2333	0.93	1.0985	-0.16846	1
0.25	0.69	0.92345	-0.23345	1
0.2666	0.5	0.77713	-0.27713	1
0.2833	0.34	0.65331	-0.31331	1
0.3	0.25	0.54922	-0.29922	1
0.3166	0.17	0.4622	-0.2922	1
0.3333	0.12	0.38856	-0.26856	1
0.4167	0.			


G1330 Hydraulic Conductivity Test
K = 0.0386 ft/min
y0 = 12.41 ft
Drawdown (ft)
100.
10.
1.
0.1
1.E-002
0.
2.4
4.8
7.2
9.6
12.
Time (min)

G134

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S

02/15/92   17:30:53

PROBLEM DEFINITION

Problem title: G134 Hydraulic Conductivity Test

Knowns and Constants:
- No. of data points................ 80
- Radius of well casing............ 0.17
- Radius of well.................... 0.17
- Aquifer saturated thickness...... 32.5
- Well screen length............... 30
- Static height of water in well... 70.3
- Log(Re/Rw)....................... 4.57

ESTIMATION RESULTS

Analytical method: Bouwer and Rice (unconfined aquifer slug test)

PARAMETER ESTIMATES

	Estimate		Std. Error
K =	4.2535E-005	+/-	4.6711E-006
y0 =	1.7845E+000	+/-	3.6651E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 80
- Number of estimated parameters.... 2
- Degrees of freedom................ 78
- Residual mean..................... 0.0007668
- Residual standard deviation....... 0.2571
- Residual variance................. 0.06609

Model Residuals:

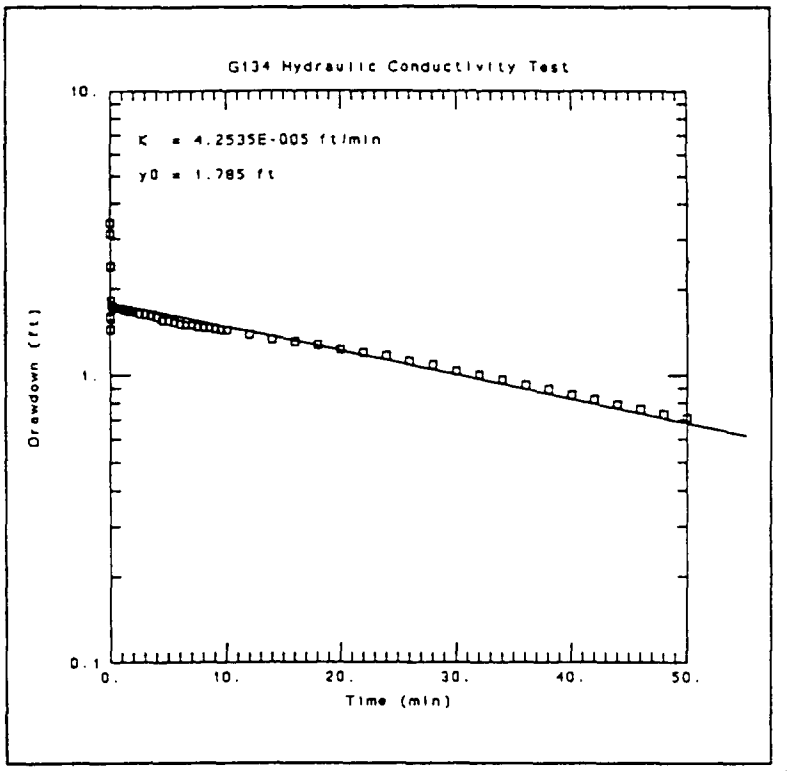
Time	Observed	Calculated	Residual	Weight
0.0166	2.39	1.7839	0.60607	1
0.02	3.4	1.7838	1.6162	1
0.0233	3.11	1.7837	1.3263	1
0.0266	1.44	1.7836	-0.34359	1
0.03	1.57	1.7835	-0.21347	1
0.0333	1.6	1.7834	-0.18336	1
0.05	1.81	1.7828	0.027219	1
0.0666	1.76	1.7822	-0.022209	1
0.0833	1.76	1.7816	-0.021634	1
0.1	1.74	1.7811	-0.041059	1
0.1166	1.74	1.7805	-0.040488	1
0.1333	1.73	1.7799	-0.049914	1
0.15	1.73	1.7793	-0.049339	1
0.1666	1.73	1.7788	-0.048769	1

0.1833	1.71	1.7782	-0.068195	1
0.2	1.73	1.7776	-0.047621	1
0.2166	1.7	1.7771	-0.077051	1
0.2333	1.73	1.7765	-0.046478	1
0.25	1.7	1.7759	-0.075905	1
0.2666	1.73	1.7753	-0.045335	1
0.2833	1.7	1.7748	-0.074762	1
0.3	1.73	1.7742	-0.04419	1
0.3166	1.7	1.7736	-0.073621	1
0.3333	1.71	1.773	-0.063048	1
0.4167	1.71	1.7702	-0.060194	1
0.5	1.71	1.7673	-0.057347	1
0.5833	1.71	1.7645	-0.054504	1
0.6667	1.71	1.7617	-0.051663	1
0.75	1.71	1.7588	-0.04883	1
0.8333	1.7	1.756	-0.056001	1
0.9167	1.7	1.7532	-0.053174	1
1	1.7	1.7504	-0.050354	1
1.0833	1.7	1.7475	-0.047539	1
1.1667	1.68	1.7447	-0.064725	1
1.25	1.68	1.7419	-0.061919	1
1.3333	1.68	1.7391	-0.059118	1
1.4166	1.68	1.7363	-0.056321	1
1.5	1.68	1.7335	-0.053525	1
1.5833	1.66	1.7307	-0.070737	1
1.6667	1.66	1.728	-0.06795	1
1.75	1.66	1.7252	-0.065171	1
1.8333	1.66	1.7224	-0.062397	1
1.9167	1.66	1.7196	-0.059623	1
2	1.65	1.7169	-0.066858	1
2.5	1.63	1.7004	-0.070351	1
3	1.62	1.684	-0.064003	1
3.5	1.6	1.6678	-0.067811	1
4	1.58	1.6518	-0.071776	1
4.5	1.55	1.6359	-0.085895	1
5	1.54	1.6202	-0.080166	1
5.5	1.52	1.6046	-0.084589	1
6	1.5	1.5892	-0.089161	1
6.5	1.49	1.5739	-0.083882	1
7	1.49	1.5587	-0.06875	1
7.5	1.47	1.5438	-0.073763	1
8	1.46	1.5289	-0.06892	1
8.5	1.46	1.5142	-0.05422	1
9	1.44	1.4997	-0.059661	1
9.5	1.43	1.4852	-0.055243	1
10	1.43	1.471	-0.040963	1
12	1.38	1.4152	-0.035202	1
14	1.33	1.3616	-0.031555	1
16	1.3	1.3099	-0.009942	1
18	1.27	1.2603	0.0097147	1
20	1.22	1.2125	0.007489	1
22	1.19	1.1665	0.023452	1
24	1.16	1.1223	0.037673	1
26	1.11	1.0798	0.030218	1
28	1.08	1.0389	0.04115	1
30	1.03	0.99947	0.03053	1
32	1	0.96158	0.038417	1
34	0.96	0.92513	0.034869	1
36	0.92	0.89006	0.029938	1
38	0.89	0.85632	0.033678	1
40	0.85	0.82386	0.026139	1
42	0.82	0.79263	0.02737	1
44	0.79	0.76258	0.027416	1
46	0.76	0.73368	0.026324	1
48	0.73	0.70586	0.024136	1
50	0.71	0.67911	0.030893	1

TYPE CURVE DATA

K = 4.25348E-005
y0 = 1.78450E+000

Time	Drawdown	Time	Drawdown	Time	Drawdown
0.000E+000	1.785E+000	5.000E+001	6.791E-001		


G134 Hydraulic Conductivity Test
K = 4.2535E-005 ft/min
y0 = 1.785 ft
Drawdown (ft)
10.
1.
0.1
0.
10.
20.
30.
40.
50.
Time (min)

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S

02/15/92 17:19:

PROBLEM DEFINITION

Problem title: G133S Hydraulic Conductivity Test

Knowns and Constants:
- No. of data points............... 32
- Radius of well casing............ 0.17
- Radius of well................... 0.17
- Aquifer saturated thickness...... 4.4
- Well screen length............... 10
- Static height of water in well... 4.4
- Log(Re/Rw)....................... 2.576

ESTIMATION RESULTS

Analytical method: Bouwer and Rice (unconfined aquifer slug test)

PARAMETER ESTIMATES

	Estimate		Std. Error
K =	1.2450E-001	+/-	6.7954E-003
y0 =	1.7181E+000	+/-	5.8871E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 23
- Number of estimated parameters.... 2
- Degrees of freedom................ 21
- Residual mean..................... 0.02558
- Residual standard deviation....... 0.05163
- Residual variance................. 0.002666

Model Residuals:

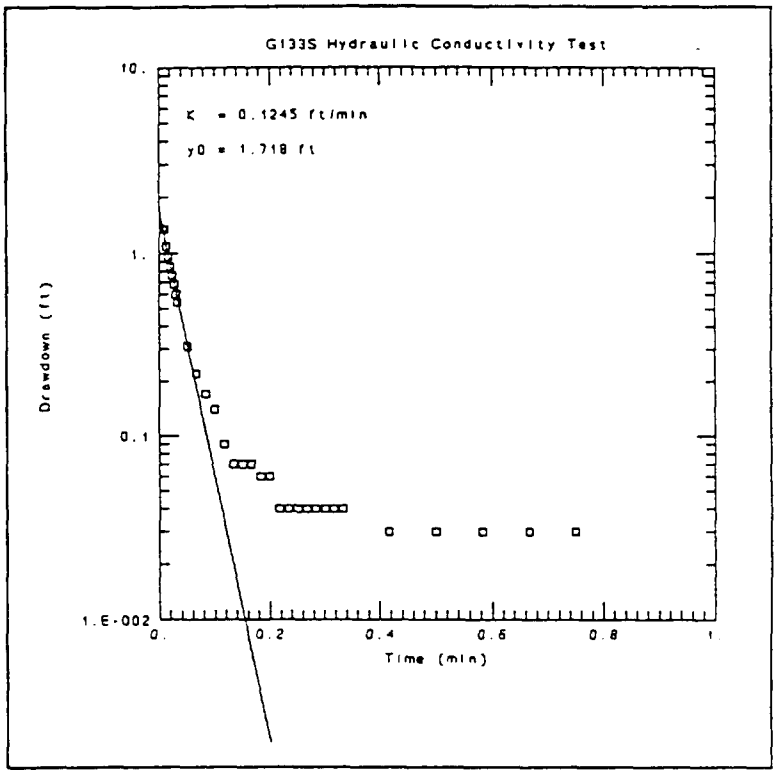
Time	Observed	Calculated	Residual	Weight
0.0066	1.36	1.3777	-0.017733	1
0.0099	1.35	1.2338	0.11625	1
0.0133	1.09	1.1011	-0.011125	1
0.0166	0.96	0.98605	-0.026049	1
0.02	0.85	0.88005	-0.030051	1
0.0233	0.76	0.78808	-0.02808	1
0.0266	0.68	0.70572	-0.02572	1
0.03	0.6	0.62986	-0.029856	1
0.0333	0.54	0.56403	-0.024032	1
0.05	0.31	0.32263	-0.012633	1
0.0666	0.22	0.18517	0.034832	1
0.0833	0.17	0.10592	0.064082	1
0.1	0.14	0.060586	0.079414	1
0.1166	0.09	0.034772	0.055228	1

0.1333	0.07	0.01989	0.05011	1
0.15	0.07	0.011377	0.058623	1
0.1666	0.07	0.0065298	0.06347	1
0.1833	0.06	0.0037351	0.056265	1
0.2	0.06	0.0021365	0.057863	1
0.2166	0.04	0.0012262	0.038774	1
0.2333	0.04	0.00070141	0.039299	1
0.25	0.04	0.00040122	0.039599	1
0.2666	0.04	0.00023027	0.03977	1

TYPE CURVE DATA

K = 1.24503E-001
y0 = 1.71807E+000

Time	Drawdown	Time	Drawdown	Time	Drawdown
0.000E+000	1.718E+000	1.000E+000	5.110E-015		


G133S Hydraulic Conductivity Test
K = 0.1245 ft/min
y0 = 1.718 ft
10.
1.
0.1
1.E-002
0.
0.2
0.4
0.6
0.8
1.
Drawdown (ft)
Time (min)

H

LANDFILL DATA

H-1

SUMMAR OF REFUSE THICKNESS AND LEACHATE THICKNESS DATA FROM BORING LOGS

Appendix H

Summary of Refuse Thickness and Leachate Thickness Data from Boring Logs

Blackwell Landfill Site
DuPage County, Illinois

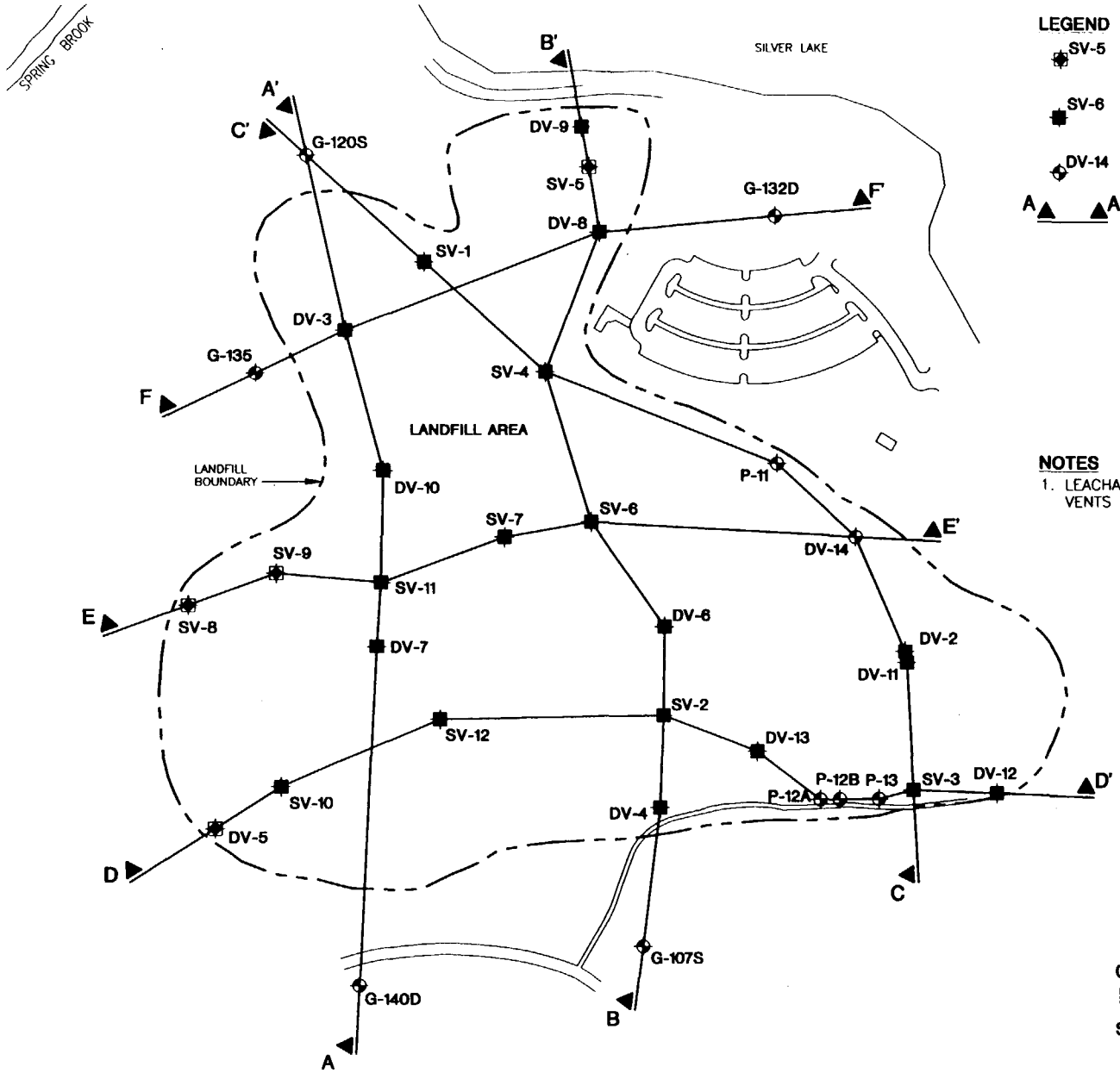
Drilling Location	Top of Refuse (ft MSL)	Base of Refuse (ft MSL)	Refuse Thickness (ft)	Avg Leachate Elevation (ft MSL)	Avg Leachate Thickness (ft)
SV-1	728.9	Below 718.9	>10	734.76	>16
SV-2	748.7	Below 707.2	>41.5	719.78	>12.5
SV-3	722.9	Below 717.9	>5	724.85	>7
SV-4	727.4	714.9	12.5	716.58	1.68
SV-5	723.9	699.9	24.0	718.32	18.42
SV-6	734.9	Below 713.9	>21	728.02	>14.5
SV-7	735.9	Below 718.9	>17	732.53	>14
SV-8	717.8	699.8	18.0	709.78	9.98
SV-9	726.2	701.2	25.0	709.84	8.63
SV-10	732.0	691.0	41.0	691.40	0.39
SV-11	757.9	Below 713.9	>44	734.05	>20.5
SV-12	771.7	Below 737.7	>34	760.65	>23
DV-1	776.9	Below 718.9	>58	NA	NA
DV-2	No Waste Encountered to a depth of 7			750.16	0.00
DV-3	737.1	707.6	29.5	736.74	29.14
DV-4	703.0	696.0	7.0	701.53	5.52
DV-5	706.9	694.9	12.0	696.16	1.26
DV-6	764.0	703.5	60.5	725.96	22.46
DV-7	773.0	704.5	68.5	726.77	22.27
DV-8	727.7	705.7	22.0	716.60	10.90
DV-9	727.1	711.1	16.0	718.41	7.31
DV-10	743.6	697.6	46.0	726.68	29.08
DV-11	728.0	709.0	19.0	748.56	39.56
DV-12	712.9	699.9	13.0	699.37	0.00
DV-13	728.0	693.0	35.0	711.81	18.80
DV-14	720.8	708.8	12.0	NA	NA
P-1	744.0	724.0	20.0	NA	NA
P-2	739.5	719.5	20.0	NA	NA
P-4	730.9	706.9	24.0	NA	NA
P-5	722.8	699.8	23.0	NA	NA
P-6	724.2	698.2	26.0	NA	NA
P-8	736.4	690.4	46.0	NA	NA
P-9	723.2	711.2	12.0	NA	NA
P-11	721.5	707.5	14.0	NA	NA
P-12	711.8	686.8	25.0	NA	NA
P-13	722.7	692.7	30.0	NA	NA

Note:

NA = Not Applicable, indicates that water level not measured in this vent, or vent not installed in this boring ("P" borings).
Boring logs contained in Appendix D-4.
Average Leachate Elevation Data contained in Table 3-1.

H-2

CROSS-SECTIONS OF LANDFILL CAP



LEGEND

- SV-5 — LEACHATE SAMPLING LOCATION AND NUMBER
- SV-6 — LEACHATE GAS VENT LOCATION AND NUMBER
- DV-14 — SOIL BORING LOCATION AND NUMBER
- A ▲ ▲ A' — CROSS SECTION LOCATION

NOTES

1. LEACHATE LEVELS WERE MEASURED AT ALL VENTS ILLUSTRATED.

FIGURE 1

CROSS SECTION LOCATION MAP - LANDFILL BORINGS

REMEDIAL INVESTIGATION REPORT
BLACKWELL LANDFILL SITE
Du PAGE COUNTY, ILLINOIS

Developed By: JAW
Drawn By: ELR
Approved By: [signature]
Date: 3/24/93
Reference:
Revisions:

Drawing Number
6072100B84

WARZYN

QUALITY CONTROL
Graphic Standards DLL 3-24-93
Lead Professional J.A.W. 3-24-93
Technical Review
Project Manager P.J.V. 3-24-93
Management Review
Other

WARZYN INC.

FIGURE 2

CROSS SECTION A - A´

MAY BE VIEWED AT

U.S. EPA REGION 5
77 W. JACKSON BLVD.
CHICAGO, IL 60604-3590

FIGURE 3

CROSS SECTION B - B′ AND C - C′

MAY BE VIEWED AT

U.S. EPA REGION 5
77 W. JACKSON BLVD.
CHICAGO, IL 60604-3590

FIGURE 4

CROSS SECTION D - D′

MAY BE VIEWED AT

U.S. EPA REGION 5
77 W. JACKSON BLVD.
CHICAGO, IL 60604-3590

FIGURE 5

CROSS SECTION E - E′ AND F - F′

MAY BE VIEWED AT

U.S. EPA REGION 5
77 W. JACKSON BLVD.
CHICAGO, IL 60604-3590

H-3

HELP MODEL SIMULATIONS

BLACKWELL LANDFILL SITE
HELP MODEL ESTIMATE OF LEACHATE GENERATION
AREA DESIGNATION: 1 RUN: JULY 17, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 78.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 39.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

BARRIER SOIL LINER
THICKNESS = 645.00 INCHES
POROSITY = 0.3949 VOL/VOL
FIELD CAPACITY = 0.2797 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3949 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000003200000 CM/SEC

LAYER 5

VERTICAL PERCOLATION LAYER
THICKNESS = 726.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 15400. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 9.0157 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 496.4103 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

.....

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.025	0.010	0.005	0.031	0.021	0.026
	0.162	0.040	0.041	0.068	0.001	0.001
STD. DEVIATIONS	0.079	0.030	0.018	0.102	0.084	0.048
	0.406	0.070	0.128	0.188	0.002	0.006
EVAPOTRANSPIRATION						
TOTALS	0.567	1.030	2.176	3.428	3.424	5.306
	4.215	4.235	2.664	1.765	0.957	0.673
STD. DEVIATIONS	0.144	0.250	0.312	0.544	1.277	1.207
	2.323	1.350	1.055	0.753	0.277	0.156
PERCOLATION FROM LAYER 4						
TOTALS	0.3131	0.4022	0.5644	0.5629	0.5672	0.4040
	0.3019	0.2367	0.1987	0.2540	0.2533	0.2903
STD. DEVIATIONS	0.3466	0.3680	0.4755	0.3219	0.3784	0.2004
	0.1130	0.0820	0.0659	0.3950	0.3489	0.3556
PERCOLATION FROM LAYER 5						
TOTALS	0.2962	0.2712	0.3009	0.2953	0.3100	0.3033
	0.3140	0.3130	0.3010	0.3096	0.2988	0.3084

STD. DEVIATIONS 0.0752 0.0695 0.0749 0.0719 0.0753 0.0740
0.0764 0.0754 0.0717 0.0735 0.0716 0.0749

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)	PERCENT
PRECIPITATION	35.37 (5.654)	45388.	100.00
RUNOFF	0.431 (0.478)	553.	1.22
EVAPOTRANSPIRATION	30.439 (4.825)	39064.	86.07
PERCOLATION FROM LAYER 4	4.3485 (1.8091)	5581.	12.30
PERCOLATION FROM LAYER 5	3.6215 (0.8745)	4648.	10.24
CHANGE IN WATER STORAGE	0.876 (2.504)	1124.	2.48

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	4504.5
RUNOFF	1.599	2052.7
PERCOLATION FROM LAYER 4	0.0900	115.5
HEAD ON LAYER 4	0.0	
PERCOLATION FROM LAYER 5	0.0142	18.2
SNOW WATER	2.47	3167.3

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2635
2	27.50	0.3525
3	2.44	0.0625
4	254.71	0.3949
5	226.69	0.3122

SNOW WATER 0.00

BLACKWELL LANDFILL SITE
HELP MODEL ESTIMATE OF LEACHATE GENERATION
AREA DESIGNATION: 2 RUN: JULY 17, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 345.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 662.00 INCHES
POROSITY = 0.5200 VOL/VOL

FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 247100. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 9.0160 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 303.3142 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95

STD. DEVIATIONS 0.92 0.71 1.26 1.48 1.34 1.82
3.34 1.87 1.99 2.05 0.72 0.64

RUNOFF

TOTALS 0.025 0.010 0.005 0.031 0.021 0.026
0.162 0.040 0.041 0.068 0.001 0.001

STD. DEVIATIONS 0.079 0.030 0.018 0.102 0.084 0.048
0.405 0.070 0.128 0.188 0.002 0.006

EVAPOTRANSPIRATION

TOTALS 0.567 1.030 2.175 3.427 3.424 5.307
4.215 4.235 2.663 1.765 0.957 0.673

STD. DEVIATIONS 0.144 0.250 0.312 0.544 1.277 1.207
2.323 1.350 1.055 0.753 0.277 0.155

PERCOLATION FROM LAYER 3

TOTALS 0.2706 0.2471 0.2719 0.2643 0.2748 0.2675
0.2777 0.2786 0.2702 0.2796 0.2710 0.2805

STD. DEVIATIONS 0.0803 0.0736 0.0800 0.0773 0.0802 0.0781
0.0810 0.0811 0.0784 0.0811 0.0786 0.0814

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)	PERCENT
PRECIPITATION	35.37 (5.654)	728276.	100.00
RUNOFF	0.431 (0.478)	8869.	1.22
EVAPOTRANSPIRATION	30.437 (4.824)	626753.	86.06
PERCOLATION FROM LAYER 3	3.2537 (0.9488)	66999.	9.20
CHANGE IN WATER STORAGE	1.246 (2.493)	25654.	3.52

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	72276.7

RUNOFF	1.599	32935.6
PERCOLATION FROM LAYER 3	0.0125	258.2
SNOW WATER	2.47	50826.5

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	120.41	0.3490
3	205.23	0.3100

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
HELP MODEL ESTIMATE OF LEACHATE GENERATION
AREA DESIGNATION: 3 RUN: JULY 18, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 123.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 8.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 490.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 176800. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 9.0159 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 184.3022 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.025	0.010	0.005	0.031	0.021	0.026
	0.162	0.040	0.041	0.068	0.001	0.001
STD. DEVIATIONS	0.079	0.030	0.018	0.102	0.084	0.048
	0.405	0.070	0.128	0.188	0.002	0.006
EVAPOTRANSPIRATION						
TOTALS	0.567	1.030	2.175	3.428	3.424	5.306
	4.215	4.235	2.663	1.765	0.957	0.673
STD. DEVIATIONS	0.144	0.250	0.312	0.544	1.277	1.207
	2.323	1.350	1.055	0.753	0.277	0.156
PERCOLATION FROM LAYER 4						
TOTALS	0.3046	0.2780	0.3069	0.3005	0.3151	0.3093
	0.3219	0.3221	0.3107	0.3194	0.3079	0.3174
STD. DEVIATIONS	0.0875	0.0806	0.0876	0.0846	0.0880	0.0862
	0.0894	0.0887	0.0846	0.0861	0.0825	0.0851

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	521081.	100.00
RUNOFF	0.431	(0.478)	6346.	1.22
EVAPOTRANSPIRATION	30.438	(4.824)	448450.	86.06
PERCOLATION FROM LAYER 4	3.7139	(1.0174)	54718.	10.50

CHANGE IN WATER STORAGE 0.785 (2.583) 11568. 2.22

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	51714.0
RUNOFF	1.599	23565.6
PERCOLATION FROM LAYER 4	0.0153	225.3
SNOW WATER	2.47	36365.2

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	43.69	0.3552
3	0.99	0.1239
4	152.81	0.3118

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
HELP MODEL ESTIMATE OF LEACHATE GENERATION
AREA DESIGNATION: 4 RUN: JULY 17, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 8.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 140.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 312.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 55000. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.2180 INCHES
INITIAL VEG. STORAGE = 5.8847 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 104.4754 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.021	0.007	0.004	0.024	0.018	0.025
	0.162	0.038	0.035	0.066	0.000	0.001
STD. DEVIATIONS	0.069	0.018	0.016	0.083	0.075	0.047
	0.407	0.067	0.103	0.179	0.002	0.003
EVAPOTRANSPIRATION						
TOTALS	0.578	1.056	2.165	3.417	3.347	4.636
	4.110	4.154	2.656	1.803	0.989	0.696
STD. DEVIATIONS	0.154	0.269	0.358	0.556	1.246	1.383
	2.274	1.303	1.058	0.772	0.305	0.167
PERCOLATION FROM LAYER 4						
TOTALS	0.3608	0.3324	0.3734	0.3713	0.3943	0.3880
	0.4011	0.3972	0.3783	0.3850	0.3690	0.3804
STD. DEVIATIONS	0.1277	0.1206	0.1353	0.1338	0.1405	0.1370
	0.1399	0.1355	0.1259	0.1249	0.1181	0.1226

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	162101.	100.00
RUNOFF	0.401	(0.462)	1838.	1.13
EVAPOTRANSPIRATION	29.606	(4.741)	135695.	83.71
PERCOLATION FROM LAYER 4	4.5312	(1.5293)	20768.	12.81

CHANGE IN WATER STORAGE 0.829 (2.741) 3800. 2.34

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	16087.5
RUNOFF	1.603	7347.2
PERCOLATION FROM LAYER 4	0.0212	97.0
SNOW WATER	2.46	11283.6

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2785

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0948

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2634
2	2.78	0.3479
3	17.22	0.1230
4	99.46	0.3188

SNOW WATER 0.00

BLACKWELL LANDFILL SITE
HELP MODEL ESTIMATE OF LEACHATE GENERATION
AREA DESIGNATION: 5 RUN: JULY 17, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 156.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 84.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 240.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 95800. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 9.0164 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 125.7378 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.024	0.010	0.005	0.031	0.021	0.026
	0.162	0.040	0.041	0.068	0.001	0.001
STD. DEVIATIONS	0.079	0.030	0.018	0.102	0.084	0.048
	0.405	0.070	0.128	0.188	0.002	0.006
EVAPOTRANSPIRATION						
TOTALS	0.567	1.030	2.174	3.426	3.423	5.309
	4.216	4.235	2.667	1.767	0.956	0.672
STD. DEVIATIONS	0.144	0.250	0.311	0.543	1.276	1.207
	2.323	1.350	1.048	0.745	0.277	0.155
PERCOLATION FROM LAYER 4						
TOTALS	0.3056	0.2776	0.3043	0.2958	0.3084	0.3022
	0.3162	0.3191	0.3103	0.3207	0.3096	0.3189
STD. DEVIATIONS	0.1196	0.1083	0.1175	0.1141	0.1190	0.1166
	0.1218	0.1223	0.1179	0.1204	0.1146	0.1161

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	282351.	100.00
RUNOFF	0.431	(0.478)	3438.	1.22
EVAPOTRANSPIRATION	30.440	(4.829)	243014.	86.07
PERCOLATION FROM LAYER 4	3.6885	(1.3793)	29446.	10.43

CHANGE IN WATER STORAGE 0.808 (2.764) 6451. 2.28

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	28021.5
RUNOFF	1.599	12768.6
PERCOLATION FROM LAYER 4	0.0175	139.4
SNOW WATER	2.47	19709.0

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	55.32	0.3546
3	10.01	0.1191
4	74.27	0.3095

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
HELP MODEL ESTIMATE OF LEACHATE GENERATION
AREA DESIGNATION: 6 RUN: JULY 17, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 42.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 45.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

BARRIER SOIL LINER
THICKNESS = 84.00 INCHES
POROSITY = 0.3949 VOL/VOL
FIELD CAPACITY = 0.2797 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3949 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000003200000 CM/SEC

LAYER 5

VERTICAL PERCOLATION LAYER
THICKNESS = 156.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 61850. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 9.0160 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 96.3774 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.024	0.010	0.005	0.031	0.021	0.026
	0.162	0.040	0.041	0.068	0.001	0.001
STD. DEVIATIONS	0.079	0.030	0.018	0.102	0.084	0.048
	0.405	0.070	0.128	0.188	0.002	0.006
EVAPOTRANSPIRATION						
TOTALS	0.567	1.030	2.174	3.427	3.423	5.308
	4.215	4.235	2.667	1.767	0.957	0.672
STD. DEVIATIONS	0.144	0.250	0.311	0.543	1.277	1.207
	2.323	1.350	1.048	0.745	0.277	0.155
PERCOLATION FROM LAYER 4						
TOTALS	0.3936	0.5875	0.7063	0.6766	0.5632	0.2921
	0.1801	0.1268	0.1518	0.2201	0.2364	0.3057
STD. DEVIATIONS	0.4562	0.6402	0.5851	0.4654	0.4998	0.1217
	0.0679	0.0633	0.2784	0.6144	0.6095	0.4341
PERCOLATION FROM LAYER 5						
TOTALS	0.2994	0.2923	0.3558	0.3706	0.4071	0.3928
	0.3852	0.3602	0.3259	0.3257	0.3096	0.3197

STD. DEVIATIONS 0.1343 0.1488 0.1762 0.1665 0.1630 0.1497
0.1373 0.1188 0.0992 0.0953 0.1063 0.1353

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	182290.	100.00
RUNOFF	0.431	(0.478)	2220.	1.22
EVAPOTRANSPIRATION	30.443	(4.830)	156907.	86.08
PERCOLATION FROM LAYER 4	4.4401	(1.9299)	22885.	12.55
PERCOLATION FROM LAYER 5	4.1444	(1.4058)	21361.	11.72
CHANGE IN WATER STORAGE	0.350	(2.764)	1802.	0.99

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	18091.1
RUNOFF	1.599	8243.9
PERCOLATION FROM LAYER 4	0.1106	570.1
HEAD ON LAYER 4	1.4	
PERCOLATION FROM LAYER 5	0.0264	136.3
SNOW WATER	2.47	12722.3

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	14.50	0.3452
3	2.81	0.0625
4	33.17	0.3949
5	50.57	0.3241

SNOW WATER 0.00

BLACKWELL LANDFILL SITE
HELP MODEL ESTIMATE OF LEACHATE GENERATION
AREA DESIGNATION: 7 RUN: JULY 17, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 91.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 38.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 345.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 387400. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 9.0161 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 133.5824 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.024	0.010	0.005	0.031	0.021	0.026
	0.162	0.040	0.041	0.068	0.001	0.001
STD. DEVIATIONS	0.079	0.030	0.018	0.102	0.084	0.048
	0.405	0.070	0.128	0.188	0.002	0.006
EVAPOTRANSPIRATION						
TOTALS	0.567	1.030	2.174	3.427	3.423	5.308
	4.215	4.235	2.667	1.767	0.956	0.672
STD. DEVIATIONS	0.144	0.250	0.311	0.543	1.277	1.207
	2.323	1.350	1.048	0.745	0.277	0.155
PERCOLATION FROM LAYER 4						
TOTALS	0.3107	0.2827	0.3117	0.3060	0.3222	0.3182
	0.3331	0.3341	0.3220	0.3299	0.3169	0.3258
STD. DEVIATIONS	0.0990	0.0917	0.1015	0.0995	0.1037	0.1015
	0.1054	0.1045	0.0990	0.0995	0.0937	0.0954

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	1141781.	100.00
RUNOFF	0.431	(0.478)	13904.	1.22
EVAPOTRANSPIRATION	30.443	(4.830)	982789.	86.08
PERCOLATION FROM LAYER 4	3.8134	(1.1644)	123109.	10.78

CHANGE IN WATER STORAGE 0.681 (2.674) 21980. 1.93

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	113314.5
RUNOFF	1.599	51635.7
PERCOLATION FROM LAYER 4	0.0172	556.9
SNOW WATER	2.47	79687.8

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	32.21	0.3540
3	4.80	0.1263
4	107.77	0.3124

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
HELP MODEL ESTIMATE OF LEACHATE GENERATION
AREA DESIGNATION: 8 RUN: JULY 17, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 39.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 208.00 INCHES
POROSITY = 0.5200 VOL/VOL

FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 133450. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 9.0159 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 74.7650 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95

STD. DEVIATIONS 0.92 0.71 1.26 1.48 1.34 1.82
3.34 1.87 1.99 2.05 0.72 0.64

RUNOFF

TOTALS 0.025 0.010 0.005 0.031 0.021 0.026
0.162 0.040 0.041 0.068 0.001 0.001

STD. DEVIATIONS 0.079 0.030 0.018 0.102 0.084 0.048
0.405 0.070 0.128 0.188 0.002 0.006

EVAPOTRANSPIRATION

TOTALS 0.567 1.030 2.175 3.428 3.424 5.306
4.215 4.235 2.663 1.765 0.957 0.673

STD. DEVIATIONS 0.144 0.250 0.312 0.544 1.277 1.207
2.323 1.350 1.055 0.753 0.277 0.156

PERCOLATION FROM LAYER 3

TOTALS 0.3059 0.2945 0.3502 0.3597 0.3907 0.3775
0.3750 0.3563 0.3276 0.3300 0.3141 0.3235

STD. DEVIATIONS 0.1169 0.1255 0.1468 0.1376 0.1387 0.1293
0.1220 0.1088 0.0937 0.0919 0.0964 0.1159

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	393316.	100.00
RUNOFF	0.431	(0.478)	4790.	1.22
EVAPOTRANSPIRATION	30.438	(4.824)	338497.	86.06
PERCOLATION FROM LAYER 3	4.1052	(1.2797)	45653.	11.61
CHANGE IN WATER STORAGE	0.394	(2.702)	4377.	1.11

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	39034.1

RUNOFF	1.599	17787.5
PERCOLATION FROM LAYER 3	0.0231	257.4
SNOW WATER	2.47	27448.3

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	13.43	0.3443
3	66.81	0.3212

SNOW WATER 0.00

BLACKWELL LANDFILL SITE
HELP MODEL ESTIMATE OF LEACHATE GENERATION
AREA DESIGNATION: 9 RUN: JULY 17, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 96.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 372.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 110000. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.1640 INCHES
INITIAL VEG. STORAGE = 5.1467 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 118.7610 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.016	0.003	0.003	0.021	0.016	0.024
	0.152	0.036	0.031	0.059	0.000	0.000
STD. DEVIATIONS	0.055	0.010	0.015	0.074	0.067	0.047
	0.386	0.062	0.084	0.156	0.000	0.001
EVAPOTRANSPIRATION						
TOTALS	0.585	1.066	2.183	3.349	3.334	4.388
	4.097	4.088	2.653	1.855	0.985	0.704
STD. DEVIATIONS	0.170	0.275	0.344	0.559	1.214	1.451
	2.271	1.335	1.085	0.759	0.319	0.171
PERCOLATION FROM LAYER 4						
TOTALS	0.3911	0.3626	0.4109	0.4099	0.4361	0.4265
	0.4371	0.4301	0.4076	0.4148	0.3984	0.4121
STD. DEVIATIONS	0.1256	0.1196	0.1346	0.1319	0.1386	0.1352
	0.1366	0.1300	0.1193	0.1182	0.1139	0.1204

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	324202.	100.00
RUNOFF	0.362	(0.431)	3316.	1.02
EVAPOTRANSPIRATION	29.287	(4.726)	268463.	82.81
PERCOLATION FROM LAYER 4	4.9372	(1.4810)	45257.	13.96

CHANGE IN WATER STORAGE	0.782	(2.660)	7167.	2.21

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)	
PRECIPITATION	3.51	32175.0	
RUNOFF	1.516	13899.5	
PERCOLATION FROM LAYER 4	0.0218	199.8	
SNOW WATER	2.46	22554.8	

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2540

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0831

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2634
2	1.66	0.2760
3	11.75	0.1224
4	119.70	0.3218

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
HELP MODEL ESTIMATE OF LEACHATE GENERATION
AREA DESIGNATION: 10 RUN: JULY 17, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 26.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 123.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 375.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 159600. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 9.0163 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 127.5364 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.024	0.010	0.005	0.031	0.021	0.026
	0.162	0.040	0.041	0.068	0.001	0.001
STD. DEVIATIONS	0.079	0.030	0.018	0.102	0.084	0.048
	0.405	0.070	0.128	0.188	0.002	0.006
EVAPOTRANSPIRATION						
TOTALS	0.567	1.030	2.174	3.426	3.423	5.309
	4.216	4.235	2.667	1.767	0.956	0.672
STD. DEVIATIONS	0.144	0.250	0.311	0.543	1.276	1.207
	2.323	1.350	1.048	0.745	0.277	0.155
PERCOLATION FROM LAYER 4						
TOTALS	0.2991	0.2732	0.3027	0.2976	0.3137	0.3089
	0.3216	0.3214	0.3090	0.3168	0.3047	0.3137
STD. DEVIATIONS	0.1017	0.0940	0.1030	0.1002	0.1050	0.1032
	0.1070	0.1059	0.1006	0.1017	0.0969	0.0998

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	470388.	100.00
RUNOFF	0.431	(0.478)	5728.	1.22
EVAPOTRANSPIRATION	30.441	(4.829)	404862.	86.07
PERCOLATION FROM LAYER 4	3.6824	(1.1987)	48976.	10.41

CHANGE IN WATER STORAGE 0.814 (2.673) 10821. 2.30

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PEAK DAILY-VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	46683.0
RUNOFF	1.599	21272.3
PERCOLATION FROM LAYER 4	0.0166	220.7
SNOW WATER	2.47	32833.6

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	8.85	0.3404
3	15.29	0.1243
4	117.24	0.3126

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
LEACHATE GENERATION DURING OPERATIONS
PERIOD 1: 1965-1967 RUN: JULY 18, 1994

BARE GROUND

LAYER 1

VERTICAL PERCOLATION LAYER

THICKNESS = 62.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 89.04
TOTAL AREA OF COVER = 1442400. SQ FT
EVAPORATIVE ZONE DEPTH = 4.00 INCHES
POTENTIAL RUNOFF FRACTION = 0.000000
UPPER LIMIT VEG. STORAGE = 2.0800 INCHES
INITIAL VEG. STORAGE = 1.1821 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 18.2404 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 0.00
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.613	1.023	1.766	2.715	2.479	2.792
	2.800	2.645	1.878	1.559	0.895	0.764
STD. DEVIATIONS	0.187	0.214	0.572	0.859	1.020	1.352
	1.647	1.150	0.984	0.703	0.359	0.194
PERCOLATION FROM LAYER 1						
TOTALS	0.9903	0.9687	0.9364	0.9811	0.9624	0.8923
	1.4425	1.4647	1.2439	1.2977	1.1790	1.0875
STD. DEVIATIONS	0.3429	0.4480	0.3541	0.5371	0.5965	0.4114
	1.0089	0.7971	0.6667	0.6761	0.7347	0.4007

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	4251173.	100.00
RUNOFF	0.000	(0.000)	0.	0.00
EVAPOTRANSPIRATION	21.929	(3.350)	2635903.	62.00
PERCOLATION FROM LAYER 1	13.4465	(2.8538)	1616266.	38.02
CHANGE IN WATER STORAGE	-0.008	(0.959)	-995.	-0.02

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	421902.0
RUNOFF	0.000	0.0
PERCOLATION FROM LAYER 1	0.4803	57728.9
SNOW WATER	2.43	292373.9

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4895

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1214

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	20.68	0.3335

SNOW WATER 0.00

BLACKWELL LANDFILL SITE
LEACHATE GENERATION DURING OPERATIONS
PERIOD 2: 1967-1973 RUN: JULY 18, 1994

BARE GROUND

LAYER 1

VERTICAL PERCOLATION LAYER

THICKNESS = 217.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 89.04
TOTAL AREA OF COVER = 1442400. SQ FT
EVAPORATIVE ZONE DEPTH = 4.00 INCHES
POTENTIAL RUNOFF FRACTION = 0.000000
UPPER LIMIT VEG. STORAGE = 2.0800 INCHES
INITIAL VEG. STORAGE = 1.1821 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 63.8414 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 0.00
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.613	1.023	1.766	2.715	2.479	2.792
	2.800	2.645	1.878	1.559	0.895	0.764
STD. DEVIATIONS	0.187	0.214	0.572	0.859	1.020	1.352
	1.647	1.150	0.984	0.703	0.359	0.194
PERCOLATION FROM LAYER 1						
TOTALS	1.0677	0.9774	1.0348	0.9928	1.0166	0.9655
	1.1137	1.2294	1.1821	1.2114	1.1707	1.1715
STD. DEVIATIONS	0.2690	0.2473	0.2574	0.2187	0.2704	0.2721
	0.3320	0.4255	0.4159	0.4024	0.3679	0.3058

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	4251173.	100.00
RUNOFF	0.000	(0.000)	0.	0.00
EVAPOTRANSPIRATION	21.929	(3.350)	2635903.	62.00
PERCOLATION FROM LAYER 1	13.1336	(2.5005)	1578661.	37.13
CHANGE IN WATER STORAGE	0.305	(2.044)	36610.	0.86

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	421902.0
RUNOFF	0.000	0.0
PERCOLATION FROM LAYER 1	0.0852	10245.0
SNOW WATER	2.43	292373.9

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4895

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1214

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	75.26	0.3468

SNOW WATER 0.00

BLACKWELL LANDFILL SITE
LEACHATE GENERATION DURING OPERATIONS
PERIOD 3: 1973-1975 RUN: JULY 18, 1994

FAIR GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 96.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000192000007 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 372.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.00
TOTAL AREA OF COVER = 1442400. SQ FT

EVAPORATIVE ZONE DEPTH = 20.00 INCHES
UPPER LIMIT VEG. STORAGE = 9.2800 INCHES
INITIAL VEG. STORAGE = 6.7029 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 139.2408 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 2.00
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.031	0.015	0.004	0.031	0.030	0.044
	0.210	0.055	0.046	0.084	0.002	0.001
STD. DEVIATIONS	0.098	0.042	0.017	0.111	0.127	0.104
	0.496	0.106	0.137	0.221	0.006	0.005
EVAPOTRANSPIRATION						
TOTALS	0.587	1.077	2.249	3.507	3.317	4.387

4.249 4.096 2.568 1.889 1.006 0.717

STD. DEVIATIONS 0.167 0.276 0.357 0.545 1.400 1.289
2.355 1.328 1.105 0.789 0.347 0.176

PERCOLATION FROM LAYER 2

TOTALS 0.3643 0.3359 0.3774 0.3744 0.3962 0.3875
0.3993 0.3953 0.3767 0.3839 0.3684 0.3800

STD. DEVIATIONS 0.1074 0.1016 0.1133 0.1112 0.1169 0.1137
0.1158 0.1118 0.1038 0.1027 0.0968 0.0999

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	4251173.	100.00
RUNOFF	0.553	(0.589)	66524.	1.56
EVAPOTRANSPIRATION	29.647	(4.809)	3563619.	83.83
PERCOLATION FROM LAYER 2	4.5392	(1.2674)	545615.	12.83
CHANGE IN WATER STORAGE	0.627	(2.477)	75415.	1.77

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	421902.0
RUNOFF	1.897	228000.5
PERCOLATION FROM LAYER 2	0.0195	2339.6
SNOW WATER	2.45	294898.6

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4231

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1853

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	33.82	0.3523
2	117.62	0.3162

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
SENSITIVITY ANALYSIS, ISWC = FC
AREA DESIGNATION: 2 RUN: JULY 18, 1994

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GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 345.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 662.00 INCHES
POROSITY = 0.5200 VOL/VOL

FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 247100. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 9.0160 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 303.3142 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95

STD. DEVIATIONS 0.92 0.71 1.26 1.48 1.34 1.82
3.34 1.87 1.99 2.05 0.72 0.64

RUNOFF

TOTALS 0.025 0.010 0.005 0.031 0.021 0.026
0.162 0.040 0.041 0.068 0.001 0.001

STD. DEVIATIONS 0.079 0.030 0.018 0.102 0.084 0.048
0.405 0.070 0.128 0.188 0.002 0.006

EVAPOTRANSPIRATION

TOTALS 0.567 1.030 2.175 3.427 3.424 5.307
4.215 4.235 2.663 1.765 0.957 0.673

STD. DEVIATIONS 0.144 0.250 0.312 0.544 1.277 1.207
2.323 1.350 1.055 0.753 0.277 0.155

PERCOLATION FROM LAYER 3

TOTALS 0.2706 0.2471 0.2719 0.2643 0.2748 0.2675
0.2777 0.2786 0.2702 0.2796 0.2710 0.2805

STD. DEVIATIONS 0.0803 0.0736 0.0800 0.0773 0.0802 0.0781
0.0810 0.0811 0.0784 0.0811 0.0786 0.0814

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)	PERCENT
PRECIPITATION	35.37 (5.654)	728276.	100.00
RUNOFF	0.431 (0.478)	8869.	1.22
EVAPOTRANSPIRATION	30.437 (4.824)	626753.	86.06
PERCOLATION FROM LAYER 3	3.2537 (0.9488)	66999.	9.20
CHANGE IN WATER STORAGE	1.246 (2.493)	25654.	3.52

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	72276.7

RUNOFF	1.599	32935.6
PERCOLATION FROM LAYER 3	0.0125	258.2
SNOW WATER	2.47	50826.5

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	120.41	0.3490
3	205.23	0.3100

SNOW WATER 0.00

BLACKWELL LANDFILL SITE
SENSITIVITY ANALYSIS, ISWC @ 10% LOWER THAN FC
AREA DESIGNATION: 2 RUN: JULY 18, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 345.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 662.00 INCHES
POROSITY = 0.5200 VOL/VOL

FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2648 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 247100. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 8.2946 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 283.8514 INCHES

SOIL WATER CONTENT INITIALIZED BY USER.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95

STD. DEVIATIONS 0.92 0.71 1.26 1.48 1.34 1.82
3.34 1.87 1.99 2.05 0.72 0.64

RUNOFF

TOTALS 0.024 0.010 0.005 0.031 0.021 0.026
0.162 0.040 0.041 0.068 0.001 0.001

STD. DEVIATIONS 0.079 0.030 0.018 0.102 0.084 0.048
0.406 0.070 0.128 0.188 0.002 0.006

EVAPOTRANSPIRATION

TOTALS 0.568 1.033 2.177 3.418 3.423 5.308
4.215 4.235 2.668 1.770 0.955 0.672

STD. DEVIATIONS 0.144 0.253 0.310 0.541 1.277 1.206
2.323 1.350 1.047 0.748 0.274 0.155

PERCOLATION FROM LAYER 3

TOTALS 0.1916 0.1758 0.1940 0.1892 0.1974 0.1929
0.2011 0.2025 0.1970 0.2046 0.1991 0.2068

STD. DEVIATIONS 0.1129 0.1033 0.1128 0.1092 0.1133 0.1101
0.1142 0.1143 0.1106 0.1144 0.1109 0.1148

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)	PERCENT
PRECIPITATION	35.37 (5.654)	728276.	100.00
RUNOFF	0.431 (0.478)	8869.	1.22
EVAPOTRANSPIRATION	30.443 (4.830)	626882.	86.08
PERCOLATION FROM LAYER 3	2.3520 (1.3396)	48432.	6.65
CHANGE IN WATER STORAGE	2.141 (2.536)	44093.	6.05

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	72276.7

RUNOFF	1.599	32936.0
PERCOLATION FROM LAYER 3	0.0121	248.8
SNOW WATER	2.47	50834.8

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	120.42	0.3490
3	204.68	0.3092

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
SENSITIVITY ANALYSIS, ISWC 0.1 UNITS LOWER THAN FC
AREA DESIGNATION: 2 RUN: JULY 18, 1994

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GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 345.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER

THICKNESS = 662.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.1942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 247100. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 8.2946 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 237.1142 INCHES

SOIL WATER CONTENT INITIALIZED BY USER.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.025	0.010	0.005	0.031	0.021	0.026
	0.162	0.040	0.041	0.068	0.001	0.001
STD. DEVIATIONS	0.079	0.030	0.018	0.102	0.084	0.048
	0.405	0.070	0.128	0.188	0.002	0.006
EVAPOTRANSPIRATION						
TOTALS	0.568	1.032	2.179	3.400	3.411	5.316
	4.216	4.235	2.664	1.780	0.952	0.672
STD. DEVIATIONS	0.144	0.252	0.314	0.534	1.277	1.198
	2.324	1.350	1.053	0.754	0.278	0.155
PERCOLATION FROM LAYER 3						
TOTALS	0.0388	0.0361	0.0402	0.0397	0.0420	0.0415
	0.0439	0.0447	0.0441	0.0464	0.0457	0.0482
STD. DEVIATIONS	0.0528	0.0492	0.0542	0.0532	0.0559	0.0550
	0.0578	0.0587	0.0576	0.0605	0.0596	0.0628

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	728276.	100.00
RUNOFF	0.431	(0.478)	8877.	1.22
EVAPOTRANSPIRATION	30.424	(4.795)	626474.	86.02
PERCOLATION FROM LAYER 3	0.5114	(0.6770)	10530.	1.45
CHANGE IN WATER STORAGE	4.001	(2.318)	82395.	11.31

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	72276.7
RUNOFF	1.599	32932.1
PERCOLATION FROM LAYER 3	0.0066	135.5
SNOW WATER	2.47	50865.7

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4039

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2637
2	120.41	0.3490
3	195.15	0.2948

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
SENSITIVITY ANALYSIS, ISWC = FC
AREA DESIGNATION: 4 RUN: JULY 18, 1994

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GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 8.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 140.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 312.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 55000. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.2180 INCHES
INITIAL VEG. STORAGE = 5.8847 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 104.4754 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.021	0.007	0.004	0.024	0.018	0.025
	0.162	0.038	0.035	0.066	0.000	0.001
STD. DEVIATIONS	0.069	0.018	0.016	0.083	0.075	0.047
	0.407	0.067	0.103	0.179	0.002	0.003
EVAPOTRANSPIRATION						
TOTALS	0.578	1.056	2.165	3.417	3.347	4.636
	4.110	4.154	2.656	1.803	0.989	0.696
STD. DEVIATIONS	0.154	0.269	0.358	0.556	1.246	1.383
	2.274	1.303	1.058	0.772	0.305	0.167
PERCOLATION FROM LAYER 4						
TOTALS	0.3608	0.3324	0.3734	0.3713	0.3943	0.3880
	0.4011	0.3972	0.3783	0.3850	0.3690	0.3804
STD. DEVIATIONS	0.1277	0.1206	0.1353	0.1338	0.1405	0.1370
	0.1399	0.1355	0.1259	0.1249	0.1181	0.1226

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	162101.	100.00
RUNOFF	0.401	(0.462)	1838.	1.13
EVAPOTRANSPIRATION	29.606	(4.741)	135695.	83.71
PERCOLATION FROM LAYER 4	4.5312	(1.5293)	20768.	12.81

CHANGE IN WATER STORAGE 0.829 (2.741) 3800. 2.34

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	16087.5
RUNOFF	1.603	7347.2
PERCOLATION FROM LAYER 4	0.0212	97.0
SNOW WATER	2.46	11283.6

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2785

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0948

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2634
2	2.78	0.3479
3	17.22	0.1230
4	99.46	0.3188

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
SENSITIVITY ANALYSIS, ISWC @ 10% LOWER THAN FC
AREA DESIGNATION: 4 RUN: JULY 18, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 8.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 140.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 312.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2647 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 55000. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.2180 INCHES
INITIAL VEG. STORAGE = 4.8226 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 95.2714 INCHES

SOIL WATER CONTENT INITIALIZED BY USER.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.021	0.007	0.004	0.024	0.018	0.025
	0.162	0.038	0.035	0.066	0.000	0.001
STD. DEVIATIONS	0.069	0.018	0.016	0.083	0.075	0.047
	0.407	0.067	0.103	0.179	0.002	0.003
EVAPOTRANSPIRATION						
TOTALS	0.577	1.055	2.164	3.416	3.333	4.650
	4.110	4.154	2.655	1.801	0.988	0.695
STD. DEVIATIONS	0.154	0.269	0.358	0.556	1.259	1.383
	2.274	1.303	1.058	0.771	0.304	0.166
PERCOLATION FROM LAYER 4						
TOTALS	0.3218	0.2968	0.3338	0.3324	0.3539	0.3490
	0.3615	0.3584	0.3416	0.3483	0.3346	0.3458
STD. DEVIATIONS	0.1632	0.1513	0.1679	0.1649	0.1733	0.1693
	0.1735	0.1694	0.1589	0.1592	0.1515	0.1568

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	162101.	100.00
RUNOFF	0.401	(0.462)	1838.	1.13
EVAPOTRANSPIRATION	29.600	(4.739)	135665.	83.69
PERCOLATION FROM LAYER 4	4.0779	(1.9347)	18691.	11.53

CHANGE IN WATER STORAGE 1.289 (2.940) 5908. 3.64

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	16087.5
RUNOFF	1.603	7346.9
PERCOLATION FROM LAYER 4	0.0212	97.1
SNOW WATER	2.46	11286.3

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2785

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0948

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2635
2	2.78	0.3480
3	17.22	0.1230
4	99.47	0.3188

SNOW WATER 0.00

BLACKWELL LANDFILL SITE
SENSITIVITY ANALYSIS, ISWC 0.1 UNITS LOWER THAN FC
AREA DESIGNATION: 4 RUN: JULY 18, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 8.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 140.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 312.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.1942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 55000. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.2180 INCHES
INITIAL VEG. STORAGE = 4.8226 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 73.2754 INCHES

SOIL WATER CONTENT INITIALIZED BY USER.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.021	0.007	0.004	0.024	0.018	0.025
	0.162	0.038	0.035	0.066	0.000	0.001
STD. DEVIATIONS	0.069	0.018	0.016	0.083	0.075	0.047
	0.406	0.067	0.103	0.179	0.002	0.003
EVAPOTRANSPIRATION						
TOTALS	0.577	1.053	2.160	3.417	3.349	4.631
	4.111	4.154	2.657	1.802	0.985	0.692
STD. DEVIATIONS	0.154	0.268	0.356	0.554	1.249	1.380
	2.274	1.303	1.056	0.772	0.302	0.165
PERCOLATION FROM LAYER 4						
TOTALS	0.2336	0.2151	0.2411	0.2400	0.2567	0.2546
	0.2648	0.2634	0.2519	0.2582	0.2497	0.2596
STD. DEVIATIONS	0.1947	0.1787	0.1981	0.1947	0.2057	0.2020
	0.2083	0.2052	0.1944	0.1973	0.1902	0.1981

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	162101.	100.00
RUNOFF	0.401	(0.462)	1838.	1.13
EVAPOTRANSPIRATION	29.588	(4.734)	135614.	83.66
PERCOLATION FROM LAYER 4	2.9887	(2.3519)	13698.	8.45

CHANGE IN WATER STORAGE 2.389 (3.205) 10951. 6.76

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	16087.5
RUNOFF	1.603	7345.4
PERCOLATION FROM LAYER 4	0.0211	96.5
SNOW WATER	2.47	11299.5

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2785

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0948

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2637
2	2.79	0.3484
3	17.21	0.1230
4	99.48	0.3188

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
SENSITIVITY ANALYSIS, ISWC = FC
AREA DESIGNATION: 9 RUN: JULY 18, 1994

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GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 96.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 372.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 110000. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.1640 INCHES
INITIAL VEG. STORAGE = 5.1467 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 118.7610 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.016	0.003	0.003	0.021	0.016	0.024
	0.152	0.036	0.031	0.059	0.000	0.000
STD. DEVIATIONS	0.055	0.010	0.015	0.074	0.067	0.047
	0.386	0.062	0.084	0.156	0.000	0.001
EVAPOTRANSPIRATION						
TOTALS	0.585	1.066	2.183	3.349	3.334	4.388
	4.097	4.088	2.653	1.855	0.985	0.704
STD. DEVIATIONS	0.170	0.275	0.344	0.559	1.214	1.451
	2.271	1.335	1.085	0.759	0.319	0.171
PERCOLATION FROM LAYER 4						
TOTALS	0.3911	0.3626	0.4109	0.4099	0.4361	0.4265
	0.4371	0.4301	0.4076	0.4148	0.3984	0.4121
STD. DEVIATIONS	0.1256	0.1196	0.1346	0.1319	0.1386	0.1352
	0.1366	0.1300	0.1193	0.1182	0.1139	0.1204

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	324202.	100.00
RUNOFF	0.362	(0.431)	3316.	1.02
EVAPOTRANSPIRATION	29.287	(4.726)	268463.	82.81
PERCOLATION FROM LAYER 4	4.9372	(1.4810)	45257.	13.96

CHANGE IN WATER STORAGE 0.782 (2.660) 7167. 2.21

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	32175.0
RUNOFF	1.516	13899.5
PERCOLATION FROM LAYER 4	0.0218	199.8
SNOW WATER	2.46	22554.8

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2540

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0831

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2634
2	1.66	0.2760
3	11.75	0.1224
4	119.70	0.3218

SNOW WATER 0.00

BLACKWELL LANDFILL SITE
SENSITIVITY ANALYSIS, ISWC @ 10% LOWER THAN FC
AREA DESIGNATION: 9 RUN: JULY 18, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 96.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 372.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2648 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 110000. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.1640 INCHES
INITIAL VEG. STORAGE = 4.3266 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 107.8242 INCHES

SOIL WATER CONTENT INITIALIZED BY USER.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.016	0.003	0.003	0.021	0.016	0.024
	0.152	0.036	0.031	0.059	0.000	0.000
STD. DEVIATIONS	0.055	0.010	0.015	0.074	0.067	0.047
	0.386	0.062	0.084	0.156	0.000	0.001
EVAPOTRANSPIRATION						
TOTALS	0.584	1.064	2.180	3.357	3.332	4.387
	4.096	4.087	2.653	1.853	0.983	0.703
STD. DEVIATIONS	0.170	0.272	0.344	0.556	1.215	1.449
	2.270	1.335	1.085	0.757	0.318	0.171
PERCOLATION FROM LAYER 4						
TOTALS	0.3440	0.3191	0.3620	0.3617	0.3861	0.3787
	0.3888	0.3828	0.3631	0.3702	0.3567	0.3700
STD. DEVIATIONS	0.1680	0.1559	0.1734	0.1698	0.1793	0.1752
	0.1781	0.1720	0.1601	0.1608	0.1551	0.1625

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	324202.	100.00
RUNOFF	0.362	(0.431)	3316.	1.02
EVAPOTRANSPIRATION	29.279	(4.723)	268389.	82.78
PERCOLATION FROM LAYER 4	4.3833	(1.9799)	40180.	12.39

CHANGE IN WATER STORAGE 1.344 (2.911) 12317. 3.80

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	32175.0
RUNOFF	1.516	13899.8
PERCOLATION FROM LAYER 4	0.0218	199.9
SNOW WATER	2.46	22559.8

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2540

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0831

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2634
2	1.66	0.2760
3	11.75	0.1224
4	119.71	0.3218

SNOW WATER 0.00

BLACKWELL LANDFILL SITE
SENSITIVITY ANALYSIS, ISWC 0.1 UNITS LOWER THAN FC
AREA DESIGNATION: 9 RUN: JULY 18, 1994

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 96.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER
THICKNESS = 372.00 INCHES
POROSITY = 0.5200 VOL/VOL
FIELD CAPACITY = 0.2942 VOL/VOL
WILTING POINT = 0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.1942 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000199999995 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 110000. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.1640 INCHES
INITIAL VEG. STORAGE = 4.3266 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 81.5610 INCHES

SOIL WATER CONTENT INITIALIZED BY USER.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.016	0.003	0.003	0.020	0.016	0.024
	0.152	0.036	0.031	0.059	0.000	0.000
STD. DEVIATIONS	0.055	0.010	0.015	0.074	0.067	0.047
	0.386	0.062	0.084	0.156	0.000	0.001
EVAPOTRANSPIRATION						
TOTALS	0.583	1.062	2.174	3.380	3.322	4.394
	4.097	4.087	2.663	1.813	0.974	0.700
STD. DEVIATIONS	0.169	0.271	0.341	0.541	1.223	1.448
	2.270	1.335	1.077	0.803	0.325	0.169
PERCOLATION FROM LAYER 4						
TOTALS	0.2398	0.2217	0.2509	0.2512	0.2702	0.2666
	0.2748	0.2711	0.2578	0.2648	0.2574	0.2689
STD. DEVIATIONS	0.2058	0.1891	0.2107	0.2079	0.2211	0.2169
	0.2218	0.2166	0.2039	0.2081	0.2031	0.2136

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	324202.	100.00
RUNOFF	0.361	(0.431)	3313.	1.02
EVAPOTRANSPIRATION	29.250	(4.707)	268126.	82.70
PERCOLATION FROM LAYER 4	3.0954	(2.4983)	28374.	8.75

CHANGE IN WATER STORAGE 2.661 (3.225) 24388. 7.52

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)	
PRECIPITATION	3.51	32175.0	
RUNOFF	1.516	13899.0	
PERCOLATION FROM LAYER 4	0.0220		201.5
SNOW WATER	2.46	22586.2	

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2539

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0831

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	1.66	0.2763
3	11.76	0.1225
4	119.77	0.3220

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
EVALUATION OF SOIL COVER ONLY
AREA DESIGNATION: 2 RUN: JULY 18, 1994

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GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 345.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 247100. SQ FT

EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.5960 INCHES
INITIAL VEG. STORAGE = 9.0164 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 108.5538 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95
STD. DEVIATIONS	0.92	0.71	1.26	1.48	1.34	1.82
	3.34	1.87	1.99	2.05	0.72	0.64
RUNOFF						
TOTALS	0.024	0.010	0.005	0.031	0.021	0.026
	0.162	0.040	0.041	0.068	0.001	0.001
STD. DEVIATIONS	0.079	0.030	0.018	0.102	0.084	0.048
	0.405	0.070	0.128	0.188	0.002	0.006
EVAPOTRANSPIRATION						
TOTALS	0.567	1.030	2.174	3.426	3.423	5.309

4.216 4.235 2.667 1.767 0.956 0.672

STD. DEVIATIONS 0.144 0.250 0.311 0.543 1.276 1.207
2.323 1.350 1.047 0.745 0.277 0.155

PERCOLATION FROM LAYER 2

TOTALS 0.2920 0.2854 0.3389 0.3466 0.3703 0.3486
0.3406 0.3219 0.2976 0.3029 0.2919 0.3070

STD. DEVIATIONS 0.1329 0.1325 0.1493 0.1391 0.1465 0.1346
0.1263 0.1142 0.1012 0.1086 0.1136 0.1294

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)	PERCENT
PRECIPITATION	35.37	(5.654)	728276.	100.00
RUNOFF	0.431	(0.478)	8869.	1.22
EVAPOTRANSPIRATION	30.439	(4.828)	626800.	86.07
PERCOLATION FROM LAYER 2	3.8437	(1.4173)	79148.	10.87
CHANGE IN WATER STORAGE	0.654	(2.671)	13459	1.85

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	72276.7
RUNOFF	1.599	32934.3
PERCOLATION FROM LAYER 2	0.0217	447.2
SNOW WATER	2.47	50838.3

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4038

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1763

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2636
2	120.42	0.3490

SNOW WATER 0.00

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BLACKWELL LANDFILL SITE
EVALUATION OF SOIL COVER ONLY
AREA DESIGNATION: 4 RUN: JULY 19, 1994

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GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 8.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 140.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 55000. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.2180 INCHES
INITIAL VEG. STORAGE = 5.8855 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 12.6850 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95

STD. DEVIATIONS 0.92 0.71 1.26 1.48 1.34 1.82
3.34 1.87 1.99 2.05 0.72 0.64

RUNOFF

TOTALS 0.021 0.007 0.004 0.024 0.018 0.025
0.162 0.038 0.035 0.066 0.000 0.001

STD. DEVIATIONS 0.069 0.018 0.016 0.083 0.075 0.047
0.406 0.067 0.103 0.179 0.002 0.003

EVAPOTRANSPIRATION

TOTALS 0.576 1.053 2.159 3.416 3.351 4.632
4.111 4.154 2.657 1.801 0.984 0.692

STD. DEVIATIONS 0.154 0.268 0.356 0.554 1.245 1.377
2.274 1.303 1.056 0.772 0.302 0.165

PERCOLATION FROM LAYER 3

TOTALS 0.3867 0.4501 0.5869 0.5845 0.5851 0.4545
0.3807 0.3198 0.2752 0.3043 0.3264 0.3795

STD. DEVIATIONS 0.3243 0.3183 0.3827 0.2845 0.3239 0.2268
0.1648 0.1326 0.1098 0.3050 0.3199 0.3364

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)	PERCENT
PRECIPITATION	35.37 (5.654)	162101.	100.00
RUNOFF	0.401 (0.462)	1838.	1.13
EVAPOTRANSPIRATION	29.586 (4.731)	135603.	83.65
PERCOLATION FROM LAYER 3	5.0339 (1.9794)	23072.	14.23
CHANGE IN WATER STORAGE	0.347 (2.370)	1588.	0.98

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	16087.5

RUNOFF	1.603	7344.9
PERCOLATION FROM LAYER 3	0.0592	271.5
SNOW WATER	2.47	11303.4

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2786

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0948

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2637
2	2.79	0.3485
3	17.22	0.1230

SNOW WATER 0.00

.....
.....

BLACKWELL LANDFILL SITE
EVALUATION OF SOIL COVER ONLY
AREA DESIGNATION: 9 RUN: JULY 19, 1994

.....
.....

GOOD GRASS

LAYER 1

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2443 VOL/VOL
WILTING POINT = 0.1361 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2443 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000503999938 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER
THICKNESS = 6.00 INCHES
POROSITY = 0.4640 VOL/VOL
FIELD CAPACITY = 0.3104 VOL/VOL
WILTING POINT = 0.1875 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3104 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.000064000000 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER
THICKNESS = 96.00 INCHES
POROSITY = 0.4370 VOL/VOL

FIELD CAPACITY = 0.0624 VOL/VOL
WILTING POINT = 0.0245 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0624 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY = 0.005799999926 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 80.12
TOTAL AREA OF COVER = 110000. SQ FT
EVAPORATIVE ZONE DEPTH = 28.00 INCHES
UPPER LIMIT VEG. STORAGE = 12.1640 INCHES
INITIAL VEG. STORAGE = 5.1495 INCHES
INITIAL SNOW WATER CONTENT = 0.0000 INCHES
INITIAL TOTAL WATER STORAGE IN
SOIL AND WASTE LAYERS = 9.3186 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 3.30
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

.....

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.88	1.32	2.41	3.91	3.22	3.67
	4.98	3.87	3.05	3.01	2.09	1.95

STD. DEVIATIONS 0.92 0.71 1.26 1.48 1.34 1.82
3.34 1.87 1.99 2.05 0.72 0.64

RUNOFF

TOTALS 0.016 0.004 0.003 0.020 0.016 0.024
0.152 0.036 0.031 0.059 0.000 0.000

STD. DEVIATIONS 0.055 0.010 0.015 0.074 0.067 0.047
0.386 0.062 0.084 0.156 0.000 0.001

EVAPOTRANSPIRATION

TOTALS 0.584 1.063 2.174 3.369 3.324 4.394
4.101 4.087 2.664 1.813 0.974 0.699

STD. DEVIATIONS 0.169 0.273 0.340 0.544 1.219 1.450
2.272 1.335 1.077 0.804 0.323 0.169

PERCOLATION FROM LAYER 3

TOTALS 0.4808 0.5892 0.7377 0.6972 0.6375 0.4267
0.3506 0.2836 0.2540 0.3164 0.3742 0.4434

STD. DEVIATIONS 0.4001 0.4076 0.4785 0.3488 0.4383 0.2078
0.1741 0.1409 0.1860 0.5133 0.4910 0.4160

.....

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)	PERCENT
PRECIPITATION	35.37 (5.654)	324202.	100.00
RUNOFF	0.362 (0.431)	3314.	1.02
EVAPOTRANSPIRATION	29.246 (4.707)	268090.	82.69
PERCOLATION FROM LAYER 3	5.5913 (1.9308)	51254.	15.81
CHANGE IN WATER STORAGE	0.168 (1.887)	1544.	0.48

.....

.....

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.51	32175.0

RUNOFF	1.516	13898.8
PERCOLATION FROM LAYER 3	0.0961	880.5
SNOW WATER	2.46	22593.6

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2539

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0831

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.58	0.2637
2	1.66	0.2764
3	11.76	0.1225

SNOW WATER 0.00

I

VERTICAL GRADIENT CALCULATION DATA

Vertical Gradient Calculation Data

Blackwell Landfill Site
DuPage County, Illinois

G140S/G140D

WELL	Date and Groundwater Elevation 13-Sep-91	2-Jan-92	10-Feb-92	9-Apr-92	1-Jul-92
G140S	689.44	691.50	691.43	692.08	690.53
G140D	688.47	690.60	690.45	691.21	689.46
Screen Separation (ft)	26.05	26.05	26.05	26.05	26.05
Vertical Gradient (ft/ft)	0.037	0.035	0.038	0.033	0.041
Direction	Down	Down	Down	Down	Down
Average of Five Dates =	0.037 Down				

G117/G141D

WELL	Date and Groundwater Elevation 13-Sep-91	2-Jan-92	10-Feb-92	9-Apr-92	1-Jul-92
G117	689.53	691.60	691.43	692.17	690.62
G141D	688.20	690.44	690.27	691.00	689.24
Screen Separation (ft)	32.62	32.62	32.62	32.62	32.62
Vertical Gradient (ft/ft)	0.041	0.036	0.036	0.036	0.042
Direction	Down	Down	Down	Down	Down
Average of Five Dates =	0.038 Down				

Vertical Gradient Calculation Data

Blackwell Landfill Site
DuPage County, Illinois

G128S/G128D

WELL	Date and Groundwater Elevation 13-Sep-91	2-Jan-92	10-Feb-92	9-Apr-92	1-Jul-92
G128S	689.69	691.60	691.44	692.20	690.72
G128D	688.24	690.39	690.22	690.97	689.19
Screen Separation (ft)	37.5	37.5	37.5	37.5	37.5
Vertical Gradient (ft/ft)	0.039	0.032	0.033	0.033	0.041
Direction	Down	Down	Down	Down	Down
Average of Five Dates =	0.035 Down				

G133S/G133D

WELL	Date and Groundwater Elevation 13-Sep-91	2-Jan-92	10-Feb-92	9-Apr-92	1-Jul-92
G133S	689.54	691.17	691.02	691.76	690.38
G133D	687.88	690.12	689.91	690.70	688.84
Screen Separation (ft)	32	32	32	32	32
Vertical Gradient (ft/ft)	0.052	0.033	0.035	0.033	0.048
Direction	Down	Down	Down	Down	Down
Average of Five Dates =	0.040 Down				

Notes: Screen separation in well cluster G140S/G140D was measured between the midpoints of the screens. Screen separation in cluster G117/G141D was measured between the bases of the two screens. This is due to the fact that the screen length of G117 is not known. The midpoint of the screen for G133D was considered as the midpoint of the ten foot open hole interval, because this well does not contain a screen.

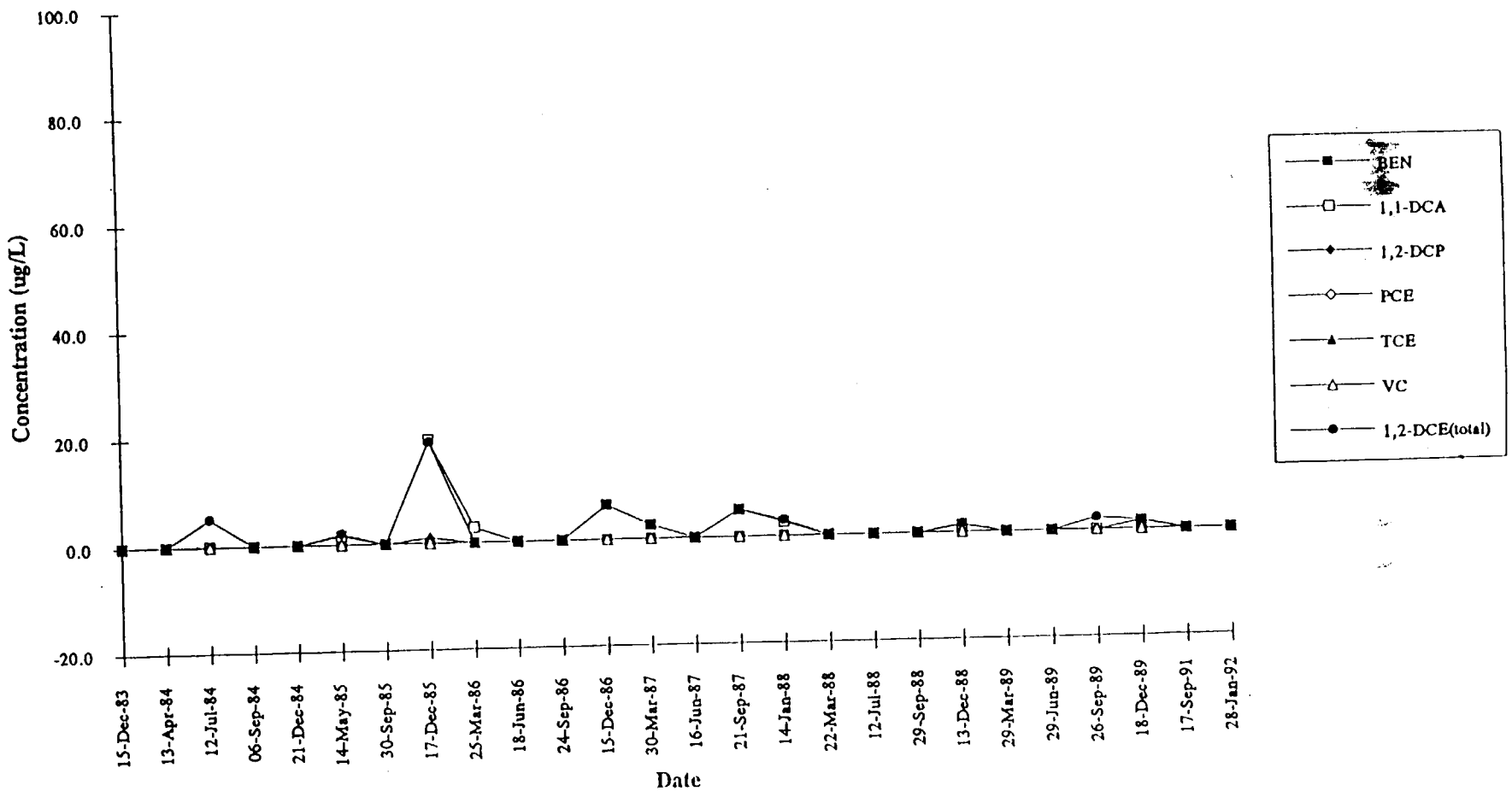
J

GRAPHICAL PRESENTATION OF GROUNDWATER ANALYTICAL DATA

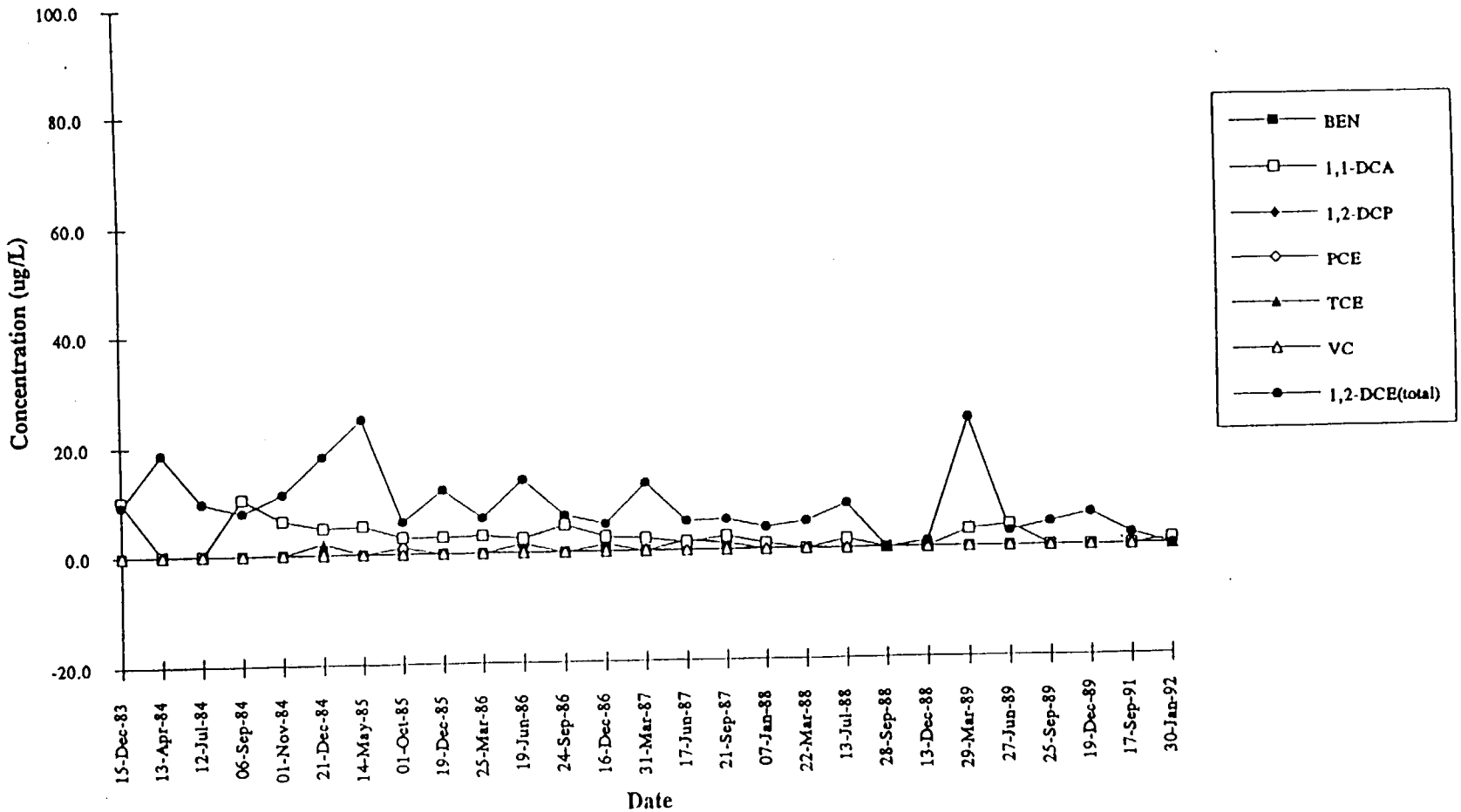
J-1

HISTORICAL GROUNDWATER DATA

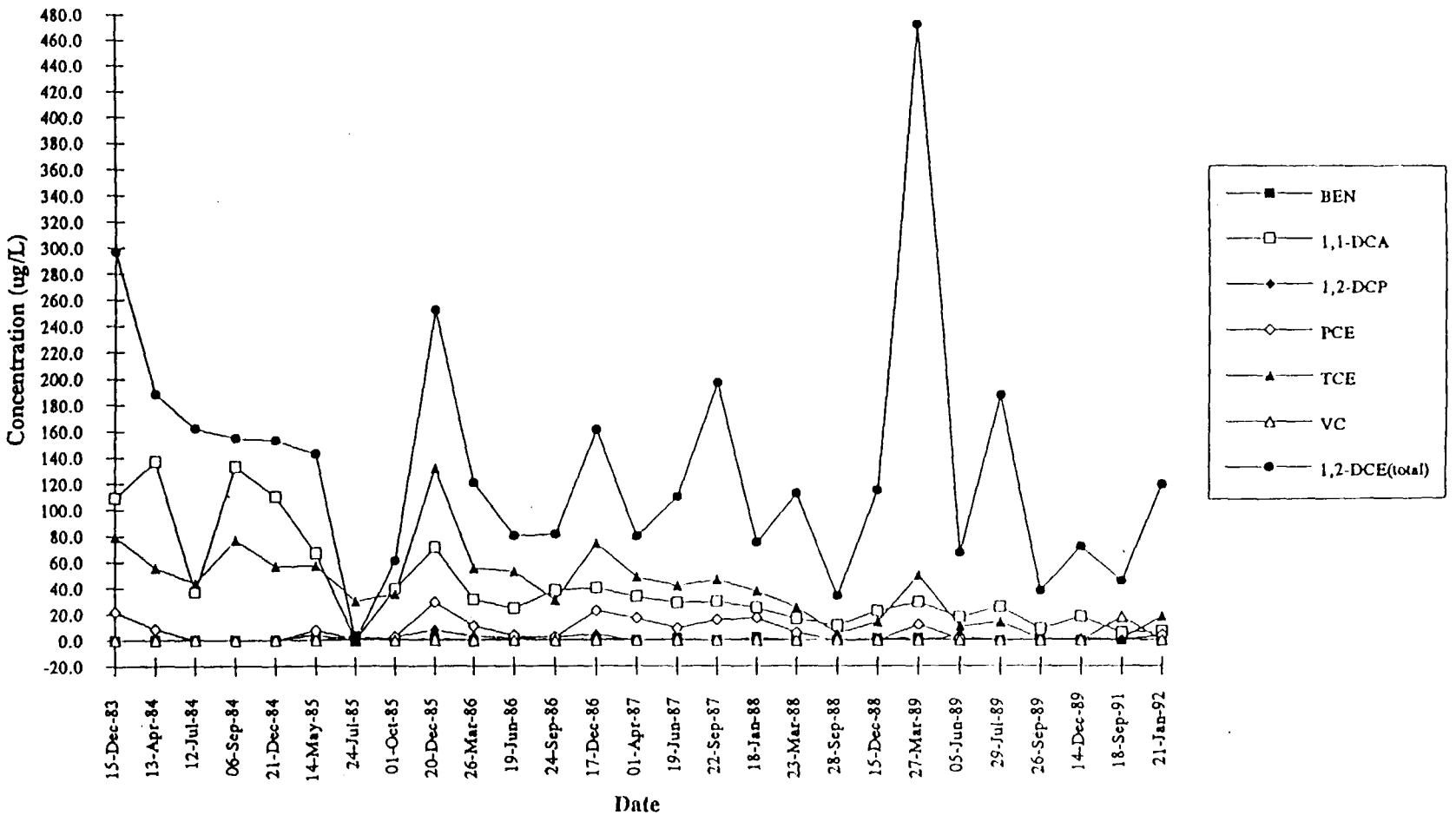
Monitoring Well G108
Blackwell Landfill RI/FS



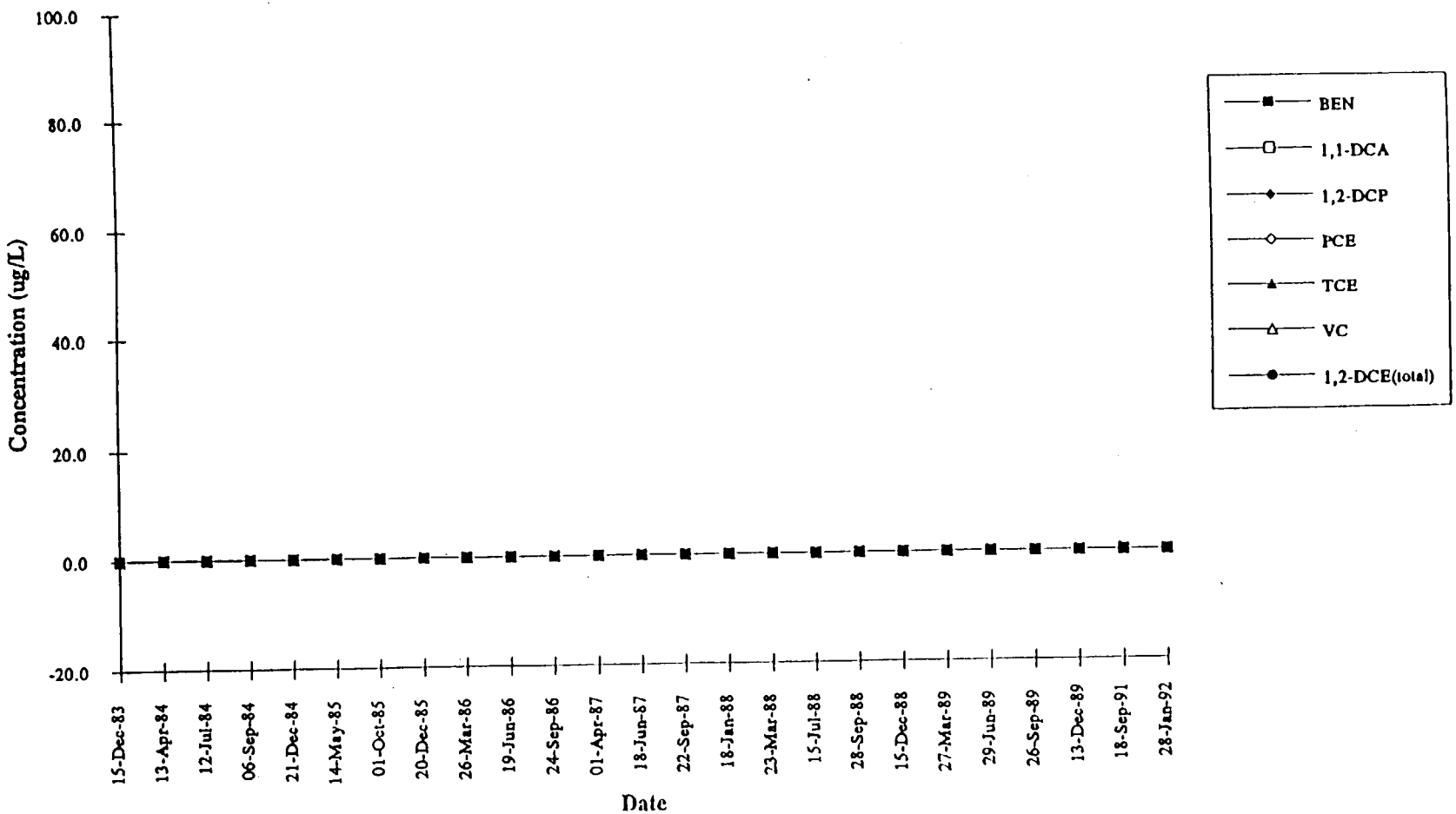
Monitoring Well G117
Blackwell Landfill RI/FS



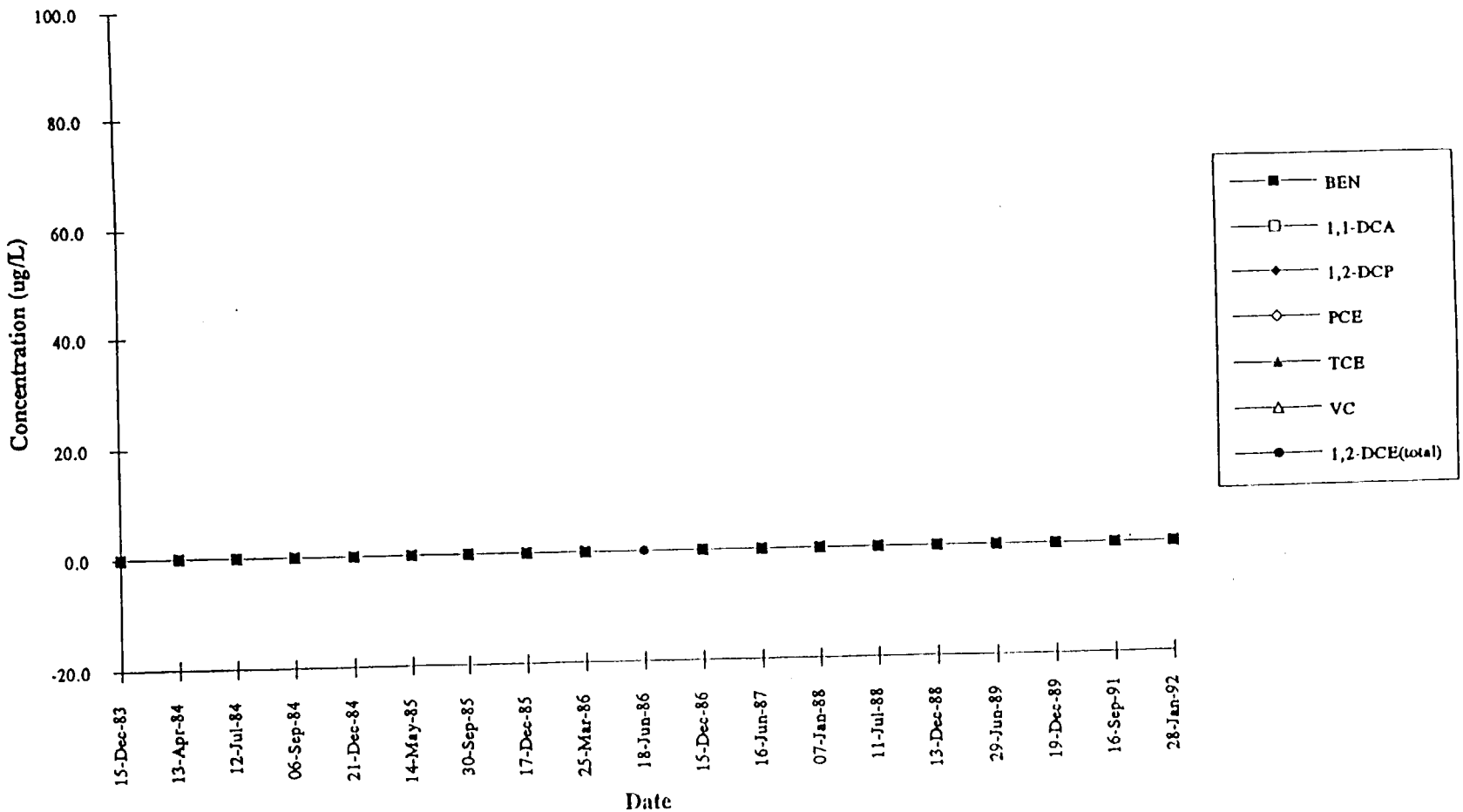
Monitoring Well G118S
Blackwell Landfill RI/FS



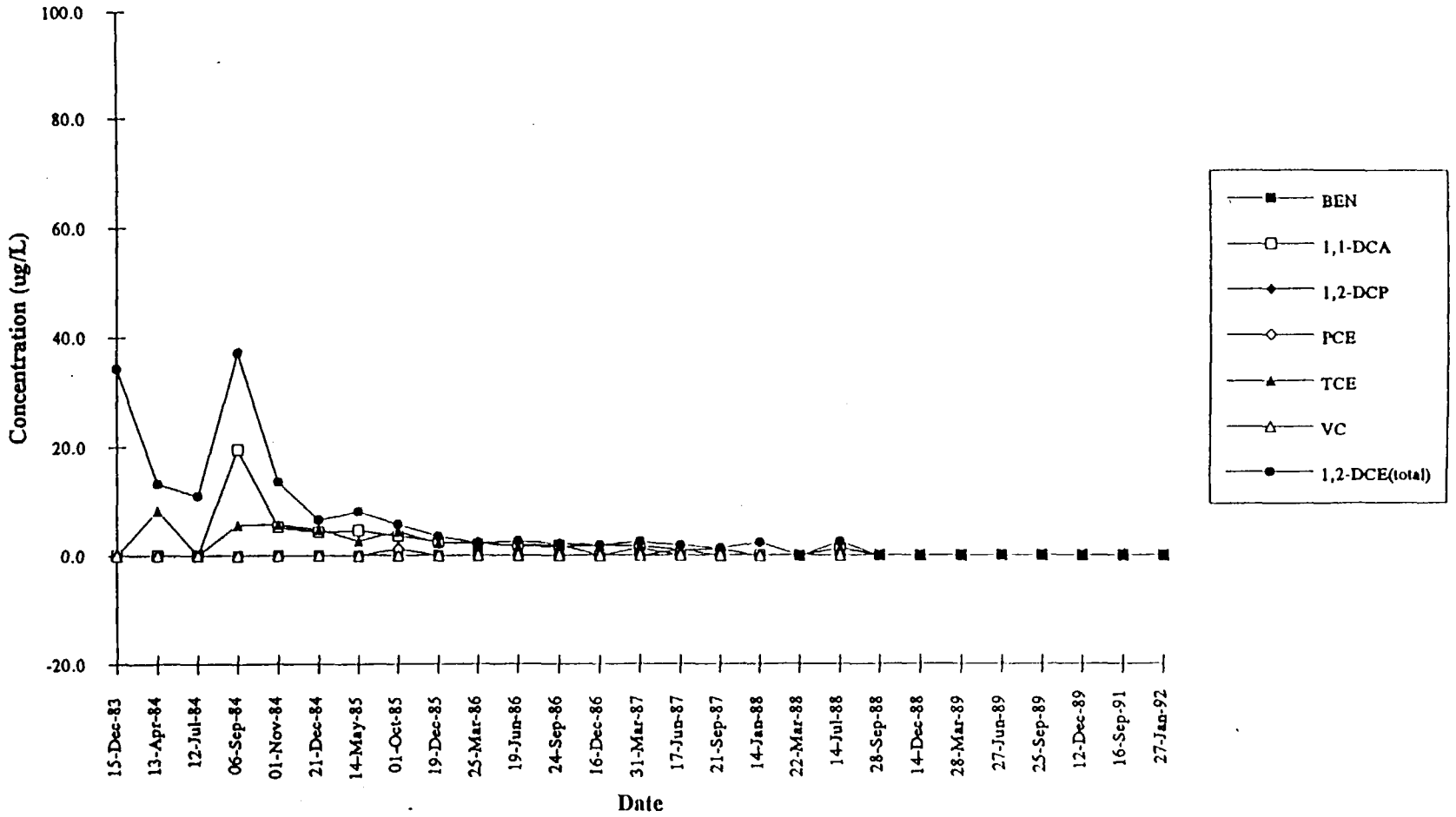
Monitoring Well G118D
Blackwell Landfill RI/FS



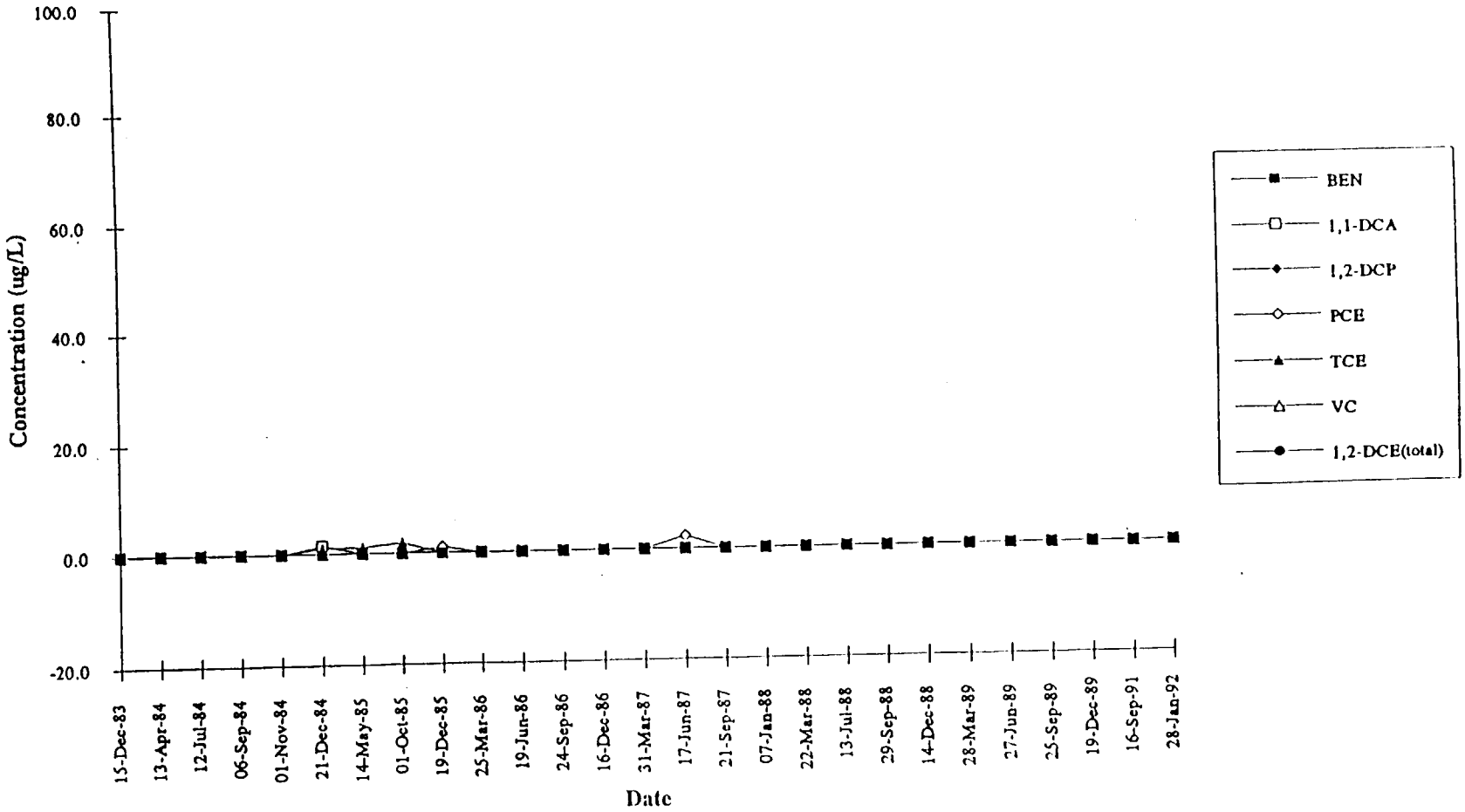
Monitoring Well G121
Blackwell Landfill RI/FS



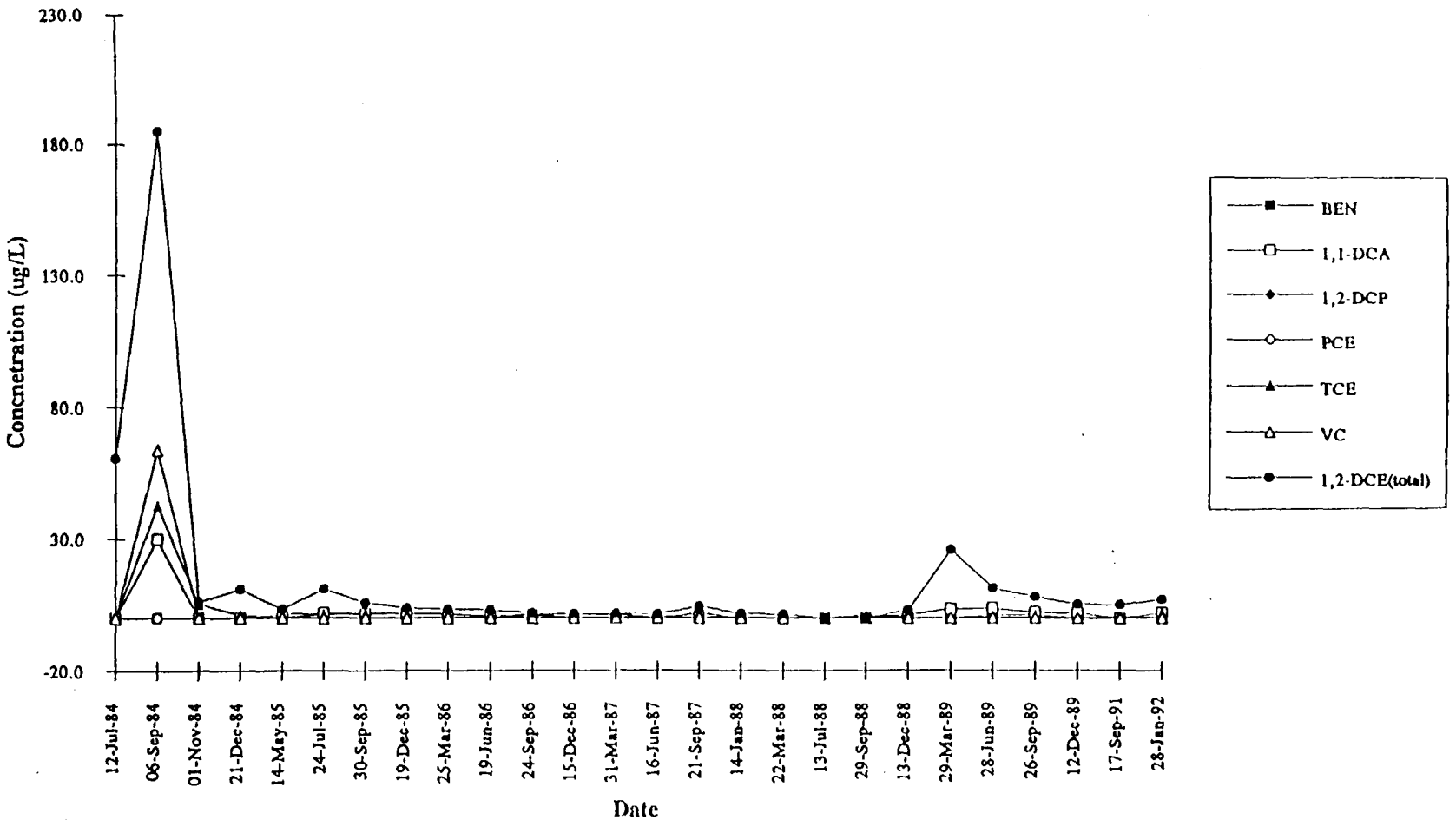
Monitoring Well G122
Blackwell Landfill RI/FS



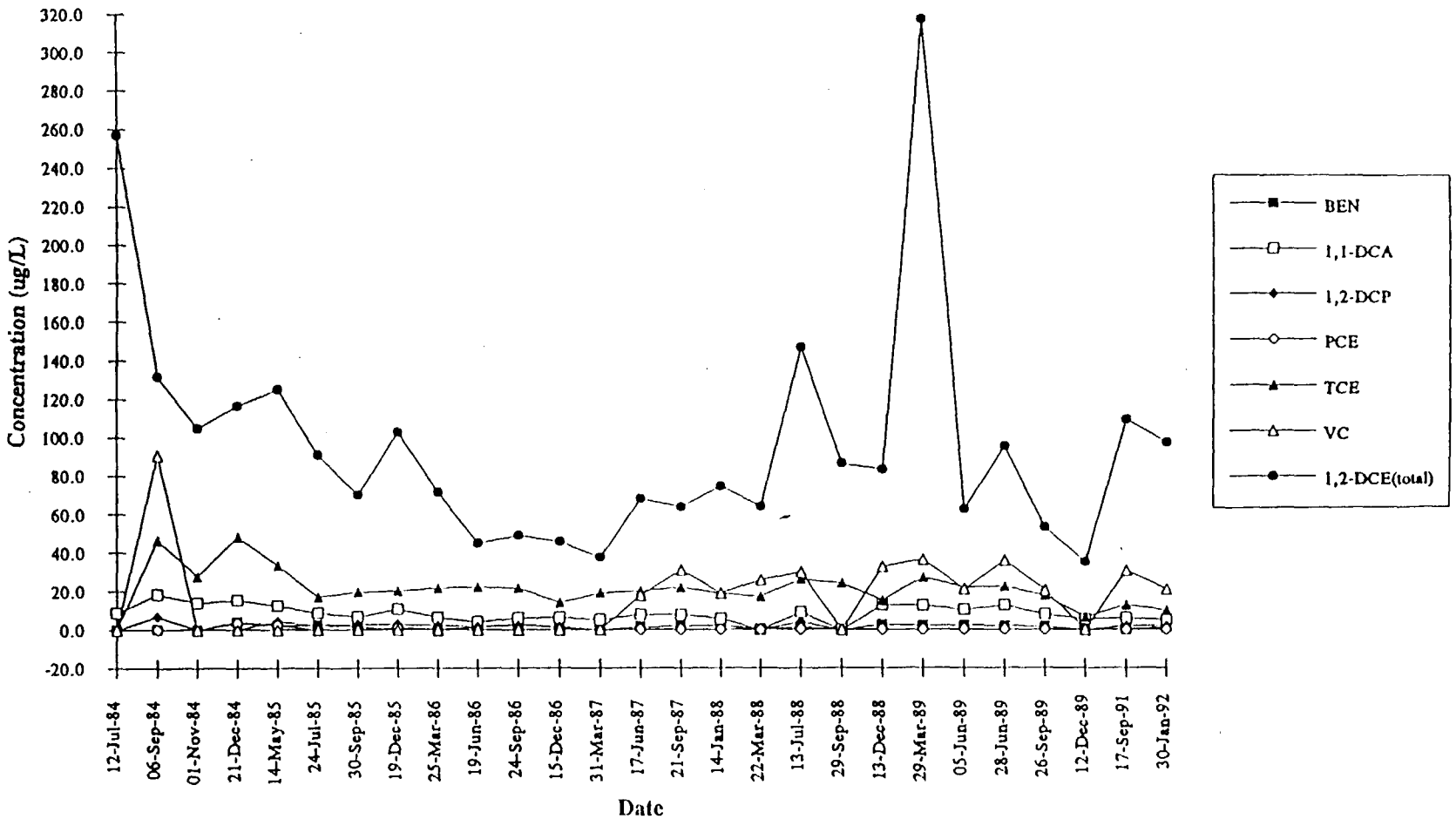
Monitoring Well G123
Blackwell Landfill RI/FS



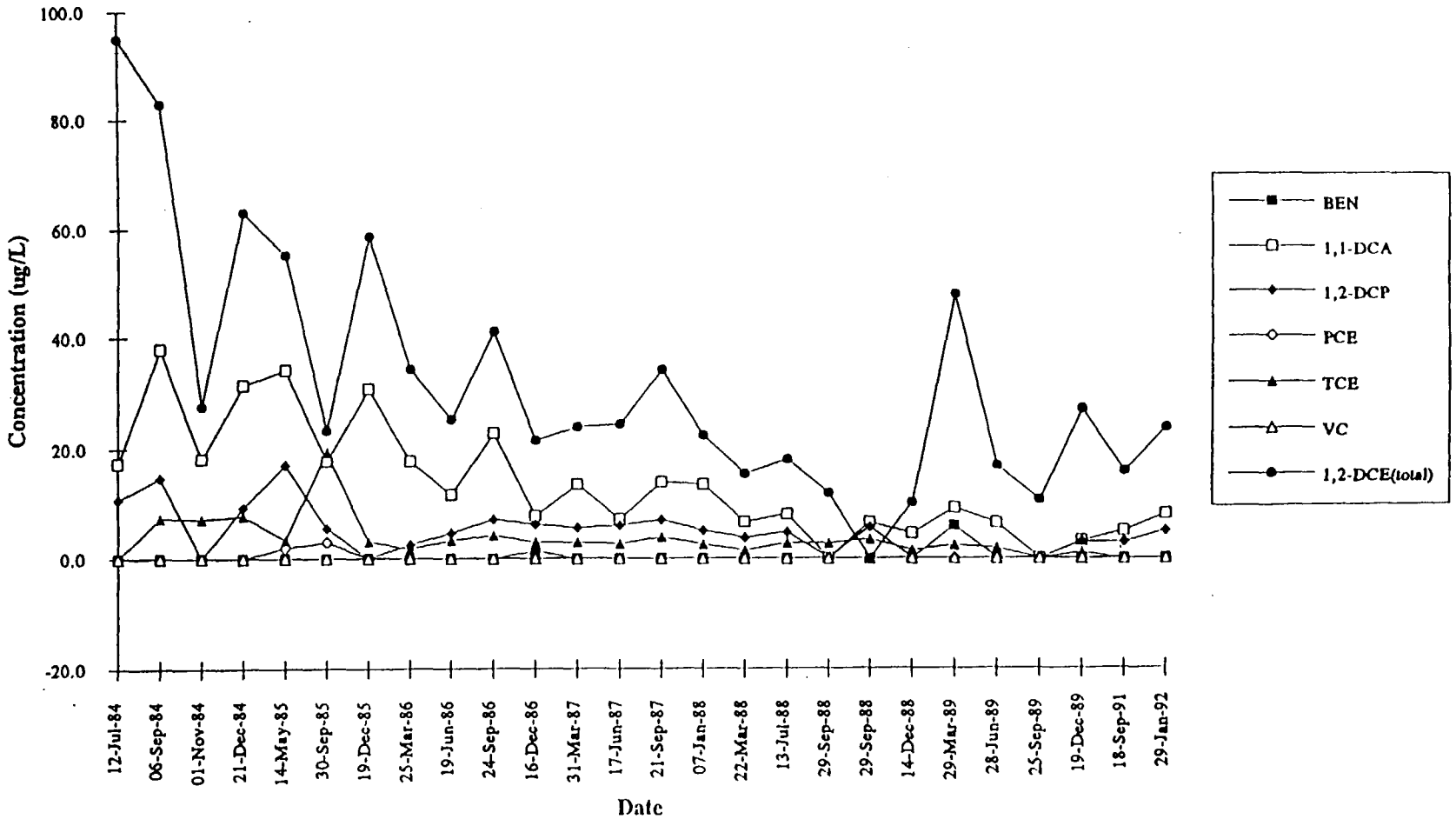
Monitoring Well G126
Blackwell Landfill RI/FS



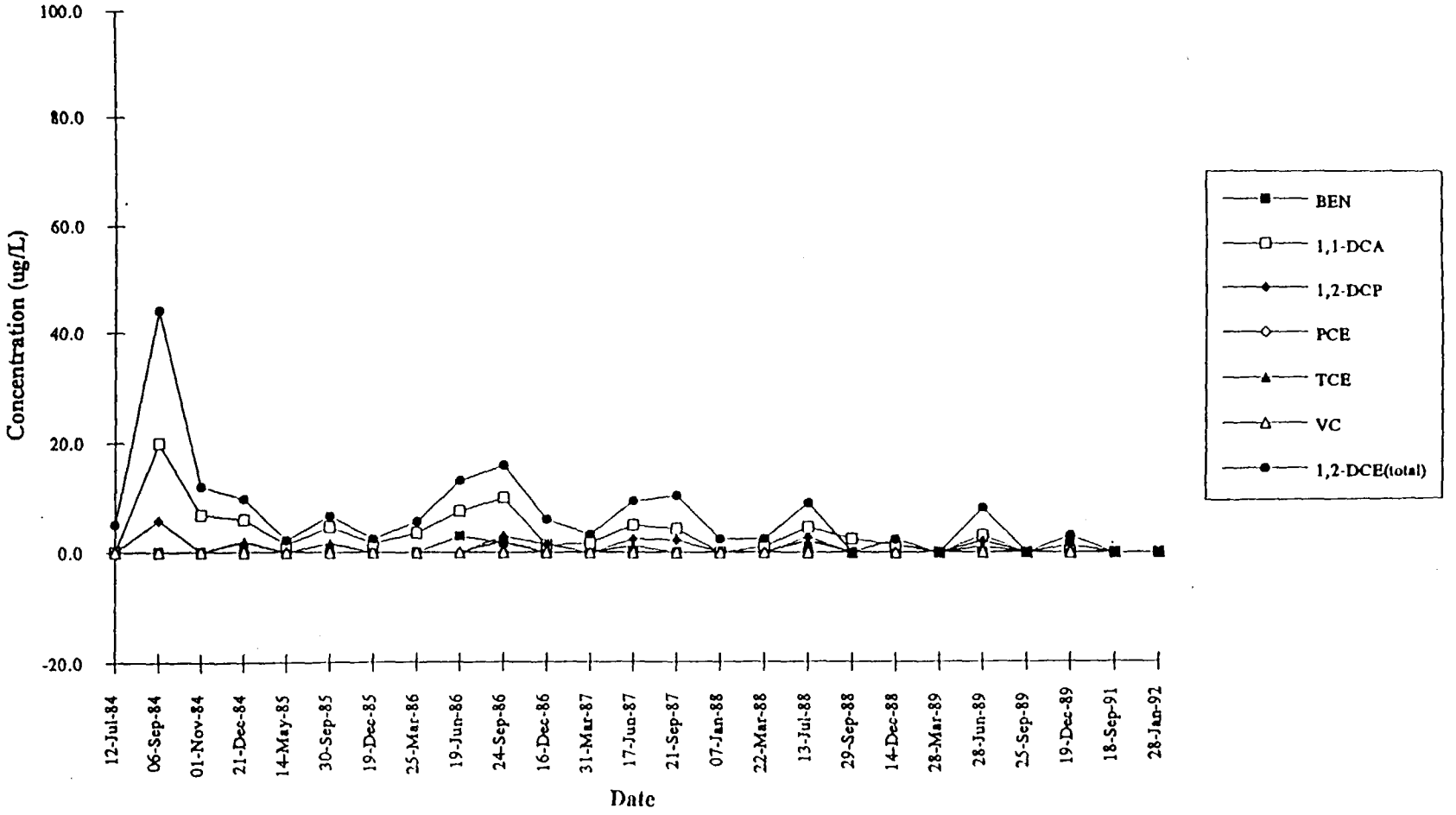
Monitoring Well G127
Balckwell Landfill RI/FS



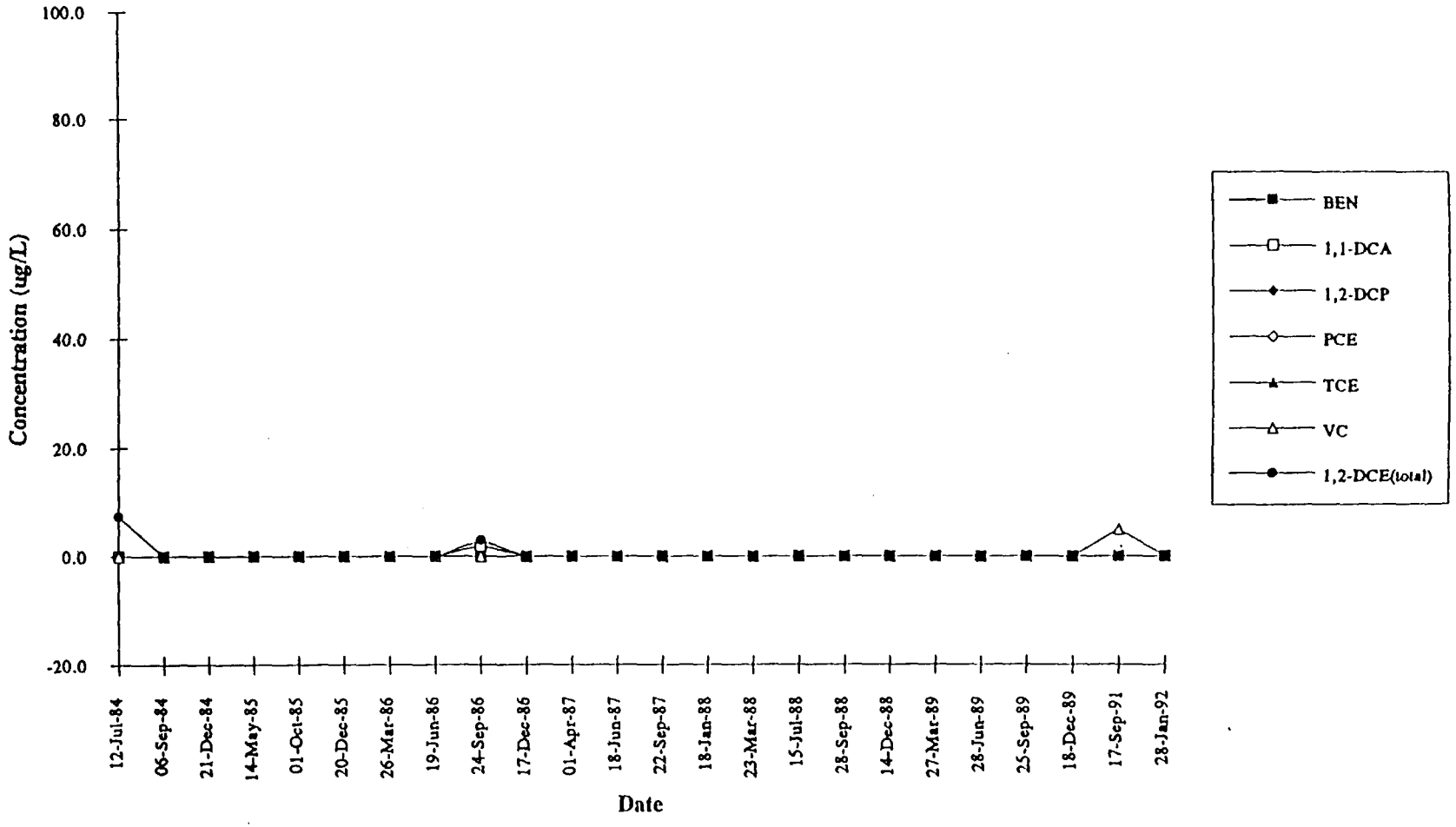
Monitoring Well G128S
Blackwell Landfill RI/FS



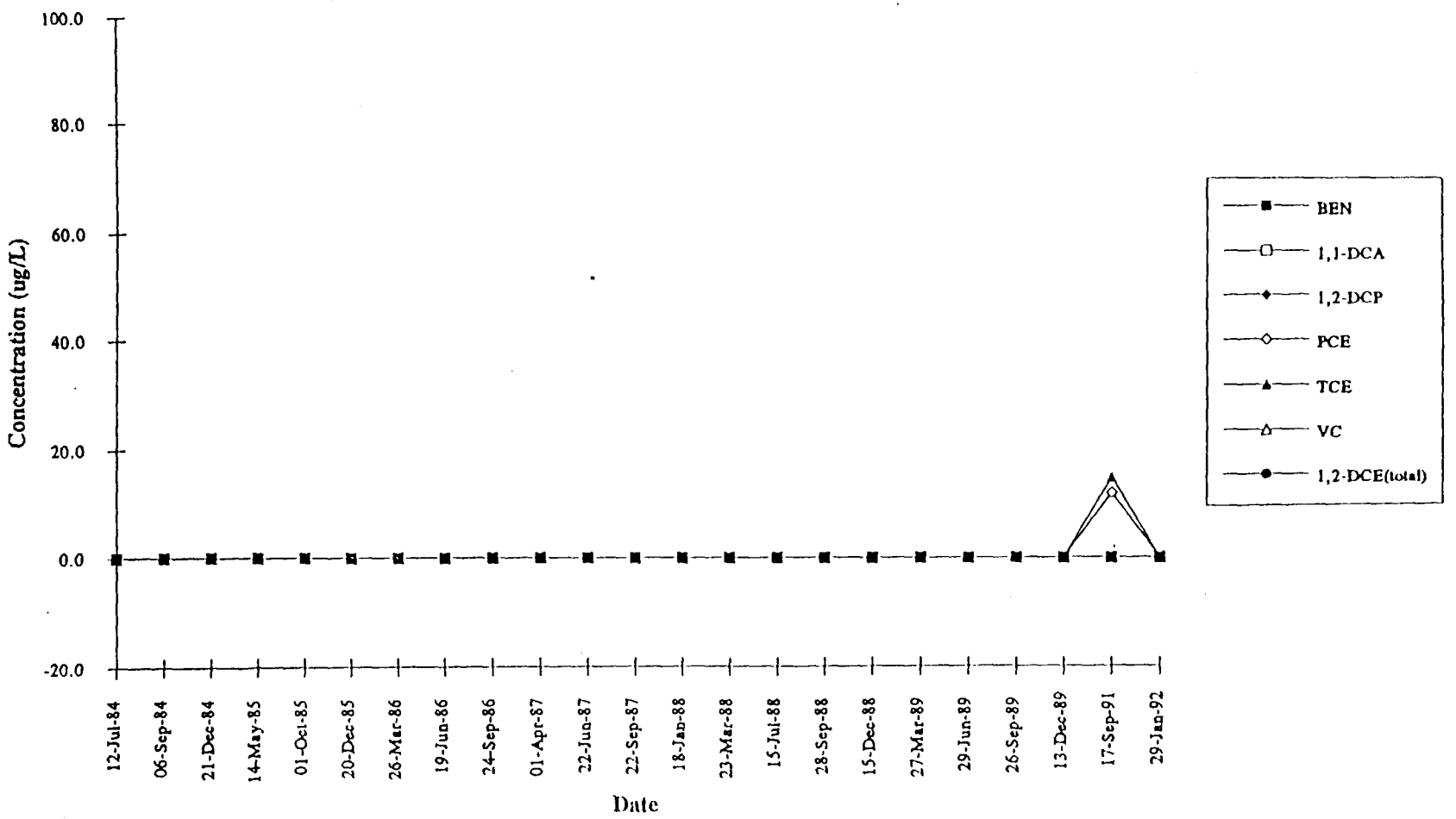
Monitoring Well G128D
Blackwell Landfill RI/FS



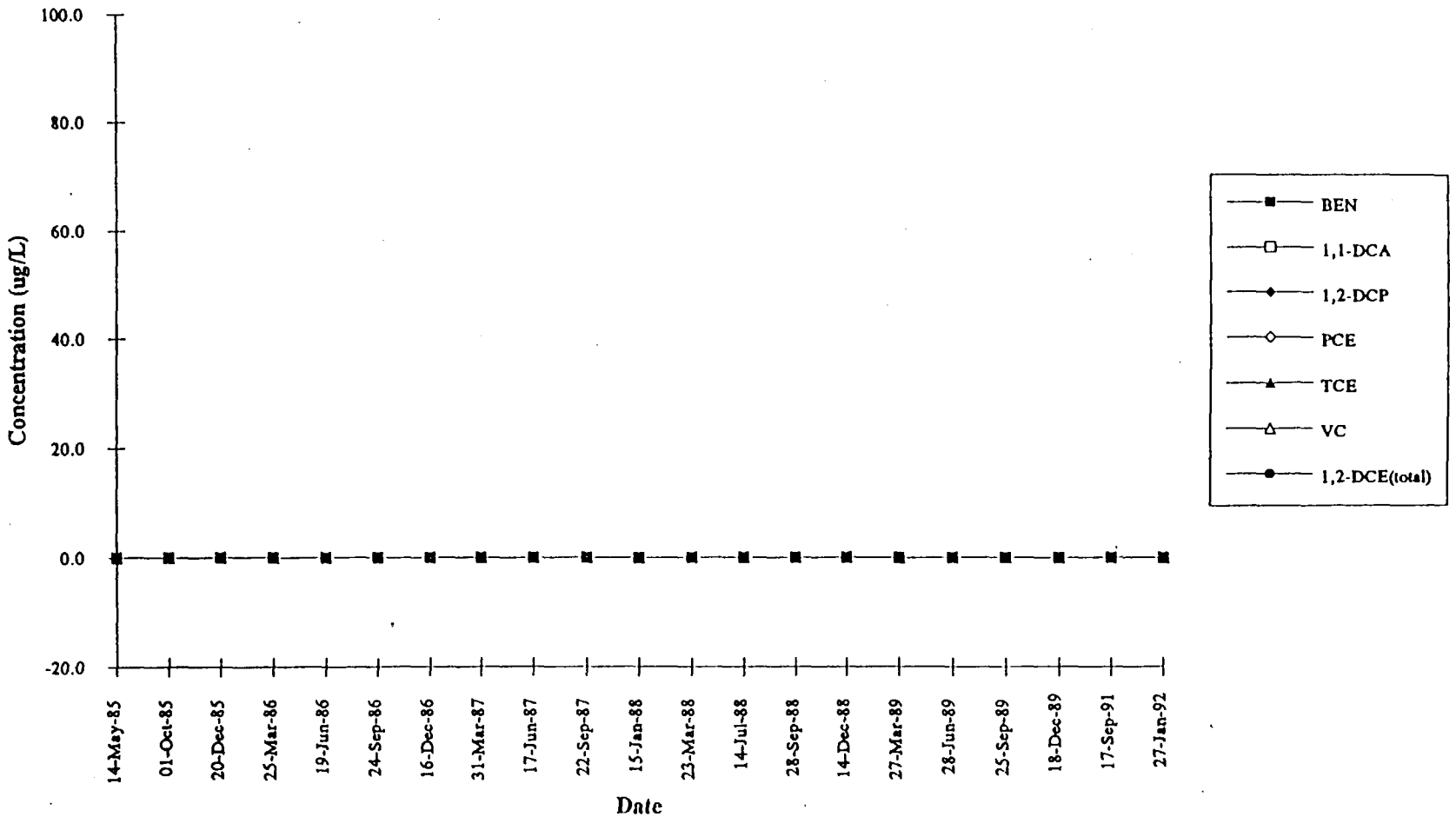
Monitoring Well G129
Blackwell Landfill RI/FS



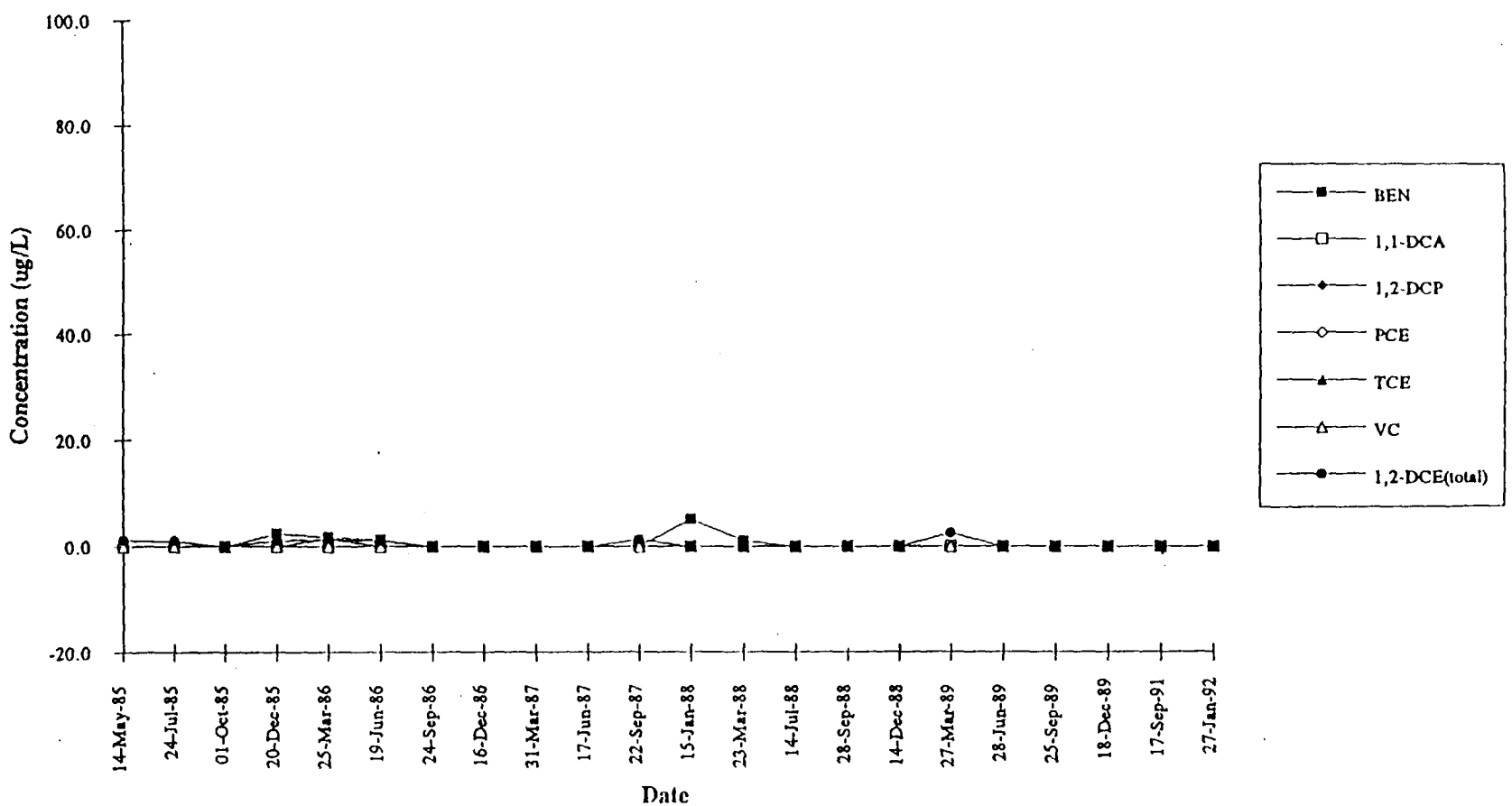
Monitoring Well G130
Blackwell Landfill RI/FS



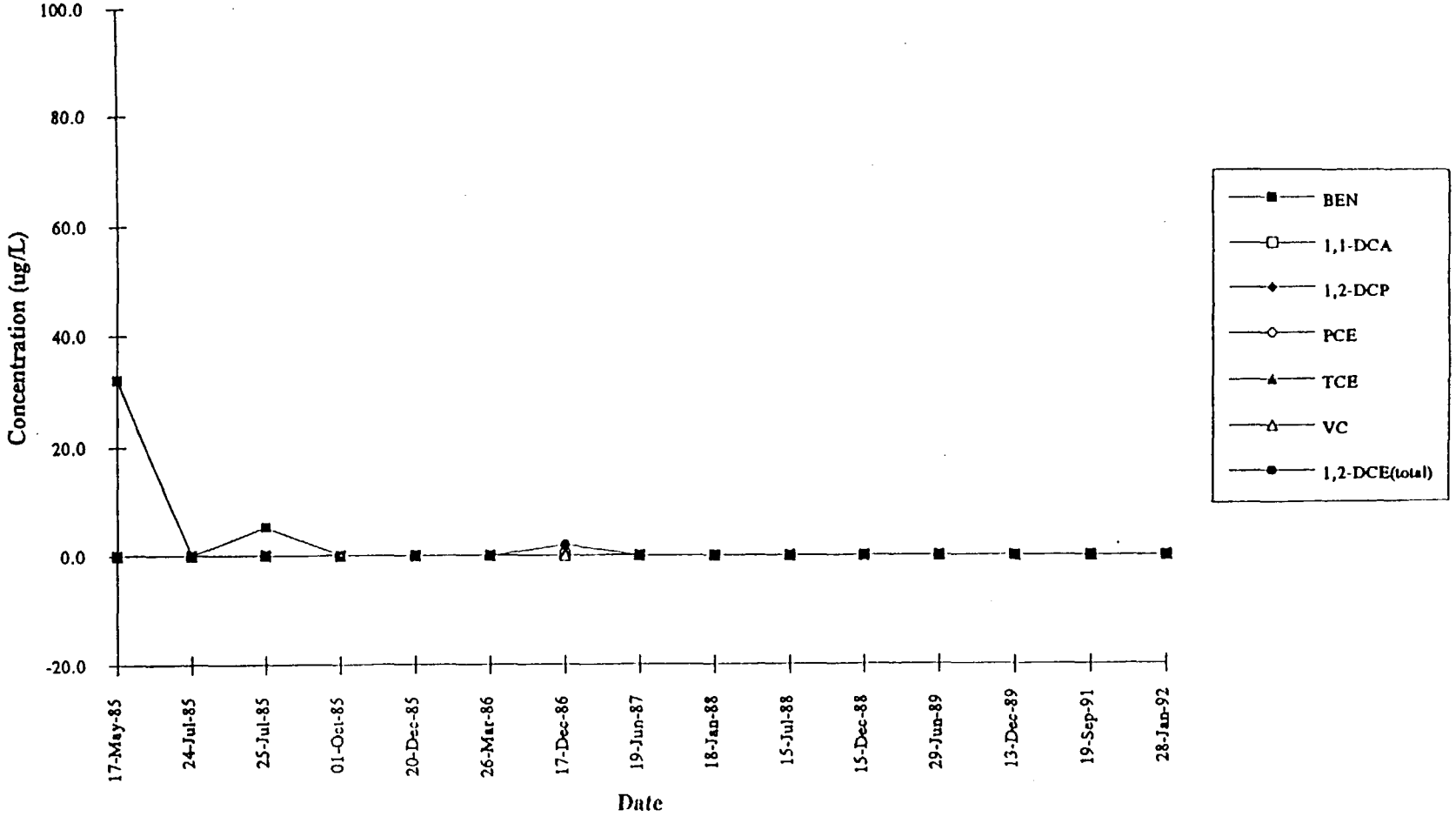
Monitoring Well G133S
Blackwell Landfill RI/FS



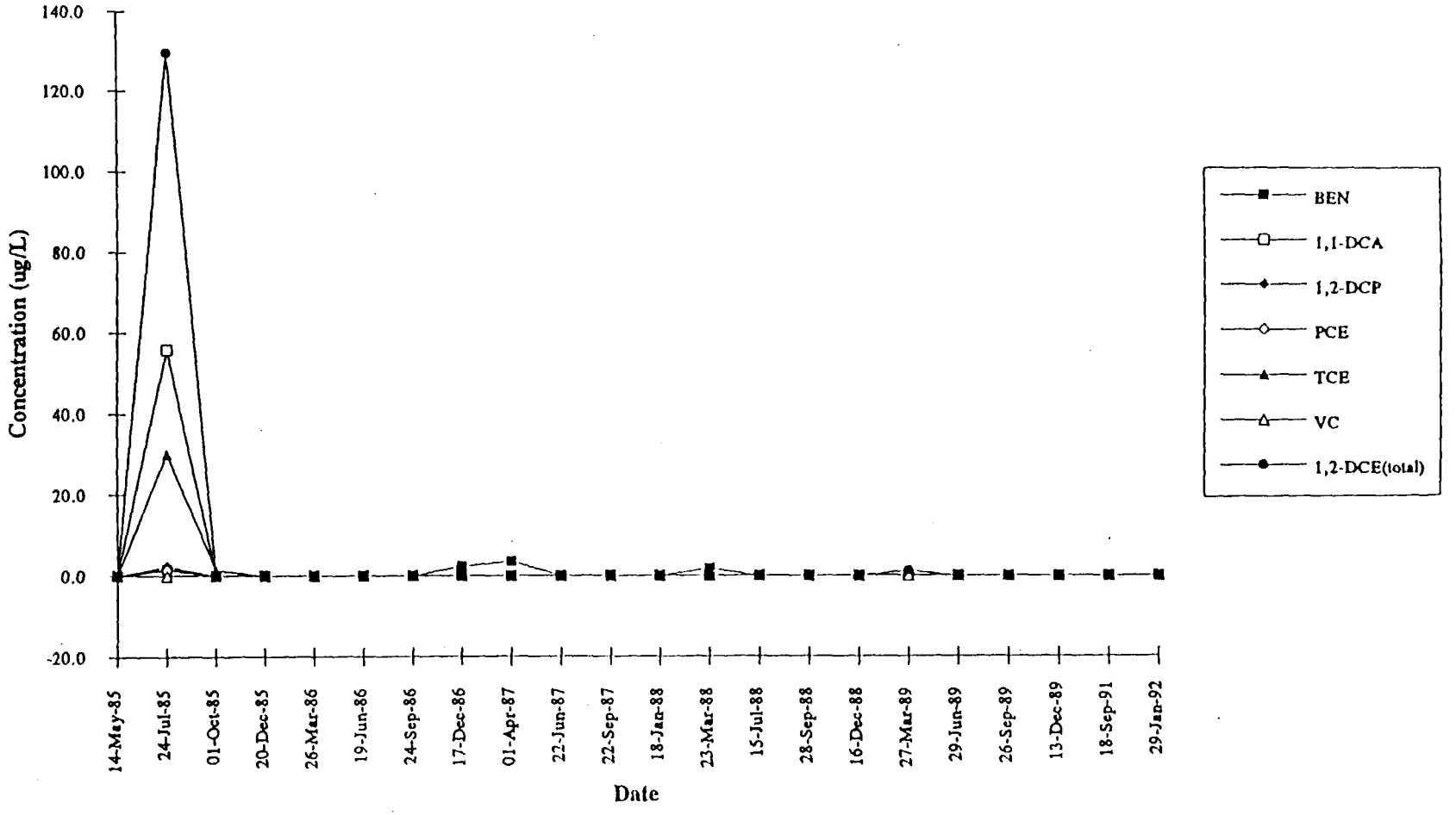
Monitoring Well G133D
Blackwell Landfill RI/FS



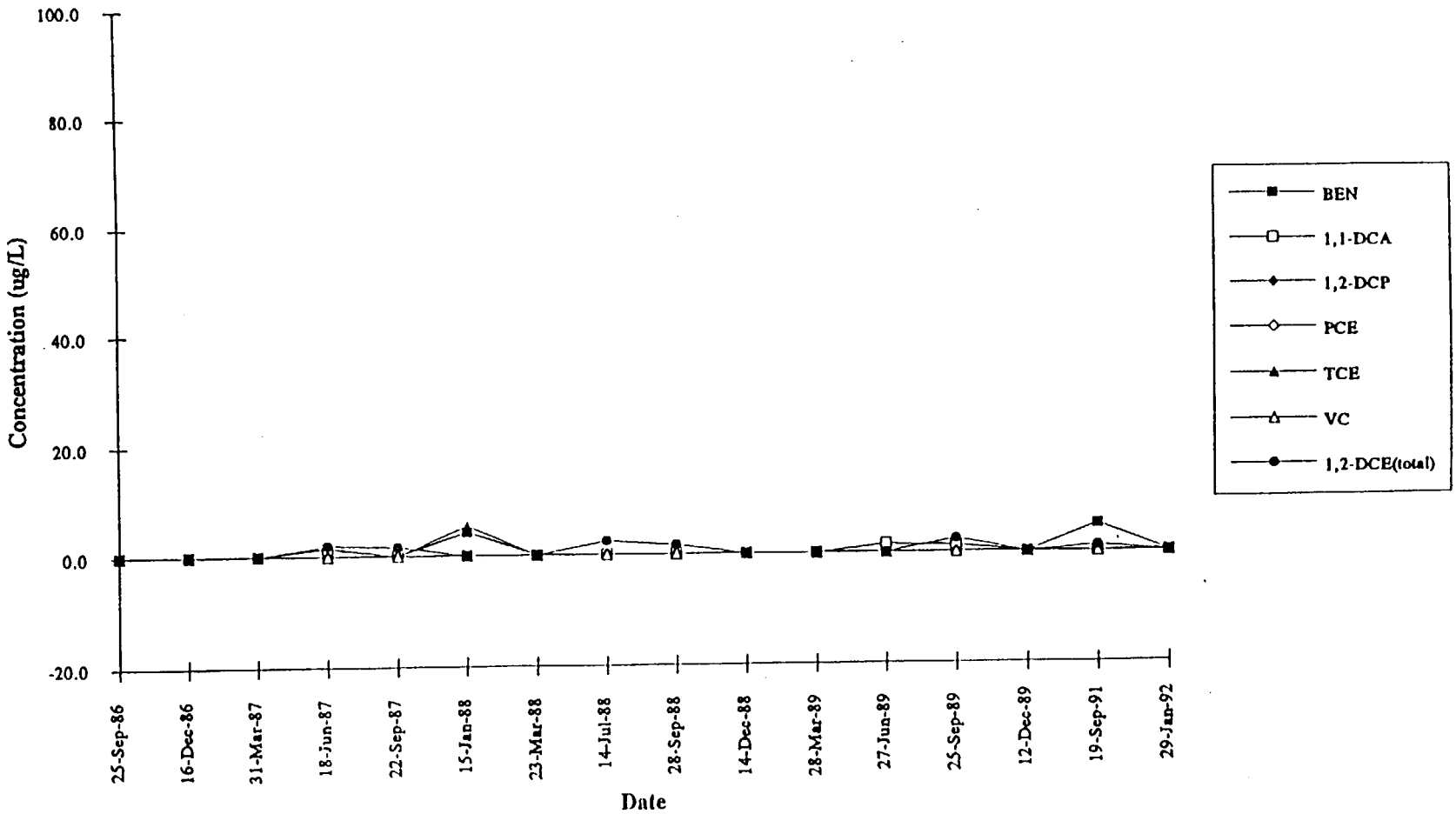
Monitoring Well G135
Blackwell Landfill RI/FS



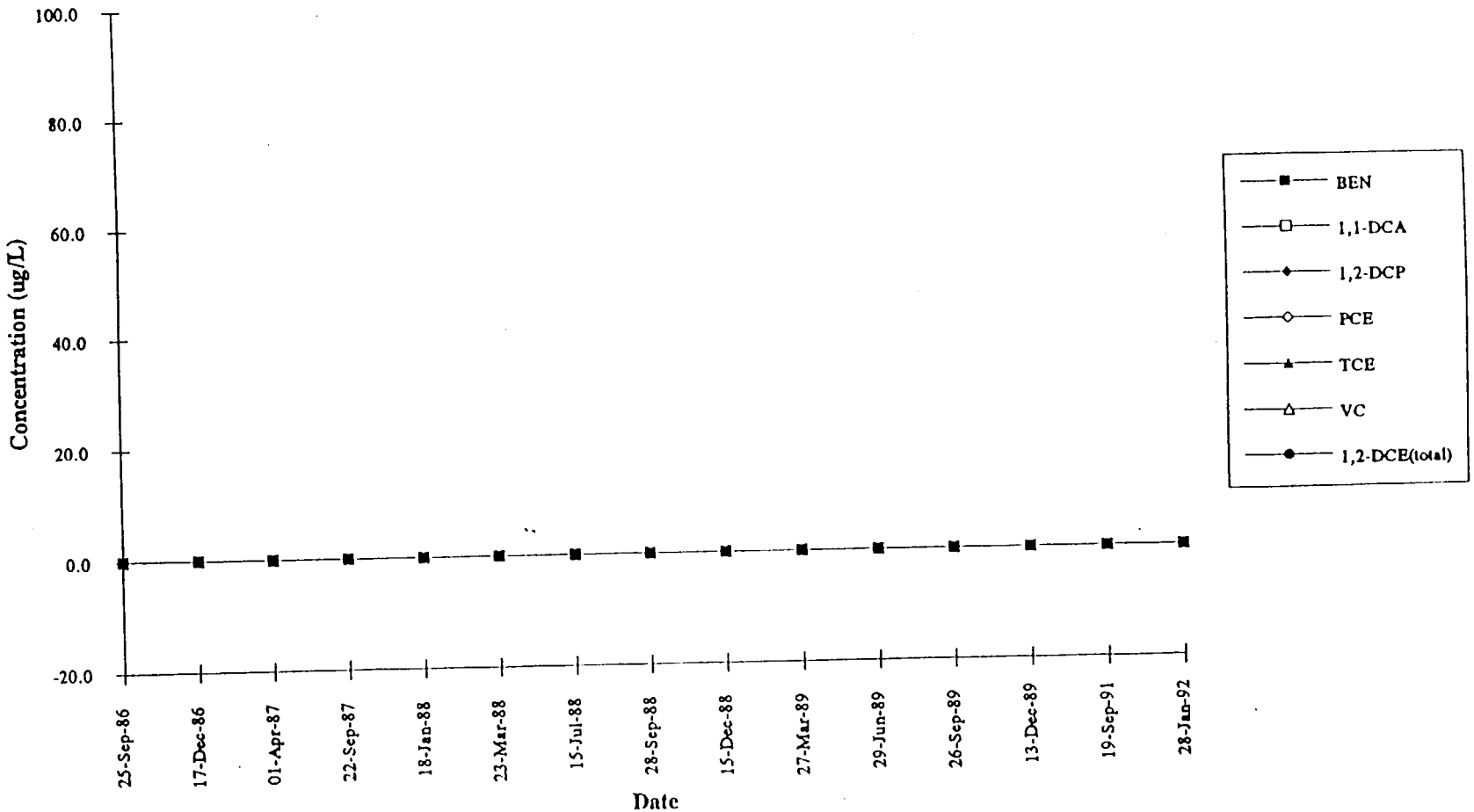
Monitoring Well G136
Blackwell Landfill RI/FS



Monitoring Well G138
Blackwell Landfill RI/FS



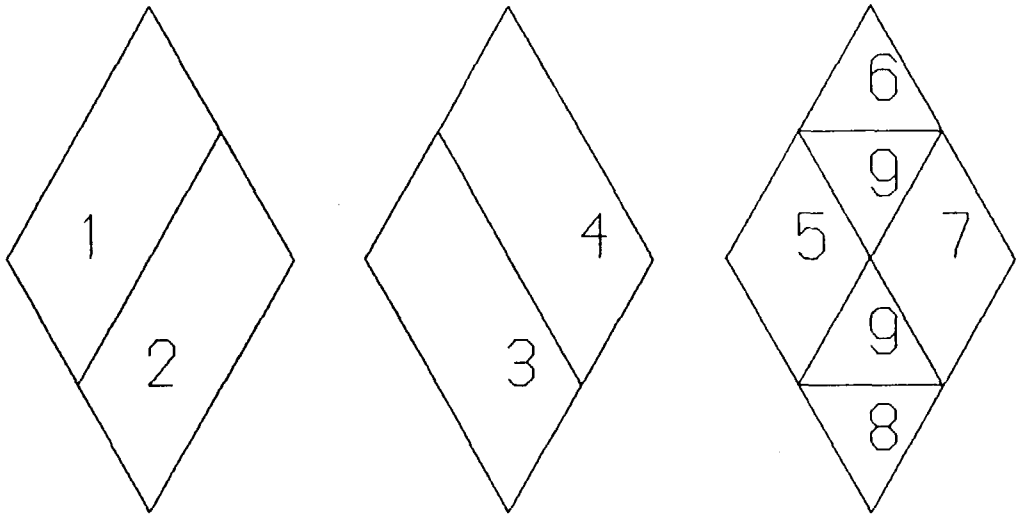
Monitoring Well G139
Blackwell Landfill RI/FS



J-2

PIPER DIAGRAMS OF SAMPLES COLLECTED DURING RI

Subdivisions of the Piper Diagram diamond shaped field



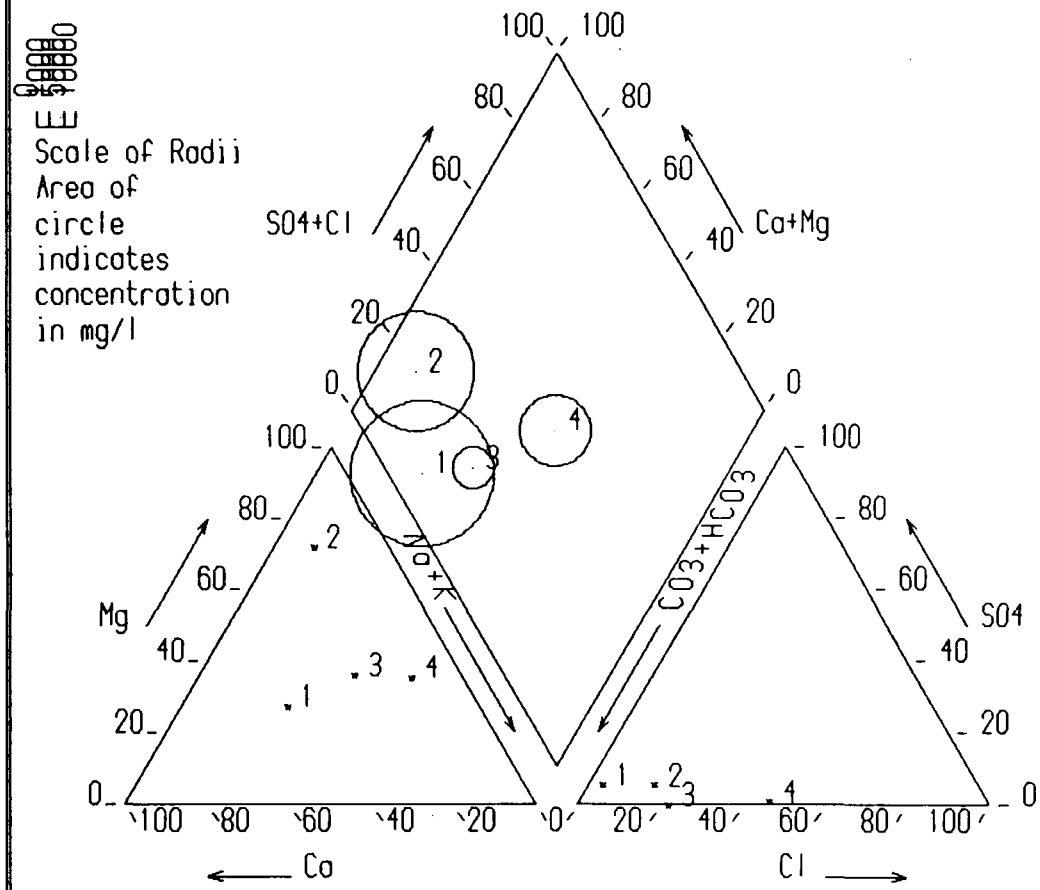
ZONE	GROUNDWATER CHARACTERISTICS		
1	Alkaline earths	>	Alkalies
2	Alkalies	>	Alkaline earths
3	Weak acids	>	Strong acids
4	Strong acids	>	Weak acids
5	Carbonate hardness	(secondary alkalinity)	> 50 %
6	Noncarbonate hardness	(secondary salinity)	> 50 %
7	Noncarbonate alkali	(primary salinity)	> 50 %
8	Carbonate alkali	(primary alkalinity)	> 50 %
9	No cation-anion pair exceeds 50 %		

WELL ID : SUB-DIVISIONS OF THE PIPER DIAGRAM

WARZYN INC.

Piper Diagram

#	Date YYMMDD	Zone	Well I.D.
1	910923	1,3,5	SV-9
2	910923	1,3,5	SV-8
3	910923	1,3,5	SV-5
4	910923	2,3,9	DV-5



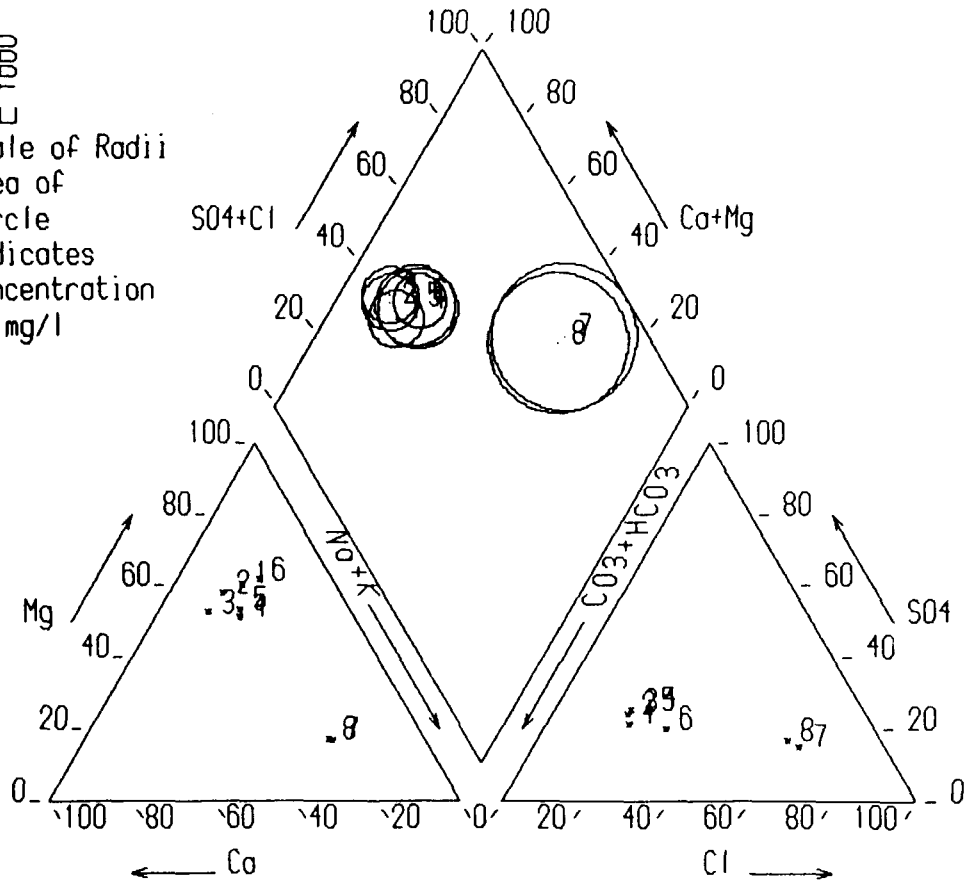
WELL ID : Leachate

WARZYN INC.

Piper Diagram

#	Date YYMMDD	Zone	Well I.D.
1	910924	1,3,5	SW-1
2	910924	1,3,5	SW-2
3	910924	1,3,5	SW-3
4	910924	1,3,5	SW-4
5	910924	1,3,5	SW-5
6	910924	1,3,5	SW-6
7	910924	2,4,7	SW-7
8	910924	2,4,7	SW-8

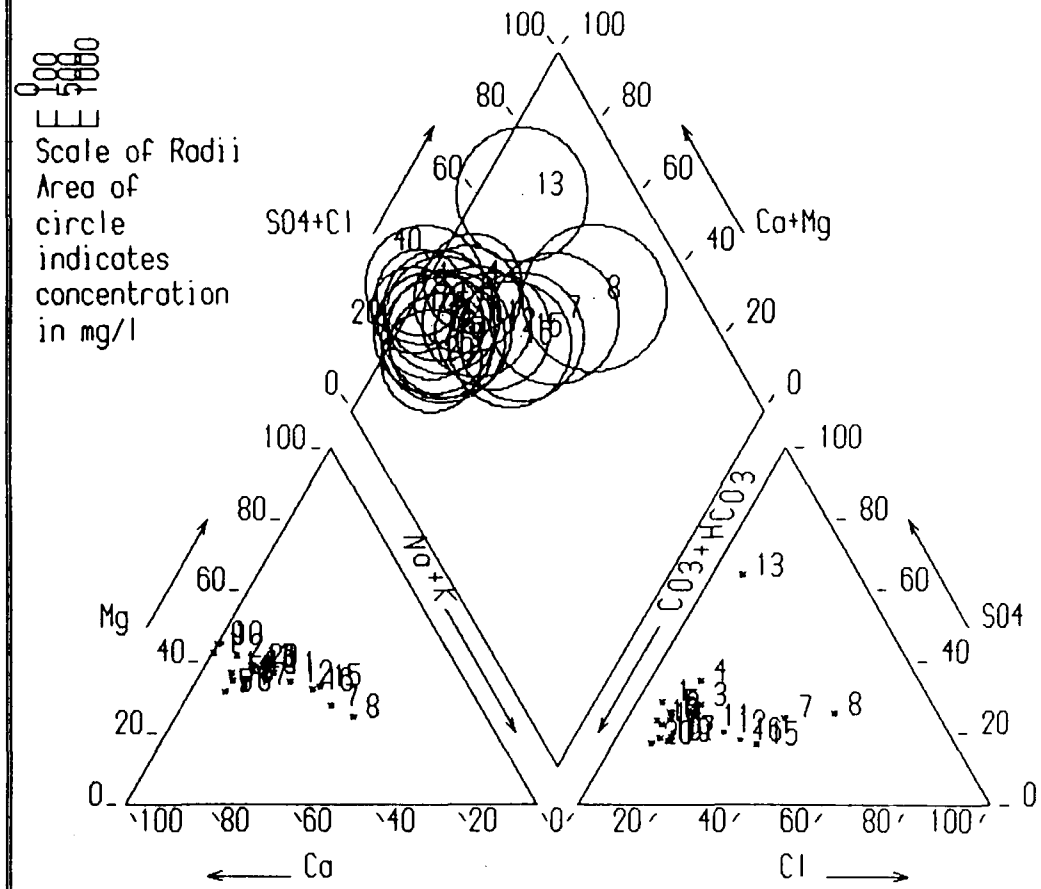
Scale of Radii
Area of circle indicates concentration in mg/l



WELL ID : Surface Water

WARZYN INC.

Piper Diagram



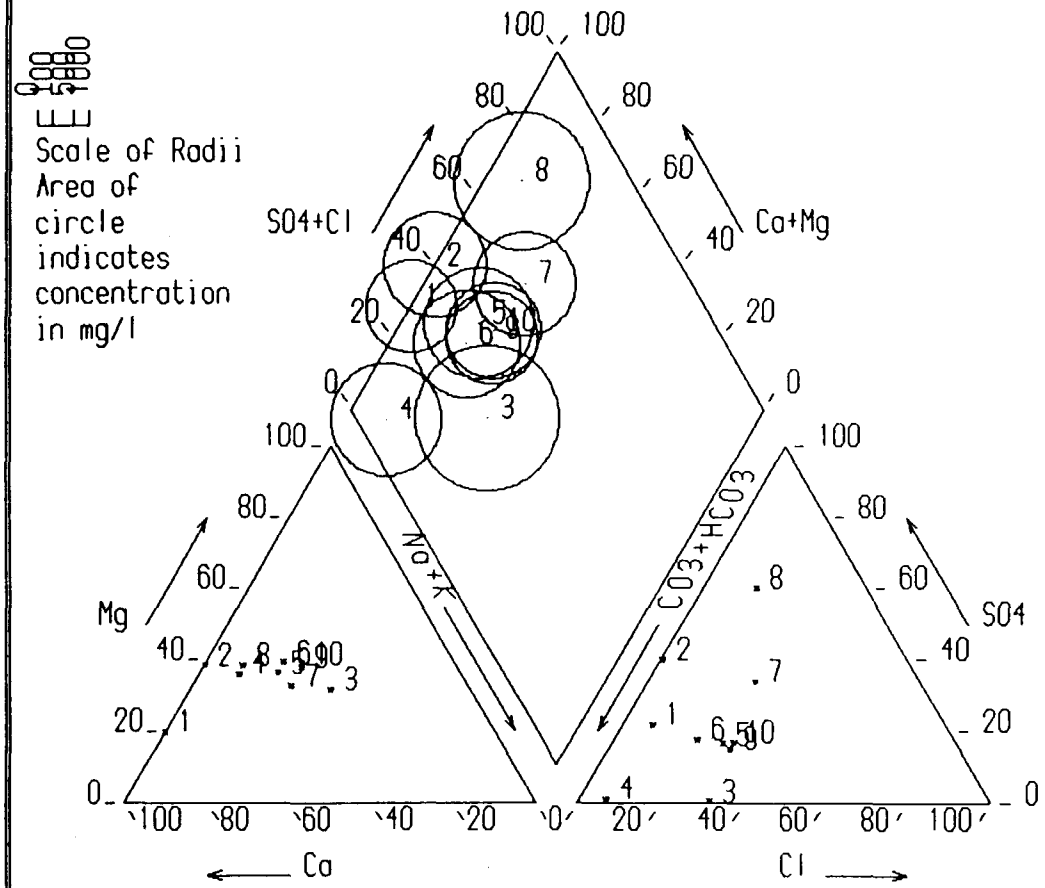
#	Date YYMMDD	Zone	Well I.D.
1	910917	1,3,5	G108-01
2	910917	1,3,5	G108-02
3	910917	1,3,5	G117-01
4	910917	1,3,5	G117-02
5	910917	1,3,5	G128S-01
6	910917	1,3,5	G128S-02
7	910917	1,4,9	G133S-01
8	910917	1,4,9	G133S-02
9	910917	1,3,5	G121-01
10	910917	1,3,5	G121-02
11	910917	1,3,5	G122-01
12	910917	1,3,5	G122-02
13	910917	1,4,6	G123-01
14	910917	1,3,5	G123-02
15	910917	1,4,9	G126-01
16	910917	1,3,5	G126-02
17	910917	1,3,5	G127-01
18	910917	1,3,5	G127-02
19	910917	1,3,5	G140S-01
20	910917	1,3,5	G140S-02

WELL ID : Shallow Groundwater SW of Landfill, S of G123

WARZYN INC.

Piper Diagram

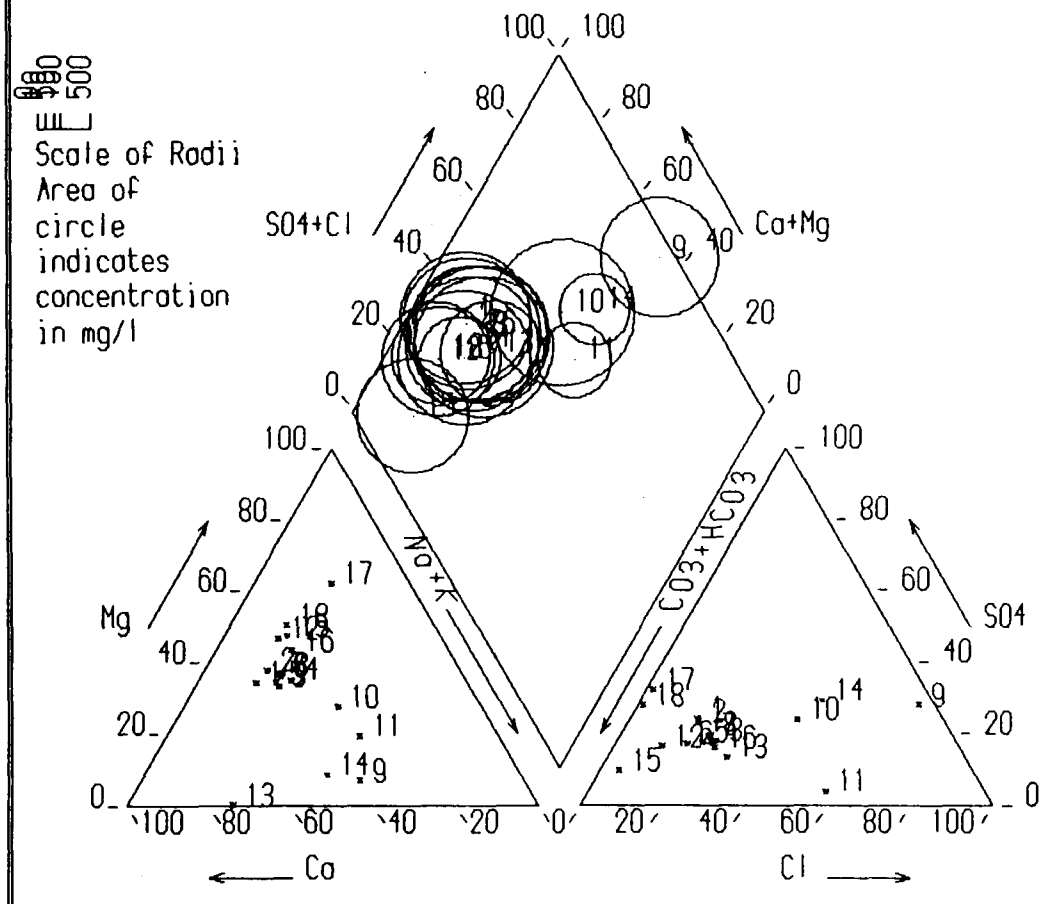
#	Date YYMMDD	Zone	Well I.D.
1	910917	1,3,5	G118S-01
2	910917	1,3,5	G118S-02
3	910917	1,3,5	G119-01
4	910917	1,3,5	G119-02
5	910917	1,3,5	G130-01
6	910917	1,3,5	G130-02
7	910917	1,4,9	G129-01
8	910917	1,4,6	G129-02
9	910917	1,3,5	G118D-01
10	910917	1,3,5	G118D-02



WELL ID : Shallow Groundwater W of Landfill, N of G129

WARZYN INC.

Piper Diagram



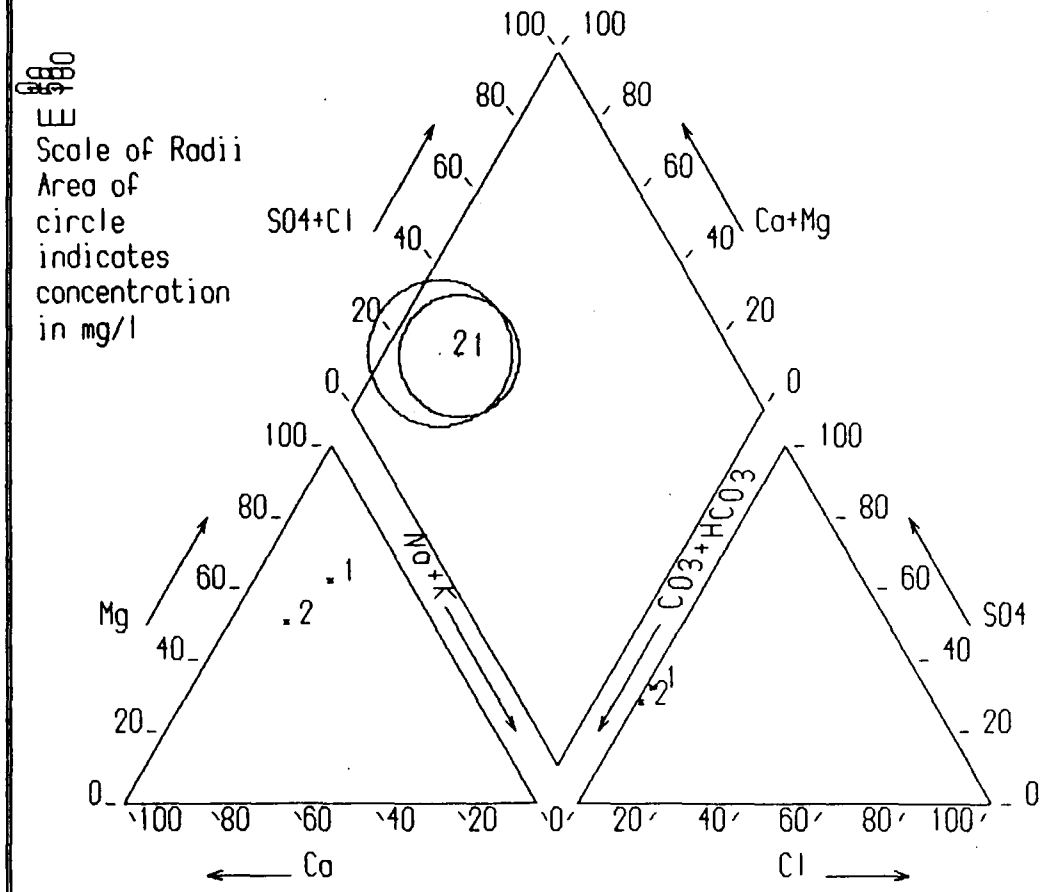
#	Date YYMMDD	Zone	Well I.D.
1	910917	1,3,5	G128D-01
2	910917	1,3,5	G128D-02
3	910917	1,3,5	G141D-01
4	910917	1,3,5	G141D-02
5	910917	1,3,5	G140D-01
6	910917	1,3,5	G140D-02
7	910917	1,3,5	G138-01
8	910917	1,3,5	G138-02
9	910917	2,4,7	G133D-01
10	910917	1,4,9	G133D-02
11	910917	1,4,9	G135-01
12	910917	1,3,5	G135-02
13	910917	1,3,5	G136-01
14	910917	1,4,9	G136-02
15	910917	1,3,5	G139-01
16	910917	1,3,5	G139-02
17	910917	1,3,5	G134D-01
18	910917	1,3,5	G134D-02

WELL ID : Deep Groundwater - All Wells

WARZYN INC.

Piper Diagram

#	Date YYMMDD	Zone	Well I.D.
1	910917	1,3,5	G134D-01
2	910917	1,3,5	G134D-02

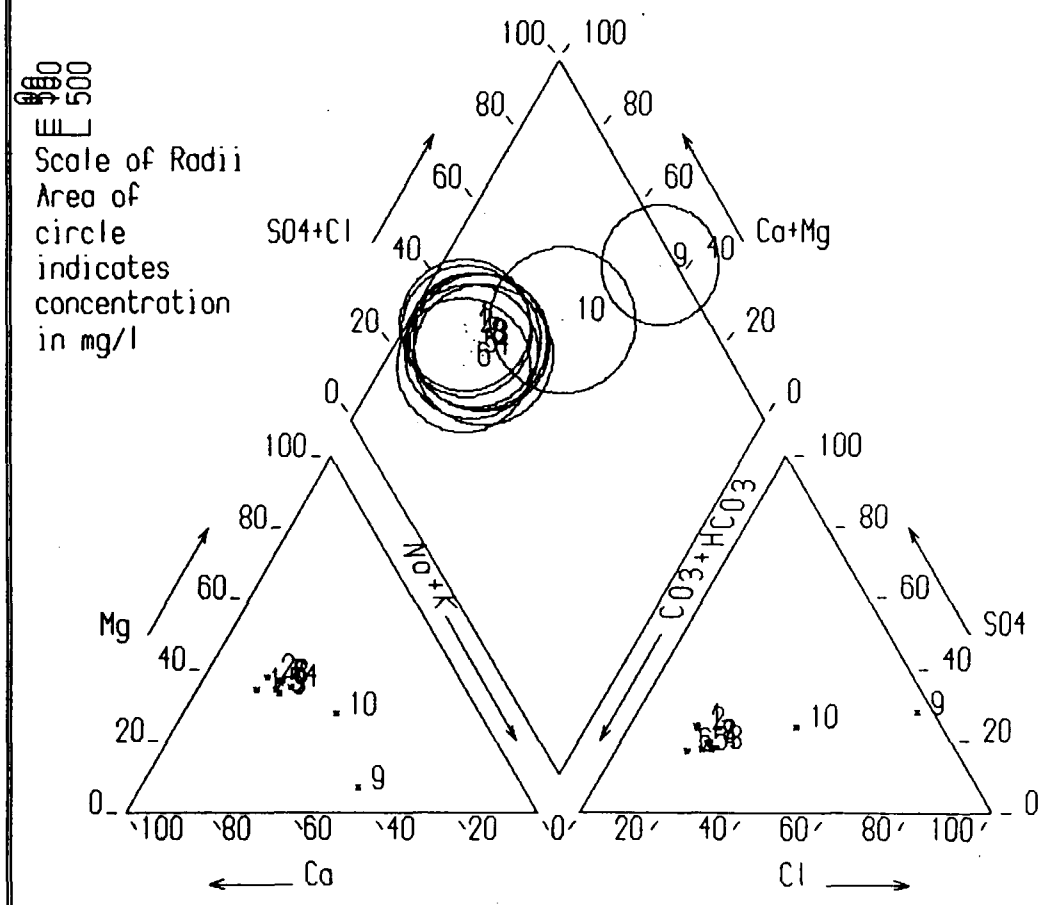


WELL ID : Upgradient Deep Groundwater at G134D

WARZYN INC.

Piper Diagram

#	Date YYMMDD	Zone	Well I.D.
1	910917	1,3,5	G128D-01
2	910917	1,3,5	G128D-02
3	910917	1,3,5	G141D-01
4	910917	1,3,5	G141D-02
5	910917	1,3,5	G140D-01
6	910917	1,3,5	G140D-02
7	910917	1,3,5	G138-01
8	910917	1,3,5	G138-02
9	910917	2,4,7	G133D-01
10	910917	1,4,9	G133D-02

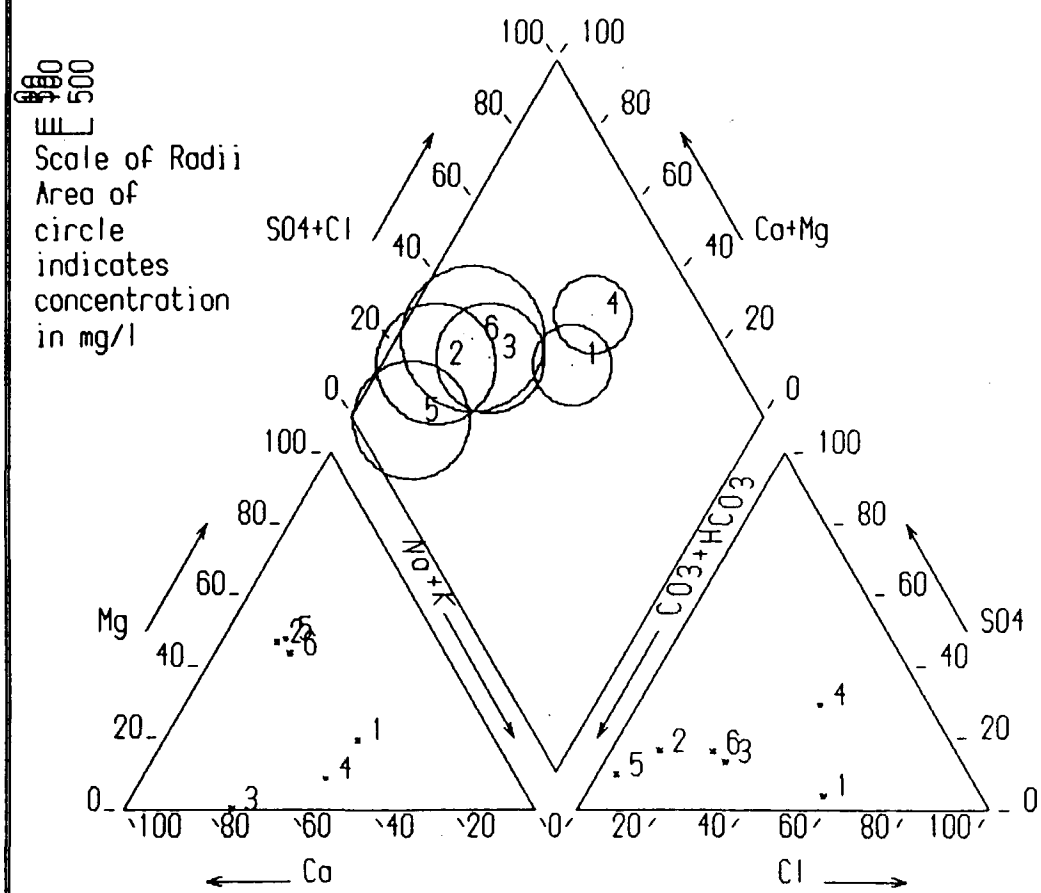


WELL ID : Deep Groundwater SW of Landfill, S of G128D

WARZYN INC.

Piper Diagram

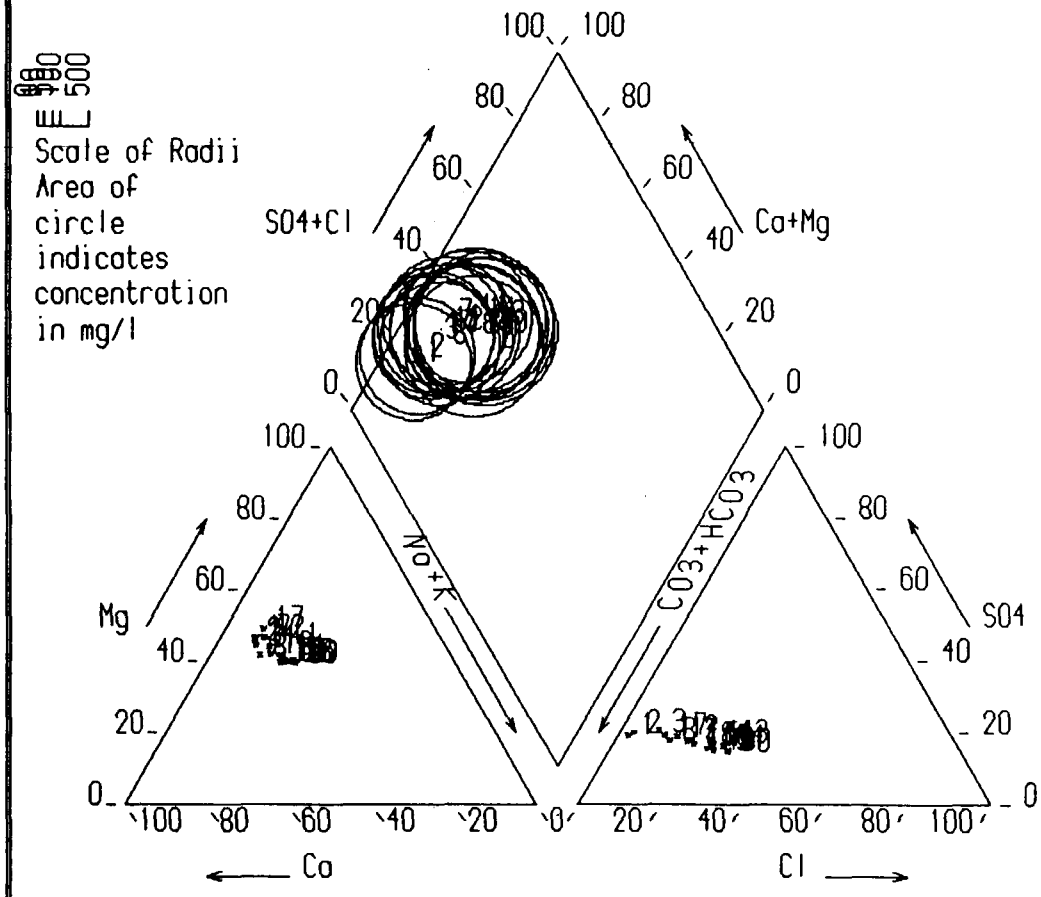
#	Date YYMMDD	Zone	Well I.D.
1	910917	1,4,9	G135-01
2	910917	1,3,5	G135-02
3	910917	1,3,5	G136-01
4	910917	1,4,9	G136-02
5	910917	1,3,5	G139-01
6	910917	1,3,5	G139-02



WELL ID : Deep Groundwater W of Landfill, N of G139

WARZYN INC.

Piper Diagram

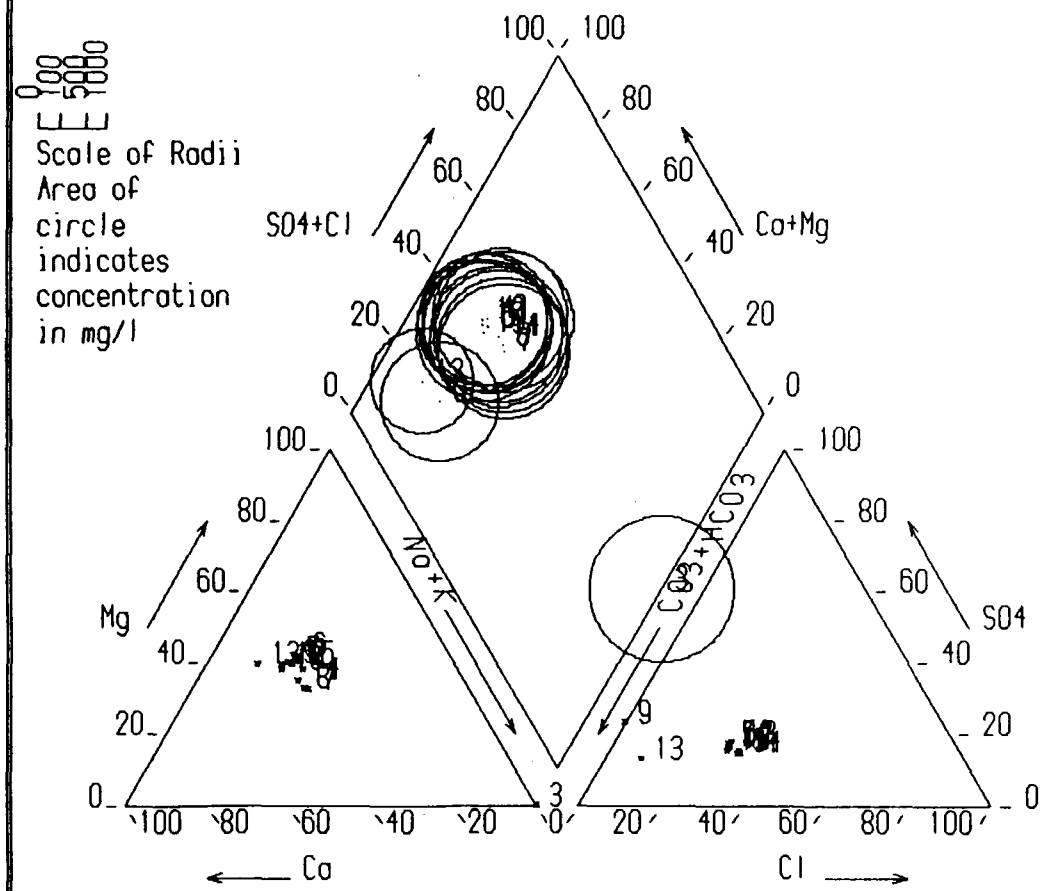


#	Date YYMMDD	Zone	Well I.D.
1	910520	1,3,5	PW-1
2	910520	1,3,5	PW-2
3	910520	1,3,5	PW-3
4	910520	1,3,5	PW-4
5	910520	1,3,5	PW-5
6	910520	1,3,5	PW-6
7	910520	1,3,5	PW-29
8	910520	1,3,5	PW-33
9	910520	1,3,5	PW-36
10	910520	1,3,5	PW-37
11	910520	1,3,5	PW-27
12	910520	1,3,5	PW-43
13	910520	1,3,5	PW-44
14	910520	1,3,5	PW-45
15	910520	1,3,5	PW-46
16	910520	1,3,5	PW-47
17	910520	1,3,5	PW-48
18	910520	1,3,5	PW-49
19	910520	1,3,5	PW-50

WELL ID : Private Wells W of the Landfill N of Forest Lane

WARZYN INC.

Piper Diagram

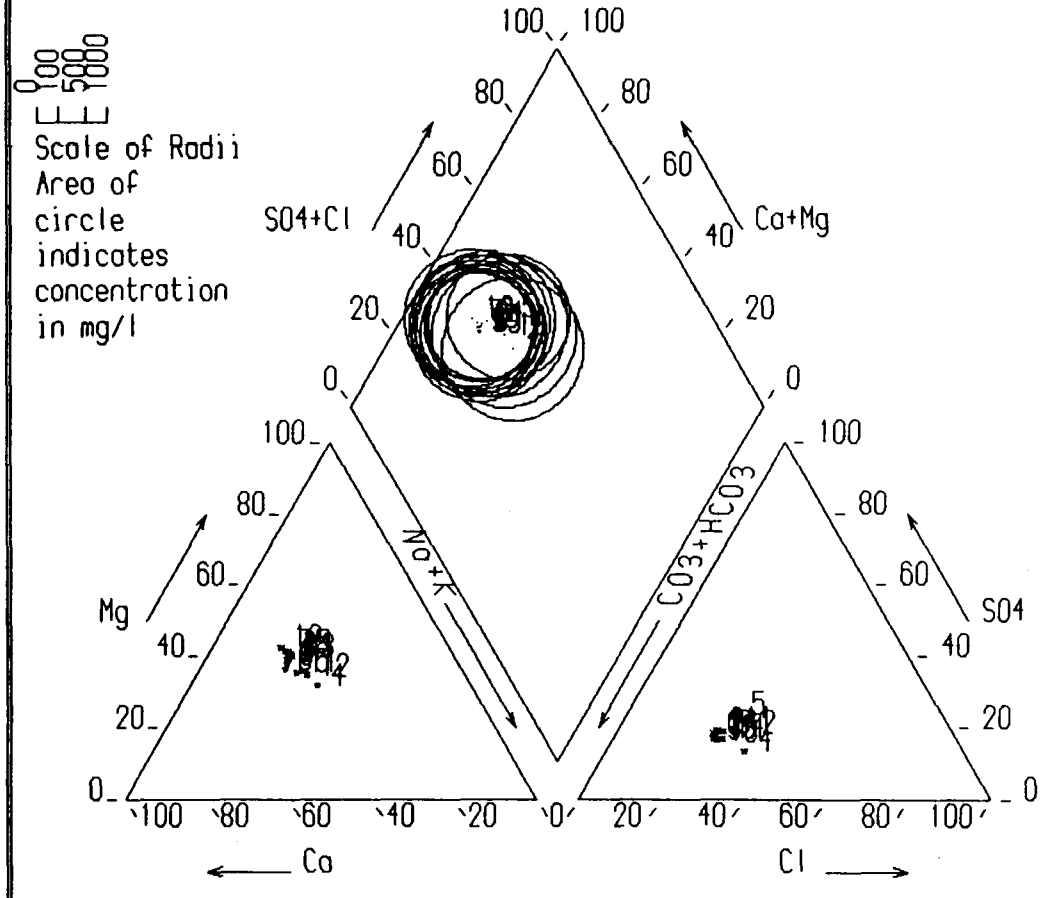


#	Date YYMMDD	Zone	Well I.D.
1	910520	1,4,9	PW-7
2	910520	1,3,5	PW-8
3	910520	2,4,7	PW-9
4	910520	1,3,5	PW-10
5	910520	1,3,5	PW-13
6	910520	1,3,5	PW-14
7	910520	1,3,5	PW-15
8	910520	1,3,5	PW-16
9	910520	1,3,5	PW-23
10	910520	1,3,5	PW-24
11	910520	1,3,5	PW-26
12	910520	1,3,5	PW-28
13	910520	1,3,5	PW-31
14	910520	1,3,5	PW-34
15	910520	1,3,5	PW-40

WELL ID : Private Wells N of Morris Court, S of Forest Lane

WARZYN INC.

Piper Diagram



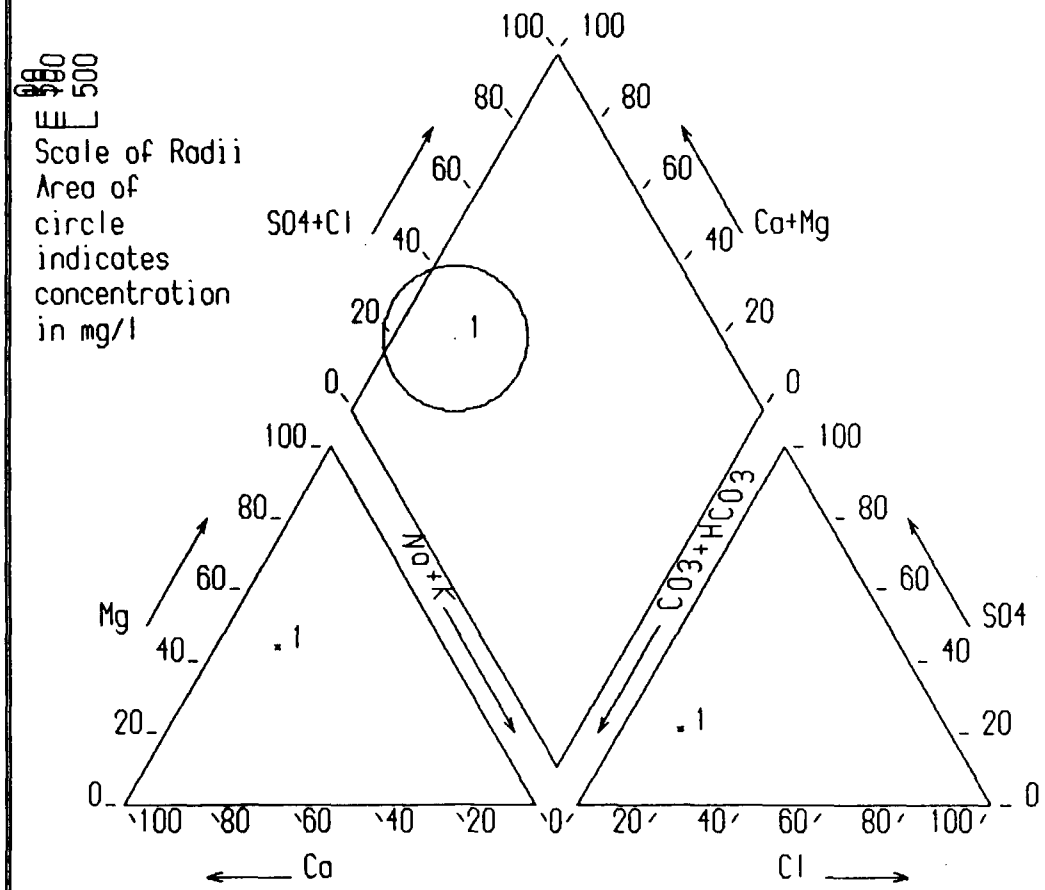
#	Date YYMMDD	Zone	Well I.D.
1	910520	1,3,5	PW-17
2	910520	1,3,5	PW-18
3	910520	1,3,5	PW-19
4	910520	1,3,5	PW-21
5	910520	1,4,9	PW-22
6	910520	1,3,5	PW-25
7	910520	1,3,5	PW-30
8	910520	1,3,5	PW-32
9	910520	1,3,5	PW-35
10	910520	1,3,5	PW-38
11	910520	1,3,5	PW-39
12	910520	1,3,5	PW-41
13	910520	1,3,5	PW-42
14	910520	1,3,5	PW-51
15	910520	1,3,5	PW-52

WELL ID : Private Wells South of Morris Court

WARZYN INC.

Piper Diagram

#	Date YYMMDD	Zone	Well I.D.
1	910520	1,3,5	PW-20

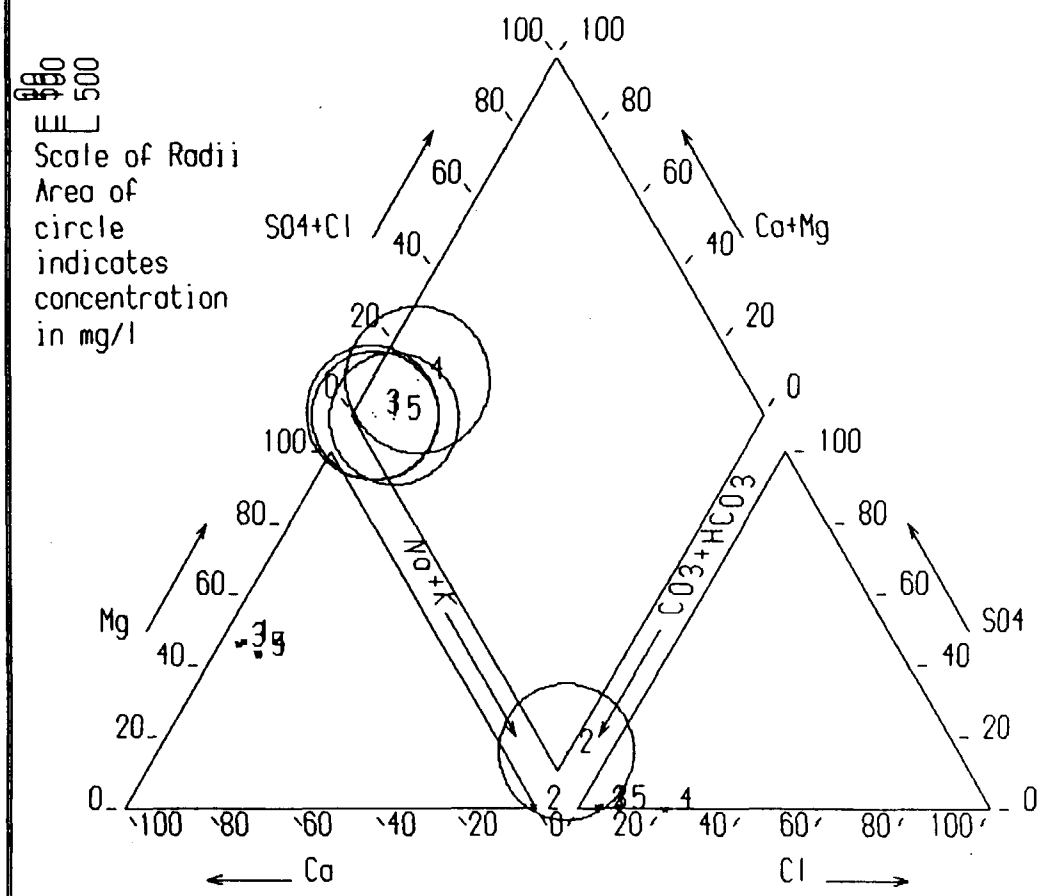


WELL ID : Upgradient Private Well 20

WARZYN INC.

Piper Diagram

#	Date YYMMDD	Zone	Well I.D.
1	910520	1,3,5	PW-53
2	910520	2,3,8	PW-54
3	910520	1,3,5	PW-55
4	910520	1,3,5	PW-56
5	910520	1,3,5	PW-57



WELL ID : Add'l Upgradient Private Wells-Cation Plots Only

Ignore anion data-sulfate not analyzed

WARZYN INC.

K

STATISTICAL ANALYSIS OF ANALYTICAL DATA BY MEDIUM

K

STATISTICAL ANALYSIS OF ANALYTICAL DATA BY MEDIUM

The analytical data collected from the Blackwell Landfill site has been organized and statistically analyzed in a manner appropriate for the baseline risk assessment using the procedures outlined in "Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual" (U.S. EPA., September 1989), and "Supplemental Guidance to RAGS: Calculating the Concentration Term" (U.S. EPA, March 1992). The following criteria were used in evaluating the data.

1. Analytical results were grouped and tabulated by medium. Aqueous medium include groundwater and surface water by water body. Non-aqueous media were organized as surface soils, sediments by water body and landfill gas. The samples used to represent each group are presented in Table 8-1.

2. Analyses were performed using Contract Laboratory Program (CLP) methodology.

3. Qualifiers applied both by the performing laboratory and during data validation were evaluated.

   Results qualified as unusable (R) were eliminated from further consideration.

   Target list compounds qualified as estimated (J) were considered to be positively identified, but with the concentration estimated, and were included for further evaluation. Tentatively identified compounds (TICs) from the volatile and semi-volatile analyses were also qualified as estimated, but both the quantity and the identity are uncertain. For this reason, TICs were considered chemicals of potential concern, and the maximum concentration of a TIC was used to represent its exposure point concentration.

4. Sample Quantitation Limits (SQLs) were evaluated. Organic and inorganic compounds detected in at least one sample from a given source area were evaluated.

   The decision path used to include non-detect data assumes; if a compound was detected in one sample from a source area, it may be present in related samples. For each compound detected, related samples were evaluated to determine the values to be included in calculating the 95 percent upper confidence limit of the arithmetic mean (95% UCL) or exposure point concentration for the quantitative risk assessment. For a given compound, all positive results were included.

   For samples where the compound was not detected, one half the SQL was included. If one half the SQL is greater than the maximum detected concentration for the source area, that result was eliminated from the data base used in the risk assessment. This was done to remove elevated detection limits due to high dilutions required for other method specific analytes which would otherwise artificially inflate the 95% UCL or exposure point concentrations. Re-analysis of such a sample, in an attempt to lower detection limits of the non-detect analytes in the method, would not eliminate the factors that required a dilution in the initial analyses.

5. Blank results were reviewed to identify and eliminate sample results that represent sampling, transportation, or laboratory introduced contamination.

After the data was evaluated using these criteria, the data base was complete, and ready for statistical analysis. A statistical analysis was conducted for each compound detected within a medium. The results of these statistical analyses (Appendix L) were used in the selection of chemicals of potential concern. The following is a discussion of the statistical analysis performed.

QUANTITATION OF UPPER CONFIDENCE LIMITS OF THE ARITHMETIC MEAN

For each compound detected within a medium, the 95% UCL was calculated assuming the data is distributed lognormally. The lognormal UCL values have been used to represent exposure point concentrations for chemicals selected as chemicals of potential concern (Appendix L), and are summarized in Table 8-12c.

CALCULATIONS

For each chemical detected within a medium, the following methods were used:

1. Data Set Preparation

   1.1 Determine the maximum detected concentration of each compound of potential concern in the source area for each media.

   1.2 For non-detect results, calculate 1/2 the SQL (sample quantitation limit)

   $$1/2\ SQL = RDL \times 0.5$$

   where:

   RDL = Reported detection limit, as presented in the analytical data in Appendix B of the RI Report. The RDL is equivalent to the SQL for an analyte.

   1.3 Compare the 1/2 SQL value to the maximum detected concentration. Eliminate 1/2 SQL values that exceed the maximum detected concentration.

   1.4 Prepare a data set table of the positive detects and 1/2 SQLs as evaluated above for each media of interest.

2. Calculation of 95 Percent Upper Confidence Limits
   To calculate the lognormal 95% UCL requires the data set to be transformed (using the natural log) before the 95% UCL can be calculated. For each compound:

   2.1 Transformed Data set. Calculate the natural log of each value in the data set.

   2.2 Calculate the arithmetic average of the transformed data set.

   2.3 Calculate the standard deviation of the transformed data set.

   2.4 Calculate the variance for the transformed data set.

2.5 Determine the number of data points or sample size (n) included in the data set (i.e., the usable positive detects and 1/2 SQLs). The sample size (n) for each chemical will vary depending upon the amount of usable data collected for the particular medium.

2.6 Determine the H value statistic. This value is taken from statistical tables for a one-sided upper 95% confidence limit on a log-normal mean (geometric mean; the geometric mean was used to estimate the true" mean) as presented in Gilbert (1987). The standard deviation and the number of data points (n) are required to determine this value.

2.7 Calculate the lognormal 95% UCL:

EXP(AVE + (0.5 VAR) + ((STD * Hv) / SQRT(n-1)))

where:

EXP	= Inverse base e logarithm
AVE	= Arithmetic average of the transformed data set
STD	= Standard deviation of the transformed data set
VAR	= Variance (STD * STD)
H value	= as determined in 2.6 above
SQRT	= Square root
n	=Sample size

2.8 Determine the value to be used for the exposure point concentration. Compare the 95% UCL value to the maximum detected concentration. The 95% UCL value is used unless it exceeds the maximum detected concentration.

Tables K-1 through K-10 provide the values that were used to calculate the lognormal 95% UCL for each chemical detected within a medium.

A summary of exposure point concentrations for each medium is presented in Table 8-12c.

MWK/vlr/KJD
J:\6072101\WP\RPT\99A_APPK.
6072101/230-MD-D2

Table K-1

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Well Water
Source Area: Private Wells

Chemical Of Potential Concern	95% UCLM Calculation						Max. Det. Conc. (ug/L)	Exposure Point Conc.	
	Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCLM (95%)		(ug/L)	(mg/L)
1,1-Dichloroethane	-0.59	0.21	1.72	0.04	51	6.0e-01	1.0e+00	6.0e-01	6.0e-04
cis-1,2-Dichloroethene	-0.55	0.34	1.76	0.11	51	6.7e-01	2.0e+00	6.7e-01	6.7e-04
Dieldrin	-4.61	0.00	1.68	0.00	51	1.0e-02	1.0e-02	1.0e-02	1.0e-05
4,4'-DDE	-4.66	0.07	2.75	0.01	2	1.2e-02	1.0e-02	1.0e-02	1.0e-05
Endrin	-4.60	0.05	1.68	0.00	51	1.0e-02	1.4e-02	1.0e-02	1.0e-05
4,4'-DDD	-5.12	ERR	1.00	ERR	1	ERR	6.0e-03	6.0e-03	6.0e-06
Endrin aldehyde	-5.81	ERR	1.00	ERR	1	ERR	3.0e-03	3.0e-03	3.0e-06
Aluminum	3.24	0.08	1.68	0.01	51	2.6e+01	3.9e+01	2.6e+01	2.6e-02
Antimony	0.94	0.17	1.72	0.03	51	2.7e+00	8.2e+00	2.7e+00	2.7e-03
Arsenic	0.40	0.69	2.03	0.48	51	2.3e+00	1.4e+01	2.3e+00	2.3e-03
Barium	4.44	0.49	1.88	0.24	51	1.1e+02	1.4e+02	1.1e+02	1.1e-01
Cadmium	-2.19	0.43	1.81	0.19	51	1.4e-01	8.7e-01	1.4e-01	1.4e-04
Calcium	11.41	0.73	2.03	0.54	51	1.5e+05	1.2e+05	1.2e+05	1.2e+02
Copper	1.79	0.35	1.81	0.13	51	7.0e+00	2.0e+01	7.0e+00	7.0e-03
Iron	6.68	1.10	2.31	1.21	51	2.1e+03	3.6e+03	2.1e+03	2.1e+00
Lead	0.55	0.63	1.95	0.39	51	2.5e+00	8.6e+01	2.5e+00	2.5e-03
Magnesium	10.90	0.69	2.03	0.47	51	8.3e+04	7.7e+04	7.7e+04	7.7e+01
Manganese	2.44	1.03	2.31	1.06	51	2.7e+01	9.6e+01	2.7e+01	2.7e-02
Nickel	2.32	0.11	1.68	0.01	51	1.0e+01	2.2e+01	1.0e+01	1.0e-02
Potassium	8.05	0.37	1.81	0.14	51	3.7e+03	7.7e+03	3.7e+03	3.7e+00
Silver	-1.36	0.22	1.72	0.05	51	2.8e-01	1.2e+00	2.8e-01	2.8e-04
Sodium	10.85	0.56	1.95	0.31	51	7.0e+04	3.6e+05	7.0e+04	7.0e+01
Zinc	3.63	1.38	2.88	1.92	51	1.7e+02	4.0e+02	1.7e+02	1.7e-01

Notes:
Ave. of LN Data = The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data = The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value = H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance = Variance of the natural log transformed data.
n = Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCLM (95%) = EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. = Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. = The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR = Statistical operations cannot be performed on a single data point.

Exposure point concentrations are calculated for each chemical detected within the medium, without exclusion of those chemicals not considered to be of potential concern. Refer to Appendix L or Table 8-3 for a discussion of the chemicals considered to be of potential concern within the medium.

[Blackwell.2020]U-PW.w20
9/23/92
JAH/jah/JDD/MWK

Table K-2

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Surface Waters
Source Area: Silver Lake

Chemical Of Potential Concern	95% UCLM Calculation						Max. Det. Conc. (ug/L)	Exposure Point Conc.	
	Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCLM (95%)		(ug/L)	(mg/L)
Aluminum	5.81	0.80	10.43	0.63	2	1.8e+06	5.9e+02	5.9e+02	5.9e-01
Arsenic	1.17	0.15	3.30	0.02	2	5.4e+00	3.6e+00	3.6e+00	3.6e-03
Barium	3.22	0.25	4.11	0.06	2	7.3e+01	3.0e+01	3.0e+01	3.0e-02
Calcium	10.22	0.23	3.30	0.05	2	6.0e+04	3.2e+04	3.2e+04	3.2e+01
Copper	3.00	0.32	4.11	0.10	2	7.7e+01	2.5e+01	2.5e+01	2.5e-02
Iron	6.66	0.76	10.43	0.58	2	2.9e+06	1.3e+03	1.3e+03	1.3e+00
Lead	1.04	0.89	11.74	0.80	2	1.5e+05	5.3e+00	5.3e+00	5.3e-03
Magnesium	10.26	0.04	2.75	0.00	2	3.2e+04	2.9e+04	2.9e+04	2.9e+01
Manganese	3.87	0.57	7.81	0.33	2	5.0e+03	7.2e+01	7.2e+01	7.2e-02
Mercury	-1.83	0.59	7.81	0.35	4	2.7e+00	3.4e-01	3.4e-01	3.4e-04
Potassium	7.96	0.05	2.75	0.00	2	3.3e+03	3.0e+03	3.0e+03	3.0e+00
Sodium	9.31	0.03	2.75	0.00	2	1.2e+04	1.1e+04	1.1e+04	1.1e+01

Notes:

Ave. of LN Data = The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data = The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value = H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance = Variance of the natural log transformed data.
n = Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCLM (95%) = EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. = Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. = The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR = Statistical operations cannot be performed on a single data point.

Exposure point concentrations are calculated for each chemical detected within the medium, without exclusion of those chemicals not considered to be of potential concern. Refer to Appendix L or Table 8-3 for a discussion of the chemicals considered to be of potential concern within the medium.

[Blackwell.2020]U-SWA.w20
9/23/92
JAH/jah/JDD/MWK

Table K-3

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Surface Waters
Source Area: Background

Chemical Of Potential Concern	95% UCLM Calculation						Max. Det. Conc.	Exposure Point Conc.	
	Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCLM (95%)	(ug/L)	(ug/L)	(mg/L)
Aluminum	4.34	1.25	16.33	1.55	4	2.1e+07	4.6e+02	4.6e+02	4.6e-01
Arsenic	1.11	0.27	4.11	0.07	4	5.9e+00	4.0e+00	4.0e+00	4.0e-03
Barium	3.17	0.43	5.22	0.18	4	9.5e+01	4.0e+01	4.0e+01	4.0e-02
Calcium	10.15	0.32	4.11	0.10	4	5.8e+04	3.9e+04	3.9e+04	3.9e+01
Copper	2.81	0.48	6.50	0.23	4	1.1e+02	2.8e+01	2.8e+01	2.8e-02
Iron	5.68	1.02	13.05	1.05	4	1.1e+06	1.3e+03	1.3e+03	1.3e+00
Magnesium	10.05	0.15	3.30	0.02	4	3.1e+04	2.9e+04	2.9e+04	2.9e+01
Manganese	3.71	1.51	19.60	2.28	4	3.3e+09	1.8e+02	1.8e+02	1.8e-01
Mercury	-1.68	0.19	3.30	0.04	3	2.9e-01	2.1e-01	2.1e-01	2.1e-04
Potassium	7.91	0.05	2.75	0.00	4	3.0e+03	2.9e+03	2.9e+03	2.9e+00
Silver	1.78	0.35	5.22	0.12	4	1.8e+01	1.0e+01	1.0e+01	1.0e-02
Sodium	10.42	0.60	7.81	0.36	4	6.1e+05	4.7e+04	4.7e+04	4.7e+01

Notes:

Ave. of LN Data = The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data = The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value = H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance = Variance of the natural log transformed data.
n = Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCLM (95%) = EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. = Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. = The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR = Statistical operations cannot be performed on a single data point.

n of those chemicals not
considered to be of potential concern. Refer to Appendix L or Table 8-3 for a discussion of the chemicals considered to be of potential concern within the medium.

[Blackwell.2020]U-SWB.w20
9/23/92
JAH/jah/JDD/MWK

Table K-4

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Surface Waters
Source Area: Swim Lake

Chemical Of Potential Concern	95% UCLM Calculation						Max. Det. Conc. (ug/L)	Exposure Point Conc.	
	Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCLM (95%)		(ug/L)	(mg/L)
Barium	3.62	0.02	2.75	0.00	2	3.9e+01	3.8e+01	3.8e+01	3.8e-02
Calcium	10.69	0.05	2.75	0.00	2	5.1e+04	4.6e+04	4.6e+04	4.6e+01
Copper	2.28	0.94	11.74	0.89	2	9.9e+05	1.9e+01	1.9e+01	1.9e-02
Iron	5.53	0.36	5.22	0.13	2	1.7e+03	3.2e+02	3.2e+02	3.2e-01
Magnesium	10.85	0.00	2.75	0.00	2	5.2e+04	5.2e+04	5.2e+04	5.2e+01
Manganese	4.07	0.17	3.30	0.03	2	1.0e+02	6.6e+01	6.6e+01	6.6e-02
Mercury	-1.89	0.59	7.81	0.35	2	1.8e+01	2.3e-01	2.3e-01	2.3e-04
Potassium	8.42	0.01	2.75	0.00	2	4.7e+03	4.6e+03	4.6e+03	4.6e+00
Sodium	10.47	0.08	2.75	0.01	2	4.4e+04	3.7e+04	3.7e+04	3.7e+01

Notes:
Ave. of LN Data = The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data = The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value = H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance = Variance of the natural log transformed data.
n = Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCLM (95%) = EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. = Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. = The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR = Statistical operations cannot be performed on a single data point.

Exposure point concentrations are calculated for each chemical detected within the medium, without exclusion of those chemicals not considered to be of potential concern. Refer to Appendix L or Table 8-3 for a discussion of the chemicals considered to be of potential concern within the medium.

[Blackwell.2020]U-SWC.w20
9/23/92
JAH/jah/JDD/MWK

Table K-5

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Sediment
Source Area: Silver Lake

Chemical Of Potential Concern	95% UCLM Calculation						Max. Det. Conc.	Exposure Point Conc.	
	Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCLM (95%)	(ug/kg)	(ug/kg)	(mg/kg)
Acenaphthene	4.36	ERR	1.00	ERR	1	ERR	7.8e+01	7.8e+01	7.8e-02
Fluorene	4.94	ERR	1.00	ERR	1	ERR	1.4e+02	1.4e+02	1.4e-01
Phenanthrene	5.83	0.40	5.22	0.16	2	3.0e+03	4.5e+02	4.5e+02	4.5e-01
Anthracene	5.14	ERR	1.00	ERR	1	ERR	1.7e+02	1.7e+02	1.7e-01
Fluoranthene	6.28	2.00	26.14	4.00	2	2.0e+26	2.2e+03	2.2e+03	2.2e+00
Pyrene	5.99	1.97	26.14	3.87	2	6.0e+25	1.6e+03	1.6e+03	1.6e+00
Butylbenzylphthalate	4.34	ERR	1.00	ERR	1	ERR	7.7e+01	7.7e+01	7.7e-02
Benzo(a)anthracene	6.07	0.74	9.12	0.55	2	5.0e+05	7.3e+02	7.3e+02	7.3e-01
Chrysene	5.47	2.01	26.14	4.05	2	1.2e+26	9.8e+02	9.8e+02	9.8e-01
Benzo(b)fluoranthene	5.95	2.34	32.69	5.48	2	ERR	2.0e+03	2.0e+03	2.0e+00
Benzo(k)fluoranthene	5.85	2.48	32.69	6.15	2	ERR	2.0e+03	2.0e+03	2.0e+00
Benzo(a)pyrene	6.11	0.80	10.43	0.64	2	2.6e+06	7.9e+02	7.9e+02	7.9e-01
Indeno(1,2,3-cd)pyrene	5.93	0.54	6.50	0.30	2	1.5e+04	5.5e+02	5.5e+02	5.5e-01
Dibenz(a,h)anthracene	5.88	0.48	6.50	0.23	2	8.8e+03	5.0e+02	5.0e+02	5.0e-01
Benzo(g,h,i)perylene	6.97	2.01	26.14	4.06	2	5.9e+26	4.4e+03	4.4e+03	4.4e+00
Aluminum	8.94	0.03	2.75	0.00	2	8.2e+03	7.8e+03		7.8e+03
Arsenic	1.64	0.10	2.75	0.01	2	6.7e+00	5.5e+00		5.5e+00
Barium	4.34	0.38	5.22	0.15	2	6.0e+02	1.0e+02		1.0e+02
Calcium	11.36	0.17	3.30	0.03	2	1.5e+05	9.7e+04		9.7e+04
Chromium, total	2.39	0.09	2.75	0.01	2	1.4e+01	1.2e+01		1.2e+01
Cobalt	2.19	0.06	2.75	0.00	2	1.0e+01	9.3e+00		9.3e+00
Copper	2.85	0.16	3.30	0.03	2	3.0e+01	1.9e+01		1.9e+01
Iron	9.70	0.02	2.75	0.00	2	1.7e+04	1.7e+04		1.7e+04
Lead	2.80	0.54	6.50	0.29	2	6.2e+02	2.4e+01		2.4e+01
Magnesium	10.37	0.58	7.81	0.34	2	3.5e+06	4.8e+04		4.8e+04
Manganese	6.10	0.39	5.22	0.15	2	3.7e+03	5.9e+02		5.9e+02
Nickel	2.37	0.07	2.75	0.01	2	1.3e+01	1.1e+01		1.1e+01
Potassium	7.13	0.06	2.75	0.00	2	1.5e+03	1.3e+03		1.3e+03
Vanadium	2.72	0.45	6.50	0.21	2	3.2e+02	2.1e+01		2.1e+01
Zinc	4.13	0.65	9.12	0.42	2	2.8e+04	9.8e+01		9.8e+01

Ave. of LN Data = The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data = The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value = H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance = Variance of the natural log transformed data.
n = Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCLM (95%) = EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. = Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. = The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR = Statistical operations cannot be performed on a single data point.

Exposure point concentrations are calculated for each chemical detected within the medium, without exclusion of those chemicals not considered to be of potential concern. Refer to Appendix L or Table 8-3 for a discussion of the chemicals considered to be of potential concern within the medium.

[Blackwell.2020]U-SDA.w20
9/23/92 JAH/JAH/JDD/MWK

Table K-6

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Sediment
Source Area: Background

Chemical Of Potential Concern	95% UCLM Calculation: Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCLM (95%)	Max. Det. Conc. (ug/kg)	Exposure Point Conc. (ug/kg)	Exposure Point Conc. (mg/kg)	Avg. Det. Conc. (mg/kg)
Phenanthrene	5.63	1.27	16.33	1.62	3	1.5e+09	1.1e+03	1.1e+03	1.1e+00	4.7e-01
Fluoranthene	6.27	1.56	19.60	2.44	4	8.5e+10	2.6e+03	2.6e+03	2.6e+00	1.1e+00
Pyrene	6.23	1.57	19.60	2.46	4	8.8e+10	2.4e+03	2.4e+03	2.4e+00	1.1e+00
Benzo(a)anthracene	4.92	1.81	22.87	3.26	3	3.3e+15	1.1e+03	1.1e+03	1.1e+00	4.0e-01
Chrysene	5.27	1.59	19.60	2.52	3	2.5e+12	1.2e+03	1.2e+03	1.2e+00	4.5e-01
bis(2-ethylhexyl)phthalate	5.79	1.30	16.33	1.69	4	1.6e+08	1.5e+03	1.5e+03	1.5e+00	5.6e-01
Benzo(b)fluoranthene	6.04	1.81	22.87	3.29	4	5.4e+13	2.3e+03	2.3e+03	2.3e+00	1.0e+00
Benzo(k)fluoranthene	6.16	1.63	22.87	2.65	4	3.8e+12	2.3e+03	2.3e+03	2.3e+00	1.0e+00
Benzo(a)pyrene	5.29	1.70	22.87	2.89	3	7.2e+14	1.4e+03	1.4e+03	1.4e+00	5.2e-01
Indeno(1,2,3-cd)pyrene	5.81	0.69	9.12	0.48	3	3.7e+04	7.4e+02	7.4e+02	7.4e-01	4.0e-01
Dibenz(a,h)anthracene	5.40	0.02	2.75	0.00	2	2.3e+02	2.3e+02	2.3e+02	2.3e-01	2.2e-01
Benzo(g,h,i)perylene	5.83	0.73	9.12	0.54	3	5.0e+04	7.9e+02	7.9e+02	7.9e-01	4.1e-01
Aluminum	8.71	0.61	7.81	0.37	4	1.1e+05	9.8e+03		9.8e+03	6.8e+03
Arsenic	2.06	0.70	9.12	0.50	4	4.1e+02	1.4e+01		1.4e+01	9.3e+00
Barium	3.47	0.77	10.43	0.59	4	4.5e+03	7.5e+01		7.5e+01	4.0e+01
Cadmium	0.76	0.91	11.74	0.83	4	1.5e+03	4.7e+00		4.7e+00	2.8e+00
Calcium	10.80	0.71	9.12	0.51	4	2.7e+06	1.1e+05		1.1e+05	5.8e+04
Chromium, total	2.20	0.43	5.22	0.18	4	3.6e+01	1.4e+01		1.4e+01	9.6e+00
Cobalt	2.14	0.37	5.22	0.14	4	2.8e+01	1.1e+01		1.1e+01	8.9e+00
Copper	2.77	0.67	9.12	0.45	4	6.7e+02	3.4e+01		3.4e+01	1.9e+01
Iron	9.56	0.51	6.50	0.26	4	1.1e+05	2.3e+04		2.3e+04	1.5e+04
Lead	2.94	0.55	7.81	0.30	4	2.7e+02	4.0e+01		4.0e+01	2.1e+01
Magnesium	10.23	0.71	9.12	0.50	4	1.5e+06	5.8e+04		5.8e+04	3.3e+04
Manganese	5.80	0.42	5.22	0.18	4	1.3e+03	5.2e+02		5.2e+02	3.5e+02
Mercury	-3.40	0.34	4.11	0.12	4	8.0e-02	5.5e-02		5.5e-02	3.5e-02
Nickel	2.66	0.60	7.81	0.36	4	2.6e+02	2.5e+01		2.5e+01	1.6e+01
Potassium	7.15	0.61	7.81	0.37	4	2.3e+04	2.0e+03		2.0e+03	1.4e+03
Sodium	5.98	0.83	10.43	0.68	4	8.1e+04	1.4e+03		1.4e+03	5.4e+02
Vanadium	2.56	0.53	6.50	0.28	4	1.1e+02	2.2e+01		2.2e+01	1.4e+01
Zinc	4.07	0.82	10.43	0.68	4	1.2e+04	1.8e+02		1.8e+02	7.7e+01

Ave. of LN Data = The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data = The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value = H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance = Variance of the natural log transformed data.
n = Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCLM (95%) = EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. = Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. = The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR = Statistical operations cannot be performed on a single data point.

Exposure point concentrations are calculated for each chemical detected within the medium, without exclusion of those chemicals not considered to be of potential concern. Refer to Appendix L or Table 8-3 for a discussion of the chemicals considered to be of potential concern within the medium.

[Blackwell.2020]U-SDB.w20
9/23/92 JAH/JAH/JDD/MWK

Table K-7

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Surface Waters
Source Area: Swim Pond

Chemical Of Potential Concern	95% UCLM Calculation						Max. Det. Conc.	Exposure Point Conc.	
	Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCLM (95%)	(ug/kg)	(ug/kg)	(mg/kg)
Vinyl chloride	1.61	ERR	1.00	ERR	1	ERR	5.0e+00	5.0e+00	5.0e-03
Carbon disulfide	1.61	ERR	1.00	ERR	1	ERR	5.0e+00	5.0e+00	5.0e-03
1,1-Dichloroethane	1.10	ERR	1.00	ERR	1	ERR	3.0e+00	3.0e+00	3.0e-03
Aluminum	7.30	0.82	10.43	0.67	2	1.0e+07	2.6e+03		2.6e+03
Arsenic	1.22	0.04	2.75	0.00	2	3.8e+00	3.5e+00		3.5e+00
Barium	3.94	1.07	13.05	1.14	2	1.0e+08	1.1e+02		1.1e+02
Calcium	11.28	1.15	16.33	1.32	2	2.2e+13	1.8e+05		1.8e+05
Cobalt	1.15	0.96	13.05	0.92	2	1.3e+06	6.2e+00		6.2e+00
Copper	2.02	2.19	26.14	4.81	2	6.7e+26	3.6e+01		3.6e+01
Iron	8.69	0.86	11.74	0.74	2	2.1e+08	1.1e+04		1.1e+04
Lead	1.80	1.24	16.33	1.55	2	8.5e+09	1.5e+01		1.5e+01
Magnesium	9.85	0.79	10.43	0.62	2	9.3e+07	3.3e+04		3.3e+04
Manganese	5.77	1.10	13.05	1.20	2	9.7e+08	6.9e+02		6.9e+02
Potassium	5.98	0.92	11.74	0.85	2	2.9e+07	7.6e+02		7.6e+02
Zinc	3.86	1.08	13.05	1.16	2	1.1e+08	1.0e+02		1.0e+02

Notes:
Ave. of LN Data = The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data = The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value = H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance = Variance of the natural log transformed data.
n = Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCLM (95%) = EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. = Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. = The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR = Statistical operations cannot be performed on a single data point.

Exposure point concentrations are calculated for each chemical detected within the medium, without exclusion of those chemicals not considered to be of potential concern. Refer to Appendix L or Table 8-3 for a discussion of the chemicals considered to be of potential concern within the medium.

[Blackwell.2020]U-SDC.W20
9/23/92
JAH/jah/JDD/MWK

Table K-8

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Surface Soils
Source Area: Landfill

Chemical Of Potential Concern	95% UCLM Calculation: Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCLM (95%)	Max. Det. Conc. (ug/kg)	Exposure Point Conc. (ug/kg)	Exposure Point Conc. (mg/kg)
Phenanthrene	5.14	0.00	2.75	0.00	2	1.7e+02	1.7e+02	1.7e+02	1.7e-01
Fluoranthene	5.32	0.26	2.40	0.07	6	2.8e+02	3.4e+02	2.8e+02	2.8e-01
Pyrene	5.29	0.20	2.20	0.04	6	2.5e+02	2.9e+02	2.5e+02	2.5e-01
Benzo(a)anthracene	5.14	ERR	1.00	ERR	1	ERR	1.7e+02	1.7e+02	1.7e-01
Chrysene	5.24	0.08	2.04	0.01	6	2.0e+02	2.1e+02	2.0e+02	2.0e-01
Benzo(b)fluoranthene	5.40	0.47	2.95	0.22	6	4.6e+02	5.8e+02	4.6e+02	4.6e-01
Benzo(k)fluoranthene	5.40	0.47	2.95	0.22	6	4.6e+02	5.8e+02	4.6e+02	4.6e-01
Benzo(a)pyrene	5.20	0.04	2.04	0.00	5	1.9e+02	1.9e+02	1.9e+02	1.9e-01
Indeno(1,2,3-cd)pyrene	5.18	0.03	2.75	0.00	4	1.9e+02	1.8e+02	1.8e+02	1.8e-01
Benzo(g,h,i)perylene	5.24	0.08	2.04	0.01	6	2.0e+02	2.1e+02	2.0e+02	2.0e-01
Aluminum	8.97	0.70	3.66	0.49	6	3.2e+04	1.6e+04		1.6e+04
Arsenic	1.79	0.08	2.04	0.01	6	6.4e+00	6.5e+00		6.4e+00
Barium	4.21	1.05	4.91	1.11	6	1.2e+03	1.8e+02		1.8e+02
Cadmium	0.15	1.16	6.00	1.35	6	5.2e+01	5.5e+00		5.5e+00
Calcium	10.13	1.54	7.12	2.36	6	1.1e+07	1.3e+05		1.3e+05
Chromium, total	2.61	0.68	3.66	0.46	6	5.2e+01	3.9e+01		3.9e+01
Cobalt	2.11	0.46	2.95	0.21	6	1.7e+01	1.7e+01		1.7e+01
Copper	2.72	0.24	2.20	0.06	6	2.0e+01	2.4e+01		2.0e+01
Iron	9.76	0.25	2.40	0.06	6	2.3e+04	2.4e+04		2.3e+04
Lead	2.50	0.43	2.65	0.18	6	2.2e+01	2.0e+01		2.0e+01
Magnesium	9.73	1.28	6.00	1.64	6	1.2e+06	7.0e+04		7.0e+04
Manganese	6.60	0.58	3.29	0.33	6	2.0e+03	1.6e+03		1.6e+03
Mercury	-3.47	0.40	2.65	0.16	6	5.4e-02	6.0e-02		5.4e-02
Nickel	2.23	0.89	4.48	0.79	6	8.2e+01	2.2e+01		2.2e+01
Potassium	6.92	0.43	2.65	0.19	6	1.9e+03	1.7e+03		1.7e+03
Silver	0.28	0.27	2.40	0.08	6	1.8e+00	2.2e+00		1.8e+00
Vanadium	2.92	0.74	3.66	0.55	6	8.3e+01	3.6e+01		3.6e+01
Zinc	3.88	0.47	2.95	0.22	6	1.0e+02	8.1e+01		8.1e+01

Ave. of LN Data = The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data = The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value = H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance = Variance of the natural log transformed data.
n = Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCLM (95%) = EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. = Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. = The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR = Statistical operations cannot be performed on a single data point.

Exposure point concentrations are calculated for each chemical detected within the medium, without exclusion of those chemicals not considered to be of potential concern. Refer to Appendix L or Table 8-3 for a discussion of the chemicals considered to be of potential concern within the medium.

{Blackwell.2020}U-SSA.w20
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Table K-9

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Surface Soils
Source Area: Background

Chemical Of Potential Concern	95% UCLM Calculation: Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCLM (95%)	Max. Det. Conc. (ug/kg)	Exposure Point Conc. (ug/kg)	Exposure Point Conc. (mg/kg)	Avg. Det. Conc. (mg/kg)
1,1,1-Trichloroethane	0.69	0.00	2.75	0.00	2	2.0e+00	2.0e+00	2.0e+00	2.0e-03	2.0e-03
Phenanthrene	5.52	0.49	2.95	0.24	5	5.8e+02	6.0e+02	5.8e+02	5.8e-01	2.8e-01
Anthracene	4.17	ERR	1.00	ERR	1	ERR	6.5e+01	6.5e+01	6.5e-02	6.5e-02
Fluoranthene	5.11	1.30	6.00	1.70	5	1.9e+04	1.2e+03	1.2e+03	1.2e+00	3.4e-01
Pyrene	5.47	1.12	6.00	1.25	5	1.3e+04	1.4e+03	1.4e+03	1.4e+00	4.1e-01
Butylbenzylphthalate	4.50	ERR	1.00	ERR	1	ERR	9.0e+01	9.0e+01	9.0e-02	9.0e-02
Benzo(a)anthracene	5.48	0.40	2.65	0.16	5	4.4e+02	4.9e+02	4.4e+02	4.4e-01	2.6e-01
Chrysene	5.24	0.93	4.48	0.87	5	2.4e+03	6.2e+02	6.2e+02	6.2e-01	2.6e-01
bis(2-ethylhexyl)phthalate	4.24	0.25	4.11	0.06	3	1.5e+02	9.2e+01	9.2e+01	9.2e-02	7.1e-02
Benzo(b)fluoranthene	5.34	1.16	6.00	1.34	5	1.3e+04	1.4e+03	1.4e+03	1.4e+00	3.9e-01
Benzo(k)fluoranthene	5.34	1.16	6.00	1.34	5	1.3e+04	1.4e+03	1.4e+03	1.4e+00	3.9e-01
Benzo(a)pyrene	5.21	0.84	4.06	0.71	5	1.4e+03	5.1e+02	5.1e+02	5.1e-01	2.3e-01
Indeno(1,2,3-cd)pyrene	5.52	0.48	2.95	0.23	5	5.6e+02	5.8e+02	5.6e+02	5.6e-01	2.8e-01
Dibenz(a,h)anthracene	5.31	0.05	2.04	0.00	5	2.1e+02	2.1e+02	2.1e+02	2.1e-01	2.0e-01
Benzo(g,h,i)perylene	5.50	0.45	2.95	0.20	5	5.3e+02	5.5e+02	5.3e+02	5.3e-01	2.7e-01
Carbazole	4.13	ERR	1.00	ERR	1	ERR	6.2e+01	6.2e+01	6.2e-02	6.2e-02
Aluminum	9.49	0.17	2.20	0.03	5	1.6e+04	1.7e+04		1.6e+04	1.3e+04
Arsenic	1.85	0.24	2.20	0.06	5	8.4e+00	7.4e+00		7.4e+00	6.5e+00
Barium	4.93	0.13	2.04	0.02	5	1.6e+02	1.7e+02		1.6e+02	1.4e+02
Cadmium	0.90	1.25	6.00	1.57	5	2.3e+02	9.7e+00		9.7e+00	4.1e+00
Calcium	9.49	0.25	2.40	0.06	5	1.8e+04	1.9e+04		1.8e+04	1.4e+04
Chromium, total	3.06	0.73	3.66	0.53	5	1.1e+02	7.7e+01		7.7e+01	2.8e+01
Cobalt	2.39	0.19	2.20	0.04	5	1.4e+01	1.5e+01		1.4e+01	1.1e+01
Copper	3.06	0.56	3.29	0.31	5	6.3e+01	5.8e+01		5.8e+01	2.5e+01
Iron	9.95	0.10	2.04	0.01	5	2.4e+04	2.4e+04		2.4e+04	2.1e+04
Lead	3.11	0.39	2.65	0.15	5	4.0e+01	3.9e+01		3.9e+01	2.4e+01
Magnesium	9.07	0.30	2.40	0.09	5	1.3e+04	1.3e+04		1.3e+04	9.0e+03
Manganese	6.65	0.55	3.29	0.30	5	2.2e+03	1.3e+03		1.3e+03	8.6e+02
Mercury	-3.17	0.60	3.29	0.36	5	1.4e-01	1.0e-01		1.0e-01	4.9e-02
Nickel	2.96	0.31	2.40	0.10	5	2.9e+01	2.9e+01		2.9e+01	2.0e+01
Potassium	7.41	0.22	2.20	0.05	5	2.1e+03	2.2e+03		2.1e+03	1.7e+03
Selenium	-1.31	0.47	2.95	0.22	5	6.0e-01	5.8e-01		5.8e-01	3.0e-01
Vanadium	3.44	0.26	2.40	0.07	5	4.4e+01	4.3e+01		4.3e+01	3.2e+01
Zinc	4.37	0.39	2.65	0.15	5	1.4e+02	1.5e+02		1.4e+02	8.4e+01

Table K-9

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Surface Soils
Source Area: Background

Notes:

Ave. of LN Data =	The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data =	The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value =	H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance =	Variance of the natural log transformed data.
n =	Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCLM (95%) =	EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. =	Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. =	The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR =	Statistical operations cannot be performed on a single data point.

Exposure point concentrations are calculated for each chemical detected within the medium, without exclusion of those chemicals not considered to be of potential concern. Refer to Appendix L or Table 8-3 for a discussion of the chemicals considered to be of potential concern within the medium.

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Table K-10

Determination of Exposure Point Concentration:
95% UCLM vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Medium: Surface Soils
Source Area: Ditch

Chemical Of Potential Concern	95% UCLM Calculation						Max. Det. Conc. (ug/kg)	Exposure Point Conc.	
	Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCLM (95%)		(ug/kg)	(mg/kg)
Aroclor-1254	3.50	0.75	10.43	0.56	2	1.0e+05	5.6e+01	5.6e+01	5.6e-02
Aluminum	9.42	0.17	3.30	0.03	2	2.2e+04	1.4e+04		1.4e+04
Arsenic	1.75	0.28	4.11	0.08	2	1.9e+01	7.0e+00		7.0e+00
Barium	4.94	0.34	4.11	0.12	2	6.0e+02	1.8e+02		1.8e+02
Cadmium	1.24	0.71	9.12	0.50	2	2.8e+03	5.7e+00		5.7e+00
Calcium	10.08	0.66	9.12	0.43	2	1.2e+07	3.8e+04		3.8e+04
Chromium, total	3.86	0.56	7.81	0.32	2	4.5e+03	7.1e+01		7.1e+01
Cobalt	2.28	0.14	2.75	0.02	2	1.4e+01	1.1e+01		1.1e+01
Copper	3.87	0.29	4.11	0.08	2	1.6e+02	5.9e+01		5.9e+01
Iron	9.87	0.08	2.75	0.01	2	2.4e+04	2.0e+04		2.0e+04
Lead	3.24	0.30	4.11	0.09	2	9.2e+01	3.2e+01		3.2e+01
Magnesium	9.31	0.92	11.74	0.85	2	8.2e+08	2.1e+04		2.1e+04
Manganese	6.07	0.15	3.30	0.02	2	7.0e+02	4.8e+02		4.8e+02
Mercury	-1.98	0.45	6.50	0.21	2	2.9e+00	1.9e-01		1.9e-01
Nickel	3.19	0.22	3.30	0.05	2	5.1e+01	2.8e+01		2.8e+01
Potassium	6.73	0.08	2.75	0.01	2	1.0e+03	8.9e+02		8.9e+02
Selenium	0.44	0.49	6.50	0.24	2	4.2e+01	2.2e+00		2.2e+00
Thallium	-0.67	0.40	5.22	0.16	2	4.5e+00	6.8e-01		6.8e-01
Vanadium	3.47	0.28	4.11	0.08	2	1.0e+02	3.9e+01		3.9e+01
Zinc	4.82	0.27	4.11	0.07	2	3.8e+02	1.5e+02		1.5e+02

Notes:

Ave. of LN Data = The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data = The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value = H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance = Variance of the natural log transformed data.
n = Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCLM (95%) = EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. = Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. = The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR = Statistical operations cannot be performed on a single data point.

Exposure point concentrations are calculated for each chemical detected within the medium, without exclusion of those chemicals not considered to be of potential concern. Refer to Appendix L or Table 8-3 for a discussion of the chemicals considered to be of potential concern within the medium.

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COMPARISON OF INVESTIGATIVE SAMPLE CHEMICAL CONCENTRATIONS TO BACKGROUND SAMPLE CHEMICAL CONCENTRATIONS

L

COMPARISON OF INVESTIGATIVE SAMPLE CHEMICAL CONCENTRATIONS TO BACKGROUND SAMPLE CHEMICAL CONCENTRATIONS

Where only one or two investigative or background samples were collected per medium (i.e., sediment [Table L-3] and surface water [Table L-2]), a direct comparison was made between background samples and investigative samples. If the investigative sample result was substantially greater than the background sample results (i.e., two times greater), the compound was assumed to be site-related. A factor of two times background was considered a reasonably conservative estimate of the statistical variability that can occur between the average and highest reported background concentration for a given chemical. Therefore, unless a chemical was detected above this criteria in an investigative sample, its concentration was considered representative of background conditions.

A one-sided student's t-test was performed when there were three or more background and investigative samples for a medium. These included private well water (Table L-1) and surficial soil samples (Table L-4). The t-test was performed to determine if the mean concentration of a chemical was greater in investigative samples (e.g., private wells downgradient of the landfill), than in background samples (e.g., wells located upgradient of the landfill). The underlying assumptions that are made when performing a t-test are that the two samples (investigative and background) came from normal populations, and the variance of the two populations (i.e., scatter in the data) are equal. although these assumptions are made, significant variations from these assumptions can occur with little effect on the applicability of the test, because the t-test is considered a relatively robust test. No tests were performed to determine whether the sample populations were normally distributed or had equal variances. Rather, it was

assumed that the deviations from these assumptions were small enough that due to the robustness of the t-test, that the test would be valid.

The t-test was calculated based on the equations present in Section 9.3 *Testing for Difference Between Two Means*, contained in *Biostatistical Analysis* (Zar 1974). A one-sided student's t-test was performed to determine the difference between the two mean chemical concentrations. The null hypothesis (H_o) was that the mean investigative sample chemical concentration (X_i) was less than or qual to the mean background chemical concentration (X_b). The alternate hypothesis (H_a) was that the mean investigative sample chemical concentration was greater then the mean background sample chemical concentration. If the two means are not found to be different, then H_o is accepted; while if there is a difference between the two means, then H_o is rejected and H_a is accepted. The level of significance for the t-test was set at alpha (α) equal to 0.05. This level of alpha corresponds to a 95% probability that if a difference between the two means is detected (i.e., H_o is rejected), it is not due to chance that a difference was detected, but rather, that a real difference exists. The probability that a difference is detected but does not really exist is equal to alpha (0.05 or 5%).

The following is a summary of the equations used to determine if there is a difference between the means.

$$t = \frac{\bar{X}_i - \bar{X}_b}{S_{\bar{x}_i - \bar{x}_b}}$$

Where:

The value "t" is referred to a t statistic and is used to determine if there is a statistically significant difference between the two populations.

$\bar{X}_i - \bar{X}_b$ is the difference between the mean chemical concentration in the investigative samples ($\bar{X}_i$) and background samples ($\bar{X}_b$), and $S_{\bar{x}_i - \bar{x}_b}$ is the standard error of the difference between these two means and is calculated as shown below.

$$S_{\bar{x}_i - \bar{x}_b} = \sqrt{\frac{S^2_p}{n_i} + \frac{S^2_p}{n_B}}$$

Where:

n_i = Number of investigative samples
n_B = Number of background samples
S^2_p = Pooled variance of the investigative and background sample

populations (see below)

and

$$S^2_p = \frac{SS_i + SS_B}{V_i + V_B}$$

Where:

SS_i = Sum of squares of the investigative samples (see below)
SS_B = Sum of squares of the background samples (see below)
V_i = Degrees of freedom of the investigative samples (n_i-1)
V_B = Degrees of freedom of the background samples (n_B-1)

and

$$SS = \Sigma X^2_n - \frac{(\Sigma X_n)^2}{n}$$

Where:

ΣX^2_n = Summation of the squares of the n sample concentrations within the investigative or background sample populations

$(\Sigma X_n)^2$ = The square of the summation of the n sample concentrations in the investigative or background sample populations

n = Number of the investigative or background samples

To determine if there is a statistically significant difference between the two means, the t-statistic is compared to the critical t-value obtain from an appropriate table (e.g., Table D.10 within Zar 1974) for a one-sided t-test for the selected α (0.05) and pooled degrees of freedom ($V_i + V_B$). If the t-statistic (e.g., 4.1) is greater than the t-critical value (e.g., 1.96), then the two sample populations are statistically different. Otherwise, the two sample populations are not considered different. When the mean chemical concentration in the investigative sample population is found to be statistically greater than the mean chemical concentration in the background sample population, the chemical is considered a chemical of potential concern (CPC).

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Table L-1

Statistical Summary of Private Well Water Concentrations
Comparison of Metals Concentrations in Investigative Samples vs. Background Samples using the Student's t-test

Blackwell Landfill Site
DuPage County, Illinois

Parameter	Downgradient Private Well Samples						Background Private Well Samples											
	Ave1 (ug/L)	n1	v1	Sum	Squares	SS1	Ave2 (ug/L)	n2	v2	Sum	Squares	SS2	Sp^2	S(x1-x2)	t	v1+v2	t Value	CPC?
Aluminum	2.6E+01	51	50	1.3E+03	3.4E+04	2.8E+02	3.6E+01	5	4	1.8E+02	7.5E+03	9.6E+02	2.3E+01	2.2E+00	-4.70	54	1.676	< Bkd
Antimony	2.6E+00	51	50	1.3E+02	3.8E+02	3.2E+01	nd	-	-	-	-	-	-	-	-	-	-	CPC
Arsenic	2.0E+00	51	50	1.0E+02	4.6E+02	2.5E+02	1.4E+00	5	4	7.2E+00	1.2E+01	1.5E+00	4.7E+00	1.0E+00	0.580	54	1.676	< Bkd
Barium	9.1E+01	51	50	4.7E+03	4.6E+05	3.8E+04	7.4E+01	5	4	3.7E+02	3.1E+04	3.2E+03	8.3E+03	4.3E+01	0.407	54	1.676	< Bkd
Cadmium	1.3E-01	51	50	6.7E+00	1.8E+00	8.7E-01	2.1E-01	5	4	1.0E+00	4.5E-01	2.3E-01	2.0E-02	6.7E-02	-1.13	54	1.676	< Bkd
Calcium	9.9E+04	51	50	5.0E+06	5.1E+11	1.9E+10	9.1E+04	5	4	4.5E+05	4.2E+10	6.2E+08	4.9E+09	3.3E+04	0.246	54	1.676	< Bkd
Copper	6.5E+00	51	50	3.3E+02	2.7E+03	5.3E+02	2.8E+01	5	4	1.4E+02	6.7E+03	2.8E+03	8.2E+02	1.3E+01	-1.596	54	1.676	< Bkd
Iron	1.2E+03	51	50	5.9E+04	1.0E+08	3.4E+07	1.8E+03	5	4	8.9E+03	1.9E+07	2.7E+06	6.8E+05	3.9E+02	-1.628	54	1.676	< Bkd
Lead	3.4E+00	51	50	1.7E+02	7.7E+03	7.1E+03	2.1E+00	5	4	1.1E+01	3.1E+01	8.2E+00	1.3E+02	5.4E+00	0.230	54	1.676	< Bkd
Magnesium	5.9E+04	51	50	3.0E+06	1.8E+11	7.1E+09	5.3E+04	5	4	2.7E+05	1.4E+10	1.5E+08	1.3E+08	5.4E+03	1.04	54	1.676	< Bkd
Manganese	2.1E+01	51	50	1.0E+03	5.2E+04	3.0E+04	1.8E+01	5	4	8.9E+01	2.2E+03	5.9E+02	5.7E+02	1.1E+01	0.25	54	1.676	< Bkd
Nickel	1.0E+01	51	50	5.2E+02	5.5E+03	1.3E+02	nd	-	-	-	-	-	-	-	-	-	-	CPC
Potassium	3.3E+03	51	50	1.7E+05	6.2E+08	6.3E+07	2.6E+03	5	4	1.3E+04	3.6E+07	2.6E+06	1.2E+06	5.2E+02	1.363	54	1.676	< Bkd
Silver	2.7E-01	51	50	1.4E+01	4.6E+00	8.8E-01	nd	-	-	-	-	-	-	-	-	-	-	CPC
Sodium	6.1E+04	51	50	3.1E+06	3.0E+11	1.1E+11	2.0E+04	5	4	1.0E+05	2.5E+09	4.6E+08	2.1E+09	2.1E+04	1.89	54	1.676	CPC
Zinc	8.0E+01	51	50	4.1E+03	7.6E+05	4.3E+05	3.7E+01	5	4	1.9E+02	9.7E+03	2.7E+03	8.1E+03	4.2E+01	1.02	54	1.676	< Bkd

Notes:

This table presents the Student's t-test for the comparison of the average metal concentrations in private well samples collected from the Blackwell Landfill and background locations. The student's t-test was conducted to determine if the chemical was detected above background concentrations on-site. If the chemical was detected above background, then it was considered a chemical of potential concern.

Background samples included in this table are PW20, PW53, PW55, PW56, and PW57. PW54 was dropped, because it was conditioned by a water softener.

A one-sided t-test was performed. The null hypothesis (Ho) was that the average private well water-metal concentration was less than or equal to the average background private well water-metal concentration. The alternative hypothesis (Ha) was that the average downgradient private well water-metal concentration was greater than the average background private well-metal concentration. The level of significance was set at alpha equal to 0.05. If Ho was rejected and Ha accepted, the chemical was considered a chemical of potential concern.

Footnotes:

Ave = Arithmetic average of the sample detects and 1/2 SQL values for the samples from the indicated area (see Table 8-1).
n = The number of usable samples (not qualified as unusable by validation guidelines) with either a positive detect, or a 1/2 SQL value less than the maximum detected concentration.
v = degrees of freedom (i.e., n-1)
Sum = The sum of the sample detects and 1/2 SQL values for the samples from the indicated area.
Squares = The sum of the squares of each of the sample detects and 1/2 SQL values for the samples from the indicated area.
SS = Sum of the Squares: (Squares - (sum^2 / n)).
Sp^2 = The pooled variance: (SS1 + SS2 / v1 + v2)
S(x1-x2) = Variance of the difference between two means: SQRT((Sp^2/n1) + (Sp^2/n2))
t = Student t statistic: (Ave1 - Ave2) / S(x1-x2)
v1+v2 = The sum of the degrees of freedom for the investigative samples and background samples: v1+v2
t value = Critical values of the t distribution for a one-tailed hypothesis for the significance level of 0.05, with v1+v2 degrees of freedom (from Table d.10 from J.H. Zar, "Biostatistical Analysis", Prentice-Hall, 1974. Section 9.3).
CPC? = If the student's t statistic is less than the critical value, then the compound is considered present at background levels (< Bkd), otherwise it is considered to be greater than background levels (i.e., a chemical of potential concern, or CPC).
nd = Not detected.

Table L-2

Summary of Surface Water Concentrations
Comparison of Analyte Concentrations in Investigative Samples vs. Background Sample

Blackwell Landfill Site
DuPage County, Illinois

Parameter	Background Criteria Concentration (mg/L) (1)	Silver Lake Max Conc (mg/L)	Sand Pond Max Conc (mg/L)	Pine Lake Max Conc (mg/L)
Metals				
Aluminum	nd	5.9E-01 *		
Arsenic	4.2E-03	3.6E-03		2.8E-03
Barium	2.8E-02	3.0E-02 *	3.8E-02 *	1.0E-02
Calcium	3.6E+01	3.2E+01	4.6E+01 *	1.5E+01
Copper	4.2E-02	2.5E-02	1.9E-02	
Iron	2.6E-01	1.3E+00 *	3.2E-01 *	1.4E-01
Lead	nd	5.3E-03 *		
Magnesium	5.8E+01	2.9E+01	5.2E+01	3.0E+01
Manganese	nd	7.2E-02 *	6.6E-02 *	2.3E-02 *
Mercury	4.2E-04	3.4E-04	2.3E-04	
Potassium	5.5E+00	3.0E+00	4.6E+00	2.1E+00
Sodium	2.7E+01	1.1E+01	3.7E+01 *	1.8E+01

Notes:
This table presents a comparison of the maximum concentration of analytes detected in investigative surface water samples to a background criteria concentration. See Table 8-1 for samples included in each source area.

The background criteria concentration for surface water was based on analytical results for sample BW-SW01-01, collected in the south-east corner of Silver Lake. Because only one sample was considered representative of background, the background criteria concentration used for comparison to investigative samples was defined as two times the detected concentration in the single background sample (i.e., the value presented above). The factor of two was considered a reasonable estimate of variation in the concentration of a particular metal in background surface water.

An asterisk (*) after the value indicates the analyte was present at a concentration greater than the background criteria concentration, and was considered a chemical of potential concern. Non-detects are identified as "nd".

Footnote:
(1) Value represents 2 times the background concentration of analyte.

Table L-3

Summary of Sediment Concentrations
Comparison of Analyte Concentrations in Investigative Samples vs. Background Sample

Blackwell Landfill Site
DuPage County, Illinois

Parameter	Background Criteria Concentration (mg/kg) (1)	Silver Lake Max Conc (mg/kg)	Sand Pond Max Conc (mg/kg)	Pine Lake Max Conc (mg/kg)
Aluminum	1.0E+04	7.8E+03	2.6E+03	3.0E+03
Arsenic	7.2E+00	5.5E+00	3.5E+00	9.4E+00 *
Barium	3.3E+01	1.0E+02 *	1.1E+02 *	7.2E+01 *
Calcium	2.2E+05	9.7E+04	1.8E+05	1.2E+05
Chromium III	1.8E+01	1.2E+01		5.8E+00
Cobalt	9.8E+00	9.3E+00	6.2E+00	
Copper	2.7E+01	1.9E+01	3.6E+01 *	2.3E+01
Iron	2.6E+04	1.7E+04	1.1E+04	1.3E+04
Lead	2.1E+01	2.4E+01 *	1.5E+01	1.1E+01
Magnesium	1.2E+05	4.8E+04	3.3E+04	2.8E+04
Manganese	7.8E+02	5.9E+02	6.9E+02	2.8E+02
Nickel	2.0E+01	1.1E+01		
Potassium	2.7E+03	1.3E+03	7.6E+02	5.7E+02
Vanadium	3.0E+01	2.1E+01		
Zinc	7.0E+01	9.8E+01 *	1.0E+02 *	6.0E+01

Notes:
This table presents a comparison of the maximum concentration of analytes detected in investigative sediment samples to a background criteria concentration. See Table 8-1 for samples included in each source area.

The background criteria concentration for sediment was based on analytical results for sample BW-SD01-01, collected in the south-east corner of Silver Lake. Because only one sample was considered representative of background, the background criteria concentration used for comparison to investigative samples was defined as two times the detected concentration in the single background sample (i.e., the value presented above). The factor of two was considered a reasonable estimate of variation in the concentration of a particular metal in background sediments.

An asterisk (*) after the value indicates the analyte was present at a concentration greater than the background criteria concentration, and was considered a chemical of potential concern.

Footnote:
(1) Value represents 2 times the background concentration of analyte.

Table L-4

Statistical Summary of Surficial Soil Concentrations
Comparison of Metals Concentrations in Investigative Samples vs. Background Samples using the Student's t-test

Blackwell Landfill Site
DuPage County, Illinois

Parameter	Landfill Surface Soils						Background Surface Soils											
	Ave1 (ug/L)	n1	v1	Sum	Squares	SS1	Ave2 (ug/L)	n2	v2	Sum	Squares	SS2	Sp^2	S(x1-x2)	t	v1+v2	t Value	CPC?
Aluminum	9.4E+03	6	5	5.7E+04	6.8E+08	1.5E+08	1.3E+04	3	2	3.8E+04	4.9E+08	4.8E+06	2.2E+07	3.3E+03	-1.01	7	1.895	< Bkd
Arsenic	6.0E+00	6	5	3.6E+01	2.2E+02	1.0E+00	7.1E+00	3	2	2.1E+01	1.5E+02	6.7E-01	2.4E-01	3.5E-01	-3.13	7	1.895	< Bkd
Barium	9.5E+01	6	5	5.7E+02	7.7E+04	2.3E+04	1.3E+02	3	2	3.9E+02	5.0E+04	2.5E+02	3.3E+03	4.0E+01	-0.841	7	1.895	< Bkd
Cadmium	2.1E+00	6	5	1.3E+01	5.5E+01	2.9E+01	2.1E+00	3	2	6.4E+00	2.7E+01	1.3E+01	6.0E+00	1.7E+00	-0.019	7	1.895	< Bkd
Calcium	5.4E+04	6	5	3.2E+05	3.3E+10	1.6E+10	1.5E+04	3	2	4.5E+04	7.1E+08	3.1E+07	2.3E+09	3.4E+04	1.16	7	1.895	< Bkd
Chromium, total	1.7E+01	6	5	9.9E+01	2.3E+03	7.0E+02	1.5E+01	3	2	4.4E+01	6.5E+02	3.7E+00	1.0E+02	7.1E+00	0.270	7	1.895	< Bkd
Cobalt	9.0E+00	6	5	5.4E+01	5.8E+02	9.6E+01	1.0E+01	3	2	3.1E+01	3.2E+02	3.4E+00	1.4E+01	2.7E+00	-0.444	7	1.895	< Bkd
Copper	1.6E+01	6	5	9.4E+01	1.6E+03	8.9E+01	1.7E+01	3	2	5.1E+01	8.6E+02	1.3E-01	1.3E+01	2.5E+00	-0.523	7	1.895	< Bkd
Iron	1.8E+04	6	5	1.1E+05	2.0E+09	1.1E+08	2.0E+04	3	2	6.0E+04	1.2E+09	5.8E+06	1.6E+07	2.8E+03	-0.766	7	1.895	< Bkd
Lead	1.3E+01	6	5	7.9E+01	1.2E+03	1.3E+02	1.8E+01	3	2	5.5E+01	1.1E+03	4.4E+01	2.4E+01	3.5E+00	-1.49	7	1.895	< Bkd
Magnesium	3.0E+04	6	5	1.8E+05	9.5E+09	4.1E+09	1.1E+04	3	2	3.2E+04	3.5E+08	1.3E+07	5.9E+08	1.7E+04	1.12	7	1.895	< Bkd
Manganese	8.4E+02	6	5	5.0E+03	5.3E+06	1.1E+06	9.1E+02	3	2	2.7E+03	2.5E+06	8.4E+03	1.5E+05	2.8E+02	-0.257	7	1.895	< Bkd
Mercury	3.3E-02	6	5	2.0E-01	7.8E-03	1.1E-03	3.7E-02	3	2	1.1E-01	4.9E-03	8.2E-04	2.7E-04	1.2E-02	-0.286	7	1.895	< Bkd
Nickel	1.2E+01	6	5	7.3E+01	1.2E+03	3.4E+02	1.7E+01	3	2	5.1E+01	9.0E+02	4.2E+01	5.5E+01	5.3E+00	-0.903	7	1.895	< Bkd
Potassium	1.1E+03	6	5	6.6E+03	8.3E+06	1.1E+06	1.8E+03	3	2	5.5E+03	1.0E+07	2.0E+05	1.9E+05	3.1E+02	-2.41	7	1.895	< Bkd
Silver	1.4E+00	6	5	8.2E+00	1.2E+01	9.3E-01	nd	-	-	-	-	-	-	-	-	-	-	CPC
Vanadium	2.2E+01	6	5	1.3E+02	3.8E+03	7.7E+02	2.8E+01	3	2	8.4E+01	2.5E+03	9.3E+01	1.2E+02	7.8E+00	-0.724	7	1.895	< Bkd
Zinc	5.3E+01	6	5	3.2E+02	2.0E+04	2.8E+03	6.4E+01	3	2	1.9E+02	1.2E+04	1.6E+02	4.2E+02	1.4E+01	-0.766	7	1.895	< Bkd

Notes:

This table presents the Student's t-test for the comparison of the average metal concentrations in surface soil samples collected from the Blackwell Landfill and background locations. The student's t-test was conducted to determine if the chemical was detected above background concentrations on-site. If the chemical was detected above background, then it was considered a chemical of potential concern.

A one-sided t-test was performed. The null hypothesis (Ho) was that the average landfill soil-metal concentration was less than or equal to the average background soil-metal concentration. The alternative hypothesis (Ha) was that the average landfill soil-metal concentration was greater than the average background soil-metal concentration. The level of significance was set at alpha equal to 0.05. If Ho was rejected and Ha accepted, the chemical was considered a chemical of potential concern.

Footnotes:

- Ave = Arithmetic average of the sample detects and 1/2 SQL values for the samples from the indicated area (see Table 8-1).
- n = The number of usable samples (not qualified as unusable by validation guidelines) with either a positive detect, or a 1/2 SQL value less than the maximum detected concentration.
- v = degrees of freedom (i.e., n-1)
- Sum = The sum of the sample detects and 1/2 SQL values for the samples from the indicated area.
- Squares = The sum of the squares of each of the sample detects and 1/2 SQL values for the samples from the indicated area.
- SS = Sum of the Squares: (Squares - (sum^2 / n)).
- Sp^2 = The pooled variance: (SS1 + SS2 / v1 + v2)
- S(x1-x2) = Variance of the difference between two means: SQRT((Sp^2/n1) + (Sp^2/n2))
- t = Student t statistic: (Ave1 - Ave2) / S(x1-x2)
- v1+v2 = The sum of the degrees of freedom for the investigative samples and background samples: v1+v2
- t value = Critical values of the t distribution for a one-tailed hypothesis for the significance level of 0.05, with v1+v2 degrees of freedom (from Table d.10 from J.H. Zar, "Biostatistical Analysis", Prentice-Hall, 1974, Section 9.3).
- CPC? = If the student's t statistic is less than the critical value, then the compound is considered present at background levels (< Bkd), otherwise it is considered to be greater than background levels (i.e., a chemical of potential concern, or CPC).
- nd = Not detected.

M

LANDFILL GAS GENERATION ESTIMATES

M

LANDFILL GAS GENERATION ESTIMATES

An estimate of the gas generation rate for the Blackwell Landfill was modeled to compare to the measured rate of gas flow from the landfill's passive vents. This information was used as a basis to determine how much gas is being emitted through the landfill's passive vents as compared to the landfill cover. This information is important for determining whether the emissions from the landfill should be modeled as point sources (the vents), an area source (landfill cover), or a combination of both point sources and an area source. In addition, the model determines the rate of landfill gas generation over time. This information can be used to estimate for how long landfill gas (and VOC) emissions will occur.

The Palos Verdes Kinetic Model as presented in Methane Generation and Recovery From Landfills, Emcon Associates, 1982, was used to estimate the gas generation rate of the landfill. The rate of gas production at any time is a function of refuse composition, moisture content, age of the refuse, temperature, nutrient content, pH and alkalinity. Based on historical information concerning the filling of the Blackwell Landfill, the following assumptions were made to estimate the landfill's gas generation rate.

The landfills refuse composition consisted of mostly municipal waste, light industrial waste, and grass clippings. To develop a conservative (high) estimate of the amount of gas the landfill is producing, it was assumed that most of the waste was organic in nature, and biodegradable. Percent composition of the various components of municipal waste were estimated for food waste, garden waste, paper, rubber and plastics, textiles, wood, and inert rubble, and are presented in the calculations at the end of this appendix. This information provides estimates of nutrient content, pH, and alkalinity.

The amount of compaction also effects the rate of gas production by increasing available surface area and contact between organisms and waste. For Blackwell landfill, a moderate density of 425 lbs/cubic yard is assumed. Moisture content has been assumed to be 30%. While high moisture content in the range of 60-80%

ESTIMATED REFUSE CHARACTERIZATION

Waste Type (%)

Component(1)	Composite			t@	tf
Food Waste	9.0	0	0	1.5	3.5
Garden Waste	10.0	0	0	7	30
Paper Products	42.0	0	0	10	30
Plastic/Rubber	12.0	0	0	20	60
Textiles	2.0	0	0	7	20
Wood	6.0	0	0	15	50
Rubble/Inerts	19.0	0	0	0	0
Moisture Content	30%	0%	0%		
Dry Solids	70%	0%	0%		
Volatile Solids (Dry Wt. Basis)	56%	0%	0%		
Volatile Solids (Biodegradable) (Dry Wt. Basis)	47%	0%	0%		

Maximum Methane Production (3)				Total Methane Production
(cu.ft./lbm)	1.54	0.00	0.00	1.54 (cu.ft./lbm)

(1) Refuse characterization based on "Methane Generation and Recovery From Landfills", Emcon Associates, and Warren Inc.

(2) Maximum methane production based on the biodegradability of volatile solids present in the refuse as described in "Methane Generation and Recovery From Landfills", Emcon Associates.

Methane Generation Calculation (3)

First Stage Equation:

$$G = (L/2)e^{-k1(t@ - t)}$$

Second Stage Equation:

$$G = L[1 - .5e^{-k2(t - t@)}]$$

Where:

G = Volume of gas produced prior to time t

L = Maximum methane production

k1 = ln(50/t@)

k2 = ln(50)/(tf - t@)

t@ = time when 50% of methane has been produced in years

tf = time when 99% of methane has been produced in years

(3) Based on the Palos Verdes Kinetic Model where the first stage methane production rate is proportional to the volume of methane already produced until half of the potential methane has been generated. The second stage methane production rate is proportional to the volume of methane remaining to be produced.

BLACKWELL LANDFILL
PROJECT NO. 6072100

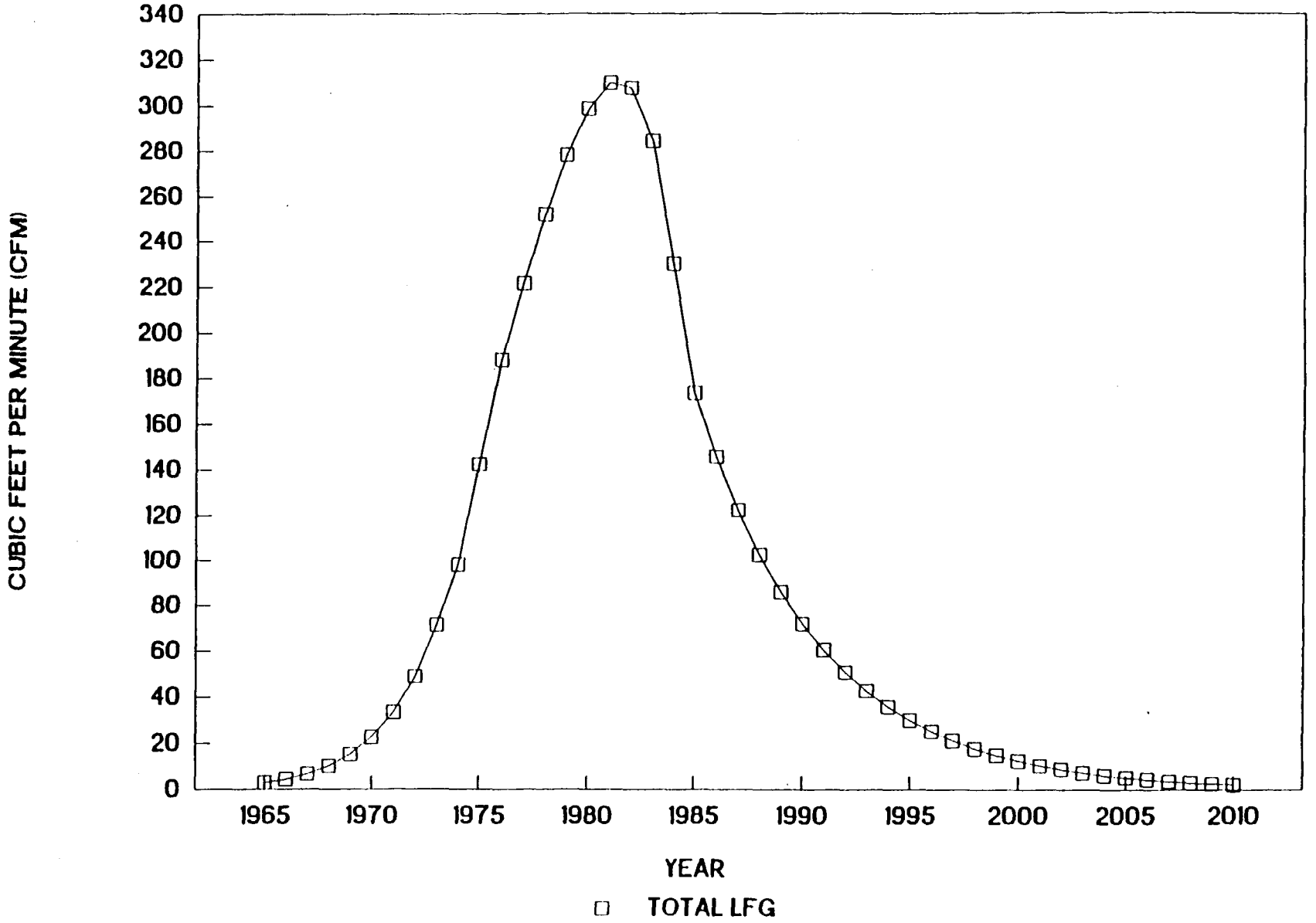
Year	Total LFG (CFM)
1965	4
1966	6
1967	9
1968	13
1969	19
1970	28
1971	41
1972	59
1973	86
1974	121
1975	176
1976	227
1977	255
1978	276
1979	289
1980	295
1981	292
1982	279
1983	251
1984	203
1985	157
1986	132
1987	110
1988	93
1989	78
1990	65
1991	55
1992	46
1993	38
1994	32
1995	27
1996	23
1997	19
1998	16
1999	13
2000	11
2001	9
2002	8
2003	7
2004	6
2005	5
2006	4
2007	3
2008	3
2009	2
2010	2

BLACKWELL LANDFILL
PROJECT NO. 6072100
Refuse Deliveries and Characterization

Year	Total Tons
1965	24,523
1966	26,975
1967	29,673
1968	32,640
1969	35,904
1970	39,494
1971	43,444
1972	47,789
1973	52,568
1974	0
1975	0
1976	0
1977	0
1978	0
1979	0
1980	0
1981	0
1982	0
1983	0
1984	0
1985	0
1986	0
1987	0
1988	0
TOTALS	333,010

GAS GENERATION MODEL

BLACKWELL LANDFILL



N

MODELING OF AMBIENT AIR CONTAMINANT CONCENTRATIONS

N

MODELING OF AMBIENT AIR CONCENTRATIONS

Volatile organic compounds present in landfill gas at the Blackwell Landfill site travel to the surface via the passive vents and are emitted to the ambient air. Negligible amounts of landfill gas are likely to be emitted directly throughout the landfill's cover (refer to Appendix M). The extent of ambient air contamination was evaluated by estimating emissions of VOCs contained in landfill gas and emitted from the landfill's vents, based on site conditions. The following is a discussion of the methods, and model used to assess VOC emissions from the landfill, and dispersion of VOCs downwind of the landfill.

COMPOUND-SPECIFIC MODELED EMISSION RATE

To estimate compound-specific emission rates from the landfill, landfill gas flow rates from the passive vents were measured, and the landfill gas VOC concentrations were determined. Refer to Table N-1 for a summary of the landfill gas flow measurements, and Table N-2 for a summary of the landfill gas VOC concentrations. Based on the passive vents which had a measurable flow of gas, an average gas flow rate was determined for the vents. Based on the analytical results, VOCs were not detected in gases collected from vents where gas flow was not detected. The VOC concentration data for the vents where measurable flow was detected were used to estimate the upper 95 percent confidence limit (UCL) arithmetic mean concentration for each VOC. The gas concentration data was assumed to be distributed lognormally to estimate the UCL for each chemical. The following equation was used to estimate compound-specific emission rates utilizing the gas flow rates and landfill gas VOC concentrations:

$$E_i = C_i * V_y$$

where:

E_i = Emission rate of compound i (ug/sec)

C_i = Concentration of compound i in landfill gas (ug/m^3)

V_y = Mean landfill gas velocity from the passive vents (m^3/sec)

The VOC-specific emission rates are presented in Table N-3. The emission rate estimates were used with the results of a screening level dispersion model run to estimate ambient air concentrations of each VOC. The following section discusses the model used to estimate the degree of VOC dispersion downwind of the landfill.

DISPERSION MODELING

The Industrial Source Complex Long-Term (ISCLT) model has been used as a screening tool to characterize the long-term impacts on ambient air quality surrounding the Blackwell Landfill as a result of releases of landfill gas containing VOCs. ISCLT is a steady-state Gaussian plume model used to predict seasonal and/or average ground level pollutant concentrations from a wide variety of sources. The ISCLT model was developed under the auspices of the U.S. EPA.

Selection of Dispersion Model

The ISCLT model was selected to model dispersion of VOC emissions for the following reasons:

- It is a U.S. EPA approved model for regulatory use.
- It can incorporate area and site specific information, such as local meteorological data, and site specific emission rate estimates from multiple point sources (e.g., vents).
- It can account for variations in emission rates across the landfill.
- It provides reasonably accurate, although somewhat conservatively high estimates of actual VOC air concentrations.

The long-term version of the model was used instead of the short-term version, because the average air VOC concentrations over long periods of exposure (i.e., chronic) were needed as input for the risk assessment.

Another rationale behind selection of the ISCLT model was the need to estimate VOC concentrations in air near the vents (i.e., on the landfill). The ISCLT model's point source algorithm provides a nonbiased estimate of the air VOC concentrations near the source (i.e., the vents) (personal communication with Mr. Russ Lee; February 25, 1993). The model can estimate air concentrations within 1 meter of a vent.

For the above reasons, the ISCLT model was selected to model the dispersion of VOC emissions from the landfill. The following discusses the application of the model to the site.

Application of Model

Many of the model inputs used were regulatory default options. These options generally result in a conservative (i.e., high) estimate of contaminant air concentrations. Rural dispersion coefficients were implemented based on the low population density in the vicinity of the Site. No adjustment was made to account for variations in topography, since the landfill surface elevation exceeds the elevation of the area surrounding the landfill.

The ISCLT model requires a statistical summary (STAR format) of hourly meteorological data (e.g., wind speed, direction, etc.) as an input. In this study, a meteorological data set collected over a five year period (1985-1989) from the National Weather Service (NWS) station at O'Hare Airport in Chicago, Illinois was processed into this format. Ambient temperatures and mixing heights were averaged over this period for each meteorological stability class.

Wind direction was grouped into 16 sectors of 22.5 degrees each. Wind speeds were grouped into classes of speed conforming to the six wind speed classes which are defaults of the ISCLT model. Hours during which calm winds were recorded were distributed over the two lower wind speed classes by standard methods, and the data set was then renormalized.

The wind rose (refer to Figure N-1) was drawn combining all stability class data into an array by wind speed and direction. It otherwise represents meteorological data used to model air impacts at the site.

The landfill emissions were modeled individually for each of the thirteen vents (i.e., point sources) where gas flow was detected. The source input data for each vent is summarized in Table N-4.

The air dispersion model calculates air chemical concentrations at predetermined locations which are input into the model. Each location has both an x and y coordinate. The x model coordinates (coordinates)

represents the direction either east (positive (+) x coordinate) or west (negative (-) coordinate) of the landfill, while the y coordinates represent the direction either north (positive y (+) coordinate) or south (negative (-) y coordinate) of the landfill. These locations are referred to as receptors. Receptors were located on a regular grid with 100 meter spacing. The most southwestern vent DV5 was used as the origin of the grid. In addition to the receptors on the regular Cartesian grid, discrete receptors on the perimeter of the landfill were also included. A map of the source area (landfill) and receptors is included (refer to Figure N-2, and N-3, respectively).

The landfill emissions were modeled generically for the 13 vents by assuming an emission rate of 0.077 gram/sec/stack or a total of 1 gram/sec of material from the combination of all thirteen stacks. The differences in gas flow from each of the vents was accounted for by adjusting the gas exit velocity based on the typical diameter of the vents. The modeled air chemical concentrations, based on the unit emission rate (1 gram/sec), at each receptor location were output in micrograms per cubic meter (ug/m^3)(refer to pages 8 through 10 of Attachment 1). To calculate the chemical specific air concentration at a receptor location, the unit concentration (U_c) at the receptor from the generic model run was multiplied by the ratio of the chemical specific emission rate over the unit emission rate (1 g/sec). In this way, the concentration of each chemical at a receptor location is calculated based on their respective concentration (95% UCL) in landfill gas.

The following is the equation used to calculate chemical specific air concentrations at a receptor location.

$$R_c(x,y) = U_c(x,y) \cdot \frac{E_i}{E_u}$$

where:

$R_c(x,y)$ = Air concentration for chemical i at the receptor with coordinates x and y, (ug/m^3)

$U_c(x,y)$ = Unit concentration at the receptor with coordinates x and y, (ug/m^3; refer to pages 8 through 10 of Attachment 1).

E_u = Unit emission rate (1 g/sec)

E_i = Chemical specific emission rate (g/sec; refer to Table N-3).

The unit concentrations from the model run at specific locations were averaged together to estimate the unit concentration of chemicals on the landfill, off the

landfill but on-site, and off-site. The average unit concentrations for each of these areas (e.g., on landfill) were used to calculate the chemical-specific air concentrations by area utilizing the equation mentioned above. The following is a discussion of the receptor locations which were combined (averaged) to estimated the unit concentrations for each of the three areas.

To estimate the unit concentration that recreational users or employees may be exposed to while on the landfill, all grid receptor locations and discrete receptor locations placed on the landfill perimeter were averaged to calculate the average unit concentration on the landfill (i.e., 54.5 ug/M^3).

To estimate the unit concentration that recreational users and employees may be exposed to while on-site, but off the landfill, blocks of receptors were averaged to estimate an average unit on-site concentration. Two adjoining rectangular blocks of on-site receptors were averaged to estimate a reasonable maximum unit concentration for ambient air off the landfill, but on-site (i.e., 5.04 ug/M^3). The coordinates of the four corners of the first block of receptor locations are (-500,1200), (-500,400), (-300,1200), and (-300,400). The coordinates of the four corners of the second block of receptor locations are (-200,1200), (-200,-200), (800,1200), and (800,-200). Within this second receptor block, receptor locations on the landfill were not included. The composite of the two blocks of receptors represents the majority of the receptors on-site, but off the landfill.

Unit concentrations at each of the areas of nearby residents were examined. Concentrations were predicted to be highest at the residents nearest the landfill located to the southwest of the site. An average of the ten highest off-site receptor unit concentrations was used to represent the unit concentration that residents may be exposed to off-site (i.e., 4.04 ug/M^3).

Each of the average unit concentrations were used with the chemical specific emission rates to estimate the average concentration of each VOC, on the landfill, off the landfill, and on-site but off the landfill (refer to Table N-3). These modeled air chemical concentrations were used in the Baseline Risk Assessment to calculate human health risks associated with inhalation of VOCs.

MWK/vlr/KJD
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6072101-230-MD-D2

Table N-1

SUMMARY OF LANDFILL GAS FLOW MEASUREMENTS

Blackwell Landfill Site
DuPage County, Illinois

GAS VENT #	(ft3/min)	(m3/sec)
SV2	15.0	0.0071
SV4	13.0	0.0061
SV5	5.5	0.0026
SV8	5.5	0.0026
SV9	8.7	0.0041
SV10	4.4	0.0021
SV11	11.0	0.0052
SV12	2.2	0.0010
DV5	11.0	0.0052
DV6	3.3	0.0016
DV7	13.0	0.0061
DV10	7.6	0.0036
DV13	2.2	0.0010
	Average =	0.00372

This table presents gas flow measurements from gas vents at Blackwell collected 9/23/91.

Results presented in ft3/min (CFM) were converted to m3/sec as follows:

((ft3/min) * 471.947)* 1e-06 = (m3/sec)

The average flow rate for all vents is calculated and carried forward in subsequent calculations.

mdux/jobs/60721/RA3/Table N-1.xls
9/25/92
JAH/jah/MWK

Table N-2

Summary of Landfill Gas VOC Concentrations
95% UCL vs Maximum Detected Concentration

Blackwell Landfill Site
DuPage County, Illinois

Chemical Of Potential Concern	MW (g/mole)	95% UCL Calculation: Ave. of LN Data	Std Dev. of LN Data	H value	Variance	n	UCL (95%)	Max. Det. Conc. (ppb-v/v)	Exposure Point Conc.: (ppb-v/v)	(mg/m3)
Chloromethane	50	5.24	0.86	2.59	0.74	15	4.9E+02	9.3E+02	4.9E+02	1.0E+00
Vinyl chloride	63	8.72	0.61	2.18	0.37	15	1.0E+04	2.1E+04	1.0E+04	2.7E+01
Chloroethane	65	5.41	0.74	2.41	0.55	13	5.0E+02	6.3E+02	5.0E+02	1.3E+00
Methylene chloride	85	7.11	2.14	4.56	4.59	15	1.7E+05	1.7E+04	1.7E+04	5.9E+01
Acetone	58	6.92	1.08	2.74	1.17	15	4.0E+03	2.8E+03	2.8E+03	6.6E+00
1,1-Dichloroethene	97	4.44	0.71	2.41	0.50	13	1.8E+02	3.0E+02	1.8E+02	7.1E-01
1,1-Dichloroethane	99	5.57	1.43	3.61	2.05	15	2.9E+03	2.6E+03	2.6E+03	1.1E+01
1,2-Dichloroethene(cis)	99	9.03	1.19	3.16	1.43	15	4.7E+04	4.4E+04	4.4E+04	1.8E+02
1,2-Dichloroethene (trans)	97	6.36	0.99	2.74	0.98	15	2.0E+03	2.3E+03	2.0E+03	7.7E+00
2-Butanone	72	6.90	1.91	4.56	3.66	15	6.4E+04	9.2E+03	9.2E+03	2.7E+01
1,2-Dichloropropane	113	5.87	0.75	2.57	0.56	13	8.2E+02	1.4E+03	8.2E+02	3.8E+00
Trichloroethene	131	8.05	1.95	4.56	3.79	15	2.2E+05	2.8E+04	2.8E+04	1.5E+02
Benzene	78	6.86	0.77	2.44	0.60	14	2.2E+03	2.7E+03	2.2E+03	6.9E+00
4-Methyl-2-pentanone	100	5.75	1.46	3.61	2.14	15	3.8E+03	6.0E+03	3.8E+03	1.5E+01
2-Hexanone	100	5.49	0.80	2.44	0.64	15	5.7E+02	1.0E+03	5.7E+02	2.3E+00
Tetrachloroethene	166	7.84	1.66	4.08	2.75	15	6.1E+04	1.7E+04	1.7E+04	1.2E+02
Toluene	92	10.06	0.95	2.74	0.90	15	7.4E+04	9.2E+04	7.4E+04	2.8E+02
Chlorobenzene	113	4.79	0.21	1.84	0.04	13	1.4E+02	1.6E+02	1.4E+02	6.4E-01
Ethylbenzene	106	8.46	0.42	1.97	0.17	15	6.4E+03	7.9E+03	6.4E+03	2.8E+01
Xylenes (mixed)	106	9.29	0.39	1.97	0.15	15	1.4E+04	1.7E+04	1.4E+04	6.2E+01
Freon 12 (Cl2F2Me)	121	7.95	1.71	4.08	2.93	15	7.9E+04	1.2E+04	1.2E+04	5.9E+01
Freon 114 (Cl2F4Et)	171	6.15	0.49	2.07	0.24	15	7.0E+02	1.2E+03	7.0E+02	4.9E+00
Freon 11 (Cl3FMe)	137	4.08	0.75	2.31	0.57	15	1.3E+02	2.0E+02	1.3E+02	7.0E-01
Freon 113 (Cl3F3Et)	187	4.55	0.53	2.14	0.28	13	1.5E+02	2.5E+02	1.5E+02	1.2E+00
4-Ethyl toluene	120	7.60	0.76	2.44	0.58	15	4.4E+03	1.4E+04	4.4E+03	2.1E+01
1,3,5-Trimethylbenzene	181	6.65	0.49	2.07	0.24	15	1.1E+03	1.9E+03	1.1E+03	8.4E+00
1,2,4-Trimethylbenzene	181	7.38	0.63	2.18	0.39	15	2.8E+03	4.3E+03	2.8E+03	2.1E+01
1,4-Dichlorobenzene	147	6.10	1.09	2.74	1.19	15	1.8E+03	7.3E+03	1.8E+03	1.1E+01

Notes:

MW = Molecular weight of the compound
Ave. of LN Data = The arithmetic mean of the natural log transformed data (i.e, detected concentration and 1/2 SQLs).
Std Dev. of LN Data = The standard deviation of the natural log transformed data (i.e., detected concentration and 1/2 SQLs).
H Value = H statistic for computing a one-sided 95% upper confidence limit on a lognormal mean (Gilbert 1987, Table A12)
Variance = Variance of the natural log transformed data.
n = Number of data points (Note: excludes unusable data and 1/2 SQLs greater than maximum detected concentration.)
UCL (95%) = EXP(Ave. + 0.5 * Variance + ((Std Dev. * H value) / SQRT (n-1)))
Max. Det. Conc. = Maximum detected concentration of the chemical in the Site Area sample group.
Exposure Point Conc. = The 95% UCLM or the Max. Det. Conc. , whichever is lower.
ERR = Statistical operations cannot be performed on a single data point.

Compound concentrations are presented as part per billion - volume to volume basis. These values are converted to mass per volume units using the following calculation: (ppb-v/v * MW / 24.5) * 1e-03 = mg/m3

mdux/jobs/6072100/RA3/TABLEN-2.XLS
JAH/jah/MWK
9/23/93

Table N-3

Summary of VOC Specific Emission Rates

Blackwell Landfill Site
DuPage County, Illinois

Parameter	UCL (mg/m3)	Emission Rate (g/sec)	Exposure Point Concentrations: Off-Site Resident (mg/m3)	Rec. Users / Employees: On-Landfill (mg/m3)	Rec. Users / Employees: Off-Landfill (mg/m3)
Chloromethane	1.0E+00	3.8E-06	1.5E-08	2.0E-07	1.9E-08
Vinyl chloride	2.7E+01	1.0E-04	4.0E-07	5.4E-06	5.0E-07
Chloroethane	1.3E+00	4.9E-06	2.0E-08	2.7E-07	2.5E-08
Methylene chloride	5.9E+01	2.2E-04	8.9E-07	1.2E-05	1.1E-06
Acetone	6.6E+00	2.5E-05	1.0E-07	1.3E-06	1.2E-07
1,1-Dichloroethene	7.1E-01	2.6E-06	1.1E-08	1.4E-07	1.3E-08
1,1-Dichloroethane	1.1E+01	3.9E-05	1.6E-07	2.1E-06	2.0E-07
1,2-Dichloroethene (cis)	1.8E+02	6.6E-04	2.7E-06	3.6E-05	3.3E-06
1,2-Dichloroethene (trans)	7.7E+00	2.9E-05	1.2E-07	1.6E-06	1.4E-07
2-Butanone	2.7E+01	1.0E-04	4.1E-07	5.5E-06	5.1E-07
1,2-Dichloropropane	3.8E+00	1.4E-05	5.7E-08	7.6E-07	7.0E-08
Trichloroethene	1.5E+02	5.6E-04	2.2E-06	3.0E-05	2.8E-06
Benzene	6.9E+00	2.6E-05	1.0E-07	1.4E-06	1.3E-07
4-Methyl-2-pentanone	1.5E+01	5.7E-05	2.3E-07	3.1E-06	2.9E-07
2-Hexanone	2.3E+00	8.6E-06	3.5E-08	4.7E-07	4.3E-08
Tetrachloroethene	1.2E+02	4.3E-04	1.7E-06	2.3E-05	2.2E-06
Toluene	2.8E+02	1.0E-03	4.2E-06	5.6E-05	5.2E-06
Chlorobenzene	6.4E-01	2.4E-06	9.6E-09	1.3E-07	1.2E-08
Ethylbenzene	2.8E+01	1.0E-04	4.2E-07	5.6E-06	5.2E-07
Xylenes (mixed)	6.2E+01	2.3E-04	9.4E-07	1.3E-05	1.2E-06
Freon 12 (Cl2F2Me)	5.9E+01	2.2E-04	8.9E-07	1.2E-05	1.1E-06
Freon 114 (Cl2F4Et)	4.9E+00	1.8E-05	7.3E-08	9.8E-07	9.1E-08
Freon 11 (Cl3FMe)	7.0E-01	2.6E-06	1.1E-08	1.4E-07	1.3E-08
Freon 113 (Cl3F3Et)	1.2E+00	4.3E-06	1.7E-08	2.3E-07	2.2E-08
4-Ethyl toluene	2.1E+01	7.9E-05	3.2E-07	4.3E-06	4.0E-07
1,3,5-Trimethylbenzene	8.4E+00	3.1E-05	1.3E-07	1.7E-06	1.6E-07
1,2,4-Trimethylbenzene	2.1E+01	7.7E-05	3.1E-07	4.2E-06	3.9E-07
1,4-Dichlorobenzene	1.1E+01	4.0E-05	1.6E-07	2.2E-06	2.0E-07

This table presents calculations of exposure point concentrations of landfill gas components for various receptors.

Emission rates in g/sec = (UCL in mg/m3) * (Average Gas Vent Flow Rate in m3/sec) * (1.0e-03 g/mg)
where:

UCL values are from Table N-2.

Average Gas Vent Flow Rate = 0.00372 (m3/sec) from Table N-1

Exposure Point Concentration = Emission Rate * Ave. Unit Concetration * 1.0e-03

Where Average Unit Concentration:

Resident - Off Site	4.04218
Rec. User/Employee - On Landfill	54.49372
Rec. User/Employee - Off Landfill	5.03766

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9/24/92

Table N-4
Source Input Data
Blackwell Landfill Site
DuPage County, Illinois

SOURCE NUMBER	SOURCE TYPE	X COORD-INATE	Y COORD-INATE	STACK DIAMETER	STACK HEIGHT	BASE ELEV-ATION	GAS EXIT TEMP.	GAS EXIT VEL.	EMISSION RATE
SV2	STACK	264	66	0.051	0.61	0	293.15	3.56	0.076923
SV4	STACK	198	233	0.051	0.61	0	293.15	3.05	0.076923
SV5	STACK	224	384	0.051	0.61	0	293.15	1.27	0.076923
SV8	STACK	-15	130	0.051	0.61	0	293.15	1.27	0.076923
SV9	STACK	37	148	0.051	0.61	0	293.15	2.03	0.076923
SV10	STACK	38	26	0.051	0.61	0	293.15	1.02	0.076923
SV11	STACK	98	143	0.051	0.61	0	293.15	2.54	0.076923
SV12	STACK	131	64	0.051	0.61	0	293.15	0.51	0.076923
DV5	STACK	0	0	0.051	0.61	0	293.15	2.54	0.076923
DV6	STACK	265	116	0.051	0.61	0	293.15	0.76	0.076923
DV7	STACK	95	105	0.051	0.61	0	293.15	3.05	0.076923
DV10	STACK	101	207	0.051	0.61	0	293.15	1.78	0.076923
DV13	STACK	320	44	0.051	0.61	0	293.15	0.51	0.076923

Notes:

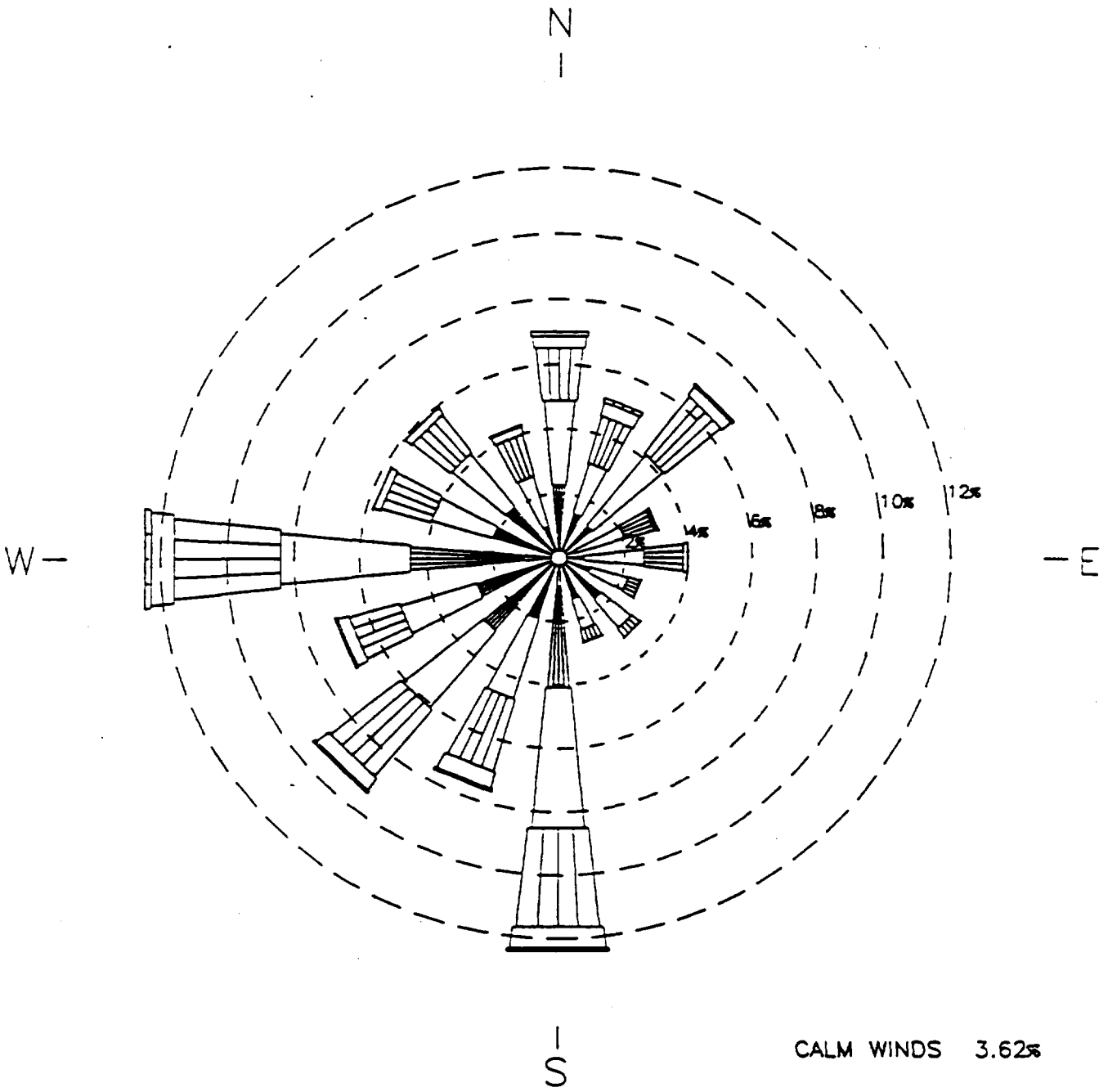
1. Source inputs listed above for each passive landfill vent were used in the air dispersion modeling run. Refer to the text of Appendix N for details.

2. Meteorological source data for O'Hare airport in Chicago, Illinois was used to represent meteorological conditions at the landfill. A five-year STAR meteorological data set was obtained for the years 1985 to 1989.

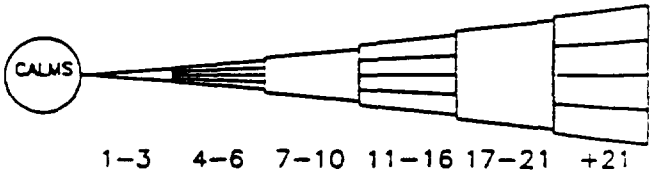
CD/mwk/MWK

FIGURE N-1

FREQUENCY OF WIND SPEED AND DIRECTION



CALM WINDS 3.62%



WIND SPEED CLASS
(KNOTS)

WINDROSE
Chicago (O'Hare), IL
1985 to 1989

ATTACHMENT 1

OUTPUT FROM
AIR DISPERSION MODEL RUN

1 ISCLT - VERSION DATED 90008

IBM-PC VERSION (2.02)
(C) COPYRIGHT 1988, TRINITY CONSULTANTS, INC.
SERIAL NUMBER 7908 SOLD TO WARZYN, INC
RUN BEGAN ON 09-02-92 AT 21:13:48

- ISCLT INPUT DATA -

```
NUMBER OF SOURCES =  13
NUMBER OF X AXIS GRID SYSTEM POINTS =   25
NUMBER OF Y AXIS GRID SYSTEM POINTS =   25
NUMBER OF SPECIAL POINTS =   14
NUMBER OF SEASONS =   1
NUMBER OF WIND SPEED CLASSES =   6
NUMBER OF STABILITY CLASSES =   6
NUMBER OF WIND DIRECTION CLASSES =  16
FILE NUMBER OF DATA FILE USED FOR REPORTS =   1
THE PROGRAM IS RUN IN RURAL MODE
CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR = .10000000E+07
ACCELERATION OF GRAVITY (METERS/SEC**2) =  9.800
HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) =  10.000
CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) =    .000
DECAY COEFFICIENT = .00000000E+00
PROGRAM OPTION SWITCHES = 1, 1, 1, 0, 0, 3, 2, 2, 3, 2, 2, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 0,
ALL SOURCES ARE USED TO FORM SOURCE COMBINATION  1
DISTANCE X AXIS GRID SYSTEM POINTS (METERS )=   -1200.00,   -1100.00,   -1000.00,    -900.00,    -800.00,    -700.00,
     -600.00,    -500.00,    -400.00,    -300.00,    -200.00,    -100.00,        .00,     100.00,     200.00,     300.00,
      400.00,     500.00,     600.00,     700.00,     800.00,     900.00,    1000.00,    1100.00,    1200.00,
DISTANCE X SPECIAL DISCRETE POINTS (METERS )=     -40.00,     -29.00,      -6.00,      38.00,      50.00,      55.00,
      143.00,     224.00,     244.00,     252.00,     267.00,     332.00,     451.00,     473.00,
DISTANCE Y AXIS GRID SYSTEM POINTS (METERS )=   -1200.00,   -1100.00,   -1000.00,    -900.00,    -800.00,    -700.00,
     -600.00,    -500.00,    -400.00,    -300.00,    -200.00,    -100.00,        .00,     100.00,     200.00,     300.00,
      400.00,     500.00,     600.00,     700.00,     800.00,     900.00,    1000.00,    1100.00,    1200.00,
DISTANCE Y SPECIAL DISCRETE POINTS (METERS )=      15.00,     166.00,     341.00,     381.00,     215.00,     -61.00,
      425.00,     -61.00,     308.00,     425.00,        .00,     299.00,     152.00,     137.00,
0                          - AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

                 STABILITY  STABILITY  STABILITY  STABILITY  STABILITY  STABILITY
                 CATEGORY 1 CATEGORY 2 CATEGORY 3 CATEGORY 4 CATEGORY 5 CATEGORY 6
 SEASON  1   296.3070   294.8660   290.2900   281.6770   281.3240   281.4360
0                              - MIXING LAYER HEIGHT (METERS) -

                                          SEASON 1
                      WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED
                      CATEGORY 1  CATEGORY 2  CATEGORY 3  CATEGORY 4  CATEGORY 5  CATEGORY 6
STABILITY CATEGORY 1 .101780E+04 .141890E+04 .141890E+04 .141890E+04 .141890E+04 .141890E+04
STABILITY CATEGORY 2 .862100E+03 .110780E+04 .125780E+04 .125780E+04 .125780E+04 .125780E+04
STABILITY CATEGORY 3 .875200E+03 .788600E+03 .107090E+04 .129310E+04 .126880E+04 .123440E+04
STABILITY CATEGORY 4 .703800E+03 .761700E+03 .856000E+03 .927100E+03 .952000E+03 .957500E+03
STABILITY CATEGORY 5 .100000E+05 .100000E+05 .100000E+05 .100000E+05 .100000E+05 .100000E+05
STABILITY CATEGORY 6 .100000E+05 .100000E+05 .100000E+05 .100000E+05 .100000E+05 .100000E+05
```

- ISCLT INPUT DATA (CONT.) -

0 - FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -
0 SEASON 1
0 STABILITY CATEGORY 1

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
.000	.00016001	.00014001	.00000000	.00000000	.00000000	.00000000
22.500	.00008001	.00007001	.00000000	.00000000	.00000000	.00000000
45.000	.00012001	.00021002	.00000000	.00000000	.00000000	.00000000
67.500	.00011001	.00011001	.00000000	.00000000	.00000000	.00000000
90.000	.00009001	.00009001	.00000000	.00000000	.00000000	.00000000
112.500	.00015001	.00018002	.00000000	.00000000	.00000000	.00000000
135.000	.00008001	.00014001	.00000000	.00000000	.00000000	.00000000
157.500	.00012001	.00002000	.00000000	.00000000	.00000000	.00000000
180.000	.00016001	.00021002	.00000000	.00000000	.00000000	.00000000
202.500	.00001000	.00002000	.00000000	.00000000	.00000000	.00000000
225.000	.00018002	.00018002	.00000000	.00000000	.00000000	.00000000
247.500	.00013001	.00009001	.00000000	.00000000	.00000000	.00000000
270.000	.00009001	.00009001	.00000000	.00000000	.00000000	.00000000
292.500	.00001000	.00002000	.00000000	.00000000	.00000000	.00000000
315.000	.00011001	.00007001	.00000000	.00000000	.00000000	.00000000
337.500	.00003000	.00005000	.00000000	.00000000	.00000000	.00000000

0 SEASON 1
0 STABILITY CATEGORY 2

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
.000	.00059005	.00089008	.00043004	.00000000	.00000000	.00000000
22.500	.00022002	.00039004	.00041004	.00000000	.00000000	.00000000
45.000	.00013001	.00082007	.00091008	.00000000	.00000000	.00000000
67.500	.00016001	.00057005	.00066006	.00000000	.00000000	.00000000
90.000	.00021002	.00082007	.00073007	.00000000	.00000000	.00000000
112.500	.00028003	.00080007	.00030003	.00000000	.00000000	.00000000
135.000	.00037003	.00091008	.00053005	.00000000	.00000000	.00000000
157.500	.00025002	.00075007	.00027002	.00000000	.00000000	.00000000
180.000	.00064006	.00231021	.00119011	.00000000	.00000000	.00000000
202.500	.00017002	.00094008	.00091008	.00000000	.00000000	.00000000
225.000	.00041004	.00135012	.00130012	.00000000	.00000000	.00000000
247.500	.00050005	.00098009	.00119011	.00000000	.00000000	.00000000
270.000	.00068006	.00155014	.00139013	.00000000	.00000000	.00000000
292.500	.00041004	.00059005	.00073007	.00000000	.00000000	.00000000
315.000	.00041004	.00062006	.00055005	.00000000	.00000000	.00000000
337.500	.00017002	.00048004	.00032003	.00000000	.00000000	.00000000

- ISCLT INPUT DATA (CONT.) -

0 - FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -
0 SEASON 1
0 STABILITY CATEGORY 3

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
.000	.00035003	.00174016	.00342031	.00046004	.00000000	.00002000
22.500	.00025002	.00084008	.00210019	.00089008	.00014001	.00007001
45.000	.00014001	.00105009	.00491044	.00210019	.00018002	.00002000
67.500	.00012001	.00050005	.00342031	.00094008	.00000000	.00000000
90.000	.00004000	.00050005	.00402036	.00091008	.00000000	.00000000
112.500	.00012001	.00084008	.00212019	.00027002	.00000000	.00000000
135.000	.00018002	.00094008	.00187017	.00021002	.00000000	.00000000
157.500	.00011001	.00091008	.00178016	.00011001	.00000000	.00000000
180.000	.00055005	.00263024	.00687062	.00096009	.00007001	.00002000
202.500	.00027002	.00114010	.00452041	.00123011	.00007001	.00005000
225.000	.00033003	.00183016	.00632057	.00146013	.00021002	.00005000
247.500	.00045004	.00171015	.00507046	.00121011	.00009001	.00005000
270.000	.00069006	.00272025	.00742067	.00128012	.00016001	.00005000
292.500	.00028003	.00153014	.00374034	.00043004	.00007001	.00000000
315.000	.00022002	.00135012	.00349031	.00041004	.00000000	.00000000
337.500	.00011001	.00071006	.00240022	.00027002	.00002000	.00000000

0 SEASON 1
0 STABILITY CATEGORY 4

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
.000	.00075007	.00671060	.01772160	.01617146	.00374034	.00139013
22.500	.00056005	.00388035	.01039094	.01400126	.00402036	.00142013
45.000	.00058005	.00418038	.01804163	.02041184	.00340031	.00080007
67.500	.00013001	.00151014	.00948085	.00904081	.00107010	.00005000
90.000	.00030003	.00228021	.01098099	.01169105	.00146013	.00014001
112.500	.00040004	.00233021	.00811073	.00370033	.00023002	.00009001
135.000	.00067006	.00450041	.00747067	.00329030	.00021002	.00000000
157.500	.00061005	.00315028	.00680061	.00390035	.00023002	.00005000
180.000	.00135012	.00831075	.02776250	.03071277	.00664060	.00096009
202.500	.00050005	.00374034	.01518137	.02249203	.00527048	.00082007
225.000	.00074007	.00516047	.01571142	.02564231	.00445040	.00078007
247.500	.00095009	.00495045	.01187107	.01441130	.00347031	.00075007
270.000	.00173016	.00852077	.01984179	.03089278	.00687062	.00187017
292.500	.00091008	.00479043	.01009091	.01484134	.00210019	.00025002
315.000	.00097009	.00486044	.01183107	.01413127	.00235021	.00025002
337.500	.00058005	.00276025	.00977088	.01315118	.00233021	.00068006

- ISCLT INPUT DATA (CONT.) -

0 - FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -
0 SEASON 1
0 STABILITY CATEGORY 5

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
.000	.00000000	.00297027	.00432039	.00000000	.00000000	.00000000
22.500	.00000000	.00249022	.00331030	.00000000	.00000000	.00000000
45.000	.00000000	.00185017	.00450041	.00000000	.00000000	.00000000
67.500	.00000000	.00075007	.00185017	.00000000	.00000000	.00000000
90.000	.00000000	.00121011	.00292026	.00000000	.00000000	.00000000
112.500	.00000000	.00201018	.00142013	.00000000	.00000000	.00000000
135.000	.00000000	.00283025	.00187017	.00000000	.00000000	.00000000
157.500	.00000000	.00267024	.00110010	.00000000	.00000000	.00000000
180.000	.00000000	.00699063	.00861078	.00000000	.00000000	.00000000
202.500	.00000000	.00354032	.00603054	.00000000	.00000000	.00000000
225.000	.00000000	.00505045	.00804072	.00000000	.00000000	.00000000
247.500	.00000000	.00384035	.00591053	.00000000	.00000000	.00000000
270.000	.00000000	.00491044	.01071096	.00000000	.00000000	.00000000
292.500	.00000000	.00219020	.00484044	.00000000	.00000000	.00000000
315.000	.00000000	.00244022	.00569051	.00000000	.00000000	.00000000
337.500	.00000000	.00114010	.00368033	.00000000	.00000000	.00000000

0 SEASON 1
0 STABILITY CATEGORY 6

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
.000	.00303027	.00555050	.00000000	.00000000	.00000000	.00000000
22.500	.00155014	.00425038	.00000000	.00000000	.00000000	.00000000
45.000	.00117011	.00292026	.00000000	.00000000	.00000000	.00000000
67.500	.00035003	.00094008	.00000000	.00000000	.00000000	.00000000
90.000	.00042004	.00146013	.00000000	.00000000	.00000000	.00000000
112.500	.00084008	.00210019	.00000000	.00000000	.00000000	.00000000
135.000	.00181016	.00438039	.00000000	.00000000	.00000000	.00000000
157.500	.00159014	.00329030	.00000000	.00000000	.00000000	.00000000
180.000	.00613055	.01169105	.00000000	.00000000	.00000000	.00000000
202.500	.00308028	.00639058	.00000000	.00000000	.00000000	.00000000
225.000	.00478043	.00982089	.00000000	.00000000	.00000000	.00000000
247.500	.00364033	.00884080	.00000000	.00000000	.00000000	.00000000
270.000	.00757068	.01653149	.00000000	.00000000	.00000000	.00000000
292.500	.00285026	.00747067	.00000000	.00000000	.00000000	.00000000
315.000	.00330030	.00651059	.00000000	.00000000	.00000000	.00000000
337.500	.00154014	.00283025	.00000000	.00000000	.00000000	.00000000

- ISCLT INPUT DATA (CONT.) -

0 - VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
STABILITY CATEGORY 1	.000000E+00	.000000E+00	.000000E+00	.000000E+00	.000000E+00	.000000E+00
STABILITY CATEGORY 2	.000000E+00	.000000E+00	.000000E+00	.000000E+00	.000000E+00	.000000E+00
STABILITY CATEGORY 3	.000000E+00	.000000E+00	.000000E+00	.000000E+00	.000000E+00	.000000E+00
STABILITY CATEGORY 4	.000000E+00	.000000E+00	.000000E+00	.000000E+00	.000000E+00	.000000E+00
STABILITY CATEGORY 5	.200000E-01	.200000E-01	.200000E-01	.200000E-01	.200000E-01	.200000E-01
STABILITY CATEGORY 6	.350000E-01	.350000E-01	.350000E-01	.350000E-01	.350000E-01	.350000E-01

0 - WIND PROFILE POWER LAW EXPONENTS -

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
STABILITY CATEGORY 1	.700000E-01	.700000E-01	.700000E-01	.700000E-01	.700000E-01	.700000E-01
STABILITY CATEGORY 2	.700000E-01	.700000E-01	.700000E-01	.700000E-01	.700000E-01	.700000E-01
STABILITY CATEGORY 3	.100000E+00	.100000E+00	.100000E+00	.100000E+00	.100000E+00	.100000E+00
STABILITY CATEGORY 4	.150000E+00	.150000E+00	.150000E+00	.150000E+00	.150000E+00	.150000E+00
STABILITY CATEGORY 5	.350000E+00	.350000E+00	.350000E+00	.350000E+00	.350000E+00	.350000E+00
STABILITY CATEGORY 6	.550000E+00	.550000E+00	.550000E+00	.550000E+00	.550000E+00	.550000E+00

- SOURCE INPUT DATA -

C A R D	T A P E	SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE / ELEV- / ATION / (M) /	- SOURCE DETAILS DEPENDING ON TYPE -
X		1	STACK	264.00	66.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= 3.56, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		2	STACK	198.00	233.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= 3.05, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		3	STACK	224.00	384.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= 1.27, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		4	STACK	-15.00	130.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= 1.27, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		5	STACK	37.00	148.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= 2.03, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		6	STACK	38.00	26.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= 1.02, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		7	STACK	98.00	143.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= 2.54, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02

- SOURCE INPUT DATA (CONT.) -

C A R D	T A P E	SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE / ELEV- / ATION / (M) /	- SOURCE DETAILS DEPENDING ON TYPE -
X		8	STACK	131.00	64.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= .51, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		9	STACK	.00	.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= 2.54, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		10	STACK	265.00	116.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= .76, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		11	STACK	95.00	105.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= 3.05, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		12	STACK	101.00	207.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= 1.78, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02
X		13	STACK	320.00	44.00	.61	.00	GAS EXIT TEMP (DEG K)= 293.15, GAS EXIT VEL. (M/SEC)= .51, STACK DIAMETER (M)= .051, HEIGHT OF ASSO. BLDG. (M)= .00, WIDTH OF ASSO. BLDG. (M)= .00, WAKE EFFECTS FLAG = 0 - SOURCE STRENGTHS ((GRAMS/SEC)) - SEASON 1 SEASON 2 SEASON 3 SEASON 4 7.69230E-02

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS/CUBIC METER)) FROM ALL SOURCES COMBINED **

- GRID SYSTEM RECEPTORS -
- X AXIS (DISTANCE, METERS) -

Y AXIS (DISTANCE , METERS)	-1200.000	-1100.000	-1000.000	-900.000	-800.000	-700.000	-600.000	-500.000	-400.000
	- CONCENTRATION -								
1200.000	.339167	.376837	.416315	.453288	.487883	.518308	.546828	.568469	.616294
1100.000	.343803	.387043	.434465	.484711	.532196	.576831	.615953	.651980	.702667
1000.000	.345367	.391962	.446712	.507629	.573134	.635708	.694847	.747140	.800563
900.000	.344993	.393507	.451547	.522362	.602702	.690653	.776665	.860679	.935169
800.000	.340966	.391811	.453705	.528982	.620973	.730416	.856036	.982981	1.106606
700.000	.335967	.385931	.449421	.528769	.630077	.759801	.917985	1.103200	1.296746
600.000	.340571	.384294	.443110	.522387	.627863	.769891	.962189	1.206187	1.502110
500.000	.354536	.399133	.455063	.524684	.623338	.768798	.972865	1.269330	1.675004
400.000	.371707	.419167	.476770	.550764	.651209	.785588	.980082	1.287924	1.778380
300.000	.384460	.435883	.499248	.580192	.686787	.830427	1.037683	1.346536	1.827553
200.000	.392243	.446205	.513319	.600426	.716839	.875310	1.099118	1.428266	1.966904
100.000	.390623	.444483	.511609	.599041	.716375	.876853	1.105842	1.447509	2.004770
.000	.376157	.426457	.488650	.569115	.675944	.820062	1.030903	1.339180	1.814423
-100.000	.353062	.397438	.451391	.521519	.615185	.737728	.909048	1.215999	1.761577
-200.000	.327010	.366884	.414978	.474250	.558198	.699302	.913016	1.240250	1.876069
-300.000	.303599	.338135	.389729	.464974	.571308	.732725	.995485	1.393956	1.979064
-400.000	.292120	.339433	.400929	.495895	.630560	.819423	1.083965	1.437640	1.855784
-500.000	.303274	.364938	.445460	.551245	.688996	.870722	1.101153	1.359504	1.596294
-600.000	.335666	.402593	.485767	.589823	.720900	.879709	1.050242	1.204622	1.359243
-700.000	.363670	.430057	.511041	.610242	.726286	.845938	.951761	1.057707	1.153020
-800.000	.382914	.447236	.524355	.612618	.701682	.778853	.855035	.924251	.983902
-900.000	.394954	.456216	.525109	.593485	.652377	.710261	.762755	.809506	.854254
-1000.000	.401180	.456112	.509907	.555997	.601176	.642402	.679944	.713991	.753069
-1100.000	.400644	.443776	.480647	.516647	.549626	.580099	.608601	.635008	.676423
-1200.000	.390560	.420495	.449689	.476489	.501507	.525383	.547072	.569735	.615211

- GRID SYSTEM RECEPTORS -
- X AXIS (DISTANCE, METERS) -

Y AXIS (DISTANCE , METERS)	-300.000	-200.000	-100.000	.000	100.000	200.000	300.000	400.000	500.000
	- CONCENTRATION -								
1200.000	.806585	1.070141	1.457081	1.920464	2.235091	2.298378	2.136019	1.830668	1.537505
1100.000	.855687	1.174847	1.601184	2.180497	2.599017	2.690701	2.472742	2.071416	1.734971
1000.000	.949170	1.291687	1.784961	2.499909	3.079270	3.220327	2.916830	2.385015	2.036115
900.000	1.076416	1.419801	2.056164	2.901783	3.716237	3.950878	3.508331	2.808828	2.493895
800.000	1.235682	1.616632	2.421359	3.489252	4.571620	5.003651	4.348728	3.449055	3.149980
700.000	1.488468	1.884373	2.844776	4.352022	5.706313	6.632274	5.620298	4.580976	4.074442
600.000	1.810984	2.229485	3.386953	5.817779	7.691670	9.504487	7.778325	6.576832	5.334848
500.000	2.203553	2.794020	4.270364	7.771526	11.303710	15.654960	13.247410	9.444435	6.705481
400.000	2.526437	3.586269	5.631386	11.029810	18.223140	36.111750	29.054110	14.352450	9.204861
300.000	2.705728	4.356666	7.342691	18.442630	38.774440	47.491940	28.580400	15.724270	10.906860
200.000	2.948528	4.948080	10.599230	41.012620	314.747600	74.096040	41.226830	23.227170	13.831830
100.000	3.000483	5.163902	12.279280	62.465000	249.896000	58.712640	79.727800	33.999170	16.864710

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS/CUBIC METER)) FROM ALL SOURCES COMBINED (CONT.) **

- GRID SYSTEM RECEPTORS -
- X AXIS (DISTANCE, METERS) -

Y AXIS (DISTANCE , METERS)	-300.000	-200.000	-100.000	.000	100.000	200.000	300.000	400.000	500.000
	- CONCENTRATION -								
-100.000	2.769977	4.919972	10.256940	18.551140	17.974870	14.710930	14.697110	10.131830	7.613072
-200.000	2.938855	4.557575	6.245526	9.147616	9.162191	8.449413	8.028111	5.943990	5.104161
-300.000	2.732627	3.440526	4.304138	5.754681	5.807252	5.323843	5.001590	4.135413	3.597595
400.000	2.244346	2.638149	3.217419	4.016625	4.124033	3.725300	3.420086	3.009221	2.592744
-500.000	1.829774	2.065420	2.490753	2.976735	3.090502	2.829960	2.544873	2.222052	1.972412
-600.000	1.497867	1.682607	2.002671	2.317451	2.422974	2.257482	1.984804	1.713284	1.568506
-700.000	1.244476	1.414883	1.646150	1.874029	1.958753	1.846650	1.628172	1.401055	1.266898
-800.000	1.062024	1.213038	1.380973	1.557822	1.621792	1.542149	1.379665	1.177761	1.044145
-900.000	.933388	1.055855	1.186424	1.322291	1.370358	1.311421	1.189975	1.016455	.894584
-1000.000	.831944	.929483	1.036907	1.143512	1.180591	1.135258	1.041872	.902084	.787648
-1100.000	.749570	.829720	.918904	1.002774	1.032115	.996508	.922503	.811560	.703203
-1200.000	.678107	.746663	.820639	.887841	.911519	.882923	.823218	.733628	.639817

- GRID SYSTEM RECEPTORS -
- X AXIS (DISTANCE, METERS) -

Y AXIS (DISTANCE , METERS)	600.000	700.000	800.000	900.000	1000.000	1100.000	1200.000
	- CONCENTRATION -						
1200.000	1.379383	1.320298	1.277946	1.249828	1.208558	1.152221	1.078082
1100.000	1.612966	1.532174	1.486426	1.434982	1.362145	1.265615	1.156733
1000.000	1.911854	1.812035	1.741726	1.643267	1.512523	1.367659	1.231345
900.000	2.308301	2.179647	2.037618	1.850660	1.649539	1.464254	1.293410
800.000	2.870812	2.629896	2.342444	2.044472	1.779200	1.542917	1.341135
700.000	3.576162	3.103590	2.632461	2.228950	1.886479	1.621078	1.404883
600.000	4.365790	3.555526	2.935843	2.431863	2.023474	1.714733	1.499154
500.000	5.310688	4.185570	3.288939	2.664019	2.238974	1.921776	1.677705
400.000	6.549667	4.934869	3.840873	3.094520	2.593652	2.245249	1.981395
300.000	7.709703	5.615954	4.424649	3.620467	3.055308	2.626889	2.287434
200.000	9.199696	6.734341	5.298796	4.273129	3.524647	2.968912	2.546009
100.000	10.875570	7.696563	5.780457	4.532986	3.692823	3.086804	2.632919
.000	8.664949	6.404189	4.960160	3.992650	3.292706	2.776523	2.391073
-100.000	5.416460	4.244358	3.546579	3.023181	2.595141	2.267681	2.000480
-200.000	4.170300	3.292744	2.656191	2.224074	1.976516	1.780825	1.617280
-300.000	3.211044	2.716977	2.255022	1.902285	1.619623	1.419457	1.289763
-400.000	2.476220	2.242538	1.960219	1.677758	1.449379	1.268217	1.122454
-500.000	1.900483	1.822303	1.672086	1.497065	1.319504	1.165385	1.031465
-600.000	1.479071	1.467131	1.408428	1.310127	1.194532	1.073349	.965328
-700.000	1.177980	1.186269	1.175521	1.133289	1.064226	.982781	.895295
-800.000	.982244	.966681	.982218	.970184	.938194	.887003	.826181
-900.000	.836652	.804235	.822602	.830020	.818129	.792489	.752974
-1000.000	.720417	.689189	.694794	.709828	.711843	.700805	.679963
-1100.000	.633611	.605650	.594363	.610702	.618806	.618193	.608229
-1200.000	.571173	.535261	.517769	.528544	.540396	.544528	.542586

** ANNUAL GROUND LEVEL CONCENTRATION ((MICROGRAMS/CUBIC METER)) FROM ALL SOURCES COMBINED (CONT.) **

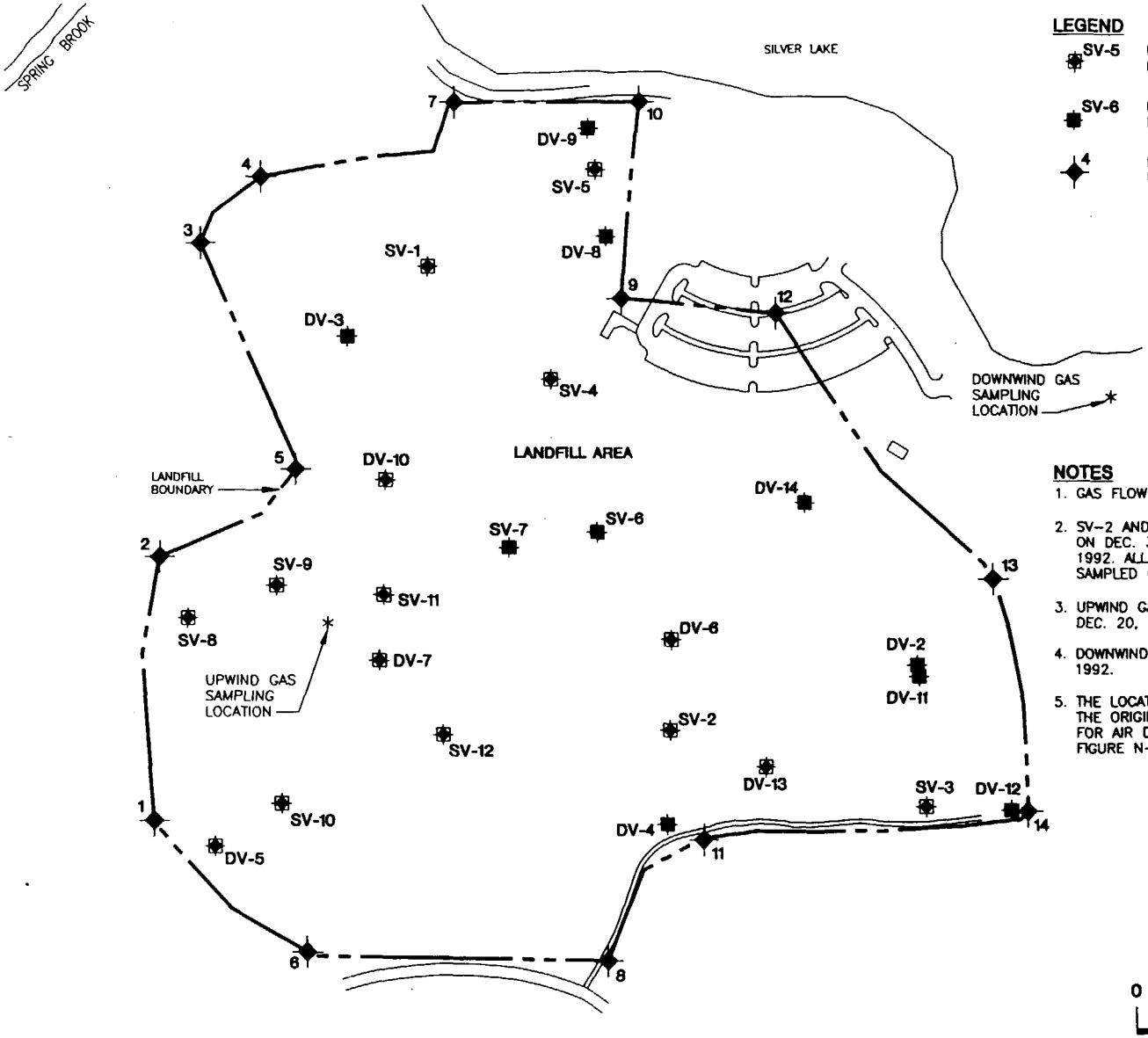
0 - DISCRETE RECEPTORS -

X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION	X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION	X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION
-40.0	15.0	27.685370	-29.0	166.0	33.100210	-6.0	341.0	14.003590
38.0	381.0	15.172040	50.0	215.0	51.425090	55.0	-61.0	27.312320
143.0	425.0	16.559020	224.0	-61.0	20.920230	244.0	308.0	35.868990
252.0	425.0	36.659600	267.0	.0	42.152230	332.0	299.0	22.824110
451.0	152.0	20.145140	473.0	137.0	18.445670			

0 - PROGRAM DETERMINED MAXIMUM 10 VALUES -

X COORDINATE (METERS)	Y COORDINATE (METERS)	CONCENTRATION
100.00	200.00	314.747600
100.00	100.00	249.896000
300.00	100.00	79.727800
200.00	200.00	74.096040
.00	100.00	62.465000
200.00	100.00	58.712640
100.00	.00	51.828770
50.00	215.00	51.425090
200.00	300.00	47.491940
267.00	.00	42.152230

1



LEGEND

- SV-5 — LANDFILL GAS SAMPLING LOCATION AND NUMBER
- SV-6 — LEACHATE GAS VENT LOCATION AND NUMBER (NOT SAMPLED)
- 4 — DISCRETE RECEPTOR LOCATION AND NUMBER USED IN AIR DISPERSION MODELING

NOTES

1. GAS FLOW MEASURED AT ALL VENTS ILLUSTRATED.
2. SV-2 AND DV-7 WERE SAMPLED TWICE, ONCE ON DEC. 30, 1991 AND ONCE ON JUNE 30, 1992. ALL OTHER SAMPLED VENTS WERE SAMPLED ONCE ON JUNE 30, 1992.
3. UPWIND GAS SAMPLES COLLECTED TWICE, ONCE ON DEC. 20, 1991 AND ONCE ON JUNE 30, 1992.
4. DOWNWIND GAS SAMPLE COLLECTED ON JUNE 30, 1992.
5. THE LOCATION OF DV-5 WAS USED TO REPRESENT THE ORIGIN OF THE RECEPTOR GRID USED FOR AIR DISPERSION MODELING. REFER TO FIGURE N-3 FOR THE RECEPTOR GRID.

north

0 200 400

SCALE IN FEET

FIGURE N-2

LANDFILL GAS FLOW MEASUREMENT, GAS SAMPLING AND DISCRETE RECEPTOR LOCATION MAP

REMEDIAL INVESTIGATION REPORT
BLACKWELL LANDFILL SITE
DU PAGE COUNTY, ILLINOIS

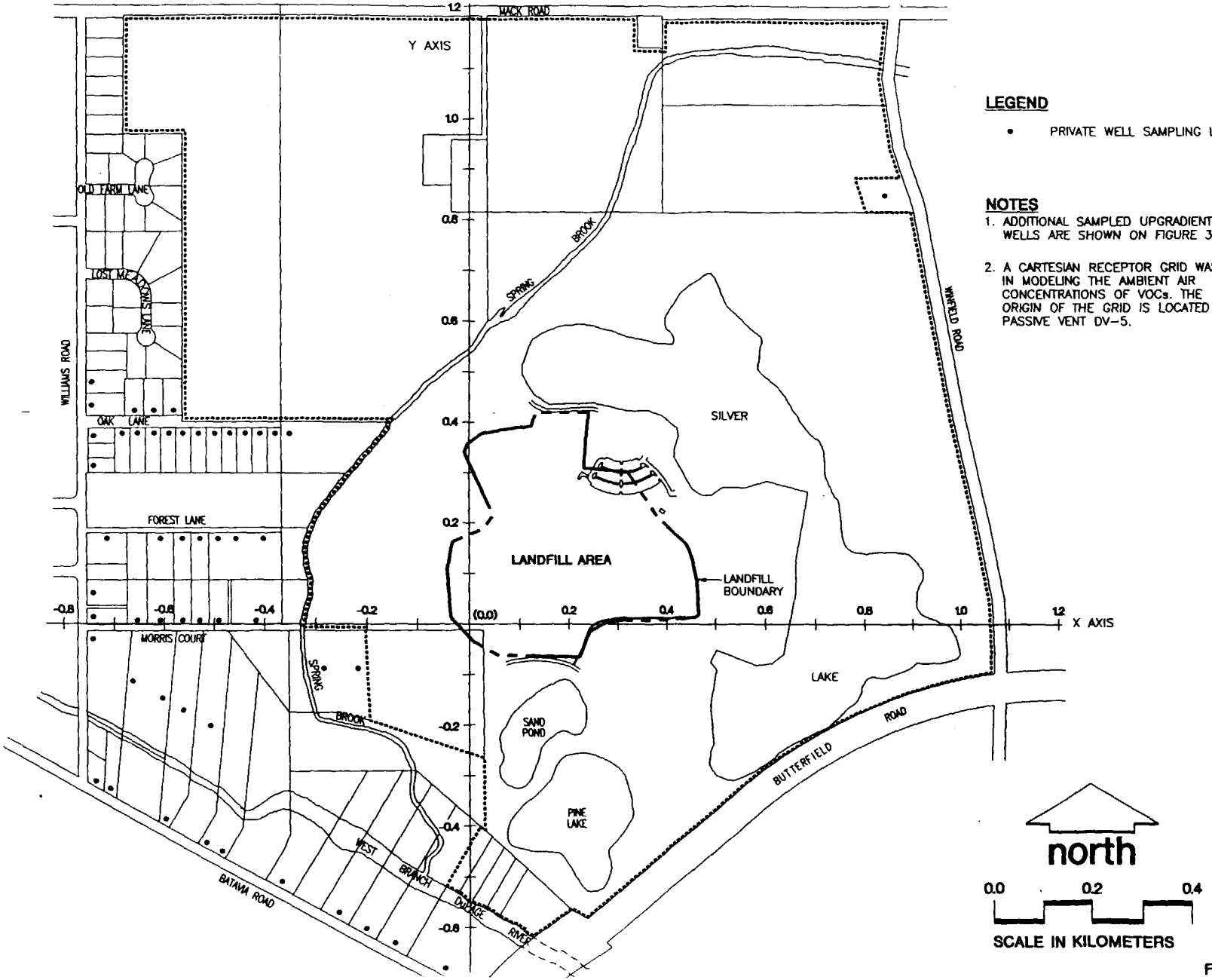
Drawing Number 6072100 B71

WARZYN

Developed By: JAW
Drawn By: ELR
Approved By:
Date: 9/28/92
Reference:
Revisions:

QUALITY CONTROL
Graphic Standards D.L.L.
Lead Professional J.A.J.
Technical Review P.J.U.
Project Manager
Management Review
Other

WARZYN INC.



LEGEND

• PRIVATE WELL SAMPLING LOCATION

NOTES

1. ADDITIONAL SAMPLED UPGRADIENT PRIVATE WELLS ARE SHOWN ON FIGURE 3-8.
2. A CARTESIAN RECEPTOR GRID WAS USED IN MODELING THE AMBIENT AIR CONCENTRATIONS OF VOCs. THE ORIGIN OF THE GRID IS LOCATED AT PASSIVE VENT DV-5.

FIGURE N-3

QUALITY CONTROL
Graphic Standards: D.L.L.
Lead Professional: J.A.W.
Technical Review
Project Manager: P.J.O.
Management Review
Other

Developed By: JAW
Drawn By: ELR
Approved By: [signature]
Date: 9/28/92
Reference:
Revisions:

CARTESIAN RECEPTOR GRID
REMEDIAL INVESTIGATION REPORT
BLACKWELL LANDFILL SITE
DU PAGE COUNTY, ILLINOIS

Drawing Number
6072100 B72

WARZYN

WARZYN INC.

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SHOWER INHALATION INTAKE CALCULATION

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SHOWER INHALATION INTAKE CALCULATION

A screening method for estimating the indoor air concentrations from indoor water uses and the resulting human inhalation exposures, with an emphasis on showering, has been developed by the Office of Health and Environmental Assessment-Exposure Assessment Group, based on procedures developed by Julian Andelman at the University of Pittsburgh. The screening method, which presents in detail the methods used to estimate chemical exposure from showering, is included in this appendix. In the baseline risk assessment, the shower exposure equation is used in conjunction with the daily intake equation for inhalation of chemicals to calculate the average daily chemical intake associated with showering and grooming. This introduction summarizes how the two equations are incorporated.

Showering exposes a person to chemicals present in groundwater used for showering, through both dermal and inhalation exposure routes. The portion of the chemical in the water (Cw) that will volatilize is estimated to determine the chemical concentration in air (CA). The time spent in the shower, as well as time spent in the bathroom after the shower, are estimated and summed to determine the exposure time (ET). The breathing or inhalation rate (IR) is also estimated. These factors (i.e., CA, IR and ET) are incorporated into both the shower exposure equation, presented below, and the daily intake equation presented in Table 8-13. The factors that average the daily exposure over the lifetime of an average receptor are included in the daily intake equation only. By integrating the two equations, the average daily chemical intake from the showering pathway was calculated.

The shower exposure equation estimates a person's chemical exposure in terms of mg of chemical per shower event, or mg/day:

$$Ei = \frac{\frac{(Cw*f*Fw*t_1)}{Va}}{2} (B*t_1) + \frac{(Cw*f*Fw*t_1)}{Va} * (B*t_2)$$

where

Ei	=	Magnitude of chemical air exposure (mg/day)
Cw	=	Concentration of chemical in water (mg/L)
f	=	Fraction volatilized from water to air (assume 90%-Volatiles, 0%-Metals and Pesticides)
Fw	=	Flow rate of water from shower (600 L/hr)
t_1	=	Shower time period (0.25 hr/day)
t_2	=	Bathroom time period (i.e., after showering while grooming) (0.20 hr/day)
Va	=	Bathroom volume (10,000 L)
B	=	Persons inhalation rate (833 L/hr)

The shower exposure equation, with the inputs given above, can be reduced to the following:

$$Ei\ (mg/day) = Cw * f * 4.06$$

The daily intake equation for inhalation of chemicals from air, presented in Table 8-13, is as follows:

$$I = \frac{CA*IR*ET*EF*ED}{BW*AT}$$

where

I	=	Chemical intake due to inhalation exposure (mg/kg-day)
CA	=	Contaminant concentration in air (mg/m^3)
IR	=	Inhalation rate (L/hr which can be converted to m^3/day)
ET	=	Exposure time (hours/day)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days)

As described previously, the shower exposure equation includes factors for exposure time (ET) and inhalation rate (IR). The chemical exposure per shower, calculated from the shower exposure equation, can be integrated into the daily intake equation to provide the average chemical exposure over the lifetime of the individual associated with showering and grooming. By including the constant derived by reducing the shower exposure equation, the factors common to both equations are:

$$Cw * f * 4.06 = CA * IR * ET$$

The shower scenario is then integrated into the inhalation intake equation by substituting the one set of factors (Cw * f * 4.06) for the other set of factors (CA * IR * ET), resulting in the following equation:

$$I = \frac{CA*f*4.06*EF*ED}{BW*AT}$$

This equation was used to calculate the daily intakes associated with showering and grooming in the baseline risk assessment.

It should be noted, that when calculating the daily intake for dermal chemical exposure resulting from showering, the concentration in water was decreased due to volatilization. The chemical concentration in water was scaled downward by the fraction not volatilized: 0.10 for volatiles, and 1.00 for pesticides and metals when calculating dermal intakes during showering.

References:

Andelman, J.B. 1985. Human Exposures to Volatile Halogenated Organic Chemicals in Indoor and Outdoor Air. Environmental Health Perspective 62: 313-318.

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SCREENING METHOD FOR ESTIMATING INHALATION EXPOSURE TO VOLATILE CHEMICALS FROM DOMESTIC WATER

1. Introduction

The following discussion has been developed to provide a screening method for estimating the indoor air concentrations of volatile chemicals from indoor water uses and the resulting human inhalation exposures, with an emphasis on showers. A computerized model titled MAVRIQ (Model for Analysis of Volatiles and Residential Indoor-Air Quality), which is under development, may also be used to refine the exposure estimates since it more accurately accounts for human behavioral and water use patterns.

This procedure evolved from research done by Julian Andelman at the Universtity of Pittsburg under funding from the Expsoure Assessment Group at US EPA in Washington, DC. The references given provide a more detailed description of these procedures and related work.

2. When is Inhalation Exposure of Concern?

In order to determine the significance of the inhalation pathway the ratio of the vapor inhalation exposure to the water ingestion exposure can be calculated. Using Henry's Law Constant to obtain the equilibrium concentration in air, and setting a ratio of < 0.1 as criteria, the equation can be derived as follow:

$$\frac{\text{max inhalation exposure}}{\text{water ingestion exposure}} < 0.1 \qquad (1)$$

$$\frac{H\,C_w \times (20{,}000\ \text{L/day})}{C_w \times (2\ \text{L/day})} < 0.1 \qquad (2)$$

$$H < 10^{-5} \qquad (3)$$

Where C_w = contaminant concentration in water (mg/L)
H = Henry's Law Constant (unitless)

The unitless Henry's Law Constant can be calculated by using the following equation.

$$H = H'/RT$$

where H' = Henry's Law Constant in atm-m^3/mol
R = gas constant in atm-m^3/mol °K
T = temperature in °K

Assuming a typical water temperature in a shower scenario of 40°C, RT is 2.6×10^{-2} atm-m^3/mol.

Equation (3) suggests that for compounds with Henry's Law Constants of $< 10^{-5}$, the inhalation exposure would not exceed ingestion and is probably much less, therefore the inhalation pathway may not be of concern when compared to ingestion. Caution should be used when applying this criterion. If the ingestion exposure is significant, the inhalation exposure, although orders of magnitude less, may also be significant when considered separately.

3. Showering Exposure

The derivations and assumptions of the equations used to estimate exposure through the showering scenario are included in Appendix 1.

The exposure equation below accounts for the exposure during the showering time and the exposure during the period subsequent to the shower where there is a decay of the chemical concentration.

$$E_i = [C_{aAVG1} B t_1]_{shower} + [C_{aAVG2} B t_2]_{after\ shower} \qquad (4)$$

Where: E_i = exposure [mg]
C_{aAVG1} = average air concentration during shower [mg/L]
C_{aAVG2} = average air concentration after shower [mg/L]
B = breathing rate [L/hr]
t_1 = shower period [hr]
t_2 = after shower period [hr]

C_{aAVG1} and C_{aAVG2} are estimated using equations (5) and (6) and (7) below.

$$C_{aAVG1} = C_{aMAX}/2 \qquad (5)$$

$$C_{aAVG2} = C_{aMAX} \qquad (6)$$

$$C_{aMAX} = \frac{C_w \times f \times F_w \times t_1}{V_a} \qquad (7)$$

Where: C_{aMAX} = maximum air concentration in bathroom [mg/L]
C_w = water concentration [mg/L]
f = fraction volatilization [unitless]
F_w = water flow rate [L/hr]
V_a = bathroom size [L]

Default values for the variables in these equations are tabulated in table 1.

Using equations (4) through (7) and the average or most probable values from Table 1, one

Example:
Assumptions

$f = .75$
$F_w = 600$ L/hr
$t_1 = 0.08$ hr
$t_2 = 0.2$ hr
$V_s = 10{,}000$ L

$$C_{sMAX} = \frac{C_w (0.75)(600 L/hr)(0.08 hr)}{(10{,}000 L)}$$

$$= 3.6 \times 10^{-3} C_w$$

$$C_{sAVG} = 1.8 \times 10^{-3} C_w$$

$$E_1 = 1.8 \times 10^{-3} C_w(833 L/hr)(0.08 hr) + 3.6 \times 10^{-3} C_w(833 L/hr)(0.2 hr)$$

$$= 0.72(L)\ C_w$$

TABLE 1

Variable	Value or Range	Reference
Fraction Volatilization (f)	0.5 - 0.9 (typical=0.75)	1
Water Flow Rate (F_w) [L/hr]	600 - 1,800 (mean=600)	2
Shower Period (t_1) [hr]	0.08 - 0.3 (mean=0.08)	2
After Shower Period (t_2)	0.2 (typical)	1
Bathroom size (V_a) [L]	8,300 - 9,800	3
Breathing Rate (B) [L/hr]	833 ($20m^3$/day)	4

1. Andelman, J., Total Exposure to Volatile Organic Compounds in Potable Water, Chapter 20, Significance and Treatment of Volatile Organic Compounds in Water Supplies

2. U.S. Department of Housing and Urban Development, Residential Water Conservation Projects, March 1984, Contract H-5230

3. Giardino NJ, Gumerman E, Andelman JB, Wilkes CR, Small MJ, Borrazo JE, Davidson CI (1990), Real-Time Air Measurements of Trichloroethylene in Domestic Bathrooms using Contaminated Water

4. U.S. EPA Factors Handbook

4. Whole House Exposure

Similarly, a one-compartment indoor-air model may be used to describe the range of average indoor-air concentrations that are likely to be encountered from a volatile organic chemical. The equation does not address the time and space variations that will be encountered throughout the day in the home. The exposure estimates obtained using the air concentrations from equation (8) do not include those that would occur at the point of water use, such as during showering.

The air concentration can be estimated by using the equation below.

$$C_a = \frac{WHF\ C_w\ f}{HV\ ER\ MC} \qquad (8)$$

where; C_a = concentration in air (mg/m^3)
C_w = concentration in water (mg/L)
WFH = water flow rate in whole house (L/day)
HV = house volume (m^3)
ER = exchange rate (air changes/day)
MC = mixing coefficient (unitless)
f = fraction of contaminant that volatilizes (unitless)

Table 2 shows a list of the ranges of values that these variables can take. An example of the use of equation (8) is presented below.

Assumptions

WFH = 723 (L/day)
HV = 177.7 (m^3)
ER = 13.7 - 58.8 (air changes/day)
MC = 0.15 - 1.0 (unitless)
f = 0.5 - 1.0 (unitless)

$$C_a = (0.03 - 2.0\ [L/m^3])\ C_w\ [mg/L] \qquad (9)$$

TABLE 2

Variable	Value or Range	Reference
Water Flow Rate (WFH) [L/day]	723 (typical)	1
House Volume (HV) [m^3]	177.7 (typical?)	2
Exchange Rate (ER) [air changes/day]	13.7 - 58.8	3
Exchange Rate (ER) [air changes/day]	21.6 - 84.0	4
Mixing Coefficient (MC) (unitless)	0.15 - 1.0	5
Fraction Volatilization (f) [unitless]	0.5 - 1.0	6

1. U.S. Department of Housing and Urban Development (1984) Residential Water Conservation Projects

2. Axley J (1988) Progress Toward a General Analytical Method for Predicting Indoor Air Pollution in Buildings: Indoor Air Quality Modeling Phase III Report. NBSIR 88-3814

3. Grimsrud D.T., Sherman M.H., and Sonderegger R.C. (1982) Calculating infiltration: Implications for a Construction Quality Standard. Proceedings - ASHRAE/DEO Conference on Thermal Performance of the Exterior Envelopes of Buildings, Las Vegas, NV, Lawrence Berkeley Laboratory Report, LBL-9416. (refers to new houses)

4. ASHRAE (1985) Natural Ventilation and Infiltration. ASHRAE Fundamentals Handbook, Chapter 22, ASHRAE Inc., Atlanta, GA. (refers to older houses)

5. U.S. EPA (1987); Exposure to Volatilized Drinking Water Contaminants Via Inhalation - Importance Relative to Ingestion; Office of Drinking Water, Criteria and Standards Division, Health Effects Branch.

6. Cantor, K.P., Christman R.F., Ram, N.M., Significance and Treatment of Volatile Organic

Compounds in Water Supplies; Chapter 20 - Total Exposure to Volatile Organic Compounds in Potable Water; Julian B. Andelman

Note: The ranges represent the average value and the maximum value. For the range presented in reference #4, the first value represents the median. Values presented for mixing coefficients are based on judgment.

Appendix A: Derivation of Equations

Nature of Volatilization Process

To assess the potential for VOC's to volatilize from water used indoors, it is useful to consider the equilibrium and rate processes involved. The relevant relationship describing the volatilization of a chemical and its subsequent equilibrium between the air and water phases is Henry's law

$$H = C_a/C_w \qquad (1)$$

where H is the dimensionless Henry's law constant, and C_a and C_w (mass/volume) are the concentrations of the volatilized chemical in the air and water phases, respectively, at equilibrium.

Table 5 is a list of H constants at 25 °C for several organic chemicals of environmental concern, along with their vapor pressures and solubilities, the values being approximate, either calculated or taken directly from the compilation by Mackay and Shiu [19]. The H constants shown there encompass a

range greater than five orders of magnitude. Their vapor pressures and water solubilities are also quite different. Since the H values are predicted fairly well by the ratio of the vapor pressure of the pure material to its aqueous solubility, compounds such as carbon tetrachloride and tetrachloroethylene, with quite different solubilities and vapor pressures, can nevertheless have similar H values. Also it is essential to recognize that even a low vapor-pressure chemical, by virtue of its low solubility in water, has the potential to volatilize to the same extent as a high vapor-pressure chemical.

The maximum extent to which a chemical may be expected to volatilize in the home from indoor water uses can be estimated by considering the average quantities of water used within a home, F_w (L/h), along with typical air flow or infiltration rates F_a (L/h). For a family of four a typical ratio of F_a/F_w may be taken as 10^4 [4]. The ratio of masses of volatilized chemicals, r, in the two phases is given by

$$r = (C_a/C_w)(V_a/V_w) \qquad (2)$$

where V_a and V_w are the quantities of air and water, respectively, used in a given period of time in the home. In the steady-state one can assume that V_a/V_w equals F_a/F_w, and r_{MAX} is the maximum expected value for r when C_a/C_w equals H, such that

$$r_{MAX} = H(F_a/F_w) = 10^4\ H \qquad (3)$$

This indicates that in the steady-state, as water is used within the typical home and air infiltrates through it, for a chemical with an H value as low as 10^{-4}, r_{MAX} is unity, or about 50% volatilization will occur. Since all the chemicals in Table 5 have H values greater than 10^{-4}, in each case, <u>assuming Henry's law equilibrium is attained</u>, one would expect substantial volatilization to occur in the home from normal uses of contaminated water as it is exposed to the indoor air.

The H constant will increase with temperature. Munz and Roberts [20] showed that for several volatile organic chemicals the temperature effect is given by

$$\log H = A' - B'/T \qquad (4)$$

where A' and B' are constants for each chemical, and T is absolute temperature. For chloroform the measured A' and B' values were found to be 4.990 and 1729, respectively; and for carbon tetrachloride, 5.853 and 1718, respectively, the measurements being taken over the range of 10 to 30 °C. For example, using this equation for chloroform, the H values are 0.076 and 0.19 at 10 °C and 30 °C, respectively, The comparable values for carbon tetrachloride are 0.606 and 1.52. Thus the maximum extent of volatilization that can occur will increase markedly with temperature.

As discussed by Mackay and Yeun [21], the rate of volatilization of a chemical from water is dependent on its molecular-diffusivity properties. Often a two-resistance model

is used to describe the process in which the volatilizing chemical has to first diffuse across a liquid film at the air water interface, followed by diffusion across the air film. Mackay and Yeun measured volatilization rates in a wind wave tank for 11 organic compounds with varying Henry's law constants. They confirmed the validity of the two-resistance model, and showed the effects of solute diffusivity and temperature. The chemicals studied included several halogenated VOC's, including chlorobenzene, carbon tetrachloride, 1,2-dibromoethane, and 1,2-dichloropropane, as well as benzene and toluene, and several ketones and alcohols. They showed that no interactions occur when solutes volatilize simultaneously, and concluded that the mass-transfer rate was predominantly liquid-phase resistant for many of these chemicals.

The two-resistance model expressing the mass flux, F_m (mol/m^2s), can be written as

$$F_m = K(C_w - C_a/H) \tag{5}$$

where K is the overall, two-resistance mass-transfer coefficient (m/s), C_a is the solute concentration in air (mol/m^3) and C_w that in water. The overall mass transfer is a product of the flux and the surface area exposed, so that, for example, small droplets in a shower with a greater surface area would be expected to have a greater rate of volatilization per unit time than would the same mass of larger droplets with a lower surface area/mass ratio.

Mackay and Yeun concluded that the mass-transfer coefficient in either the liquid or gas phase was most likely dependent on the Schmidt number, Sc, which is the dimensionless ratio of viscosity/(density x diffusivity), in the respective phase. The two-resistance model describes the K in terms of liquid and gas phase transfer coefficients, K_L and K_G, respectively, such that

$$1/K = 1/K_L + 1/HK_G \qquad (6)$$

They showed that for their data K_L was proportional to 3.41×10^{-3} $Sc_L^{-0.5}$, while K_G was proportional to 4.62×10^{-2} $Sc_G^{-0.67}$. The Sc_G and Sc_L values for the 12 compounds did not differ greatly, ranging from 0.72-1.07 for Sc_G, and 939-1177 for Sc_L at 20 °C. However, the H values varied considerably by almost four orders of magnitude. For the smallest H-value compound, 1-butanol, the K_G term dominated to establish the overall K, while for the high H-value compounds like benzene and carbon tetrachloride, liquid-film transfer was the dominant rate-controlling step, the $1/HK_G$ term being negligible in Equation 8. The overall mass-transfer coefficients measured were thus quite different at these two extremes. For example, the ratio of mass-transfer coefficients for benzene to that of 1-butanol varied from 14 to 20. In contrast, for those compounds where K_L dominated, the K values did not vary much, as expected, since their Sc_L values were quite similar, and H no longer played a significant role in determining K. Thus, in one series of determinations of mass-transfer coefficients, Mackay and Yeun measured K values of 51.1, 51.1,

and 45.3 (10^{6} m/s), respectively, for benzene, carbon tetrachloride, and 1,2-dibromoethane, their Sc_L values being 1021, 1062, and 1075, respectively.

This analysis indicates that one should be able to compare and predict the K values among compounds based on fundamental molecular properties and H values, to the extent that this two-resistance model applies to the volatilization from indoor water uses. They observed that the use of the K_L dependency on $Sc_L^{-0.5}$ predicts a 2.8% temperature increase in K per degree.

Equation 5 for the mass-transfer or flux at the water air-interface predicts that when the air concentration, C_a, is negligible, meaning a small buildup of chemical in the receiving air, then the rate of mass transfer is directly proportional to the concentration of volatilizing chemical in the water. This is of importance in that one could then extrapolate the percent volatilization at a high concentration in the feed water to predict the same fractional volatilization at a low-feed concentration. At the same time, even if the buildup in the air did occur, however, and its removal were first order in concentration, one could still extrapolate to the lower feed concentration.

There is independent evidence in laboratory studies that the mass-transfer coefficient may be reasonably constant over several orders of magnitude of concentration [22]. For 1,2-dichloroethane in the range of 1 g/L to 10 ug/L the coefficient

of variation of mass-transfer coefficient was found to be ± 6.31%; for 1,1,1-trichloroethane it was ± 5.42% over a range of concentration of 0.05 g/L to 30 ug/L.

In summary, the H constant will limit the maximum volatilization that can occur in indoor water uses. However, except for a few still-water systems in the home, such as water in a toilet bowl, many water uses are flowing or are of short-term duration in which the rate of volatilization will be limiting and equilibrium not reached. In those instances the mass-transfer coefficients become the principal controlling factor for the relative releases of different volatile and semi-volatile chemicals. Even here, however, the H constant is of importance in that it will influence the magnitude of the mass-transfer coefficient, as well as the extent to which the flux for volatilization at the water-air interface will be reduced as the air concentration builds up.

Finally, the water-air interfacial areas and temperatures of the water uses are critical determining factors in the rate of mass transfer; and certainly the H constants will increase with temperature as well. Thus, one can expect that since the various indoor water uses involve different quantities and flows of water, residence times in the water appliances and uses, degrees of mixing and turbulence, and temperatures, the extents of volatilization among the water uses, even for a given chemical, should vary.

Values for transfer efficiencies among water uses in a typical home have been determined for radon by Prichard and Gessell [10]. As shown in Table 6, the transfer efficiencies (percent volatilization) were found to vary from 30 to 90% among the water uses, the volume use-weighted mean being about 50%.

Laboratory Shower Experiments

We have performed studies on volatilization of chemicals from laboratory and full-size shower and bath systems in which chemicals have been added to the water [3-8]. In our typical laboratory shower experiments with chloroform shown in Figure 1 [23], the concentration of the chemical in the air pumped from the chamber is measured continuously as the shower water flows, and continues to be measured after the chemical injection is terminated, but with the shower still flowing. The peak concentrations shown in Figure 1 occur shortly after terminating the injection of chemical. In these studies we have also monitored the drainwater leaving the shower chamber for mass-balance purposes.

For this system the equation describing the rate of change of air concentration, C_a (mg/L), can be expressed as [6]

$$V_a(dC_a/dt) = k(C_w - C_a/H) - F_aC_a \qquad (7)$$

where V_a (L) is the volume of the shower chamber, C_w (mg/L) the concentration of the chemical in the feed water, F_a (L/min) the air flow rate through the chamber, and k (L/min) the

volatilization mass-transfer coefficient. When the feed concentration is terminated, the volatilization source term becomes zero and Equation 7 reduces to

$$V_a(dC_a/dt) = -F_aC_a \quad (8)$$

the integrated form being

$$\ln C_a = \ln C_{a,initial} - (F_a/V_a)t \quad (9)$$

As expressed by Equation 7, we find that the volatilization source term $k(C_w - C_a/H)$ does indeed reduce significantly with time as C_a increases. For example, in the experiment with a chloroform feed of 1.84 mg/L shown in Figure 1, at 10, 30, and 50 min, the instantaneous fractional rate of volatilization, f, was 0.82, 0.70, and 0.62, respectively. This is consistent with our experimental observation that the C_a/C_w ratio for air and water leaving the chamber was found to be less than the H value for chloroform, but that the latter value of about 0.15 was gradually approached during the shower experiment [23], thus gradually inhibiting the volatilization rate.

We have also found in our experiments with both chloroform and trichloroethylene (TCE), that during the decay period (following the termination of the chemical in the shower feed) significant quantities of the volatilized chemical in the shower chamber air redissolves in the flowing water, as measured in the drainwater. Thus, Equations 8 and 9 are not quite accurate, since there is this additional decay route.

As shown in Figure 1 for chloroform, as expected the air concentration due to volatilization increases with temperature and concentration of the feed water in the shower experiments. Also as expected, we have found that increased air flow reduces the concentration of volatilized chemical in the chamber air and at the same time increases the rate of volatilization, since the rate of approach to Henry's law equilibrium is reduced. Rates of volatilization for chloroform and TCE ranged from about 50 to 90%, depending on temperature and other shower conditions, with chloroform volatilization typically lower than that for TCE.

Modeling Shower and Whole House Exposures

One can estimate the shower and whole house exposures by the use of simple, one-compartment modeling. For example, integrating Equation 7 and assuming that C_a/H is negligible compared to C_w, one obtains an expression for the change in C_a with time in a chamber

$$\ln (1 - C_a F_a / k C_w) = - (F_a / V_a) t \qquad (10)$$

The assumption that C_a/H is negligible implies that the rate of volatilization in the shower is constant. In that case it can be shown that k equals fF_w, where f is the fraction of chemical that volatilizes from the feedwater whose flow rate is F_w (V/t). Although, as noted above there is a gradual decrease in f values with time during the shower experiments, this will not substantially affect the estimated average values of C_a that will

be used to calculate exposures. Using Equation 10 one can calculate the maximum air concentration that will be achieved in a one-compartment shower or bath. For small values of $(P_w/V_a)t$ (the magnitude of which will be considered below), Equation 10 reduces to a simple linear form

$$C_a = ktC_w/V_a \tag{11}$$

Thus, after a given shower period, t, this is also the maximum concentration, C_{MAX},

$$C_{MAX} = ktC_w/V_a \tag{12}$$

Also, the average concentration, C_{AVG}, would be $C_{MAX}/2$ since C_a increases linearly with time

$$C_{AVG} = ktC_w/2V_a \tag{13}$$

For the purpose of estimating possible shower exposures, it will be assumed that the concentrations during the shower period itself, as well as subsequently while a person remains in the bathroom, will be the same in the shower and bathroom. In fact, our measurements in a full-size shower show that there is indeed a difference between the two, and that the system should be more appropriately treated as a two-compartment system [24]. For precise modeling of the exposures, this difference should be considered, but as an approximation it will be neglected here.

Subsequent to the showering period there will be a decay of the air concentrations in the bathroom due to normal exchange of air. During this period the person in the bathroom will continue to be exposed to the volatilized chemicals in the air. The decay

of C_a is represented by

$$\ln (C_a/C_{MAX}) = - (F_a/V_a)t \quad (14)$$

For small values of $(F_a/V_a)t$ this equation linearizes to

$$C_a = C_{MAX} [1 - (F_a/V_a)t] \quad (15)$$

The average concentration during this period, C_{AVG}, is

$$C_{AVG} = (C_a + C_{MAX})/2 \quad (16)$$

Combining Equations 15 and 16, one obtains

$$C_{AVG} = C_{MAX} [1 - F_a t/(2V_a)] \quad (17)$$

In many cases, the $F_a t/(2V_a)$ term in Equation 17 is likely to be substantially smaller than unity, so that as an approximation during the decay period one can assume that $C_{AVG} = C_{MAX}$, at least for the purposes of estimating the magnitude of inhalation exposures.

One can use these equations to estimate the C_{AVG} values for various shower-water flow and bathroom characteristics. In an Australian survey of water uses, distributions of average shower-water flow rates and duration were reported for about 2,500 households [25]. The geometric mean for the shower flow rates, F_w, was about 8 L/min (about 500 L/h), and about 6 min for the shower duration, which will be specified as t_d, and typically taken as 0.1 h. These values will be utilized here to estimate C_a values using the above equations. In a study of modern houses in one heating season the geometric mean for air exchange rates was reported to be 0.53 h^{-1} [13]. This value will be used for the bathroom, along with a value for its size, V_a, of 10,000 L.

Thus, the F_a for the bathroom will be $0.53V_a$, or about 5,000 L/h. Thus, for a shower period of 0.1 h, or a decay period of 0.2 h, with $(F_a/V_a)t$ values of 0.053 and 0.115, respectively, the approximation of linearizing Equations 10 and 14 involves errors of less than one percent.

The above equations and data can be utilized to estimate the average air concentrations to which people are exposed in bathrooms during and after showering. As discussed earlier, the fractional volatilization rate in our shower experiments has been found to range from 0.5 to 0.9, depending on the specific chemical, water temperature, and other factors. For the purposes of estimating a typical value, we will use an f value of 0.75.

Using Equation 12 and the fact that k equals fF_w yields

$$C_{MAX} = C_w f F_w t_d / V_a \qquad (18)$$

One can use typical values for the variables indicated above to obtain

$$C_{MAX} = C_w(0.75)(500)(0.1)/10^4 = 3.75\times10^{-3}\ C_w \qquad (19)$$

The value for C_{AVG} would be one-half this, or $1.9\times10^{-3}\ C_w$. It is interesting to note that Prichard and Gesell [10] predicted that for a five-minute shower using 75 L of water and with 65% volatilization in a 30,000 L room, the average radon air concentration would be $1.6\times10^{-3}\ C_w$. Similarly, McCone [9] modeled several low molecular-weight organics volatilizing with multiple family use of a bathroom in the early morning hours and calculated typical bathroom air concentrations of $5\times10^{-3}\ C_w$.

Such predicted air concentrations will be highly dependent on a variety of factors, including the nature of the volatilizing chemical, geometry and air exchange between the shower and surrounding room, water temperature, and water flow rate. Nevertheless, these can be assessed to determine the likely range of bathroom air concentrations that can be expected in homes.

It is also of interest to estimate the inhalation exposures in the shower and bathroom, and compare them to the likely ingestion exposures. Inhalation exposure, E_i (mg), can be defined as the product of C_a, the breathing rate, B (L/h), typically 1,000 L/h for an adult, and the exposure time, t.

$$E_i = C_a Bt \qquad (20)$$

As an example, one can use this equation to estimate the exposures during a 0.1 h showering time, using the value of C_{AVG} above of 1.9×10^{-3} C_w. Also as noted above, during a 0.2 h period subsequent to the shower, the decay will not be significant, so that the C_{AVG} during this period can be taken to be C_{max}, namely 3.75×10^{-3} C_w. Thus, one can calculate the E_i for the combined 0.1 h shower and 0.2 h subsequent period in the bathroom as the sum of two terms using Equation 20, to give

$$E_i = [C_{AVG}Bt]_{shower} + [C_{AVG}Bt]_{decay} \qquad (21)$$

Inserting the appropriate values, one obtains

$$E_i = 1.875 \times 10^{-3}\ C_w(1000)(0.1) + 3.75 \times 10^{-3}\ C_w(1000)(0.2) \qquad (22)$$

Thus, E_i has the value $0.94C_w$, where the units of C_w are mass/L.

This is the inhalation exposure in the bathroom during the shower and subsequent to it while the bather remains in the bathroom, and is approximately equivalent to the exposure that would occur from ingesting one liter of the water. However, several occupants of a home may take a shower during a period when the volatile chemical air concentration in a bathroom has not decayed and builds up to levels higher than one would predict for a single bather. In that instance, the exposures could be substantially higher than would be predicted by the above relationship.

Similarly, we have used a simple predictive equation, based on a one-compartment indoor-air model, to describe the range of average indoor-air concentrations that are likely to be encountered from a chemical volatilizing at an average rate of 50% from all water uses, as discussed above to be a typical value for radon. The relationship we have obtained for the expected range of indoor-air concentrations is [7]

$$C_a = (0.1 \text{ to } 5)\times10^{-4}\ C_w \qquad (23)$$

where C_a is the average indoor-air concentration (mg/L), generated by the corresponding average water concentration, C_w (mg/L). Thus, for example, a water concentration of 1 mg/L would be expected to generate between 1×10^{-5} to 5×10^{-4} mg/L average air concentration in the home. This, of course, does not address the time and space variations that will be encountered throughout the day in the home. It is interesting to note that

Nazaroff et al. [13] have similarly made estimates of the likely indoor-air concentrations of radon for U.S. homes by the water volatilization route. The geometric mean in their factor applicable to Equation 23 is 0.65×10^{-4}, within our range of predicted values. Also, their range of one standard deviation around the mean corresponds to the following equation

$$C_a = (0.23 \text{ to } 1.87) \times 10^{-4}\ C_w \qquad (24)$$

also within our predicted range. McKone [9] has similarly estimated household air concentration for several volatilizing chemicals, predicting an average C_a ranging from 2×10^{-5} to 1.2×10^{-4} mg/L in air for a C_w of 1 mg/L in water, also within the range of that predicted by Equation 23.

One can use these air concentration predictions to estimate the likely inhalation exposures, E_i, for an adult during a 24-hour residence period in a house. Combining Equations 20 and 23 one obtains

$$E_i = (0.1 \text{ to } 5)(10^{-4})(1000)(24)\ C_w = (0.2 \text{ to } 10)\ C_w \qquad (25)$$

Since the C_w units here are mass/L, a 1 mg/L water concentration corresponds to a range of inhalation exposures of 0.2 to 10 mg per day, in comparison to 2 mg per day for the ingestion of 2 liters of that water. It should be noted that these inhalation exposure estimates do not include those that would occur at the point of water use, such as during showering. As discussed above, the latter exposures can be comparable to those from direct ingestion.

There is a remarkable consistency in the above range of likely predicted average indoor-air concentrations from the totality of indoor water sources. Nevertheless, there are a number of factors to be considered in refining these estimates and developing a useful and simple predictive relationship that can be applied by those responsible for exposure assessments in specific situations. They can be categorized as follows:

a) chemical characteristics that affect the rate and extent of volatilization, including soap and detergent use

b) water use factors that affect the "source strength" and its time and location variability

c) chemical characteristics that influence the behavior and interactions of the volatilized chemicals with "sinks", typically high surface area materials in the home; also the specific nature, amounts, and locations of these sinks

d) house structure and indoor-air flow regimes that transport the volatilized chemicals throughout the home

e) personal behavior and home occupancy factors that determine an individual's exposure.

The simple indoor-air models mentioned above generally are not sufficiently specific to address all the above factors, although they can and have been evaluated for some indoor-air pollution sources other than those from water [26].

The potential interactions between surfaces in homes and organic vapors released from water into indoor air have not been

studied and need to be evaluated. For some chemicals it may be appropriate to incorporate these interactions into the volatilization, indoor-air exposure model. One study of the interaction of volatile organic chemicals with materials used in the home examined three surfaces [27]: plywood, nylon carpeting, and wool carpeting. The study focused on twenty volatile organic chemicals, including alkanes, aromatics, alcohols, esters, ketones, aldehydes, terpenes, and chlorinated hydrocarbons. They showed clear interactions between the gaseous organic chemicals and the surfaces. For example, in one experiment wool carpeting became essentially saturated with lindane within about one day.

In order to determine the role of such "sink" interactions there are three broad questions that need to be addressed:

1) Which classes of organic/surface systems demonstrate significant sorption effects?

2) What are the appropriate equilibrium and kinetic models for the sorption process for the organic/surface systems of interest?

3) How can this equilibrium and kinetic information be incorporated into a water-volatilization, indoor-air quality model?

Summary and Conclusions

VOC's have the potential for causing substantial human exposures from indoor uses of contaminated water by non-ingestion

routes, namely inhalation following volatilization from water, as well as by skin contact. The latter exposures have been estimated to be comparable to those from direct ingestion of water, although published research in this area is scanty.

Measurements in homes have shown that VOC's can be detected in indoor air following the use of contaminated water. Scaled-down and full-size laboratory bath and shower studies for such VOC's as chloroform and trichloroethylene have shown that a variety of factors can affect the extent of volatilization, found to be typically in the range of 50 to 90%. These include the nature of the volatilizing chemical, water temperature, air and water flow rates, and nature of the water use (e.g., bath versus shower).

The Henry's law equilibrium constants, H, predict that even chemicals with low vapor pressures may be expected to volatilize substantially, provided their water solubilities are also low. Thus, so-called semi-volatile organic chemicals have the potential to volatilize and cause inhalation exposures. Also, chemicals with varying H values may nevertheless volatilize at comparable rates.

Modeling and estimates of inhalation exposures to VOC's indicate that for the bather these exposures during and directly after a shower can be comparable to that from direct ingestion of the contaminated water. Also, when all water uses are considered, the inhalation exposures to all inhabitants of a home

may be substantially larger than that from direct ingestion, even without considering the inhalation exposures at the point of water use. However, additional research is required to more specifically and precisely quantify these exposures to encompass the full range of home characteristics, as well as personal water uses and occupancy factors.

Because the non-ingestion exposures to VOC's in indoor water uses are likely to be comparable to or greater than those from direct ingestion, it would be prudent to consider this in establishing regulatory limits in drinking water, as well as the need to restrict all indoor water uses when it is judged that there is a significant health risk from the direct ingestion of a contaminated water.

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Appendix B: Assumptions and Uncertainties

- Equation (4) does not account for the concentration of the chemical in the air remaining from previous showers taken by other members of the family.

- The use of Equation (4) also assumes that $(F_a/V)t$, where F_a is the air flow rate, is small compared to unity, which implies that the relationship between concentration in air and time is linear.

- Equation (4) also assumes that C_a/H during the course of the shower is small compared to C_w; which implies that the volatilization rate in the shower is constant.

- The use of Equation (6) assumes that $tF_a/2V_a$ is small compared to unity so that the concentration during the decay period after the shower, C_{AVE2}, can be approximated by C_{MAX}.

- The exchange between the air in the shower chamber and that in the bathroom is so rapid that the combined volume of these two compartments can be treated as a single chamber with a single concentration of volatilized chemical.

- Equation (4) does not account for the exchange rate that occurs when an exhaust fan is turned on. Modeling results using the Model for Analysis of Volatiles and Residential Indoor-air Quality (MAVRIQ) indicate that exposure is reduced by 20 % if exhaust fan is used.

- The range of volatilization fraction in Table 1 is based on experiments conducted with trichloroethylene, chloroform and dibromochloropropane. The relationship between these volatilization rates, Henry's Law Constant and molecular weight is not known yet. Summarized below are the experimental results for these three chemicals under approximately the same conditions.

Chemical	T (°C)	H (unitless)	% Volatilized
Trichloroethylene	46	1.14	81.8
Chloroform	42	0.35	56
Dibromochlorpropane	42	0.03	22.8

- Equation (8) treats the whole house as one compartment model.

P

DAILY INTAKE SUMMARY TABLES - REASONABLE MAXIMUM EXPOSURES

Table P-1

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d) Inhalation	CARCINOGENS (mg/kg-d) Inhalation
VOLATILES		
Chloromethane	7.7E-10	3.3E-10
Vinyl chloride	2.0E-08	8.8E-09
Chloroethane	1.0E-09	4.3E-10
Methylene chloride	4.5E-08	1.9E-08
Acetone	5.1E-09	2.2E-09
1,1-Dichloroethene	5.4E-10	2.3E-10
1,1-Dichloroethane	8.0E-09	3.4E-09
1,2-Dichloroethene (cis)	1.4E-07	5.8E-08
1,2-Dichloroethene (trans)	5.9E-09	2.5E-09
2-Butanone	2.1E-08	8.8E-09
1,2-Dichloropropane	2.9E-09	1.2E-09
Trichloroethene	1.1E-07	4.9E-08
Benzene	5.3E-09	2.3E-09
4-Methyl-2-pentanone	1.2E-08	5.0E-09
2-Hexanone	1.8E-09	7.5E-10
Tetrachloroethene	8.8E-08	3.8E-08
Toluene	2.1E-07	9.0E-08
Chlorobenzene	4.8E-10	2.1E-10
Ethylbenzene	2.1E-08	9.1E-09
Xylenes (mixed)	4.8E-08	2.0E-08
Dichlorodifluoromethane	4.5E-08	1.9E-08
Dichlorotetrafluoroethane	3.7E-09	1.6E-09
Trichlorofluoromethane	5.3E-10	2.3E-10
Trichlorotrifluoroethane	8.8E-10	3.8E-10
4-ethyl toluene	1.6E-08	7.0E-09
1,3,5-Trimethylbenzene	6.4E-09	2.7E-09
1,2,4-Trimethylbenzene	1.6E-08	6.8E-09
SEMIVOLATILES		
1,4-Dichlorobenzene	8.3E-09	3.5E-09

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period, whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs carcinogenic effects is due to the different methods of time weighting used to estimate the value

Table P-2

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Off Landfill
Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)	CARCINOGENS (mg/kg-d)
	Inhalation	Inhalation
VOLATILES		
Chloromethane	6.4E-10	2.8E-10
Vinyl chloride	1.7E-08	7.3E-09
Chloroethane	8.4E-10	3.6E-10
Methylene chloride	3.8E-08	1.6E-08
Acetone	4.2E-09	1.8E-09
1,1-Dichloroethene	4.5E-10	1.9E-10
1,1-Dichloroethane	6.7E-09	2.9E-09
1,2-Dichloroethene (cis)	1.1E-07	4.9E-08
1,2-Dichloroethene (trans)	4.9E-09	2.1E-09
2-Butanone	1.7E-08	7.4E-09
1,2-Dichloropropane	2.4E-09	1.0E-09
Trichloroethene	9.5E-08	4.1E-08
Benzene	4.4E-09	1.9E-09
4-Methyl-2-pentanone	9.8E-09	4.2E-09
2-Hexanone	1.5E-09	6.3E-10
Tetrachloroethene	7.3E-08	3.1E-08
Toluene	1.8E-07	7.5E-08
Chlorobenzene	4.1E-10	1.7E-10
Ethylbenzene	1.8E-08	7.6E-09
Xylenes (mixed)	4.0E-08	1.7E-08
Dichlorodifluoromethane	3.8E-08	1.6E-08
Dichlorotetrafluoroethane	3.1E-09	1.3E-09
Trichlorofluoromethane	4.5E-10	1.9E-10
Trichlorotrifluoroethane	7.4E-10	3.2E-10
4-ethyl toluene	1.4E-08	5.8E-09
1,3,5-Trimethylbenzene	5.4E-09	2.3E-09
1,2,4-Trimethylbenzene	1.3E-08	5.7E-09
SEMIVOLATILES		
1,4-Dichlorobenzene	6.9E-09	3.0E-09

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-3a

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg d)			CARCINOGENS (mg/kg d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Acenaphthene	NA	1.0E-09	NA	NA	4.5E-10	NA
Fluorene	NA	1.9E-09	NA	NA	8.0E-10	NA
Phenanthrene	NA	6.0E-09	NA	NA	2.6E-09	NA
Anthracene	NA	2.3E-09	NA	NA	9.7E-10	NA
Fluoranthene	NA	2.9E-08	NA	NA	1.3E-08	NA
Pyrene	NA	2.1E-08	NA	NA	9.2E-09	NA
Butylbenzylphthalate	NA	1.0E-09	NA	NA	4.4E-10	NA
Benzo(g,h,i)perylene	NA	5.9E-08	NA	NA	2.5E-08	NA
Total Carcinogenic PAHs	NA	1.6E-07	NA	NA	6.8E-08	NA
METALS						
Barium	NA	1.3E-06	NA	NA	5.7E-07	NA
Lead	NA	3.2E-07	NA	NA	1.4E-07	NA
Zinc	NA	1.3E-06	NA	NA	5.6E-07	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	5.6E-09	NA	NA	2.4E-09	NA
Sulfides	NA	5.6E-09	NA	NA	2.4E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period, whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-3b

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment
Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Acenaphthene	NA	1.0E-09	NA	NA	4.5E-10	NA
Fluorene	NA	1.9E-09	NA	NA	8.0E-10	NA
Phenanthrene	NA	6.0E-09	NA	NA	2.6E-09	NA
Anthracene	NA	2.3E-09	NA	NA	9.7E-10	NA
Fluoranthene	NA	2.9E-08	NA	NA	1.3E-08	NA
Pyrene	NA	2.1E-08	NA	NA	9.2E-09	NA
Butylbenzylphthalate	NA	1.0E-09	NA	NA	4.4E-10	NA
Benzo(a)anthracene	NA	9.8E-09	NA	NA	4.2E-09	NA
Chrysene	NA	1.3E-08	NA	NA	5.6E-09	NA
Benzo(b)fluoranthene	NA	2.7E-08	NA	NA	1.1E-08	NA
Benzo(k)fluoranthene	NA	2.7E-08	NA	NA	1.1E-08	NA
Benzo(a)pyrene	NA	1.1E-08	NA	NA	4.5E-09	NA
Ideno(1,2,3-cd)pyrene	NA	7.4E-09	NA	NA	3.2E-09	NA
Dibenz(a,h)anthracene	NA	6.7E-09	NA	NA	2.9E-09	NA
Benzo(g,h,i)perylene	NA	5.9E-08	NA	NA	2.5E-08	NA
METALS						
Barium	NA	1.3E-06	NA	NA	5.7E-07	NA
Lead	NA	3.2E-07	NA	NA	1.4E-07	NA
Zinc	NA	1.3E-06	NA	NA	5.6E-07	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	5.6E-09	NA	NA	2.4E-09	NA
Sulfides	NA	5.6E-09	NA	NA	2.4E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-4

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Sediment
Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Arsenic	NA	1.3E-07	NA	NA	5.4E-08	NA
Barium	NA	9.6E-07	NA	NA	4.1E-07	NA

Notes:
1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-5

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Sand Pond
Medium: Sediment
Population: Trespasser
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
VOLATILES						
Vinyl chloride	NA	6.7E-11	NA	NA	2.9E-11	NA
Carbon disulfide	NA	6.7E-11	NA	NA	2.9E-11	NA
1,1-Dichloroethane	NA	4.0E-11	NA	NA	1.7E-11	NA
METALS						
Barium	NA	1.5E-06	NA	NA	6.2E-07	NA
Copper	NA	4.8E-07	NA	NA	2.0E-07	NA
Zinc	NA	1.4E-06	NA	NA	5.8E-07	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-6a

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil
Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Phenanthrene	NA	2.5E-09	NA	NA	1.1E-09	NA
Fluoranthene	NA	4.1E-09	NA	NA	1.7E-09	NA
Pyrene	NA	3.6E-09	NA	NA	1.6E-09	NA
Benzo(g,h,i)perylene	NA	2.9E-09	NA	NA	1.2E-09	NA
Total Carcinogenic PAHs	NA	2.7E-08	NA	NA	1.2E-08	NA
METALS						
Silver	NA	2.6E-08	NA	NA	1.1E-08	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	1.6E-09	NA	NA	6.8E-10	NA
PAHs, non-TCL	NA	3.3E-09	NA	NA	1.4E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-6b

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg d)			CARCINOGENS (mg/kg d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Phenanthrene	NA	2.5E-09	NA	NA	1.1E-09	NA
Fluoranthene	NA	4.1E-09	NA	NA	1.7E-09	NA
Pyrene	NA	3.6E-09	NA	NA	1.6E-09	NA
Benzo(a)anthracene	NA	2.5E-09	NA	NA	1.1E-09	NA
Chrysene	NA	2.9E-09	NA	NA	1.2E-09	NA
Benzo(b)fluoranthene	NA	6.7E-09	NA	NA	2.9E-09	NA
Benzo(k)fluoranthene	NA	6.7E-09	NA	NA	2.9E-09	NA
Benzo(a)pyrene	NA	2.8E-09	NA	NA	1.2E-09	NA
Ideno(1,2,3-cd)pyrene	NA	2.6E-09	NA	NA	1.1E-09	NA
Benzo(g,h,i)perylene	NA	2.9E-09	NA	NA	1.2E-09	NA
METALS						
Silver	NA	2.6E-08	NA	NA	1.1E-08	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	1.6E-09	NA	NA	6.8E-10	NA
PAHs, non-TCL	NA	3.3E-09	NA	NA	1.4E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period, whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-7

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Surface Water

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Aluminum	2.6E-05	5.6E-05	NA	1.1E-05	2.4E-05	NA
Barium	1.3E-06	2.9E-06	NA	5.6E-07	1.2E-06	NA
Lead	9.3E-10	5.0E-07	NA	4.0E-10	2.2E-07	NA
Manganese	3.1E-06	6.8E-06	NA	1.3E-06	2.9E-06	NA
TIC Groups						
Ethers, cyclic	3.5E-07	3.8E-07	NA	1.5E-07	1.6E-07	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-8

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Surface Water

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Manganese	1.0E-06	2.2E-06	NA	4.3E-07	9.4E-07	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-9

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Sand Pond
Medium: Surface Water

Population: Trespasser
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Barium	1.7E-06	3.6E-06	NA	7.1E-07	1.5E-06	NA
Manganese	2.9E-06	6.3E-06	NA	1.2E-06	2.7E-06	NA
Sodium	3.3E-03	3.5E-03	NA	1.4E-03	1.5E-03	NA
TIC Groups						
Acids, non-cyclic	1.5E-07	3.8E-07	NA	6.4E-08	1.6E-07	NA

Notes:
1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value

Table P-10a

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Fish

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)	CARCINOGENS (mg/kg-d)
	Ingestion	Ingestion
SEMIVOLATILES		
Acenaphthene	2.8E-08	1.2E-08
Fluorene	5.0E-08	2.2E-08
Phenanthrene	1.6E-07	6.9E-08
Anthracene	6.1E-08	2.6E-08
Fluoranthene	7.9E-07	3.4E-07
Pyrene	5.7E-07	2.5E-07
Benzo(g,h,i)perylene	1.0E-08	4.4E-09
Total Carcinogenic PAHs	2.8E-08	1.2E-08

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-10b

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Fish

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)	CARCINOGENS (mg/kg-d)
	Ingestion	Ingestion
SEMIVOLATILES		
Acenaphthene	2.8E-08	1.2E-08
Fluorene	5.0E-08	2.2E-08
Phenanthrene	1.6E-07	6.9E-08
Anthracene	6.1E-08	2.6E-08
Fluoranthene	7.9E-07	3.4E-07
Pyrene	5.7E-07	2.5E-07
Benzo(a)anthracene	1.7E-09	7.3E-10
Chrysene	2.3E-09	9.9E-10
Benzo(b)fluoranthene	4.7E-09	2.0E-09
Benzo(k)fluoranthene	4.7E-09	2.0E-09
Benzo(a)pyrene	1.9E-09	7.9E-10
Ideno(1,2,3-cd)pyrene	1.3E-09	5.5E-10
Dibenz(a,h)anthracene	1.2E-09	5.0E-10
Benzo(g,h,i)perylene	1.0E-08	4.4E-09

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-11a

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Fish

Population: Subsistence Fishermen
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)	CARCINOGENS (mg/kg-d)
	Ingestion	Ingestion
SEMIVOLATILES		
Acenaphthene	1.5E-06	6.4E-07
Fluorene	2.7E-06	1.1E-06
Phenanthrene	8.6E-06	3.7E-06
Anthracene	3.2E-06	1.4E-06
Fluoranthene	4.2E-05	1.8E-05
Pyrene	3.0E-05	1.3E-05
Benzo(g,h,i)perylene	5.5E-07	2.3E-07
Total Carcinogenic PAHs	1.5E-06	6.4E-07

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-11b

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Fish

Population: Subsistence Fishermen
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)	CARCINOGENS (mg/kg-d)
	Ingestion	Ingestion
SEMIVOLATILES		
Acenaphthene	1.5E-06	6.4E-07
Fluorene	2.7E-06	1.1E-06
Phenanthrene	8.6E-06	3.7E-06
Anthracene	3.2E-06	1.4E-06
Fluoranthene	4.2E-05	1.8E-05
Pyrene	3.0E-05	1.3E-05
Benzo(a)anthracene	9.1E-08	3.9E-08
Chrysene	1.2E-07	5.2E-08
Benzo(b)fluoranthene	2.5E-07	1.1E-07
Benzo(k)fluoranthene	2.5E-07	1.1E-07
Benzo(a)pyrene	9.8E-08	4.2E-08
Ideno(1,2,3-cd)pyrene	6.8E-08	2.9E-08
Dibenz(a,h)anthracene	6.2E-08	2.7E-08
Benzo(g,h,i)perylene	5.5E-07	2.3E-07

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-12

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air On Landfill

Population: On Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d) Inhalation	CARCINOGENS (mg/kg-d) Inhalation
VOLATILES		
Chloromethane	2.4E-09	8.6E-10
Vinyl chloride	6.4E-08	2.3E-08
Chloroethane	3.1E-09	1.1E-09
Methylene chloride	1.4E-07	5.0E-08
Acetone	1.6E-08	5.6E-09
1,1-Dichloroethene	1.7E-09	6.0E-10
1,1-Dichloroethane	2.5E-08	8.9E-09
1,2-Dichloroethene (cis)	4.2E-07	1.5E-07
1,2-Dichloroethene (trans)	1.8E-08	6.6E-09
2-Butanone	6.4E-08	2.3E-08
1,2-Dichloropropane	9.0E-09	3.2E-09
Trichloroethene	3.6E-07	1.3E-07
Benzene	1.6E-08	5.9E-09
4-Methyl-2-pentanone	3.7E-08	1.3E-08
2-Hexanone	5.5E-09	2.0E-09
Tetrachloroethene	2.7E-07	9.8E-08
Toluene	6.6E-07	2.3E-07
Chlorobenzene	1.5E-09	5.4E-10
Ethylbenzene	6.6E-08	2.4E-08
Xylenes (mixed)	1.5E-07	5.3E-08
Dichlorodifluoromethane	1.4E-07	5.0E-08
Dichlorotetrafluoroethane	1.2E-08	4.1E-09
Trichlorofluoromethane	1.7E-09	5.9E-10
Trichlorotrifluoroethane	2.8E-09	9.8E-10
4-ethyl toluene	5.1E-08	1.8E-08
1,3,5-Trimethylbenzene	2.0E-08	7.1E-09
1,2,4-Trimethylbenzene	4.9E-08	1.8E-08
SEMIVOLATILES		
1,4-Dichlorobenzene	2.6E-08	9.2E-09

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-13

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Off Landfill
Population: On Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d) Inhalation	CARCINOGENS (mg/kg-d) Inhalation
VOLATILES		
Chloromethane	4.6E-09	1.7E-09
Vinyl chloride	1.2E-07	4.4E-08
Chloroethane	6.0E-09	2.2E-09
Methylene chloride	2.7E-07	9.6E-08
Acetone	3.0E-08	1.1E-08
1,1-Dichloroethene	3.2E-09	1.2E-09
1,1-Dichloroethane	4.8E-08	1.7E-08
1,2-Dichloroethene (cis)	8.1E-07	2.9E-07
1,2-Dichloroethene (trans)	3.5E-08	1.3E-08
2-Butanone	1.2E-07	4.4E-08
1,2-Dichloropropane	1.7E-08	6.1E-09
Trichloroethene	6.8E-07	2.4E-07
Benzene	3.2E-08	1.1E-08
4-Methyl-2-pentanone	7.0E-08	2.5E-08
2-Hexanone	1.1E-08	3.8E-09
Tetrachloroethene	5.3E-07	1.9E-07
Toluene	1.3E-06	4.5E-07
Chlorobenzene	2.9E-09	1.0E-09
Ethylbenzene	1.3E-07	4.5E-08
Xylenes (mixed)	2.9E-07	1.0E-07
Dichlorodifluoromethane	2.7E-07	9.7E-08
Dichlorotetrafluoroethane	2.2E-08	7.9E-09
Trichlorofluoromethane	3.2E-09	1.1E-09
Trichlorotrifluoroethane	5.3E-09	1.9E-09
4-ethyl toluene	9.8E-08	3.5E-08
1,3,5-Trimethylbenzene	3.8E-08	1.4E-08
1,2,4-Trimethylbenzene	9.5E-08	3.4E-08
SEMIVOLATILES		
1,4-Dichlorobenzene	5.0E-08	1.8E-08

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-14a

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Acenaphthene	NA	1.1E-09	NA	NA	3.9E-10	NA
Fluorene	NA	2.0E-09	NA	NA	7.0E-10	NA
Phenanthrene	NA	6.3E-09	NA	NA	2.3E-09	NA
Anthracene	NA	2.4E-09	NA	NA	8.6E-10	NA
Fluoranthene	NA	3.1E-08	NA	NA	1.1E-08	NA
Pyrene	NA	2.3E-08	NA	NA	8.1E-09	NA
Butylbenzylphthalate	NA	1.1E-09	NA	NA	3.9E-10	NA
Benzo(g,h,i)perylene	NA	6.2E-08	NA	NA	2.2E-08	NA
Total Carcinogenic PAHs	NA	1.7E-07	NA	NA	6.0E-08	NA
METALS						
Barium	NA	1.4E-06	NA	NA	5.0E-07	NA
Lead	NA	3.4E-07	NA	NA	1.2E-07	NA
Zinc	NA	1.4E-06	NA	NA	5.0E-07	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	5.9E-09	NA	NA	2.1E-09	NA
Sulfides	NA	5.9E-09	NA	NA	2.1E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-14b

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment
Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Acenaphthene	NA	1.1E-09	NA	NA	3.9E-10	NA
Fluorene	NA	2.0E-09	NA	NA	7.0E-10	NA
Phenanthrene	NA	6.3E-09	NA	NA	2.3E-09	NA
Anthracene	NA	2.4E-09	NA	NA	8.6E-10	NA
Fluoranthene	NA	3.1E-08	NA	NA	1.1E-08	NA
Pyrene	NA	2.3E-08	NA	NA	8.1E-09	NA
Butylbenzylphthalate	NA	1.1E-09	NA	NA	3.9E-10	NA
Benzo(a)anthracene	NA	1.0E-08	NA	NA	3.7E-09	NA
Chrysene	NA	1.4E-08	NA	NA	4.9E-09	NA
Benzo(b)fluoranthene	NA	2.8E-08	NA	NA	1.0E-08	NA
Benzo(k)fluoranthene	NA	2.8E-08	NA	NA	1.0E-08	NA
Benzo(a)pyrene	NA	1.1E-08	NA	NA	4.0E-09	NA
Ideno(1,2,3-cd)pyrene	NA	7.7E-09	NA	NA	2.8E-09	NA
Dibenz(a,h)anthracene	NA	7.0E-09	NA	NA	2.5E-09	NA
Benzo(g,h,i)perylene	NA	6.2E-08	NA	NA	2.2E-08	NA
METALS						
Barium	NA	1.4E-06	NA	NA	5.0E-07	NA
Lead	NA	3.4E-07	NA	NA	1.2E-07	NA
Zinc	NA	1.4E-06	NA	NA	5.0E-07	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	5.9E-09	NA	NA	2.1E-09	NA
Sulfides	NA	5.9E-09	NA	NA	2.1E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-15

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Sediment
Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Arsenic	NA	1.3E-07	NA	NA	4.7E-08	NA
Barium	NA	1.0E-06	NA	NA	3.6E-07	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-16a

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil
Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Phenanthrene	NA	1.7E-09	NA	NA	6.0E-10	NA
Fluoranthene	NA	2.8E-09	NA	NA	9.9E-10	NA
Pyrene	NA	2.5E-09	NA	NA	8.8E-10	NA
Benzo(g,h,i)perylene	NA	2.0E-09	NA	NA	7.0E-10	NA
Total Carcinogenic PAHs	NA	1.8E-08	NA	NA	6.6E-09	NA
METALS						
Silver	NA	1.8E-08	NA	NA	6.3E-09	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	1.1E-09	NA	NA	3.9E-10	NA
PAHs, non-TCL	NA	2.3E-09	NA	NA	8.1E-10	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-16b

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil
Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Phenanthrene	NA	1.7E-09	NA	NA	6.0E-10	NA
Fluoranthene	NA	2.8E-09	NA	NA	9.9E-10	NA
Pyrene	NA	2.5E-09	NA	NA	8.8E-10	NA
Benzo(a)anthracene	NA	1.7E-09	NA	NA	6.0E-10	NA
Chrysene	NA	2.0E-09	NA	NA	7.0E-10	NA
Benzo(b)fluoranthene	NA	4.5E-09	NA	NA	1.6E-09	NA
Benzo(k)fluoranthene	NA	4.5E-09	NA	NA	1.6E-09	NA
Benzo(a)pyrene	NA	1.9E-09	NA	NA	6.7E-10	NA
Ideno(1,2,3-cd)pyrene	NA	1.8E-09	NA	NA	6.3E-10	NA
Benzo(g,h,i)perylene	NA	2.0E-09	NA	NA	7.0E-10	NA
METALS						
Silver	NA	1.8E-08	NA	NA	6.3E-09	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	1.1E-09	NA	NA	3.9E-10	NA
PAHs, non-TCL	NA	2.3E-09	NA	NA	8.1E-10	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-17

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Surface Water

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Aluminum	3.0E-05	6.6E-05	NA	1.1E-05	2.3E-05	NA
Barium	1.5E-06	3.3E-06	NA	5.5E-07	1.2E-06	NA
Lead	1.1E-09	5.9E-07	NA	3.9E-10	2.1E-07	NA
Manganese	3.7E-06	8.0E-06	NA	1.3E-06	2.9E-06	NA
TIC Groups						
Ethers, cyclic	4.1E-07	4.5E-07	NA	1.5E-07	1.6E-07	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-18

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Surface Water
Population: On Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Manganese	1.2E-06	2.6E-06	NA	4.2E-07	9.2E-07	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-19

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Off-site

Population: Off-Site Resident
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)	CARCINOGENS (mg/kg-d)
	Inhalation	Inhalation
VOLATILES		
Chloromethane	4.9E-09	2.1E-09
Vinyl chloride	1.3E-07	5.6E-08
Chloroethane	6.4E-09	2.8E-09
Methylene chloride	2.9E-07	1.2E-07
Acetone	3.2E-08	1.4E-08
1,1-Dichloroethene	3.5E-09	1.5E-09
1,1-Dichloroethane	5.1E-08	2.2E-08
1,2-Dichloroethene (cis)	8.7E-07	3.7E-07
1,2-Dichloroethene (trans)	3.8E-08	1.6E-08
2-Butanone	1.3E-07	5.7E-08
1,2-Dichloropropane	1.8E-08	7.9E-09
Trichloroethene	7.3E-07	3.1E-07
Benzene	3.4E-08	1.4E-08
4-Methyl-2-pentanone	7.5E-08	3.2E-08
2-Hexanone	1.1E-08	4.8E-09
Tetrachloroethene	5.6E-07	2.4E-07
Toluene	1.3E-06	5.8E-07
Chlorobenzene	3.1E-09	1.3E-09
Ethylbenzene	1.4E-07	5.8E-08
Xylenes (mixed)	3.0E-07	1.3E-07
Dichlorodifluoromethane	2.9E-07	1.2E-07
Dichlorotetrafluoroethane	2.4E-08	1.0E-08
Trichlorofluoromethane	3.4E-09	1.5E-09
Trichlorotrifluoroethane	5.7E-09	2.4E-09
4-ethyl toluene	1.0E-07	4.5E-08
1,3,5-Trimethylbenzene	4.1E-08	1.8E-08
1,2,4-Trimethylbenzene	1.0E-07	4.4E-08
SEMIVOLATILES		
1,4-Dichlorobenzene	5.3E-08	2.3E-08

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-20

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Private Wells
Medium: Groundwater
Population: Off-Site Resident
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
VOLATILES						
1,1-Dichloroethane	7.9E-08	3.3E-05	5.9E-05	3.4E-08	1.4E-05	2.5E-05
1,2-Dichloroethene (cis)	1.9E-07	6.5E-05	1.2E-04	7.9E-08	2.8E-05	5.1E-05
PESTICIDE/PCB						
Dieldrin	1.8E-08	3.3E-07	0.0E+00	7.6E-09	1.4E-07	0.0E+00
4,4'-DDE	3.0E-07	3.3E-07	0.0E+00	1.3E-07	1.4E-07	0.0E+00
Endrin	2.5E-08	4.6E-07	0.0E+00	1.1E-08	2.0E-07	0.0E+00
4,4'-DDD	2.1E-07	2.0E-07	0.0E+00	8.9E-08	8.4E-08	0.0E+00
Endrin Aldehyde	4.5E-09	9.8E-08	0.0E+00	1.9E-09	4.2E-08	0.0E+00
METALS						
Antimony	7.7E-07	2.7E-04	0.0E+00	3.3E-07	1.1E-04	0.0E+00
Nickel	2.0E-07	7.0E-04	0.0E+00	8.6E-08	3.0E-04	0.0E+00
Silver	6.7E-08	3.9E-05	0.0E+00	2.9E-08	1.7E-05	0.0E+00
Sodium	6.7E-02	1.2E+01	0.0E+00	2.9E-02	5.0E+00	0.0E+00
TIC Groups						
Hydrocarbons, branched	1.5E-05	6.5E-05	0.0E+00	6.4E-06	2.8E-05	0.0E+00
Hydrocarbons, cyclic	3.1E-05	1.6E-04	0.0E+00	1.3E-05	7.0E-05	0.0E+00

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-21a

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill (Dust)

Population: Construction Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)	CARCINOGENS (mg/kg-d)
	Inhalation	Inhalation
SEMIVOLATILES		
Phenanthrene	1.3E-09	5.6E-10
Fluoranthene	2.1E-09	9.2E-10
Pyrene	1.9E-09	8.1E-10
Benzo(g,h,i)perylene	1.6E-09	6.7E-10
Total Carcinogenic PAHs	1.4E-08	6.2E-09
METALS		
Silver	1.4E-08	6.1E-09
TIC Groups		
Benzenes, oxygenated	8.5E-10	3.6E-10
PAHs, non-TCL	1.8E-09	7.6E-10

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-21b

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill (Dust)

Population: Construction Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)	CARCINOGENS (mg/kg-d)
	Inhalation	Inhalation
SEMIVOLATILES		
Phenanthrene	1.3E-09	5.6E-10
Fluoranthene	2.1E-09	9.2E-10
Pyrene	1.9E-09	8.1E-10
Benzo(a)anthracene	1.3E-09	5.6E-10
Chrysene	1.6E-09	6.7E-10
Benzo(b)fluoranthene	3.6E-09	1.5E-09
Benzo(k)fluoranthene	3.6E-09	1.5E-09
Benzo(a)pyrene	1.5E-09	6.2E-10
Indeno(1,2,3-cd)pyrene	1.4E-09	6.0E-10
Dibenz(a,h)anthracene	0.0E+00	0.0E+00
Benzo(g,h,i)perylene	1.6E-09	6.7E-10
METALS		
Silver	1.4E-08	6.1E-09
TIC Groups		
Benzenes, oxygenated	8.5E-10	3.6E-10
PAHs, non-TCL	1.8E-09	7.6E-10

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-22a

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: Construction Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Phenanthrene	NA	5.7E-07	NA	NA	8.2E-09	NA
Fluoranthene	NA	9.4E-07	NA	NA	1.3E-08	NA
Pyrene	NA	8.4E-07	NA	NA	1.2E-08	NA
Benzo(g,h,i)perylene	NA	6.7E-07	NA	NA	9.6E-09	NA
Total Carcinogenic PAHs	NA	6.3E-06	NA	NA	8.9E-08	NA
METALS						
Silver	NA	6.1E-06	NA	NA	8.6E-08	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	3.7E-07	NA	NA	5.3E-09	NA
PAHs, non-TCL	NA	7.7E-07	NA	NA	1.1E-08	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-22b

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: Construction Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Phenanthrene	NA	5.7E-07	NA	NA	8.2E-09	NA
Fluoranthene	NA	9.4E-07	NA	NA	1.3E-08	NA
Pyrene	NA	8.4E-07	NA	NA	1.2E-08	NA
Benzo(a)anthracene	NA	5.7E-07	NA	NA	8.2E-09	NA
Chrysene	NA	6.7E-07	NA	NA	9.6E-09	NA
Benzo(b)fluoranthene	NA	1.5E-06	NA	NA	2.2E-08	NA
Benzo(k)fluoranthene	NA	1.5E-06	NA	NA	2.2E-08	NA
Benzo(a)pyrene	NA	6.4E-07	NA	NA	9.1E-09	NA
Ideno(1,2,3-cd)pyrene	NA	6.1E-07	NA	NA	8.6E-09	NA
Benzo(g,h,i)perylene	NA	6.7E-07	NA	NA	9.6E-09	NA
Total Carcinogenic PAHs	NA	0.0E+00	NA	NA	0.0E+00	NA
METALS						
Silver	NA	6.1E-06	NA	NA	8.6E-08	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	3.7E-07	NA	NA	5.3E-09	NA
PAHs, non-TCL	NA	7.7E-07	NA	NA	1.1E-08	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table P-23

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill (VOCs)
Population: Construction Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d) Inhalation	CARCINOGENS (mg/kg-d) Inhalation
VOLATILES		
Chloromethane	2.9E-08	4.1E-10
Vinyl chloride	7.6E-07	1.1E-08
Chloroethane	3.7E-08	5.3E-10
Methylene chloride	1.7E-06	2.4E-08
Acetone	1.9E-07	2.7E-09
1,1-Dichloroethene	2.0E-08	2.9E-10
1,1-Dichloroethane	3.0E-07	4.3E-09
1,2-Dichloroethene (cis)	5.0E-06	7.2E-08
1,2-Dichloroethene (trans)	2.2E-07	3.1E-09
2-Butanone	7.7E-07	1.1E-08
1,2-Dichloropropane	1.1E-07	1.5E-09
Trichloroethene	4.2E-06	6.1E-08
Benzene	2.0E-07	2.8E-09
4-Methyl-2-pentanone	4.4E-07	6.2E-09
2-Hexanone	6.5E-08	9.4E-10
Tetrachloroethene	3.3E-06	4.7E-08
Toluene	7.8E-06	1.1E-07
Chlorobenzene	1.8E-08	2.6E-10
Ethylbenzene	7.9E-07	1.1E-08
Xylenes (mixed)	1.8E-06	2.5E-08
Dichlorodifluoromethane	1.7E-06	2.4E-08
Dichlorotetrafluoroethane	1.4E-07	2.0E-09
Trichlorofluoromethane	2.0E-08	2.8E-10
Trichlorotrifluoroethane	3.3E-08	4.7E-10
4-ethyl toluene	6.1E-07	8.7E-09
1,3,5-Trimethylbenzene	2.4E-07	3.4E-09
1,2,4-Trimethylbenzene	5.9E-07	8.4E-09
SEMIVOLATILES		
1,4-Dichlorobenzene	3.1E-07	4.4E-09

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period, whereas for carcinogenic effects, the CDI is averaged over the lifetime (i e , 70 years) Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Q

DAILY INTAKE SUMMARY TABLES - CENTRAL TENDENCY

Table Q-1

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill (VOCs)

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d) Inhalation	CARCINOGENS (mg/kg-d) Inhalation
VOLATILES		
Chloromethane	2.1E-11	2.6E-12
Vinyl chloride	5.5E-10	7.0E-11
Chloroethane	2.7E-11	3.4E-12
Methylene chloride	1.2E-09	1.5E-10
Acetone	1.3E-10	1.7E-11
1,1-Dichloroethene	1.4E-11	1.9E-12
1,1-Dichloroethane	2.1E-10	2.7E-11
1,2-Dichloroethene (cis)	3.6E-09	4.6E-10
1,2-Dichloroethene (trans)	1.6E-10	2.0E-11
2-Butanone	5.5E-10	7.1E-11
1,2-Dichloropropane	7.6E-11	9.8E-12
Trichloroethene	3.0E-09	3.9E-10
Benzene	1.4E-10	1.8E-11
4-Methyl-2-pentanone	3.1E-10	4.0E-11
2-Hexanone	4.7E-11	6.0E-12
Tetrachloroethene	2.3E-09	3.0E-10
Toluene	5.6E-09	7.2E-10
Chlorobenzene	1.3E-11	1.7E-12
Ethylbenzene	5.6E-10	7.3E-11
Xylenes (mixed)	1.3E-09	1.6E-10
Dichlorodifluoromethane	1.2E-09	1.5E-10
Dichlorotetrafluoroethane	9.9E-11	1.3E-11
Trichlorofluoromethane	1.4E-11	1.8E-12
Trichlorotrifluoroethane	2.4E-11	3.0E-12
4-ethyl toluene	4.3E-10	5.6E-11
1,3,5-Trimethylbenzene	1.7E-10	2.2E-11
1,2,4-Trimethylbenzene	4.2E-10	5.4E-11
SEMIVOLATILES		
1,4-Dichlorobenzene	2.2E-10	2.8E-11

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-2

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Off Landfill (VOCs)

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d) Inhalation	CARCINOGENS (mg/kg-d) Inhalation
VOLATILES		
Chloromethane	7.2E-11	9.3E-12
Vinyl chloride	1.9E-09	2.5E-10
Chloroethane	9.4E-11	1.2E-11
Methylene chloride	4.2E-09	5.4E-10
Acetone	4.7E-10	6.1E-11
1,1-Dichloroethene	5.1E-11	6.5E-12
1,1-Dichloroethane	7.5E-10	9.6E-11
1,2-Dichloroethene (cis)	1.3E-08	1.6E-09
1,2-Dichloroethane (trans)	5.5E-10	7.1E-11
2-Butanone	1.9E-09	2.5E-10
1,2-Dichloropropane	2.7E-10	3.5E-11
Trichloroethene	1.1E-08	1.4E-09
Benzene	4.9E-10	6.3E-11
4-Methyl-2-pentanone	1.1E-09	1.4E-10
2-Hexanone	1.6E-10	2.1E-11
Tetrachloroethene	8.2E-09	1.1E-09
Toluene	2.0E-08	2.5E-09
Chlorobenzene	4.5E-11	5.8E-12
Ethylbenzene	2.0E-09	2.5E-10
Xylenes (mixed)	4.5E-09	5.7E-10
Dichlorodifluoromethane	4.2E-09	5.4E-10
Dichlorotetrafluoroethane	3.5E-10	4.5E-11
Trichlorofluoromethane	5.0E-11	6.4E-12
Trichlorotrifluoroethane	8.3E-11	1.1E-11
4-ethyl toluene	1.5E-09	2.0E-10
1,3,5-Trimethylbenzene	6.0E-10	7.7E-11
1,2,4-Trimethylbenzene	1.5E-09	1.9E-10
SEMIVOLATILES		
1,4-Dichlorobenzene	7.7E-10	9.9E-11

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-3

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment
Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Acenaphthene	NA	1.7E-11	NA	NA	2.2E-12	NA
Fluorene	NA	3.0E-11	NA	NA	3.9E-12	NA
Phenanthrene	NA	9.8E-11	NA	NA	1.3E-11	NA
Anthracene	NA	3.7E-11	NA	NA	4.8E-12	NA
Fluoranthene	NA	4.8E-10	NA	NA	6.1E-11	NA
Pyrene	NA	3.5E-10	NA	NA	4.5E-11	NA
Butylbenzylphthalate	NA	1.7E-11	NA	NA	2.2E-12	NA
Benzo(g,h,i)perylene	NA	9.6E-10	NA	NA	1.2E-10	NA
Total Carcinogenic PAHs	NA	2.6E-09	NA	NA	3.3E-10	NA
METALS						
Barium	NA	2.2E-08	NA	NA	2.8E-09	NA
Lead	NA	5.2E-09	NA	NA	6.7E-10	NA
Zinc	NA	2.1E-08	NA	NA	2.7E-09	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	9.1E-11	NA	NA	1.2E-11	NA
Sulfides	NA	9.1E-11	NA	NA	1.2E-11	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value. NA indicates the route is not applicable.

Table Q-4

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Sediment

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Arsenic	NA	2.0E-09	NA	NA	2.6E-10	NA
Barium	NA	1.6E-08	NA	NA	2.0E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-5

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Sand Pond
Medium: Sediment
Population: Trespasser
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
VOLATILES						
Vinyl chloride	NA	1.1E-12	NA	NA	1.4E-13	NA
Carbon disulfide	NA	1.1E-12	NA	NA	1.4E-13	NA
1,1-Dichloroethane	NA	6.5E-13	NA	NA	8.4E-14	NA
METALS						
Barium	NA	2.4E-08	NA	NA	3.0E-09	NA
Copper	NA	7.7E-09	NA	NA	9.9E-10	NA
Zinc	NA	2.2E-08	NA	NA	2.9E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-6

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Phenanthrene	NA	6.4E-11	NA	NA	8.3E-12	NA
Fluoranthene	NA	1.1E-10	NA	NA	1.4E-11	NA
Pyrene	NA	9.5E-11	NA	NA	1.2E-11	NA
Benzo(a)anthracene	NA	0.0E+00	NA	NA	0.0E+00	NA
Chrysene	NA	0.0E+00	NA	NA	0.0E+00	NA
Benzo(b)fluoranthene	NA	0.0E+00	NA	NA	0.0E+00	NA
Benzo(k)fluoranthene	NA	0.0E+00	NA	NA	0.0E+00	NA
Benzo(a)pyrene	NA	0.0E+00	NA	NA	0.0E+00	NA
Ideno(1,2,3-cd)pyrene	NA	0.0E+00	NA	NA	0.0E+00	NA
Benzo(g,h,i)perylene	NA	7.6E-11	NA	NA	9.7E-12	NA
Total Non-Carc PAHs	NA	2.7E-10	NA	NA	3.4E-11	NA
Total Carcinogenic PAHs	NA	7.0E-10	NA	NA	9.1E-11	NA
METALS						
Silver	NA	6.8E-10	NA	NA	8.8E-11	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	4.2E-11	NA	NA	5.4E-12	NA
PAHs, non-TCL	NA	8.7E-11	NA	NA	1.1E-11	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-7

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Surface Water

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg d)			CARCINOGENS (mg/kg d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Aluminum	3.5E-07	8.9E-07	NA	4.6E-08	1.1E-07	NA
Barium	1.8E-08	4.5E-08	NA	2.3E-09	5.8E-09	NA
Lead	1.3E-11	8.0E-09	NA	1.6E-12	1.0E-09	NA
Manganese	4.3E-08	1.1E-07	NA	5.6E-09	1.4E-08	NA
TIC Groups						
Ethers, cyclic	4.8E-09	6.0E-09	NA	6.2E-10	7.8E-10	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value

Table Q-8

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Surface Water

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg d)			CARCINOGENS (mg/kg d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Manganese	1.4E-08	3.5E-08	NA	1.8E-09	4.5E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-9

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Sand Pond
Medium: Surface Water

Population: Trespasser
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg d)			CARCINOGENS (mg/kg d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Barium	2.3E-08	5.7E-08	NA	2.9E-09	7.4E-09	NA
Manganese	4.0E-08	1.0E-07	NA	5.1E-09	1.3E-08	NA
Sodium	4.5E-05	5.6E-05	NA	5.8E-06	7.2E-06	NA
TIC Groups						
Acids, non cyclic	2.1E-09	6.0E-09	NA	2.7E-10	7.8E-10	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-10

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Fish

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)	CARCINOGENS (mg/kg-d)
	Ingestion	Ingestion
SEMIVOLATILES		
Acenaphthene	3.4E-09	4.4E-10
Fluorene	6.1E-09	7.8E-10
Phenanthrene	2.0E-08	2.5E-09
Anthracene	7.4E-09	9.5E-10
Fluoranthene	9.6E-08	1.2E-08
Pyrene	7.0E-08	8.9E-09
Benzo(g,h,i)perylene	1.3E-09	1.6E-10
Total Carcinogenic PAHs	3.4E-09	4.4E-10

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-11

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill (VOCs)

Population: On-Site Workers
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d) Inhalation	CARCINOGENS (mg/kg-d) Inhalation
VOLATILES		
Chloromethane	5.8E-10	6.0E-11
Vinyl chloride	1.5E-08	1.6E-09
Chloroethane	7.5E-10	7.8E-11
Methylene chloride	3.4E-08	3.5E-09
Acetone	3.8E-09	3.9E-10
1,1-Dichloroethene	4.0E-10	4.2E-11
1,1-Dichloroethane	6.0E-09	6.3E-10
1,2-Dichloroethene (cis)	1.0E-07	1.1E-08
1,2-Dichloroethene (trans)	4.4E-09	4.6E-10
2-Butanone	1.5E-08	1.6E-09
1,2-Dichloropropane	2.1E-09	2.2E-10
Trichloroethene	8.5E-08	8.9E-09
Benzene	3.9E-09	4.1E-10
4-Methyl-2-pentanone	8.8E-09	9.2E-10
2-Hexanone	1.3E-09	1.4E-10
Tetrachloroethene	6.6E-08	6.9E-09
Toluene	1.6E-07	1.6E-08
Chlorobenzene	3.6E-10	3.8E-11
Ethylbenzene	1.6E-08	1.7E-09
Xylenes (mixed)	3.6E-08	3.7E-09
Dichlorodifluoromethane	3.4E-08	3.5E-09
Dichlorotetrafluoroethane	2.8E-09	2.9E-10
Trichlorofluoromethane	4.0E-10	4.2E-11
Trichlorotrifluoroethane	6.6E-10	6.9E-11
4-ethyl toluene	1.2E-08	1.3E-09
1,3,5-Trimethylbenzene	4.8E-09	5.0E-10
1,2,4-Trimethylbenzene	1.2E-08	1.2E-09
SEMIVOLATILES		
1,4-Dichlorobenzene	6.2E-09	6.4E-10

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i e , 70 years) Therefore, the difference between the CDI for noncarcinogenic vs carcinogenic effects is due to the different methods of time weighting used to estimate the value

Table Q-12

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Off Landfill (VOCs)
Population: On-Site Workers
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d) Inhalation	CARCINOGENS (mg/kg-d) Inhalation
VOLATILES		
Chloromethane	2.4E-09	2.5E-10
Vinyl chloride	6.3E-08	6.6E-09
Chloroethane	3.1E-09	3.2E-10
Methylene chloride	1.4E-07	1.4E-08
Acetone	1.6E-08	1.6E-09
1,1-Dichloroethene	1.7E-09	1.7E-10
1,1-Dichloroethane	2.5E-08	2.6E-09
1,2-Dichloroethene (cis)	4.2E-07	4.3E-08
1,2-Dichloroethene (trans)	1.8E-08	1.9E-09
2-Butanone	6.3E-08	6.6E-09
1,2-Dichloropropane	8.8E-09	9.2E-10
Trichloroethene	3.5E-07	3.7E-08
Benzene	1.6E-08	1.7E-09
4-Methyl-2-pentanone	3.6E-08	3.8E-09
2-Hexanone	5.4E-09	5.6E-10
Tetrachloroethene	2.7E-07	2.8E-08
Toluene	6.5E-07	6.8E-08
Chlorobenzene	1.5E-09	1.6E-10
Ethylbenzene	6.5E-08	6.8E-09
Xylenes (mixed)	1.5E-07	1.5E-08
Dichlorodifluoromethane	1.4E-07	1.4E-08
Dichlorotetrafluoroethane	1.1E-08	1.2E-09
Trichlorofluoromethane	1.6E-09	1.7E-10
Trichlorotrifluoroethane	2.7E-09	2.8E-10
4-ethyl toluene	5.0E-08	5.2E-09
1,3,5-Trimethylbenzene	2.0E-08	2.1E-09
1,2,4-Trimethylbenzene	4.9E-08	5.1E-09
SEMIVOLATILES		
1,4-Dichlorobenzene	2.5E-08	2.6E-09

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-13

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment

Population: On Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Acenaphthene	NA	5.1E-11	NA	NA	5.3E-12	NA
Fluorene	NA	9.2E-11	NA	NA	9.6E-12	NA
Phenanthrene	NA	3.0E-10	NA	NA	3.1E-11	NA
Anthracene	NA	1.1E-10	NA	NA	1.2E-11	NA
Fluoranthene	NA	1.4E-09	NA	NA	1.5E-10	NA
Pyrene	NA	1.1E-09	NA	NA	1.1E-10	NA
Butylbenzylphthalate	NA	5.1E-11	NA	NA	5.3E-12	NA
Benzo(g,h,i)perylene	NA	2.9E-09	NA	NA	3.0E-10	NA
Total Carcinogenic PAHs	NA	7.9E-09	NA	NA	8.2E-10	NA
METALS						
Barium	NA	6.6E-08	NA	NA	6.9E-09	NA
Lead	NA	1.6E-08	NA	NA	1.7E-09	NA
Zinc	NA	6.5E-08	NA	NA	6.7E-09	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	2.8E-10	NA	NA	2.9E-11	NA
Sulfides	NA	2.8E-10	NA	NA	2.9E-11	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-14

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Sediment
Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Arsenic	NA	6.2E-09	NA	NA	6.4E-10	NA
Barium	NA	4.7E-08	NA	NA	4.9E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-15

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
SEMIVOLATILES						
Phenanthrene	NA	1.6E-10	NA	NA	1.7E-11	NA
Fluoranthene	NA	2.7E-10	NA	NA	2.8E-11	NA
Pyrene	NA	2.4E-10	NA	NA	2.5E-11	NA
Benzo(g,h,i)perylene	NA	1.9E-10	NA	NA	2.0E-11	NA
Total Carcinogenic PAHs	NA	1.8E-09	NA	NA	1.8E-10	NA
METALS						
Silver	NA	1.7E-09	NA	NA	1.8E-10	NA
TIC GROUPINGS						
Benzenes, oxygenated	NA	1.0E-10	NA	NA	1.1E-11	NA
PAHs, non-TCL	NA	2.2E-10	NA	NA	2.3E-11	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-16

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Surface Water

Population: On Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg d)			CARCINOGENS (mg/kg d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Aluminum	8.6E-07	2.2E-06	NA	9.0E-08	2.2E-07	NA
Barium	4.4E-08	1.1E-07	NA	4.6E-09	1.1E-08	NA
Lead	3.1E-11	1.9E-08	NA	3.2E-12	2.0E-09	NA
Manganese	1.1E-07	2.6E-07	NA	1.1E-08	2.7E-08	NA
TIC Groups						
Ethers, cyclic	1.2E-08	1.5E-08	NA	1.2E-09	1.5E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-17

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Surface Water

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
METALS						
Manganese	3.4E-08	8.4E-08	NA	3.5E-09	8.8E-09	NA

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-18

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Offsite (VOCs)
Population: Off-Site Resident
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d) Inhalation	CARCINOGENS (mg/kg-d) Inhalation
VOLATILES		
Chloromethane	4.9E-09	6.3E-10
Vinyl chloride	1.3E-07	1.7E-08
Chloroethane	6.4E-09	8.3E-10
Methylene chloride	2.9E-07	3.7E-08
Acetone	3.2E-08	4.2E-09
1,1-Dichloroethene	3.5E-09	4.5E-10
1,1-Dichloroethane	5.1E-08	6.6E-09
1,2-Dichloroethene (cis)	8.7E-07	1.1E-07
1,2-Dichloroethene (trans)	3.8E-08	4.9E-09
2-Butanone	1.3E-07	1.7E-08
1,2-Dichloropropane	1.8E-08	2.4E-09
Trichloroethene	7.3E-07	9.4E-08
Benzene	3.4E-08	4.3E-09
4-Methyl-2-pentanone	7.5E-08	9.7E-09
2-Hexanone	1.1E-08	1.4E-09
Tetrachloroethene	5.6E-07	7.2E-08
Toluene	1.3E-06	1.7E-07
Chlorobenzene	3.1E-09	4.0E-10
Ethylbenzene	1.4E-07	1.7E-08
Xylenes (mixed)	3.0E-07	3.9E-08
Dichlorodifluoromethane	2.9E-07	3.7E-08
Dichlorotetrafluoroethane	2.4E-08	3.1E-09
Trichlorofluoromethane	3.4E-09	4.4E-10
Trichlorotrifluoroethane	5.7E-09	7.3E-10
4-ethyl toluene	1.0E-07	1.3E-08
1,3,5-Trimethylbenzene	4.1E-08	5.3E-09
1,2,4-Trimethylbenzene	1.0E-07	1.3E-08
SEMIVOLATILES		
1,4-Dichlorobenzene	5.3E-08	6.8E-09

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

Table Q-19

CHRONIC DAILY INTAKE AND ABSORBED DOSE ESTIMATES
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Private Wells
Medium: Groundwater
Population: Off-Site Resident
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	NONCARCINOGENS (mg/kg-d)			CARCINOGENS (mg/kg-d)		
	Dermal Contact	Ingestion	Inhalation	Dermal Contact	Ingestion	Inhalation
VOLATILES						
1,1-Dichloroethane	5.4E-08	1.8E-05	4.7E-05	7.0E-09	2.3E-06	6.0E-06
1,2-Dichloroethene (cis)	1.3E-07	3.6E-05	9.3E-05	1.6E-08	4.6E-06	1.2E-05
PESTICIDE/PCB						
Dieldrin	1.2E-08	1.8E-07	0.0E+00	1.6E-09	2.3E-08	0.0E+00
4,4'-DDE	2.0E-07	1.8E-07	0.0E+00	2.6E-08	2.3E-08	0.0E+00
Endrin	1.7E-08	2.5E-07	0.0E+00	2.2E-09	3.2E-08	0.0E+00
4,4'-DDD	1.4E-07	1.1E-07	0.0E+00	1.8E-08	1.4E-08	0.0E+00
Endrin Aldehyde	3.1E-09	5.4E-08	0.0E+00	3.9E-10	6.9E-09	0.0E+00
METALS						
Aluminum	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Antimony	5.2E-07	1.5E-04	0.0E+00	6.7E-08	1.9E-05	0.0E+00
Nickel	1.4E-07	3.8E-04	0.0E+00	1.8E-08	4.9E-05	0.0E+00
Silver	4.6E-08	2.1E-05	0.0E+00	5.9E-09	2.8E-06	0.0E+00
Sodium	4.6E-02	6.4E+00	0.0E+00	5.9E-03	8.3E-01	0.0E+00
TIC Groups						
Hydrocarbons, branched	1.0E-05	3.6E-05	0.0E+00	1.3E-06	4.6E-06	0.0E+00
Hydrocarbons, cyclic	2.1E-05	8.9E-05	0.0E+00	2.7E-06	1.1E-05	0.0E+00

Notes:

1. For noncarcinogenic effects, the chronic daily intake (CDI) is averaged over the exposure period; whereas for carcinogenic effects, the CDI is averaged over the lifetime (i.e., 70 years). Therefore, the difference between the CDI for noncarcinogenic vs. carcinogenic effects is due to the different methods of time weighting used to estimate the value.

R

RISK ESTIMATE SUMMARY TABLES - REASONABLE MAXIMUM EXPOSURES

Table R-1

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	ND	0.0	2.1E-12	0.1
Vinyl chloride	ND	0.0	2.6E-09	83.6
Chloroethane	3.5E-10	0.0	ND	0.0
Methylene chloride	5.2E-08	1.1	3.1E-11	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethene	ND	0.0	4.2E-11	1.3
1,1-Dichloroethane	8.0E-08	1.6	ND	0.0
1,2-Dichloroethene (cis)	ND	0.0	ND	0.0
1,2-Dichloroethene (trans)	ND	0.0	ND	0.0
2-Butanone	7.1E-08	1.4	ND	0.0
1,2-Dichloropropane	7.2E-07	14.5	ND	0.0
Trichloroethene	ND	0.0	2.9E-10	9.5
Benzene	ND	0.0	6.5E-11	2.1
4-Methyl-2-pentanone	5.9E-07	11.8	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	7.5E-11	2.4
Toluene	1.9E-06	38.6	ND	0.0
Chlorobenzene	6.9E-09	0.1	ND	0.0
Ethylbenzene	7.3E-08	1.5	ND	0.0
Xylenes (mixed)	5.5E-07	11.2	ND	0.0
Dichlorodifluoromethane	7.9E-07	16.0	ND	0.0
Dichlorotetrafluoroethane	6.5E-08	1.3	ND	0.0
Trichlorofluoromethane	2.7E-09	0.1	ND	0.0
Trichlorotrifluoroethane	1.0E-10	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	4.1E-08	0.8	ND	0.0
Totals:	5.0E-06	100.0	3.1E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S. EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table R-2

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Off Landfill

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	ND	0.0	1.7E-12	0.1
Vinyl chloride	ND	0.0	2.2E-09	83.6
Chloroethane	2.9E-10	0.0	ND	0.0
Methylene chloride	4.4E-08	1.1	2.6E-11	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethane	ND	0.0	3.5E-11	1.3
1,1-Dichloroethane	6.7E-08	1.6	ND	0.0
1,2-Dichloroethane (cis)	ND	0.0	ND	0.0
1,2-Dichloroethane (trans)	ND	0.0	ND	0.0
2-Butanone	5.9E-08	1.4	ND	0.0
1,2-Dichloropropane	6.0E-07	14.5	ND	0.0
Trichloroethane	ND	0.0	2.5E-10	9.5
Benzene	ND	0.0	5.5E-11	2.1
4-Methyl-2-pentanone	4.9E-07	11.8	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	6.3E-11	2.4
Toluene	1.6E-06	38.6	ND	0.0
Chlorobenzene	5.8E-09	0.1	ND	0.0
Ethylbenzene	6.1E-08	1.5	ND	0.0
Xylenes (mixed)	4.6E-07	11.2	ND	0.0
Dichlorodifluoromethane	6.6E-07	16.0	ND	0.0
Dichlorotetrafluoroethane	5.4E-08	1.3	ND	0.0
Trichlorofluoromethane	2.2E-09	0.1	ND	0.0
Trichlorotrifluoroethane	8.6E-11	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	3.5E-08	0.8	ND	0.0
Totals:	4.1E-06	100.0	2.6E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships
Hazard Quotient = Chronic Daily Intake / Reference Dose
Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available

Table R-3a

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Acenaphthene	NA	1.7E-08	NA	1.7E-08	0.1	NA	ND	NA	0.0E+00	0.0
Fluorene	NA	4.7E-08	NA	4.7E-08	0.2	NA	ND	NA	0.0E+00	0.0
Phenanthrene	NA	1.5E-07	NA	1.5E-07	0.6	NA	ND	NA	0.0E+00	0.0
Anthracene	NA	7.6E-09	NA	7.6E-09	0.0	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	7.4E-07	NA	7.4E-07	2.7	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	7.1E-07	NA	7.1E-07	2.7	NA	ND	NA	0.0E+00	0.0
Butylbenzylphthalate	NA	5.1E-09	NA	5.1E-09	0.0	NA	ND	NA	0.0E+00	0.0
Benzo(g,h,i)perylene	NA	1.5E-06	NA	1.5E-06	5.5	NA	ND	NA	0.0E+00	0.0
Total Carcinogenic PAHs	NA	ND	NA	0.0E+00	0.0	NA	5.0E-07	NA	5.0E-07	100.0
METALS										
Barium	NA	1.9E-05	NA	1.9E-05	71.4	NA	ND	NA	0.0E+00	0.0
Lead	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Zinc	NA	4.4E-06	NA	4.4E-06	16.4	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	5.6E-08	NA	5.6E-08	0.2	NA	ND	NA	0.0E+00	0.0
Sulfides	NA	5.6E-08	NA	5.6E-08	0.2	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	2.7E-05	0.0E+00	2.7E-05	100.0	0.0E+00	5.0E-07	0.0E+00	5.0E-07	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-3b

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Acenaphthene	NA	1.7E-08	NA	1.7E-08	0.1	NA	ND	NA	0.0E+00	0.0
Fluorene	NA	4.7E-08	NA	4.7E-08	0.2	NA	ND	NA	0.0E+00	0.0
Phenanthrene	NA	1.5E-07	NA	1.5E-07	0.6	NA	ND	NA	0.0E+00	0.0
Anthracene	NA	7.6E-09	NA	7.6E-09	0.0	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	7.4E-07	NA	7.4E-07	2.7	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	7.1E-07	NA	7.1E-07	2.7	NA	ND	NA	0.0E+00	0.0
Butylbenzylphthalate	NA	5.1E-09	NA	5.1E-09	0.0	NA	ND	NA	0.0E+00	0.0
Benzo(a)anthracene	NA	ND	NA	0.0E+00	0.0	NA	3.1E-09	NA	3.1E-09	4.0
Chrysene	NA	ND	NA	0.0E+00	0.0	NA	1.6E-10	NA	1.6E-10	0.2
Benzo(b)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	8.4E-09	NA	8.4E-09	11.0
Benzo(k)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	5.8E-09	NA	5.8E-09	7.7
Benzo(a)pyrene	NA	ND	NA	0.0E+00	0.0	NA	3.3E-08	NA	3.3E-08	43.4
Ideno(1,2,3-cd)pyrene	NA	ND	NA	0.0E+00	0.0	NA	4.7E-09	NA	4.7E-09	6.2
Dibenz(a,h)anthracene	NA	ND	NA	0.0E+00	0.0	NA	2.1E-08	NA	2.1E-08	27.5
Benzo(g,h,i)perylene	NA	1.5E-06	NA	1.5E-06	5.5	NA	ND	NA	0.0E+00	0.0
METALS										
Barium	NA	1.9E-05	NA	1.9E-05	71.4	NA	ND	NA	0.0E+00	0.0
Lead	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Zinc	NA	4.4E-06	NA	4.4E-06	16.4	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	5.6E-08	NA	5.6E-08	0.2	NA	ND	NA	0.0E+00	0.0
Sulfides	NA	5.6E-08	NA	5.6E-08	0.2	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	2.7E-05	0.0E+00	2.7E-05	100.0	0.0E+00	7.6E-08	0.0E+00	7.6E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-4

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Sediment

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Arsenic	NA	4.2E-04	NA	4.2E-04	96.8	NA	9.7E-08	NA	9.7E-08	100.0
Barium	NA	1.4E-05	NA	1.4E-05	3.2	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	4.3E-04	0.0E+00	4.3E-04	100.0	0.0E+00	9.7E-08	0.0E+00	9.7E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-5

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Sand Pond
Medium: Sediment

Population: Trespasser
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
VOLATILES										
Vinyl chloride	NA	ND	NA	0.0E+00	0.0	NA	5.4E-11	NA	5.4E-11	100.0
Carbon disulfide	NA	6.7E-10	NA	6.7E-10	0.0	NA	ND	NA	0.0E+00	0.0
1,1-Dichloroethane	NA	4.0E-10	NA	4.0E-10	0.0	NA	ND	NA	0.0E+00	0.0
METALS										
Barium	NA	2.1E-05	NA	2.1E-05	82.1	NA	ND	NA	0.0E+00	0.0
Copper	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Zinc	NA	4.5E-06	NA	4.5E-06	17.9	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	2.5E-05	0.0E+00	2.5E-05	100.0	0.0E+00	5.4E-11	0.0E+00	5.4E-11	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-6a

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Phenanthrene	NA	6.2E-08	NA	6.2E-08	1.1	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	1.0E-07	NA	1.0E-07	1.8	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	1.2E-07	NA	1.2E-07	2.1	NA	ND	NA	0.0E+00	0.0
Benzo(g,h,i)perylene	NA	7.2E-08	NA	7.2E-08	1.3	NA	ND	NA	0.0E+00	0.0
Total Carcinogenic PAHs	NA	ND	NA	0.0E+00	0.0	NA	8.4E-08	NA	8.4E-08	100.0
METALS										
Silver	NA	5.2E-06	NA	5.2E-06	92.0	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	1.6E-08	NA	1.6E-08	0.3	NA	ND	NA	0.0E+00	0.0
PAHs, non-TCL	NA	8.3E-08	NA	8.3E-08	1.5	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	5.7E-06	0.0E+00	5.7E-06	100.0	0.0E+00	8.4E-08	0.0E+00	8.4E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-6b

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Phenanthrene	NA	6.2E-08	NA	6.2E-08	1.1	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	1.0E-07	NA	1.0E-07	1.8	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	1.2E-07	NA	1.2E-07	2.1	NA	ND	NA	0.0E+00	0.0
Benzo(a)anthracene	NA	ND	NA	0.0E+00	0.0	NA	7.7E-10	NA	7.7E-10	5.3
Chrysene	NA	ND	NA	0.0E+00	0.0	NA	3.6E-11	NA	3.6E-11	0.2
Benzo(b)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	2.1E-09	NA	2.1E-09	14.2
Benzo(k)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	1.5E-09	NA	1.5E-09	10.0
Benzo(a)pyrene	NA	ND	NA	0.0E+00	0.0	NA	8.6E-09	NA	8.6E-09	58.8
Ideno(1,2,3-cd)pyrene	NA	ND	NA	0.0E+00	0.0	NA	1.7E-09	NA	1.7E-09	11.5
Benzo(g,h,i)perylene	NA	7.2E-08	NA	7.2E-08	1.3	NA	ND	NA	0.0E+00	0.0
METALS										
Silver	NA	5.2E-06	NA	5.2E-06	92.0	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	1.6E-08	NA	1.6E-08	0.3	NA	ND	NA	0.0E+00	0.0
PAHs, non-TCL	NA	8.3E-08	NA	8.3E-08	1.5	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	5.7E-06	0.0E+00	5.7E-06	100.0	0.0E+00	1.5E-08	0.0E+00	1.5E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships.
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-7

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Surface Water

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Aluminum	5.1E-04	5.6E-05	NA	5.7E-04	2.4	ND	ND	NA	0.0E+00	0.0
Barium	3.7E-04	4.1E-05	NA	4.2E-04	1.8	ND	ND	NA	0.0E+00	0.0
Lead	ND	ND	NA	0.0E+00	0.0	ND	ND	NA	0.0E+00	0.0
Manganese	2.1E-02	1.4E-03	NA	2.2E-02	95.8	ND	ND	NA	0.0E+00	0.0
TIC Groups										
Ethers, cyclic	ND	ND	NA	0.0E+00	0.0	ND	ND	NA	0.0E+00	0.0
Totals:	2.2E-02	1.5E-03	NA	2.3E-02	100.0	0.0E+00	0.0E+00	NA	0.0E+00	0.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships.
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable

Table R-8

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Surface Water

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Manganese	6.7E-03	4.4E-04	NA	7.1E-03	100.0	ND	ND	NA	0.0E+00	0.0
Totals:	6.7E-03	4.4E-04	NA	7.1E-03	100.0	0.0E+00	0.0E+00	NA	0.0E+00	0.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-9

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Sand Pond
Medium: Surface Water

Population: Trespasser
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Barium	4.7E-04	5.2E-05	NA	5.3E-04	2.5	ND	ND	NA	0.0E+00	0.0
Manganese	1.9E-02	1.3E-03	NA	2.0E-02	97.5	ND	ND	NA	0.0E+00	0.0
Sodium	ND	ND	NA	0.0E+00	0.0	ND	ND	NA	0.0E+00	0.0
TIC Groups										
Acids, non-cyclic	3.8E-06	4.8E-06	NA	8.5E-06	0.0	ND	ND	NA	0.0E+00	0.0
Totals:	2.0E-02	1.3E-03	NA	2.1E-02	100.0	0.0E+00	0.0E+00	NA	0.0E+00	0.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. *Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships.*
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-10a

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Fish

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Ingestion	% of Total	Ingestion	% of Total
SEMIVOLATILES				
Acenaphthene	4.7E-07	1.0	ND	0.0
Fluorene	1.3E-06	2.8	ND	0.0
Phenanthrene	4.0E-06	9.0	ND	0.0
Anthracene	2.0E-07	0.5	ND	0.0
Fluoranthene	2.0E-05	43.8	ND	0.0
Pyrene	1.9E-05	42.4	ND	0.0
Benzo(g,h,i)perylene	2.6E-07	0.6	ND	0.0
Total Carcinogenic PAHs	ND	0.0	8.8E-08	100.0
Totals:	4.5E-05	100.0	8.8E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-10b

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Fish

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Ingestion	% of Total	Ingestion	% of Total
SEMIVOLATILES				
Acenaphthene	4.7E-07	1.0	ND	0.0
Fluorene	1.3E-06	2.8	ND	0.0
Phenanthrene	4.0E-06	9.0	ND	0.0
Anthracene	2.0E-07	0.5	ND	0.0
Fluoranthene	2.0E-05	43.8	ND	0.0
Pyrene	1.9E-05	42.4	ND	0.0
Benzo(a)anthracene	ND	0.0	5.4E-10	4.0
Chrysene	ND	0.0	2.9E-11	0.2
Benzo(b)fluoranthene	ND	0.0	1.5E-09	11.0
Benzo(k)fluoranthene	ND	0.0	1.0E-09	7.7
Benzo(a)pyrene	ND	0.0	5.8E-09	43.4
Ideno(1,2,3-cd)pyrene	ND	0.0	8.3E-10	6.2
Dibenz(a,h)anthracene	ND	0.0	3.7E-09	27.5
Benzo(g,h,i)perylene	2.6E-07	0.6	ND	0.0
Totals:	4.5E-05	100.0	1.3E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-11a

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Fish

Population: Subsistence Fishermen
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Ingestion	% of Total	Ingestion	% of Total
SEMIVOLATILES				
Acenaphthene	2.5E-05	1.0	ND	0.0
Fluorene	6.7E-05	2.8	ND	0.0
Phenanthrene	2.1E-04	9.0	ND	0.0
Anthracene	1.1E-05	0.5	ND	0.0
Fluoranthene	1.0E-03	43.8	ND	0.0
Pyrene	1.0E-03	42.4	ND	0.0
Benzo(g,h,i)perylene	1.4E-05	0.6	ND	0.0
Total Carcinogenic PAHs	ND	0.0	4.7E-06	100.0
Totals:	2.4E-03	100.0	4.7E-06	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. Those risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-11b

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Fish

Population: Subsistence Fishermen
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Ingestion	% of Total	Ingestion	% of Total
SEMIVOLATILES				
Acenaphthene	2.5E-05	1.0	ND	0.0
Fluorene	6.7E-05	2.8	ND	0.0
Phenanthrene	2.1E-04	9.0	ND	0.0
Anthracene	1.1E-05	0.5	ND	0.0
Fluoranthene	1.0E-03	43.8	ND	0.0
Pyrene	1.0E-03	42.4	ND	0.0
Benzo(a)anthracene	ND	0.0	2.8E-08	4.0
Chrysene	ND	0.0	1.5E-09	0.2
Benzo(b)fluoranthene	ND	0.0	7.8E-08	11.0
Benzo(k)fluoranthene	ND	0.0	5.4E-08	7.7
Benzo(a)pyrene	ND	0.0	3.1E-07	43.4
Ideno(1,2,3-cd)pyrene	ND	0.0	4.4E-08	6.2
Dibenz(a,h)anthracene	ND	0.0	1.9E-07	27.5
Benzo(g,h,i)perylene	1.4E-05	0.6	ND	0.0
Totals:	2.4E-03	100.0	7.1E-07	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-12

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill

Population: On Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	ND	0.0	5.4E-12	0.1
Vinyl chloride	ND	0.0	6.7E-09	83.6
Chloroethane	1.1E-09	0.0	ND	0.0
Methylene chloride	1.6E-07	1.1	8.0E-11	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethene	ND	0.0	1.1E-10	1.3
1,1-Dichloroethane	2.5E-07	1.6	ND	0.0
1,2-Dichloroethene (cis)	ND	0.0	ND	0.0
1,2-Dichloroethene (trans)	ND	0.0	ND	0.0
2-Butanone	2.2E-07	1.4	ND	0.0
1,2-Dichloropropane	2.2E-06	14.5	ND	0.0
Trichloroethene	ND	0.0	7.6E-10	9.5
Benzene	ND	0.0	1.7E-10	2.1
4-Methyl-2-pentanone	1.8E-06	11.8	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	2.0E-10	2.4
Toluene	6.0E-06	38.6	ND	0.0
Chlorobenzene	2.2E-08	0.1	ND	0.0
Ethylbenzene	2.3E-07	1.5	ND	0.0
Xylenes (mixed)	1.7E-06	11.2	ND	0.0
Dichlorodifluoromethane	2.5E-06	16.0	ND	0.0
Dichlorotetrafluoroethane	2.0E-07	1.3	ND	0.0
Trichlorofluoromethane	8.3E-09	0.1	ND	0.0
Trichlorotrifluoroethane	3.2E-10	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	1.3E-07	0.8	ND	0.0
Totals:	1.5E-05	100.0	8.1E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
Hazard Quotient = Chronic Daily Intake / Reference Dose
Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

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Table R-13

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Off Landfill

Population: On Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	ND	0.0	1.0E-11	0.1
Vinyl chloride	ND	0.0	1.3E-08	83.6
Chloroethane	2.1E-09	0.0	ND	0.0
Methylene chloride	3.1E-07	1.1	1.5E-10	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethene	ND	0.0	2.1E-10	1.3
1,1-Dichloroethane	4.8E-07	1.6	ND	0.0
1,2-Dichloroethene (cis)	ND	0.0	ND	0.0
1,2-Dichloroethene (trans)	ND	0.0	ND	0.0
2-Butanone	4.3E-07	1.4	ND	0.0
1,2-Dichloropropane	4.3E-06	14.5	ND	0.0
Trichloroethene	ND	0.0	1.5E-09	9.5
Benzene	ND	0.0	3.3E-10	2.1
4-Methyl-2-pentanone	3.5E-06	11.8	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	3.8E-10	2.4
Toluene	1.1E-05	38.6	ND	0.0
Chlorobenzene	4.2E-08	0.1	ND	0.0
Ethylbenzene	4.4E-07	1.5	ND	0.0
Xylenes (mixed)	3.3E-06	11.2	ND	0.0
Dichlorodifluoromethane	4.8E-06	16.0	ND	0.0
Dichlorotetrafluoroethane	3.9E-07	1.3	ND	0.0
Trichlorofluoromethane	1.6E-08	0.1	ND	0.0
Trichlorotrifluoroethane	6.2E-10	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	2.5E-07	0.8	ND	0.0
Totals:	3.0E-05	100.0	1.6E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
Hazard Quotient = Chronic Daily Intake / Reference Dose
Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table R-14a

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Acenaphthene	NA	1.8E-08	NA	1.8E-08	0.1	NA	ND	NA	0.0E+00	0.0
Fluorene	NA	4.9E-08	NA	4.9E-08	0.2	NA	ND	NA	0.0E+00	0.0
Phenanthrene	NA	1.6E-07	NA	1.6E-07	0.6	NA	ND	NA	0.0E+00	0.0
Anthracene	NA	8.0E-09	NA	8.0E-09	0.0	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	7.7E-07	NA	7.7E-07	2.7	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	7.5E-07	NA	7.5E-07	2.7	NA	ND	NA	0.0E+00	0.0
Butylbenzylphthalate	NA	5.4E-09	NA	5.4E-09	0.0	NA	ND	NA	0.0E+00	0.0
Benzo(g,h,i)perylene	NA	1.5E-06	NA	1.5E-06	5.5	NA	ND	NA	0.0E+00	0.0
Total Carcinogenic PAHs	NA	ND	NA	0.0E+00	0.0	NA	4.4E-07	NA	4.4E-07	100.0
METALS										
Barium	NA	2.0E-05	NA	2.0E-05	71.4	NA	ND	NA	0.0E+00	0.0
Lead	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Zinc	NA	4.6E-06	NA	4.6E-06	16.4	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	5.9E-08	NA	5.9E-08	0.2	NA	ND	NA	0.0E+00	0.0
Sulfides	NA	5.9E-08	NA	5.9E-08	0.2	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	2.8E-05	0.0E+00	2.8E-05	100.0	0.0E+00	4.4E-07	0.0E+00	4.4E-07	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-14b

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Acenaphthene	NA	1.8E-08	NA	1.8E-08	0.1	NA	ND	NA	0.0E+00	0.0
Fluorene	NA	4.9E-08	NA	4.9E-08	0.2	NA	ND	NA	0.0E+00	0.0
Phenanthrene	NA	1.6E-07	NA	1.6E-07	0.6	NA	ND	NA	0.0E+00	0.0
Anthracene	NA	8.0E-09	NA	8.0E-09	0.0	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	7.7E-07	NA	7.7E-07	2.7	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	7.5E-07	NA	7.5E-07	2.7	NA	ND	NA	0.0E+00	0.0
Butylbenzylphthalate	NA	5.4E-09	NA	5.4E-09	0.0	NA	ND	NA	0.0E+00	0.0
Benzo(a)anthracene	NA	ND	NA	0.0E+00	0.0	NA	2.7E-09	NA	2.7E-09	4.0
Chrysene	NA	ND	NA	0.0E+00	0.0	NA	1.4E-10	NA	1.4E-10	0.2
Benzo(b)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	7.3E-09	NA	7.3E-09	11.0
Benzo(k)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	5.1E-09	NA	5.1E-09	7.7
Benzo(a)pyrene	NA	ND	NA	0.0E+00	0.0	NA	2.9E-08	NA	2.9E-08	43.4
Ideno(1,2,3-cd)pyrene	NA	ND	NA	0.0E+00	0.0	NA	4.2E-09	NA	4.2E-09	6.2
Dibenz(a,h)anthracene	NA	ND	NA	0.0E+00	0.0	NA	1.8E-08	NA	1.8E-08	27.5
Benzo(g,h,i)perylene	NA	1.5E-06	NA	1.5E-06	5.5	NA	ND	NA	0.0E+00	0.0
METALS										
Barium	NA	2.0E-05	NA	2.0E-05	71.4	NA	ND	NA	0.0E+00	0.0
Lead	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Zinc	NA	4.6E-06	NA	4.6E-06	16.4	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	5.9E-08	NA	5.9E-08	0.2	NA	ND	NA	0.0E+00	0.0
Sulfides	NA	5.9E-08	NA	5.9E-08	0.2	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	2.8E-05	0.0E+00	2.8E-05	100.0	0.0E+00	6.7E-08	0.0E+00	6.7E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-15

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Sediment

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Arsenic	NA	4.4E-04	NA	4.4E-04	96.8	NA	8.5E-08	NA	8.5E-08	100.0
Barium	NA	1.4E-05	NA	1.4E-05	3.2	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	4.6E-04	0.0E+00	4.6E-04	100.0	0.0E+00	8.5E-08	0.0E+00	8.5E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-16a

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Phenanthrene	NA	4.2E-08	NA	4.2E-08	1.1	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	6.9E-08	NA	6.9E-08	1.8	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	8.2E-08	NA	8.2E-08	2.1	NA	ND	NA	0.0E+00	0.0
Benzo(g,h,i)perylene	NA	4.9E-08	NA	4.9E-08	1.3	NA	ND	NA	0.0E+00	0.0
Total Carcinogenic PAHs	NA	ND	NA	0.0E+00	0.0	NA	4.8E-08	NA	4.8E-08	100.0
METALS										
Silver	NA	3.6E-06	NA	3.6E-06	92.0	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	1.1E-08	NA	1.1E-08	0.3	NA	ND	NA	0.0E+00	0.0
PAHs, non-TCL	NA	5.7E-08	NA	5.7E-08	1.5	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	3.9E-06	0.0E+00	3.9E-06	100.0	0.0E+00	4.8E-08	0.0E+00	4.8E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-16b

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Phenanthrene	NA	4.2E-08	NA	4.2E-08	1.1	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	6.9E-08	NA	6.9E-08	1.8	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	8.2E-08	NA	8.2E-08	2.1	NA	ND	NA	0.0E+00	0.0
Benzo(a)anthracene	NA	ND	NA	0.0E+00	0.0	NA	4.4E-10	NA	4.4E-10	5.3
Chrysene	NA	ND	NA	0.0E+00	0.0	NA	2.0E-11	NA	2.0E-11	0.2
Benzo(b)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	1.2E-09	NA	1.2E-09	14.2
Benzo(k)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	8.3E-10	NA	8.3E-10	10.0
Benzo(a)pyrene	NA	ND	NA	0.0E+00	0.0	NA	4.9E-09	NA	4.9E-09	58.8
Ideno(1,2,3-cd)pyrene	NA	ND	NA	0.0E+00	0.0	NA	9.5E-10	NA	9.5E-10	11.5
Benzo(g,h,i)perylene	NA	4.9E-08	NA	4.9E-08	1.3	NA	ND	NA	0.0E+00	0.0
METALS										
Silver	NA	3.6E-06	NA	3.6E-06	92.0	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	1.1E-08	NA	1.1E-08	0.3	NA	ND	NA	0.0E+00	0.0
PAHs, non-TCL	NA	5.7E-08	NA	5.7E-08	1.5	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	3.9E-06	0.0E+00	3.9E-06	100.0	0.0E+00	8.3E-09	0.0E+00	8.3E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-17

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Surface Water

Population: On Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Aluminum	6.0E-04	6.6E-05	NA	6.7E-04	2.4	ND	ND	NA	0.0E+00	0.0
Barium	4.4E-04	4.8E-05	NA	4.9E-04	1.8	ND	ND	NA	0.0E+00	0.0
Lead	ND	ND	NA	0.0E+00	0.0	ND	ND	NA	0.0E+00	0.0
Manganese	2.5E-02	1.6E-03	NA	2.6E-02	95.8	ND	ND	NA	0.0E+00	0.0
TIC Groups										
Ethers, cyclic	ND	ND	NA	0.0E+00	0.0	ND	ND	NA	0.0E+00	0.0
Totals:	2.6E-02	1.7E-03	NA	2.7E-02	100.0	0.0E+00	0.0E+00	NA	0.0E+00	0.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships.
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-18

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Surface Water

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Manganese	7.9E-03	5.1E-04	NA	8.4E-03	100.0	ND	ND	NA	0.0E+00	0.0
Totals:	7.9E-03	5.1E-04	NA	8.4E-03	100.0	0.0E+00	0.0E+00	NA	0.0E+00	0.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-19

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Off-site

Population: Off-Site Resident
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	ND	0.0	1.3E-11	0.1
Vinyl chloride	ND	0.0	1.7E-08	83.6
Chloroethane	2.2E-09	0.0	ND	0.0
Methylene chloride	3.3E-07	1.1	2.0E-10	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethene	ND	0.0	2.7E-10	1.3
1,1-Dichloroethane	5.1E-07	1.6	ND	0.0
1,2-Dichloroethene (cis)	ND	0.0	ND	0.0
1,2-Dichloroethene (trans)	ND	0.0	ND	0.0
2-Butanone	4.6E-07	1.4	ND	0.0
1,2-Dichloropropane	4.6E-06	14.5	ND	0.0
Trichloroethene	ND	0.0	1.9E-09	9.5
Benzene	ND	0.0	4.2E-10	2.1
4-Methyl-2-pentanone	3.8E-06	11.8	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	4.8E-10	2.4
Toluene	1.2E-05	38.6	ND	0.0
Chlorobenzene	4.4E-08	0.1	ND	0.0
Ethylbenzene	4.7E-07	1.5	ND	0.0
Xylenes (mixed)	3.5E-06	11.2	ND	0.0
Dichlorodifluoromethane	5.1E-06	16.0	ND	0.0
Dichlorotetrafluoroethane	4.2E-07	1.3	ND	0.0
Trichlorofluoromethane	1.7E-08	0.1	ND	0.0
Trichlorotrifluoroethane	6.6E-10	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	2.6E-07	0.8	ND	0.0
Totals:	3.2E-05	100.0	2.0E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S. EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
Hazard Quotient = Chronic Daily Intake / Reference Dose
Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table R-20

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County Illinois

Source Area: Private Wells
Medium: Groundwater

Population: Off-Site Resident
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
VOLATILES										
1,1-Dichloroethane	7.9E-07	3.3E-04	5.9E-04	9.2E-04	0.1	ND	ND	ND	0.0E+00	0.0
1,2-Dichloroethene (cis)	1.9E-05	6.5E-03	ND	6.5E-03	0.7	ND	ND	ND	0.0E+00	0.0
PESTICIDE/PCB										
Dieldrin	7.1E-04	6.5E-03	ND	7.2E-03	0.8	2.4E-07	2.2E-06	ND	2.5E-06	94.0
4,4'-DDE	ND	ND	ND	0.0E+00	0.0	4.8E-08	4.7E-08	ND	9.6E-08	3.6
Endrin	1.7E-04	1.5E-03	ND	1.7E-03	0.2	ND	ND	ND	0.0E+00	0.0
4,4'-DDD	ND	ND	ND	0.0E+00	0.0	4.3E-08	2.0E-08	ND	6.3E-08	2.4
Endrin Aldehyde	3.0E-05	3.3E-04	ND	3.5E-04	0.0	ND	ND	ND	0.0E+00	0.0
METALS										
Antimony	1.9E-01	6.7E-01	ND	8.6E-01	93.5	ND	ND	ND	0.0E+00	0.0
Nickel	1.0E-04	3.5E-02	ND	3.5E-02	3.8	ND	ND	ND	0.0E+00	0.0
Silver	1.3E-04	7.8E-03	ND	7.9E-03	0.9	ND	ND	ND	0.0E+00	0.0
Sodium	ND	ND	ND	0.0E+00	0.0	ND	ND	ND	0.0E+00	0.0
TIC Groups										
Hydrocarbons, branched	ND	ND	ND	0.0E+00	0.0	ND	ND	ND	0.0E+00	0.0
Hydrocarbons, cyclic	ND	ND	ND	0.0E+00	0.0	ND	ND	ND	0.0E+00	0.0
Totals:	1.9E-01	7.2E-01	5.9E-04	9.2E-01	100.0	3.3E-07	2.3E-06	0.0E+00	2.6E-06	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table R-21a

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill (Dust)

Population: Construction Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
SEMIVOLATILES				
Phenanthrene	ND	ND	ND	0.0
Fluoranthene	ND	ND	ND	0.0
Pyrene	ND	ND	ND	0.0
Benzo(g,h,i)perylene	ND	ND	ND	0.0
Total Carcinogenic PAHs	ND	ND	3.8E-08	100.0
METALS				
Silver	ND	ND	ND	0.0
TIC Groups				
Benzenes, oxygenated	ND	ND	ND	0.0
PAHs, non-TCL	ND	ND	ND	0.0
Totals:	0.0E+00	ND	3.8E-08	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
Hazard Quotient = Chronic Daily Intake / Reference Dose
Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table R-21b

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill (Dust)

Population: Construction Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
SEMIVOLATILES				
Phenanthrene	ND	ND	ND	0.0
Fluoranthene	ND	ND	ND	0.0
Pyrene	ND	ND	ND	0.0
Benzo(a)anthracene	ND	ND	3.4E-10	5.3
Chrysene	ND	ND	1.6E-11	0.2
Benzo(b)fluoranthene	ND	ND	9.4E-10	14.5
Benzo(k)fluoranthene	ND	ND	6.6E-10	10.2
Benzo(a)pyrene	ND	ND	3.8E-09	58.8
Indeno(1,2,3-cd)pyrene	ND	ND	7.1E-10	11.0
Dibenz(a,h)anthracene	ND	ND	ND	0.0
Benzo(g,h,i)perylene	ND	ND	ND	0.0
METALS				
Silver	ND	ND	ND	0.0
TIC Groups				
Benzenes, oxygenated	ND	ND	ND	0.0
PAHs, non-TCL	ND	ND	ND	0.0
Totals:	0.0E+00	ND	6.5E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
Hazard Quotient = Chronic Daily Intake / Reference Dose
Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table R-22a

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: Construction Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Phenanthrene	NA	1.4E-05	NA	1.4E-05	1.1	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	2.4E-06	NA	2.4E-06	0.2	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	2.8E-06	NA	2.8E-06	0.2	NA	ND	NA	0.0E+00	0.0
Benzo(g,h,i)perylene	NA	1.7E-05	NA	1.7E-05	1.3	NA	ND	NA	0.0E+00	0.0
Total Carcinogenic PAHs	NA	ND	NA	0.0E+00	0.0	NA	6.5E-07	NA	6.5E-07	100.0
METALS										
Silver	NA	1.2E-03	NA	1.2E-03	95.6	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	3.7E-07	NA	3.7E-07	0.0	NA	ND	NA	0.0E+00	0.0
PAHs, non-TCL	NA	1.9E-05	NA	1.9E-05	1.5	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	1.3E-03	0.0E+00	1.3E-03	100.0	0.0E+00	6.5E-07	0.0E+00	6.5E-07	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-22b

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposure

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: Construction Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Phenanthrene	NA	1.4E-05	NA	1.4E-05	1.1	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	2.4E-06	NA	2.4E-06	0.2	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	2.8E-06	NA	2.8E-06	0.2	NA	ND	NA	0.0E+00	0.0
Benzo(a)anthracene	NA	ND	NA	0.0E+00	0.0	NA	6.0E-09	NA	6.0E-09	5.3
Chrysene	NA	ND	NA	0.0E+00	0.0	NA	2.8E-10	NA	2.8E-10	0.2
Benzo(b)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	1.6E-08	NA	1.6E-08	14.2
Benzo(k)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	1.1E-08	NA	1.1E-08	10.0
Benzo(a)pyrene	NA	ND	NA	0.0E+00	0.0	NA	6.7E-08	NA	6.7E-08	58.8
Ideno(1,2,3-cd)pyrene	NA	ND	NA	0.0E+00	0.0	NA	1.3E-08	NA	1.3E-08	11.5
Benzo(g,h,i)perylene	NA	1.7E-05	NA	1.7E-05	1.3	NA	ND	NA	0.0E+00	0.0
Total Carcinogenic PAHs	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
METALS										
Silver	NA	1.2E-03	NA	1.2E-03	95.6	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	3.7E-07	NA	3.7E-07	0.0	NA	ND	NA	0.0E+00	0.0
PAHs, non-TCL	NA	1.9E-05	NA	1.9E-05	1.5	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	1.3E-03	0.0E+00	1.3E-03	100.0	0.0E+00	1.1E-07	0.0E+00	1.1E-07	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table R-23

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Reasonable Maximum Exposures

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill (VOCs)

Population: Construction Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	1.1E-08	0.0	2.6E-12	0.1
Vinyl chloride	ND	0.0	3.2E-09	83.6
Chloroethane	1.3E-07	0.1	ND	0.0
Methylene chloride	1.9E-06	2.2	3.8E-11	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethene	ND	0.0	5.2E-11	1.3
1,1-Dichloroethane	3.0E-07	0.3	ND	0.0
1,2-Dichloroethene (cis)	ND	0.0	ND	0.0
1,2-Dichloroethene (trans)	ND	0.0	ND	0.0
2-Butanone	8.5E-07	1.0	ND	0.0
1,2-Dichloropropane	2.9E-05	32.2	ND	0.0
Trichloroethene	ND	0.0	3.6E-10	9.5
Benzene	1.2E-07	0.1	8.1E-11	2.1
4-Methyl-2-pentanone	2.2E-06	2.4	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	9.3E-11	2.4
Toluene	2.7E-05	30.2	ND	0.0
Chlorobenzene	3.6E-07	0.4	ND	0.0
Ethylbenzene	2.7E-06	3.0	ND	0.0
Xylenes (mixed)	2.1E-05	23.0	ND	0.0
Dichlorodifluoromethane	3.0E-06	3.3	ND	0.0
Dichlorotetrafluoroethane	2.4E-07	0.3	ND	0.0
Trichlorofluoromethane	9.9E-09	0.0	ND	0.0
Trichlorotrifluoroethane	3.8E-09	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	1.3E-06	1.5	ND	0.0
Totals:	9.0E-05	100.0	3.8E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships
Hazard Quotient = Chronic Daily Intake / Reference Dose
Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available

S

RISK ESTIMATE SUMMARY TABLES - CENTRAL TENDENCY

Table S-1

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill (VOCs)
Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	ND	0.0	1.7E-14	0.1
Vinyl chloride	ND	0.0	2.1E-11	83.6
Chloroethane	9.2E-12	0.0	ND	0.0
Methylene chloride	1.4E-09	1.1	2.5E-13	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethene	ND	0.0	3.3E-13	1.3
1,1-Dichloroethane	2.1E-09	1.6	ND	0.0
1,2-Dichloroethene (cis)	ND	0.0	ND	0.0
1,2-Dichloroethene (trans)	ND	0.0	ND	0.0
2-Butanone	1.9E-09	1.4	ND	0.0
1,2-Dichloropropane	1.9E-08	14.5	ND	0.0
Trichloroethene	ND	0.0	2.3E-12	9.5
Benzene	ND	0.0	5.2E-13	2.1
4-Methyl-2-pentanone	1.6E-08	11.8	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	6.0E-13	2.4
Toluene	5.1E-08	38.6	ND	0.0
Chlorobenzene	1.8E-10	0.1	ND	0.0
Ethylbenzene	1.9E-09	1.5	ND	0.0
Xylenes (mixed)	1.5E-08	11.2	ND	0.0
Dichlorodifluoromethane	2.1E-08	16.0	ND	0.0
Dichlorotetrafluoroethane	1.7E-09	1.3	ND	0.0
Trichlorofluoromethane	7.1E-11	0.1	ND	0.0
Trichlorotrifluoroethane	2.7E-12	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	1.1E-09	0.8	ND	0.0
Totals:	1.3E-07	100.0	2.5E-11	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S EPA's point of departure for Superfund Sites
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available

Table S-2

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Off Landfill (VOCs)

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	ND	0.0	5.8E-14	0.1
Vinyl chloride	ND	0.0	7.3E-11	83.6
Chloroethane	3.2E-11	0.0	ND	0.0
Methylene chloride	4.9E-09	1.1	8.7E-13	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethene	ND	0.0	1.2E-12	1.3
1,1-Dichloroethane	7.5E-09	1.6	ND	0.0
1,2-Dichloroethene (cis)	ND	0.0	ND	0.0
1,2-Dichloroethene (trans)	ND	0.0	ND	0.0
2-Butanone	6.7E-09	1.4	ND	0.0
1,2-Dichloropropane	6.7E-08	14.5	ND	0.0
Trichloroethene	ND	0.0	8.2E-12	9.5
Benzene	ND	0.0	1.8E-12	2.1
4-Methyl-2-pentanone	5.5E-08	11.8	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	2.1E-12	2.4
Toluene	1.8E-07	38.6	ND	0.0
Chlorobenzene	6.5E-10	0.1	ND	0.0
Ethylbenzene	6.8E-09	1.5	ND	0.0
Xylenes (mixed)	5.2E-08	11.2	ND	0.0
Dichlorodifluoromethane	7.4E-08	16.0	ND	0.0
Dichlorotetrafluoroethane	6.1E-09	1.3	ND	0.0
Trichlorofluoromethane	2.5E-10	0.1	ND	0.0
Trichlorotrifluoroethane	9.6E-12	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	3.9E-09	0.8	ND	0.0
Totals:	4.6E-07	100.0	8.7E-11	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table S-3

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Acenaphthene	NA	2.8E-10	NA	2.8E-10	0.1	NA	ND	NA	0.0E+00	0.0
Fluorene	NA	7.6E-10	NA	7.6E-10	0.2	NA	ND	NA	0.0E+00	0.0
Phenanthrene	NA	2.4E-09	NA	2.4E-09	0.6	NA	ND	NA	0.0E+00	0.0
Anthracene	NA	1.2E-10	NA	1.2E-10	0.0	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	1.2E-08	NA	1.2E-08	2.7	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	1.2E-08	NA	1.2E-08	2.7	NA	ND	NA	0.0E+00	0.0
Butylbenzylphthalate	NA	8.4E-11	NA	8.4E-11	0.0	NA	ND	NA	0.0E+00	0.0
Benzo(g,h,i)perylene	NA	2.4E-08	NA	2.4E-08	5.5	NA	ND	NA	0.0E+00	0.0
Total Carcinogenic PAHs	NA	ND	NA	0.0E+00	0.0	NA	2.4E-09	NA	2.4E-09	100.0
METALS										
Barium	NA	3.1E-07	NA	3.1E-07	71.4	NA	ND	NA	0.0E+00	0.0
Lead	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Zinc	NA	7.1E-08	NA	7.1E-08	16.4	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	9.1E-10	NA	9.1E-10	0.2	NA	ND	NA	0.0E+00	0.0
Sulfides	NA	9.1E-10	NA	9.1E-10	0.2	NA	ND	NA	0.0E+00	0.0
Totals:	NA	4.3E-07	NA	4.3E-07	100.0	NA	2.4E-09	NA	2.4E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table S-4

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Sediment

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Arsenic	NA	6.8E-06	NA	6.8E-06	96.8	NA	4.7E-10	NA	4.7E-10	100.0
Barium	NA	2.2E-07	NA	2.2E-07	3.2	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	7.0E-06	0.0E+00	7.0E-06	100.0	0.0E+00	4.7E-10	0.0E+00	4.7E-10	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table S-5

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Sand Pond
Medium: Sediment

Population: Trespasser
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
VOLATILES										
Vinyl chloride	NA	ND	NA	0.0E+00	0.0	NA	2.7E-13	NA	2.7E-13	100.0
Carbon disulfide	NA	1.1E-11	NA	1.1E-11	0.0	NA	ND	NA	0.0E+00	0.0
1,1-Dichloroethane	NA	6.5E-12	NA	6.5E-12	0.0	NA	ND	NA	0.0E+00	0.0
METALS										
Barium	NA	3.4E-07	NA	3.4E-07	82.1	NA	ND	NA	0.0E+00	0.0
Copper	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Zinc	NA	7.4E-08	NA	7.4E-08	17.9	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	4.1E-07	0.0E+00	4.1E-07	100.0	0.0E+00	2.7E-13	0.0E+00	2.7E-13	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table S-6

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Phenanthrene	NA	1.6E-09	NA	1.6E-09	1.1	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	2.7E-09	NA	2.7E-09	1.8	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	3.2E-09	NA	3.2E-09	2.1	NA	ND	NA	0.0E+00	0.0
Benzo(a)anthracene	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Chrysene	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Benzo(b)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Benzo(k)fluoranthene	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Benzo(a)pyrene	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Ideno(1,2,3-cd)pyrene	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Benzo(g,h,i)perylene	NA	1.9E-09	NA	1.9E-09	1.3	NA	ND	NA	0.0E+00	0.0
Total Non-Carc PAHs	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Total Carcinogenic PAHs	NA	ND	NA	0.0E+00	0.0	NA	6.6E-10	NA	6.6E-10	100.0
METALS										
Silver	NA	1.4E-07	NA	1.4E-07	92.0	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	4.2E-10	NA	4.2E-10	0.3	NA	ND	NA	0.0E+00	0.0
PAHs, non-TCL	NA	2.2E-09	NA	2.2E-09	1.5	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	1.5E-07	0.0E+00	1.5E-07	100.0	0.0E+00	6.6E-10	0.0E+00	6.6E-10	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table S-7

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Surface Water

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Aluminum	7.1E-06	8.9E-07	NA	8.0E-06	2.5	ND	ND	NA	0.0E+00	0.0
Barium	5.2E-06	6.5E-07	NA	5.8E-06	1.8	ND	ND	NA	0.0E+00	0.0
Lead	ND	ND	NA	0.0E+00	0.0	ND	ND	NA	0.0E+00	0.0
Manganese	2.9E-04	2.2E-05	NA	3.1E-04	95.8	ND	ND	NA	0.0E+00	0.0
TIC Groups										
Ethers, cyclic	ND	ND	NA	0.0E+00	0.0	ND	ND	NA	0.0E+00	0.0
Totals:	3.0E-04	2.3E-05	NA	3.3E-04	100.0	0.0E+00	0.0E+00	NA	0.0E+00	0.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table S-8

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendenc

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Surface Water

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Manganese	9.3E-05	6.9E-06	NA	1.0E-04	100.0	ND	ND	NA	0.0E+00	0.0
Totals:	9.3E-05	6.9E-06	NA	1.0E-04	100.0	0.0E+00	0.0E+00	NA	0.0E+00	0.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships.
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table S-9

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Sand Pond
Medium: Surface Water

Population: Trespasser
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Barium	6.6E-06	8.2E-07	NA	7.4E-06	2.5	ND	ND	NA	0.0E+00	0.0
Manganese	2.7E-04	2.0E-05	NA	2.9E-04	97.4	ND	ND	NA	0.0E+00	0.0
Sodium	ND	ND	NA	0.0E+00	0.0	ND	ND	NA	0.0E+00	0.0
TIC Groups										
Acids, non-cyclic	5.2E-08	7.5E-08	NA	1.3E-07	0.0	ND	ND	NA	0.0E+00	0.0
Totals:	2.7E-04	2.1E-05	NA	2.9E-04	100.0	0.0E+00	0.0E+00	NA	0.0E+00	0.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table S-10

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Fish

Population: Recreational User
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Ingestion	% of Total	Ingestion	% of Total
SEMIVOLATILES				
Acenaphthene	5.7E-08	1.0	ND	0.0
Fluorene	1.5E-07	2.8	ND	0.0
Phenanthrene	4.9E-07	9.0	ND	0.0
Anthracene	2.5E-08	0.5	ND	0.0
Fluoranthene	2.4E-06	43.8	ND	0.0
Pyrene	2.3E-06	42.4	ND	0.0
Benzo(g,h,i)perylene	3.1E-08	0.6	ND	0.0
Total Carcinogenic PAHs	ND	0.0	3.2E-09	100.0
Totals:	5.5E-06	100.0	3.2E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table S-11

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - On Landfill (VOCs)
Population: On-Site Workers
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	ND	0.0	3.8E-13	0.1
Vinyl chloride	ND	0.0	4.7E-10	83.6
Chloroethane	2.6E-10	0.0	ND	0.0
Methylene chloride	3.9E-08	1.1	5.6E-12	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethene	ND	0.0	7.6E-12	1.3
1,1-Dichloroethane	6.0E-08	1.6	ND	0.0
1,2-Dichloroethene (cis)	ND	0.0	ND	0.0
1,2-Dichloroethene (trans)	ND	0.0	ND	0.0
2-Butanone	5.3E-08	1.4	ND	0.0
1,2-Dichloropropane	5.4E-07	14.5	ND	0.0
Trichloroethene	ND	0.0	5.3E-11	9.5
Benzene	ND	0.0	1.2E-11	2.1
4-Methyl-2-pentanone	4.4E-07	11.8	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	1.4E-11	2.4
Toluene	1.4E-06	38.6	ND	0.0
Chlorobenzene	5.2E-09	0.1	ND	0.0
Ethylbenzene	5.5E-08	1.5	ND	0.0
Xylenes (mixed)	4.1E-07	11.2	ND	0.0
Dichlorodifluoromethane	5.9E-07	16.0	ND	0.0
Dichlorotetrafluoroethane	4.9E-08	1.3	ND	0.0
Trichlorofluoromethane	2.0E-09	0.1	ND	0.0
Trichlorotrifluoroethane	7.7E-11	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	3.1E-08	0.8	ND	0.0
Totals:	3.7E-06	100.0	5.7E-10	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e g , liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1 0e-06 (i e , one in a million) is above the U S EPA's point of departure for Superfund Sites
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships
Hazard Quotient = Chronic Daily Intake / Reference Dose
Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure Values for each route are summed to arrive at an exposure pathway total risk The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available

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Table S-12

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Off Landfill (VOCs)

Population: On-Site Workers
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	ND	0.0	1.6E-12	0.1
Vinyl chloride	ND	0.0	1.9E-09	83.6
Chloroethane	1.1E-09	0.0	ND	0.0
Methylene chloride	1.6E-07	1.1	2.3E-11	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethene	ND	0.0	3.1E-11	1.3
1,1-Dichloroethane	2.5E-07	1.6	ND	0.0
1,2-Dichloroethene (cis)	ND	0.0	ND	0.0
1,2-Dichloroethene (trans)	ND	0.0	ND	0.0
2-Butanone	2.2E-07	1.4	ND	0.0
1,2-Dichloropropane	2.2E-06	14.5	ND	0.0
Trichloroethene	ND	0.0	2.2E-10	9.5
Benzene	ND	0.0	4.9E-11	2.1
4-Methyl-2-pentanone	1.8E-06	11.8	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	5.6E-11	2.4
Toluene	5.9E-06	38.6	ND	0.0
Chlorobenzene	2.1E-08	0.1	ND	0.0
Ethylbenzene	2.2E-07	1.5	ND	0.0
Xylenes (mixed)	1.7E-06	11.2	ND	0.0
Dichlorodifluoromethane	2.4E-06	16.0	ND	0.0
Dichlorotetrafluoroethane	2.0E-07	1.3	ND	0.0
Trichlorofluoromethane	8.2E-09	0.1	ND	0.0
Trichlorotrifluoroethane	3.2E-10	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	1.3E-07	0.8	ND	0.0
Totals:	1.5E-05	100.0	2.3E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships.
Hazard Quotient = Chronic Daily Intake / Reference Dose
Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

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Table S-13

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Sediment

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Acenaphthene	NA	8.5E-10	NA	8.5E-10	0.1	NA	ND	NA	0.0E+00	0.0
Fluorene	NA	2.3E-09	NA	2.3E-09	0.2	NA	ND	NA	0.0E+00	0.0
Phenanthrene	NA	7.4E-09	NA	7.4E-09	0.6	NA	ND	NA	0.0E+00	0.0
Anthracene	NA	3.7E-10	NA	3.7E-10	0.0	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	3.6E-08	NA	3.6E-08	2.7	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	3.5E-08	NA	3.5E-08	2.7	NA	ND	NA	0.0E+00	0.0
Butylbenzylphthalate	NA	2.5E-10	NA	2.5E-10	0.0	NA	ND	NA	0.0E+00	0.0
Benzo(g,h,i)perylene	NA	7.2E-08	NA	7.2E-08	5.5	NA	ND	NA	0.0E+00	0.0
Total Carcinogenic PAHs	NA	ND	NA	0.0E+00	0.0	NA	6.0E-09	NA	6.0E-09	100.0
METALS										
Barium	NA	9.4E-07	NA	9.4E-07	71.4	NA	ND	NA	0.0E+00	0.0
Lead	NA	ND	NA	0.0E+00	0.0	NA	ND	NA	0.0E+00	0.0
Zinc	NA	2.2E-07	NA	2.2E-07	16.4	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	2.8E-09	NA	2.8E-09	0.2	NA	ND	NA	0.0E+00	0.0
Sulfides	NA	2.8E-09	NA	2.8E-09	0.2	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	1.3E-06	0.0E+00	1.3E-06	100.0	0.0E+00	6.0E-09	0.0E+00	6.0E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table S-14

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Sediment

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Arsenic	NA	2.1E-05	NA	2.1E-05	96.8	NA	1.2E-09	NA	1.2E-09	100.0
Barium	NA	6.8E-07	NA	6.8E-07	3.2	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	2.1E-05	0.0E+00	2.1E-05	100.0	0.0E+00	1.2E-09	0.0E+00	1.2E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table S-15

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Soil

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
SEMIVOLATILES										
Phenanthrene	NA	4.0E-09	NA	4.0E-09	1.1	NA	ND	NA	0.0E+00	0.0
Fluoranthene	NA	6.7E-09	NA	6.7E-09	1.8	NA	ND	NA	0.0E+00	0.0
Pyrene	NA	7.9E-09	NA	7.9E-09	2.1	NA	ND	NA	0.0E+00	0.0
Benzo(g,h,i)perylene	NA	4.8E-09	NA	4.8E-09	1.3	NA	ND	NA	0.0E+00	0.0
Total Carcinogenic PAHs	NA	ND	NA	0.0E+00	0.0	NA	1.3E-09	NA	1.3E-09	100.0
METALS										
Silver	NA	3.4E-07	NA	3.4E-07	92.0	NA	ND	NA	0.0E+00	0.0
TIC GROUPINGS										
Benzenes, oxygenated	NA	1.0E-09	NA	1.0E-09	0.3	NA	ND	NA	0.0E+00	0.0
PAHs, non-TCL	NA	5.5E-09	NA	5.5E-09	1.5	NA	ND	NA	0.0E+00	0.0
Totals:	0.0E+00	3.7E-07	0.0E+00	3.7E-07	100.0	0.0E+00	1.3E-09	0.0E+00	1.3E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available. NA indicates the route is not applicable.

Table S-16

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Silver Lake
Medium: Surface Water

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Aluminum	1.7E-05	2.2E-06	NA	1.9E-05	2.5	ND	ND	NA	0.0E+00	0.0
Barium	1.3E-05	1.6E-06	NA	1.4E-05	1.8	ND	ND	NA	0.0E+00	0.0
Lead	ND	ND	NA	0.0E+00	0.0	ND	ND	NA	0.0E+00	0.0
Manganese	7.0E-04	5.3E-05	NA	7.5E-04	95.8	ND	ND	NA	0.0E+00	0.0
TIC Groups										
Ethers, cyclic	ND	ND	NA	0.0E+00	0.0	ND	ND	NA	0.0E+00	0.0
Totals:	7.3E-04	5.6E-05	NA	7.9E-04	100.0	0.0E+00	0.0E+00	NA	0.0E+00	0.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table S-17

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Pine Lake
Medium: Surface Water

Population: On-Site Worker
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
METALS										
Manganese	2.2E-04	1.7E-05	NA	2.4E-04	100.0	ND	ND	NA	0.0E+00	0.0
Totals:	2.2E-04	1.7E-05	NA	2.4E-04	100.0	0.0E+00	0.0E+00	NA	0.0E+00	0.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships.
   Hazard Quotient = Chronic Daily Intake / Reference Dose
   Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

Table S-18

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Landfill
Medium: Ambient Air - Offsite (VOCs)

Population: Off-Site Resident
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS		CANCER RISKS	
	Inhalation	% of Total	Inhalation	% of Total
VOLATILES				
Chloromethane	ND	0.0	4.0E-12	0.1
Vinyl chloride	ND	0.0	5.0E-09	83.6
Chloroethane	2.2E-09	0.0	ND	0.0
Methylene chloride	3.3E-07	1.1	5.9E-11	1.0
Acetone	ND	0.0	ND	0.0
1,1-Dichloroethene	ND	0.0	8.0E-11	1.3
1,1-Dichloroethane	5.1E-07	1.6	ND	0.0
1,2-Dichloroethene (cis)	ND	0.0	ND	0.0
1,2-Dichloroethene (trans)	ND	0.0	ND	0.0
2-Butanone	4.6E-07	1.4	ND	0.0
1,2-Dichloropropane	4.6E-06	14.5	ND	0.0
Trichloroethene	ND	0.0	5.6E-10	9.5
Benzene	ND	0.0	1.3E-10	2.1
4-Methyl-2-pentanone	3.8E-06	11.8	ND	0.0
2-Hexanone	ND	0.0	ND	0.0
Tetrachloroethene	ND	0.0	1.4E-10	2.4
Toluene	1.2E-05	38.6	ND	0.0
Chlorobenzene	4.4E-08	0.1	ND	0.0
Ethylbenzene	4.7E-07	1.5	ND	0.0
Xylenes (mixed)	3.5E-06	11.2	ND	0.0
Dichlorodifluoromethane	5.1E-06	16.0	ND	0.0
Dichlorotetrafluoroethane	4.2E-07	1.3	ND	0.0
Trichlorofluoromethane	1.7E-08	0.1	ND	0.0
Trichlorotrifluoroethane	6.6E-10	0.0	ND	0.0
4-ethyl toluene	ND	0.0	ND	0.0
1,3,5-Trimethylbenzene	ND	0.0	ND	0.0
1,2,4-Trimethylbenzene	ND	0.0	ND	0.0
SEMIVOLATILES				
1,4-Dichlorobenzene	2.6E-07	0.8	ND	0.0
Totals:	3.2E-05	100.0	6.0E-09	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
2. Hazard quotient and cancer risks are unitless values which represent the probability of incurring an adverse health effect. These risk values are calculated using the following relationships:
Hazard Quotient = Chronic Daily Intake / Reference Dose
Cancer Risk = Chronic Daily Intake x Slope Factor
3. Hazard Quotients and cancer risks are summarized for applicable routes of exposure. Values for each route are summed to arrive at an exposure pathway total risk. The percentage of total risk is also shown for each compound. In some cases, risks were not determined (ND) because the reference dose or slope factors were not available.

mdux/jobs/6072100/RA3/R.XLS
7/19/94

Table S-19

SUMMARY OF NONCANCER HAZARDS AND CANCER RISKS
Central Tendencies

Blackwell Landfill Site
DuPage County, Illinois

Source Area: Private Wells
Medium: Groundwater

Population: Off-Site Resident
Land Use: Current Use Scenario

CHEMICAL OF POTENTIAL CONCERN	HAZARD QUOTIENTS					CANCER RISKS				
	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total	Dermal Absorp.	Ingestion	Inhalation	Total	% of Total
VOLATILES										
1,1-Dichloroethane	5.4E-07	1.8E-04	4.7E-04	6.5E-04	0.1	ND	ND	ND	0.0E+00	0.0
1,2-Dichloroethene (cis)	1.3E-05	3.6E-03	ND	3.6E-03	0.7	ND	ND	ND	0.0E+00	0.0
PESTICIDE/PCB										
Dieldrin	4.9E-04	3.6E-03	ND	4.1E-03	0.8	5.0E-08	3.7E-07	ND	4.2E-07	93.3
4,4'-DDE	ND	ND	ND	0.0E+00	0.0	9.9E-09	7.8E-09	ND	1.8E-08	4.0
Endrin	1.1E-04	8.3E-04	ND	9.5E-04	0.2	ND	ND	ND	0.0E+00	0.0
4,4'-DDD	ND	ND	ND	0.0E+00	0.0	8.7E-09	3.3E-09	ND	1.2E-08	2.7
Endrin Aldehyde	2.0E-05	1.8E-04	ND	2.0E-04	0.0	ND	ND	ND	0.0E+00	0.0
METALS										
Aluminum	ND	ND	ND	0.0E+00	0.0	ND	ND	ND	0.0E+00	0.0
Antimony	1.3E-01	3.7E-01	ND	5.0E-01	93.8	ND	ND	ND	0.0E+00	0.0
Nickel	6.9E-05	1.9E-02	ND	1.9E-02	3.6	ND	ND	ND	0.0E+00	0.0
Silver	9.2E-05	4.3E-03	ND	4.4E-03	0.8	ND	ND	ND	0.0E+00	0.0
Sodium	ND	ND	ND	0.0E+00	0.0	ND	ND	ND	0.0E+00	0.0
TIC Groups										
Hydrocarbons, branched	ND	ND	ND	0.0E+00	0.0	ND	ND	ND	0.0E+00	0.0
Hydrocarbons, cyclic	ND	ND	ND	0.0E+00	0.0	ND	ND	ND	0.0E+00	0.0
Totals:	1.3E-01	4.0E-01	4.7E-04	5.3E-01	100.0	6.9E-08	3.8E-07	0.0E+00	4.5E-07	100.0

Notes:

1. A noncancer risk estimate (HQ) of greater than 1 indicates the potential of noncancer effects (e.g., liver disease) to occur in humans exposed at an assumed level and duration to a contaminated medium. A cancer risk level of greater than 1.0e-06 (i.e., one in a million) is above the U.S.EPA's point of departure for Superfund Sites.
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T

DOCUMENTATION OF FPD'S INABILITY TO SELL THE BLACKWELL FOREST PRESERVE

Ray Soden
President

RECEIVED
JUN 20 1992

June 16, 1992

Warzyn Engineers
435 Devon Park Drive
Suite 702
Wayne, PA 19087

Attn: Peter J. Vagt, PH.D

RE: FOREST PRESERVE DISTRICT LEGAL OPINION
BLACKWELL PRESERVE

Dear Peter:

Attached is Legal Opinion on the sale of Forest Preserve property.

Very Truly Yours,

Richard L. Utt
Director
Government Services

Attachment

cc: R. Lance/USEPA
R. Lanham/IEPA

Forest Preserve District of DuPage County
P.O. Box 2339 • Glen Ellyn, IL 60138 • 708/790-4900 FAX 708/790-1071

Ray Soden, President **Michael R.Formento**, Vice-President **Gary A. King**, Secretary **S. Patricia Trowbridge**, Treasurer

Nadelhoffer, Campbell, Kuhn, Mitchell, Moss & Saloga, P.C.
Attorneys at Law

Carleton Nadelhoffer
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James E. Saloga
Gary E. Campbell

Alan E. Lechowicz
Robert I. Mork
John F. Argoudelis
Annette C. Kraus

June 12, 1992

Mr. Richard Utt
Forest Preserve District
of DuPage County
P.O. Box 2339
Glen Ellyn, IL 60138

Re: Sale of Blackwell to a Private Party

Dear Mr. Utt:

Pursuant to your request, I am writing to confirm the opinion that I gave during our telephone conversation of June 10, 1992, concerning the sale of District property. Specifically, you had asked whether the District can sell any portion of the Blackwell Forest Preserve to a private party. As I indicated in our conversation, the District lacks the power to sell any portion of the Blackwell Forest Preserve to a private party.

It is firmly established that units of government that do not possess home rule powers--such as the District--derive their authority solely from the legislature. Accordingly, they can exercise only the powers which have been expressly granted by statute, together with such implied powers that are necessarily incident to those expressly granted. Ill. Const. 1970, art. VII, sec. 8; Marquette Properties, Inc. v. City of Wood Dale (1987), 159 Ill. App. 3d 307, 512 N.E.2d 371, 373; Charlton v. Champaign Park District (1982), 110 Ill. App. 3d 554, 442 N.E.2d 915, 917.

The only statutory authority for selling forest preserve property to a private party is found in sections 6 and 6c of the Downstate Forest Preserve District Act, Ill. Rev. Stat. 1991, ch. 96-1/2, pars. 6309, 6311.1, neither of which has any application to the sale of a portion of the Blackwell Forest Preserve. Section 6 authorizes a forest preserve district to purchase a parcel of property and to sell a portion thereof within 30 days after the acquisition. Section 6c, on the other hand, deals with the sale of a golf course clubhouse when there are two clubhouses serving two contiguous golf courses owned by a forest preserve district.

111 East Jefferson Avenue, P.O. Box 359, Naperville, Illinois 60566-0359 (708) 355-1700
Fax: (708) 355-0458

Since the power to sell forest preserve property to a private party is limited to the two examples cited above, it is clear that the District has no authority to sell any portion of the Blackwell Forest Preserve. Such authority can only be conferred by action on the part of the legislature.

Please feel free to contact me if I can be of any further assistance in this matter.

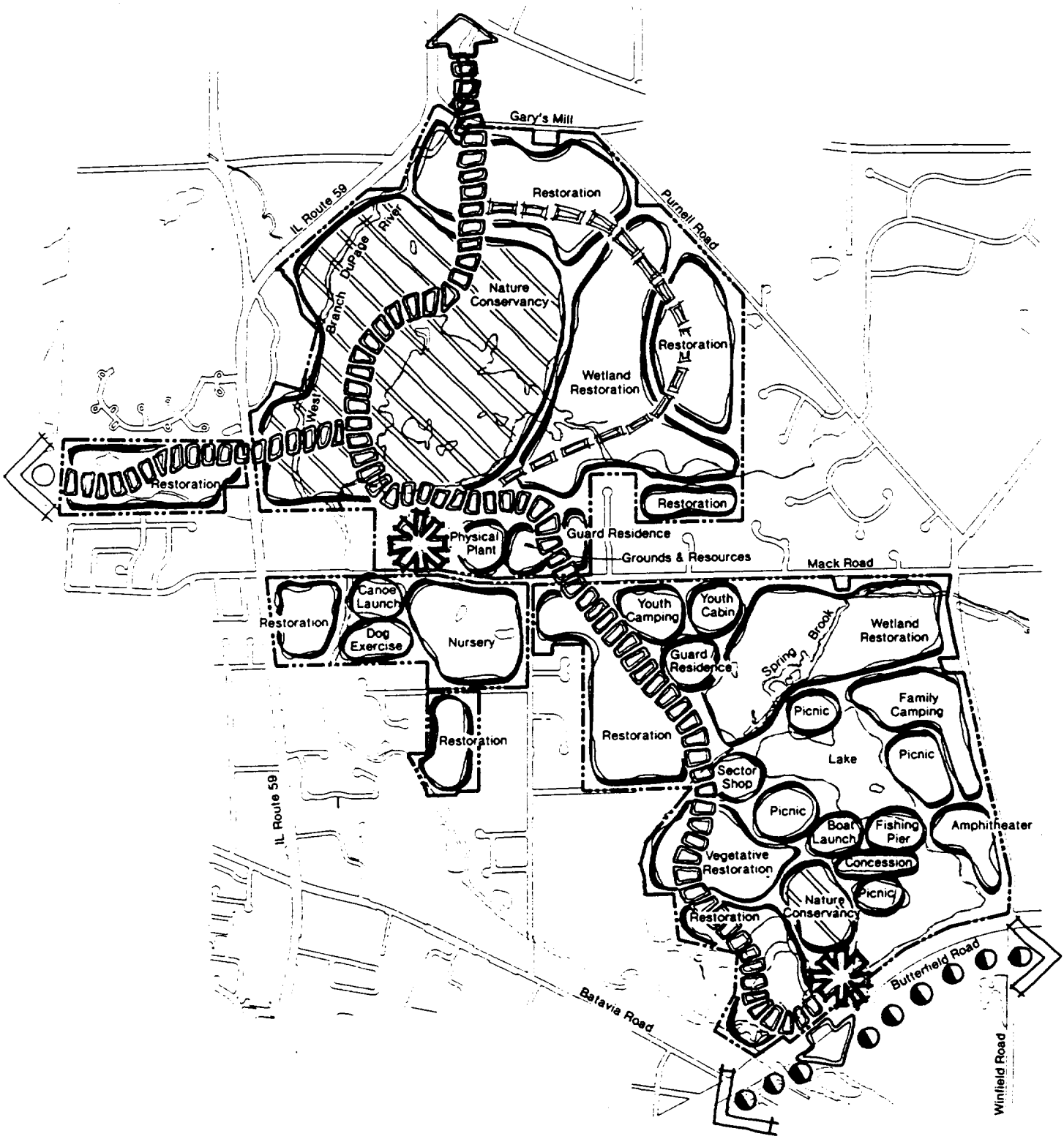
Very truly yours,

Robert I. Mork

Robert I. Mork

RIM:tb

cc: H. C. Johnson



Blackwell

Conceptual Master Plan

Forest Preserve District of DuPage County

Date: July 13, 1992
Project Number: Z-450-32

Revised 8-20-92
Revised 8-13-92

0 450 900 1800

North

Key

Nature Conservancy

Facilities or Nature Zones

Picnic

Restoration

Trailhead/Parking

Trail Origin

Regional Preserve Trail

Preserve Trail Loop

Regional County Trail

Proposed Regional County Trail

U

TOXICITY PROFILES

U

TOXICOLOGY PROFILES FOR CHEMICALS OF POTENTIAL CONCERN

Toxicity profiles are presented for most chemicals of potential concern detected at the site. Adverse chemical effects may be quite different depending upon the magnitude and duration of exposure. Therefore, the most applicable effects associated with exposure to the Site would be due to low level and long-term exposure to the chemicals of potential concern. Chemical effects associated with long-term exposure are presented along with the carcinogenic potential of the chemicals.

The toxicity information contained in the profiles was obtained from one or more of the following sources:

- Patty's Industrial Hygiene and Toxicology
- Health Effects Assessment Summary Tables (1993)
- Coastward and Doull's Toxicology
- Integrated Risk Information System (IRIS)
- Health Effects Assessments Documents (HEA)

The following are summaries of health effects associated with exposure to the primary chemicals of potential concern at the Site (i.e., contributed greater than 20% of the risk associated with a particular medium). Chemical-specific profiles are provided for most chemicals of potential concern, but some chemicals which have similar toxicological effects are either addressed generically as a group, (e.g., chlorinated cyclodienes), or are represented by a specific chemical of potential concern, which represents the toxicology of the other chemicals in the group (e.g., carcinogenic polycyclic aromatic hydrocarbons (PAHs)). The following chemicals did not contribute significantly to the total health risks in any media on-site, and for this reason, toxicity profiles were not developed.

- Chloromethane
- Carbon Disulfide
- Chloroethene
- 2-Butanone

- Trimethylbenzenes
- Selenium
- Sodium
- Dichlorotetrafluromethane
- Trichlorotrifluroethane
- Chlorobenzene
- 4-Ethyltoluene
- Copper
- Dichlorodifluromethane
- Trichlorofluromethane

SPECIAL NOTE TO THE READER

The toxic effects which are summarized in these toxicity profiles do not represent effects which would be anticipated to occur to persons exposed to the soil, surface water, sediment, air, or fish at the Blackwell Forest Preserve. Based on the conclusions of the Baseline Risk Assessment, deleterious health effects are not anticipated to occur to exposed individuals. Therefore, the toxicity information is provided for information purposes only, as required by the U.S. EPA.

ACETONE

Effects from Long-Term Exposure

Limited chronic toxicity data exists for acetone. Occupational exposure studies which have been conducted on inhalation exposure to acetone, revealed evidence of eye and nose irritation but there was no evidence of other toxic effects. No pertinent data regarding the teratogenic effects of acetone were identified in the literature. It has been found in animal studies that acetone can potentiate the effects of a number of chlorinated alkanes (e.g., carbon tetrachloride, and trichloroethane).

Carcinogenic Potential

There is no pertinent information available on the carcinogenicity of acetone in the literature, but acetone does not show mutagenic activity in microbial assay systems, cell transformation systems or appear to damage DNA.

ALUMINUM

Effects from Long-Term Exposure

Aluminum appears to have a low order of toxicity based on the information in the available literature. Most common forms of aluminum are not absorbed well through the gastrointestinal tract. For example, aluminum sulfate (alum) which is used as a food additive. However at relative high doses of certain forms of aluminum, central nervous, skeletal, and hematological systems have been affected in humans and laboratory animals. In addition, it has been hypothesized that aluminum exposure may be related to Alzheimer's Disease (AD). However, currently there is no evidence that this is a causal relationship between aluminum exposure and AD in humans.

Carcinogenic Potential

Based on the available literature a definitive determination of the carcinogenic potential of aluminum in humans could not be made. The data which is available provides mixed results. In fact, some studies even support the idea that aluminum may be anti-tumorigenic. The metal is currently not classified by the U.S. EPA as a carcinogen (i.e., class D).

ANTIMONY

Effects from Long-Term Exposure

Information on long-term exposure to antimony in humans exists, but its relevance is limited because exposures to arsenic usually accompanied the exposure to antimony. Nonetheless, chronic occupational exposure to the metal via inhalation has been reported to cause upper respiratory tract irritation, pneumonitis, dizziness, diarrhea, vomiting, and dermatitis.

The only data reported in the available literature on low level and long-term exposure to antimony was a lifetime exposure study of the metal in rats. Rats administered antimony in their drinking water had shortened life spans and altered blood chemistry compared to unexposed rats.

Antimony is a suspected human teratogen and reproductive toxicant. Female workers chronically exposed to antimony in the work place had a higher incidence of late, spontaneous abortions and premature births than unexposed controls.

Animals studies have repeatedly shown a causal link between antimony exposure and reduced reproductive capacity in laboratory animals. In rats and rabbits the number of pregnancies were reduced, and the frequencies of abortions were increased.

Carcinogenic Potential

No clear evidence could be found in the available literature which links human exposure to antimony with increases in the incidence of cancer. The studies reported did not control for confounding factors (i.e., smoking) or did not follow workers for a long enough period post-exposure to determine if there was an association between cancer (i.e., lung) and antimony exposure.

In a lifetime cancer bioassay conducted with rats, the incidence of cancer in exposed (i.e., orally) versus nonexposed rats were not different, indicating that antimony may not be an animal carcinogen via the oral route. More recent cancer bioassays conducted with rats have shown qualitative evidence that antimony may be an animal carcinogen when inhaled.

ARSENIC

Noncancer Effects from Long-Term Exposure

Chronic worker exposure to arsenic compounds primarily affect the skin, mucous membranes, gastrointestinal tract, central nervous system and less commonly the liver and circulatory system.

There is some evidence from animal studies that implicates arsenic as a teratogen and reproductive toxicant. Mice exposed to arsenic as arsenate or arsenite during gestation had increased numbers of fetal reabsorptions, fetal deaths, and fetuses with exencephaly, and short jaws. The trivalent arsenite was much more toxic than then pentavalent arsenate at an equivalent arsenic dose.

Carcinogenic Potential

Arsenic compounds, particularly trivalent inorganic salt, have been associated with skin and lung carcinomas in humans. Arsenic is a Group A, human carcinogen. Based on epidemiology studies conducted on workers in smelting facilities, inhalation of dust containing arsenic have been shown to cause an increase in lung cancers. In addition to occupational studies that have examined cancer risks associated with arsenic tainted dust exposure, epidemiologic studies which have examined populations with increased arsenic exposure from drinking water have found a does-response relationship between arsenic water concentration and the incidence of skin cancer risk. Ingestion of arsenic contaminated water may also cause liver, lung, kidney, and bladder cancer.

BARIUM

Noncancer Effects from Long-Term Exposure

High barium concentrations in public drinking water supplies have been associated with elevated blood pressure in humans. Clinical studies to confirm this have not revealed any toxicity, including increased blood pressure, at a dose level as high as 10 mg/day.

Most animal studies that have been conducted have also detected no association between barium exposure and increased blood pressure. A single study with rats revealed increased blood pressure, but this was potentially attributable to other mineral deficiencies in the exposed rat population.

In occupational studies barium dust has been shown to cause baritosis. No symptoms of toxicity are evident other than workers have a significantly higher incidence of increased blood pressure.

Carcinogenic Potential

No appropriate information could be located in the available literature on the carcinogenic potential of barium in humans. Based on negative results in animal and mutation bioassays, barium does not appear to be a carcinogen. The metal is currently not classified by the U.S. EPA as a carcinogen (i.e., class D).

BENZENE

Noncancer Effects from Long-Term Exposure

Two general effects on the human blood system have been associated with chronic benzene exposure: cytotoxic blood disorders and carcinogenic blood disorders. The main organ that is affected is the bone marrow which produces red and white blood cell precursors. The cytotoxic blood disorders include a plastic anemia (a significant reduction in white blood cells, red blood cells and platelets) and cytogenetic changes in the nucleus of bone marrow cells and circulating lymphocytes.

Based on the available literature, there is no clear evidence that benzene is a reproductive toxicant after long-term exposure to low levels of the chemical. In animal studies, despite some maternal toxicity and embryonic resorption, no strong evidence of teratogenesis has been seen in animal studies.

Carcinogenic Potential

Data from studies of persons with known exposure to benzene indicate that benzene is a human carcinogen. Acute myeloblastic leukemia is a cancer of the blood cells, which has been associated with benzene exposure. Of note in human case reports is the long delay between the cessation of a known benzene exposure and the onset of leukemia. The U.S. EPA classifies benzene as a Group A, human carcinogen.

BUTYLBENZYL PHTHALATE

Effects from Long-Term Exposure

There was not information in the available literature on either human or animal health effects associated with long-term exposure to butylbenzyl phthalate. There was no information in the available literature on the teratogenic and reproductive effects of butylbenzyl phthalate in humans. Butylbenzyl phthalate is reported to be a reproductive toxicant to rats but at very high dose levels. The lowest reported toxic dose (TDLO) to exposed male rats was 21 g/kg.

Carcinogenic Potential

There was no information in the available literature on the carcinogenic or mutagenic potential of butylbenzyl phthalate in the human. Butylbenzyl phthalate is classified C, a possible human carcinogen based on animal data. A National Toxicology Program cancer bioassay indicated that butylbenzyl phthalate was not a carcinogen in mice, but the results for rats were indefinite.

CHLORINATED CYCLODIENE INSECTICIDES (DIELDRIN, ENDRIN)

Dieldrin and endrin are members of a class of insecticides called the chlorinate cyclodiene's (cyclodiene's). Endrin aldehyde is a degradation product of endrin. Because the compounds have similar chemical structures, their modes of toxicity are quite similar. For example, each of the cyclodiene's is considered a carcinogen in laboratory mice due to increases in liver cancer. Therefore, the generic toxicology of the group of compounds is presented rather than chemical specific data.

Effects from Long-Term Exposure

No data was available in the available literature on the effects of long-term cyclodiene exposure to humans.

Long-term exposure to cyclodiene's have been found to cause liver, kidney, lung, myocardium, adrenal glands, and spleen damage in laboratory animals. The no-effect-level (NOEL) over long-term exposure to chemicals have been estimated to be quite low for this class of compounds. For example, the no-effect-level (NOEL) for long-term exposure to heptachlor (another cyclodiene) was estimated to be 0.125 mg/kg per day in the dog.

Data on the teratogenic or reproductive toxicity of cyclodiene's in laboratory animals was mixed. It appears that at high dose levels of cyclodiene's, these compounds may be reproductive toxicants (e.g., reduced fertility of the mother and viability of young), but at low doses no effects are apparent. The reproductive effects occur at similar dose levels which produce other effects (i.e., liver damage) in the animals.

Carcinogenic Potential

Cyclodiene exposure in the workplace during production of the pesticides has been associated, but not causally linked, to forms of bone cancer (i.e., aplastic anemia and leukemia).

Although there was no clear evidence linking human exposure to cyclodiene's to cancer, long-term cancer bioassays in laboratory animal studies have indicated that the compounds are liver carcinogens. Cyclodiene's have been reported to produce liver (rats and mice) and endocrine organ (rats) tumors. Based on the weight of evidence, the U.S EPA has classified cyclodienes (i.e., dieldrin and endrin) as probable human carcinogens (B2). The slope factors for the cyclodienes are based on the incidence of liver cancer in mice exposed to the insecticides.

1,1-DICHLOROETHANE (DCA)

Effects from Long-Term Exposure

Data on human toxicity associated with long-term exposure to 1,1,-DCA could not be located in the available literature. The only long-term studies have been conducted with mice and rats. These studies indicate that the compound has a relatively low order of toxicity. Studies utilizing 2 to 3 gram oral doses found trends but not statistical differences in the mortality and weight gain of treated animals.

Data on the toxicity associated with long-term exposure to 1,1,-DCA via inhalation could not be located in the available literature. Teratogenic or reproductive effects have been found to occur in the rat, but only after inhalation of large doses of 1,1,-DCE. The NOEL for rats via inhalation was calculated to be 3,300 mg/kg/day. Other data on the teratogenic or reproductive effects of 1,1,-DCE could not be located in the available literature.

Carcinogenic Potential

1,1- dichloroethane is classified as a B2- probable human carcinogen. The compound has been found to cause increases in tumors (both benign and cancerous) in rats and mice. The oral slope factor for the compound was developed based on increases in hemangiosarcoma in rats.

1,2-DICHLOROETHENES (cis or trans) (DCE)

Noncancer Effects from Long-Term Exposure
Data on the effects of long-term, low level 1,2-DCE exposure to humans could not be located in the available literature.

Toxicological results from animal studies indicate that exposed animals exhibit loss of appetite, decreases in body weight and pathological changes in lung, liver, blood and kidneys at relatively high dose levels and over short periods of exposure. Effects associated with long-term exposure could not be located in the available literature.

The U.S. EPA selected studies on the health effects of rats and mice to estimate the risk of noncancer effects due to human exposures to cis and trans 1,2-DCE, respectively. Effects on blood were used as a measure of toxicity in the mouse, while changes in liver enzyme levels were used as a measure of toxicity in the rat.

No data on the potential for 1,2-DCE to be a reproductive toxicant in humans or animals could be identified.

Carcinogenic Potential
Data could not be located in the available literature to assess the carcinogenic potential of 1,2-DCE to humans or animals. Based on the chemicals low potential to produce mutations in a variety of in-vitro laboratory bioassays, it appears that this chemical may have a low potential to produce cancer. The U.S EPA classifies this chemical as D- a nonclassified chemical.

1,2-DICHLOROPROPANE

Effects from Long-Term Exposure

There was information on the long-term health effects of 1,2-dichloropropane in the available literature. Subchronic exposure of rodent species (rats and mice), has been shown to cause hyperplasia of the nasal mucosa (i.e., precurser to benign tumors of the lining of the nasal passages). Studies on the dose-effect relationship between 1,2-dichloropropane and nasal hyperplasia were used to develop the inhalation reference dose for this compound.

Carcinogenic Potential

No appropriate information could be located in the available literature on the carcinogenic potential of 1,2-dichloropropane in humans. Based on the positive results in animal and mutation bioassays, the compound appears to be a carcinogen. The solvent was found to cause liver cancer in mice chronically exposed via gavage (i.e., intubation into the stomach). 1,2- dichloropropane is currently classified by the U.S. EPA as a probable human carcinogen (i.e., class B2).

4,4-DDT

The health effects associated with only 4,4-DDT are described below, however, the health effects of 4,4-DDT, 4,4-DDE, 4,4-DDD are similar to one another. The latter two commons are degradation products of 4,4-DDT.

Effects from Long-Term Exposure

Long-term exposure to DDT has been tolerated by humans in many countries without apparent signs of toxicity. Long-term exposure to DDT has been shown to cause an increase in liver weight in a number of animal species. High dose exposures to the chemical causes tremors in exposed animals. In the available literature , a relationship between human exposure to DDT and either teratogenic or reproductive effects was not indicated.

Animal studies have shown a clear link between moderate levels of DDT exposure and adverse reproductive effects in other mammalian species. Effects observed include embryotoxicity and decreased fertility.

Carcinogenic Potential

Human exposure over the past 45 years has not been associated with increases in cancer, although the chemical has been shown to cause liver cancer and leukemia in some species of laboratory animals. It appears improbable that DDT is a potent human liver carcinogen since the rate of liver cancer in the human population has decreased since DDT's use started in the mid 1940's.

The U.S EPA based on the weight of evidence has classified DDT as a B2 carcinogen- probable human carcinogen.

1,4-DICHLOROBENZENE

Noncancer Effects from Long-Term Exposure

Long-term exposure studies on the effects of 1,4-dichlorobenzene to humans could not be located in the available literature. However, chronic oral exposure studies have been conducted with laboratory animals. Rats exposed for 192 days to high doses of 1,4 dichlorobenzene (i.e., 376 mg/kg) had increased liver and kidney weights. The liver revealed evidence of cirrhosis and local necrosis. Similar liver and kidney changes were detected in rabbits exposed for 1 year to either 500 or 1000 mg/kg of 1,4 dichlorobenzene. Even at the low dose, rabbits suffered from body weight reductions, tremors, weakness, and focal necrosis of the liver.

Very little information was available in the literature on the teratogenic or fetotoxic effects of 1,4 dichlorobenzene. A case study of a pregnant woman who developed pica for 1,4 dichlorobenzene found that upon neonatal examination of the child there were no apparent abnormalities.

Carcinogenic Potential

1,4-dichlorobenzene is classified C, a possible human carcinogen. Sufficient animal data indicates that 1,4-dichlorobenzene is an animal carcinogen, but there is a lack of data to support the fact that the chemical is a human carcinogen.

1,4-dichlorobenzene has been shown to cause mitotic changes in somatic chromosomes which included separation of chromatids, chromosome bridges, and chromosome breakage.

LEAD

Noncancer Effects From Long-Term Exposure

In general, the most sensitive system to long term lead exposure is the hematopoietic system. Lead inhibits two key enzymes in the heme synthesis pathway. At high levels, heme synthesis is depressed to the extent that anemia occurs. At high levels of chronic lead exposure, the nervous system, kidneys, and GI tract may also be affected.

Mental deterioration, hyperkinetic or aggressive behavior, sleeping disorders, vomiting have all been associated with chronic lead exposure. There is evidence that various types of neural dysfunction, resulting in permanent learning disabilities, can exist in apparently asymptomatic children. Decreased nerve conduction velocities have been documented in children and adults due to lead exposure. Children are especially sensitive to low-level exposure to lead.

There is little evidence that relatively high prenatal exposure to lead decreases the reproductive capability of women. Lead seems to have detrimental effects on the male reproductive system, however, producing gonadal impairment. Recently, there has been evidence indicating that lead has detrimental effects on the developing human fetus.

Carcinogenic potential

Four epidemiology studies which have been conducted on occupational cohorts exposed to lead have not conclusively linked lead exposure with an increased incidence of cancer. Some studies have found a positive association between lead exposure and cancer while others have not. In general, the studies lack quantitative exposure information, and the sites of cancer (i.e., liver or kidney) are not consistent from study to study. The studies did not account for other known exposures to carcinogens (i.e., arsenic).

Although there is not sufficient evidence to causally link lead exposure and cancer in the human, a number of animal studies have shown associations between lead exposure and renal cancer. Lead is classified as a B2; probable human carcinogen.

Supporting data indicates that lead is mutagenic. Forms of lead have induced cell transformation in hamster embryo cells, as well as enhanced the incidence of simian adenovirus induction. Lead has been found to induce chromosomal aberrations both in-vivo and in-vitro.

MANGANESE

Noncancer Effects from Long-Term Exposure

Manganese is a essential trace nutrient in the human diet. The National Research Council (NRC) has determined a safe level of manganese ingestion to be 2-5 mg/day. Manganese ingested orally is one of the least toxic trace metals. At high concentrations in drinking water 14 to 28 mg/L, manganese can cause lethargy, increased muscle tone, tremors, and mental disturbances. The human body efficiently regulates manganese, therefore unless the dose of manganese becomes excessive, the body can regulate a constant blood serum concentration of manganese.

Inhalation exposure to manganese in the occupational environment has been associated with lung and central nervous system effects for decades. Such effects included pneumonia and mental disturbances.

Carcinogenic Potential

No appropriate information could be located in the available literature on the carcinogenic potential of manganese in humans. Based on negative results in animal studies and weak results in only a small proportion of the mutation bioassays reviewed, manganese does not appear to be a carcinogenic. The metal is currently not classified by the U.S. EPA as a carcinogen (i.e., class D).

METHYL ISOBUTYL KETONE (MIBK) or 4-METHYL-2-PENTANONE

Effects From Long-Term Exposure

The most apparent manifestation of MIBK toxicity appears to be its narcotic effect. Renal and hepatic toxicity have also been reported by several investigators in animal studies. In a subchronic inhalation study conducted on monkeys, dogs, and rats, inflammation was found to occur in the kidneys of exposed monkeys. The exposed rats had kidney damage (i.e., proximal tubuler degeneration) and increased kidney and liver weights.

There was no readily available information on the effects associated with chronic MIBK exposure to humans. Studies conducted on a variety of animal species have found no toxic neuropathy although exposure to the chemical has been found to cause transient anesthesia and the reduction of body weight. There was no readily available information on the teratogenic or reproductive effects of MIBK.

The reference dose was based on a subchronic rat oral bioassay in which increased liver and kidney weight, as well as kidney toxicity was detected. The highest concentration of the chemical which caused no observable effect (NOEL) was 50 mg/kg/day. An uncertainty factor of 1000 was used to account for interspecies and intraspecies variations (i.e., factor of 100), and to extrapolate from short-term to long-term exposure (i.e., factor of 10). The U.S. EPA associates a low confidence with the oral reference dose of MIBK because of the limited animal study data, and lack of applicable human data.

Carcinogenic Potential

Presently, MIBK has not been evaluated by the U.S. EPA for evidence of human carcinogenic potential. There was no information on the mutagenic or carcinogenic potential of MIBK in the available literature.

METHYLENE CHLORIDE

Effects from Long-Term Exposure

There is little evidence that long term exposure to methylene chloride causes systemic toxicity in animals or humans. After a lifetime of inhalation exposure to methylene chloride, hamsters were unaffected. Rats which had similar exposure to methylene chloride had increased liver weight and some histological changes, but only at a very high methylene chloride concentration (3,500 ppm). There is little data on the long term health effects of methylene chloride in humans. An epidemiological study conducted on males who had been exposed to methylene chloride for up to 30 years found no evidence of an increased rate of mortality or incidence of malignant tumors.

There is no available evidence that methylene chloride causes teratogenic effects in animals. Only at high methylene chloride air concentrations is there evidence that methylene chloride is embryotoxic (e.g., lower birth weight). There is no data available to evaluate the human teratogenic or reproductive effects of methylene chloride.

Carcinogenic Potential

Methylene chloride is a possible mutagen. Methylene chloride tested positive in the ames test, but in an in vivo animal study, it did not cause any increase in chromosome aberrations in bone marrow cells. Carcinogenicity studies conducted with methylene chloride indicate that the chemical at this time, cannot be ruled out as a possible carcinogen in laboratory animals. Present animal studies indicate that methylene chloride may be a weak carcinogen in animals. The U.S. EPA classifies methylene chloride as a Group B2, probable human carcinogen.

NONCARCINOGENIC POLYNUCLEAR AROMATIC HYDROCARBONS (PAHS)- NAPHTHALENE

Limited toxicity information is available for the noncarcinogenic PAHs detected at the site. For this reason, the toxicity of the most studied, and generally most toxic, noncarcinogenic PAH (i.e., naphthalene) has been summarized. The following were the noncarcinogenic PAHs which were detected at the site:

- Acenaphthene
- Fluorene
- Phenathrene
- Anthracene
- Fluoranthene
- Pyrene
- Benzo(g,h,i)perylene

Effects From Long-Term Exposure

Little is known about the chronic health effects of naphthalene. Most of the chronic effects associated with naphthalene exposure have been documented in industry where exposures were high (but undocumented). The general effects from chronic xylene exposure to the ocular system have been corneal ulceration, and cataracts. Dermal exposure to xylene has caused erythema and dermatitis. Chronic inhalation of naphthalene vapors can cause malaise, headache, and vomiting. There is not pertinent data on the teratogenicity of naphthalene. It is known that naphthalene is fetotoxic to infants causing hemolytic anemia. In the rabbit it causes retinal damage and cataracts.

Carcinogenic Potential

Naphthalene was not found to be genotoxic in in vitro cell transformation assays with either rodent embryo cells, or murine mammary gland cells. Naphthalene was not found to be mutagenic in bacterial/microsomal assay systems. Based on a rat cancer bioassay conducted on naphthalene, oral ingestion of naphthalene did not result in an increased incidence of cancer. Based on the weight of evidence, the U.S. EPA has classified naphthalene as a noncarcinogen.

NICKEL

Noncancer Effects from Long-Term Exposure

Information was not available within the available literature on the health effects associated with long-term low level ingestion or inhalation of nickel compounds by humans. Animal studies have shown that drinking water concentrations of 5 parts per million (ppm) nickel caused reduction in the mean body weight of exposed treatments of rats. It has also been shown that at this water concentration, nickel is a reproductive toxicant. In multiple generation exposure studies conducted with rats, the rate of neonatal mortality was increased in all generations.

Inhalation of nickel has been associated with pathological changes in the respiratory tract of laboratory animals at high dose levels (i.e., 15 mg/M3), but no information was available on low dose chronic inhalation exposures to nickel in the available literature.

Carcinogenic Potential

Long-term high dose exposure of humans to nickel refinery dust in the occupational work environment has been associated with cancers of the respiratory tract. The majority of carcinomas occurred in the nasal passages, while fewer cases of lung cancer have been detected. The U.S. EPA classifies nickel as a human carcinogen (i.e., Class A).

Currently, little evidence occurs which conclusively suggests that nickel is a carcinogen if ingested. For this reason, the U.S. EPA has classified nickel from this route of exposure as unclassified (i.e., Class D).

POLYCHLORINATED BIPHENYLS (PCB)

Effects From Long-Term Exposure

Workers exposed intermittently to PCB vapors developed chloracne and other dermatologic symptoms. Also reported were hyperpigmentation of skin, eye irritation, respiratory complaints, gastrointestinal symptoms, neurological symptoms, and liver damage. Some studies of low level PCB exposure by human populations have demonstrated associations with PCBs and increased blood pressure, various serum lipids, and liver enzyme levels.

Babies born to PCB-poisoned mothers are small for their gestational age, have hyperpigmentation, liver malfunction, excessive eye secretions, facial edema, gingival hyperplasia, natal teeth, and calcification of the skull. PCBs are also transferred to offspring via breast-milk. Nursing children of PCB-poisoned women show decayed nails, gingival pigmentation, mottled enamel, and an excess of dental caries. In an extensive study utilizing rhesus monkeys, treated females showed decreased rates of conception, increased fetal death, decreased number of live births weights, hyperpigmentation and infant mortality.

Carcinogenic Potential

PCB exposure has resulted in an increased incidence of hepatocellular carcinomas in several studies, using rats and mice. In appropriate circumstances, PCBs enhance the effects of other carcinogens. No adequate studies have been conducted to judge whether long-term exposure to PCBs causes cancer in humans. Based on the weight of evidence, the U.S. EPA has classified PCBs as probable human carcinogens (B2).

CARCINOGENIC POLYNUCLEAR AROMATIC HYDROCARBONS (PAHS)- BENZO(A)PYRENE

PAHs are a group of aromatic hydrocarbons which are formed naturally as a by-product of incomplete combustion of organic matter. PAHs are not used as a raw material, but are found rather as components of complex mixtures such as coal tars derived from carbonaceous materials (e.g., coal). Certain PAHs are known to be carcinogenic. The carcinogenic PAHs detected at the site were:

- Benzo(a)anthracene
- Benzo(k)fluoranthene
- Benzo(b)fluoranthene
- Benzo(a)pyrene
- Indeno(1,2,3-cd)pyrene
- Dibenz(a,h)anthracene

The most potent and widely studied carcinogenic PAH being benzo(a)pyrene. Within the risk assessment process, as a conservative approach, the carcinogenic potency of benzo(a)pyrene is used to assess the carcinogenic potency of all carcinogenic PAHs. For this reason, the toxicity of benzo(a)pyrene is only described below.

Effects from Long-Term Exposure

There was no information on the toxic effects associated with long-term exposure to benzo(a)pyrene in the available literature. Benzo(a) pyrene being a potent animal carcinogen, research has been limited to this compound's carcinogenic effects.

Information on the teratogenic and reproductive effects of benzo(a)pyrene are limited to oral administration of the compound to pregnant rodents. In rats and mice there is evidence that benzo(a)pyrene is both a reproductive toxicant and teratogen. For example, benzo(a)pyrene at a relatively low dose (50 mg/kg/day) has been associated with drastic reductions in fertility, deformed young, and increased incidence of still births in pregnant rats.

Carcinogenic Potential

Little human data exists on the carcinogenic potential of benzo(a)pyrene in the human. When benzo(a)pyrene was repeatedly applied to the skin of persons over a four month period, there were the formation of benign tumors. Although begin, the tumors were thought to be early stages of neoplastic proliferation.

Many epidemiologic studies of human populations have shown strong associations between human exposure to PAH-containing materials and increased cancer risk. It is assumed that the main carcinogenic initiator may be benzo(a)pyrene in these PAH-containing materials.

In laboratory animals benzo(a)pyrene is clearly a carcinogen. The chemical causes cancer in laboratory animals if administered orally, via inhalation, or applied dermally. Unlike many chemical carcinogens, benzo(a)pyrene is not carcinogenic until it is metabolized in the body by a specific enzyme system. The carcinogenic metabolite has been found to bind to the genetic material in cells (i.e., DNA) and cause the initiation of cancer. Species to species variability in the metabolism of benzo(a)pyrene is thought to account for species differences in sensitivity to the carcinogenic effects of the compound.

Because of the weight of evidence, the U.S. EPA has classified benzo(a)pyrene as a probable human carcinogen (B2). Although no slope factor exists for the compound, a unit risk value is available from the U.S. EPA which relates the probability of contracting cancer per unit exposure (i.e., mg/kg/day).

SILVER

Effects from Long-Term Exposure

In humans relatively high doses of silver may cause argyria which is a patchy pigmentation of the skin. The pigmentation has a gray-blue, or purple color in some forms of the disease. The pigmentation is permanent. In addition to argyria, exposure to the metal has been associated with allergic skin reactions. Studies on the dose-effect relationship between silver and argyria were used to develop the oral reference dose for silver.

Carcinogenic Potential

No appropriate information could be located in the available literature on the carcinogenic potential of silver in humans. The metal is currently not classified by the U.S. EPA as a carcinogen (i.e., class D).

TRICHLOROETHENE (TCE)

Effects from Long-Term Exposure

Human data relating long-term exposure to TCE to toxic end-points could not be located in the available literature. In laboratory studies conducted with rats, prolonged exposure to TCE results in histopathologic changes in the kidneys. Also observed were increased liver weight and loss of body weight in several laboratory species. Reduced fetal body weight, body size and delayed ossification have been reported in offspring following maternal exposure to TCE. In addition, results from a study performed in rabbits suggests an increased incidence of hydrocephalus.

Carcinogenic Potential

A weak mutagenic activity for TCE has been reported in bacterial systems in the presence of enzymatic activation. TCE has been demonstrated to produce multiple types of cancer in mice. Using criteria applied by the Carcinogen Assessment Group of the U.S. EPA, TCE is classified as a Group B2 compound, probable human carcinogen.

TETRACHLOROETHENE (PCE)

Effects from Long-Term Exposure

Potential adverse health effects resulting from prolonged exposure to PCE include changes in liver and kidney weight in laboratory animals. In addition, livers of treated animals exhibited histopathological changes. In some species, prolonged exposure to PCE caused reduced weight gain. PCE exposure to pregnant rats has resulted in significantly increased incidences of subcutaneous edema, delayed ossification of skull bones and split sternebrae in offspring.

Carcinogenic Potential

PCE has demonstrated mutagenic activity in bacterial and mammalian cell bioassays. Based on cancer produced in mice, PCE is classified by the Carcinogen Assessment Group of the U.S. EPA to be a Group B2, probable human carcinogen.

TOLUENE

Effects From Long-Term Exposure

Chronic abuse of toluene can lead to permanent neurological impairment, e.g., cerebral and cerebellular cuticle atrophy on CT scan. Long-term ingestion and inhalation studies in various animal species resulted in no adverse effects.

Toluene appears to readily cross the placenta and be teratogenic in mice, rats, and rabbits. It does exhibit fetotoxicity, causing reduction in fetal weight, retarded skeletal ossification and minor skeletal anomalies.

Carcinogenic Potential

Toluene has been tested for its genetic activity in a number of test systems, with the results generally negative. There are no reports of increased incidence of cancer in humans associated with the toluene exposure.

ETHYLBENZENE

Effects From Long-Term Exposure

There was no readily available information on the long-term effects of ethylbenzene exposure in the literature.

There is limited data from animal studies which indicates that ethylbenzene may be teratogenic and a reproductive toxicant in animals exposed to large doses of ethylbenzene vapor. High doses of ethylbenzene caused skeletal anomalies as well as fewer live animals/litter. There was no data available to asses the teratogenic or reproductive effects of ethylbenzene exposure in the human.

The oral reference dose for chronic oral exposure to ethylbenzene is 1E-01 mg/kg/day. The reference dose was based on a subchronic rat bioassay study. The study which was chosen was a 182-day rat oral bioassay in which ethylbenzene was administered 5 days/week at doses of 13.6, 136, 405, or 608 mg/kg/day in olive oil by intubation. There were 10 albino female rats/dose group and 20 control rats.

The endpoints which were studies were growth, mortality, appearance and behavior, hematological findings, terminal concentration of urea nitrogen in the blood, final average organ and body weights, histopathologic finding, and bone marrow counts. The lowest observed dose of ethylbenzene which was associated with potentially toxic endpoints (i.e., LOAEL) was 408 mg/kg/day. At this dose level, histopathologic changes in liver and kidney were observed.

Carcinogenic Potential

Pertinent data regarding the carcinogenicity of ethylbenzene in the human could not be located in the available literature. Currently there have been no animal bioassays conducted to test the carcinogenicity of ethylbenzene. The National Toxicology Program has plans to initiate a bioassay in the future. Ethylbenzene is classified as D: not classifiable as a human carcinogen.

Ethylbenzene has been shown to have limited mutagenic potential in in-vitro (i.e., test tube) experiments. Ethylbenzene did not induce mutations in bacteria, although an ethylbenzene derivative, ethylbenzene hydroperoxide showed positive results. In an experiment that exposed human whole blood lymphocytes, the frequency of chromosome rearrangements increased at the highest dose level tested.

XYLENES

Effects From Long-Term Exposure

In humans long-term exposure to xylene has been observed to cause corneal vacuoles. Repeated dermal exposure to xylene may cause skin irritation and necrosis. Many of the effects on the hematopoietic system attributed to xylene exposure in early studies have been shown more recently to have been caused by benzene contamination of the xylene mixture.

Very few animal studies have been conducted on the chronic effects of xylene exposure. A study conducted with rats showed that long-term exposure (i.e., intermittent exposure for 1 year) to xylene via inhalation caused a variety of effects. Treated animals in general ate more, but weighed less than untreated animals. Liver enzymes were affected and there was liver enlargement.

Xylene was found to be both teratogenic and fetotoxic in mouse and rat studies, but generally only at relatively high xylene concentrations (i.e., >2000 mg/m^3) in air. The toxicity is related in part to the methyl substitution (i.e., ortho, meta, or para) on the benzene ring. Oral ingestion is also associated with fetal toxicity in mice, but again only at relatively high xylene doses (i.e., >1.0 g/kg/day).

The oral reference dose for xylene (i.e., 2E+0 mg/kg/day) was based on the hyperactivity, decreased body weight, and increased mortality detected in male mice associated with high oral exposures to xylene for two years in a National Toxicology Program bioassay. A safety factor of 100 was included to account for both differences in interspecies and intraspecies sensitivity to the compound.

Carcinogenic Potential

Xylene is classified D; not classifiable as a human carcinogen. A two year cancer bioassay performed with rats and mice by the National Toxicology Program concluded that xylene was not carcinogenic. In vitro studies such as sister chromatid exchange and the Ames test did not show xylenes to have mutagenic potential.

VINYL CHLORIDE

Effects from Long-Term Exposure

Chronic studies in common laboratory animal species have identified a number of toxic effects of vinyl chloride exposure including: hepatomegaly, decreased adrenal weight, pathology of the kidney, splenomegaly, hematological and biochemical changes in the blood, and hyperplasia of lung epithelium. Other toxic effects attributed to vinyl chloride exposure in humans include sclerdoerma, acro-osteolysis and Raynaud's syndrome.

Two studies conducted in rodents indicate that vinyl chloride is not a teratogen, although some fetotoxic effects were observed.

Carcinogenic Potential

Vinyl chloride is a human carcinogen, having been identified as the causative agent in hepatic angiosarcomas in industrial workers. Similar cancers have been produced by vinyl chloride administration to animals. In addition, evidence suggests that cancer of other tissues such as the brain, lung and blood may be attributable to vinyl chloride. The U.S. EPA classifies vinyl chloride as a Group A, human carcinogen.

ZINC

Noncancer Effects from Long-Term Exposure

Zinc is an essential element which is needed for the proper function of enzyme systems in the body. In the human, daily intakes must exceed approximately 10 times the recommended daily allowance for the metal (i.e., 15 mg/day) before adverse health effects would be expected. At very high doses of zinc, gastric discomfort has been noted in some exposed individuals

Long-term exposure to high doses of zinc may cause a form of anemia (hypochromic microcytic) caused by lowered copper levels in the body. The anemia may be treated by lowering zinc intake and increasing copper intake.

Long-term inhalation exposure to zinc dose not pose a problem if zinc air concentrations are not high. Based on studies with workers, the National Institute of Occupational Health and Safety (NIOSH) has set a safe air concentration in air (i.e., PEL) to be 15 mg/m^3.

Although it is known that excessive zinc intake can cause reproductive problems, it is well documented that zinc deficiencies will also cause reproductive problems. For this reason, low level environmental exposure to zinc should not result in reproductive problems.

Carcinogenic Potential

In the available literature, no studies were located that linked zinc exposure to increases in the frequency of cancer. There is some evidence that zinc may be a promoter of cancer, but no evidence was found which suggested zinc was an initiator.

MWK/vlr/KJD
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6072101/230-MD-D4

V

Plant Species of Blackwell Recreational Preserve South of Mack Road

	PLANT GROWTH FORM			NO. C
				RATING SPECIF
E:	NATIVE	NO.	%	-3
S:	Tree	0	ERR	-2
E:	Shrub	0	ERR	-1
	Vine	0	ERR	0
.E:	Fern	0	ERR	1
	Forb	0	ERR	2
0 NATIVE TAXA	Grass	0	ERR	3
0 W/Adventives (shown in ALL CAPS)	Sedge	0	ERR	4
:RR NATIVE QUALITY				5
00 W/Adventives	ADVENTIVE			6
:RR NATIVE INDEX	Tree	0	ERR	7
.00 W/Adventives	Shrub	0	ERR	8
:RR NATIVE WETNESS	Vine	0	ERR	9
:RR W/Adventives	Forb	0	ERR	10
LAND CLASSIFICATION	Grass	0	ERR	15
	Sedge	0	ERR	20

'C	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME

'IVE TAXA = NUMBER OF NATIVE SPECIES PRESENT
ADVENTIVES = TOTAL NUMBER OF SPECIES PRESENT

'C = COEFFICIENT OF CONSERVATIVENESS (THIS RATING RANGES FROM -3 TO 20)
DETERMINED BY WILHELM AND LADD (1988)

'IVE QUALITY = AVERAGE FOR ALL OF THE NATIVE PLANTS RATINGS
ADVENTIVES = AVERAGE OF RATINGS FOR ALL PLANT SPECIES PRESENT

'IVE INDEX = NATIVE QUALITY X SQUARE ROOT OF THE NUMBER OF NATIVE PLANTS

ADVENTIVES = SAME AS ABOVE EXCEPT USING ALL PLANT SPECIES PRESENT. AS DETERMINED BY WILHELM AND LADD (1988

: VAST MAJORITY OF LAND IN THE CHICAGO REGION RANKS LESS THAN 20 AND IS OF
SENTIALLY NO SIGNIFICANCE FROM A NATURAL AREA PERSPECTIVE. AREAS RANKING ABOVE
POSSESS SUFFICIENT CONSERVATISM AND RICHNESS TO BE OF PROFOUND IMPORTANCE FROM A
GIONAL PERSPECTIVE. AREAS RATING IN THE 50'S AND ABOVE ARE EXTREMELY RARE AND OF
RAMOUNT IMPORTANCE; THEY REPRESENT LESS THAN 0.02% OF THE LAND IN THE CHICAGO REGION.

: FOREST PRESERVE USING THE NATIVE INDEX TO SEPARATE LANDS INTO FOUR GROUPS:
UNDER 19 = CLASS I - OPEN LAND (ACTIVE USE)
20 - 39 = CLASS II - OPEN LAND (PASSIVE USE)
40 - 59 = CLASS III - NATURE AREA
60 + = CLASS IV - CONSERVANCY

'W = COEFFICIENT OF WETNESS (RANGES FROM -5 TO 5 WITH -5 BEING
WET AND 5 BEING DRY)

TIVE WETNESS = AVERAGE OF THE CofW FOR NATIVE PLANTS
ADVENTIVES = AVERAGE OF THE CofW FOR ALL PLANT SPECIES

TNESS = ARMY CORP OF ENGINEERS/EPA LAND CLASSIFICATION

TERATURE CITED:

_HELM G., AND D. LADD. 1988. NATURAL AREA ASSESSMENT IN THE CHICAGO REGION.
TRANS. 53RD N. A. WILDL. & NAT. RES. CONF. PP.361-375.

SITE: SOUTH OF MACK ROAD
PRES: R.C. BLACKWELL
DATE: 1992
BY:
FILE: A:\BLACKWELL

410 NATIVE TAXA
521 W/Adventives (shown in ALL CAPS)
4.64 NATIVE QUALITY
3.55 W/Adventives
94.03 NATIVE INDEX
81.09 W/Adventives
0.3 NATIVE WETNESS
0.8 W/Adventives
FACULTATIVE

NATIVE	NO.	%
Tree	36	7.0
Shrub	26	5.0
Vine	11	2.1
Fern	6	1.2
Forb	257	49.8
Grass	33	6.4
Sedge	40	7.8
ADVENTIVE		
Tree	11	2.1
Shrub	13	2.5
Vine	2	0.4
Forb	64	12.4
Grass	17	3.3
Sedge	0	0.0

-3	16
-2	9
-1	17
0	70
1	58
2	38
3	32
4	51
5	103
6	44
7	32
8	20
9	8
10	16
15	7
20	0

CofC	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acalypha rhomboidea	3	FACU	THREE-SEEDED MERCURY
0	ACER GINNALA	5	UPL	AMUR MAPLE
0	Acer negundo	-2	FACW-	BOX ELDER
5	Acer nigrum	5	UPL	BLACK MAPLE
-1	ACER PLATANOIDES	5	UPL	NORWAY MAPLE
0	Acer saccharinum	-3	FACW	SILVER MAPLE
5	Acer saccharum	3	FACU	SUGAR MAPLE
1	ACHILLEA MILLEFOLIUM	3	FACU	YARROW
0	Acnida altissima	-5	OBL	WATER HEMP
7	Acorus calamus	-5	OBL	SWEET FLAG
7	Actaea pachypoda	5	UPL	WHITE BANEBERRY
5	Actinomeris alternifolia	-3	FACW	WINGSTEM
5	Agastache nepetoides	3	FACU	YELLOW GIANT HYSSOP
5	Agastache scrophulariaefolia	5	UPL	PURPLE GIANT HYSSOP
2	Agrimonia gryposepala	2	FACU+	TALL AGRIMONY
8	Agrimonia parviflora	-1	FAC+	SWAMP AGRIMONY
5	Agrimonia pubescens	5	UPL	SOFT AGRIMONY
-2	AGROPYRON REPENS	3	FACU	QUACK GRASS
1	AGROSTIS ALBA	-3	FACW	REDTOP
6	Agrostis alba palustris	-3	FACW	CREEPING BENT
1	Agrostis perennans	1	FAC-	THIN GRASS
4	Alisma subcordatum	-5	OBL	COMMON WATER PLANTAIN
4	Alisma triviale	-5	OBL	LARGE-FLOWERED WATER PLANTAIN
-3	ALLIARIA OFFICINALIS	0	FAC	GARLIC MUSTARD
1	Allium canadense	3	FACU	WILD ONION
6	Allium cernuum	5	UPL	NODDING WILD ONION
7	Allium tricoccum	2	FACU+	WILD LEEK
6	Allium tricoccum burdickii	2	FACU+	BURDICK'S LEEK
2	ALNUS GLUTINOSA	-2	FACW-	EUROPEAN ALDER
0	ALOPECURUS CAROLINIANUS	-3	FACW	ANNUAL FOXTAIL
0	Ambrosia artemisiifolia elatior	3	FACU	COMMON RAGWEED
0	Ambrosia trifida	-1	FAC+	GIANT RAGWEED
10	Amorpha canescens	5	UPL	LEAD PLANT
4	Amphicarpa bracteata	0	FAC	HOG PEANUT
4	Amphicarpa bracteata comosa	0	FAC	HOG PEANUT
4	Andropogon gerardii	1	FAC-	BIG BLUESTEM GRASS
5	Andropogon scoparius	4	FACU-	LITTLE BLUESTEM GRASS
4	Anemone canadensis	-3	FACW	MEADOW ANEMONE

7	Anemone quinquefolia interior	0	FAC	WOOD ANEMONE
2	Anemone virginiana	5	[UPL]	TALL ANEMONE
5	Angelica atropurpurea	-5	OBL	GREAT ANGELICA
6	Antennaria neglecta	5	UPL	CAT'S FOOT
6	Antennaria plantaginifolia	5	UPL	PUSSY TOES
6	Apios americana	-3	FACW	GROUND NUT
5	Apocynum androsaemifolium	5	UPL	SPREADING DOGBANE
4	Apocynum cannabinum	0	FAC	INDIAN HEMP
2	Apocynum sibiricum	-1	FAC+	INDIAN HEMP
5	Aquilegia canadensis	1	FAC-	WILD COLUMBINE
-3	ARCTIUM LAPPA	5	UPL	GREAT BURDOCK
-3	ARCTIUM MINUS	5	UPL	COMMON BURDOCK
9	Arenaria lateriflora	3	FACU	WOOD SANDWORT
10	Arenaria stricta	5	UPL	STIFF SANDWORT
5	Arisaema atrorubens	-2	FACW-	JACK-IN-THE-PULPIT
8	Arisaema dracontium	-3	FACW	GREEN DRAGON
0	ARTEMISIA BIENNIS	-2	FACW-	BIENNIAL WORMWOOD
10	Asclepias exaltata	5	[UPL]	POKE MILKWEED
4	Asclepias incarnata	-5	OBL	SWAMP MILKWEED
0	Asclepias syriaca	5	UPL	COMMON MILKWEED
1	Asclepias verticillata	5	UPL	WHORLED MILKWEED
15	Asclepias viridiflora	5	UPL	SHORT GREEN MILKWEED
1	ASPARAGUS OFFICINALIS	3	FACU	ASPARAGUS
6	Asplenium platyneuron	3	FACU	EBONY SPLEENWORT
5	Aster ericoides	4	FACU-	HEATH ASTER
8	Aster laevis	5	UPL	SMOOTH BLUE ASTER
4	Aster lateriflorus	-2	FACW-	SIDE-FLOWERING ASTER
4	Aster novae-angliae	-3	FACW	NEW ENGLAND ASTER
1	Aster pilosus	4	FACU+	HAIRY ASTER
6	Aster puniceus	-5	OBL	SWAMP ASTER
5	Aster puniceus firmus	-5	[OBL]	SMOOTH SWAMP ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
8	Aster shortii	5	UPL	SHORT'S ASTER
3	Aster simplex	-5	[OBL]	PANICLED ASTER
0	ATRIPLEX PATULA	-2	FACW-	COMMON ORACH
1	BARBAREA VULGARIS	0	FAC	YELLOW ROCKET
-2	BERBERIS THUNBERGII	4	FACU-	JAPANESE BARBERRY
5	Bidens cernua	-5	OBL	NODDING BUR MARIGOLD
5	Bidens comosa	-3	FACW	SWAMP TICKSEED
1	Bidens frondosa	-3	FACW	COMMON BEGGAR'S TICKS
1	Bidens vulgata	-3	FACW	TALL BEGGAR'S TICKS
2	Boehmeria cylindrica	-5	OBL	FALSE NETTLE
3	Boehmeria cylindrica drummondiana	-5	OBL	FALSE NETTLE
15	Botrychium dissectum	0	FAC	CUT-LEAVED GRAPE FERN
6	Botrychium virginianum	3	FACU	RATTLESNAKE FERN
7	Bouteloua curtipendula	5	UPL	SIDE-OATS GRAMA
15	Brachyelytrum erectum	5	UPL	LONG-AWNED WOOD GRASS
-1	BRASSICA KABER PINNATIFIDA	5	UPL	CHARLOCK
-1	BRASSICA NIGRA	5	UPL	BLACK MUSTARD
-1	BROMUS INERMIS	5	UPL	HUNGARIAN BROME
0	BROMUS JAPONICUS	3	FACU	JAPANESE CHESS
10	Bromus latiglumis	-2	FACW-	EAR-LEAVED BROME
5	Bromus purgans	2	FACU+	WOODLAND BROME
0	BROMUS TECTORUM	5	UPL	DOWNY BROME
3	Calamagrostis canadensis	-5	OBL	BLUE JOINT GRASS
5	Calamagrostis inexpansa brevior	-4	FACW+	BOG REED GRASS

5	Caltha palustris	-5	OBL	MARSH MARIGOLD
6	Camassia scilloides	-1	FAC+	WILD HYACINTH
2	Campanula americana	0	FAC	TALL BELLFLOWER
7	Campanula aparinoides	-5	OBL	MARSH BELLFLOWER
0	CAPSELLA BURSA-PASTORIS	1	FAC-	SHEPHERD'S PURSE
5	Cardamine bulbosa	-5	OBL	BULBOUS CRESS
2	Carex amphibola turgida	5	UPL	GRAY SEDGE
7	Carex annectens xanthocarpa	-3	FACW	FALSE FOX SEDGE
3	Carex bebbii	-5	OBL	BEBB'S SEDGE
10	Carex bicknellii	1	FAC-	PRAIRIE SEDGE
3	Carex brevior	0	FAC	FIELD SEDGE
2	Carex cephalophora	3	FACU	WOODBANK SEDGE
1	Carex convoluta	5	UPL	TUFTED WOOD SEDGE
4	Carex cristatella	-4	FACW+	ROSETTE SEDGE
10	Carex festucacea	0	FAC	FESCUE SEDGE
5	Carex granularis	-4	FACW+	PALE FIELD SEDGE
3	Carex gravida	5	UPL	COARSE FIELD SEDGE
6	Carex haydenii	-5	OBL	LONG-SCALED MEADOW SEDGE
4	Carex hirtifolia	5	UPL	HAIRY WOOD SEDGE
4	Carex hystricina	-5	OBL	BOTTLEBRUSH SEDGE
5	Carex jamesii	5	UPL	GRASS SEDGE
10	Carex lacustris	-5	OBL	LAKE SEDGE
4	Carex lanuginosa	-5	OBL	WOOLLY SEDGE
1	Carex laxiflora	0	FAC	WOOD SEDGE
9	Carex meadii	0	FAC	
5	Carex normalis	-3	FACW	SCALE WOOD SEDGE
5	Carex pensylvanica	5	UPL	PENNSYLVANIA SEDGE
1	Carex rosea	5	UPL	TUFTED WOOD SEDGE
3	Carex sparganioides	0	FAC	BUR-REED SEDGE
9	Carex sprengelii	0	FAC	LONG-BEAKED SEDGE
2	Carex stipata	-5	OBL	SOFT SEDGE
5	Carex stricta	-5	OBL	MEADOW SEDGE
8	Carex suberecta	-5	OBL	POINTED FEN SEDGE
9	Carex tetanica	-3	FACW	RUNNING PRAIRIE SEDGE
10	Carex trichocarpa	-5	OBL	HAIRY-FRUITED SEDGE
10	Carex umbellata	5	UPL	LAX SAND SEDGE
2	Carex vulpinoidea	-5	OBL	FOX SEDGE
7	Carya cordiformis	0	FAC	BITTERNUT HICKORY
5	Carya ovata	3	FACU	SHAGBARK HICKORY
1	CATALPA SPECIOSA	3	FACU	HARDY CATALPA
8	Caulophyllum thalictroides	5	UPL	BLUE COHOSH
8	Ceanothus americanus	5	UPL	NEW JERSEY TEA
-2	CELASTRUS ORBICULATUS	5	[UPL]	ORIENTAL BITTERSWEET
6	Celastrus scandens	3	FACU	CLIMBING BITTERSWEET
3	Celtis occidentalis	1	FAC-	HACKBERRY
1	CERASTIUM VULGATUM	3	FACU	MOUSE-EAR CHICKWEED
8	Chelone glabra	-5	OBL	TURTLEHEAD
1	CHENOPODIUM ALBUM	1	FAC-	LAMB'S QUARTERS
4	Chenopodium boscianum	5	UPL	WOODLAND GOOSEFOOT
3	Chenopodium hybridum gigantospermum	5	UPL	MAPLE-LEAVED GOOSEFOOT
1	CHRYSANTHEMUM LEUCANTHEMUM PINNATIFIDUM	5	UPL	OX-EYE DAISY
1	CICHORIUM INTYBUS	5	UPL	CHICORY
6	Cicuta maculata	-5	OBL	WATER HEMLOCK
5	Cinna arundinacea	-3	FACW	COMMON WOOD REED
0	Circaea quadrisulcata canadensis	3	FACU	ENCHANTER'S NIGHTSHADE
6	Cirsium altissimum	5	UPL	TALL THISTLE

-3	CIRSIUM ARVENSE	3	FACU	FIELD THISTLE
2	Cirsium discolor	5	UPL	PASTURE THISTLE
10	Cirsium muticum	-5	OBL	SWAMP THISTLE
-3	CIRSIUM VULGARE	4	FACU-	BULL THISTLE
2	Claytonia virginica	3	FACU	SPRING BEAUTY
7	Comandra richardsiana	3	FACU	FALSE TOADFLAX
-3	CONVALLARIA MAJALIS	5	UPL	LILY-OF-THE-VALLEY
-3	CONVOLVULUS ARVENSIS	5	UPL	FIELD BINDWEED
1	Convolvulus sepium	0	FAC	HEDGE BINDWEED
5	Cornus obliqua	-5	[OBL]	PALE DOGWOOD
1	Cornus racemosa	-2	FACW-	GRAY DOGWOOD
6	Cornus stolonifera	-3	FACW	RED-OSIER DOGWOOD
-1	CORONILLA VARIA	5	UPL	CROWN VETCH
2	Corylus americana	0	[FAC]	AMERICAN HAZELNUT
5	Crataegus calpodendron	5	UPL	SUGAR HAWTHORN
5	Crataegus coccinea	5	UPL	SCARLET HAWTHORN
1	Crataegus crus-galli	0	FAC	COCKSPUR HAWTHORN
5	Crataegus macrosperma	5	UPL	LARGE-SEEDED HAWTHORN
2	Crataegus mollis	-2	FACW-	DOWNY HAWTHORN
1	Crataegus punctata	5	UPL	DOTTED HAWTHORN
8	Crataegus rotundifolia	5	UPL	ROUND-LEAVED HAWTHORN
5	Crataegus succulenta	5	UPL	FLESHY HAWTHORN
0	Cryptotaenia canadensis	0	FAC	HONEWORT
4	Cuscuta gronovii	-3	[FACW]	COMMON DODDER
1	Cyperus strigosus	-3	FACW	COMMON SHORELINE SEDGE
6	Cystopteris fragilis	3	FACU	FRAGILE FERN
1	DACTYLIS GLOMERATA	3	FACU	ORCHARD GRASS
1	DAUCUS CAROTA	5	UPL	WILD CARROT
5	Dentaria laciniata	5	UPL	TOOTHWORT
4	Desmodium canadense	1	FAC-	SHOWY TICK TREFOIL
8	Desmodium cuspidatum	5	UPL	SMOOTH BRACTED TICK TREFOIL
6	Desmodium cuspidatum longifolium	5	UPL	ROUGH BRACTED TICK TREFOIL
8	Desmodium glutinosum	5	UPL	POINTED TICK TREFOIL
0	DIGITARIA ISCHAEMUM	3	FACU	SMOOTH CRAB GRASS
5	Dioscorea villosa	1	FAC-	WILD YAM
6	Dodecatheon meadia	4	FACU-	SHOOTING STAR
8	Echinacea pallida	5	UPL	PURPLE CONEFLOWER
0	Echinochloa crusgalli	-3	FACW	BARNYARD GRASS
5	Echinocystis lobata	-2	FACW-	WILD CUCUMBER
5	Eleocharis calva	-5	OBL	RED-FOOTED SPIKE RUSH
5	Eleocharis obtusa	-5	OBL	BLUNT SPIKE RUSH
5	Eleocharis palustris major	-5	OBL	
2	Ellisia nyctelea	-1	FAC+	AUNT LUCY
4	Elymus canadensis	1	FAC-	CANADA WILD RYE
5	Elymus villosus	3	FACU	SILKY WILD RYE
4	Elymus virginicus	-2	FACW-	VIRGINIA WILD RYE
3	Epilobium coloratum	-5	OBL	CINNAMON WILLOW HERB
2	EPIPACTIS HELLEBORINE	5	UPL	HELLEBORINE
0	Equisetum arvense	0	FAC	HORSETAIL
5	Eragrostis hypnoides	-5	OBL	CREEPING LOVE GRASS
0	ERAGROSTIS POAEOIDES	5	UPL	LOW LOVE GRASS
1	Erigeron annuus	1	FAC-	ANNUAL FLEABANE
0	Erigeron canadensis	1	FAC-	HORSEWEED
4	Erigeron philadelphicus	-3	FACW	MARSH FLEABANE
3	Erigeron strigosus	1	FAC-	DAISY FLEABANE
9	Eryngium yuccifolium	-1	FAC+	RATTLESNAKE MASTER

5	Erythronium albidum	5	UPL	WHITE TROUT LILY
0	EUONYMUS ALATUS	5	UPL	BURNING BUSH
8	Euonymus atropurpureus	1	FAC-	WAHOO
0	EUONYMUS EUROPAEUS	5	UPL	SPINDLE TREE
0	Eupatorium altissimum	3	FACU	TALL BONESET
5	Eupatorium maculatum	-5	OBL	SPOTTED JOE PYE WEED
6	Eupatorium perfoliatum	-5	[OBL]	COMMON BONESET
7	Eupatorium purpureum	0	FAC	PURPLE JOE PYE WEED
4	Eupatorium rugosum	3	FACU	WHITE SNAKEROOT
1	Eupatorium serotinum	-1	FAC+	LATE BONESET
2	Euphorbia corollata	5	UPL	FLOWERING SPURGE
-1	EUPHORBIA MACULATA	4	FACU-	NODDING SPURGE
1	FESTUCA ELATIOR	4	FACU-	MEADOW FESCUE
5	Festuca obtusa	2	FACU+	NODDING FESCUE
1	Fragaria virginiana	1	FAC-	WILD STRAWBERRY
5	Fraxinus americana	3	FACU	WHITE ASH
7	Fraxinus pennsylvanica	-3	FACW	RED ASH
2	Fraxinus pennsylvanica subintegerrima	-3	FACW	GREEN ASH
1	Galium aparine	3	FACU	ANNUAL BEDSTRAW
4	Galium concinnum	3	FACU	SHINING BEDSTRAW
5	Galium obtusum	-5	[OBL]	WILD MADDER
5	Galium triflorum	2	FACU+	SWEET-SCENTED BEDSTRAW
2	Gaura biennis	4	FACU-	BIENNIAL GAURA
7	Gentiana andrewsii	-3	FACW	CLOSED GENTIAN
4	Geranium maculatum	3	FACU	WILD GERANIUM
7	Gerardia tenuifolia	-3	FACW	SLENDER FALSE FOXGLOVE
0	Geum canadense	0	FAC	WHITE AVENS
1	Geum laciniatum trichocarpum	-3	FACW	ROUGH AVENS
-1	GLECHOMA HEDERACEA	4	FACU-	GROUND IVY
4	Glyceria striata	-5	OBL	FOWL MANNA GRASS
0	Hackelia virginiana	1	FAC-	STICKSEED
5	Helenium autumnale	-4	FACW+	SNEEZEWEED
5	Helianthus decapetalus	5	UPL	PALE SUNFLOWER
5	Helianthus divaricatus	5	UPL	WOODLAND SUNFLOWER
2	Helianthus grosseserratus	-2	FACW-	SAWTOOTH SUNFLOWER
5	Helianthus hirsutus	5	UPL	OBLONG SUNFLOWER
10	Helianthus occidentalis	4	FACU-	WESTERN SUNFLOWER
5	Helianthus strumosus	5	UPL	PALE-LEAVED SUNFLOWER
3	Helianthus tuberosus	0	FAC	JERUSALEM ARTICHOKE
0	HEMEROCALLIS FLAVA			LEMON DAY LILY
-1	HEMEROCALLIS FULVA	5	UPL	ORANGE DAY LILY
-2	HESPERIS MATRONALIS	5	UPL	DAME'S ROCKET
8	Heuchera richardsonii	1	FAC-	PRAIRIE ALUM ROOT
-1	HORDEUM JUBATUM	-1	FAC+	SQUIRREL-TAIL GRASS
5	Hydrophyllum virginianum	-2	FACW-	VIRGINIA WATERLEAF
0	HYPERICUM PERFORATUM	5	UPL	COMMON ST. JOHN'S WORT
4	Hypericum punctatum	-1	FAC+	SPOTTED ST. JOHN'S WORT
10	Hypoxis hirsuta	0	FAC	YELLOW STAR GRASS
5	Hystrix patula	5	UPL	BOTTLEBRUSH GRASS
3	Impatiens capensis	-3	FACW	ORANGE JEWELWEED
0	IRIS PSEUDACORUS	-5	OBL	YELLOW IRIS
5	Iris virginica shrevei	-5	OBL	BLUE FLAG
5	Juglans nigra	3	FACU	BLACK WALNUT
4	Juncus dudleyi	0	FAC	DUDLEY'S RUSH
6	Juncus nodosus	-5	OBL	JOINT RUSH
0	Juncus tenuis	0	FAC	ROADSIDE RUSH

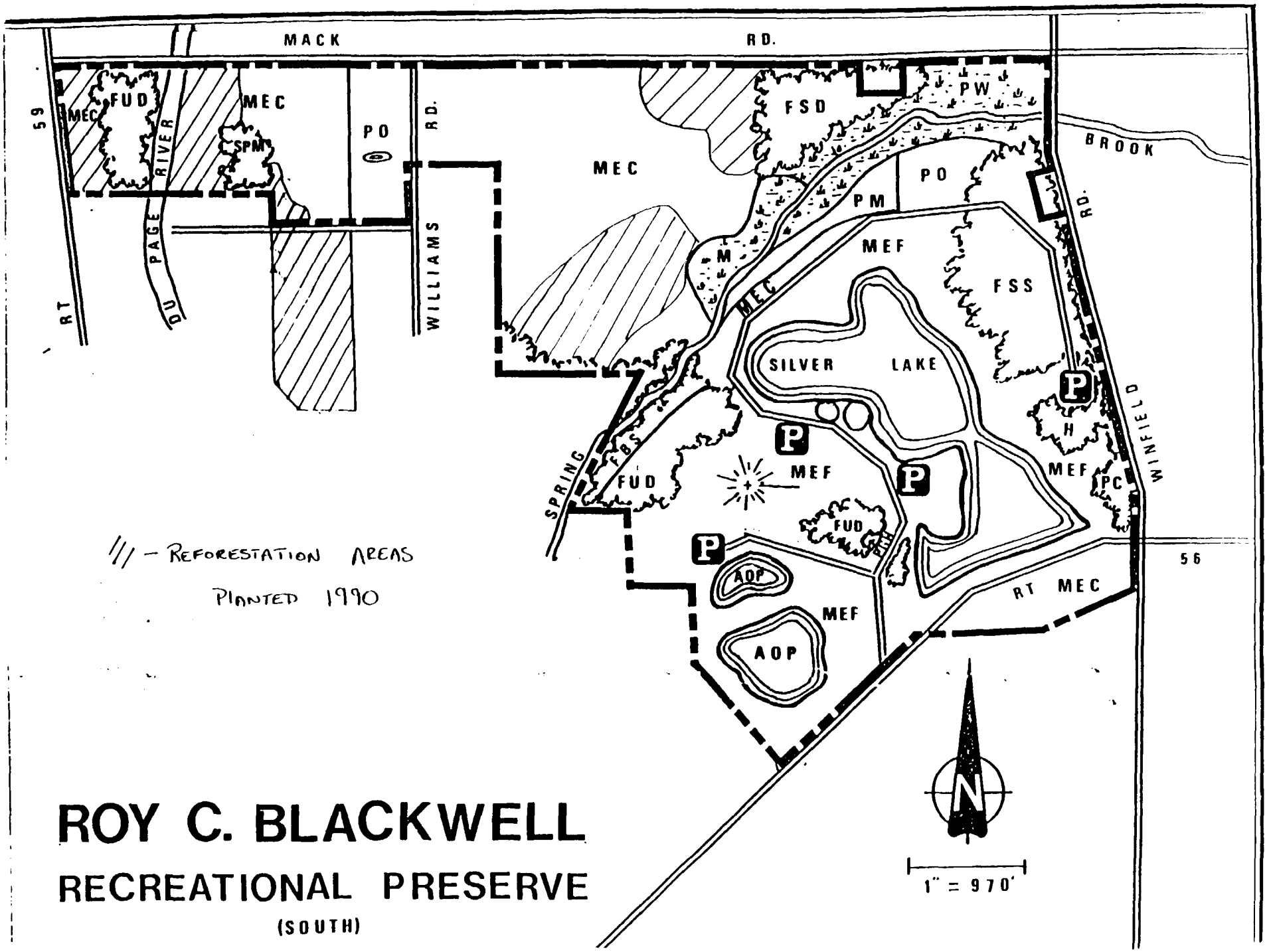
4	Juncus torreyi	-3	FACW	TORREY'S RUSH
2	Juniperus virginiana crebra	3	FACU	RED CEDAR
4	Kuhnia eupatorioides corymbulosa	5	UPL	FALSE BONESET
2	Lactuca canadensis	2	FACU+	WILD LETTUCE
-1	LACTUCA SCARIOLA	0	FAC	PRICKLY LETTUCE
6	Lathyrus palustris myrtifolius	-5	[OBL]	MARSH VETCHLING
8	Lathyrus venosus	0	FAC	VEINY PEA
5	Leersia oryzoides	-5	OBL	RICE CUT GRASS
7	Leersia virginica	-3	FACW	WHITE GRASS
5	Lemna minor	-5	OBL	SMALL DUCKWEED
-1	LEONURUS CARDIACA	5	UPL	MOTHERWORT
0	LEPIDIUM CAMPESTRE	5	UPL	FIELD CRESS
0	LEPIDIUM DENSIFLORUM	0	FAC	SMALL PEPPERGRASS
4	Lespedeza capitata	3	FACU	ROUND-HEADED BUSH CLOVER
8	Liatris cylindracea	5	UPL	CYLINDRICAL BLAZING STAR
6	Lilium michiganense	-1	FAC+	TURK'S CAP LILY
8	Liparis lilifolia	4	FACU-	PURPLE TWAYBLADE
7	Liparis loeselii	-4	FACW+	GREEN TWAYBLADE
6	Lithospermum canescens	5	UPL	HOARY PUCCOON
8	Lithospermum incisum	5	UPL	FRINGED PUCCOON
15	Lithospermum latifolium	5	UPL	BROAD-LEAVED PUCCOON
6	Lobelia siphilitica	-4	FACW+	GREAT BLUE LOBELIA
6	Lobelia spicata	0	FAC	PALE SPIKED LOBELIA
-2	LONICERA MAACKII	5	UPL	AMUR HONEYSUCKLE
7	Lonicera prolifera	5	UPL	YELLOW HONEYSUCKLE
-3	LONICERA X BELLA	5	UPL	NCN
0	LONICERA X MINUTIFLORA			NCN
-3	LONICERA X MUENDENIENSIS	5	UPL	COMMON BUSH HONEYSUCKLE
0	LONICERA X XYLOSTEOIDES	5	UPL	NCN
0	LONICERA XYLOSTEUM	5	UPL	EUROPEAN FLY HONEYSUCKLE
-2	LYCHNIS ALBA	5	UPL	WHITE CAMPION
5	Lycopus americanus	-5	OBL	COMMON WATER HOREHOUND
6	Lycopus uniflorus	-5	OBL	NORTHERN BUGLE WEED
4	Lysimachia ciliata	-3	FACW	FRINGED LOOSESTRIFE
9	Lysimachia thyrsiflora	-5	OBL	TUFTED LOOSESTRIFE
7	Lythrum alatum	-5	OBL	WINGED LOOSESTRIFE
0	MATRICARIA MATRICARIOIDES	3	FACU	PINEAPPLE WEED
0	MEDICAGO LUPULINA	1	FAC-	BLACK MEDICK
0	MEDICAGO SATIVA	5	UPL	ALFALFA
-3	MELILOTUS ALBA	3	FACU	WHITE SWEET CLOVER
-2	MELILOTUS OFFICINALIS	3	FACU	YELLOW SWEET CLOVER
6	Menispermum canadense	-1	FAC+	MOONSEED
5	Mentha arvensis villosa	-3	FACW	WILD MINT
6	Mimulus ringens	-5	OBL	MONKEY FLOWER
0	MIRABILIS NYCTAGINEA	5	UPL	WILD FOUR O'CLOCK
4	Monarda fistulosa	3	FACU	WILD BERGAMOT
-1	MORUS ALBA	0	FAC	WHITE MULBERRY
3	Muhlenbergia frondosa	-3	FACW	COMMON SATIN GRASS
5	Muhlenbergia mexicana	-3	FACW	LEAFY SATIN GRASS
0	Muhlenbergia schreberi	0	FAC	NIMBLEWILL
1	MYOSOTON AQUATICUM	-1	FAC+	WATER CHICKWEED
-1	NEPETA CATARIA	1	FAC-	CATNIP
1	Oenothera biennis	3	FACU	COMMON EVENING PRIMROSE
10	Oenothera pilosella	1	FAC-	PRAIRIE SUNDROPS
8	Onoclea sensibilis	-3	FACW	SENSITIVE FERN
3	Osmorhiza claytoni	4	FACU-	HAIRY SWEET CICELY

3	Osmorhiza longistylis	4	FACU-	SMOOTH SWEET CICELY
0	Oxalis europaea	3	FACU	TALL WOOD SORREL
0	Oxalis stricta	3	FACU	COMMON WOOD SORREL
15	Oxalis violacea	5	UPL	VIOLET WOOD SORREL
15	Panax quinquefolius	5	UPL	GINSENG
0	Panicum dichotomiflorum	-2	FACW-	KNEE GRASS
3	Panicum implicatum	0	FAC	COMMON WOOLY PANIC GRASS
7	Panicum oligosanthes scribnerianum	3	FACU	SCRIBNER'S PANIC GRASS
5	Panicum virgatum	-1	FAC+	SWITCH GRASS
7	Parthenium integrifolium	5	UPL	WILD QUININE
2	Parthenocissus quinquefolia	1	FAC-	VIRGINIA CREEPER
-3	PASTINACA SATIVA	5	UPL	WILD PARSNIP
7	Pedicularis lanceolata	-4	FACW+	SWAMP BETONY
5	Penthorum sedoides	-5	OBL	DITCH STONECROP
9	Petalostemum purpureum	5	UPL	PURPLE PRAIRIE CLOVER
0	Phalaris arundinacea	-4	FACW+	REED CANARY GRASS
1	PHLEUM PRATENSE	3	FACU	TIMOTHY
5	Phlox divaricata	3	FACU	WOODLAND PHLOX
3	Phryma leptostachya	5	UPL	LOPSEED
3	Physalis heterophylla	5	UPL	CLAMMY GROUND CHERRY
1	Physalis subglabrata	5	UPL	TALL GROUND CHERRY
2	Phytolacca americana	1	FAC-	POKEWEED
7	Pilea fontana	-3	FACW	BOG CLEARWEED
5	Pilea pumila	-3	FACW	CLEARWEED
1	PLANTAGO LANCEOLATA	0	FAC	ENGLISH PLANTAIN
0	PLANTAGO MAJOR	-1	FAC+	COMMON PLANTAIN
0	Plantago rugelii	0	FAC	RED-STALKED PLANTAIN
1	POA ANNUA	1	FAC-	ANNUAL BLUE GRASS
0	POA COMPRESSA	2	FACU+	CANADA BLUE GRASS
0	POA PRATENSIS	1	FAC-	KENTUCKY BLUE GRASS
5	Podophyllum peltatum	3	FACU	MAY APPLE
5	Polemonium reptans	0	FAC	JACOB'S LADDER
3	Polygonatum canaliculatum	3	FACU	SMOOTH SOLOMON'S SEAL
5	Polygonum amphibium stipulaceum	-5	OBL	WATER KNOTWEED
0	POLYGONUM AVICULARE	1	FAC-	COMMON KNOTWEED
5	Polygonum coccineum	-5	OBL	WATER HEARTSEASE
0	Polygonum erectum	3	FACU	ERECT KNOTWEED
2	Polygonum hydropiper	0	[FAC]	WATER PEPPER
0	Polygonum lapathifolium	-4	FACW+	HEARTSEASE
0	Polygonum pensylvanicum laevigatum	-4	FACW+	PENNSYLVANIA KNOTWEED
0	POLYGONUM PERSICARIA	-3	FACW	LADY'S THUMB
6	Polygonum punctatum	-5	OBL	SMARTWEED
2	Polygonum scandens	0	FAC	CLIMBING FALSE BUCKWHEAT
0	POPULUS ALBA			WHITE POPLAR
2	Populus deltoides	-1	FAC+	COTTONWOOD POPLAR
6	Populus grandidentata	3	FACU	LARGE-TOOTHED ASPEN
9	Potentilla arguta	4	FACU-	PRAIRIE CINQUEFOIL
0	Potentilla norvegica	0	FAC	NORWAY CINQUEFOIL
1	POTENTILLA RECTA	5	UPL	SULFUR CINQUEFOIL
4	Potentilla simplex	4	FACU-	COMMON CINQUEFOIL
5	Prenanthes alba	3	FACU	WHITE LETTUCE
0	Prunella vulgaris lanceolata	0	FAC	SELF HEAL
5	Prunus americana	5	UPL	WILD PLUM
1	Prunus serotina	3	FACU	WILD BLACK CHERRY
1	Prunus virginiana	1	FAC-	CHOKE CHERRY
7	Ptelea trifoliata	2	FACU+	WAFER ASH

5	Pycnanthemum virginianum	-4	FACW+	COMMON MOUNTAIN MINT
2	Pyrus loensis	5	UPL	IOWA CRAB
1	PYRUS MALUS	5	UPL	APPLE
4	Quercus alba	3	FACU	WHITE OAK
4	Quercus ellipsoidalis	5	UPL	HILL'S OAK
4	Quercus macrocarpa	1	FAC-	BUR OAK
7	Quercus rubra	3	FACU	RED OAK
6	Quercus velutina	5	UPL	BLACK OAK
0	Ranunculus abortivus	4	FACW-	SMALL-FLOWERED BUTTERCUP
6	Ranunculus fascicularis	3	FACU	EARLY BUTTERCUP
6	Ranunculus sceleratus	-5	OBL	CURSED BUTTERCUP
4	Ranunculus septentrionalis	-4	FACW+	SWAMP BUTTERCUP
4	Ratibida pinnata	5	UPL	YELLOW CONEFLOWER
-3	RHAMNUS CATHARTICA	3	FACU	COMMON BUCKTHORN
-3	RHAMNUS FRANGULA	-1	FAC+	GLOSSY BUCKTHORN
1	Rhus glabra	5	UPL	SMOOTH SUMAC
1	Rhus radicans	3	[FACU]	POISON IVY
3	Rhus typhina	5	UPL	STAGHORN SUMAC
7	Ribes americanum	-3	FACW	WILD BLACK CURRANT
5	Ribes missouriense	5	UPL	WILD GOOSEBERRY
-3	ROBINIA PSEUDO-ACACIA	4	FACU-	BLACK LOCUST
5	Rorippa islandica fernaldiana	-5	OBL	MARSH CRESS
5	Rosa arkansana suffulta	5	UPL	SUNSHINE ROSE
5	Rosa blanda	3	FACU	EARLY WILD ROSE
5	Rosa carolina	4	FACU-	PASTURE ROSE
-3	ROSA MULTIFLORA	3	FACU	MULTIFLORA ROSE
7	Rosa setigera	2	FACU+	ILLINOIS ROSE
3	Rubus allegheniensis	2	FACU+	COMMON BLACKBERRY
2	Rubus occidentalis	5	UPL	BLACK RASPBERRY
3	Rubus pensylvanicus	1	FAC-	YANKEE BLACKBERRY
1	Rudbeckia hirta	3	FACU	BLACK-EYED SUSAN
3	Rudbeckia laciniata	-4	FACW+	WILD GOLDEN GLOW
3	Rudbeckia triloba	1	FAC-	BROWN-EYED SUSAN
2	Rumex altissimus	4	FACW-	PALE DOCK
-1	RUMEX CRISPUS	-1	FAC+	CURLY DOCK
4	Sagittaria latifolia	-5	OBL	COMMON ARROWHEAD
0	SALIX ALBA	-3	FACW	WHITE WILLOW
2	Salix discolor	-3	FACW	PUSSY WILLOW
0	SALIX FRAGILIS	-1	FAC+	CRACK WILLOW
1	Salix interior	-5	OBL	SANDBAR WILLOW
4	Salix nigra	-5	OBL	BLACK WILLOW
0	SALIX PURPUREA	-3	FACW	PURPLE WILLOW
5	Salix rigida	-4	FACW+	HEART-LEAVED WILLOW
1	Sambucus canadensis	4	FACW-	ELDERBERRY
2	Sanicula gregaria	-1	FAC+	CLUSTERED BLACK SNAKEROOT
6	Sanicula marilandica	5	[UPL]	SANICLE
6	Scirpus acutus	-5	OBL	HARD-STEMMED BULRUSH
4	Scirpus atrovirens	-5	OBL	DARK GREEN RUSH
6	Scirpus fluviatilis	-5	OBL	RIVER BULRUSH
4	Scirpus lineatus	-5	OBL	RED BULRUSH
5	Scirpus validus creber	-5	OBL	GREAT BULRUSH
4	Scrophularia marilandica	4	FACU-	LATE FIGWORT
5	Scutellaria epilobiifolia	-5	OBL	MARSH SKULLCAP
5	Scutellaria lateriflora	-5	OBL	MAD-DOG SKULLCAP
7	Scutellaria parvula leonardi	3	FACU	SMALL SKULLCAP
0	SETARIA GLAUCA	0	FAC	YELLOW FOXTAIL

-1	SETARIA VIRIDIS	5	UPL	GREEN FOXTAIL
6	Silene stellata	5	UPL	STARRY CAMPION
10	Silene virginica	5	UPL	FIRE PINK
5	Silphium integrifolium	5	UPL	ROSIN WEED
5	Silphium perfoliatum	-2	FACW-	CUP PLANT
5	Silphium terebinthinaceum	1	[FAC-]	PRAIRIE DOCK
7	Sisyrinchium albidum	3	FACU	COMMON BLUE-EYED GRASS
7	Sium suave	-5	OBL	WATER PARSNIP
2	Smilacina racemosa	3	FACU	FEATHERY FALSE SOLOMON'S SEAL
5	Smilacina stellata	1	FAC-	STARRY FALSE SOLOMON'S SEAL
3	Smilax ecirrhata	5	UPL	UPRIGHT CARRION FLOWER
4	Smilax lasioneura	5	UPL	COMMON CARRION FLOWER
5	Smilax tamnoides hispida	0	FAC	BRISTLY GREEN BRIER
-2	SOLANUM CAROLINENSE	4	FACU-	HORSE NETTLE
-3	SOLANUM DULCAMARA	0	FAC	BITTERSWEET NIGHTSHADE
1	Solidago altissima	3	FACU	TALL GOLDENROD
6	Solidago flexicaulis	3	FACU	BROAD-LEAVED GOLDENROD
3	Solidago gigantea	-3	FACW	LATE GOLDENROD
3	Solidago graminifolia nuttallii	-2	FACW-	GRASS-LEAVED GOLDENROD
5	Solidago gymnospermoides	-1	FAC+	SAND GOLDENROD
5	Solidago missouriensis fasciculata	5	UPL	MISSOURI GOLDENROD
4	Solidago nemoralis	5	UPL	OLD-FIELD GOLDENROD
4	Solidago rigida	4	FACU-	STIFF GOLDENROD
5	Solidago ulmifolia	5	UPL	ELM-LEAVED GOLDENROD
-1	SONCHUS ASPER	0	FAC	SPINY SOW THISTLE
0	SONCHUS OLERACEUS	3	FACU	STORE-FRONT SOW THISTLE
-2	SONCHUS ULIGINOSUS	1	FAC-	COMMON SOW THISTLE
5	Sorghastrum nutans	2	FACU+	INDIAN GRASS
6	Sparganium eurycarpum	-5	OBL	COMMON BUR REED
5	Spartina pectinata	-4	FACW+	PRAIRIE CORD GRASS
4	Sphenopholis intermedia	0	FAC	SLENDER WEDGE GRASS
5	Stachys palustris homotricha	-5	OBL	WOUNDWORT
5	Stachys tenuifolia hispida	-5	[OBL]	ROUGH HEDGE NETTLE
8	Stellaria longifolia	-4	FACW+	STITCHWORT
6	Stipa spartea	5	UPL	PORCUPINE GRASS
0	SYMPHORICARPOS ORBICULATUS	3	FACU	CORALBERRY
6	Symplocarpus foetidus	-5	OBL	SKUNK CABBAGE
0	TARAXACUM OFFICINALE	3	FACU	COMMON DANDELION
3	Teucrium canadense	-2	FACW-	WOOD SAGE
3	Teucrium occidentale	-2	FACW-	WOOD SAGE
4	Thalictrum dasycarpum	-2	FACW-	HAIRY PURPLE MEADOW RUE
5	Thalictrum dasycarpum hypoglaucum	-2	FACW-	SMOOTH PURPLE MEADOW RUE
5	Thalictrum revolutum	0	FAC	WAXY MEADOW RUE
7	Thaspium trifoliatum flavum	5	UPL	MEADOW PARSNIP
0	THLASPI ARVENSE	5	[UPL]	PENNY CRESS
5	Tilia americana	3	FACU	AMERICAN LINDEN
2	Tovara virginiana	0	FAC	WOODLAND KNOTWEED
2	Tradescantia ohiensis	2	FACU+	COMMON SPIDERWORT
1	TRAGOPOGON MAJOR	5	UPL	SAND GOAT'S BEARD
1	TRAGOPOGON PRATENSIS	5	UPL	COMMON GOAT'S BEARD
1	TRIFOLIUM HYBRIDUM	1	FAC-	ALSIKE CLOVER
1	TRIFOLIUM PRATENSE	2	FACU+	RED CLOVER
1	TRIFOLIUM REPENS	2	FACU+	WHITE CLOVER
6	Trillium flexipes	1	FAC-	DECLINED TRILLIUM
5	Trillium recurvatum	4	FACU-	RED TRILLIUM
5	Triosteum aurantiacum	5	UPL	EARLY HORSE GENTIAN

5	Triosteum perfoliatum	5	UPL	LATE HORSE GENTIAN
0	TYPHA ANGUSTIFOLIA	-5	OBL	NARROW-LEAVED CAT-TAIL
1	Typha latifolia	-5	OBL	BROAD-LEAVED CAT-TAIL
3	Ulmus americana	-2	FACW-	AMERICAN ELM
-1	ULMUS PUMILA	5	UPL	SIBERIAN ELM
4	Ulmus rubra	0	FAC	SLIPPERY ELM
2	Urtica procera	-1	FAC+	TALL NETTLE
7	Uvularia grandiflora	5	UPL	BELLWORT
0	VALERIANA OFFICINALIS	-4	[FACW+]	GARDEN HELIOTROPE
1	VERBASCUM BLATTARIA	4	FACU-	MOTH MULLEIN
1	VERBASCUM THAPSUS	5	UPL	COMMON MULLEIN
4	Verbena hastata	-4	FACW+	BLUE VERVAIN
5	Verbena urticifolia	-1	FAC+	WHITE VERVAIN
5	Vernonia fasciculata	-3	FACW	COMMON IRONWEED
1	Veronica peregrina	-4	FACW+	PURSLANE SPEEDWELL
1	VERONICA SERPYLLIFOLIA	-3	FACW	THYME-LEAVED SPEEDWELL
6	Veronicastrum virginicum	0	FAC	CULVER'S ROOT
0	VIBURNUM LANTANA	5	UPL	WAYFARING TREE
5	Viburnum lentago	-1	FAC+	NANNYBERRY
0	VIBURNUM OPULUS	0	[FAC]	EUROPEAN HIGHBUSH CRANBERRY
4	Viburnum prunifolium	3	FACU	BLACK HAW
5	Viburnum rafinesquianum	5	UPL	DOWNY ARROW-WOOD
7	Vicia americana	5	[UPL]	AMERICAN VETCH
2	Viola affinis	-3	FACW	LE CONTE'S VIOLET
6	Viola cucullata	-5	OBL	HOODED VIOLET
15	Viola fimbriatula	-2	FACW-	SAND VIOLET
5	Viola missouriensis	-3	FACW	MISSOURI VIOLET
0	Viola papilionacea	0	FAC	COMMON BLUE VIOLET
10	Viola pedata lineariloba	5	UPL	BIRD'S FOOT VIOLET
10	Viola pedatifida	4	FACU-	PRAIRIE VIOLET
5	Viola pensylvanica	-2	FACW-	SMOOTH YELLOW VIOLET
3	Viola sororia	1	FAC-	HAIRY WOOD VIOLET
4	Vitis riparia	-2	FACW-	RIVERBANK GRAPE
1	Xanthoxylum americanum	5	UPL	PRICKLY ASH
7	Zizia aurea	-1	FAC+	GOLDEN ALEXANDERS



ROY C. BLACKWELL
RECREATIONAL PRESERVE
(SOUTH)

KEY TO MAP SYMBOLS FOR BLACKWELL FOREST PRESERVE

MEC - Tall grass meadow, alien

FUD - Forest, dry-mesic upland

PO - Nursery

MEF - short grass meadow, alien

FSS - Thorn thicket

PM - Mesic prairie

H - Homesite

AOP - Lake

FBS - Forest, bottomland

PGH - Gravel hill prairie

PC - Conifer plantation

SPM - Mesic savanna

M - Marsh

REFORESTATION TREE AND SHRUB SPECIES

Bitternut hickory	Blue ash
Shagbark hickory	Washington hawthorn
Black Cherry	Cockspur hawthorn
Sugar Maple	Downy hawthorn
Silver Maple	Pin oak
American linden	Chinquapin oak
Red aok	Sycamore
Black oak	Iowa crabapple
Bur oak	Sweet wild crabapple
White oak	American plum
Black maple	Hackberry
Green ash	Red cedar
White ash	Ironwood
Red ash	Hazelnut
Black ash	Witch hazel
Elderberry	Arrowwood
Silky dogwood	Red osier dogwood
Nannyberry	

'E: KAME
'S: BLACKWELL
'E: JANUARY 1988

.E: A:\BL\RLPF0014.188

241 NATIVE TAXA
269 W/Adventives (shown in ALL CAPS)
.62 NATIVE QUALITY
.04 W/Adventives
.69 NATIVE INDEX
.28 W/Adventives
2.1 NATIVE WETNESS
2.2 W/Adventives
FAC, UPLAND (+)

NATIVE	NO.	%	-3	6
Tree	26	9.7	-2	3
Shrub	16	6.0	-1	4
Vine	11	4.1	0	20
Fern	4	1.5	1	31
Forb	150	56.0	2	23
Grass	21	7.8	3	22
Sedge	13	4.9	4	32
			5	56
ADVENTIVE			6	20
Tree	2	0.7	7	17
Shrub	1	0.4	8	12
Vine	1	0.4	9	5
Forb	20	7.5	10	10
Grass	3	1.1	15	6
Sedge	0	0.0	20	0

'C	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acalypha rhomboidea	3	FACU	THREE-SEEDED MERCURY
0	Acer negundo	-2	FACW-	BOX ELDER
5	Acer saccharum	3	FACU	SUGAR MAPLE
7	Actaea pachypoda	5	UPL	WHITE BANEBERRY
5	Agastache nepetoides	3	FACU	YELLOW GIANT HYSSOP
5	Agastache scrophulariaefolia	5	UPL	PURPLE GIANT HYSSOP
5	Agrimonia pubescens	5	UPL	SOFT AGRIMONY
1	AGROSTIS ALBA	-3	FACW	REDTOP
1	Agrostis perennans	1	FAC-	THIN GRASS
-3	ALLIARIA OFFICINALIS	0	FAC	GARLIC MUSTARD
1	Allium canadense	3	FACU	WILD ONION
6	Allium cernuum	5	UPL	NODDING WILD ONION
7	Allium tricoccum	2	FACU+	WILD LEEK
6	Allium tricoccum burdickii	2	FACU+	BURDICK'S LEEK
0	Ambrosia artemisiifolia elatior	3	FACU	COMMON RAGWEED
0	Ambrosia trifida	-1	FAC+	GIANT RAGWEED
10	Amorpha canescens	5	UPL	LEAD PLANT
4	Amphicarpa bracteata comosa	0	FAC	HOG PEANUT
4	Andropogon gerardii	1	FAC-	BIG BLUESTEM GRASS
5	Andropogon scoparius	4	FACU-	LITTLE BLUESTEM GRASS
7	Anemone quinquefolia interior	0	FAC	WOOD ANEMONE
2	Anemone virginiana	5	[UPL]	TALL ANEMONE
6	Antennaria plantaginifolia	5	UPL	PUSSY TOES
6	Apios americana	-3	FACW	GROUND NUT
5	Apocynum androsaemifolium	5	UPL	SPREADING DOGBANE
2	Apocynum sibiricum	-1	FAC+	INDIAN HEMP
5	Aquilegia canadensis	1	FAC-	WILD COLUMBINE
-3	ARCTIUM MINUS	5	UPL	COMMON BURDOCK
10	Arenaria stricta	5	UPL	STIFF SANDWORT
5	Arisaema atrorubens	-2	FACW-	JACK-IN-THE-PULPIT
10	Asclepias exaltata	5	[UPL]	POKE MILKWEED
1	Asclepias verticillata	5	UPL	WHORLED MILKWEED
15	Asclepias viridiflora	5	UPL	SHORT GREEN MILKWEED
6	Asplenium platyneuron	3	FACU	EBONY SPLEENWORT
5	Aster ericoides	4	FACU-	HEATH ASTER
8	Aster laevis	5	UPL	SMOOTH BLUE ASTER
4	Aster lateriflorus	-2	FACW-	SIDE-FLOWERING ASTER
4	Aster novae-angliae	-3	FACW	NEW ENGLAND ASTER

1	Aster pilosus	4	FACU+	HAIRY ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
8	Aster shortii	5	UPL	SHORT'S ASTER
3	Aster simplex	-5	[OBL]	PANICLED ASTER
1	BARBAREA VULGARIS	0	FAC	YELLOW ROCKET
-2	BERBERIS THUNBERGII	4	FACU-	JAPANESE BARBERRY
15	Botrychium dissectum	0	FAC	CUT-LEAVED GRAPE FERN
6	Botrychium virginianum	3	FACU	RATTLESNAKE FERN
7	Bouteloua curtipendula	5	UPL	SIDE-OATS GRAMA
15	Brachyelytrum erectum	5	UPL	LONG-AWNED WOOD GRASS
10	Bromus latiglumis	-2	FACW-	EAR-LEAVED BROME
5	Bromus purgans	2	FACU+	WOODLAND BROME
6	Camassia scilloides	-1	FAC+	WILD HYACINTH
2	Campanula americana	0	FAC	TALL BELLFLOWER
2	Carex cephalophora	3	FACU	WOODBANK SEDGE
1	Carex convoluta	5	UPL	TUFTED WOOD SEDGE
5	Carex granularis	-4	FACW+	PALE FIELD SEDGE
3	Carex gravida	5	UPL	COARSE FIELD SEDGE
4	Carex hirtifolia	5	UPL	HAIRY WOOD SEDGE
5	Carex jamesii	5	UPL	GRASS SEDGE
1	Carex laxiflora	0	FAC	WOOD SEDGE
9	Carex meadii	0	FAC	
5	Carex pensylvanica	5	UPL	PENNSYLVANIA SEDGE
1	Carex rosea	5	UPL	TUFTED WOOD SEDGE
3	Carex sparganioides	0	FAC	BUR-REED SEDGE
9	Carex sprengelii	0	FAC	LONG-BEAKED SEDGE
0	Carex umbellata	5	UPL	LAX SAND SEDGE
7	Carya cordiformis	0	FAC	BITTERNUT HICKORY
5	Carya ovata	3	FACU	SHAGBARK HICKORY
8	Caulophyllum thalictroides	5	UPL	BLUE COHOSH
5	Celastrus scandens	3	FACU	CLIMBING BITTERSWEET
3	Celtis occidentalis	1	FAC-	HACKBERRY
4	Chenopodium boscianum	5	UPL	WOODLAND GOOSEFOOT
1	CHRYSANTHEMUM LEUCANTHEMUM PINNATIFIDUM	5	UPL	OX-EYE DAISY
5	Cinna arundinacea	-3	FACW	COMMON WOOD REED
1	Circaea quadrisulcata canadensis	3	FACU	ENCHANTER'S NIGHTSHADE
5	Cirsium altissimum	5	UPL	TALL THISTLE
3	CIRSIUM ARVENSE	3	FACU	FIELD THISTLE
2	Cirsium discolor	5	UPL	PASTURE THISTLE
	CIRSIUM VULGARE	4	FACU-	BULL THISTLE
	Claytonia virginica	3	FACU	SPRING BEAUTY
	Comandra richardsiana	3	FACU	FALSE TOADFLAX
	CONVALLARIA MAJALIS	5	UPL	LILY-OF-THE-VALLEY
	Cornus racemosa	-2	FACW-	GRAY DOGWOOD
	Corylus americana	0	[FAC]	AMERICAN HAZELNUT
	Crataegus coccinea	5	UPL	SCARLET HAWTHORN
	Crataegus macrosperma	5	UPL	LARGE-SEEDED HAWTHORN
	Crataegus mollis	-2	FACW-	DOWNY HAWTHORN
	Crataegus punctata	5	UPL	DOTTED HAWTHORN
	Crataegus rotundifolia	5	UPL	ROUND-LEAVED HAWTHORN
	Crataegus succulenta	5	UPL	FLESHY HAWTHORN
	Cryptotaenia canadensis	0	FAC	HONEWORT
	Cuscuta gronovii	-3	[FACW]	COMMON DODDER
	DAUCUS CAROTA	5	UPL	WILD CARROT
	Dentaria laciniata	5	UPL	TOOTHWORT
	Desmodium canadense	1	FAC-	SHOWY TICK TREFOIL

8	Desmodium cuspidatum	5	UPL	SMOOTH BRACTED TICK TREFOIL
8	Desmodium glutinosum	5	UPL	POINTED TICK TREFOIL
5	Dioscorea villosa	1	FAC-	WILD YAM
6	Dodecatheon meadia	4	FACU-	SHOOTING STAR
8	Echinacea pallida	5	UPL	PURPLE CONEFLOWER
5	Echinocystis lobata	-2	FACW-	WILD CUCUMBER
2	Ellisia nyctelea	-1	FAC+	AUNT LUCY
4	Elymus canadensis	1	FAC-	CANADA WILD RYE
5	Elymus villosus	3	FACU	SILKY WILD RYE
1	Erigeron annuus	1	FAC-	ANNUAL FLEABANE
4	Erigeron philadelphicus	-3	FACW	MARSH FLEABANE
3	Erigeron strigosus	1	FAC-	DAISY FLEABANE
9	Eryngium yuccifolium	-1	FAC+	RATTLESNAKE MASTER
5	Erythronium albidum	5	UPL	WHITE TROUT LILY
7	Eupatorium purpureum	0	FAC	PURPLE JOE PYE WEED
4	Eupatorium rugosum	3	FACU	WHITE SNAKEROOT
2	Euphorbia corollata	5	UPL	FLOWERING SPURGE
5	Festuca obtusa	2	FACU+	NODDING FESCUE
1	Fragaria virginiana	1	FAC-	WILD STRAWBERRY
5	Fraxinus americana	3	FACU	WHITE ASH
2	Fraxinus pennsylvanica subintegerrima	-3	FACW	GREEN ASH
1	Galium aparine	3	FACU	ANNUAL BEDSTRAW
4	Galium concinnum	3	FACU	SHINING BEDSTRAW
5	Galium triflorum	2	FACU+	SWEET-SCENTED BEDSTRAW
4	Geranium maculatum	3	FACU	WILD GERANIUM
0	Geum canadense	0	FAC	WHITE AVENS
1	Geum laciniatum trichocarpum	-3	FACW	ROUGH AVENS
4	Glyceria striata	-5	OBL	FOWL MANNA GRASS
0	Hackelia virginiana	1	FAC-	STICKSEED
5	Helianthus decapetalus	5	UPL	PALE SUNFLOWER
5	Helianthus divaricatus	5	UPL	WOODLAND SUNFLOWER
5	Helianthus hirsutus	5	UPL	OBLONG SUNFLOWER
10	Helianthus occidentalis	4	FACU-	WESTERN SUNFLOWER
-2	HESPERIS MATRONALIS	5	UPL	DAME'S ROCKET
8	Heuchera richardsonii	1	FAC-	PRAIRIE ALUM ROOT
5	Hydrophyllum virginianum	-2	FACW-	VIRGINIA WATERLEAF
0	Hypoxis hirsuta	0	FAC	YELLOW STAR GRASS
5	Hystrix patula	5	UPL	BOTTLEBRUSH GRASS
3	Impatiens capensis	-3	FACW	ORANGE JEWELWEED
4	Kuhnia eupatorioides corymbulosa	5	UPL	FALSE BONESET
2	Lactuca canadensis	2	FACU+	WILD LETTUCE
8	Lathyrus venosus	0	FAC	VEINY PEA
4	Lespedeza capitata	3	FACU	ROUND-HEADED BUSH CLOVER
8	Liatris cylindracea	5	UPL	CYLINDRICAL BLAZING STAR
6	Lilium michiganense	-1	FAC+	TURK'S CAP LILY
6	Lithospermum canescens	5	UPL	HOARY PUCCOON
8	Lithospermum incisum	5	UPL	FRINGED PUCCOON
5	Lithospermum latifolium	5	UPL	BROAD-LEAVED PUCCOON
6	Lobelia spicata	0	FAC	PALE SPIKED LOBELIA
7	Lonicera prolifera	5	UPL	YELLOW HONEYSUCKLE
3	LONICERS X BELLA	5	UPL	NCN
0	MEDICAGO LUPULINA	1	FAC-	BLACK MEDICK
3	MELILOTUS ALBA	3	FACU	WHITE SWEET CLOVER
2	MELILOTUS OFFICINALIS	3	FACU	YELLOW SWEET CLOVER
5	Menispermum canadense	-1	FAC+	MOONSEED
0	MIRABILIS NYCTAGINEA	5	UPL	WILD FOUR O'CLOCK

4	Monarda fistulosa	3	FACU	WILD BERGAMOT
-1	MORUS ALBA	0	FAC	WHITE MULBERRY
3	Muhlenbergia frondosa	-3	FACW	COMMON SATIN GRASS
-1	NEPETA CATARIA	1	FAC-	CATNIP
1	Oenothera biennis	3	FACU	COMMON EVENING PRIMROSE
8	Onoclea sensibilis	-3	FACW	SENSITIVE FERN
3	Osmorhiza claytoni	4	FACU-	HAIRY SWEET CICELY
3	Osmorhiza longistylis	4	FACU-	SMOOTH SWEET CICELY
0	Oxalis europaea	3	FACU	TALL WOOD SORREL
0	Oxalis stricta	3	FACU	COMMON WOOD SORREL
15	Oxalis violacea	5	UPL	VIOLET WOOD SORREL
15	Panax quinquefolius	5	UPL	GINSENG
3	Panicum implicatum	0	FAC	COMMON WOOLY PANIC GRASS
7	Panicum oligosanthes scribnerianum	3	FACU	SCRIBNER'S PANIC GRASS
5	Panicum virgatum	-1	FAC+	SWITCH GRASS
7	Parthenium integrifolium	5	UPL	WILD QUININE
2	Parthenocissus quinquefolia	1	FAC-	VIRGINIA CREEPER
9	Petalostemum purpureum	5	UPL	PURPLE PRAIRIE CLOVER
0	Phalaris arundinacea	-4	FACW+	REED CANARY GRASS
5	Phlox divaricata	3	FACU	WOODLAND PHLOX
3	Phryma leptostachya	5	UPL	LOPSEED
3	Physalis heterophylla	5	UPL	CLAMMY GROUND CHERRY
2	Phytolacca americana	1	FAC-	POKEWEED
5	Pilea pumila	-3	FACW	CLEARWEED
1	PLANTAGO LANCEOLATA	0	FAC	ENGLISH PLANTAIN
0	Plantago rugelii	0	FAC	RED-STALKED PLANTAIN
0	POA COMPRESSA	2	FACU+	CANADA BLUE GRASS
0	POA PRATENSIS	1	FAC-	KENTUCKY BLUE GRASS
5	Podophyllum peltatum	3	FACU	MAY APPLE
5	Polemonium reptans	0	FAC	JACOB'S LADDER
3	Polygonatum canaliculatum	3	FACU	SMOOTH SOLOMON'S SEAL
6	Polygonum punctatum	-5	OBL	SMARTWEED
2	Polygonum scandens	0	FAC	CLIMBING FALSE BUCKWHEAT
2	Populus deltoides	-1	FAC+	COTTONWOOD
6	Populus grandidentata	3	FACU	LARGE-TOOTHED ASPEN
9	Potentilla arguta	4	FACU-	PRAIRIE CINQUEFOIL
4	Potentilla simplex	4	FACU-	COMMON CINQUEFOIL
5	Prenanthes alba	3	FACU	WHITE LETTUCE
0	Prunella vulgaris lanceolata	0	FAC	SELF HEAL
5	Prunus americana	5	UPL	WILD PLUM
1	Prunus serotina	3	FACU	WILD BLACK CHERRY
1	Prunus virginiana	1	FAC-	CHOKE CHERRY
5	Pycnanthemum virginianum	-4	FACW+	COMMON MOUNTAIN MINT
2	Pyrus ioensis	5	UPL	IOWA CRAB
4	Quercus alba	3	FACU	WHITE OAK
4	Quercus ellipsoidalis	5	UPL	HILL'S OAK
4	Quercus macrocarpa	1	FAC-	BUR OAK
0	Ranunculus abortivus	4	FACW-	SMALL-FLOWERED BUTTERCUP
4	Ranunculus septentrionalis	-4	FACW+	SWAMP BUTTERCUP
4	Ratibida pinnata	5	UPL	YELLOW CONEFLOWER
1	Rhus glabra	5	UPL	SMOOTH SUMAC
1	Rhus radicans	3	[FACU]	POISON IVY
3	Rhus typhina	5	UPL	STAGHORN SUMAC
7	Ribes americanum	-3	FACW	WILD BLACK CURRANT
5	Ribes missouriense	5	UPL	WILD GOOSEBERRY
5	Rosa arkansana suffulta	5	UPL	SUNSHINE ROSE

5	Rosa blanda	3	FACU	EARLY WILD ROSE
5	Rosa carolina	4	FACU-	PASTURE ROSE
7	Rosa setigera	2	FACU+	ILLINOIS ROSE
3	Rubus allegheniensis	2	FACU+	COMMON BLACKBERRY
2	Rubus occidentalis	5	UPL	BLACK RASPBERRY
1	Rudbeckia hirta	3	FACU	BLACK-EYED SUSAN
3	Rudbeckia laciniata	-4	FACW+	WILD GOLDEN GLOW
3	Rudbeckia triloba	1	FAC-	BROWN-EYED SUSAN
-1	RUMEX CRISPUS	-1	FAC+	CURLY DOCK
1	Sambucus canadensis	4	FACW-	ELDERBERRY
2	Sanicula gregaria	-1	FAC+	CLUSTERED BLACK SNAKEROOT
6	Sanicula marilandica	5	[UPL]	SANICLE
4	Scrophularia marilandica	4	FACU-	LATE FIGWORT
7	Scutellaria parvula leonardi	3	FACU	SMALL SKULLCAP
6	Silene stellata	5	UPL	STARRY CAMPION
10	Silene virginica	5	UPL	FIRE PINK
5	Silphium integrifolium	5	UPL	ROSIN WEED
5	Silphium terebinthinaceum	1	[FAC-]	PRAIRIE DOCK
7	Sisyrinchium albidum	3	FACU	COMMON BLUE-EYED GRASS
2	Smilacina racemosa	3	FACU	FEATHERY FALSE SOLOMON'S SEAL
5	Smilacina stellata	1	FAC-	STARRY FALSE SOLOMON'S SEAL
3	Smilax ecirrhata	5	UPL	UPRIGHT CARRION FLOWER
4	Smilax lasioneura	5	UPL	COMMON CARRION FLOWER
5	Smilax tamnoides hispida	0	FAC	BRISTLY GREEN BRIER
-3	SOLANUM DULCAMARA	0	FAC	BITTERSWEET NIGHTSHADE
1	Solidago altissima	3	FACU	TALL GOLDENROD
3	Solidago graminifolia nuttallii	-2	FACW-	GRASS-LEAVED GOLDENROD
4	Solidago nemoralis	5	UPL	OLD-FIELD GOLDENROD
4	Solidago rigida	4	FACU-	STIFF GOLDENROD
5	Solidago ulmifolia	5	UPL	ELM-LEAVED GOLDENROD
5	Sorghastrum nutans	2	FACU+	INDIAN GRASS
4	Sphenopholis intermedia	0	FAC	SLENDER WEDGE GRASS
6	Stipa spartea	5	UPL	PORCUPINE GRASS
0	TARAXACUM OFFICINALE	3	FACU	COMMON DANDELION
3	Teucrium occidentale	-2	FACW-	WOOD SAGE
4	Thalictrum dasycarpum	-2	FACW-	HAIRY PURPLE MEADOW RUE
5	Tilia americana	3	FACU	AMERICAN LINDEN
2	Tovara virginiana	0	FAC	WOODLAND KNOTWEED
2	Tradescantia ohiensis	2	FACU+	COMMON SPIDERWORT
1	TRAGOPOGON MAJOR	5	UPL	SAND GOAT'S BEARD
1	TRAGOPOGON PRATENSIS	5	UPL	COMMON GOAT'S BEARD
6	Trillium flexipes	1	FAC-	DECLINED TRILLIUM
5	Trillium recurvatum	4	FACU-	RED TRILLIUM
5	Triosteum aurantiacum	5	UPL	EARLY HORSE GENTIAN
5	Triosteum perfoliatum	5	UPL	LATE HORSE GENTIAN
3	Ulmus americana	-2	FACW-	AMERICAN ELM
-1	ULMUS PUMILA	5	UPL	SIBERIAN ELM
4	Ulmus rubra	0	FAC	SLIPPERY ELM
7	Uvularia grandiflora	5	UPL	BELLWORT
1	VERBASCUM THAPSUS	5	UPL	COMMON MULLEIN
5	Verbena urticifolia	-1	FAC+	WHITE VERVAIN
1	Veronica peregrina	-4	FACW+	PURSLANE SPEEDWELL
5	Viburnum lentago	-1	FAC+	NANNYBERRY
4	Viburnum prunifolium	3	FACU	BLACK HAW
7	Vicia americana	5	[UPL]	AMERICAN VETCH
0	Viola papilionacea	0	FAC	COMMON BLUE VIOLET

10	Viola pedata lineariloba	5 UPL	BIRD'S FOOT VIOLET
10	Viola pedatifida	4 FACU-	PRAIRIE VIOLET
5	Viola pensylvanica	-2 FACW-	SMOOTH YELLOW VIOLET
3	Viola sororia	1 FAC-	HAIRY WOOD VIOLET
4	Vitis riparia	-2 FACW-	RIVERBANK GRAPE
1	Xanthoxylum americanum	5 UPL	PRICKLY ASH
7	Zizia aurea	-1 FAC+	GOLDEN ALEXANDERS

E: SPRINGBROOK WOODS
S: BLACKWELL
E: JANUARY 1988

E: A:\BL\RLPF0011.188

00 NATIVE TAXA
30 W/Adventives (shown in ALL CAPS)
74 NATIVE QUALITY
66 W/Adventives
40 NATIVE INDEX
35 W/Adventives
.2 NATIVE WETNESS
.6 W/Adventives
FACULTATIVE (-)

NATIVE	NO.	%	-3	8
Tree	20	15.6	-2	4
Shrub	15	11.7	-1	4
Vine	4	3.1	0	16
Fern	2	1.6	1	22
Forb	55	43.0	2	14
Grass	2	1.6	3	5
Sedge	1	0.8	4	14
			5	23
ADVENTIVE			6	7
Tree	3	2.3	7	9
Shrub	7	5.5	8	2
Vine	1	0.8	9	0
Forb	18	14.1	10	1
Grass	0	0.0	15	1
Sedge	0	0.0	20	0

C	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acer negundo	-2	FACW-	BOX ELDER
5	Acer nigrum	5	UPL	BLACK MAPLE
-1	ACER PLATANOIDES	5	UPL	NORWAY MAPLE
5	Acer saccharum	3	FACU	SUGAR MAPLE
5	Agastache nepetoides	3	FACU	YELLOW GIANT HYSSOP
8	Agrimonia parviflora	-1	FAC+	SWAMP AGRIMONY
5	Agrimonia pubescens	5	UPL	SOFT AGRIMONY
-3	ALLIARIA OFFICINALIS	0	FAC	GARLIC MUSTARD
7	Allium tricoccum	2	FACU+	WILD LEEK
7	Anemone quinquefolia interior	0	FAC	WOOD ANEMONE
2	Anemone virginiana	5	[UPL]	TALL ANEMONE
6	Antennaria neglecta	5	UPL	CAT'S FOOT
4	Apocynum cannabinum	0	FAC	INDIAN HEMP
-3	ARCTIUM MINUS	5	UPL	COMMON BURDOCK
0	Asclepias syriaca	5	UPL	COMMON MILKWEED
4	Aster lateriflorus	-2	FACW-	SIDE-FLOWERING ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
1	BARBAREA VULGARIS	0	FAC	YELLOW ROCKET
-2	BERBERIS THUNBERGII	4	FACU-	JAPANESE BARBERRY
6	Botrychium virginianum	3	FACU	RATTLESNAKE FERN
2	Campanula americana	0	FAC	TALL BELLFLOWER
5	Carex pensylvanica	5	UPL	PENNSYLVANIA SEDGE
7	Carya cordiformis	0	FAC	BITTERNUT HICKORY
5	Carya ovata	3	FACU	SHAGBARK HICKORY
3	Chenopodium hybridum gigantospermum	5	UPL	MAPLE-LEAVED GOOSEFOOT
0	Circaea quadrisulcata canadensis	3	FACU	ENCHANTER'S NIGHTSHADE
-3	CIRSIUM VULGARE	4	FACU-	BULL THISTLE
-3	CONVALLARIA MAJALIS	5	UPL	LILY-OF-THE-VALLEY
5	Cornus obliqua	-5	[OBL]	PALE DOGWOOD
1	Cornus racemosa	-2	FACW-	GRAY DOGWOOD
2	Corylus americana	0	[FAC]	AMERICAN HAZELNUT
1	Crataegus crus-galli	0	FAC	COCKSPUR HAWTHORN
5	Crataegus macrosperma	5	UPL	LARGE-SEEDED HAWTHORN
2	Crataegus mollis	-2	FACW-	DOWNY HAWTHORN
6	Cystopteris fragilis	3	FACU	FRAGILE FERN
1	DAUCUS CAROTA	5	UPL	WILD CARROT
6	Dodecatheon meadia	4	FACU-	SHOOTING STAR
1	Erigeron annuus	1	FAC-	ANNUAL FLEABANE

0	EUONYMUS ALATUS	5	UPL	BURNING BUSH
4	Eupatorium rugosum	3	FACU	WHITE SNAKEROOT
1	Fragaria virginiana	1	FAC-	WILD STRAWBERRY
5	Fraxinus americana	3	FACU	WHITE ASH
1	Galium aparine	3	FACU	ANNUAL BEDSTRAW
5	Galium triflorum	2	FACU+	SWEET-SCENTED BEDSTRAW
4	Geranium maculatum	3	FACU	WILD GERANIUM
0	Geum canadense	0	FAC	WHITE AVENS
1	Geum laciniatum trichocarpum	-3	FACW	ROUGH AVENS
-2	HESPERIS MATRONALIS	5	UPL	DAME'S ROCKET
5	Iris virginica shrevei	-5	OBL	BLUE FLAG
0	Juncus tenuis	0	FAC	ROADSIDE RUSH
2	Juniperus virginiana crebra	3	FACU	RED CEDAR
-1	LEONURUS CARDIACA	5	UPL	MOTHERWORT
4	Lespedeza capitata	3	FACU	ROUND-HEADED BUSH CLOVER
8	Liparis lilifolia	4	FACU-	PURPLE TWAYBLADE
7	Liparis loeselii	-4	FACW+	GREEN TWAYBLADE
6	Lobelia spicata	0	FAC	PALE SPIKED LOBELIA
-2	LONICERA MAACKII	5	UPL	AMUR HONEYSUCKLE
7	Lonicera prolifera	5	UPL	YELLOW HONEYSUCKLE
0	LONICERA X MINUTIFLORA			NCN
0	LONICERA XYLOSTEUM	5	UPL	EUROPEAN FLY HONEYSUCKLE
-3	MELILOTUS ALBA	3	FACU	WHITE SWEET CLOVER
-2	MELILOTUS OFFICINALIS	3	FACU	YELLOW SWEET CLOVER
1	MYOSOTON AQUATICUM	-1	FAC+	WATER CHICKWEED
-1	NEPETA CATARIA	1	FAC-	CATNIP
10	Oenothera pilosella	1	FAC-	PRAIRIE SUNDROPS
0	Oxalis europaea	3	FACU	TALL WOOD SORREL
0	Oxalis stricta	3	FACU	COMMON WOOD SORREL
3	Panicum implicatum	0	FAC	COMMON WOOLY PANIC GRASS
2	Parthenocissus quinquefolia	1	FAC-	VIRGINIA CREEPER
0	Phalaris arundinacea	-4	FACW+	REED CANARY GRASS
2	Phytolacca americana	1	FAC-	POKEWEED
5	Pilea pumila	-3	FACW	CLEARWEED
1	PLANTAGO LANCEOLATA	0	FAC	ENGLISH PLANTAIN
5	Podophyllum peltatum	3	FACU	MAY APPLE
5	Polemonium reptans	0	FAC	JACOB'S LADDER
2	Populus deltoides	-1	FAC+	COTTONWOOD
1	POTENTILLA RECTA	5	UPL	SULFUR CINQUEFOIL
4	Potentilla simplex	4	FACU-	COMMON CINQUEFOIL
1	Prunus serotina	3	FACU	WILD BLACK CHERRY
1	Prunus virginiana	1	FAC-	CHOKE CHERRY
7	Ptelea trifoliata	2	FACU+	WAFER ASH
5	Pycnanthemum virginianum	-4	FACW+	COMMON MOUNTAIN MINT
2	Pyrus ioensis	5	UPL	IOWA CRAB
1	PYRUS MALUS	5	UPL	APPLE
4	Quercus alba	3	FACU	WHITE OAK
4	Quercus ellipsoidalis	5	UPL	HILL'S OAK
4	Quercus macrocarpa	1	FAC-	BUR OAK
0	Ranunculus abortivus	4	FACW-	SMALL-FLOWERED BUTTERCUP
6	Ranunculus fascicularis	3	FACU	EARLY BUTTERCUP
4	Ranunculus septentrionalis	-4	FACW+	SWAMP BUTTERCUP
-3	RHAMNUS CATHARTICA	3	FACU	COMMON BUCKTHORN
1	Rhus glabra	5	UPL	SMOOTH SUMAC
1	Rhus radicans	3	[FACU]	POISON IVY
7	Ribes americanum	-3	FACW	WILD BLACK CURRANT

5	Ribes missouriense	5	UPL	WILD GOOSEBERRY
5	Rorippa islandica fernaldiana	-5	OBL	MARSH CRESS
3	ROSA MULTIFLORA	3	FACU	MULTIFLORA ROSE
7	Rosa setigera	2	FACU+	ILLINOIS ROSE
2	Rubus occidentalis	5	UPL	BLACK RASPBERRY
1	RUMEX CRISPUS	-1	FAC+	CURLY DOCK
2	Salix discolor	-3	FACW	PUSSY WILLOW
1	Salix interior	-5	OBL	SANDBAR WILLOW
0	SALIX PURPUREA	-3	FACW	PURPLE WILLOW
1	Sambucus canadensis	4	FACW-	ELDERBERRY
2	Sanicula gregaria	-1	FAC+	CLUSTERED BLACK SNAKEROOT
2	Smilacina racemosa	3	FACU	FEATHERY FALSE SOLOMON'S SEAL
5	Smilacina stellata	1	FAC-	STARRY FALSE SOLOMON'S SEAL
3	SOLANUM DULCAMARA	0	FAC	BITTERSWEET NIGHTSHADE
1	Solidago altissima	3	FACU	TALL GOLDENROD
3	Solidago gigantea	-3	FACW	LATE GOLDENROD
5	Symplocarpus foetidus	-5	OBL	SKUNK CABBAGE
0	TARAXACUM OFFICINALE	3	FACU	COMMON DANDELION
4	Thalictrum dasycarpum	-2	FACW-	HAIRY PURPLE MEADOW RUE
7	Thaspium trifoliatum flavum	5	UPL	MEADOW PARSNIP
3	Tilia americana	3	FACU	AMERICAN LINDEN
3	Trillium recurvatum	4	FACU-	RED TRILLIUM
3	Triosteum perfoliatum	5	UPL	LATE HORSE GENTIAN
	Ulmus americana	-2	FACW-	AMERICAN ELM
	Ulmus rubra	0	FAC	SLIPPERY ELM
	VERBASCUM BLATTARIA	4	FACU-	MOTH MULLEIN
	VERBASCUM THAPSUS	5	UPL	COMMON MULLEIN
	Viburnum lentago	-1	FAC+	NANNYBERRY
	VIBURNUM OPULUS	0	[FAC]	EUROPEAN HIGHBUSH CRANBERRY
	Viburnum prunifolium	3	FACU	BLACK HAW
	Viola fimbriatula	-2	FACW-	SAND VIOLET
	Viola missouriensis	-3	FACW	MISSOURI VIOLET
	Viola papillonacea	0	FAC	COMMON BLUE VIOLET
	Viola sororia	1	FAC-	HAIRY WOOD VIOLET
	Vitis riparia	-2	FACW-	RIVERBANK GRAPE
	Xanthoxylum americanum	5	UPL	PRICKLY ASH

TE: CAMPGROUND MEADOW
ES: BLACKWELL
TE: JANUARY 1988
:
LE: A:\BL\RLPF0015.188

80 NATIVE TAXA
148 W/Adventives (shown in ALL CAPS)
2.21 NATIVE QUALITY
).92 W/Adventives
).79 NATIVE INDEX
1.18 W/Adventives
1.5 NATIVE WETNESS
2.1 W/Adventives
FACULTATIVE (-)

NATIVE	NO.	%
Tree	23	15.9
Shrub	8	5.5
Vine	3	2.1
Fern	0	0.0
Forb	40	27.6
Grass	3	2.1
Sedge	2	1.4
ADVENTIVE		
Tree	7	4.8
Shrub	4	2.8
Vine	1	0.7
Forb	40	27.6
Grass	14	9.7
Sedge	0	0.0

-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	15	20

ofC	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acalypha rhomboidea	3	FACU	THREE-SEEDED MERCURY
0	ACER GINNALA	5	UPL	AMUR MAPLE
0	Acer negundo	-2	FACW-	BOX ELDER
5	Acer nigrum	5	UPL	BLACK MAPLE
0	Acer saccharinum	-3	FACW	SILVER MAPLE
1	ACHILLEA MILLEFOLIUM	3	FACU	YARROW
2	Agrimonia gryposepala	2	FACU+	TALL AGRIMONY
-2	AGROPYRON REPENS	3	FACU	QUACK GRASS
1	AGROSTIS ALBA	-3	FACW	REDTOP
0	Ambrosia artemisiifolia elatior	3	FACU	COMMON RAGWEED
0	Ambrosia trifida	-1	FAC+	GIANT RAGWEED
2	Anemone virginiana	5	[UPL]	TALL ANEMONE
2	Apocynum sibiricum	-1	FAC+	INDIAN HEMP
-3	ARCTIUM LAPPA	5	UPL	GREAT BURDOCK
-3	ARCTIUM MINUS	5	UPL	COMMON BURDOCK
0	Asclepias syriaca	5	UPL	COMMON MILKWEED
1	Asclepias verticillata	5	UPL	WHORLED MILKWEED
4	Aster novae-angliae	-3	FACW	NEW ENGLAND ASTER
1	Aster pilosus	4	FACU+	HAIRY ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
1	BARBAREA VULGARIS	0	FAC	YELLOW ROCKET
1	Bidens frondosa	-3	FACW	COMMON BEGGAR'S TICKS
-1	BRASSICA KABER PINNATIFIDA	5	UPL	CHARLOCK
-1	BROMUS INERMIS	5	UPL	HUNGARIAN BROME
0	BROMUS JAPONICUS	3	FACU	JAPANESE CHESS
0	CAPSELLA BURSA-PASTORIS	1	FAC-	SHEPHERD'S PURSE
1	Carex laxiflora	0	FAC	WOOD SEDGE
5	Carya ovata	3	FACU	SHAGBARK HICKORY
1	Catalpa speciosa	3	FACU	HARDY CATALPA
1	CHRYSANTHEMUM LEUCANTHEMUM PINNATIFIDUM	5	UPL	OX-EYE DAISY
1	CICHORIUM INTYBUS	5	UPL	CHICORY
6	Cirsium altissimum	5	UPL	TALL THISTLE
-3	CIRSIUM ARVENSE	3	FACU	FIELD THISTLE
2	Cirsium discolor	5	UPL	PASTURE THISTLE
-3	CIRSIUM VULGARE	4	FACU-	BULL THISTLE
-3	CONVOLVULUS ARVENSIS	5	UPL	FIELD BINDWEED
1	Convolvulus sepium	0	FAC	HEDGE BINDWEED
1	Cornus racemosa	-2	FACW-	GRAY DOGWOOD

6	Cornus stolonifera	-3	FACW	RED-OSIER DOGWOOD
-1	CORONILLA VARIA	5	UPL	CROWN VETCH
5	Crataegus coccinea	5	UPL	SCARLET HAWTHORN
1	Crataegus crus-galli	0	FAC	COCKSPUR HAWTHORN
2	Crataegus mollis	-2	FACW-	DOWNY HAWTHORN
1	Crataegus punctata	5	UPL	DOTTED HAWTHORN
1	DACTYLIS GLOMERATA	3	FACU	ORCHARD GRASS
1	DAUCUS CAROTA	5	UPL	WILD CARROT
0	DIGITARIA ISCHAEMUM	3	FACU	SMOOTH CRAB GRASS
4	Elymus virginicus	-2	FACW-	VIRGINIA WILD RYE
1	Erigeron annuus	1	FAC-	ANNUAL FLEABANE
0	Erigeron canadensis	1	FAC-	HORSEWEED
0	Eupatorium altissimum	3	FACU	TALL BONESET
-1	EUPHORBIA MACULATA	4	FACU-	NODDING SPURGE
1	FESTUCA ELATIOR	4	FACU-	MEADOW FESCUE
1	Fragaria virginiana	1	FAC-	WILD STRAWBERRY
5	Fraxinus americana	3	FACU	WHITE ASH
7	Fraxinus pennsylvanica	-3	FACW	RED ASH
2	Fraxinus pennsylvanica subintegerrima	-3	FACW	GREEN ASH
2	Gaura biennis	4	FACU-	BIENNIAL GAURA
0	Geum canadense	0	FAC	WHITE AVENS
-1	GLECHOMA HEDERACEA	4	FACU-	GROUND IVY
2	Helianthus grosseserratus	-2	FACW-	SAWTOOTH SUNFLOWER
-1	HORDEUM JUBATUM	-1	FAC+	SQUIRREL-TAIL GRASS
5	Juglans nigra	3	FACU	BLACK WALNUT
0	Juncus tenuis	0	FAC	ROADSIDE RUSH
2	Juniperus virginiana crebra	3	FACU	RED CEDAR
2	Lactuca canadensis	2	FACU+	WILD LETTUCE
-1	LACTUCA SCARIOLA	0	FAC	PRICKLY LETTUCE
-2	LONICERA MAACKII	5	UPL	AMUR HONEYSUCKLE
-3	LONICERS X BELLA	5	UPL	NCN
-2	LYCHNIS ALBA	5	UPL	WHITE CAMPION
0	MEDICAGO LUPULINA	1	FAC-	BLACK MEDICK
-3	MELILOTUS ALBA	3	FACU	WHITE SWEET CLOVER
-2	MELILOTUS OFFICINALIS	3	FACU	YELLOW SWEET CLOVER
4	Monarda fistulosa	3	FACU	WILD BERGAMOT
-1	MORUS ALBA	0	FAC	WHITE MULBERRY
0	Muhlenbergia schreberi	0	FAC	NIMBLEWILL
1	MYOSOTON AQUATICUM	-1	FAC+	WATER CHICKWEED
-1	NEPETA CATARIA	1	FAC-	CATNIP
1	Oenothera biennis	3	FACU	COMMON EVENING PRIMROSE
0	Oxalis stricta	3	FACU	COMMON WOOD SORREL
2	Parthenocissus quinquefolia	1	FAC-	VIRGINIA CREEPER
-3	PASTINACA SATIVA	5	UPL	WILD PARSNIP
0	Phalaris arundinacea	-4	FACW+	REED CANARY GRASS
1	PHLEUM PRATENSE	3	FACU	TIMOTHY
1	Physalis subglabrata	5	UPL	TALL GROUND CHERRY
1	PLANTAGO LANCEOLATA	0	FAC	ENGLISH PLANTAIN
0	PLANTAGO MAJOR	-1	FAC+	COMMON PLANTAIN
0	Plantago rugelii	0	FAC	RED-STALKED PLANTAIN
1	POA ANNUA	1	FAC-	ANNUAL BLUE GRASS
0	POA COMPRESSA	2	FACU+	CANADA BLUE GRASS
0	POA PRATENSIS	1	FAC-	KENTUCKY BLUE GRASS
0	POLYGONUM AVICULARE	1	FAC-	COMMON KNOTWEED
0	Polygonum erectum	3	FACU	ERECT KNOTWEED
0	POPULUS ALBA			WHITE POPLAR

2	Populus deltoides	-1	FAC+	COTTONWOOD
1	POTENTILLA RECTA	5	UPL	SULFUR CINQUEFOIL
4	Potentilla simplex	4	FACU-	COMMON CINQUEFOIL
0	Prunella vulgaris lanceolata	0	FAC	SELF HEAL
5	Prunus americana	5	UPL	WILD PLUM
1	Prunus serotina	3	FACU	WILD BLACK CHERRY
2	Pyrus ioensis	5	UPL	IOWA CRAB
1	PYRUS MALUS	5	UPL	APPLE
4	Quercus ellipsoidalis	5	UPL	HILL'S OAK
4	Quercus macrocarpa	1	FAC-	BUR OAK
-3	RHAMNUS CATHARTICA	3	FACU	COMMON BUCKTHORN
-3	RHAMNUS FRANGULA	-1	FAC+	GLOSSY BUCKTHORN
1	Rhus glabra	5	UPL	SMOOTH SUMAC
1	Rhus radicans	3	[FACU]	POISON IVY
3	Rhus typhina	5	UPL	STAGHORN SUMAC
-3	ROBINIA PSEUDO-ACACIA	4	FACU-	BLACK LOCUST
-3	ROSA MULTIFLORA	3	FACU	MULTIFLORA ROSE
7	Rosa setigera	2	FACU+	ILLINOIS ROSE
2	Rubus occidentalis	5	UPL	BLACK RASPBERRY
1	Rudbeckia hirta	3	FACU	BLACK-EYED SUSAN
3	Rudbeckia triloba	1	FAC-	BROWN-EYED SUSAN
1	RUMEX CRISPUS	-1	FAC+	CURLY DOCK
1	Salix interior	-5	OBL	SANDBAR WILLOW
1	Sambucus canadensis	4	FACW-	ELDERBERRY
4	Scirpus atrovirens	-5	OBL	DARK GREEN RUSH
0	SETARIA GLAUCA	0	FAC	YELLOW FOXTAIL
1	SETARIA VIRIDIS	5	UPL	GREEN FOXTAIL
2	Smilacina racemosa	3	FACU	FEATHERY FALSE SOLOMON'S SEAL
2	SOLANUM CAROLINENSE	4	FACU-	HORSE NETTLE
3	SOLANUM DULCAMARA	0	FAC	BITTERSWEET NIGHTSHADE
1	Solidago altissima	3	FACU	TALL GOLDENROD
4	Solidago nemoralis	5	UPL	OLD-FIELD GOLDENROD
4	Solidago rigida	4	FACU-	STIFF GOLDENROD
0	SONCHUS OLERACEUS	3	FACU	STORE-FRONT SOW THISTLE
2	SONCHUS ULIGINOSUS	1	FAC-	COMMON SOW THISTLE
0	TARAXACUM OFFICINALE	3	FACU	COMMON DANDELION
3	Teucrium canadense	-2	FACW-	WOOD SAGE
0	THLASPI ARVENSE	5	[UPL]	PENNY CRESS
1	TRAGOPOGON MAJOR	5	UPL	SAND GOAT'S BEARD
1	TRAGOPOGON PRATENSIS	5	UPL	COMMON GOAT'S BEARD
1	TRIFOLIUM HYBRIDUM	1	FAC-	ALSIKE CLOVER
1	TRIFOLIUM PRATENSE	2	FACU+	RED CLOVER
1	TRIFOLIUM REPENS	2	FACU+	WHITE CLOVER
3	Ulmus americana	-2	FACW-	AMERICAN ELM
1	ULMUS PUMILA	5	UPL	SIBERIAN ELM
4	Ulmus rubra	0	FAC	SLIPPERY ELM
1	VERBASCUM BLATTARIA	4	FACU-	MOTH MULLEIN
1	VERBASCUM THAPSUS	5	UPL	COMMON MULLEIN
5	Verbena urticifolia	-1	FAC+	WHITE VERVAIN
0	VIBURNUM OPULUS	0	[FAC]	EUROPEAN HIGHBUSH CRANBERRY
4	Viburnum prunifolium	3	FACU	BLACK HAW
5	Viburnum rafinesquianum	5	UPL	DOWNY ARROW-WOOD
0	Viola papilionacea	0	FAC	COMMON BLUE VIOLET
4	Vitis riparia	-2	FACW-	RIVERBANK GRAPE

TE: MACK ROAD MARSH
ES: BLACKWELL
TE: OCTOBER 1987
:
LE: A:\BL\RLPF0009.188

201 NATIVE TAXA
254 W/Adventives (shown in ALL CAPS)
.80 NATIVE QUALITY
.87 W/Adventives
.82 NATIVE INDEX
.74 W/Adventives
2.0 NATIVE WETNESS
1.3 W/Adventives
FAC. WETLAND (-)

NATIVE	NO.	%
Tree	15	6.0
Shrub	14	5.6
Vine	3	1.2
Fern	1	0.4
Forb	128	50.8
Grass	13	5.2
Sedge	26	10.3
ADVENTIVE		
Tree	6	2.4
Shrub	6	2.4
Vine	1	0.4
Forb	32	12.7
Grass	7	2.8
Sedge	0	0.0

-3	
-2	4
-1	9
0	38
1	35
2	25
3	14
4	29
5	48
6	19
7	13
8	4
9	2
10	4
15	0
20	0

FC	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acalypha rhomboidea	3	FACU	THREE-SEEDED MERCURY
0	Acer negundo	-2	FACW-	BOX ELDER
0	Acer saccharinum	-3	FACW	SILVER MAPLE
1	ACHILLEA MILLEFOLIUM	3	FACU	YARROW
0	Acnida altissima	-5	OBL	WATER HEMP
7	Acorus calamus	-5	OBL	SWEET FLAG
5	Actinomeris alternifolia	-3	FACW	WINGSTEM
2	Agrimonia gryposepala	2	FACU+	TALL AGRIMONY
8	Agrimonia parviflora	-1	FAC+	SWAMP AGRIMONY
-2	AGROPYRON REPENS	3	FACU	QUACK GRASS
1	AGROSTIS ALBA	-3	FACW	REDTOP
6	Agrostis alba palustris	-3	FACW	CREEPING BENT
4	Alisma subcordatum	-5	OBL	COMMON WATER PLANTAIN
4	Alisma triviale	-5	OBL	LARGE-FLOWERED WATER PLANTAIN
-3	ALLIARIA OFFICINALIS	0	FAC	GARLIC MUSTARD
1	Allium canadense	3	FACU	WILD ONION
6	Allium cernuum	5	UPL	NODDING WILD ONION
2	ALNUS GLUTINOSA	-2	FACW-	EUROPEAN ALDER
0	ALOPECURUS CAROLINIANUS	-3	FACW	ANNUAL FOXTAIL
0	Ambrosia artemisiifolia elatior	3	FACU	COMMON RAGWEED
0	Ambrosia trifida	-1	FAC+	GIANT RAGWEED
4	Anemone canadensis	-3	FACW	MEADOW ANEMONE
2	Anemone virginiana	5	[UPL]	TALL ANEMONE
5	Angelica atropurpurea	-5	OBL	GREAT ANGELICA
6	Apios americana	-3	FACW	GROUND NUT
4	Apocynum cannabinum	0	FAC	INDIAN HEMP
2	Apocynum sibiricum	-1	FAC+	INDIAN HEMP
-3	ARCTIUM MINUS	5	UPL	COMMON BURDOCK
0	ARTEMISIA BIENNIS	-2	FACW-	BIENNIAL WORMWOOD
4	Asclepias incarnata	-5	OBL	SWAMP MILKWEED
0	Asclepias syriaca	5	UPL	COMMON MILKWEED
1	ASPARAGUS OFFICINALIS	3	FACU	ASPARAGUS
4	Aster novae-angliae	-3	FACW	NEW ENGLAND ASTER
1	Aster pilosus	4	FACU+	HAIRY ASTER
6	Aster puniceus	-5	OBL	SWAMP ASTER
5	Aster puniceus firmus	-5	[OBL]	SMOOTH SWAMP ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
3	Aster simplex	-5	[OBL]	PANICLED ASTER

0	ATRIPLEX PATULA	-2	FACW-	COMMON ORACH
1	BARBAREA VULGARIS	0	FAC	YELLOW ROCKET
-2	BERBERIS THUNBERGII	4	FACU-	JAPANESE BARBERRY
5	Bidens cernua	-5	OBL	NODDING BUR MARIGOLD
5	Bidens comosa	-3	FACW	SWAMP TICKSEED
1	Bidens frondosa	-3	FACW	COMMON BEGGAR'S TICKS
1	Bidens vulgata	-3	FACW	TALL BEGGAR'S TICKS
2	Boehmeria cylindrica	-5	OBL	FALSE NETTLE
3	Boehmeria cylindrica drummondiana	-5	OBL	FALSE NETTLE
-1	BRASSICA NIGRA	5	UPL	BLACK MUSTARD
3	Calamagrostis canadensis	-5	OBL	BLUE JOINT GRASS
5	Caltha palustris	-5	OBL	MARSH MARIGOLD
7	Campanula aparinoides	-5	OBL	MARSH BELLFLOWER
5	Cardamine bulbosa	-5	OBL	BULBOUS CRESS
2	Carex amphibola turgida	5	UPL	GRAY SEDGE
7	Carex annectens xanthocarpa	-3	FACW	FALSE FOX SEDGE
3	Carex bebbii	-5	OBL	BEBB'S SEDGE
10	Carex bicknellii	1	FAC-	PRAIRIE SEDGE
3	Carex brevior	0	FAC	FIELD SEDGE
4	Carex cristatella	-4	FACW+	ROSETTE SEDGE
10	Carex festucacea	0	FAC	FESCUE SEDGE
5	Carex granularis	-4	FACW+	PALE FIELD SEDGE
6	Carex haydenii	-5	OBL	LONG-SCALED MEADOW SEDGE
4	Carex hystricina	-5	OBL	BOTTLEBRUSH SEDGE
4	Carex lanuginosa	-5	OBL	WOOLLY SEDGE
1	Carex laxiflora	0	FAC	WOOD SEDGE
5	Carex normalis	-3	FACW	SCALE WOOD SEDGE
2	Carex stipata	-5	OBL	SOFT SEDGE
5	Carex stricta	-5	OBL	MEADOW SEDGE
8	Carex suberecta	-5	OBL	POINTED FEN SEDGE
9	Carex tetanica	-3	FACW	RUNNING PRAIRIE SEDGE
10	Carex trichocarpa	-5	OBL	HAIRY-FRUITED SEDGE
2	Carex vulpinoidea	-5	OBL	FOX SEDGE
1	CERASTIUM VULGATUM	3	FACU	MOUSE-EAR CHICKWEED
8	Chelone glabra	-5	OBL	TURTLEHEAD
1	CHENOPODIUM ALBUM	1	FAC-	LAMB'S QUARTERS
1	CHRYSANTHEMUM LEUCANTHEMUM PINNATIFIDUM	5	UPL	OX-EYE DAISY
6	Cicuta maculata	-5	OBL	WATER HEMLOCK
5	Cinna arundinacea	-3	FACW	COMMON WOOD REED
-3	CIRSIUM ARVENSE	3	FACU	FIELD THISTLE
2	Cirsium discolor	5	UPL	PASTURE THISTLE
-3	CIRSIUM VULGARE	4	FACU-	BULL THISTLE
1	Convolvulus sepium	0	FAC	HEDGE BINDWEED
5	Cornus obliqua	-5	[OBL]	PALE DOGWOOD
1	Cornus racemosa	-2	FACW-	GRAY DOGWOOD
6	Cornus stolonifera	-3	FACW	RED-OSIER DOGWOOD
1	Crataegus crus-galli	0	FAC	COCKSPUR HAWTHORN
2	Crataegus mollis	-2	FACW-	DOWNY HAWTHORN
1	Crataegus punctata	5	UPL	DOTTED HAWTHORN
0	Cryptotaenia canadensis	0	FAC	HONEWORT
1	Cyperus strigosus	-3	FACW	COMMON SHORELINE SEDGE
1	DACTYLIS GLOMERATA	3	FACU	ORCHARD GRASS
1	DAUCUS CAROTA	5	UPL	WILD CARROT
0	Echinochloa crusgalli	-3	FACW	BARNYARD GRASS
5	Echinocystis lobata	-2	FACW-	WILD CUCUMBER
5	Eleocharis obtusa	-5	OBL	BLUNT SPIKE RUSH

5	Eleocharis palustris major	-5	OBL	
4	Elymus virginicus	-2	FACW-	VIRGINIA WILD RYE
3	Epilobium coloratum	-5	OBL	CINNAMON WILLOW HERB
0	Equisetum arvense	0	FAC	HORSETAIL
5	Eragrostis hypnoides	-5	OBL	CREEPING LOVE GRASS
1	Erigeron annuus	1	FAC-	ANNUAL FLEABANE
4	Erigeron philadelphicus	-3	FACW	MARSH FLEABANE
0	Eupatorium altissimum	3	FACU	TALL BONESET
5	Eupatorium maculatum	-5	OBL	SPOTTED JOE PYE WEED
6	Eupatorium perfoliatum	-5	[OBL]	COMMON BONESET
4	Eupatorium rugosum	3	FACU	WHITE SNAKEROOT
1	Eupatorium serotinum	-1	FAC+	LATE BONESET
1	Fragaria virginiana	1	FAC-	WILD STRAWBERRY
7	Fraxinus pennsylvanica	-3	FACW	RED ASH
2	Fraxinus pennsylvanica subintegerrima	-3	FACW	GREEN ASH
1	Galium aparine	3	FACU	ANNUAL BEDSTRAW
5	Galium obtusum	-5	[OBL]	WILD MADDER
5	Galium triflorum	2	FACU+	SWEET-SCENTED BEDSTRAW
2	Gaura biennis	4	FACU-	BIENNIAL GAURA
7	Gentiana andrewsii	-3	FACW	CLOSED GENTIAN
7	Gerardia tenuifolia	-3	FACW	SLENDER FALSE FOXGLOVE
0	Geum canadense	0	FAC	WHITE AVENS
1	Geum laciniatum trichocarpum	-3	FACW	ROUGH AVENS
-1	GLECHOMA HEDERACEA	4	FACU-	GROUND IVY
4	Glyceria striata	-5	OBL	FOWL MANNA GRASS
0	Hackelia virginiana	1	FAC-	STICKSEED
5	Helenium autumnale	-4	FACW+	SNEEZEWEED
2	Helianthus grosseserratus	-2	FACW-	SAWTOOTH SUNFLOWER
5	Helianthus hirsutus	5	UPL	OBLONG SUNFLOWER
3	Helianthus tuberosus	0	FAC	JERUSALEM ARTICHOKE
-1	HEMEROCALLIS FULVA	5	UPL	ORANGE DAY LILY
-1	HORDEUM JUBATUM	-1	FAC+	SQUIRREL-TAIL GRASS
3	Impatiens capensis	-3	FACW	ORANGE JEWELWEED
0	IRIS PSEUDACORUS	-5	OBL	YELLOW IRIS
5	Iris virginica shrevei	-5	OBL	BLUE FLAG
4	Juncus dudleyi	0	FAC	DUDLEY'S RUSH
6	Juncus nodosus	-5	OBL	JOINT RUSH
0	Juncus tenuis	0	FAC	ROADSIDE RUSH
4	Juncus torreyi	-3	FACW	TORREY'S RUSH
2	Lactuca canadensis	2	FACU+	WILD LETTUCE
6	Lathyrus palustris myrtifolius	-5	[OBL]	MARSH VETCHLING
5	Leersia oryzoides	-5	OBL	RICE CUT GRASS
5	Lemna minor	-5	OBL	SMALL DUCKWEED
-1	LEONURUS CARDIACA	5	UPL	MOTHERWORT
6	Lobelia siphilitica	-4	FACW+	GREAT BLUE LOBELIA
6	Lobelia spicata	0	FAC	PALE SPIKED LOBELIA
-3	LONICERA X MUENDENIENSIS	5	UPL	COMMON BUSH HONEYSUCKLE
0	LONICERA X XYLOSTEOIDES	5	UPL	
-2	LYCHNIS ALBA	5	UPL	WHITE CAMPION
5	Lycopus americanus	-5	OBL	COMMON WATER HOREHOUND
6	Lycopus uniflorus	-5	OBL	NORTHERN BUGLE WEED
4	Lysimachia ciliata	-3	FACW	FRINGED LOOSESTRIFE
9	Lysimachia thyrsiflora	-5	OBL	TUFTED LOOSESTRIFE
7	Lythrum alatum	-5	OBL	WINGED LOOSESTRIFE
0	MEDICAGO LUPULINA	1	FAC-	BLACK MEDICK
-3	MELILOTUS ALBA	3	FACU	WHITE SWEET CLOVER

-2	MELILOTUS OFFICINALIS	3	FACU	YELLOW SWEET CLOVER
5	Mentha arvensis villosa	-3	FACW	WILD MINT
6	Mimulus ringens	-5	OBL	MONKEY FLOWER
4	Monarda fistulosa	3	FACU	WILD BERGAMOT
-1	MORUS ALBA	0	FAC	WHITE MULBERRY
5	Muhlenbergia mexicana	-3	FACW	LEAFY SATIN GRASS
1	MYOSOTON AQUATICUM	-1	FAC+	WATER CHICKWEED
1	Oenothera biennis	3	FACU	COMMON EVENING PRIMROSE
10	Oenothera pilosella	1	FAC-	PRAIRIE SUNDROPS
0	Panicum dichotomiflorum	-2	FACW-	KNEE GRASS
-3	PASTINACA SATIVA	5	UPL	WILD PARSNIP
7	Pedicularis lanceolata	-4	FACW+	SWAMP BETONY
5	Penthorum sedoides	-5	OBL	DITCH STONECROP
0	Phalaris arundinacea	-4	FACW+	REED CANARY GRASS
7	Pilea fontana	-3	FACW	BOG CLEARWEED
5	Pilea pumila	-3	FACW	CLEARWEED
0	POA COMPRESSA	2	FACU+	CANADA BLUE GRASS
0	POA PRATENSIS	1	FAC-	KENTUCKY BLUE GRASS
5	Polygonum amphibium stipulaceum	-5	OBL	WATER KNOTWEED
5	Polygonum coccineum	-5	OBL	WATER HEARTSEASE
0	Polygonum erectum	3	FACU	ERECT KNOTWEED
2	Polygonum hydropiper	0	[FAC]	WATER PEPPER
0	Polygonum lapathifolium	-4	FACW+	HEARTSEASE
0	Polygonum pensylvanicum laevigatum	-4	FACW+	PENNSYLVANIA KNOTWEED
0	POLYGONUM PERSICARIA	-3	FACW	LADY'S THUMB
6	Polygonum punctatum	-5	OBL	SMARTWEED
2	Polygonum scandens	0	FAC	CLIMBING FALSE BUCKWHEAT
0	POPULUS ALBA			WHITE POPLAR
2	Populus deltoides	-1	FAC+	COTTONWOOD
0	Potentilla norvegica	0	FAC	NORWAY CINQUEFOIL
1	POTENTILLA RECTA	5	UPL	SULFUR CINQUEFOIL
4	Potentilla simplex	4	FACU-	COMMON CINQUEFOIL
0	Prunella vulgaris lanceolata	0	FAC	SELF HEAL
1	Prunus serotina	3	FACU	WILD BLACK CHERRY
5	Pycnanthemum virginianum	-4	FACW+	COMMON MOUNTAIN MINT
2	Pyrus ioensis	5	UPL	IOWA CRAB
1	PYRUS MALUS	5	UPL	APPLE
4	Quercus macrocarpa	1	FAC-	BUR OAK
6	Ranunculus sceleratus	-5	OBL	CURSED BUTTERCUP
4	Ranunculus septentrionalis	-4	FACW+	SWAMP BUTTERCUP
-3	RHAMNUS CATHARTICA	3	FACU	COMMON BUCKTHORN
-3	RHAMNUS FRANGULA	-1	FAC+	GLOSSY BUCKTHORN
1	Rhus glabra	5	UPL	SMOOTH SUMAC
7	Ribes americanum	-3	FACW	WILD BLACK CURRANT
5	Ribes missouriense	5	UPL	WILD GOOSEBERRY
5	Rorippa islandica fernaldiana	-5	OBL	MARSH CRESS
5	Rosa blanda	3	FACU	EARLY WILD ROSE
-3	ROSA MULTIFLORA	3	FACU	MULTIFLORA ROSE
7	Rosa setigera	2	FACU+	ILLINOIS ROSE
2	Rubus occidentalis	5	UPL	BLACK RASPBERRY
3	Rudbeckia laciniata	-4	FACW+	WILD GOLDEN GLOW
2	Rumex altissimus	4	FACW-	PALE DOCK
-1	RUMEX CRISPUS	-1	FAC+	CURLY DOCK
4	Sagittaria latifolia	-5	OBL	COMMON ARROWHEAD
0	SALIX ALBA	-3	FACW	WHITE WILLOW
2	Salix discolor	-3	FACW	PUSSY WILLOW

0	SALIX FRAGILIS	-1	FAC+	CRACK WILLOW
1	Salix interior	-5	OBL	SANDBAR WILLOW
4	Salix nigra	-5	OBL	BLACK WILLOW
5	Salix rigida	-4	FACW+	HEART-LEAVED WILLOW
1	Sambucus canadensis	4	FACW-	ELDERBERRY
4	Scirpus atrovirens	-5	OBL	DARK GREEN RUSH
6	Scirpus fluviatilis	-5	OBL	RIVER BULRUSH
4	Scirpus lineatus	-5	OBL	RED BULRUSH
5	Scirpus validus creber	-5	OBL	GREAT BULRUSH
5	Scutellaria epilobiifolia	-5	OBL	MARSH SKULLCAP
5	Scutellaria lateriflora	-5	OBL	MAD-DOG SKULLCAP
7	Sisyrinchium albidum	3	FACU	COMMON BLUE-EYED GRASS
7	Sium suave	-5	OBL	WATER PARSNIP
-3	SOLANUM DULCAMARA	0	FAC	BITTERSWEET NIGHTSHADE
1	Solidago altissima	3	FACU	TALL GOLDENROD
3	Solidago gigantea	-3	FACW	LATE GOLDENROD
3	Solidago graminifolia nuttallii	-2	FACW-	GRASS-LEAVED GOLDENROD
5	Solidago gymnospermoides	-1	FAC+	SAND GOLDENROD
-1	SONCHUS ASPER	0	FAC	SPINY SOW THISTLE
6	Sparganium eurycarpum	-5	OBL	COMMON BUR REED
5	Spartina pectinata	-4	FACW+	PRAIRIE CORD GRASS
4	Sphenopholis intermedia	0	FAC	SLENDER WEDGE GRASS
5	Stachys palustris homotricha	-5	OBL	WOUNDWORT
5	Stachys tenuifolia hispida	-5	[OBL]	ROUGH HEDGE NETTLE
8	Stellaria longifolia	-4	FACW+	STITCHWORT
0	TARAXACUM OFFICINALE	3	FACU	COMMON DANDELION
3	Teucrium canadense	-2	FACW-	WOOD SAGE
3	Teucrium occidentale	-2	FACW-	WOOD SAGE
4	Thalictrum dasycarpum	-2	FACW-	HAIRY PURPLE MEADOW RUE
5	Thalictrum dasycarpum hypoglaucum	-2	FACW-	SMOOTH PURPLE MEADOW RUE
2	Tradescantia ohiensis	2	FACU+	COMMON SPIDERWORT
0	TYPHA ANGUSTIFOLIA	-5	OBL	NARROW-LEAVED CAT-TAIL
1	Typha latifolia	-5	OBL	BROAD-LEAVED CAT-TAIL
3	Ulmus americana	-2	FACW-	AMERICAN ELM
4	Ulmus rubra	0	FAC	SLIPPERY ELM
2	Urtica procera	-1	FAC+	TALL NETTLE
0	VALERIANA OFFICINALIS	-4	[FACW+]	GARDEN HELIOTROPE
1	VERBASCUM BLATTARIA	4	FACU-	MOTH MULLEIN
4	Verbena hastata	-4	FACW+	BLUE VERVAIN
5	Verbena urticifolia	-1	FAC+	WHITE VERVAIN
5	Vernonia fasciculata	-3	FACW	COMMON IRONWEED
5	Viburnum lentago	-1	FAC+	NANNYBERRY
0	VIBURNUM OPULUS	0	[FAC]	EUROPEAN HIGHBUSH CRANBERRY
5	Viburnum rafinesquianum	5	UPL	DOWNY ARROW-WOOD
2	Viola affinis	-3	FACW	LE CONTE'S VIOLET
6	Viola cucullata	-5	OBL	HOODED VIOLET
0	Viola papilionacea	0	FAC	COMMON BLUE VIOLET
4	Vitis riparia	-2	FACW-	RIVERBANK GRAPE

TE: CAMPGROUNDS
ES: BLACKWELL
TE: JANUARY 1988
:
LE: A:\BL\RLPF0012.188

111 NATIVE TAXA
159 W/Adventives (shown in ALL CAPS)
.68 NATIVE QUALITY
.72 W/Adventives
.19 NATIVE INDEX
.73 W/Adventives
1.1 NATIVE WETNESS
1.5 W/Adventives
FACULTATIVE (-)

NATIVE	NO.	%	-3	9
Tree	21	13.4	-2	5
Shrub	10	6.4	-1	6
Vine	7	4.5	0	33
Fern	0	0.0	1	38
Forb	62	39.5	2	15
Grass	7	4.5	3	9
Sedge	3	1.9	4	20
			5	16
ADVENTIVE			6	5
Tree	2	1.3	7	3
Shrub	4	2.5	8	1
Vine	1	0.6	9	0
Forb	29	18.5	10	0
Grass	11	7.0	15	0
Sedge	0	0.0	20	0

rC	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acalypha rhomboidea	3	FACU	THREE-SEEDED MERCURY
0	Acer negundo	-2	FACW-	BOX ELDER
0	Acer saccharinum	-3	FACW	SILVER MAPLE
5	Acer saccharum	3	FACU	SUGAR MAPLE
1	ACHILLEA MILLEFOLIUM	3	FACU	YARROW
2	Agrimonia gryposepala	2	FACU+	TALL AGRIMONY
-2	AGROPYRON REPENS	3	FACU	QUACK GRASS
1	AGROSTIS ALBA	-3	FACW	REDTOP
-3	ALLIARIA OFFICINALIS	0	FAC	GARLIC MUSTARD
1	Allium canadense	3	FACU	WILD ONION
0	Ambrosia artemisiifolia elatior	3	FACU	COMMON RAGWEED
0	Ambrosia trifida	-1	FAC+	GIANT RAGWEED
2	Anemone virginiana	5	[UPL]	TALL ANEMONE
4	Apocynum cannabinum	0	FAC	INDIAN HEMP
2	Apocynum sibiricum	-1	FAC+	INDIAN HEMP
4	Asclepias incarnata	-5	OBL	SWAMP MILKWEED
0	Asclepias syriaca	5	UPL	COMMON MILKWEED
1	Asclepias verticillata	5	UPL	WHORLED MILKWEED
1	ASPARAGUS OFFICINALIS	3	FACU	ASPARAGUS
4	Aster novae-angliae	-3	FACW	NEW ENGLAND ASTER
1	Aster pilosus	4	FACU+	HAIRY ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
3	Aster simplex	-5	[OBL]	PANICLED ASTER
1	BARBAREA VULGARIS	0	FAC	YELLOW ROCKET
-2	BERBERIS THUNBERGII	4	FACU-	JAPANESE BARBERRY
0	BROMUS TECTORUM	5	UPL	DOWNY BROME
2	Campanula americana	0	FAC	TALL BELLFLOWER
1	Carex laxiflora	0	FAC	WOOD SEDGE
2	Carex stipata	-5	OBL	SOFT SEDGE
7	Carya cordiformis	0	FAC	BITTERNUT HICKORY
5	Carya ovata	3	FACU	SHAGBARK HICKORY
8	Ceanothus americanus	5	UPL	NEW JERSEY TEA
6	Celastrus scandens	3	FACU	CLIMBING BITTERSWEET
1	CERASTIUM VULGATUM	3	FACU	MOUSE-EAR CHICKWEED
1	CHRYSANTHEMUM LEUCANTHEMUM PINNATIFIDUM	5	UPL	OX-EYE DAISY
0	Circaea quadrisulcata canadensis	3	FACU	ENCHANTER'S NIGHTSHADE
2	Cirsium discolor	5	UPL	PASTURE THISTLE
-3	CIRSIUM VULGARE	4	FACU-	BULL THISTLE

3	CONVALLARIA MAJALIS	5	UPL	LILY-OF-THE-VALLEY
1	Convolvulus sepium	0	FAC	HEDGE BINDWEED
1	Cornus racemosa	-2	FACW-	GRAY DOGWOOD
6	Cornus stolonifera	-3	FACW	RED-OSIER DOGWOOD
1	Crataegus crus-galli	0	FAC	COCKSPUR HAWTHORN
2	Crataegus mollis	-2	FACW-	DOWNY HAWTHORN
1	Crataegus punctata	5	UPL	DOTTED HAWTHORN
1	DACTYLIS GLOMERATA	3	FACU	ORCHARD GRASS
1	DAUCUS CAROTA	5	UPL	WILD CARROT
6	Desmodium cuspidatum longifolium	5	UPL	ROUGH BRACTED TICK TREFOIL
0	DIGITARIA ISCHAEMUM	3	FACU	SMOOTH CRAB GRASS
0	Echinochloa crusgalli	-3	FACW	BARNYARD GRASS
3	Epilobium coloratum	-5	OBL	CINNAMON WILLOW HERB
0	ERAGROSTIS POAEOIDES	5	UPL	LOW LOVE GRASS
1	Erigeron annuus	1	FAC-	ANNUAL FLEABANE
0	Erigeron canadensis	1	FAC-	HORSEWEED
4	Erigeron philadelphicus	-3	FACW	MARSH FLEABANE
0	Eupatorium altissimum	3	FACU	TALL BONESET
4	Eupatorium rugosum	3	FACU	WHITE SNAKEROOT
1	FESTUCA ELATIOR	4	FACU-	MEADOW FESCUE
5	Festuca obtusa	2	FACU+	NODDING FESCUE
1	Fragaria virginiana	1	FAC-	WILD STRAWBERRY
5	Fraxinus americana	3	FACU	WHITE ASH
1	Galium aparine	3	FACU	ANNUAL BEDSTRAW
5	Galium triflorum	2	FACU+	SWEET-SCENTED BEDSTRAW
0	Geum canadense	0	FAC	WHITE AVENS
1	Geum lacinlatum trichocarpum	-3	FACW	ROUGH AVENS
0	Hackelia virginiana	1	FAC-	STICKSEED
4	Hypericum punctatum	-1	FAC+	SPOTTED ST. JOHN'S WORT
5	Juglans nigra	3	FACU	BLACK WALNUT
4	Juncus dudleyi	0	FAC	DUDLEY'S RUSH
0	Juncus tenuis	0	FAC	ROADSIDE RUSH
4	Juncus torreyi	-3	FACW	TORREY'S RUSH
2	Lactuca canadensis	2	FACU+	WILD LETTUCE
1	LACTUCA SCARIOLA	0	FAC	PRICKLY LETTUCE
1	LEONURUS CARDIACA	5	UPL	MOTHERWORT
7	Liparis loeselii	-4	FACW+	GREEN TWAYBLADE
2	LONICERA MAACKII	5	UPL	AMUR HONEYSUCKLE
3	LONICERS X BELLA	5	UPL	NCN
2	LYCHNIS ALBA	5	UPL	WHITE CAMPION
0	MATRICARIA MATRICARIOIDES	3	FACU	PINEAPPLE WEED
0	MEDICAGO LUPULINA	1	FAC-	BLACK MEDICK
3	MELILOTUS ALBA	3	FACU	WHITE SWEET CLOVER
2	MELILOTUS OFFICINALIS	3	FACU	YELLOW SWEET CLOVER
6	Menispermum canadense	-1	FAC+	MOONSEED
4	Monarda fistulosa	3	FACU	WILD BERGAMOT
1	MORUS ALBA	0	FAC	WHITE MULBERRY
0	Muhlenbergia schreberi	0	FAC	NIMBLEWILL
1	MYOSOTON AQUATICUM	-1	FAC+	WATER CHICKWEED
1	NEPETA CATARIA	1	FAC-	CATNIP
1	Oenothera biennis	3	FACU	COMMON EVENING PRIMROSE
0	Oxalis stricta	3	FACU	COMMON WOOD SORREL
3	Panicum implicatum	0	FAC	COMMON WOOLY PANIC GRASS
2	Parthenocissus quinquefolia	1	FAC-	VIRGINIA CREEPER
3	PASTINACA SATIVA	5	UPL	WILD PARSNIP
0	Phalaris arundinacea	-4	FACW+	REED CANARY GRASS

1	PHLEUM PRATENSE	3	FACU	TIMOTHY
3	Physalis heterophylla	5	UPL	CLAMMY GROUND CHERRY
1	Physalis subglabrata	5	UPL	TALL GROUND CHERRY
0	Plantago rugelii	0	FAC	RED-STALKED PLANTAIN
0	POA COMPRESSA	2	FACU+	CANADA BLUE GRASS
0	POA PRATENSIS	1	FAC-	KENTUCKY BLUE GRASS
3	Polygonatum canaliculatum	3	FACU	SMOOTH SOLOMON'S SEAL
0	Polygonum lapathifolium	-4	FACW+	HEARTSEASE
0	Polygonum pensylvanicum laevigatum	-4	FACW+	PENNSYLVANIA KNOTWEED
2	Polygonum scandens	0	FAC	CLIMBING FALSE BUCKWHEAT
2	Populus deltoides	-1	FAC+	COTTONWOOD
1	POTENTILLA RECTA	5	UPL	SULFUR CINQUEFOIL
4	Potentilla simplex	4	FACU-	COMMON CINQUEFOIL
0	Prunella vulgaris lanceolata	0	FAC	SELF HEAL
5	Prunus americana	5	UPL	WILD PLUM
1	Prunus serotina	3	FACU	WILD BLACK CHERRY
1	Prunus virginiana	1	FAC-	CHOKE CHERRY
2	Pyrus ioensis	5	UPL	IOWA CRAB
4	Quercus alba	3	FACU	WHITE OAK
4	Quercus ellipsoidalis	5	UPL	HILL'S OAK
4	Quercus macrocarpa	1	FAC-	BUR OAK
6	Quercus velutina	5	UPL	BLACK OAK
0	Ranunculus abortivus	4	FACW-	SMALL-FLOWERED BUTTERCUP
1	Rhus glabra	5	UPL	SMOOTH SUMAC
1	Rhus radicans	3	[FACU]	POISON IVY
5	Ribes missouriense	5	UPL	WILD GOOSEBERRY
-3	ROSA MULTIFLORA	3	FACU	MULTIFLORA ROSE
7	Rosa setigera	2	FACU+	ILLINOIS ROSE
3	Rubus allegheniensis	2	FACU+	COMMON BLACKBERRY
2	Rubus occidentalis	5	UPL	BLACK RASPBERRY
-1	RUMEX CRISPUS	-1	FAC+	CURLY DOCK
1	Sambucus canadensis	4	FACW-	ELDERBERRY
4	Scirpus atrovirens	-5	OBL	DARK GREEN RUSH
4	Scrophularia marilandica	4	FACU-	LATE FIGWORT
0	SETARIA GLAUCA	0	FAC	YELLOW FOXTAIL
2	Smilacina racemosa	3	FACU	FEATHERY FALSE SOLOMON'S SEAL
5	Smilacina stellata	1	FAC-	STARRY FALSE SOLOMON'S SEAL
4	Smilax lasioneura	5	UPL	COMMON CARRION FLOWER
-3	SOLANUM DULCAMARA	0	FAC	BITTERSWEET NIGHTSHADE
1	Solidago altissima	3	FACU	TALL GOLDENROD
3	Solidago graminifolia nuttallii	-2	FACW-	GRASS-LEAVED GOLDENROD
5	Solidago missouriensis fasciculata	5	UPL	MISSOURI GOLDENROD
0	SONCHUS OLERACEUS	3	FACU	STORE-FRONT SOW THISTLE
5	Sorghastrum nutans	2	FACU+	INDIAN GRASS
5	Spartina pectinata	-4	FACW+	PRAIRIE CORD GRASS
0	TARAXACUM OFFICINALE	3	FACU	COMMON DANDELION
3	Teucrium canadense	-2	FACW-	WOOD SAGE
5	Tilia americana	3	FACU	AMERICAN LINDEN
1	TRAGOPOGON MAJOR	5	UPL	SAND GOAT'S BEARD
1	TRIFOLIUM PRATENSE	2	FACU+	RED CLOVER
5	Triosteum aurantiacum	5	UPL	EARLY HORSE GENTIAN
5	Triosteum perfoliatum	5	UPL	LATE HORSE GENTIAN
0	TYPHA ANGUSTIFOLIA	-5	OBL	NARROW-LEAVED CAT-TAIL
1	Typha latifolia	-5	OBL	BROAD-LEAVED CAT-TAIL
-1	ULMUS PUMILA	5	UPL	SIBERIAN ELM
4	Ulmus rubra	0	FAC	SLIPPERY ELM

1	VERBASCUM BLATTARIA	4	FACU-	MOTH MULLEIN
1	VERBASCUM THAPSUS	5	UPL	COMMON MULLEIN
4	Verbena hastata	-4	FACW+	BLUE VERVAIN
5	Verbena urticifolia	-1	FAC+	WHITE VERVAIN
1	VERONICA SERPYLLIFOLIA	-3	FACW	THYME-LEAVED SPEEDWELL
0	VIBURNUM OPULUS	0	[FAC]	EUROPEAN HIGHBUSH CRANBERRY
4	Viburnum prunifolium	3	FACU	BLACK HAW
3	Viola sororia	1	FAC-	HAIRY WOOD VIOLET
4	Vitis riparia	-2	FACW-	RIVERBANK GRAPE

8	Euonymus atropurpureus	1	FAC-	WAHOO
7	Eupatorium purpureum	0	FAC	PURPLE JOE PYE WEED
4	Eupatorium rugosum	3	FACU	WHITE SNAKEROOT
5	Festuca obtusa	2	FACU+	NODDING FESCUE
1	Fragaria virginiana	1	FAC-	WILD STRAWBERRY
5	Fraxinus americana	3	FACU	WHITE ASH
7	Fraxinus pennsylvanica	-3	FACW	RED ASH
1	Galium aparine	3	FACU	ANNUAL BEDSTRAW
4	Geranium maculatum	3	FACU	WILD GERANIUM
0	Geum canadense	0	FAC	WHITE AVENS
5	Helianthus divaricatus	5	UPL	WOODLAND SUNFLOWER
5	Helianthus strumosus	5	UPL	PALE-LEAVED SUNFLOWER
0	HEMEROCALLIS FLAVA			LEMON DAY LILY
2	HESPERIS MATRONALIS	5	UPL	DAME'S ROCKET
5	Hydrophyllum virginianum	-2	FACW-	VIRGINIA WATERLEAF
5	Hystrix patula	5	UPL	BOTTLEBRUSH GRASS
5	Juglans nigra	3	FACU	BLACK WALNUT
0	Juncus tenuis	0	FAC	ROADSIDE RUSH
2	Juniperus virginiana crebra	3	FACU	RED CEDAR
7	Leersia virginica	-3	FACW	WHITE GRASS
	LEONURUS CARDIACA	5	UPL	MOTHERWORT
	Lonicera prolifera	5	UPL	YELLOW HONEYSUCKLE
	MELILOTUS ALBA	3	FACU	WHITE SWEET CLOVER
	MELILOTUS OFFICINALIS	3	FACU	YELLOW SWEET CLOVER
	NEPETA CATARIA	1	FAC-	CATNIP
	Osmorhiza claytoni	4	FACU-	HAIRY SWEET CICELY
	Oxalis stricta	3	FACU	COMMON WOOD SORREL
	Phryma leptostachya	5	UPL	LOPSEED
	POA COMPRESSA	2	FACU+	CANADA BLUE GRASS
	POA PRATENSIS	1	FAC-	KENTUCKY BLUE GRASS
	Podophyllum peltatum	3	FACU	MAY APPLE
	Polygonatum canaliculatum	3	FACU	SMOOTH SOLOMON'S SEAL
	Populus deltoides	-1	FAC+	COTTONWOOD
	Populus grandidentata	3	FACU	LARGE-TOOTHED ASPEN
	Prenanthes alba	3	FACU	WHITE LETTUCE
	Prunella vulgaris lanceolata	0	FAC	SELF HEAL
	Prunus serotina	3	FACU	WILD BLACK CHERRY
	Prunus virginiana	1	FAC-	CHOKE CHERRY
	Quercus alba	3	FACU	WHITE OAK
	Quercus ellipsoidalis	5	UPL	HILL'S OAK
	Quercus macrocarpa	1	FAC-	BUR OAK
	Ranunculus abortivus	4	FACW-	SMALL-FLOWERED BUTTERCUP
	Ranunculus septentrionalis	-4	FACW+	SWAMP BUTTERCUP
	Rhus glabra	5	UPL	SMOOTH SUMAC
	Rhus radicans	3	[FACU]	POISON IVY
	Ribes missouriense	5	UPL	WILD GOOSEBERRY
	ROBINIA PSEUDO-ACACIA	4	FACU-	BLACK LOCUST
	Rosa setigera	2	FACU+	ILLINOIS ROSE
	Sambucus canadensis	4	FACW-	ELDERBERRY
	Sanicula gregaria	-1	FAC+	CLUSTERED BLACK SNAKEROOT
	Smilacina racemosa	3	FACU	FEATHERY FALSE SOLOMON'S SEAL
	Smilacina stellata	1	FAC-	STARRY FALSE SOLOMON'S SEAL
	SOLANUM DULCAMARA	0	FAC	BITTERSWEET NIGHTSHADE
	Solidago altissima	3	FACU	TALL GOLDENROD
	Solidago flexicaulis	3	FACU	BROAD-LEAVED GOLDENROD
	Solidago ulmifolia	5	UPL	ELM-LEAVED GOLDENROD

TE: AMPHITHEATRE WOODS
ES: BLACKWELL
TE: JANUARY 1988
:
LE: A:\BL\RLPF0013.188

91 NATIVE TAXA
114 W/Adventives (shown in ALL CAPS)
.84 NATIVE QUALITY
.89 W/Adventives
.59 NATIVE INDEX
.91 W/Adventives
2.1 NATIVE WETNESS
2.3 W/Adventives
FAC. UPLAND (+)

NATIVE	NO.	%	-3
Tree	21	18.6	-2
Shrub	10	8.8	-1
Vine	4	3.5	0
Fern	0	0.0	1
Forb	50	44.2	2
Grass	4	3.5	3
Sedge	2	1.8	4
			5
ADVENTIVE			6
Tree	2	1.8	7
Shrub	3	2.7	8
Vine	1	0.9	9
Forb	13	11.5	10
Grass	3	2.7	15
Sedge	0	0.0	20

fC	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acer negundo	-2	FACW-	BOX ELDER
5	Acer nigrum	5	UPL	BLACK MAPLE
5	Acer saccharum	3	FACU	SUGAR MAPLE
1	ACHILLEA MILLEFOLIUM	3	FACU	YARROW
7	Actaea pachypoda	5	UPL	WHITE BANEBERRY
5	Agrimonia pubescens	5	UPL	SOFT AGRIMONY
-3	ALLIARIA OFFICINALIS	0	FAC	GARLIC MUSTARD
6	Allium tricoccum burdickii	2	FACU+	BURDICK'S LEEK
4	Amphicarpa bracteata	0	FAC	HOG PEANUT
7	Anemone quinquefolia interior	0	FAC	WOOD ANEMONE
2	Anemone virginiana	5	[UPL]	TALL ANEMONE
5	Aquilegia canadensis	1	FAC-	WILD COLUMBINE
-3	ARCTIUM MINUS	5	UPL	COMMON BURDOCK
5	Arisaema atrorubens	-2	FACW-	JACK-IN-THE-PULPIT
4	Aster lateriflorus	-2	FACW-	SIDE-FLOWERING ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
1	BARBAREA VULGARIS	0	FAC	YELLOW ROCKET
-2	BERBERIS THUNBERGII	4	FACU-	JAPANESE BARBERRY
-1	BROMUS INERMIS	5	UPL	HUNGARIAN BROME
6	Camassia scilloides	-1	FAC+	WILD HYACINTH
2	Campanula americana	0	FAC	TALL BELLFLOWER
5	Carex pensylvanica	5	UPL	PENNSYLVANIA SEDGE
1	Carex rosea	5	UPL	TUFTED WOOD SEDGE
7	Carya cordiformis	0	FAC	BITTERNUT HICKORY
5	Carya ovata	3	FACU	SHAGBARK HICKORY
0	Circaea quadrisulcata canadensis	3	FACU	ENCHANTER'S NIGHTSHADE
6	Cirsium altissimum	5	UPL	TALL THISTLE
2	Cirsium discolor	5	UPL	PASTURE THISTLE
1	Cornus racemosa	-2	FACW-	GRAY DOGWOOD
5	Crataegus macrosperma	5	UPL	LARGE-SEEDED HAWTHORN
1	Crataegus punctata	5	UPL	DOTTED HAWTHORN
5	Dentaria laciniata	5	UPL	TOOTHWORT
5	Dioscorea villosa	1	FAC-	WILD YAM
5	Elymus villosus	3	FACU	SILKY WILD RYE
2	EPIPACTIS HELLEBORINE	5	UPL	HELLEBORINE
1	Erigeron annuus	1	FAC-	ANNUAL FLEABANE
4	Erigeron philadelphicus	-3	FACW	MARSH FLEABANE
5	Erythronium albidum	5	UPL	WHITE TROUT LILY

0	SYMPHORICARPOS ORBICULATUS	3	FACU	CORALBERRY
0	TARAXACUM OFFICINALE	3	FACU	COMMON DANDELION
5	Tilia americana	3	FACU	AMERICAN LINDEN
5	Trillium recurvatum	4	FACU-	RED TRILLIUM
5	Triosteum aurantiacum	5	UPL	EARLY HORSE GENTIAN
3	Ulmus americana	-2	FACW-	AMERICAN ELM
-1	ULMUS PUMILA	5	UPL	SIBERIAN ELM
4	Ulmus rubra	0	FAC	SLIPPERY ELM
7	Uvularia grandiflora	5	UPL	BELLWORT
1	VERBASCUM BLATTARIA	4	FACU-	MOTH MULLEIN
1	VERBASCUM THAPSUS	5	UPL	COMMON MULLEIN
6	Veronicastrum virginicum	0	FAC	CULVER'S ROOT
5	Viburnum lentago	-1	FAC+	NANNYBERRY
0	VIBURNUM OPULUS	0	[FAC]	EUROPEAN HIGHBUSH CRANBERRY
4	Viburnum prunifolium	3	FACU	BLACK HAW
5	Viburnum rafinesquianum	5	UPL	DOWNY ARROW-WOOD
5	Viola pensylvanica	-2	FACW-	SMOOTH YELLOW VIOLET
3	Viola sororia	1	FAC-	HAIRY WOOD VIOLET
4	Vitis riparia	-2	FACW-	RIVERBANK GRAPE
1	Xanthoxylum americanum	5	UPL	PRICKLY ASH

TE: MACK ROAD WOODS
ES: BLACKWELL
TE: OCTOBER 1987
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LE: A:\BL\RLPF0008.188

41 NATIVE TAXA
51 W/Adventives (shown in ALL CAPS)
.76 NATIVE QUALITY
.00 W/Adventives
.65 NATIVE INDEX
..28 W/Adventives
2.3 NATIVE WETNESS
2.3 W/Adventives
FAC. UPLAND (+)

NATIVE	NO.	%
Tree	9	17.6
Shrub	4	7.8
Vine	2	3.9
Fern	0	0.0
Forb	25	49.0
Grass	0	0.0
Sedge	1	2.0
ADVENTIVE		
Tree	2	3.9
Shrub	2	3.9
Vine	1	2.0
Forb	5	9.8
Grass	0	0.0
Sedge	0	0.0

-3	
-2	
-1	
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
15	
20	

FC	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acer negundo	-2	FACW-	BOX ELDER
5	Agrimonia pubescens	5	UPL	SOFT AGRIMONY
-3	ALLIARIA OFFICINALIS	0	FAC	GARLIC MUSTARD
7	Anemone quinquefolia interior	0	FAC	WOOD ANEMONE
-3	ARCTIUM MINUS	5	UPL	COMMON BURDOCK
1	Aster pilosus	4	FACU+	HAIRY ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
5	Carex pensylvanica	5	UPL	PENNSYLVANIA SEDGE
5	Carya ovata	3	FACU	SHAGBARK HICKORY
3	Celtis occidentalis	1	FAC-	HACKBERRY
0	Circaea quadrisulcata canadensis	3	FACU	ENCHANTER'S NIGHTSHADE
5	Dentaria laciniata	5	UPL	TOOTHWORT
6	Dodecatheon meadia	4	FACU-	SHOOTING STAR
2	EPIPACTIS HELLEBORINE	5	UPL	HELLEBORINE
1	Erigeron annuus	1	FAC-	ANNUAL FLEABANE
4	Eupatorium rugosum	3	FACU	WHITE SNAKEROOT
1	Fragaria virginiana	1	FAC-	WILD STRAWBERRY
1	Galium aparine	3	FACU	ANNUAL BEDSTRAW
5	Galium triflorum	2	FACU+	SWEET-SCENTED BEDSTRAW
0	Geum canadense	0	FAC	WHITE AVENS
1	Geum laciniatum trichocarpum	-3	FACW	ROUGH AVENS
2	Lactuca canadensis	2	FACU+	WILD LETTUCE
-1	MORUS ALBA	0	FAC	WHITE MULBERRY
0	Oxalis stricta	3	FACU	COMMON WOOD SORREL
2	Parthenocissus quinquefolia	1	FAC-	VIRGINIA CREEPER
5	Podophyllum peltatum	3	FACU	MAY APPLE
5	Polemonium reptans	0	FAC	JACOB'S LADDER
3	Polygonatum canaliculatum	3	FACU	SMOOTH SOLOMON'S SEAL
0	Prunella vulgaris lanceolata	0	FAC	SELF HEAL
5	Prunus americana	5	UPL	WILD PLUM
1	Prunus serotina	3	FACU	WILD BLACK CHERRY
1	Prunus virginiana	1	FAC-	CHOKE CHERRY
2	Pyrus ioensis	5	UPL	IOWA CRAB
1	PYRUS MALUS	5	UPL	APPLE
4	Quercus alba	3	FACU	WHITE OAK
4	Quercus macrocarpa	1	FAC-	BUR OAK
0	Ranunculus abortivus	4	FACW-	SMALL-FLOWERED BUTTERCUP
1	Rhus glabra	5	UPL	SMOOTH SUMAC

5	Ribes missouriense	5	UPL	WILD GOOSEBERRY
-3	ROSA MULTIFLORA	3	FACU	MULTIFLORA ROSE
2	Rubus occidentalis	5	UPL	BLACK RASPBERRY
-1	RUMEX CRISPUS	-1	FAC+	CURLY DOCK
1	Sambucus canadensis	4	FACW-	ELDERBERRY
6	Silene stellata	5	UPL	STARRY CAMPION
5	Silphium perfoliatum	-2	FACW-	CUP PLANT
-3	SOLANUM DULCAMARA	0	FAC	BITTERSWEET NIGHTSHADE
1	Solidago altissima	3	FACU	TALL GOLDENROD
0	TARAXACUM OFFICINALE	3	FACU	COMMON DANDELION
2	Tovara virginiana	0	FAC	WOODLAND KNOTWEED
0	VIBURNUM OPULUS	0	[FAC]	EUROPEAN HIGHBUSH CRANBERRY
4	Vitis riparia	-2	FACW-	RIVERBANK GRAPE

TE: SOUTH SAVANNA
ES: BLACKWELL
TE: JANUARY 1988
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LE: A:\BL\RLPF0010.188

57 NATIVE TAXA
60 W/Adventives (shown in ALL CAPS)
.49 NATIVE QUALITY
.28 W/Adventives
.81 NATIVE INDEX
.69 W/Adventives
1.6 NATIVE WETNESS
1.7 W/Adventives
FAC. UPLAND (+)

NATIVE	NO.	%	-3
Tree	9	15.0	-2
Shrub	6	10.0	-1
Vine	3	5.0	0
Fern	0	0.0	1
Forb	38	63.3	2
Grass	1	1.7	3
Sedge	0	0.0	4
			5
ADVENTIVE			6
Tree	0	0.0	7
Shrub	1	1.7	8
Vine	0	0.0	9
Forb	2	3.3	10
Grass	0	0.0	15
Sedge	0	0.0	20

C	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acer negundo	-2	FACW-	BOX ELDER
1	ACHILLEA MILLEFOLIUM	3	FACU	YARROW
2	Agrimonia gryposepala	2	FACU+	TALL AGRIMONY
0	Ambrosia artemisiifolia elatior	3	FACU	COMMON RAGWEED
0	Ambrosia trifida	-1	FAC+	GIANT RAGWEED
4	Amphicarpa bracteata comosa	0	FAC	HOG PEANUT
-3	ARCTIUM MINUS	5	UPL	COMMON BURDOCK
4	Aster lateriflorus	-2	FACW-	SIDE-FLOWERING ASTER
1	Aster pilosus	4	FACU+	HAIRY ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
2	Boehmeria cylindrica	-5	OBL	FALSE NETTLE
5	Carya ovata	3	FACU	SHAGBARK HICKORY
4	Chenopodium boscianum	5	UPL	WOODLAND GOOSEFOOT
0	Circaea quadrisulcata canadensis	3	FACU	ENCHANTER'S NIGHTSHADE
1	Cornus racemosa	-2	FACW-	GRAY DOGWOOD
2	Crataegus mollis	-2	FACW-	DOWNY HAWTHORN
0	Cryptotaenia canadensis	0	FAC	HONEWORT
4	Eupatorium rugosum	3	FACU	WHITE SNAKEROOT
1	Eupatorium serotinum	-1	FAC+	LATE BONESET
4	Galium concinnum	3	FACU	SHINING BEDSTRAW
5	Galium triflorum	2	FACU+	SWEET-SCENTED BEDSTRAW
0	Geum canadense	0	FAC	WHITE AVENS
0	Hackelia virginiana	1	FAC-	STICKSEED
5	Juglans nigra	3	FACU	BLACK WALNUT
0	Juncus tenuis	0	FAC	ROADSIDE RUSH
2	Lactuca canadensis	2	FACU+	WILD LETTUCE
4	Monarda fistulosa	3	FACU	WILD BERGAMOT
0	Muhlenbergia schreberi	0	FAC	NIMBLEWILL
3	Osmorhiza longistylis	4	FACU-	SMOOTH SWEET CICELY
0	Oxalis stricta	3	FACU	COMMON WOOD SORREL
2	Parthenocissus quinquefolia	1	FAC-	VIRGINIA CREEPER
3	Phryma leptostachya	5	UPL	LOPSEED
2	Phytolacca americana	1	FAC-	POKEWEED
0	Plantago rugelii	0	FAC	RED-STALKED PLANTAIN
5	Podophyllum peltatum	3	FACU	MAY APPLE
3	Polygonatum canaliculatum	3	FACU	SMOOTH SOLOMON'S SEAL
0	Polygonum pensylvanicum laevigatum	-4	FACW+	PENNSYLVANIA KNOTWEED
4	Potentilla simplex	4	FACU-	COMMON CINQUEFOIL

0	Prunella vulgaris lanceolata	0	FAC	SELF HEAL
5	Prunus americana	5	UPL	WILD PLUM
1	Prunus serotina	3	FACU	WILD BLACK CHERRY
4	Quercus alba	3	FACU	WHITE OAK
4	Quercus ellipsoidalis	5	UPL	HILL'S OAK
1	Rhus radicans	3	[FACU]	POISON IVY
5	Ribes missouriense	5	UPL	WILD GOOSEBERRY
-3	ROSA MULTIFLORA	3	FACU	MULTIFLORA ROSE
7	Rosa setigera	2	FACU+	ILLINOIS ROSE
3	Rubus allegheniensis	2	FACU+	COMMON BLACKBERRY
2	Rubus occidentalis	5	UPL	BLACK RASPBERRY
1	Sambucus canadensis	4	FACW-	ELDERBERRY
2	Sanicula gregaria	-1	FAC+	CLUSTERED BLACK SNAKEROOT
2	Smilacina racemosa	3	FACU	FEATHERY FALSE SOLOMON'S SEAL
1	Solidago altissima	3	FACU	TALL GOLDENROD
5	Solidago ulmifolia	5	UPL	ELM-LEAVED GOLDENROD
5	Triosteum aurantiacum	5	UPL	EARLY HORSE GENTIAN
3	Ulmus americana	-2	FACW-	AMERICAN ELM
5	Verbena urticifolia	-1	FAC+	WHITE VERVAIN
5	Viola pensylvanica	-2	FACW-	SMOOTH YELLOW VIOLET
3	Viola sororia	1	FAC-	HAIRY WOOD VIOLET
4	Vitis riparia	-2	FACW-	RIVERBANK GRAPE

TE: NURSERY SAVANNA
ES: BLACKWELL
TE: OCTOBER 1987
:
LE: A:\BL\RLPF0007.188

40 NATIVE TAXA
61 W/Adventives (shown in ALL CAPS)
.60 NATIVE QUALITY
.33 W/Adventives
.44 NATIVE INDEX
.37 W/Adventives
0.5 NATIVE WETNESS
1.4 W/Adventives
FACULTATIVE (-)

NATIVE	NO.	%
Tree	15	25.0
Shrub	5	8.3
Vine	2	3.3
Fern	0	0.0
Forb	15	25.0
Grass	1	1.7
Sedge	1	1.7
ADVENTIVE		
Tree	3	5.0
Shrub	2	3.3
Vine	1	1.7
Forb	11	18.3
Grass	4	6.7
Sedge	0	0.0

-3	6
-2	2
-1	6
0	9
1	14
2	8
3	1
4	5
5	6
6	2
7	2
8	0
9	0
10	0
15	0
20	0

fC	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acer negundo	-2	FACW-	BOX ELDER
0	Acer saccharinum	-3	FACW	SILVER MAPLE
2	Agrimonia gryposepala	2	FACU+	TALL AGRIMONY
-2	AGROPYRON REPENS	3	FACU	QUACK GRASS
-3	ARCTIUM MINUS	5	UPL	COMMON BURDOCK
4	Asclepias incarnata	-5	OBL	SWAMP MILKWEED
0	Asclepias syriaca	5	UPL	COMMON MILKWEED
1	Aster pilosus	4	FACU+	HAIRY ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
1	BARBAREA VULGARIS	0	FAC	YELLOW ROCKET
-1	BROMUS INERMIS	5	UPL	HUNGARIAN BROME
4	Carex cristatella	-4	FACW+	ROSETTE SEDGE
7	Carya cordiformis	0	FAC	BITTERNUT HICKORY
5	Carya ovata	3	FACU	SHAGBARK HICKORY
-3	CIRSIUM ARVENSE	3	FACU	FIELD THISTLE
5	Cornus obliqua	-5	[OBL]	PALE DOGWOOD
1	Cornus racemosa	-2	FACW-	GRAY DOGWOOD
6	Cornus stolonifera	-3	FACW	RED-OSIER DOGWOOD
2	Crataegus mollis	-2	FACW-	DOWNY HAWTHORN
5	Crataegus succulenta	5	UPL	FLESHY HAWTHORN
1	DAUCUS CAROTA	5	UPL	WILD CARROT
1	Erigeron annuus	1	FAC-	ANNUAL FLEABANE
1	Fragaria virginiana	1	FAC-	WILD STRAWBERRY
5	Fraxinus americana	3	FACU	WHITE ASH
7	Fraxinus pennsylvanica	-3	FACW	RED ASH
2	Gaura biennis	4	FACU-	BIENNIAL GAURA
0	Geum canadense	0	FAC	WHITE AVENS
1	Geum laciniatum trichocarpum	-3	FACW	ROUGH AVENS
5	Juglans nigra	3	FACU	BLACK WALNUT
-1	LEONURUS CARDIACA	5	UPL	MOTHERWORT
-3	LONICERA X MUENDENIENSIS	5	UPL	COMMON BUSH HONEYSUCKLE
-1	MORUS ALBA	0	FAC	WHITE MULBERRY
-1	NEPETA CATARIA	1	FAC-	CATNIP
1	Oenothera biennis	3	FACU	COMMON EVENING PRIMROSE
2	Parthenocissus quinquefolia	1	FAC-	VIRGINIA CREEPER
0	Phalaris arundinacea	-4	FACW+	REED CANARY GRASS
1	Physalis subglabrata	5	UPL	TALL GROUND CHERRY
0	POA COMPRESSA	2	FACU+	CANADA BLUE GRASS

0	POA PRATENSIS	1	FAC-	KENTUCKY BLUE GRASS
2	Populus deltoides	-1	FAC+	COTTONWOOD
0	Potentilla norvegica	0	FAC	NORWAY CINQUEFOIL
1	POTENTILLA RECTA	5	UPL	SULFUR CINQUEFOIL
1	Prunus serotina	3	FACU	WILD BLACK CHERRY
4	Quercus alba	3	FACU	WHITE OAK
4	Quercus macrocarpa	1	FAC-	BUR OAK
6	Quercus velutina	5	UPL	BLACK OAK
-3	RHAMNUS CATHARTICA	3	FACU	COMMON BUCKTHORN
-3	ROSA MULTIFLORA	3	FACU	MULTIFLORA ROSE
2	Rubus occidentalis	5	UPL	BLACK RASPBERRY
-1	RUMEX CRISPUS	-1	FAC+	CURLY DOCK
1	Sambucus canadensis	4	FACW-	ELDERBERRY
-2	SOLANUM CAROLINENSE	4	FACU-	HORSE NETTLE
-3	SOLANUM DULCAMARA	0	FAC	BITTERSWEET NIGHTSHADE
1	TRAGOPOGON MAJOR	5	UPL	SAND GOAT'S BEARD
3	Ulmus americana	-2	FACW-	AMERICAN ELM
-1	ULMUS PUMILA	5	UPL	SIBERIAN ELM
2	Urtica procera	-1	FAC+	TALL NETTLE
1	VERBASCUM BLATTARIA	4	FACU-	MOTH MULLEIN
5	Verbena urticifolia	-1	FAC+	WHITE VERVAIN
0	Viola papilionacea	0	FAC	COMMON BLUE VIOLET
4	Vitis riparia	-2	FACW-	RIVERBANK GRAPE

1	TRIFOLIUM HYBRIDUM	1	FAC-	ALSIKE CLOVER
1	TRIFOLIUM PRATENSE	2	FACU+	RED CLOVER
1	TRIFOLIUM REPENS	2	FACU+	WHITE CLOVER
0	TYPHA ANGUSTIFOLIA	-5	OBL	NARROW-LEAVED CAT-TAIL
4	Ulmus rubra	0	FAC	SLIPPERY ELM
1	VERBASCUM THAPSUS	5	UPL	COMMON MULLEIN
1	Veronica peregrina	-4	FACW+	PURSLANE SPEEDWELL
0	Viola papilionacea	0	FAC	COMMON BLUE VIOLET
4	Vitis riparia	-2	FACW-	RIVERBANK GRAPE

1	Fragaria virginiana	1	FAC-	WILD STRAWBERRY
7	Fraxinus pennsylvanica	-3	FACW	RED ASH
2	Fraxinus pennsylvanica subintegerrima	-3	FACW	GREEN ASH
0	Geum canadense	0	FAC	WHITE AVENS
1	Geum laciniatum trichocarpum	-3	FACW	ROUGH AVENS
-1	HORDEUM JUBATUM	-1	FAC+	SQUIRREL-TAIL GRASS
0	Juncus tenuis	0	FAC	ROADSIDE RUSH
-1	LACTUCA SCARIOLA	0	FAC	PRICKLY LETTUCE
0	LEPIDIUM CAMPESTRE	5	UPL	FIELD CRESS
0	LEPIDIUM DENSIFLORUM	0	FAC	SMALL PEPPERGRASS
-3	LONICERS X BELLA	5	UPL	NCN
-2	LYCHNIS ALBA	5	UPL	WHITE CAMPION
0	MEDICAGO LUPULINA	1	FAC-	BLACK MEDICK
0	MEDICAGO SATIVA	5	UPL	ALFALFA
-3	MELILOTUS ALBA	3	FACU	WHITE SWEET CLOVER
-2	MELILOTUS OFFICINALIS	3	FACU	YELLOW SWEET CLOVER
-1	MORUS ALBA	0	FAC	WHITE MULBERRY
-	NEPETA CATARIA	1	FAC-	CATNIP
	Oenothera biennis	3	FACU	COMMON EVENING PRIMROSE
0	Oxalis europaea	3	FACU	TALL WOOD SORREL
	Phalaris arundinacea	-4	FACW+	REED CANARY GRASS
	PHLEUM PRATENSE	3	FACU	TIMOTHY
	Physalis subglabrata	5	UPL	TALL GROUND CHERRY
1	PLANTAGO LANCEOLATA	0	FAC	ENGLISH PLANTAIN
0	PLANTAGO MAJOR	-1	FAC+	COMMON PLANTAIN
0	Plantago rugelii	0	FAC	RED-STALKED PLANTAIN
1	POA ANNUA	1	FAC-	ANNUAL BLUE GRASS
0	POA COMPRESSA	2	FACU+	CANADA BLUE GRASS
0	POA PRATENSIS	1	FAC-	KENTUCKY BLUE GRASS
3	Polygonatum canaliculatum	3	FACU	SMOOTH SOLOMON'S SEAL
5	Polygonum amphibium stipulaceum	-5	OBL	WATER KNOTWEED
0	POLYGONUM AVICULARE	1	FAC-	COMMON KNOTWEED
0	Polygonum erectum	3	FACU	ERECT KNOTWEED
0	Polygonum pensylvanicum laevigatum	-4	FACW+	PENNSYLVANIA KNOTWEED
0	POLYGONUM PERSICARIA	-3	FACW	LADY'S THUMB
2	Polygonum scandens	0	FAC	CLIMBING FALSE BUCKWHEAT
2	Populus deltoides	-1	FAC+	COTTONWOOD
1	POTENTILLA RECTA	5	UPL	SULFUR CINQUEFOIL
1	Prunus serotina	3	FACU	WILD BLACK CHERRY
5	Rorippa islandica fernaldiana	-5	OBL	MARSH CRESS
5	Rosa carolina	4	FACU-	PASTURE ROSE
-3	ROSA MULTIFLORA	3	FACU	MULTIFLORA ROSE
2	Rubus occidentalis	5	UPL	BLACK RASPBERRY
-1	RUMEX CRISPUS	-1	FAC+	CURLY DOCK
6	Scirpus acutus	-5	OBL	HARD-STEMMED BULRUSH
-2	SOLANUM CAROLINENSE	4	FACU-	HORSE NETTLE
-3	SOLANUM DULCAMARA	0	FAC	BITTERSWEET NIGHTSHADE
1	Solidago altissima	3	FACU	TALL GOLDENROD
3	Solidago gigantea	-3	FACW	LATE GOLDENROD
-1	SONCHUS ASPER	0	FAC	SPINY SOW THISTLE
4	Sphenopholis intermedia	0	FAC	SLENDER WEDGE GRASS
5	Stachys palustris homotricha	-5	OBL	WOUNDWORT
0	TARAXACUM OFFICINALE	3	FACU	COMMON DANDELION
0	THLASPI ARVENSE	5	[UPL]	PENNY CRESS
1	TRAGOPOGON MAJOR	5	UPL	SAND GOAT'S BEARD
1	TRAGOPOGON PRATENSIS	5	UPL	COMMON GOAT'S BEARD

TE: DRY MEADOWS
ES: BLACKWELL
TE: OCTOBER 1987
:
LE: A:\BL\RLPF0003.188

47 NATIVE TAXA
103 W/Adventives (shown in ALL CAPS)
.85 NATIVE QUALITY
.62 W/Adventives
.69 NATIVE INDEX
.31 W/Adventives
0.6 NATIVE WETNESS
1.0 W/Adventives
FACULTATIVE (+)

NATIVE	NO.	%
Tree	7	6.9
Shrub	3	3.0
Vine	2	2.0
Fern	0	0.0
Forb	29	28.7
Grass	3	3.0
Sedge	2	2.0
ADVENTIVE		
Tree	1	1.0
Shrub	1	1.0
Vine	1	1.0
Forb	39	38.6
Grass	13	12.9
Sedge	0	0.0

FC	SCIENTIFIC NAME	CofW	WETNESS	COMMON NAME
0	Acer negundo	-2	FACW-	BOX ELDER
1	ACHILLEA MILLEFOLIUM	3	FACU	YARROW
0	Acnida a tissima	-5	OBL	WATER HEMP
-2	AGROPYRON REPENS	3	FACU	QUACK GRASS
1	AGROSTIS ALBA	-3	FACW	REDTOP
0	Ambrosia artemisiifolia elatior	3	FACU	COMMON RAGWEED
0	Ambrosia trifida	-1	FAC+	GIANT RAGWEED
-3	ARCTIUM MINUS	5	UPL	COMMON BURDOCK
4	Asclepias incarnata	-5	OBL	SWAMP MILKWEED
0	Asclepias syriaca	5	UPL	COMMON MILKWEED
1	Aster pilosus	4	FACU+	HAIRY ASTER
2	Aster sagittifolius drummondii	3	[FACU]	DRUMMOND'S ASTER
3	Aster simplex	-5	[OBL]	PANICLED ASTER
0	ATRIPLEX PATULA	-2	FACW-	COMMON ORACH
1	BARBAREA VULGARIS	0	FAC	YELLOW ROCKET
1	Bidens frondosa	-3	FACW	COMMON BEGGAR'S TICKS
-1	BRASSICA KABER PINNATIFIDA	5	UPL	CHARLOCK
-1	BRASSICA NIGRA	5	UPL	BLACK MUSTARD
-1	BROMUS INERMIS	5	UPL	HUNGARIAN BROME
0	BROMUS JAPONICUS	3	FACU	JAPANESE CHESS
0	BROMUS TECTORUM	5	UPL	DOWNY BROME
0	CAPSELLA BURSA-PASTORIS	1	FAC-	SHEPHERD'S PURSE
5	Carex normalis	-3	FACW	SCALE WOOD SEDGE
1	CHRYSANTHEMUM LEUCANTHEMUM PINNATIFIDUM	5	UPL	OX-EYE DAISY
1	CICHORIUM INTYBUS	5	UPL	CHICORY
-3	CIRSIUM ARVENSE	3	FACU	FIELD THISTLE
-3	CIRSIUM VULGARE	4	FACU-	BULL THISTLE
-3	CONVOLVULUS ARVENSIS	5	UPL	FIELD BINDWEED
1	Convolvulus sepium	0	FAC	HEDGE BINDWEED
1	Cornus racemosa	-2	FACW-	GRAY DOGWOOD
2	Crataegus mollis	-2	FACW-	DOWNY HAWTHORN
1	DACTYLIS GLOMERATA	3	FACU	ORCHARD GRASS
1	DAUCUS CAROTA	5	UPL	WILD CARROT
0	DIGITARIA ISCHAEMUM	3	FACU	SMOOTH CRAB GRASS
0	Echinochloa crusgalli	-3	FACW	BARNYARD GRASS
1	Erigeron annuus	1	FAC-	ANNUAL FLEABANE
0	Erigeron canadensis	1	FAC-	HORSEWEED
1	FESTUCA ELATIOR	4	FACU-	MEADOW FESCUE

W

VERTEBRATE SPECIES OF BLACKWELL RECREATIONAL PRESERVE SOUTH OF MACK ROAD

VERTEBRATES FROM BLACKWELL RECREATIONAL PRESERVE
SOUTH OF MACK ROAD
BLACKWELL LANDFILL NPL SITE

Scientific Name	Common Name	Lakes	Wetlands	Meadows	Woods	DuPage R.
Fishes						
Ameiurus melas	Black bullhead	x	x			
Catostomus commersoni	White sucker	x	x			x
Cyprinella spilopterus	Spotfin shiner		x			
Cyprinus carpio	Common carp					x
Esox lucius	Northern pike	x				
Ictalurus punctatus	Channel catfish	x				
Lepomis cyanellus	Green sunfish	x	x			x
Lepomis macrochirus	Bluegill	x				x
Micropterus salmoides	Largemouth bass	x				
Notemigonus chrysoleucas	Golden shiner		x			x
Notropis ludibundus	Sand shiner					x
Pimephales notatus	Bluntnose minnow		x			x
Pimephales promelas	Fathead minnow		x			x
Pomoxis annularis	White crappie	x				
Pomoxis nigromaculatus	Black crappie	x				
Pylodictis oliveris	Flathead catfish	x				
Salmo gairdneri	Rainbow trout	x				
Semotilus atromaculatus	Creek chub		x			x
Stizostedion vitreum	Walleye	x				
Umbra limi	Central mudminnow		x			
Amphibians						
Ambystoma tigrinum	Eastern tiger salamander		x	x	x	
Bufo americanus	American toad		x	x	x	
Pseudacris t. triseriata	Western chorus frog		x	x		
Rana catesbeiana	Bullfrog	x	x			
Rana clamitans melanota	Green frog		x			
Rana pipiens pipiens	Northern leopard frog		x			
Reptiles						
Apolone s. spinifera	Eastern spiny softshell	x	x			
Chelydra serpentina	Common snapping turtle	x	x			
Chrysemys picta marginata	Midland painted turtle	x	x			
Elaphe vulpina vulpina	Western fox snake			x	x	
Nerodia sipedon	Northern water snake		x			
Storeria dekayi wrightorum	Midland brown snake			x	x	
Thamnophis radix radix	East plains garter snake			x	x	
Thamnophis s. semifasciata	Eastern garter snake			x	x	
Trachemys scripta elegans	Red-eared slider	x				
Birds						
Actitis macularia	Spotted sandpiper	x	x			
Agelaius phoeniceus	Red-winged blackbird			x		
Aix sponsa	Wood duck	x				
Ammodramus savannarum	Grasshopper sparrow			x		
Anas discors	Blue-winged teal		x			
Anas platyrhynchos	Mallard	x	x			
Ardea herodias	Great blue heron	x	x			
Bombycilla cedorum	Cedar waxwing	x	x			
Branta canadensis	Canada goose	x	x			

Bubo virginianus	Great horned owl		X		X
Buteo jamaicensis	Red-tailed hawk	X	X	X	X
Butorides striatus	Green-backed heron	X	X		
Cardinalis cardinalis	Northern cardinal				X
Carduelis tristis	American goldfinch			X	
Casmerodius albus	Great egret	X	X		
Catharus fuscescens	Veery				X
Ceryle alcyon	Belted kingfisher	X	X		
Chaetura pelagica	Chimney swift	X	X	X	X
Charadrius vociferus	Killdeer	X	X		
Chordeiles minor	Common nighthawk		X		
Coccyzus americanus	Yellow-billed cuckoo				X
Coccyzus erythropthalmus	Black-billed cuckoo				X
Colaptes auratus	Northern flicker			X	X
Columba livia	Rock dove			X	
Contopus virens	Eastern wood pewee				X
Corvus brachyrhynchos	American crow	X		X	X
Cyanocitta cristata	Blue jay				X
Dendroica petechia	Yellow warbler				X
Dolichonyx oryzivorus	Bobolink			X	
Dumetella carolinensis	Gray catbird				X
Empidonax traillii	Willow flycatcher		X		
Falco sparverius	American kestrel		X	X	
Fulica americana	American coot		X		
Geothlypis trichas	Common yellowthroat		X		X
Hirundo rustica	Barn swallow	X	X		
Hylocichla mustelina	Wood thrush				X
Icterus galbula	Northern oriole				X
Icterus spurius	Orchard oriole				X
Melanerpes carolinus	Red-bellied woodpecker				X
Melanerpes erthrocephalus	Red-headed woodpecker		X		X
Melospiza melodia	Song sparrow		X		
Molothrus ater	Brown-headed cowbird		X	X	X
Myiarchus crinitus	Great crested flycatcher				X
Nyctiocorax nyctiocorax	Black-crowned night heron	X	X		
Otus asio	Eastern screech owl		X		X
Parus atricapillus	Black-capped chickadee				X
Parus bicolor	Tufted titmouse				X
Passer domesticus	House sparrow			X	X
Passerculus sandwichensis	Savannah sparrow			X	
Passerina cyanea	Indigo bunting				X
Phasianus colchicus	Ring-necked pheasant		X	X	
Pheucticus ludovicianus	Rose-breasted grosbeak				X
Picoides pubescens	Downy woodpecker				X
Picoides villosus	Hairy woodpecker				X
Pipilo erythrophthalmus	Rufous-sided towhee				X
Piranga olivacea	Scarlet tanager				X
Polioptila caerulea	Blue-gray gnatcatcher				X
Porzana carolina	Sora		X		
Progne subis	Purple martin	X	X		
Quiscalus quiscula	Common grackle		X	X	X
Riparia riparia	Bank swallow	X	X		
Sayornis phoebe	Eastern phoebe				X
Scolopax minor	American woodcock				X
Sialia sialis	Eastern bluebird			X	X
Sitta carolinensis	White-breasted nuthatch				X

Spiza americana	Dickcissel			X	
Spizella pusilla	Field sparrow			X	
Stelgidopteryx serripennis	N. rough-winged swallow	X	X		
Sturnella magna	Eastern meadowlark			X	
Tachycineta bicolor	Tree swallow	X	X		
Toxostoma rufum	Brown thrasher			X	X
Troglodytes aedon	House wren				X
Turdus migratorius	American robin			X	X
Tyrannus tyrannus	Eastern kingbird		X	X	
Vireo olivaceus	Red-eyed vireo				X
Zenaida macroura	Mourning dove		X	X	X
Mammals					
Blarina brevicauda	Short-tailed shrew		X	X	X
Canis latrans	Coyote			X	
Castor canadensis	Beaver	X	X		
Didelphis virginiana	Virginia opossum		X	X	X
Eptesicus fuscus	Big brown bat				X
Glaucomys volans	Southern flying squirrel				X
Lasionycteris noctivagans	Silver-haired bat				X
Lasiurus borealis	Red bat				X
Lasiurus cinereus	Hoary bat				X
Marmota monax	Woodchuck			X	X
Mephitis mephitis	Striped skunk		X	X	X
Microtus pennsylvanicus	Meadow vole			X	
Mustela nivalis	Least weasel			X	
Mustela vison	Mink		X		
Myotis lucifugus	Little brown myotis				X
Odocoileus virginianus	White-tailed deer			X	X
Ondatra zibethecus	Muskrat	X	X		
Peromyscus leucopus	White-footed mouse			X	X
Procyon lotor	Raccoon	X	X	X	X
Scalopus aquaticus	Eastern mole				X
Sciurus carolinensis	Gray squirrel				X
Sciurus niger	Fox squirrel				X
Sorex cinereus	Masked shrew		X	X	X
Spermophilus tridecemlineat	13-lined ground squirrel			X	
Sylvilagus floridanus	Eastern cottontail			X	X
Tamias striatus	Eastern chipmunk				X
Vulpes vulpes	Red fox		X	X	

X

History of Fish Stocking by the Forest Preserve District of DuPage County

APPENDIX V

HISTORY OF FISH STOCKING BY THE FOREST PRESERVE DISTRICT OF DUPAGE COUNTY

Silver Lake (Blackwell)

Month	Year	Number	Species
September	1984	2000	Channel Catfish
		2200	Largemouth Bass
April	1985	6500	Rainbow Trout
June	1985	4000	Channel Catfish
October	1985	3000	Rainbow Trout
		2000	Channel Catfish
November	1985	2000	Rainbow Trout
April	1986		Rainbow Trout
April	1987		Rainbow Trout
	1987		Flathead Catfish (58 lb catfish)
	1987		Northern Pike
April	1988		Rainbow Trout
October	1988		Walleye
April	1989	6000	Rainbow Trout
April	1990	6853	Rainbow Trout
June	1990	25	Grass Carp/Triploid White Amur
			Filtration Lake
March	1991	3500	Crappie (3'5" Long)
April	1991	6826	Rainbow Trout (@ 1 lb each)

Note: Blanks indicate unknown quantities

JFK/mls/SGW
[phi-600-33d]
6072100-159

Y

Agency Responses Concerning Threatened and Endangered Species at the Blackwell Landfill NPL Site

IN REPLY REFER TO

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Rock Island Field Office (ES)
4469 - 48th Avenue Court
Rock Island, Illinois 61201

COM: 309/793-5800
FTS: 782-5800

TAKE PRIDE IN AMERICA

January 17, 1992

Mr. Jerome F. Kelly
Environmental Scientist
Warzyn Incorporated
One Science Court
P.O. Box 5385
Madison, Wisconsin 53705

Dear Mr. Kelly:

In response to your request for information on endangered species and in accordance with Section 7(c) of the Endangered Species Act of 1973, as amended, we are providing the following list of federally-listed endangered or threatened species that may be present in the area of Blackwell Landfill NPL Site, DuPage County, Illinois. Should the project site contain any habitat similar to that described below, it may be necessary to conduct a survey to determine the presence of the listed species. Should a listed species be found to occur on site, and the proposed project may affect it, the Federal agency responsible for actions authorized, funded, or carried out in furtherance of the construction project must enter into formal consultation with the U.S. Fish and Wildlife Service and prepare a Biological Assessment.

This site is within the range of three federally-listed endangered and threatened species:

Classification	Common Name	Scientific Name	Habitat
Endangered	Indiana Bat	*Myotis sodalis*	Riparian woods
Threatened	Eastern prairie fringed orchid	*Platanthera leucophaea*	Wet grasslands
Threatened	Prairie bush clover	*Lespedeza leptostachya*	Dry to mesic prairies with gravelly soil

The endangered Indiana bat (Myotis sodalis) is listed as statewide in distribution. It frequents the corridors of small streams with well developed riparian woods as well as mature upland forests. It forages for insects by flying beneath the tree canopy, and roosts and rears its young beneath the loose bark of large dead trees that are generally greater than sixteen inches in diameter. It winters in caves and abandoned mines.

Because of the nature of this species, we cannot provide you with specific locations from one year to the next. If the project site contains any habitat that fits the above description, it may be necessary to conduct a survey to determine the presence of the bat. If the bat is present, it must not be harmed, harassed or disturbed. If suitable habitat exists on the site, no trees may be cleared between the dates of May 1 and August 31.

The eastern prairie fringed orchid (Platanthera leucophaea) is listed as threatened status in DuPage County, Illinois. It occupies wet grassland habitats. There is no Critical Habitat designated for this species in Illinois. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law.

The prairie bush clover (Lespedeza leptostachya) is listed as threatened in DuPage County, Illinois. It occupies dry to mesic prairies with gravelly soil. There is no Critical Habitat designated for this species in Illinois. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law.

Please contact Deanna Glosser, Illinois Department of Conservation, Springfield, Illinois at (217) 785-8687 for information on state-listed endangered or threatened species. If you have any questions or need further clarification, please do not hesitate to call us.

Sincerely,

for J. J. Millar

Richard C. Nelson
Field Supervisor

MC:sjg

rent Manning
irector

ohn W. Comerio
Deputy Director

ruce F. Clay
ssistant Director

Illinois Department of Conservation
life and land together

LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62701-1787
CHICAGO OFFICE • ROOM 4-300 • 100 WEST RANDOLPH 60601

November 18, 1991

Jerome F. Kelly
Warzyn
One Science Court
P.O. Box 5385
Madison, WI 53705

Dear Mr. Kelly:

This is in reference to your request for information on the presence of endangered or threatened species at a site in DuPage County. The area in question was delineated on the Naperville 7.5' quadrangle map. The location specified in your letter is somewhat different than that shown on the map. The location examined for endangered and threatened species corresponds to the map, Sections 26 & 35, R9E, T39N, rather than R8E, T30N, which was given in the letter.

According to the Natural Heritage Database, there are no known occurrences of state or federally listed species in the area you have identified. You are aware, however, that the property is a DuPage County Forest Preserve District. Please contact Mr. Bob Vick, Director of Planning and Development, DuPage County Forest Preserve District. He can be reached at 708-790-4900.

Please be aware that the Natural Heritage Database cannot provide a conclusive statement on the presence, absence, or condition of significant natural features in any part of Illinois. The reports only summarize the existing information regarding the natural features or the locations in question known to the Division of Natural Heritage at the time of the request. The reports should never be regarded as final statements on the site being considered, nor should they be a substitute for field surveys required for environmental assessments.

I cannot charge you for the search of our database, but I would like to urge your support of the Illinois Natural Heritage Database by contributing to the Illinois Nongame Wildlife Conservation Fund. The recommended donation for a standard information request is $30.00. Such contributions may be mailed to the above address. We appreciate your support of this important source of information.

If you need additional information or have any questions, please do not hesitate to contact me at 217-785-8290.

Sincerely,

Deanna Glosser

Deanna Glosser, Ph.D.
Endangered Species Protection
Program Manager

cc Bob Vick
File