

JACK HADEN

REMEDIAL INVESTIGATION

AT THE

LOCKPORT CITY LANDFILL

LOCKPORT (C), NIAGARA (C), NEW YORK

NYSDEC SITE NO. 9-32-010

CITY OF LOCKPORT, NEW YORK

DRAFT FINAL REPORT APPENDICES M - P

JULY 1991

PREPARED BY

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APPENDIX M
FIRST AND SECOND ROUND
ANALYTICAL DATA

LOCKPORT CITY LANDELL: MONITORING WELL SOIL BORINGS

Analytical Results

SAMPLE-ID	MW1-SB	MW-8I	MW-6D	MW-7S	MW-5I	MW-9S	MW-9S	MW-2I	MW-5I #
SAMPLE INTERVAL (DEPTH IN ft.)	O-3'	2-4'	2-4'	2-4'	2-4'	4-6'	4-6'- RE	0-2'	10-12'
SAMPLE MATERIAL	SOIL	SOIL	SOIL	SOIL	FILL	FILL	FILL	FILL	FILL
COLLECTION DATE	12/7/89	1/19/90	1/17/90	1/15/90	1/12/90	1/11/90	1/11/90	1/29/90	1/2/90
LOCATION	OFFSITE	OFFSITE	OFFSITE	ON SITE	ON SITE	ON SITE	ON SITE	ON SITE	BELOW SEWER
PARAMETER	TYPE								
CHLOROMETHANE	VOC						NA		
BROMOMETHANE	VOC						NA		
VINYL CHLORIDE	VOC						NA		
CHLOROETHANE	VOC						NA		
METHYLENE CHLORIDE	VOC	R	R		R	R	NA	R	R
ACETONE	VOC	R	R		R	R	NA	R	R
CARBON DISULFIDE	VOC						NA		
1,1-DICHLOROETHENE	VOC						NA		
1,1-DICHLOROETHANE	VOC						NA		
1,2-DICHLOROETHENE (TOTAL)	VOC						NA		
CHLOROFORM	VOC						NA		
1,2-DICHLOROETHANE	VOC						NA		
2-BUTANONE	VOC						NA		
1,1,1-TRICHLOROETHANE	VOC	R	R				NA		R
CARBON TETRACHLORIDE	VOC						NA		
VINYL ACETATE	VOC						NA		
BROMODICHLOROMETHANE	VOC						NA		
1,2-DICHLOROPROPANE	VOC						NA		
CIS-1,3-DICHLOROPROPENE	VOC						NA		
TRICHLOROETHENE	VOC						NA		
DIBROMOCHLOROMETHANE	VOC						NA		
1,1,2-TRICHLOROETHANE	VOC						NA		
BENZENE	VOC						NA		
TRANS-1,3-DICHLOROPROPENE	VOC						NA		
BROMOFORM	VOC						NA		
4-METHYL-2-PENTANONE	VOC						NA		
2-HEXANONE	VOC						NA		
TETRACHLOROETHENE	VOC						NA		
1,1,2,2-TETRACHLOROETHANE	VOC						NA		
TOLUENE	VOC						NA		
CHLOROBENZENE	VOC						NA		
ETHYLBENZENE	VOC						NA		
STYRENE	VOC						NA		
TOTAL XYLENES	VOC						NA		
						200			

All results reported in µg/kg (ppb).

Only detected results are reported.

R - Analyte rejected due to blank contamination (See Appendix O).

NA - Not Analyzed

- Sample taken from backfill material underneath sanitary sewer.

LOCKPORT CITY LANDFILL: MONITORING WELL SOIL BORINGS

Analytical Results

SAMPLE-ID		MW1-SB	MW-8I	MW-6D	MW-7S	MW-5I	MW-9S	MW-9S	MW-2I	MW-5I #
SAMPLE INTERVAL (DEPTH IN ft.)		O-3'	2-4'	2-4'	2-4'	2-4'	4-6'	4-6'- RE	0-2'	10-12'
SAMPLE MATERIAL		SOIL	SOIL	SOIL	SOIL	FILL	FILL	FILL	FILL	FILL
COLLECTION DATE		12/7/89	1/19/90	1/17/90	1/15/90	1/12/90	1/11/90	1/11/90	1/29/90	1/2/90
LOCATION		OFFSITE	OFFSITE	OFFSITE	ON SITE	ON SITE	ON SITE	ON SITE	ON SITE	BELOW SEWER
PARAMETER	TYPE									
PHENOL	SEMI						170 J			
BIS(2-CHLOROETHYL) ETHER	SEMI									
2-CHLOROPHENOL	SEMI									
1,3-DICHLOROBENZENE	SEMI									
1,4-DICHLOROBENZENE	SEMI									
BENZYL ALCOHOL	SEMI									
1,2-DICHLOROBENZENE	SEMI									
2-METHYLPHENOL	SEMI									
BIS(2-CHLOROISOPROPYL) ETHER	SEMI									
4-METHYLPHENOL	SEMI	87 J								
N-NITROSO-DI-N-PROPYLAMINE	SEMI									
HEXACHLOROETHANE	SEMI									
NITROBENZENE	SEMI									
ISOPHORONE	SEMI									
2-NITROPHENOL	SEMI									
2,4-DIMETHYLPHENOL	SEMI									
BENZOIC ACID	SEMI					72 J			380 J	
BIS(2-CHLOROETHOXY)METHANE	SEMI	410 J								
2,4-DICHLOROPHENOL	SEMI									
1,2,4-TRICHLOROBENZENE	SEMI									
NAPHTHALENE	SEMI	280 J					340 J	360 J		
4-CHLOROANILINE	SEMI									
HEXACHLOROBUTADIENE	SEMI									
4-CHLORO-3-METHYLPHENOL	SEMI									
2-METHYLNAPHTHALENE	SEMI	230 J								
HEXACHLOROCYCLOPENTADIENE	SEMI									
2,4,6-TRICHLOROPHENOL	SEMI						260 J	270 J		
2,4,5-TRICHLOROPHENOL	SEMI									
2-CHLORONAPHTHALENE	SEMI									
2-NITROANILINE	SEMI									
DIMETHYLPHTHALATE	SEMI									
ACENAPHTHYLENE	SEMI	27 J								
2,6-DINITROTOLUENE	SEMI									

All results reported in µg/kg (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.
- Sample taken from backfill material underneath sanitary sewer.

LOCKPORT CITY LANDFILL: MONITORING WELL SOIL BORINGS

Analytical Results

SAMPLE-ID		MW1-SB	MW-8I	MW-6D	MW-7S	MW-5I	MW-9S	MW-9S	MW-2I	MW-5I #
SAMPLE INTERVAL (DEPTH IN ft.)		O-3'	2-4'	2-4'	2-4'	2-4'	4-6'	4-6'- RE	0-2'	10-12'
SAMPLE MATERIAL		SOIL	SOIL	SOIL	SOIL	FILL	FILL	FILL	FILL	FILL
COLLECTION DATE		12/7/89	1/19/90	1/17/90	1/15/90	1/12/90	1/11/90	1/11/90	1/29/90	1/2/90
LOCATION		OFFSITE	OFFSITE	OFFSITE	ON SITE	ON SITE	ON SITE	ON SITE	ON SITE	BELOW SEWER
PARAMETER	TYPE									
3-NITROANILINE	SEMI									
ACENAPHTHENE	SEMI									
2,4-DINITROPHENOL	SEMI	75 J					410	460		1,200 J
4-NITROPHENOL	SEMI									
DIBENZOFURAN	SEMI	48 J					260 J	300 J		570 J
2,4-DINITROTOLUENE	SEMI									
DIETHYLPHTHALATE	SEMI									
4-CHLOROPHENYL-PHENYL ETHER	SEMI	R	R	R		R				
FLUORENE	SEMI	130 J					530	520	51 J	1,500 J
4-NITROANILINE	SEMI									
4,6-DINITRO-2-METHYLPHENOL	SEMI									
N-NITROSODIPHENYLAMINE	SEMI									
4-BROMOPHENYL-PHENYL ETHER	SEMI									
HEXACHLOROBENZENE	SEMI									
PENTACHLOROPHENOL	SEMI									
PHENANTHRENE	SEMI	380 J					3,600	6,000	370 J	1,300 J
ANTHRACENE	SEMI	140 J					500		62 J	18,000
DI-N-BUTYLPHTHALATE	SEMI	R	R	R	R	R			39 J	5,600
FLUORANTHENE	SEMI	890			26 J		1,700	2,200	500	34,000
PYRENE	SEMI	1,000					3,100	2,300	330 J	33,000
BUTYLBENZYLPHTHALATE	SEMI	66 J								
3,3'-DICHLOROBENZIDINE	SEMI									
BENZO(A)ANTHRACENE	SEMI	300 J					1,500	1,700	190 J	19,000
CHRYSENE	SEMI	340 J					1,400	1,700	200 J	16,000
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	4300 B	R	R	R	R	R	R	130 J	R
DI-N-OCTYLPHTHALATE	SEMI	770 B								
BENZO(B)FLUORANTHENE	SEMI	510					1,800	2,500	130 J	18,000
BENZO(K)FLUORANTHENE	SEMI								110 J	11,000
BENZO(A)PYRENE	SEMI						1,100	1,200	150 J	14,000
INDENO(1,2,3-CD)PYRENE	SEMI						890	890	110 J	8,700
DIBENZ(A,H)ANTHRACENE	SEMI									2,300
BENZO(G,H,I)PERYLENE	SEMI						810	830		7,300

All results reported in µg/kg (ppb).

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R - Analyte rejected due to blank contamination (See Appendix O).

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B - Analyte detected in associated method blank.

- Sample taken from backfill material underneath sanitary sewer.

LOCKPORT CITY LANDFILL: MONITORING WELL SOIL BORINGS

Analytical Results

SAMPLE-ID		MW1-SB	MW-8I	MW-6D	MW-7S	MW-5I	MW-9S	MW-9S	MW-2I	MW-5I #
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COLLECTION DATE		12/7/89	1/19/90	1/17/90	1/15/90	1/12/90	1/11/90	1/11/90	1/29/90	1/2/90
LOCATION		OFFSITE	OFFSITE	OFFSITE	ON SITE	ON SITE	ON SITE	ON SITE	ON SITE	BELOW SEWER
PARAMETER	TYPE									
ALPHA-BHC	PST	4.7 J						NA		
BETA-BHC	PST									
DELTA-BHC	PST									
GAMMA-BHC (LINDANE)	PST									
HEPTACHLOR	PST									
ALDRIN	PST									
HEPTACHLOR EPOXIDE	PST									
ENDOSULFAN I	PST									
DIELDRIN	PST									
4,4'-DDE	PST									
ENDRIN	PST	32 J								
ENDOSULFAN II	PST									
4,4'-DDD	PST									
ENDOSULFAN SULFATE	PST									
4,4'-DDT	PST									
METHOXYCHLOR	PST									
ENDRIN KETONE	PST									
ALPHA-CHLORDANE	PST									
GAMMA-CHLORDANE	PST									
TOXAPHENE	PST									
AROCOR-1016	PCB	62 J						14,000	230	10,000 3,100
AROCOR-1221	PCB									
AROCOR-1232	PCB									
AROCOR-1242	PCB									
AROCOR-1248	PCB									
AROCOR-1254	PCB									
AROCOR-1260	PCB									

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LOCKPORT CITY LANDFILL: MONITORING WELL SOIL BORINGS

Analytical Results

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SAMPLE MATERIAL		SOIL	SOIL	SOIL	SOIL	FILL	FILL	FILL	FILL	FILL
COLLECTION DATE		12/7/89	1/19/90	1/17/90	1/15/90	1/12/90	1/11/90	1/11/90	1/29/90	1/2/90
LOCATION		OFFSITE	OFFSITE	OFFSITE	ON SITE	ON SITE	ON SITE	ON SITE	ON SITE	BELOW SEWER
PARAMETER	TYPE									
ALUMINUM	MCP	13000 E	7760	5100	8810	28700	6970		15300	3700
ANTIMONY	MCP									
ARSENIC	MCP	12.9 N*B	6.3 N	15.6	12	37	19.7		11.8 N	11.7
BARIUM	MCP	103	15.2 NB	16.5 B	56.4	323	32.9 B		119N	33 B
BERYLLIUM	MCP	1.3 N	1.7 *						1.9*	
CADMIUM	MCP					4.9	8.00			
CALCIUM	MCP	17200	211000 *	176000	163000	80800	124000		5920 *	159000
CHROMIUM	MCP	7.1	8.5	4.2 *		72.9 *	123 *		12.4	
COBALT	MCP	8.6 B			15.4	13.6 B	10 B		10 B	
COPPER	MCP	31.6 *		8.8	257	2360	1460		21	23
IRON	MCP	26400 E	10500	8040 E	21200 E	68600 E	21200 E		29000	11300E
LEAD	MCP	65.3	7.8 N	16 *S	21.3 *	2160 *	3020 *		91.2 N	57.3 **
MAGNESIUM	MCP	6610	21200	20700	2570	19000	19000		2320	31300
MANGANESE	MCP	1450E	370	241	2060	883	453		1540	939
MERCURY	MCP	1.2	0.39	0.67 N			0.6 N		0.73	0.23 N
NICKEL	MCP	23.9	10.3 B		16.1	122	20.3		23	4 B
POTASSIUM	MCP	1580	3310	2030	1600	3960	3570		3820	1240
SELENIUM	MCP									
SILVER	MCP									
SODIUM	MCP			219 B		3940	377 B			222 B
THALLIUM	MCP									
VANADIUM	MCP									
ZINC	MCP	22.5	6.7 B	4.6 B	20.6	36.8	12.6 B		23.1	6.4 B
	MCP	115 E	20.3 *	110	67.2	5430	6220		136 *	39.7
CYANIDE	MCP									
PHENOLS	MCP									
AMMONIA, AS N	MISC	108.7	3.98	17.1	14.7	35.1	52.8		98.6	32.15
NITRATE-NITROGEN	MISC	61.6	9.54	27.3	3.67	13.2	4.8		164.3	18.75
TOTAL KJELDAHL NITROGEN, AS N	MISC	387.7	178.1	112.7	47.8	122.2	182.5		816.02	114.3
MOISTURE %	MISC	22.4	11.7	17.9	23.4	36.9	40.8		27.2	14.3
pH UNITS	MISC	7.3	8.5	8.6	8.45	8.35	7.2		8	7
TOTAL ORGANIC CARBON	MISC	10346	443	4284	6401	8262	27427		7811	2731

All results indicated in mg/kg (ppm).

Only detected results are reported.

N - Spike sample % recovery out of control limits.

W - Post-digestion spike analysis is out of control limits.

B - Less than quantitation limits but greater than or equal to instrument detection limits.

E - Estimated value due to interference.

* - Duplicate analysis not within control limits.

S - Value determined by the method of standard addition (MSA).

+ - Correlation coefficient for MSA is less than 0.995.

- Sample taken from backfill material underneath sanitary sewer.

LOCKPORT CITY LANDFILL: SOIL BORINGS AND WASTE SAMPLES
PHASE I AND II

SAMPLE-ID	SB-1	SB-5	SB-9	SB-13	SB-14	SB-18	SB-19	SB-25	WS-1	WS-2	WS-3	WS-3-RE
COLLECTION DATE	1/30/90	2/2/90	2/7/90	2/9/90	2/9/90	2/13/90	2/13/90	2/13/90	2/21/90	2/21/90	2/21/90	2/21/90
SAMPLE TYPE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB
SAMPLE INTERVAL (DEPTH IN ft.)	0-4.4'	0-30.2'	0-14'	0-16'	0-14'	0-10'	0-24'	6'-12'	0-1'	0-1'	0-1'	0-1'
PARAMETER	TYPE											
CHLOROMETHANE	VOC											
BROMOMETHANE	VOC											
VINYL CHLORIDE	VOC											
CHLOROETHANE	VOC											
METHYLENE CHLORIDE	VOC											
ACETONE	VOC											
CARBON DISULFIDE	VOC											
1,1-DICHLOROETHENE	VOC											
1,1-DICHLOROETHANE	VOC											
1,2-DICHLOROETHENE (TOTAL)	VOC											
CHLOROFORM	VOC											
1,2-DICHLOROETHANE	VOC											
2-BUTANONE	VOC											
1,1,1-TRICHLOROETHANE	VOC											
CARBON TETRACHLORIDE	VOC											
VINYL ACETATE	VOC											
BROMODICHLOROMETHANE	VOC											
1,2-DICHLOROPROPANE	VOC											
CIS-1,3-DICHLOROPROPENE	VOC											
TRICHLOROETHENE	VOC											
DIBROMOCHLOROMETHANE	VOC											
1,1,2-TRICHLOROETHANE	VOC											
BENZENE	VOC											
TRANS-1,3-DICHLOROPROPENE	VOC											
BROMOFORM	VOC											
4-METHYL-2-PENTANONE	VOC											
2-HEXANONE	VOC											
TETRACHLOROETHENE	VOC											
1,1,2,2-TETRACHLOROETHANE	VOC											
TOLUENE	VOC											
CHLOROBENZENE	VOC											
ETHYLBENZENE	VOC											
STYRENE	VOC											
TOTAL XYLENES	VOC											

All results reported in µg/kg (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.
R - Analyte rejected due to blank contamination (See Appendix O).

LUCKPORT CITY LANDFILL: SOIL BORINGS AND WASTE SAMPLES
PHASE I AND II

SAMPLE-ID	SB-1	SB-5	SB-9	SB-13	SB14	SB-18	SB-19	SB-25	WS-1	WS-2	WS-3	WS-3-RE
COLLECTION DATE	1/30/90	2/2/90	2/7/90	2/9/90	2/9/90	2/13/90	2/13/90	2/13/90	2/21/90	2/21/90	2/21/90	2/21/90
SAMPLE TYPE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB
SAMPLE INTERVAL (DEPTH IN ft.)	0-4.4'	0-30.2'	0-14'	0-16'	0-14'	0-10'	0-24'	6'-12'	0-1'	0-1'	0-1'	0-1'
PARAMETER	TYPE											
PHENOL	SEMI											
BIS(2-CHLOROETHYL) ETHER	SEMI											
2-CHLOROPHENOL	SEMI											
1,3-DICHLOROBENZENE	SEMI											
1,4-DICHLOROBENZENE	SEMI											
BENZYL ALCOHOL	SEMI											
1,2-DICHLOROBENZENE	SEMI											
2-METHYLPHENOL	SEMI											
BIS(2-CHLOROISOPROPYL) ETHER	SEMI											
4-METHYLPHENOL	SEMI											
N-NITROSO-DI-N-PROPYLAMINE	SEMI											
HEXACHLOROETHANE	SEMI											
NITROBENZENE	SEMI											
ISOPHORONE	SEMI											
2-NITROPHENOL	SEMI											
2,4-DIMETHYLPHENOL	SEMI											
BENZOIC ACID	SEMI	1,900 J		80 J		120 J	440 J		290 J			
BIS(2-CHLOROETHOXY)METHANE	SEMI											
2,4-DICHLOROPHENOL	SEMI											
1,2,4-TRICHLOROBENZENE	SEMI											
NAPHTHALENE	SEMI											
4-CHLOROANILINE	SEMI	3,800 J	37 J	160 J		63 J	130 J	70000			2000 J	3400
HEXACHLOROBUTADIENE	SEMI											
4-CHLORO-3-METHYLPHENOL	SEMI											
2-METHYLNAPHTHALENE	SEMI	1,100 J		160 J		71 J	91 J	40000			710 J	1200 J
HEXACHLOROCYCLOPENTADIENE	SEMI											
2,4,6-TRICHLOROPHENOL	SEMI											
2,4,5-TRICHLOROPHENOL	SEMI											
2-CHLORONAPHTHALENE	SEMI											
2-NITROANILINE	SEMI											
DIMETHYLPHTHALATE	SEMI											

All results reported in µg/kg (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.

**LOCKPORT CITY LANDFILL: SOIL BORINGS AND WASTE SAMPLES
PHASE I AND II**

SAMPLE-ID	SB-1	SB-5	SB-9	SB-13	SB14	SB-18	SB-19	SB-25	WS-1	WS-2	WS-3	WS-3-RE
COLLECTION DATE	1/30/90	2/2/90	2/7/90	2/9/90	2/9/90	2/13/90	2/13/90	2/13/90	2/21/90	2/21/90	2/21/90	2/21/90
SAMPLE TYPE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB
SAMPLE INTERVAL (DEPTH IN ft.)	0-4.4'	0-30.2'	0-14'	0-16'	0-14'	0-10'	0-24'	6'-12'	0-1'	0-1'	0-1'	0-1'
PARAMETER	TYPE											
ACENAPHTHYLENE	SEMI		240 J	84 J		140 J	230 J					
2,6-DINITROTOLUENE	SEMI											
3-NITROANILINE	SEMI											
ACENAPHTHENE	SEMI		180 J	580 J	740 J	91 J	150 J	2700 J			1400 J	2200 J
2,4-DINITROPHENOL	SEMI											
4-NITROPHENOL	SEMI		130 J	440 J				4000 J			960 J	1600 J
DIBENZOFURAN	SEMI											
2,4-DINITROTOLUENE	SEMI											
DIETHYLPHTHALATE	SEMI		37 J	460 J		32 J	40 J			63 J		
4-CHLOROPHENYL-PHENYL ETHER	SEMI											
FLUORENE	SEMI		400 J	650 J	740 J	190 J	300 J	5200 J			950 J	1500 J
4-NITROANILINE	SEMI											
4,6-DINITRO-2-METHYLPHENOL	SEMI					850	79 J					
N-NITROSODIPHENYLAMINE	SEMI											
4-BROMOPHENYL-PHENYL ETHER	SEMI											
HEXACHLOROBENZENE	SEMI											
PENTACHLOROPHENOL	SEMI											
PHENANTHRENE	320 J	1,800 J	2400	3300	4400 J	840	3000	25000 J				
ANTHRACENE	SEMI		750	530 J	800 J	150 J	430	19000			12000	23000
DI-N-BUTYLPHTHALATE	SEMI	R	R	R		77 J	62 J	R				
FLUORANTHENE	SEMI	1,700 J	4300	3800	4800	1000	4000	16000			7100	15000
PYRENE	SEMI	1,100 J	2600	3000	4200 J	700	2500	12000			13000	26000
BUTYLBENZYLPHTHALATE	SEMI	1,600 J		260 J								
3,3'-DICHLOROBENZIDINE	SEMI											
BENZO(A)ANTHRACENE	340 J	710 J	1800	1900	2100 J	560	1900	5000 J			6000	11000
CHRYSENE	360 J	700 J	1800	2100	2200 J	530	2100	4800 J			7500	14000
BIS(2-ETHYLHEXYL)PHTHALATE	20,000	57,000 B	1200 B	R	78000 B	1600 B	R	R	66 J		26000 B	50000 B
DI-N-OCTYL PHTHALATE	330 J	2,000 J	42 J	110 J		41 J	67 J					
BENZO(B)FLUORANTHENE	SEMI	960 J	2600	2600	1900 J	700	2400	2200 J			6200	10000
BENZO(K)FLUORANTHENE	SEMI			1700		490	1700	1500 J			6000	8100
BENZO(A)PYRENE	SEMI	540 J	1600	2000	1700 J	450	1200	4100 J			6700	11000
INDENO(1,2,3-CD)PYRENE	SEMI		520	930	1000 J	160 J	450	2400 J			3600	8700
DIBENZ(A,H)ANTHRACENE	SEMI		75 J				140 J					
BENZO(G,H,I)PERYLENE	SEMI		400 J	750 J	910 J	150 J	420	2400 J				

All results reported in µg/kg (ppb).

Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.

B - Analyte is detected in the associated method blank

R - Analyte rejected due to blank contamination (See Appendix O).

LOCKPORT CITY LANDFILL: SOIL BORINGS AND WASTE SAMPLES
PHASE I AND II

SAMPLE-ID	SB-1	SB-5	SB-9	SB-13	SB14	SB-18	SB-19	SB-25	WS-1	WS-2	WS-3	WS-3-RE
COLLECTION DATE	1/30/90	2/2/90	2/7/90	2/9/90	2/9/90	2/13/90	2/13/90	2/13/90	2/21/90	2/21/90	2/21/90	2/21/90
SAMPLE TYPE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB
SAMPLE INTERVAL (DEPTH IN ft.)	0-4.4'	0-30.2'	0-14'	0-16'	0-14'	0-10'	0-24'	6'-12'	0-1'	0-1'	0-1'	0-1'
PARAMETER	TYPE											
ALPHA-BHC	PST											NA
BETA-BHC	PST											NA
DELTA-BHC	PST											NA
GAMMA-BHC (LINDANE)	PST											NA
HEPTACHLOR	PST											NA
ALDRIN	PST											NA
HEPTACHLOR EPOXIDE	PST											NA
ENDOSULFAN I	PST											NA
DIELDRIN	PST											NA
4,4'-DDE	PST							57				NA
ENDRIN	PST							120				NA
ENDOSULFAN II	PST							7.7 J				NA
4,4'-DDD	PST							150				NA
ENDOSULFAN SULFATE	PST							450				NA
4,4'-DDT	PST											NA
METHOXYCHLOR	PST											NA
ENDRIN KETONE	PST											NA
ALPHA-CHLORDANE	PST											NA
GAMMA-CHLORDANE	PST		26 J								230 J	NA
TOXAPHENE	PST											NA
AROCOLOR-1016	PCB											NA
AROCOLOR-1221	PCB											NA
AROCOLOR-1232	PCB											NA
AROCOLOR-1242	PCB	8700										NA
AROCOLOR-1248	PCB	32000		2100	2300	570				110 J	1200	NA
AROCOLOR-1254	PCB	11000		810		230	550	910		54 J	450 J	NA
AROCOLOR-1260	PCB											NA

All results reported in µg/kg (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.
NA - Not Analyzed

LOCKPORT CITY LANDFILL: SOIL BORINGS AND WASTE SAMPLES
PHASE I AND II

SAMPLE-ID		SB-1	SB-5	SB-9	SB-13	SB14	SB-18	SB-19	SB-25	WS-1	WS-2	WS-3	WS-3-RE
COLLECTION DATE		1/30/90	2/2/90	2/7/90	2/9/90	2/9/90	2/13/90	2/13/90	2/13/90	2/21/90	2/21/90	2/21/90	2/21/90
SAMPLE TYPE		COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB
SAMPLE INTERVAL (DEPTH IN ft.)		0-4.4'	0-30.2'	0-14'	0-16'	0-14'	0-10'	0-24'	6'-12'	0-1'	0-1'	0-1'	0-1'
PARAMETER	TYPE												
ALUMINUM	MCP	12500	7890	5990	14800	10499	10600	9970	15800	14300	8390	23400	NA
ANTIMONY	MCP								8.8 BN				NA
ARSENIC	MCP	8.4 N	11.2	5.4	20.1	14.2	14.1	16.2 S	5.2	23.3 NS	24.8 N+	15 NS	NA
BARIUM	MCP	124 N	87.4	81.6	178	109	170	300	159	779	254	140	NA
BERYLLIUM	MCP	1.4*			1.8 *				1.4				NA
CADMIUM	MCP	3.4	1.3 N*		9.7 N*	5 N*	4*	4.1*	2.9	16.4	6.1	4.8	NA
CALCIUM	MCP	72200*	144000 E	121000 E	69100 E	90900 E	77700	36500	66200*	48600	96200	53500	NA
CHROMIUM	MCP	20	24.9	25	50.8	222	286	39.2	295*	36.3	14.2	1480	NA
COBALT	MCP	14.2	5 B		10.3 B	12.6 B	12.4 B	14.4	94.5	16.2	223		NA
COPPER	MCP	150	54	69.1	2870	227	384	399	636	800 E	210 E	1540 E	NA
IRON	MCP	43000	19400 E	12600 E	49000 E	19800 E	41400	47100	21400	67300	43300	30100	NA
LEAD	MCP	269 N	154 E	182 E	1160 E	310 E	466 N	986 N	1400	2160	170	4810	NA
MAGNESIUM	MCP	6560	17700	30900	10700	15900	11800	9800	46900*	6930	7710	12700	NA
MANGANESE	MCP	611	788 E	571 E	797 E	499 E	476 N	449 N	821*	1090	2660	342	NA
MERCURY	MCP	1.5	0.49 N	0.31 N	1.2 N	1.2 N	0.91	1.1	0.31	0.19	0.66		NA
NICKEL	MCP	51.9	22.6	58	133	113	88.9 N E	63 N E	189 N*	61.9*	27.7*	163*	NA
POTASSIUM	MCP	2420	1970	1450	3700	2710	2520	1640	2740	2430	2450	5900	NA
SELENIUM	MCP												NA
SILVER	MCP												NA
SODIUM	MCP		798 B	618 B	2.5 B	691 B	3.5 N	1050 B	8.9 N	5.3		7.4	NA
THALLIUM	MCP				590 B				864 B	2260		2060 B	NA
VANADIUM	MCP												NA
ZINC	MCP	20.5	12.1 B	13	24.7	41.4	33.5	30	37.2	25.5	16.7 B	30.5	NA
CYANIDE	MCP	641*	204 E	203 E	1540 E	802 E	764	730	1920 *	2050	497	9570	NA
PHENOLS	MCP	1.9		15.5					15.6				NA
AMMONIA, AS N	MISC	153.3											NA
NITRATE-NITROGEN	MISC	266.1											NA
TOTAL KJELDAHL NITROGEN, AS N	MISC	2084.2											NA
MOISTURE %	MISC	28.9											NA
pH UNITS	MISC	7.7											NA
TOTAL ORGANIC CARBON	MISC	2848.3											NA

All results reported in mg/kg (ppm) unless otherwise specified. B - Less than quantitation limit but greater than or equal to instrument detection limit.

Only detected results reported.

NA - Not Analyzed

E - Estimated value due to interference.

S - Value determined by the method of standard addition (MSA).

N - Spike sample % recovery out of control limits.

+ - Correlation coefficient for (MSA) < 0.995.

* - Duplicate analysis not within control limits.

LOCKPORT CITY LANDFILL: SOIL BORINGS AND WASTE SAMPLES
PHASE I AND II

SAMPLE-ID	SB-1	SB-5	SB-9	SB-13	SB14	SB-18	SB-19	SB-25	WS-1	WS-2	WS-3	WS-3-RE
COLLECTION DATE	1/30/90	2/2/90	2/7/90	2/9/90	2/9/90	2/13/90	2/13/90	2/13/90	2/21/90	2/21/90	2/21/90	2/21/90
SAMPLE TYPE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB	SURFACE GRAB
SAMPLE INTERVAL (DEPTH IN ft.)	0-4.4'	0-30.2'	0-14'	0-16'	0-14'	0-10'	0-24'	6'-12'	0-1'	0-1'	0-1'	0-1'
PARAMETER	TYPE											
CORROSIIVITY	MISC	NON	NON	NON	NON	NON	NON		NON	NON	NON	NA
IGNITABILITY	MISC	NON	NON	NON	NON	NON	NON		NON	NON	NON	NA
REACTIVITY	MISC	NON	NON	NON	NON	NON	NON		NON	NON	NON	NA
pH, S.U.	MISC	8.36	8.08	7.30	7.65	7.82	7.83		7.90	7.54	7.14	NA
SULFUR (%)	MISC	0.13	0.11	0.16	0.14	0.16	0.56		0.019	0.010	0.010	NA
CHLORINE (PPM)	MISC		0.030						137		109	NA
ASH WEIGHT(%)	MISC	61.30	52.91	56.03	54.47	63.37	53.51		61.68	70.52	32.41	NA
HEAT OF COMBUSTION (BTU/lb)	MISC									443	3,046	NA
EP Tox - ARSENIC	MCP				18.5	26.4					22	NA
EP Tox - BARIUM	MCP	456	610	656	530	985	704		1070	1000	293	NA
EP Tox - CADMIUM	MCP	32.9	4.4 B	75.1	27.8	26.1	12.1		38.3	6.9		NA
EP Tox - CHROMIUM	MCP		4.3 B		8.5 B	10.7	3.3 B				14.6	NA
EP Tox - LEAD	MCP	86.4	28.6	1990	130	279	231		496	14.1	1190	NA
EP Tox - MERCURY	MCP											NA
EP Tox - SELENIUM	MCP											NA
EP Tox - SILVER	MCP											NA
EP Tox - Lindane	PEST											NA
EP Tox - Endrine	PEST											NA
EP Tox - Methoxychlor	PEST											NA
EP Tox - Toxaphene	PEST											NA
EP Tox - 2,4-D	HERB											NA
EP Tox - Silvex	HERB											NA
WATER REACTIVITY	WASTE		NEG	NEG	NEG	NEG	NEG		NEG	NEG	NEG	NA
HEXANE SOLUBILITY	WASTE		NEG	NEG	NEG	NEG	NEG		NEG	NEG	NEG	NA
WATER SOLUBILITY	WASTE		NEG	NEG	NEG	NEG	NEG		NEG	NEG	NEG	NA
pH	WASTE		8.08	7.30	7.65	7.82	7.83		7.90	7.54	7.14	NA
FLAMMABILITY	WASTE		NEG	NEG	NEG	NEG	NEG		NEG	NEG	NEG	NA
RADIOACTIVITY(mR/h)	WASTE											NA
S/CN RELEASE	WASTE		NEG	NEG	NEG	NEG	NEG		NEG	NEG	NEG	NA
BEILESTEIN TEST	WASTE		NEG	NEG	NEG	NEG	NEG		NEG	NEG	NEG	NA
PEROXIDE TEST(mg/Kg)	WASTE		NEG	NEG	NEG	NEG	NEG		NEG	NEG	NEG	NA
REDOX POTENTIAL(mV)	WASTE		-48.4	-24.9	-58.1	-30.7	-33.2		-88.3	-104	90.1	NA

All results reported in µg/L (ppb) unless otherwise specified. NA - Not Analyzed

Only detected results reported.

NEG - No reaction

B - Less than quantitation limit but greater than or equal to instrument detection limit.

NON - Non-corrosive, non-reactive, non-ignitable

**TCLP RESULTS
LOCKPORT CITY LANDFILL SITE
SAMPLE SB25**

PARAMETER:	TYPE	Detection Limit	Detected Conc.
BENZENE	VOC		0.009
CARBON TETRACHLORIDE	VOC	0.005	
CHLOROBENZENE	VOC		.004J
CHLOROFORM	VOC	0.005	
2-BUTANONE	VOC		.003 J
TETRACHLOROETHYLENE	VOC	0.005	
TRICHLOROETHYLENE	VOC	0.005	
VINYL CHLORIDE	VOC	0.01	
1,2-DICHLOROETHANE	VOC	0.005	
1,1-DICHLOROETHYLENE	VOC	0.005	
1,4-DICHLOROBENZENE	SEMI	0.02	
HEXACHLOROETHANE	SEMI	0.02	
NITROBENZENE	SEMI	0.02	
HEXACHLOROBUTADIENE	SEMI	0.02	
2,4,6-TRICHLOROPHENOL	SEMI	0.02	
2,4,5-TRICHLOROPHENOL	SEMI	0.1	
2,4-DINITROTOLUENE	SEMI	0.02	
HEXACHLOROBENZENE	SEMI	0.02	
PENTACHLOROPHENOL	SEMI	0.1	
2-METHYLPHENOL	SEMI	0.02	
3 & 4-METHYLPHENOL *	SEMI	0.02	
PYRIDINE	SEMI	0.02	
CHLORDANE	PEST	0.0025	
ENDRIN	PEST	0.0005	
HEPTACHLOR	PEST	0.00025	
HEPTACHLOR EPOXIDE	PEST	0.00025	
LINDANE	PEST	0.00025	
METHOXYCHLOR	PEST	0.0025	
TOXAPHENE	PEST	0.005	
2,4-D	HERB	0.0005	
SILVEX	HERB	0.00005	
ARSENIC	MCP	0.025	
BARIUM	MCP		0.93
CADMIUM	MCP		0.006
CHROMIUM	MCP	0.003	
LEAD	MCP		0.77
MERCURY	MCP	0.002	
SELENIUM	MCP	0.036	
SILVER	MCP	0.003	

* Cannot be separated.

All concentrations are presented in mg/L (ppm).

LOCKPORT CITY LANDFILL: SURFICIAL SOILS

Analytical Results

SAMPLE-ID	SPS-1	SPS-2	SPS-2-DL	SPS-3	SPS-3RE	SPS-4	SPS-5
COLLECTION DATE	12/8/89	12/8/89	12/8/89	12/8/89	12/8/89	12/11/89	12/12/89
PARAMETER	TYPE						
CHLOROMETHANE	VOC		NA		NA		
BROMODICHLOROMETHANE	VOC		NA		NA		
VINYL CHLORIDE	VOC		NA		NA		
CHLOROETHANE	VOC		NA		NA		
METHYLENE CHLORIDE	VOC	R	NA	R	NA	R	
ACETONE	VOC	R	NA	R	NA	R	R
CARBON DISULFIDE	VOC		NA		NA		
1,1-DICHLOROETHENE	VOC		NA		NA		
1,1-DICHLOROETHANE	VOC		NA		NA		
1,2-DICHLOROETHENE (TOTAL)	VOC		NA		NA		
CHLOROFORM	VOC	R	NA		NA		
1,2-DICHLOROETHANE	VOC		NA		NA		
2-BUTANONE	VOC	R	NA		NA	1 J	
1,1,1-TRICHLOROETHANE	VOC		NA		NA		
CARBON TETRACHLORIDE	VOC		NA		NA		
VINYL ACETATE	VOC		NA		NA		
BROMOMETHANE	VOC		NA		NA		
1,2-DICHLOROPROPANE	VOC		NA		NA		
CIS-1,3-DICHLOROPROPENE	VOC		NA		NA		
TRICHLOROETHENE	VOC		NA		NA		
DIBROMOCHLOROMETHANE	VOC		NA		NA		
1,1,2-TRICHLOROETHANE	VOC		NA		NA		
BENZENE	VOC		NA		NA		
TRANS-1,3-DICHLOROPROPENE	VOC		NA		NA		
BROMOFORM	VOC		NA		NA		
4-METHYL-2-PENTANONE	VOC		NA		NA		
2-HEXANONE	VOC		NA		NA		
TETRACHLOROETHENE	VOC		NA		NA		
1,1,2,2-TETRACHLOROETHANE	VOC		NA		NA		
TOLUENE	VOC	R	NA		NA	R	
CHLOROBENZENE	VOC		NA		NA		
ETHYLBENZENE	VOC		NA		NA		
STYRENE	VOC		NA		NA		
TOTAL XYLENES	VOC		NA		NA	1 J	

All results reported in µg/kg (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.
R - Analyte rejected due to blank contamination (See Appendix O).
NA - Not Analyzed

LOCKPORT CITY LANDFILL: SURFICIAL SOILS

Analytical Results

SAMPLE-ID	SPS-1	SPS-2	SPS-2-DL	SPS-3	SPS-3RE	SPS-4	SPS-5
COLLECTION DATE	12/8/89	12/8/89	12/8/89	12/8/89	12/8/89	12/11/89	12/12/89
PARAMETER	TYPE						
PHENOL	SEMI						
BIS(2-CHLOROETHYL)ETHER	SEMI						
2-CHLOROPHENOL	SEMI						
1,3-DICHLOROBENZENE	SEMI						
1,4-DICHLOROBENZENE	SEMI						
BENZYL ALCOHOL	SEMI						
1,2-DICHLOROBENZENE	SEMI						
2-METHYLPHENOL	SEMI						
BIS(2-CHLOROISOPROPYL)ETHER	SEMI						
4-METHYLPHENOL	SEMI						
N-NITROSO-DI-N-PROPYLAMINE	SEMI						
HEXACHLOROETHANE	SEMI						
NITROBENZENE	SEMI						
ISOPHORONE	SEMI						
2-NITROPHENOL	SEMI						
2,4-DIMETHYLPHENOL	SEMI						
BENZOIC ACID	SEMI	420 J	510 JD	220 J	280 J	77 J	70 J
BIS(2-CHLOROETHOXY)METHANE	SEMI						
2,4-DICHLOROPHENOL	SEMI						
1,2,4-TRICHLOROBENZENE	SEMI						
NAPHTHALENE	SEMI	150 J	160 JD	160 J	160 J		
4-CHLOROANILINE	SEMI						
HEXACHLOROBUTADIENE	SEMI						
4-CHLORO-3-METHYLPHENOL	SEMI						
2-METHYLNAPHTHALENE	SEMI	180 J	180 JD	150 J	150 J		
HEXACHLOROCYCLOPENTADIENE	SEMI						
2,4,6-TRICHLOROPHENOL	SEMI						
2,4,5-TRICHLOROPHENOL	SEMI						
2-CHLORONAPHTHALENE	SEMI						
2-NITROANILINE	SEMI						
DIMETHYLPHTHALATE	SEMI	1,300	1,400 D				
ACENAPHTHYLENE	SEMI	120 J	180 JD	430 J	280 J		
2,6-DINITROTOLUENE	SEMI						
3-NITROANILINE	SEMI						
ACENAPHTHENE	SEMI	410 J	420 JD	180 J	200 J		
2,4-DINITROPHENOL	SEMI						

All results reported in µg/kg (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample
quantitation limit but greater than zero.

D - Indicates compounds were analyzed at a secondary dilution
factor.

LOCKPORT CITY LANDFILL: SURFICIAL SOILS

Analytical Results

SAMPLE-ID		SPS-1	SPS-2	SPS-2-DL	SPS-3	SPS-3RE	SPS-4	SPS-5
COLLECTION DATE		12/8/89	12/8/89	12/8/89	12/8/89	12/8/89	12/11/89	12/12/89
PARAMETER	TYPE							
4-NITROPHENOL	SEMI							
DIBENZOFURAN	SEMI		240 J	230 JD	180 J	170 J		
2,4-DINITROTOLUENE	SEMI		33 J					
DIETHYLPHTHALATE	SEMI							
4-CHLOROPHENYL-PHENYL ETHER	SEMI							
FLUORENE	SEMI	43 J	430 J	510 JD	280 J	300 J		
4-NITROANILINE	SEMI							
4,6-DINITRO-2-METHYLPHENOL	SEMI							
N-NITROSODIPHENYLAMINE	SEMI							
4-BROMOPHENYL-PHENYL ETHER	SEMI							
HEXACHLOROBENZENE	SEMI							
PENTACHLOROPHENOL	SEMI							
PHENANTHRENE	SEMI	350 J	4,800	6,000 D	3,100	3,000	320 J	160 J
ANTHRACENE	SEMI	97 J	760	890 JD	680 J	770	370 J	36 J
DI-N-BUTYLPHTHALATE	SEMI	R	3,700 B	6,000 BD	R	R	R	R
FLUORANTHENE	SEMI	800	3,900	8,700 D	5,000	4,300	850	400 J
PYRENE	SEMI	420	10,000 E	7,200 D	5,800	4,200	730	350 J
BUTYLBENZYLPHTHALATE	SEMI				130 J			
3,3'-DICHLOROBENZIDINE	SEMI							
BENZO(A)ANTHRACENE	SEMI	310 J	4,200	5,000 D	2,900	3,000	300 J	180 J
CHRYSENE	SEMI	310 J	4,100	4,800 D	2,800	2,700	320 J	190 J
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	680 B	3,900 B	4,000 BD	1,900 B	1,700 B	R	1,400 B
DI-N-OCTYL PHTHALATE	SEMI	58 J	260 J					88 J
BENZO(B)FLUORANTHENE	SEMI	320 J	4,600	5,900 D	3,500	3,800	390 J	260 J
BENZO(K)FLUORANTHENE	SEMI	300 J		790 JD	3,200	2,200	220 J	220 J
BENZO(A)PYRENE	SEMI	280 J	3,700	4,100 D	2,700	2,400	280 J	180 J
INDENO(1,2,3-CD)PYRENE	SEMI		1,700	2,100 D	1,600	1,200		
DIBENZ(A,H)ANTHRACENE	SEMI		1,200			200 J		
BENZO(G,H,I)PERYLENE	SEMI		3,300	1,800 D	830	1,100		

All results reported in µg/kg (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.
R - Analyte rejected due to blank contamination (See Appendix O).
D - Indicates compounds were analyzed at a secondary dilution factor.
B - Analyte detected in associated method blank.
E - Compound concentration exceeded the calibration range for that specific analysis.

LOCKPORT CITY LANDELL: SURFICIAL SOILS

Analytical Results

SAMPLE-ID		SPS-1	SPS-2	SPS-2-DL	SPS-3	SPS-3RE	SPS-4	SPS-5
COLLECTION DATE		12/8/89	12/8/89	12/8/89	12/8/89	12/8/89	12/11/89	12/12/89
PARAMETER	TYPE							
ALPHA-BHC	PST	7.9 J	9,300	NA	67	NA	20	160 J
BETA-BHC	PST							
DELTA-BHC	PST							
GAMMA-BHC (LINDANE)	PST							
HEPTACHLOR	PST							
ALDRIN	PST							
HEPTACHLOR EPOXIDE	PST							
ENDOSULFAN I	PST							
DIELDRIN	PST							
4,4'-DDE	PST							
ENDRIN	PST	36 J	9,300	NA	1,900	NA	170 J	160 J
ENDOSULFAN II	PST							
4,4'-DDD	PST							
ENDOSULFAN SULFATE	PST							
4,4'-DDT	PST							
METHOXYCHLOR	PST							
ENDRIN KETONE	PST							
ALPHA-CHLORDANE	PST							
GAMMA-CHLORDANE	PST							
TOXAPHENE	PST							
AROCLOR-1016	PCB	36 J	9,300	NA	1,900	NA	170 J	160 J
AROCLOR-1221	PCB							
AROCLOR-1232	PCB							
AROCLOR-1242	PCB							
AROCLOR-1248	PCB							
AROCLOR-1254	PCB							
AROCLOR-1260	PCB							

All results reported in µg/kg (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample
quantitation limit but greater than zero.
NA - Not Analyzed

LOCKPORT CITY LANDFILL: SURFICIAL SOILS

Analytical Results

SAMPLE-ID		SPS-1	SPS-2	SPS-2-DL	SPS-3	SPS-3RE	SPS-4	SPS-5
COLLECTION DATE		12/8/89	12/8/89	12/8/89	12/8/89	12/8/89	12/11/89	12/12/89
PARAMETER	TYPE							
ALUMINUM	MCP	6,550 E	15,100 E	NA	9,870 E	NA	10,200 E	12,800 E
ANTIMONY	MCP		14 B	NA		NA	13.3 B	
ARSENIC	MCP	11.10 N*	18.2 N*	NA	17.7 N *	NA	13.9 N*	19.8 N*
BARIUM	MCP	28.2 B	122	NA	108	NA	84.5	89.7
BERYLLIUM	MCP		0.97 NB	NA	1.1 BN	NA		1.4 N
CADMIUM	MCP		4.5	NA	5.4	NA		2.4
CALCIUM	MCP	155,000	69,400	NA	83,700	NA	109,000	21,800
CHROMIUM	MCP	6.6	403	NA	350	NA	31.4	29.4
COBALT	MCP	3.2 B	9	NA	18.6	NA	6.5 B	16.6
COPPER	MCP	12.8*	626*	NA	637 *	NA	124*	124*
IRON	MCP	14,900 E	23,500 E	NA	21,000 E	NA	21,400 E	31,100 E
LEAD	MCP	78	1990	NA	1,520	NA	274	386
MAGNESIUM	MCP	23,500	16,400	NA	24,400	NA	12,100	7,440
MANGANESE	MCP	652 E	647 E	NA	1,090 E	NA	585 E	1,280 E
MERCURY	MCP	1.2	0.76	NA	2.4	NA	0.69	0.43
NICKEL	MCP	15.3	82.7	NA	159	NA	38.2	58.7
POTASSIUM	MCP	2,120	3,080	NA	2,050	NA	2,020	2,470
SELENIUM	MCP			NA		NA		
SILVER	MCP		3.6	NA	2.9	NA		4
SODIUM	MCP	328 B	370 B	NA	362 B	NA	339 B	350 B
THALLIUM	MCP			NA		NA		
VANADIUM	MCP	8.8	28.3	NA	27.4	NA	24.7	27.4
ZINC	MCP	89 E	6,070 E	NA	2,060 E	NA	562 E	684 E
CYANIDE	MCP		5.6	NA		NA		
PHENOLS	MCP			NA		NA		
AMMONIA, AS N	MISC	27.6	52.8	NA	37.4	NA	146.5	76.3
NITRATE-NITROGEN	MISC	25.9	50.7	NA	82.6	NA	67.2	82.3
TOTAL KJELDAHL NITROGEN, AS N	MISC	276.6	477.6	NA	496	NA	749.3	542
MOISTURE %	MISC	20.1	34	NA	29.1	NA	41.5	29.2
pH UNITS	MISC	7.85	7.55	NA	7.45	NA	7.45	7.75
TOTAL ORGANIC CARBON	MISC	4816	12658	NA	12,610	NA	15723	15098

All results reported in mg/kg (ppm) unless otherwise stated.
Only detected results are reported.

E - Estimated value due to interference.

N - Spike sample % recovery out of control limits.

NA - Not Analyzed

* - Duplicate analysis not within control limits.

B - Less than quantitation limit but greater than or equal to instrument detection limit.

Analytical Results

PHASE I AND II

All results reported in $\mu\text{g}/\text{kg}$ (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.
B - Analyte is detected in associated method blank.
R - Analyte rejected due to blank contamination (See Appendix O).

PHASE I AND II

All results reported in $\mu\text{g}/\text{kg}$ (ppb).
Only detected results are reported.

J – Indicates the result is less than the sample quantitation limit but greater than zero.
R – Analyte rejected due to blank contamination (See Appendix O).

LOCKPORT CITY LANDFILL: STREAM SEDIMENTS

Analytical Results

PHASE I AND II

SAMPLE-ID		SS-1	SS-4	SS-4a	SS-2	SS-3	SS-5	WSS-1	SS-6	SS-7	SS-8	SS-9	SS-10
STREAM		EAST BR. GULF	WEST BR. GULF	WEST BR. GULF	EAST BR. GULF	GULF	GULF	MARSH	SWALE	SWALE	GULF	GULF	GULF
LOCATION		UPSTREAM	UPSTREAM	UPSTREAM	ADJACENT	ADJACENT	ADJACENT	ADJACENT	OFFSITE	OFFSITE	DOWNSTREAM	DOWNSTREAM	DOWNSTREAM
COLLECTION DATE		12/1/89	12/1/89	4/9/91	12/1/89	12/1/89	12/4/89	3/19/91	2/15/90	2/15/90	12/4/89	4/8/91	4/8/91
PARAMETER	TYPE												
ACENAPHTHENE	SEMI	260 J	170 J	1400 J			2,100	59 J	130 J	10 J	290 J	49 J	
2,4-DINITROPHENOL	SEMI												
4-NITROPHENOL	SEMI												
DIBENZOFURAN	SEMI	320 J	96 J	1200 J			2,000	44 J	100 J	9 J	190 J	74 J	
2,4-DINITROTOLUENE	SEMI												
DIETHYLPHTHALATE	SEMI												
4-CHLOROPHENYL-PHENYL ETHER	SEMI												
FLUORENE	SEMI	710 J	200 J	1600 J			2,600		520	23 J	1,000	190 J	
4-NITROANILINE	SEMI												
4,6-DINITRO-2-METHYLPHENOL	SEMI												
N-NITROSODIPHENYLAMINE	SEMI	130 J											
4-BROMOPHENYL-PHENYL ETHER	SEMI												
HEXACHLOROBENZENE	SEMI												
PENTACHLOROPHENOL	SEMI												
PHENANTHRENE	SEMI	4,500	2,200	14000	22 J	40 J	19,000	1300	2800	150 J	6,900	1900	800 J
ANTHRACENE	SEMI	1,200	290 J	2400		12 J	3,100	160 J	900	38 J	1,400	330 J	
DI-N-BUTYLPHTHALATE	SEMI	R	R		R	R	R		70 J	R	R		R
FLUORANTHENE	SEMI	7,000	2,800	13000	40 J	80 J	15,000	2400	5100	340 J	11,000	2600	1300 J
PYRENE	SEMI	15,000	2,900	12000	51 J	130 J	14,000	1900	2500	240 J	5,100	2200	1100 J
BUTYLBENZYLPHTHALATE	SEMI	1,200	38 J		40 J				180 J	R		25 J	
3,3'-DICHLOROBENZIDINE	SEMI												
BENZO(A)ANTHRACENE	SEMI	4,900	1,200	5600			8,300	760 J	1900	150 J	4,400	990	480 J
CHRYSENE	SEMI	5,600	1,400	7200			7,000	1200	1800	160 J	4,400	1300	510 J
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	R	R	R	R	R	R	R	3100 B	R	R	R	93000 B
DI-N-OCTYLPHTHALATE	SEMI	950 J	120 J		35 J	43 J			250 J	R			
BENZO(B)FLUORANTHENE	SEMI	15,000	2,400	2700		37 J	5,600	1500	3100	120 J	3,800	610 J	440 J
BENZO(K)FLUORANTHENE	SEMI		2,200	1800			5,800	450 J	1800	170 J	3,900	270 J	220 J
BENZO(A)PYRENE	SEMI	7,700	1,300	5600			5,500	1200	1600	100 J	3,700	1100	
INDENO(1,2,3-CD)PYRENE	SEMI	5,000	170 J	5200			2,600	560 J	390 J	41 J	570 J	980	370 J
DIBENZ(A,H)ANTHRACENE	SEMI			970 J			660 J	54 J				190 J	
BENZO(G,H,I)PERYLENE	SEMI	5,000	150 J	4800			1,800 J	370 J	310 J	31 J	720 J	910	

All results reported in µg/kg (ppb).

Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.

B - Analyte is detected in the associated method blank.

R - Analyte rejected due to blank contamination (See Appendix O).

PHASE I AND II

All results reported in $\mu\text{g/kg}$ (ppb).
Only detected results are reported.

J – Indicates the result is less than the sample quantitation limit but greater than zero.

LOCKPORT CITY LANDFILL: STREAM SEDIMENTS

Analytical Results

PHASE I AND II

SAMPLE-ID	SS-1		SS-4		SS-4a		SS-2		SS-3		SS-5		WSS-1		SS-6		SS-7		SS-8		SS-9		SS-10	
	EAST BR. GULF	UPSTREAM	WEST BR. GULF	UPSTREAM	WEST BR. GULF	UPSTREAM	EAST BR. GULF	ADJACENT	GULF	ADJACENT	GULF	ADJACENT	MARSH	ADJACENT	SWALE	OFFSITE	SWALE	OFFSITE	GULF	DOWNSTREAM	GULF	DOWNSTREAM	GULF	DOWNSTREAM
COLLECTION DATE																								
PARAMETER																								
PARAMETER	SS-1		SS-4		SS-4a		SS-2		SS-3		SS-5		WSS-1		SS-6		SS-7		SS-8		SS-9		SS-10	
	EAST BR. GULF	UPSTREAM	WEST BR. GULF	UPSTREAM	WEST BR. GULF	UPSTREAM	EAST BR. GULF	ADJACENT	GULF	ADJACENT	GULF	ADJACENT	MARSH	ADJACENT	SWALE	OFFSITE	SWALE	OFFSITE	GULF	DOWNSTREAM	GULF	DOWNSTREAM	GULF	DOWNSTREAM
ALUMINUM	16000 E		11200 E		6670		3620 E		5380 E		19400 E		* 29000		9130		6660		7410 E		5060		5430	
ANTIMONY							17.3 B																	
ARSENIC	45		18.8		5.8		12.6		10.1		31.2		11.3 S		5 S		5.6		13.9		4.6		3.2	
BARIUM	398 N		21.8 B,N		30.3 B		29.1 B,N		118 N		7.3 B,N		108		84.3		35.6 B		49.3 B,N		24.4		25.8 B	
BERYLLIUM					0.53 B		1.2 B*						1.1 B				0.55 B				0.55 B		0.36 B	
CADMIUM	14.7*				1.1 B				3.1*				3.8								1.3		1	
CALCIUM	49300		129000		147000		121000		141000		57700		36500		112000		69200		44800		115000 *		122000 *	
CHROMIUM	218 N		46.2 N		28.6						277 N		604		17.9		8.2		7.8 N		43.5		43.4	
COBALT	10.5 B		4.1 B		5.4 B		3.6 B		4.4 B				11.9 B		8.1 B		4.7 B		5.9 B		4.3 B		5 B	
COPPER	1540		46.3		219		31.2		331		233		754		35.9		16.1		14.4		98.8		125	
IRON	44700		16000		13600		17800		47100		19000		34800		16100		10800		12900		15500		13400	
LEAD	4330		192		317		121		213		747		2390		88.1 N		26.8 N		39		227 N		270 N	
MAGNESIUM	21600		20700		24100		7960		11200		14800		16400		49200		10400		9590		26100 *		20400 *	
MANGANESE	709 NE		593 NE		585		442 NE		1030 NE		450 NE		611		631 N		350 N		871 NE		580		669	
MERCURY	1.1*		0.26*				0.23*		0.51*		0.9*		0.4		0.18				0.14*					
NICKEL	102		19.1		28.5		10.4 B		19.4		47.5		77.8		12.6 NE				13.6		20.5		29.7	
POTASSIUM	2630 B		3840		2070		1230 B		1100 B		3690 B		5670		1020 B		1660		1530		992 B		1030	
SELENIUM													2.2											
SILVER																								
SODIUM	1320 B		259 B		289 B		535 B		636 B		1080 B		572 B				386 B				224 B		218 B	
THALLIUM													1.1 B								0.57 B		0.41 B	
VANADIUM	26.7 B		13.9		13.3		5.6 B		6.2 B				57.4 E		14.6		14.5		12.9 B		10.1 B		9.4 B	
ZINC	4270		689		1780		133		573		4520		4940		212		129		89		554 B*		666 *	
CYANIDE	3.4												8.7											
PHENOLS					1.00								2.91								1.08			
AMMONIA, AS N	304.6		50.4		43.7		49.3		197		1487.3		507		218.9		70.4		86.1		23.5		29.0	
NITRATE-NITROGEN	78.8		19.8		10.8		6.45		34.5		142.3		8.65		136.4		19.6		17.8					
TOTAL KJELDAHL NITROGEN, AS N	679.01		128.7		901		94.7		251.8		1862.3		5930		1254		862.9		126.5		674		430	
MOISTURE %	68.8		22		22.7		35.6		31.8		77.7		65.2		30.8		22.2		28.8		18.1		14.8	
pH UNITS	7.3		7.8		7.8		7.5		7.25		6.6		7.0		6.8		6.9		7.85		7.8		7.7	
TOTAL ORGANIC CARBON	63672		5019		65000		5696		4823		95473		66000		14749		1067.9		6608		39000		47000	

All results reported in mg/kg (ppm) unless otherwise specified.

Only detected results are reported.

* - Duplicate analysis not within control limits.

B - Less than quantitation limit but greater than or equal to instrument detection limit.

E - Estimated value due to interference.

N - Spike sample recovery not within control limits.

S - Value determined by the method of standard addition (MSA).

Analytical Results PHASE I AND II

**All results are reported in $\mu\text{g/L}$ (ppb).
Only detected results are reported.**

J - Indicates the result is less than the sample quantitation limit but greater than zero.
B - Analyte is detected in associated method blank.
E - Compound concentration exceeded the calibration range for that specific analysis.
R - Analyte rejected due to blank contamination (See Appendix O).

LOCKPORT CITY LANDFILL: SURFACE WATERS

Analytical Results

PHASE I AND II

SAMPLE-ID	SW-1	SW-4	SW-4a	SW-2	SW-3	SW-5	SW-6	SW-7	SW-8	SW-9	SW-10
STREAM	EAST BR. GULF UPSTREAM	WEST BR. GULF UPSTREAM	WEST BR. GULF UPSTREAM	EAST BR. GULF ADJACENT	GULF ADJACENT	GULF ADJACENT	SWALE OFFSITE	SWALE OFFSITE	GULF DOWNSTREAM	GULF DOWNSTREAM	GULF DOWNSTREAM
LOCATION											
COLLECTION DATE	12/1/89	12/1/89	4/8/91	12/1/89	12/1/89	12/4/89	2/15/90	2/15/90	12/4/89	4/8/91	4/8/91
PARAMETER											
PHENOL	SEMI								5 J		
BIS(2-CHLOROETHYL) ETHER	SEMI										
2-CHLOROPHENOL	SEMI										
1,3-DICHLOROBENZENE	SEMI										
1,4-DICHLOROBENZENE	SEMI										
BENZYL ALCOHOL	SEMI										
1,2-DICHLOROBENZENE	SEMI										
2-METHYLPHENOL	SEMI										
BIS(2-CHLOROISOPROPYL) ETHER	SEMI										
4-METHYLPHENOL	SEMI										
N-NITROSO-DI-N-PROPYLAMINE	SEMI										
HEXACHLOROETHANE	SEMI										
NITROBENZENE	SEMI										
ISOPHORONE	SEMI										
2-NITROPHENOL	SEMI	2 J									
2,4-DIMETHYLPHENOL	SEMI	38 J									
BENZOIC ACID	SEMI		16 J			6 J			6 J	12 J	11 J
BIS(2-CHLOROETHOXY)METHANE	SEMI										
2,4-DICHLOROPHENOL	SEMI										
1,2,4-TRICHLOROBENZENE	SEMI										
NAPHTHALENE	SEMI										
4-CHLOROANILINE	SEMI										
HEXACHLOROBUTADIENE	SEMI										
4-CHLORO-3-METHYLPHENOL	SEMI										
2-METHYLNAPHTHALENE	SEMI										
HEXACHLOROCYCLOPENTADIENE	SEMI										
2,4,6-TRICHLOROPHENOL	SEMI										
2,4,5-TRICHLOROPHENOL	SEMI										
2-CHLORONAPHTHALENE	SEMI										
2-NITROANILINE	SEMI										
DIMETHYLPHTHALATE	SEMI										
ACENAPHTHYLENE	SEMI										
2,6-DINITROTOLUENE	SEMI										
3-NITROANILINE	SEMI										
ACENAPHTHENE	SEMI										
2,4-DINITROPHENOL	SEMI										
4-NITROPHENOL	SEMI										

All results are reported in µg/L (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.

LOCKPORT CITY LANDFILL: SURFACE WATERS

Analytical Results

PHASE I AND II

SAMPLE-ID	SW-1	SW-4	SW-4a	SW-2	SW-3	SW-5	SW-6	SW-7	SW-8	SW-9	SW-10
STREAM	EAST BR. GULF UPSTREAM	WEST BR. GULF UPSTREAM	WEST BR. GULF UPSTREAM	EAST BR. GULF ADJACENT	GULF ADJACENT	GULF ADJACENT	SWALE OFFSITE	SWALE OFFSITE	GULF DOWNSTREAM	GULF DOWNSTREAM	GULF DOWNSTREAM
LOCATION											
COLLECTION DATE	12/1/89	12/1/89	4/8/91	12/1/89	12/1/89	12/4/89	2/15/90	2/15/90	12/4/89	4/8/91	4/8/91
PARAMETER	TYPE										
DIBENZOFURAN	SEMI									.4 J	
2,4-DINITROTOLUENE	SEMI									2 J	
DIETHYLPHTHALATE	SEMI		.4 J	1 J						.9 J	
4-CHLOROPHENYL-PHENYL ETHER	SEMI									.9 J	
FLUORENE	SEMI									2 J	
4-NITROANILINE	SEMI									2 J	
4,6-DINITRO-2-METHYLPHENOL	SEMI									2 J	
N-NITROSODIPHENYLAMINE	SEMI									2 J	
4-BROMOPHENYL-PHENYL ETHER	SEMI									2 J	
HEXACHLOROBENZENE	SEMI									2 J	
PENTACHLOROPHENOL	SEMI									2 J	
PHENANTHRENE	SEMI									2 J	
ANTHRACENE	SEMI									2 J	
DI-N-BUTYLPHTHALATE	SEMI	R		R	R					R	R
FLUORANTHENE	SEMI									4 J	
PYRENE	SEMI									3 JB	
BUTYLBENZYLPHTHALATE	SEMI									3 J	
3,3'-DICHLOROBENZIDINE	SEMI									3 J	
BENZO(A)ANTHRACENE	SEMI									3 J	
CHRYSENE	SEMI									3 J	
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	R		R	R	R	1 JB			R	R
DI-N-OCTYL PHTHALATE	SEMI									R	R
BENZO(B)FLUORANTHENE	SEMI									R	
BENZO(K)FLUORANTHENE	SEMI									R	
BENZO(A)PYRENE	SEMI									2 J	
INDENO(1,2,3-CD)PYRENE	SEMI									R	
DIBENZO(A,H)ANTHRACENE	SEMI									2 J	
BENZO(G,H,I)PERYLENE	SEMI									2 J	

All results are reported in µg/L (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.
R - Analyte rejected due to blank contamination (See Appendix O).
B - Analyte is detected in associated method blank.

LOCKPORT CITY LANDFILL: SURFACE WATERS

Analytical Results

PHASE I AND II

SAMPLE-ID	SW-1	SW-4	SW-4a	SW-2	SW-3	SW-5	SW-6	SW-7	SW-8	SW-9	SW-10
STREAM	EAST BR. GULF	WEST BR. GULF	WEST BR. GULF	EAST BR. GULF	GULF	GULF	SWALE	SWALE	GULF	GULF	GULF
LOCATION	UPSTREAM	UPSTREAM	UPSTREAM	ADJACENT	ADJACENT	ADJACENT	OFFSITE	OFFSITE	DOWNSTREAM	DOWNSTREAM	DOWNSTREAM
COLLECTION DATE	12/1/89	12/1/89	4/8/91	12/1/89	12/1/89	12/4/89	2/15/90	2/15/90	12/4/89	4/8/91	4/8/91
PARAMETER	TYPE										
ALPHA-BHC	PST										
BETA-BHC	PST										
DELTA-BHC	PST										
GAMMA-BHC (LINDANE)	PST										
HEPTACHLOR	PST										
ALDRIN	PST										
HEPTACHLOR EPOXIDE	PST										
ENDOSULFAN I	PST										
DIELDRIN	PST										
4,4'-DDE	PST						0.022 J				
ENDRIN	PST										
ENDOSULFAN II	PST										
4,4'-DDD	PST										
ENDOSULFAN SULFATE	PST										
4,4'-DDT	PST										
METHOXYCHLOR	PST										
ENDRIN KETONE	PST										
ALPHA-CHLORDANE	PST										
GAMMA-CHLORDANE	PST										
TOXAPHENE	PST										
AROCLOR-1016	PCB										
AROCLOR-1221	PCB										
AROCLOR-1232	PCB										
AROCLOR-1242	PCB										
AROCLOR-1248	PCB										
AROCLOR-1254	PCB										
AROCLOR-1260	PCB										

All results are reported in $\mu\text{g/L}$ (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.

LOCKPORT CITY LANDFILL: SURFACE WATERS

Analytical Results

PHASE I AND II

SAMPLE-ID	SW-1	SW-4	SW-4a	SW-2	SW-3	SW-5	SW-6	SW-7	SW-8	SW-9	SW-10
STREAM	EAST BR. GULF	WEST BR. GULF	WEST BR. GULF	EAST BR. GULF	GULF	GULF	SWALE	SWALE	GULF	GULF	GULF
LOCATION	UPSTREAM	UPSTREAM	UPSTREAM	ADJACENT	ADJACENT	ADJACENT	OFFSITE	OFFSITE	DOWNSTREAM	DOWNSTREAM	DOWNSTREAM
COLLECTION DATE	12/1/89	12/1/89	4/8/91	12/1/89	12/1/89	12/4/89	2/15/90	2/15/90	12/4/89	4/8/91	4/8/91
PARAMETER	TYPE										
ALUMINUM	MCP	74.7 B	447	506		820	698	148 B	735	268	279
ANTIMONY	MCP			29.1 B						27.9 B	
ARSENIC	MCP	4.3 B			5.3 B		3.1 B	5.4 B			
BARIUM	MCP	44.3 B		67.1 B	65.2 B		82.8 B	52.1 B		30.7 B	30.7 B
BERYLLIUM	MCP		3.4 B								
CADMIUM	MCP		9.4								
CALCIUM	MCP										
CHROMIUM	MCP	64200		114000	112000	145000	90000	87500	138000	90200	92600
COBALT	MCP		23.7	10.4		20.7			10.9	5.7 B	6.4 B
COPPER	MCP										
IRON	MCP	25.5*	47.6*	78.5*	65.6*	50.5*	109	46.5	53.8*		
LEAD	MCP	155		154	184	114	890	169	65.8 B	376	378
MAGNESIUM	MCP	6.3 NW	52.3 N	21.5	6.1 NW	79 NW	5.50		155 N	18	18.7
MANGANESE	MCP	21800	9080	11300	38500	10700	31800	29000	10700	16600	17100
MERCURY	MCP	74.1 N*	27 N*	21.4	75.5 N*	45.3 N*	35.9		16.6 N*	247	248
NICKEL	MCP	0.6 N	0.3 N	0.4 N	0.5 N	1.4 N			0.39 N		
POTASSIUM	MCP		30.6 B			19 B			19.2 B		
SELENIUM	MCP		101000	4240 B	6000	103000	2400 B	2900 B	98000	5110	4970 B
SILVER	MCP										
SODIUM	MCP	136 N*	11.6 N*	20.8 N*	19.4 N*	8.5 N*	36.1		8.7 N*		
THALLIUM	MCP	116000	117000	231000	225000	129000	50000 N	79700	125000	100000	102000
VANADIUM	MCP							2.4 BW			
ZINC	MCP	146	12.4 B	388	17.4 B		39.2	28.6	517	268	274
CYANIDE	MCP		399	40.2	188	585				45.7	28
PHENOLS	MCP		92	0.006	213	271			64	0.007	
	MCP	100									

All results are reported in µg/L (ppb) unless otherwise specified.
Only detected results are reported.

W - Post-digestion spike analysis is out of control limits.

B - Less than quantitation limit but greater than or equal to instrument detection limit.

E - Estimated value due to interference.

* - Duplicate analysis not within control limits.

N - Spike sample % recovery not within control limits.

LOCKPORT CITY LANDFILL: SURFACE WATERS

Analytical Results

PHASE I AND II

SAMPLE-ID	SW-1	SW-4	SW-4a	SW-2	SW-3	SW-5	SW-6	SW-7	SW-8	SW-9	SW-10
STREAM	EAST BR. GULF UPSTREAM	WEST BR. GULF UPSTREAM	WEST BR. GULF UPSTREAM	EAST BR. GULF ADJACENT	GULF ADJACENT	GULF ADJACENT	SWALE OFFSITE	SWALE OFFSITE	GULF DOWNSTREAM	GULF DOWNSTREAM	GULF DOWNSTREAM
LOCATION											
COLLECTION DATE	12/1/89	12/1/89	4/8/91	12/1/89	12/1/89	12/4/89	2/15/90	2/15/90	12/4/89	4/8/91	4/8/91
PARAMETER	TYPE										
CHEMICAL OXYGEN DEMAND (mg O2/L)	MISC	10.5	141.5	88.1	11.3	9.7	93.3	21.1	9.0	58.2	61.2
TOTAL DISSOLVED SOLIDS	MISC	722	1254	606	548	1291	1229	611	629	615	615
TOTAL SUSPENDED SOLIDS	MISC		7		2	4	13		4.0		7
AMMONIA, AS N	MISC	0.108	5.5	0.833	0.22		5.9	0.19		0.903	0.931
NITRATE-NITROGEN	MISC	0.54	667.7	5.23	0.32	0.71	614.4	2.07	1.71	2.79	2.69
TOTAL KJELDAHL NITROGEN, AS N	MISC		25	4.38			25.2			4.04	4.31
pH UNITS	MISC	7.65	6.8	7.85	7.55	7.6	6.85	7.65	7.9	8.03	8.04
TOTAL ORGANIC CARBON	MISC	7.57	18.45	20.3	5.14	3.75	0.689	47.7	31.2	14.7	14.4
ACIDITY (mg CaCO3/L)	MISC			36.9						57.2	50
ALKALINITY (mg/L CaCO3)	MISC	298.5	51.5	104	147.0	300.5	72.5	273	225	159	157
BICARBONATE (mg CaCO3/L)	MISC	298.5	51.5	104	147.0	300.5	72.5	273	225	159	157
BOD	MISC	8.15	103.8	135	11.7	8.15	70.9	25.6	12.8	16	15
CHLORIDE (mg Cl/L)	MISC	434.2	402.0	193	229.3	450.8	377.6	86.9	129	196	189
HARDNESS (mg/L CaCO3)	MISC	251.3	406.5	274	445.7	440.9	406.5	358	340	291	290
OIL & GREASE	MISC			4.4				0.6		1.2	1
PHOSPHATE	MISC			0.315				0.3			
SULFATE	MISC	147.5	117.5	141	72.5	145.0	132.5	88.8	155	133	125
SULFIDE	MISC										
SP.CONDUCTANCE (µmho/cm)	MISC	1232.0	1804	NA	1034	2222	1914	570	633	1200	1200

All results are reported in mg/L (ppm) unless otherwise stated.

NA - Not Available

**LOCKPORT CITY LANDFILL
SEWER SAMPLES
PHASE II**

SAMPLE-ID		MH-1	MH-2
COLLECTION DATE		3/26/91	3/26/91
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT	DOWNGRADIENT
PARAMETER	TYPE		
CHLOROMETHANE	VOC	25	14
BROMOMETHANE	VOC		
VINYL CHLORIDE	VOC		
CHLOROETHANE	VOC		
METHYLENE CHLORIDE	VOC		
ACETONE	VOC		
CARBON DISULFIDE	VOC		
1,1-DICHLOROETHENE	VOC		
1,1-DICHLOROETHANE	VOC		
1,2-DICHLOROETHENE (TOTAL)	VOC		
CHLOROFORM	VOC		
1,2-DICHLOROETHANE	VOC		
2-BUTANONE	VOC		
1,1,1-TRICHLOROETHANE	VOC		
CARBON TETRACHLORIDE	VOC	12	35
VINYL ACETATE	VOC		
BROMODICHLOROMETHANE	VOC		
1,2-DICHLOROPROPANE	VOC		
CIS-1,3-DICHLOROPROPENE	VOC		
TRICHLOROETHENE	VOC		
DIBROMOCHLOROMETHANE	VOC		
1,1,2-TRICHLOROETHANE	VOC		
BENZENE	VOC		
TRANS-1,3-DICHLOROPROPENE	VOC		
BROMOFORM	VOC		
4-METHYL-2-PENTANONE	VOC		
2-HEXANONE	VOC		
TETRACHLOROETHENE	VOC		
1,1,2,2-TETRACHLOROETHANE	VOC		
TOLUENE	VOC		
CHLOROBENZENE	VOC		
ETHYLBENZENE	VOC		
STYRENE	VOC		
TOTAL XYLENES	VOC		

All results reported in µg/L (ppb).

**LOCKPORT CITY LANDFILL
SEWER SAMPLES
PHASE II**

SAMPLE-ID		MH-1	MH-2
COLLECTION DATE		3/26/91	3/26/91
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT	DOWNGRADIENT
PARAMETER	TYPE		
PHENOL	SEMI		
BIS(2-CHLOROETHYL) ETHER	SEMI		
2-CHLOROPHENOL	SEMI		
1,3-DICHLOROBENZENE	SEMI		
1,4-DICHLOROBENZENE	SEMI		
BENZYL ALCOHOL	SEMI		
1,2-DICHLOROBENZENE	SEMI		
2-METHYLPHENOL	SEMI		
BIS(2-CHLOROISOPROPYL) ETHER	SEMI		
4-METHYLPHENOL	SEMI		
N-NITROSO-DI-N-PROPYLAMINE	SEMI		
HEXACHLOROETHANE	SEMI		
NITROBENZENE	SEMI		
ISOPHORONE	SEMI		
2-NITROPHENOL	SEMI		
2,4-DIMETHYLPHENOL	SEMI		
BENZOIC ACID	SEMI		
BIS(2-CHLOROETHOXY)METHANE	SEMI		
2,4-DICHLOROPHENOL	SEMI		
1,2,4-TRICHLOROBENZENE	SEMI		
NAPHTHALENE	SEMI		
4-CHLOROANILINE	SEMI		
HEXACHLOROBUTADIENE	SEMI		
4-CHLORO-3-METHYLPHENOL	SEMI		
2-METHYLNAPHTHALENE	SEMI		
HEXACHLOROCYCLOPENTADIENE	SEMI		
2,4,6-TRICHLOROPHENOL	SEMI		
2,4,5-TRICHLOROPHENOL	SEMI		
2-CHLORONAPHTHALENE	SEMI		
2-NITROANILINE	SEMI		
DIMETHYLPHTHALATE	SEMI		
ACENAPHTHYLENE	SEMI		
2,6-DINITROTOLUENE	SEMI		
3-NITROANILINE	SEMI		

All results reported in $\mu\text{g/L}$ (ppb).

J - Indicates the results is less than the sample quantitation limit but greater than zero.

**LOCKPORT CITY LANDFILL
SEWER SAMPLES
PHASE II**

SAMPLE-ID		MH-1	MH-2
COLLECTION DATE		3/26/91	3/26/91
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT	DOWNGRADIENT
PARAMETER	TYPE		
ACENAPHTHENE	SEMI		
2,4-DINITROPHENOL	SEMI		
4-NITROPHENOL	SEMI		
DIBENZOFURAN	SEMI		
2,4-DINITROTOLUENE	SEMI		
DIETHYLPHTHALATE	SEMI	1 J	1 J
4-CHLOROPHENYL-PHENYL ETHER	SEMI		
FLUORENE	SEMI		
4-NITROANILINE	SEMI		
4,6-DINITRO-2-METHYLPHENOL	SEMI		
N-NITROSODIPHENYLAMINE	SEMI		
4-BROMOPHENYL-PHENYL ETHER	SEMI		
HEXACHLOROBENZENE	SEMI		
PENTACHLOROPHENOL	SEMI		
PHENANTHRENE	SEMI		
ANTHRACENE	SEMI		
DI-N-BUTYLPHTHALATE	SEMI	2 J	
FLUORANTHENE	SEMI		
PYRENE	SEMI		
BUTYLBENZYLPHTHALATE	SEMI		2 J
3,3'-DICHLOROBENZIDINE	SEMI	3 J	
BENZO(A)ANTHRACENE	SEMI		
CHRYSENE	SEMI		
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI		26 B
DI-N-OCTYL PHTHALATE	SEMI	45 B	
BENZO(B)FLUORANTHENE	SEMI		
BENZO(K)FLUORANTHENE	SEMI		
BENZO(A)PYRENE	SEMI		
INDENO(1,2,3-CD)PYRENE	SEMI		
DIBENZ(A,H)ANTHRACENE	SEMI		
BENZO(G,H,I)PERYLENE	SEMI		

All results reported in $\mu\text{g/L}$ (ppb).

J - Indicates the results is less than the sample quantitation limit but greater than zero.

B - Analyte is detected in associated method blank.

LOCKPORT CITY LANDFILL
SEWER SAMPLES
PHASE II

SAMPLE-ID		MH-1	MH-2
COLLECTION DATE		3/26/91	3/26/91
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT	DOWNGRADIENT
PARAMETER	TYPE		
ALPHA-BHC	PST		
BETA-BHC	PST		
DELTA-BHC	PST		
GAMMA-BHC (LINDANE)	PST		
HEPTACHLOR	PST		
ALDRIN	PST		
HEPTACHLOR EPOXIDE	PST		
ENDOSULFAN I	PST		
DELDRIN	PST		
4,4'-DDE	PST		
ENDRIN	PST		
ENDOSULFAN II	PST		
4,4'-DDD	PST		
ENDOSULFAN SULFATE	PST		
4,4'-DDT	PST		
METHOXYCHLOR	PST		
ENDRIN KETONE	PST		
ALPHA-CHLORDANE	PST		
GAMMA-CHLORDANE	PST		
TOXAPHENE	PST		
AROCOLOR-1016	PCB		
AROCOLOR-1221	PCB		
AROCOLOR-1232	PCB		
AROCOLOR-1242	PCB		
AROCOLOR-1248	PCB		
AROCOLOR-1254	PCB		
AROCOLOR-1260	PCB		

All results reported in $\mu\text{g/L}$ (ppb).

**LOCKPORT CITY LANDFILL
SEWER SAMPLES
PHASE II**

SAMPLE-ID		MH-1	MH-2
COLLECTION DATE		3/26/91	3/26/91
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT	DOWNGRADIENT
PARAMETER	TYPE		
ALUMINUM	MCP	210	221
ANTIMONY	MCP		
ARSENIC	MCP	1.3 B	1.1
BARIUM	MCP	43.4 B	46.7
BERYLLIUM	MCP		
CADMIUM	MCP		
CALCIUM	MCP	56100	64000
CHROMIUM	MCP		
COBALT	MCP		
COPPER	MCP	29.5	30.2
IRON	MCP	487	700
LEAD	MCP	9.9	10
MAGNESIUM	MCP	14600	17600
MANGANESE	MCP	57.6	80.8
MERCURY	MCP		
NICKEL	MCP		
POTASSIUM	MCP	12100	7750
SELENIUM	MCP	1.4 B	1.0 B
SILVER	MCP		
SODIUM	MCP	97500	133000
THALLIUM	MCP		
VANADIUM	MCP		
ZINC	MCP	93	83.1
CYANIDE	MCP		
PHENOLS (mg/L)	MISC	0.078	0.028

All results reported in $\mu\text{g/L}$ (ppb) unless otherwise specified.
 * Concentrations in these columns are reported in mg/kg (ppm).
 B - Analyte is detected in associated method blank.

**LOCKPORT CITY LANDFILL
SEWER SAMPLES
PHASE II**

SAMPLE-ID		MH-1	MH-2
COLLECTION DATE		3/26/91	3/26/91
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT	DOWNGRADIENT
PARAMETER	TYPE		
CHEMICAL OXYGEN DEMAND (mg O ₂ /L)	MISC		
TOTAL DISSOLVED SOLIDS (mg/L)	MISC		
TOTAL SUSPENDED SOLIDS (mg/L)	MISC		
AMMONIA, AS N (mg/L)	MISC		
NITRITE-NITROGEN (mg/L)	MISC		
TOTAL KJELDAHL NITROGEN, AS N (mg/L)	MISC		
pH UNITS	MISC		
TOTAL ORGANIC CARBON (mg/L)	MISC		
ACIDITY (mg CaCO ₃ /L)	MISC		
ALKALINITY (mg/L CaCO ₃)	MISC		
BICARBONATE (mg CaCO ₃ /L)	MISC		
BIOLOGICAL OXYGEN DEMAND (mg/L)	MISC		
CHLORIDE (mg Cl/L)	MISC		
HARDNESS (mg/L CaCO ₃)	MISC		
OIL & GREASE (mg/L)	MISC		
PHOSPHATE (mg/L)	MISC		
SULFATE (mg/L)	MISC		
SULFIDE (mg/L)	MISC		
SP CONDUCTANCE (μmho\CM)	MISC		

LOCKPORT CITY LANDFILL: SEEPS

Analytical Results

PHASE I AND II

SAMPLE-ID		L-1	LL-1	L-2	LL-2
LOCATION		TOP OF SLOPE		BOTTOM OF SLOPE	
COLLECTION DATE		12/4/89	3/19/91	12/4/89	3/19/91
PARAMETER	TYPE				
CHLOROMETHANE	VOC				
BROMOMETHANE	VOC				
VINYL CHLORIDE	VOC				47
CHLOROETHANE	VOC				
METHYLENE CHLORIDE	VOC				
ACETONE	VOC				
CARBON DISULFIDE	VOC				
1,1-DICHLOROETHENE	VOC				
1,1-DICHLOROETHANE	VOC				
1,2-DICHLOROETHENE (TOTAL)	VOC				
CHLOROFORM	VOC				140
1,2-DICHLOROETHANE	VOC				
2-BUTANONE	VOC				
1,1,1-TRICHLOROETHANE	VOC				
CARBON TETRACHLORIDE	VOC				
VINYL ACETATE	VOC				
BROMODICHLOROMETHANE	VOC				
1,2-DICHLOROPROPANE	VOC				
CIS-1,3-DICHLOROPROPENE	VOC				
TRICHLOROETHENE	VOC				
DIBROMOCHLOROMETHANE	VOC				
1,1,2-TRICHLOROETHANE	VOC				
BENZENE	VOC				
TRANS-1,3-DICHLOROPROPENE	VOC				
BROMOFORM	VOC				
4-METHYL-2-PENTANONE	VOC				
2-HEXANONE	VOC				
TETRACHLOROETHENE	VOC				
1,1,2,2-TETRACHLOROETHANE	VOC				
TOLUENE	VOC				
CHLOROBENZENE	VOC				
ETHYLBENZENE	VOC				
STYRENE	VOC				
TOTAL XYLENES	VOC				

All results are reported in µg/L (ppb).

Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.

B - Analyte is detected in associated method blank.

E - Compound concentration exceeded the calibration range for that specific analysis.

R - Analyte rejected due to blank contamination (See Appendix O).

LOCKPORT CITY LANDFILL: SEEPS

Analytical Results

PHASE I AND II

SAMPLE-ID		L-1	LL-1	L-2	LL-2
LOCATION		TOP OF SLOPE		BOTTOM OF SLOPE	
COLLECTION DATE		12/4/89	3/19/91	12/4/89	3/19/91
PARAMETER	TYPE				
PHENOL	SEMI				
BIS(2-CHLOROETHYL) ETHER	SEMI				
2-CHLOROPHENOL	SEMI				
1,3-DICHLOROBENZENE	SEMI				
1,4-DICHLOROBENZENE	SEMI				
BENZYL ALCOHOL	SEMI				
1,2-DICHLOROBENZENE	SEMI				
2-METHYLPHENOL	SEMI				
BIS(2-CHLOROISOPROPYL) ETHER	SEMI				
4-METHYLPHENOL	SEMI				
N-NITROSO-DI-N-PROPYLAMINE	SEMI				
HEXACHLOROETHANE	SEMI				
NITROBENZENE	SEMI				
ISOPHORONE	SEMI				
2-NITROPHENOL	SEMI				
2,4-DIMETHYLPHENOL	SEMI				
BENZOIC ACID	SEMI				4 J
BIS(2-CHLOROETHOXY)METHANE	SEMI				
2,4-DICHLOROPHENOL	SEMI				
1,2,4-TRICHLOROBENZENE	SEMI				
NAPHTHALENE	SEMI				
4-CHLOROANILINE	SEMI				
HEXACHLOROBUTADIENE	SEMI				
4-CHLORO-3-METHYLPHENOL	SEMI				0.5 J
2-METHYLNAPHTHALENE	SEMI				
HEXACHLOROCYCLOPENTADIENE	SEMI				
2,4,6-TRICHLOROPHENOL	SEMI				
2,4,5-TRICHLOROPHENOL	SEMI				
2-CHLORONAPHTHALENE	SEMI				
2-NITROANILINE	SEMI				
DIMETHYLPHTHALATE	SEMI				
ACENAPHTHYLENE	SEMI				
2,6-DINITROTOLUENE	SEMI				
3-NITROANILINE	SEMI				
ACENAPHTHENE	SEMI				2 J
2,4-DINITROPHENOL	SEMI				
4-NITROPHENOL	SEMI				

All results are reported in $\mu\text{g/L}$ (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.

LOCKPORT CITY LANDFILL: SEEPS

Analytical Results

PHASE I AND II

SAMPLE-ID		L-1	LL-1	L-2	LL-2
LOCATION		TOP OF SLOPE		BOTTOM OF SLOPE	
COLLECTION DATE		12/4/89	3/19/91	12/4/89	3/19/91
PARAMETER	TYPE				
DIBENZOFURAN	SEMI				
2,4-DINITROTOLUENE	SEMI				1 J
DIETHYLPHTHALATE	SEMI				
4-CHLOROPHENYL-PHENYL ETHER	SEMI				1 J
FLUORENE	SEMI				
4-NITROANILINE	SEMI				
4,6-DINITRO-2-METHYLPHENOL	SEMI				
N-NITROSODIPHENYLAMINE	SEMI				
4-BROMOPHENYL-PHENYL ETHER	SEMI				
HEXACHLOROBENZENE	SEMI				
PENTACHLOROPHENOL	SEMI				
PHENANTHRENE	SEMI				1 J
ANTHRACENE	SEMI				
DI-N-BUTYLPHTHALATE	SEMI				
FLUORANTHENE	SEMI		0.5 J		0.5 JB
PYRENE	SEMI		0.4 J		
BUTYLBENZYLPHTHALATE	SEMI				
3,3'-DICHLOROBENZIDINE	SEMI				
BENZO(A)ANTHRACENE	SEMI				
CHRYSENE	SEMI				
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	R	R	R	R
DI-N-OCTYL PHTHALATE	SEMI				
BENZO(B)FLUORANTHENE	SEMI				
BENZO(K)FLUORANTHENE	SEMI				
BENZO(A)PYRENE	SEMI				
INDENO(1,2,3-CD)PYRENE	SEMI				
DIBENZ(A,H)ANTHRACENE	SEMI				
BENZO(G,H,I)PERYLENE	SEMI				

All results are reported in $\mu\text{g/L}$ (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.
R - Analyte rejected due to blank contamination (See Appendix O).
B - Analyte is detected in associated method blank.

LOCKPORT CITY LANDFILL: SEEPS

Analytical Results

PHASE I AND II

SAMPLE-ID		L-1	LL-1	L-2	LL-2
LOCATION		TOP OF SLOPE		BOTTOM OF SLOPE	
COLLECTION DATE		12/4/89	3/19/91	12/4/89	3/19/91
PARAMETER	TYPE				
ALPHA-BHC	PST				
BETA-BHC	PST				
DELTA-BHC	PST				
GAMMA-BHC (LINDANE)	PST				
HEPTACHLOR	PST				
ALDRIN	PST				
HEPTACHLOR EPOXIDE	PST				
ENDOSULFAN I	PST				
DIELDRIN	PST				
4,4'-DDE	PST				
ENDRIN	PST				
ENDOSULFAN II	PST				
4,4'-DDD	PST				
ENDOSULFAN SULFATE	PST				
4,4'-DDT	PST				
METHOXYCHLOR	PST				
ENDRIN KETONE	PST				
ALPHA-CHLORDANE	PST				
GAMMA-CHLORDANE	PST				
TOXAPHENE	PST				
AROCOR-1016	PCB				
AROCOR-1221	PCB				
AROCOR-1232	PCB				
AROCOR-1242	PCB				
AROCOR-1248	PCB				
AROCOR-1254	PCB				
AROCOR-1260	PCB				

All results are reported in $\mu\text{g/L}$ (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.

LOCKPORT CITY LANDFILL: SEEPS

Analytical Results

PHASE I AND II

SAMPLE-ID		L-1	LL-1	L-2	LL-2
LOCATION		TOP OF SLOPE		BOTTOM OF SLOPE	
COLLECTION DATE		12/4/89	3/19/91	12/4/89	3/19/91
PARAMETER	TYPE				
ALUMINUM	MCP	600	490		506
ANTIMONY	MCP				29.1 B
ARSENIC	MCP		1.3 BW		1.9 B
BARIUM	MCP	205	148 B	857	771
BERYLLIUM	MCP				
CADMIUM	MCP				2.2 B
CALCIUM	MCP	156000	117000	129000	127000
CHROMIUM	MCP				10.4
COBALT	MCP				
COPPER	MCP	32.7*		26.1*	
IRON	MCP	15600	1380	39100	41500
LEAD	MCP	1.6 NWB	5.2		21.5
MAGNESIUM	MCP	33200	23700	46000	42100
MANGANESE	MCP	1640 N*	591	283 N*	303
MERCURY	MCP	1.4 N		0.39 N	
NICKEL	MCP				
POTASSIUM	MCP	10100	7910	80000	18700
SELENIUM	MCP		1.2 B		
SILVER	MCP	13.6 N*			
SODIUM	MCP	193000	363000	99200	83000
THALLIUM	MCP				
VANADIUM	MCP				
ZINC	MCP	38.3	38.4	14.9 B	2.6 B
CYANIDE	MCP				10 B
PHENOLS	MCP			92	40.2
					0.006

All results are reported in µg/L (ppb) unless otherwise specified.
Only detected results are reported.

W - Post-digestion spike analysis is out of control limits.
B - Less than quantitation limit but greater than or equal to instrument detection limit.
E - Estimated value due to interference.
* - Duplicate analysis not within control limits.
N - Spike sample % recovery not within control limits.

LOCKPORT CITY LANDFILL: SEEPS

Analytical Results

PHASE I AND II

SAMPLE-ID		L-1	LL-1	L-2	LL-2
LOCATION		TOP OF SLOPE		BOTTOM OF SLOPE	
COLLECTION DATE		12/4/89	3/19/91	12/4/89	3/19/91
PARAMETER	TYPE				
CHEMICAL OXYGEN DEMAND (mg O2/L)	MISC	60.7	43.2	34.2	46.2
TOTAL DISSOLVED SOLIDS	MISC	1275	1450	920	759
TOTAL SUSPENDED SOLIDS	MISC	114	20	84	96
AMMONIA, AS N	MISC	1.8	0.59	9.8	16.5
NITRATE-NITROGEN	MISC	7.45	0.26		5.23
TOTAL KJELDAHL NITROGEN, AS N	MISC	9.8	1.58	44.2	22.1
pH UNITS	MISC	6.7		6.45	
TOTAL ORGANIC CARBON	MISC	31.17	10.9	2.66	11.5
ACIDITY (mg CaCO3/L)	MISC		84.5		192
ALKALINITY (mg/L CaCO3)	MISC	355.5	302	574.5	585
BICARBONATE (mg CaCO3/L)	MISC	355.5	302	574.5	585
BOD	MISC	18.95	5	12.5	4
CHLORIDE (mg Cl/L)	MISC	400.2	694	217.1	178
HARDNESS (mg/L CaCO3)	MISC	526.4	360	513.4	455
OIL & GREASE	MISC				4.4
PHOSPHATE	MISC	4.25		0.50	0.469
SULFATE	MISC	82.0	93	3.5	141
SULFIDE	MISC				
SP.CONDUCTANCE (µmho/cm)	MISC	1968		1738	

All results are reported in mg/L (ppm) unless otherwise stated.

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID WELL SCREEN LOCATION RELATIVE HORIZONTAL GRADIENT	COLLECTION DATE	MW-1S		MW-1S-RE		MW-II		IRONDEQUOIT FRM		MW-2S		MW-2I	
		OVERBURDEN	UPGRADIENT	OVERBURDEN	UPGRADIENT	ROCHESTER FRM	UPGRADIENT	UPGRADIENT	UPGRADIENT	OVERBURDEN	DOWNGRADIENT	DOWNGRADIENT	DOWNGRADIENT
PARAMETER	TYPE	3/22/90	4/2/91	3/22/90	3/22/90	3/22/90	4/2/91	3/23/90	7/11/91	3/19/90	3/28/91	3/19/90	3/28/91
CHLOROMETHANE	VOC			NA									
BROMOMETHANE	VOC			NA									
VINYL CHLORIDE	VOC			NA									
CHLOROETHANE	VOC			NA									
METHYLENE CHLORIDE	VOC			NA									
ACETONE	VOC			NA									
CARBON DISULFIDE	VOC			NA									
1,1-DICHLOROETHENE	VOC			NA									
1,1-DICHLOROETHANE	VOC			NA									
1,2-DICHLOROETHENE (TOTAL)	VOC			NA									
CHLOROFORM	VOC			NA									
1,2-DICHLOROETHANE	VOC			NA									
2-BUTANONE	VOC			NA									
1,1,1-TRICHLOROETHANE	VOC			NA									
CARBON TETRACHLORIDE	VOC			NA									
VINYL ACETATE	VOC			NA									
BROMODICHLOROMETHANE	VOC			NA									
1,2-DICHLOROPROPANE	VOC			NA									
CIS-1,3-DICHLOROPROPENE	VOC			NA									
TRICHLOROETHENE	VOC			NA									
DIBROMOCHLOROMETHANE	VOC			NA									
1,1,2-TRICHLOROETHANE	VOC			NA									
BENZENE	VOC			NA									
TRANS-1,3-DICHLOROPROPENE	VOC			NA									
BROMOFORM	VOC			NA									
4-METHYL-2-PENTANONE	VOC			NA									
2-HEXANONE	VOC			NA									
TETRACHLOROETHENE	VOC			NA									
1,1,2,2-TETRACHLOROETHANE	VOC			NA									
TOLUENE	VOC			NA									
CHLOROBENZENE	VOC			NA									
ETHYLBENZENE	VOC			NA									
STYRENE	VOC			NA									
TOTAL XYLENES	VOC			NA									

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R - Analyte rejected due to blank contamination (See Appendix O).
NA - Not Analyzed

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-1S		MW-1S-RE		MW-1I		MW-1D		MW-2S		MW-2I	
WELL SCREEN LOCATION		OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
COLLECTION DATE		3/22/90		3/22/90		3/22/90		3/23/90		3/19/90		3/28/91	
PARAMETER	TYPE												
CHLOROMETHANE	VOC			NA									
BROMOMETHANE	VOC			NA									
VINYL CHLORIDE	VOC			NA									
CHLOROETHANE	VOC			NA									
METHYLENE CHLORIDE	VOC			NA									
ACETONE	VOC			NA		R		R				R	
CARBON DISULFIDE	VOC	R		NA		R		0.9 J					
1,1-DICHLOROETHENE	VOC			NA									
1,1-DICHLOROETHANE	VOC			NA									
1,2-DICHLOROETHENE (TOTAL)	VOC			NA									
CHLOROFORM	VOC			NA								1 J	
1,2-DICHLOROETHANE	VOC			NA									
2-BUTANONE	VOC			NA									
1,1,1-TRICHLOROETHANE	VOC			NA									
CARBON TETRACHLORIDE	VOC			NA									
VINYL ACETATE	VOC			NA									
BROMODICHLOROMETHANE	VOC			NA									
1,2-DICHLOROPROPANE	VOC			NA									
CIS-1,3-DICHLOROPROPENE	VOC			NA									
TRICHLOROETHENE	VOC			NA									
DIBROMOCHLOROMETHANE	VOC			NA									
1,1,2-TRICHLOROETHANE	VOC			NA									
BENZENE	VOC			NA				R					
TRANS-1,3-DICHLOROPROPENE	VOC			NA									
BROMOFORM	VOC			NA									
4-METHYL-2-PENTANONE	VOC			NA									
2-HEXANONE	VOC			NA									
TETRACHLOROETHENE	VOC			NA									
1,1,2,2-TETRACHLOROETHANE	VOC			NA									
TOLUENE	VOC			NA		R						4 J	
CHLOROBENZENE	VOC			NA								4 J	
ETHYLBENZENE	VOC			NA									
STYRENE	VOC			NA									
TOTAL XYLENES	VOC			NA				3 J					

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LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-1S		MW-1S-RE		MW-1I		MW-1D		MW-2S		MW-2I	
WELL SCREEN LOCATION		OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
COLLECTION DATE		3/22/90	4/2/91	3/22/90	4/2/91	3/22/90	4/2/91	3/23/90	7/11/91	3/19/90	3/28/91	3/19/90	3/28/91
PARAMETER	TYPE												
PHENOL	SEMI	X											
BIS(2-CHLOROETHYL) ETHER	SEMI	X		X									
2-CHLOROPHENOL	SEMI	X		X									
1,3-DICHLOROBENZENE	SEMI	X		X									
1,4-DICHLOROBENZENE	SEMI	X		X									
BENZYL ALCOHOL	SEMI	X		X									
1,2-DICHLOROBENZENE	SEMI	X		X									
2-METHYLPHENOL	SEMI	X		X									
BIS(2-CHLOROISOPROPYL) ETHER	SEMI	X		X									
4-METHYLPHENOL	SEMI	X		X				1 J					
N-NITROSO-DI-N-PROPYLAMINE	SEMI	X		X									
HEXACHLOROETHANE	SEMI	X		X									
NITROBENZENE	SEMI	X		X									
ISOPHORONE	SEMI	X		X									
2-NITROPHENOL	SEMI	X		X									
2,4-DIMETHYLPHENOL	SEMI	X		X									
BENZOIC ACID	SEMI	X		X				5 J					
BIS(2-CHLOROETHOXY)METHANE	SEMI	X		X									
2,4-DICHLOROPHENOL	SEMI	X		X									
1,2,4-TRICHLOROBENZENE	SEMI	X		X									
NAPHTHALENE	SEMI	X		X									
4-CHLOROANILINE	SEMI	X		X									
HEXACHLOROBUTADIENE	SEMI	X		X									
4-CHLORO-3-METHYLPHENOL	SEMI	X		X									
2-METHYLNAPHTHALENE	SEMI	X		X									
HEXACHLOROCYCLOPENTADIENE	SEMI	X		X				0.6 J					
2,4,6-TRICHLOROPHENOL	SEMI	X		X									
2,4,5-TRICHLOROPHENOL	SEMI	X		X									
2-CHLORONAPHTHALENE	SEMI	X		X									
2-NITROANILINE	SEMI	X		X									
DIMETHYLPHTHALATE	SEMI	X		X									
ACENAPHTHYLENE	SEMI	X		X									
2,6-DINITROTOLUENE	SEMI	X		X									
3-NITROANILINE	SEMI	X		X									

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LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-1S		MW-1S-RE		MW-II		MW-1D		MW-2S		MW-2I	
WELL SCREEN LOCATION		OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
COLLECTION DATE		3/22/90		3/22/90		3/22/90		3/23/90		3/19/90		3/19/90	
PARAMETER	TYPE												
PHENOL	SEMI	X		X									
BIS(2-CHLOROETHYL) ETHER	SEMI	X		X									
2-CHLOROPHENOL	SEMI	X		X									
1,3-DICHLOROBENZENE	SEMI	X		X									
1,4-DICHLOROBENZENE	SEMI	X		X									
BENZYL ALCOHOL	SEMI	X		X									
1,2-DICHLOROBENZENE	SEMI	X		X									
2-METHYLPHENOL	SEMI	X		X									
BIS(2-CHLOROISOPROPYL) ETHER	SEMI	X		X									
4-METHYLPHENOL	SEMI	X		X									
N-NITROSO-DI-N-PROPYLAMINE	SEMI	X		X									
HEXACHLOROETHANE	SEMI	X		X									
NITROBENZENE	SEMI	X		X									
ISOPHORONE	SEMI	X		X									
2-NITROPHENOL	SEMI	X		X									
2,4-DIMETHYLPHENOL	SEMI	X		X									
BENZOIC ACID	SEMI	X		X									
BIS(2-CHLOROETHOXY)METHANE	SEMI	X		X									
2,4-DICHLOROPHENOL	SEMI	X		X									
1,2,4-TRICHLOROBENZENE	SEMI	X		X									
NAPHTHALENE	SEMI	X		X									
4-CHLOROANILINE	SEMI	X		X									
HEXACHLORO BUTADIENE	SEMI	X		X									
4-CHLORO-3-METHYLPHENOL	SEMI	X		X									
2-METHYLNAPHTHALENE	SEMI	X		X									
HEXACHLOROCYCLOPENTADIENE	SEMI	X		X									
2,4,6-TRICHLOROPHENOL	SEMI	X		X									
2,4,5-TRICHLOROPHENOL	SEMI	X		X									
2-CHLORONAPHTHALENE	SEMI	X		X									
2-NITROANILINE	SEMI	X		X									
DIMETHYLPHTHALATE	SEMI	X		X									
ACENAPHTHYLENE	SEMI	X		X									
2,6-DINITROTOLUENE	SEMI	X		X									
3-NITROANILINE	SEMI	X		X									

1 J

5 J

0.6 J

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LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-1S		MW-1S-RE		MW-1I		MW-1D		MW-2S		MW-2I	
WELL SCREEN LOCATION		OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
COLLECTION DATE		3/22/90		3/22/90		3/22/90		3/23/90		3/19/90		3/19/90	
PARAMETER	TYPE												
ACENAPHTHENE	SEMI	X		X						0.4 J			
2,4-DINITROPHENOL	SEMI	X		X									
4-NITROPHENOL	SEMI	X		X									
DIBENZOFURAN	SEMI	X		X									
2,4-DINITROTOLUENE	SEMI	X		X									
DIETHYLPHTHALATE	SEMI	X		X									
4-CHLOROPHENYL-PHENYL ETHER	SEMI	X		X		0.6 J				R		R	
FLUORENE	SEMI	X		X									
4-NITROANILINE	SEMI	X		X									
4,6-DINITRO-2-METHYLPHENOL	SEMI	X		X									
N-NITROSODIPHENYLAMINE	SEMI	X		X									
4-BROMOPHENYL-PHENYL ETHER	SEMI	X		X									
HEXACHLOROBENZENE	SEMI	X		X									
PENTACHLOROPHENOL	SEMI	X		X				0.8 J					
PHENANTHRENE	SEMI	X		X				0.6 J					
ANTHRACENE	SEMI	X		X				2 J					
DI-N-BUTYLPHTHALATE	SEMI	X		X				2 J					
FLUORANTHENE	SEMI	X		X				1 J					
PYRENE	SEMI	X		X				2 J					
BUTYLBENZYLPHTHALATE	SEMI	X		X				2 J					
3,3'-DICHLOROBENZIDINE	SEMI	X		X				1 J					
BENZO(A)ANTHRACENE	SEMI	X		X				2 J					
CHRYSENE	SEMI	X		X				2 J					
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	X		X				1 J					
DI-N-OCTYL PHTHALATE	SEMI	X		X		R		R					
BENZO(B)FLUORANTHENE	SEMI	X		X				R					
BENZO(K)FLUORANTHENE	SEMI	X		X				1 J					
BENZO(A)PYRENE	SEMI	X		X				2 J					
INDENO(1,2,3-CD)PYRENE	SEMI	X		X									
DIBENZO(A,H)ANTHRACENE	SEMI	X		X				1 J					
BENZO(G,H,I)PERYLENE	SEMI	X		X				1 J					

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LOCKPORT CITY LANDFILL

SAMPLE-ID		MW-1S		MW-1S-RE		MW-II		MW-1D		MW-2S		MW-2I	
WELL SCREEN LOCATION		OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
COLLECTION DATE		3/22/90	4/2/91	3/22/90	3/22/90	3/22/90	4/2/91	3/23/90	3/19/90	3/28/91	3/19/90	3/28/91	
PARAMETER	TYPE												
ACENAPHTHENE	SEMI	X			X				0.4 J				
2,4-DINITROPHENOL	SEMI	X			X								
4-NITROPHENOL	SEMI	X			X								
DIBENZOFURAN	SEMI	X			X								
2,4-DINITROTOLUENE	SEMI	X			X								
DIETHYLPHTHALATE	SEMI	X			X								
4-CHLOROPHENYL-PHENYL ETHER	SEMI	X			X		0.6 J						
FLUORENE	SEMI	X			X								
4-NITROANILINE	SEMI	X			X								
4,6-DINITRO-2-METHYLPHENOL	SEMI	X			X								
N-NITROSODIPHENYLAMINE	SEMI	X			X								
4-BROMOPHENYL-PHENYL ETHER	SEMI	X			X								
HEXACHLOROBENZENE	SEMI	X			X								
PENTACHLOROPHENOL	SEMI	X			X								
PHENANTHRENE	SEMI	X			X								
ANTHRACENE	SEMI	X			X			0.8 J					
DI-N-BUTYLPHTHALATE	SEMI	X			X			0.6 J					
FLUORANTHENE	SEMI	X			X			2 J					
PYRENE	SEMI	X			X			1 J					
BUTYLBENZYLPHTHALATE	SEMI	X			X			2 J					
3,3'-DICHLOROBENZIDINE	SEMI	X			X			2 J					
BENZO(A)ANTHRACENE	SEMI	X			X			2 J					
CHRYSENE	SEMI	X			X								
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	X			X			2 J					
DI-N-OCTYL PHTHALATE	SEMI	X	R		X		R	1 J					
BENZO(B)FLUORANTHENE	SEMI	X			X			R					
BENZO(K)FLUORANTHENE	SEMI	X			X			R					
BENZO(A)PYRENE	SEMI	X			X			1 J					
INDENO(1,2,3-CD)PYRENE	SEMI	X			X			2 J					
DIBENZ(A,H)ANTHRACENE	SEMI	X			X								
BENZO(G,H,I)PERYLENE	SEMI	X			X								
	SEMI	X			X								

All results reported in $\mu\text{g/L}$ (ppb).
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LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-1S		MW-1S-RE		MW-1I		MW-1D		MW-2S		MW-2I	
WELL SCREEN LOCATION		OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
COLLECTION DATE		3/22/90		3/22/90		3/22/90		3/23/90		3/19/90		3/19/90	
PARAMETER	TYPE												
ALPHA-BHC	PST												
BETA-BHC	PST												
DELTA-BHC	PST												
GAMMA-BHC (LINDANE)	PST												
HEPTACHLOR	PST												
ALDRIN	PST												
HEPTACHLOR EPOXIDE	PST												
ENDOSULFAN I	PST												
DIELDRIN	PST												
4,4'-DDE	PST												
ENDRIN	PST												
ENDOSULFAN II	PST												
4,4'-DDD	PST												
ENDOSULFAN SULFATE	PST												
4,4'-DDT	PST												
METHOXYCHLOR	PST												
ENDRIN KETONE	PST												
ALPHA-CHLORDANE	PST												
GAMMA-CHLORDANE	PST												
TOXAPHENE	PST												
AROCOLOR-1016	PCB												
AROCOLOR-1221	PCB												
AROCOLOR-1232	PCB												
AROCOLOR-1242	PCB												
AROCOLOR-1248	PCB												
AROCOLOR-1254	PCB												
AROCOLOR-1260	PCB												

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Only detected results are reported.

NA - Not Analyzed

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-1S		MW-1S-RE		MW-1I		MW-1D		MW-2S		MW-2I	
WELL SCREEN LOCATION		OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
COLLECTION DATE		3/22/90		3/22/90		3/22/90		3/23/90		3/19/90		3/19/90	
PARAMETER	TYPE												
ALPHA-BHC	PST												
BETA-BHC	PST												
DELTA-BHC	PST												
GAMMA-BHC (LINDANE)	PST												
HEPTACHLOR	PST												
ALDRIN	PST												
HEPTACHLOR EPOXIDE	PST												
ENDOSULFAN I	PST												
DIELDRIN	PST												
4,4'-DDE	PST												
ENDRIN	PST												
ENDOSULFAN II	PST												
4,4'-DDD	PST												
ENDOSULFAN SULFATE	PST												
4,4'-DDT	PST												
METHOXYCHLOR	PST												
ENDRIN KETONE	PST												
ALPHA-CHLORDANE	PST												
GAMMA-CHLORDANE	PST												
TOXAPHENE	PST												
AROCOLOR-1016	PCB												
AROCOLOR-1221	PCB												
AROCOLOR-1232	PCB												
AROCOLOR-1242	PCB												
AROCOLOR-1248	PCB												
AROCOLOR-1254	PCB												
AROCOLOR-1260	PCB												

All results reported in $\mu\text{g/L}$ (ppb).
Only detected results are reported.

NA - Not Analyzed

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-1S		MW-1S-RE		MW-1I		MW-1D		MW-2S		MW-2I	
WELL SCREEN LOCATION		OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
COLLECTION DATE		3/22/90	4/2/91	3/22/90	3/22/90	3/22/90	4/2/91	3/23/90	7/11/91	3/19/90	3/28/91	3/19/90	3/28/91
PARAMETER	TYPE												
ALUMINUM	MCP				NA	154 B	229	6180	1010 E	1170	62.6 B	29400	66.4 B
ANTIMONY	MCP				NA								28.6 B
ARSENIC	MCP		2.6 B		NA			15.5	2.6 B	3.6 B,N		53.8 N+	
BARIUM	MCP	161 B,N	145 B		NA	79.6 B,N	87.6 B	195 B,N	61.3 B	85.9 B	74.3 B	57.8 B	54.4 B
BERYLLIUM	MCP				NA								
CADMIUM	MCP				NA								
CALCIUM	MCP	108000	115000		NA	161000	142000	258000	195000	140000	120000	176000	181000
CHROMIUM	MCP	44.20			NA	1560	328	203	212 E	15.4			
COBALT	MCP				NA				36 B				
COPPER	MCP	25.60*			NA	61.3*		36*	24.7 B	42		34	
IRON	MCP	44100	19500		NA	4960	1180	4010	4250	18300 NE	26300	428 NE	443
LEAD	MCP	122	19		NA		1.7 B		10.15	74.6 N,+	28.4		1.8 B
MAGNESIUM	MCP	23100	30700		NA	42400	40400	2750 B	56300	39600	46200	72100	74500
MANGANESE	MCP	2990	2380		NA	104	20.2	59.3	222	2050 N	1600	438 N	583
MERCURY	MCP				NA	0.40		0.20		0.60			
NICKEL	MCP				NA	758	35.4 B	108	114	33.8 B			
POTASSIUM	MCP	2900 B	3080 B		NA	3900 B	2530 B	24600	14800	8300	4810 B	8900	7410
SELENIUM	MCP				NA								
SILVER	MCP				NA					25.5		11	
SODIUM	MCP	51000	38300		NA	78300	76000	505000	272000	189000	189000	142000	144000
THALLIUM	MCP				NA								
VANADIUM	MCP		3.6 B		NA		4.4 B		23.2 B		2.6 B		
ZINC	MCP	16600	1740		NA	101	18.4 B	489	161 E	5220	5650	23.9	36.6
CYANIDE	MCP				NA								
PHENOLS	MCP				NA			0.005	NA		0.007		0.009
CHEMICAL OXYGEN DEMAND (mg O2/L)	MISC	19.22	31.2		NA	4.27		95.27	NA	15.82	31.2	20.3	13.3
TOTAL DISSOLVED SOLIDS (mg/L)	MISC	600	581		NA	1010	1020	6866	NA	1158	1030	1458	1170
TOTAL SUSPENDED SOLIDS (mg/L)	MISC	69	58.8		NA	16	19	216	NA	208	72	10	11

All results reported in µg/L (ppb) unless otherwise specified. Only detected results are reported.

N - Spike sample % recovery out of control limits.

* - Duplicate analysis not within control limits.

E - Estimated value due to interference.

S - Value determined by the method of standard addition (MSA).

+ - Correlation coefficient for MSA is less than 0.995

B - Less than quantitation limit but greater than or equal to instrument detection limit.

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID	WELL SCREEN LOCATION	MW-1S		MW-1S-RE		MW-II		MW-1D		MW-2S		MW-2I	
		OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
		UPGRADIENT	3/22/90	UPGRADIENT	3/22/90	UPGRADIENT	3/22/90	UPGRADIENT	3/23/90	DOWNGRADIENT	3/19/90	DOWNGRADIENT	3/28/91
PARAMETER	COLLECTION DATE	TYPE											
ALUMINUM		MCP											
ANTIMONY		MCP											
ARSENIC		MCP											
BARIUM		MCP	161 B,N	2.6 B	NA	154 B	229	6180		1170	29400	66.4 B	
BERYLLIUM		MCP		145 B	NA			15.5		3.6 B,N	53.8 N+	28.6 B	
CADMIUM		MCP			NA	79.6 B,N	87.6 B	195 B,N		85.9 B	57.8 B	54.4 B	
CALCIUM		MCP			NA								
CHROMIUM		MCP	108000	115000	NA	161000	142000	258000		140000	176000	181000	
COBALT		MCP	44.20		NA	1560	328	203		15.4			
COPPER		MCP			NA								
IRON		MCP	25.60*		NA	61.3*		36*		42	34		
LEAD		MCP	44100	19500	NA	4960	1180	4010		18300 NE	428 NE	443	
MAGNESIUM		MCP	122	19	NA		1.7 B			28.4		1.8 B	
MANGANESE		MCP	23100	30700	NA	42400	40400	2750 B		39600	72100	74500	
MERCURY		MCP	2990	2380	NA	104	20.2	59.3		2050 N	438 N	583	
NICKEL		MCP			NA	0.40		0.20		0.60			
POTASSIUM		MCP			NA	758	35.4 B	108		33.8 B			
SELENIUM		MCP	2900 B	3080 B	NA	3900 B	2530 B	24600		8300	8900	7410	
SILVER		MCP			NA								
SODIUM		MCP	51000	38300	NA	78300	76000	505000		25.5	11		
THALLIUM		MCP			NA					189000	142000	144000	
VANADIUM		MCP		3.6 B	NA		4.4 B						
ZINC		MCP	16600	1740	NA	101	18.4 B	489		5220	23.9	36.6	
CYANIDE		MCP			NA								
PHENOLS		MCP			NA			0.005		0.007		0.009	
CHEMICAL OXYGEN DEMAND (mg O2/L)		MISC	19.22	31.2	NA	4.27		95.27		15.82	20.3	13.3	
TOTAL DISSOLVED SOLIDS (mg/L)		MISC	600	581	NA	1010	1020	6866		1158	1458	1170	
TOTAL SUSPENDED SOLIDS (mg/L)		MISC	69	58.8	NA	16	19	216		208	10	11	

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N - Spike sample % recovery out of control limits.

* - Duplicate analysis not within control limits.

E - Estimated value due to interference.

S - Value determined by the method of standard addition (MSA).

+ - Correlation coefficient for MSA is less than 0.995

B - Less than quantitation limit but greater than or equal to instrument detection limit.

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-1S		MW-1S-RE		MW-II		MW-ID		MW-2S		MW-2I	
WELL SCREEN LOCATION		OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
COLLECTION DATE		3/22/90		3/22/90		3/22/90		3/23/90		3/19/90		3/19/90	
PARAMETER	TYPE												
AMMONIA, AS N (mg/L)	MISC	2.0		0.862		NA		6.2		0.25		0.137	
NITRATE-NITROGEN (mg/L)	MISC	2.66		1.49		1.8		2.17		NA		NA	
TOTAL KJELDAHL NITROGEN, AS N (mg/L)	MISC	6.85		5.84		1.68		0.77		NA		NA	
pH UNITS	MISC	27.25		94.7		7.1		11.65		6.95		6.95	
TOTAL ORGANIC CARBON (mg/L)	MISC	288		378		85.73		30.12		89.38		116.3	
ACIDITY (mg CaCO3/L)	MISC	277		370		1.93		176		117		253	
ALKALINITY (mg/L CaCO3)	MISC	10.5		75.9		92.3		83		318		413	
BICARBONATE (mg CaCO3/L)	MISC	99.26		398		180		24.1		318		413	
BIOLOGICAL OXYGEN DEMAND (mg/L)	MISC	365.29		8.4		173		3275.58		9.9		17.9	
CHLORIDE (mg Cl/L)	MISC	0.058		75.7		14.9		656.97		372.23		377.19	
HARDNESS (mg/L CaCO3)	MISC	55		55		218.37		510		515.26		740.91	
OIL & GREASE (mg/L)	MISC	1126		1126		578.93		5.6		0.048		4.4	
PHOSPHATE (mg/L)	MISC					0.053		0.093		0.048		0.039	
SULFATE (mg/L)	MISC					90		95		60.5		107.5	
SULFIDE (mg/L)	MISC					1612		2.4		2223.6		11.2	
SP CONDUCTANCE (µmho/CM)	MISC					NA		13360		2223.6		2085	

All results reported in mg/L (ppm) unless otherwise specified. Only detected results are reported.

NA - Not Analyzed

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID	MW-1S		MW-1S-RE		MW-1I		MW-1D		MW-2S		MW-2I	
	OVERBURDEN		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCKWAY FRM	
	UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
	3/22/90	4/2/91	3/22/90	3/22/90	3/22/90	4/2/91	3/23/90	3/19/90	3/28/91	3/19/90	3/28/91	3/28/91
PARAMETER												
COLLECTION DATE												
TYPE												
AMMONIA, AS N (mg/L)	MISC	2.0	0.862	NA			6.2	0.25	0.137			
NITRATE-NITROGEN (mg/L)	MISC			NA	1.8	2.17						
TOTAL KJELDAHL NITROGEN, AS N (mg/L)	MISC	2.66	1.49	NA	1.68	0.77	6.58		0.677			0.753
pH UNITS	MISC	6.85		NA	7.1		11.65	6.95		6.95		
TOTAL ORGANIC CARBON (mg/L)	MISC	27.25	5.84	NA	85.73	1.93	30.12	89.38	1.31	116.3		6.78
ACIDITY (mg CaCO3/L)	MISC		94.7	NA		92.3			117			253
ALKALINITY (mg/L CaCO3)	MISC	288	378	NA	180	340	176	318	413	284		539
BICARBONATE (mg CaCO3/L)	MISC	277	370	NA	173	334	83	318	413	284		539
BIOLOGICAL OXYGEN DEMAND (mg/L)	MISC	10.5		NA	14.9		24.1	9.9		17.9		
CHLORIDE (mg Cl/L)	MISC	99.26	75.9	NA	218.37	221	3275.58	372.23	396	377.19		332
HARDNESS (mg/L CaCO3)	MISC	365.29	398	NA	578.93	510	656.97	515.26	497	740.91		753
OIL & GREASE (mg/L)	MISC		8.4	NA		5.6	2.50		4.4			2
PHOSPHATE (mg/L)	MISC	0.058		NA	0.053		0.093	0.048		0.039		
SULFATE (mg/L)	MISC	55	75.7	NA	90	115	95	60.5	49	107.5		149
SULFIDE (mg/L)	MISC			NA			2.4			11.2		
SP CONDUCTANCE (µmho/CM)	MISC	1126		NA	1612		13360	2223.6		2085		

All results reported in mg/L (ppm) unless otherwise specified. Only detected results are reported.

NA - Not Analyzed

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		OVER BURDEN		GRIMSBY FRM			
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT			
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE												
CHLOROMETHANE	VOC											NA	NA
BROMOMETHANE	VOC											NA	NA
VINYL CHLORIDE	VOC											NA	NA
CHLOROETHANE	VOC											NA	NA
METHYLENE CHLORIDE	VOC											NA	NA
ACETONE	VOC											NA	NA
CARBON DISULFIDE	VOC											NA	NA
1,1-DICHLOROETHENE	VOC											NA	NA
1,1-DICHLOROETHANE	VOC											NA	NA
1,2-DICHLOROETHENE (TOTAL)	VOC											NA	NA
CHLOROFORM	VOC											NA	NA
1,2-DICHLOROETHANE	VOC											NA	NA
2-BUTANONE	VOC											NA	NA
1,1,1-TRICHLOROETHANE	VOC											NA	NA
CARBON TETRACHLORIDE	VOC											NA	NA
VINYL ACETATE	VOC											NA	NA
BROMODICHLOROMETHANE	VOC											NA	NA
1,2-DICHLOROPROPANE	VOC											NA	NA
CIS-1,3-DICHLOROPROPENE	VOC											NA	NA
TRICHLOROETHENE	VOC											NA	NA
DIBROMOCHLOROMETHANE	VOC											NA	NA
1,1,2-TRICHLOROETHANE	VOC											NA	NA
BENZENE	VOC											NA	NA
TRANS-1,3-DICHLOROPROPENE	VOC											NA	NA
BROMOFORM	VOC											NA	NA
4-METHYL-2-PENTANONE	VOC											NA	NA
2-HEXANONE	VOC											NA	NA
TETRACHLOROETHENE	VOC											NA	NA
1,1,2,2-TETRACHLOROETHANE	VOC											NA	NA
TOLUENE	VOC											NA	NA
CHLOROBENZENE	VOC											NA	NA
ETHYLBENZENE	VOC											NA	NA
STYRENE	VOC											NA	NA
TOTAL XYLENES	VOC											NA	NA

All results reported in µg/L (ppb).
J - Indicates the result is less than the sample quantitation limit but greater than zero.
R - Analyte rejected due to blank contamination.
NA - Not Analyzed

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		OVER BURDEN		GRIMSBY FRM			
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT			
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE												
CHLOROMETHANE	VOC							NA				NA	
BROMOMETHANE	VOC							NA				NA	
VINYL CHLORIDE	VOC							NA				NA	
CHLOROETHANE	VOC							NA				NA	
METHYLENE CHLORIDE	VOC							NA				NA	
ACETONE	VOC							NA				NA	
CARBON DISULFIDE	VOC							NA				NA	
1,1-DICHLOROETHENE	VOC							NA				NA	
1,1-DICHLOROETHANE	VOC							NA				NA	
1,2-DICHLOROETHENE (TOTAL)	VOC							NA				NA	
CHLOROFORM	VOC							NA				NA	
1,2-DICHLOROETHANE	VOC							NA				NA	
2-BUTANONE	VOC							NA				NA	
1,1,1-TRICHLOROETHANE	VOC							NA				NA	
CARBON TETRACHLORIDE	VOC							NA				NA	
VINYL ACETATE	VOC							NA				NA	
BROMODICHLOROMETHANE	VOC							NA				NA	
1,2-DICHLOROPROPANE	VOC							NA				NA	
CIS-1,3-DICHLOROPROPENE	VOC							NA				NA	
TRICHLOROETHENE	VOC							NA				NA	
DIBROMOCHLOROMETHANE	VOC							NA				NA	
1,1,2-TRICHLOROETHANE	VOC							NA				NA	
BENZENE	VOC							NA				NA	
TRANS-1,3-DICHLOROPROPENE	VOC							NA				NA	
BROMOFORM	VOC							NA				NA	
4-METHYL-2-PENTANONE	VOC							NA				NA	
2-HEXANONE	VOC							NA				NA	
TETRACHLOROETHENE	VOC							NA				NA	
1,1,2,2-TETRACHLOROETHANE	VOC							NA				NA	
TOLUENE	VOC							NA				NA	
CHLOROBENZENE	VOC							NA				NA	
ETHYLBENZENE	VOC							NA				NA	
STYRENE	VOC							NA				NA	
TOTAL XYLENES	VOC							NA				NA	

All results reported in µg/L (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.
R - Analyte rejected due to blank contamination.
NA - Not Analyzed

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID WELL SCREEN LOCATION RELATIVE HORIZONTAL GRADIENT COLLECTION DATE	MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
	OVER BURDEN		OVER BURDEN		OVER BURDEN		DOWN GRADIENT		DOWN GRADIENT		DOWN GRADIENT	
	3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE											
PHENOL	SEMI											
BIS(2-CHLOROETHYL) ETHER	SEMI											
2-CHLOROPHENOL	SEMI											
1,3-DICHLOROBENZENE	SEMI											
1,4-DICHLOROBENZENE	SEMI											
BENZYL ALCOHOL	SEMI											
1,2-DICHLOROBENZENE	SEMI											
2-METHYLPHENOL	SEMI											
BIS(2-CHLOROISOPROPYL) ETHER	SEMI											
4-METHYLPHENOL	SEMI											
N-NITROSO-DI-N-PROPYLAMINE	SEMI											
HEXACHLOROETHANE	SEMI											
NITROBENZENE	SEMI											
ISOPHORONE	SEMI											
2-NITROPHENOL	SEMI											
2,4-DIMETHYLPHENOL	SEMI											
BENZOIC ACID	SEMI											
BIS(2-CHLOROETHOXY)METHANE	SEMI											
2,4-DICHLOROPHENOL	SEMI											
1,2,4-TRICHLOROBENZENE	SEMI											
NAPHTHALENE	SEMI											
4-CHLOROANILINE	SEMI											
HEXACHLOROBUTADIENE	SEMI											
4-CHLORO-3-METHYLPHENOL	SEMI											
2-METHYLNAPHTHALENE	SEMI											
HEXACHLOROCYCLOPENTADIENE	SEMI											
2,4,6-TRICHLOROPHENOL	SEMI											
2,4,5-TRICHLOROPHENOL	SEMI											
2-CHLORONAPHTHALENE	SEMI											
2-NITROANILINE	SEMI											
DIMETHYLPHTHALATE	SEMI											
ACENAPHTHYLENE	SEMI											
2,6-DINITROTOLUENE	SEMI											
3-NITROANILINE	SEMI											

2 J

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J - Indicates the result is less than the sample quantitation limit but greater than zero.

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		GRIMSBY FRM			
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT			
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE										
PHENOL	SEMI										
BIS(2-CHLOROETHYL) ETHER	SEMI										
2-CHLOROPHENOL	SEMI										
1,3-DICHLOROBENZENE	SEMI										
1,4-DICHLOROBENZENE	SEMI										
BENZYL ALCOHOL	SEMI										
1,2-DICHLOROBENZENE	SEMI										
2-METHYLPHENOL	SEMI										
BIS(2-CHLOROISOPROPYL) ETHER	SEMI										
4-METHYLPHENOL	SEMI										
N-NITROSO-DI-N-PROPYLAMINE	SEMI										
HEXACHLOROETHANE	SEMI										
NITROBENZENE	SEMI										
ISOPHORONE	SEMI										
2-NITROPHENOL	SEMI										
2,4-DIMETHYLPHENOL	SEMI										
BENZOIC ACID	SEMI										
BIS(2-CHLOROETHOXY)METHANE	SEMI										
2,4-DICHLOROPHENOL	SEMI										
1,2,4-TRICHLOROBENZENE	SEMI										
NAPHTHALENE	SEMI										
4-CHLOROANILINE	SEMI										
HEXACHLOROBUTADIENE	SEMI										
4-CHLORO-3-METHYLPHENOL	SEMI										
2-METHYLNAPHTHALENE	SEMI										
HEXACHLOROCYCLOPENTADIENE	SEMI										
2,4,6-TRICHLOROPHENOL	SEMI										
2,4,5-TRICHLOROPHENOL	SEMI										
2-CHLORONAPHTHALENE	SEMI										
2-NITROANILINE	SEMI										
DIMETHYLPHTHALATE	SEMI										
ACENAPHTHYLENE	SEMI										
2,6-DINITROTOLUENE	SEMI										
3-NITROANILINE	SEMI										

2 J

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LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		OVER BURDEN		GRIMSBY FRM			
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT			
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE												
ACENAPHTHENE	SEMI												
2,4-DINITROPHENOL	SEMI												
4-NITROPHENOL	SEMI												
DIBENZOFURAN	SEMI												
2,4-DINITROTOLUENE	SEMI												
DIETHYLPHTHALATE	SEMI												
4-CHLOROPHENYL-PHENYL ETHER	SEMI												
FLUORENE	SEMI												
4-NITROANILINE	SEMI												
4,6-DINITRO-2-METHYLPHENOL	SEMI												
N-NITROSODIPHENYLAMINE	SEMI												
4-BROMOPHENYL-PHENYL ETHER	SEMI												
HEXACHLOROBENZENE	SEMI												
PENTACHLOROPHENOL	SEMI												
PHENANTHRENE	SEMI												
ANTHRACENE	SEMI												
DI-N-BUTYLPHTHALATE	SEMI												
FLUORANTHENE	SEMI												
PYRENE	SEMI												
BUTYLBENZYLPHTHALATE	SEMI												
3,3'-DICHLOROBENZIDINE	SEMI												
BENZO(A)ANTHRACENE	SEMI												
CHRYSENE	SEMI												
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI												
DI-N-OCTYL PHTHALATE	SEMI												
BENZO(B)FLUORANTHENE	SEMI												
BENZO(K)FLUORANTHENE	SEMI												
BENZO(A)PYRENE	SEMI												
INDENO(1,2,3-CD)PYRENE	SEMI												
DIBENZ(A,H)ANTHRACENE	SEMI												
BENZO(G,H,I)PERYLENE	SEMI												

All results reported in µg/L (ppb).
Only detected results are reported.

J - Indicates the value is less than the sample quantitation limit but greater than zero.
R - Analyte rejected due to blank contamination.

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		OVER BURDEN		GRIMSBY FRM			
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT			
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE												
ACENAPHTHENE	SEMI	R											
2,4-DINITROPHENOL	SEMI												
4-NITROPHENOL	SEMI												
DIBENZOFURAN	SEMI												
2,4-DINITROTOLUENE	SEMI												
DIETHYLPHTHALATE	SEMI												
4-CHLOROPHENYL-PHENYL ETHER	SEMI												
FLUORENE	SEMI												
4-NITROANILINE	SEMI												
4,6-DINITRO-2-METHYLPHENOL	SEMI												
N-NITROSODIPHENYLAMINE	SEMI	R											
4-BROMOPHENYL-PHENYL ETHER	SEMI												
HEXACHLOROBENZENE	SEMI												
PENTACHLOROPHENOL	SEMI												
PHENANTHRENE	SEMI												
ANTHRACENE	SEMI												
DI-N-BUTYLPHTHALATE	SEMI												
FLUORANTHENE	SEMI												
PYRENE	SEMI												
BUTYLBENZYLPHTHALATE	SEMI												
3,3'-DICHLOROBENZIDINE	SEMI	0.7 J											
BENZO(A)ANTHRACENE	SEMI												
CHRYSENE	SEMI												
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI												
DI-N-OCTYL PHTHALATE	SEMI												
BENZO(B)FLUORANTHENE	SEMI												
BENZO(K)FLUORANTHENE	SEMI												
BENZO(A)PYRENE	SEMI												
INDENO(1,2,3-CD)PYRENE	SEMI												
DIBENZ(A,H)ANTHRACENE	SEMI												
BENZO(G,H,I)PERYLENE	SEMI												

All results reported in µg/L (ppb).

Only detected results are reported.

J - Indicates the value is less than the sample quantitation limit but greater than zero.

R - Analyte rejected due to blank contamination.

LOCKPORT CITY LANDELL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		OVER BURDEN		GRIMSBY FRM			
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT			
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE												
ALPHA-BHC	PST							NA				NA	NA
BETA-BHC	PST							NA				NA	NA
DELTA-BHC	PST							NA				NA	NA
GAMMA-BHC (LINDANE)	PST							NA				NA	NA
HEPTACHLOR	PST							NA				NA	NA
ALDRIN	PST							NA				NA	NA
HEPTACHLOR EPOXIDE	PST							NA				NA	NA
ENDOSULFAN I	PST							NA				NA	NA
DIELDRIN	PST							NA				NA	NA
4,4'-DDE	PST							NA				NA	NA
ENDRIN	PST							NA				NA	NA
ENDOSULFAN II	PST							NA				NA	NA
4,4'-DDD	PST							NA				NA	NA
ENDOSULFAN SULFATE	PST							NA				NA	NA
4,4'-DDT	PST							NA				NA	NA
METHOXYCHLOR	PST							NA				NA	NA
ENDRIN KETONE	PST							NA				NA	NA
ALPHA-CHLORDANE	PST							NA				NA	NA
GAMMA-CHLORDANE	PST							NA				NA	NA
TOXAPHENE	PST							NA				NA	NA
AROCOLOR-1016	PCB							NA				NA	NA
AROCOLOR-1221	PCB							NA				NA	NA
AROCOLOR-1232	PCB							NA				NA	NA
AROCOLOR-1242	PCB							NA				NA	NA
AROCOLOR-1248	PCB							NA				NA	NA
AROCOLOR-1254	PCB							NA				NA	NA
AROCOLOR-1260	PCB							NA				NA	NA

All results reported in µg/L (ppb).
Only detected results are reported.

NA - Not Analyzed

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		OVER BURDEN		GRIMSBY FRM			
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT			
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE												
ALPHA-BHC	PST							NA				NA	NA
BETA-BHC	PST							NA				NA	NA
DELTA-BHC	PST							NA				NA	NA
GAMMA-BHC (LINDANE)	PST							NA				NA	NA
HEPTACHLOR	PST							NA				NA	NA
ALDRIN	PST							NA				NA	NA
HEPTACHLOR EPOXIDE	PST							NA				NA	NA
ENDOSULFAN I	PST							NA				NA	NA
DIELDRIN	PST							NA				NA	NA
4,4'-DDE	PST							NA				NA	NA
ENDRIN	PST							NA				NA	NA
ENDOSULFAN II	PST							NA				NA	NA
4,4'-DDD	PST							NA				NA	NA
ENDOSULFAN SULFATE	PST							NA				NA	NA
4,4'-DDT	PST							NA				NA	NA
METHOXYCHLOR	PST							NA				NA	NA
ENDRIN KETONE	PST							NA				NA	NA
ALPHA-CHLORDANE	PST							NA				NA	NA
GAMMA-CHLORDANE	PST							NA				NA	NA
TOXAPHENE	PST							NA				NA	NA
AROCOLOR-1016	PCB							NA				NA	NA
AROCOLOR-1221	PCB							NA				NA	NA
AROCOLOR-1232	PCB							NA				NA	NA
AROCOLOR-1242	PCB							NA				NA	NA
AROCOLOR-1248	PCB							NA				NA	NA
AROCOLOR-1254	PCB							NA				NA	NA
AROCOLOR-1260	PCB							NA				NA	NA

All results reported in $\mu\text{g/L}$ (ppb).
Only detected results are reported.

NA - Not Analyzed

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		DOWNGRADIENT		DOWNGRADIENT		GRIMSBY FRM	
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT	
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE												
ALUMINUM	MCP	4690	322	80300		2550	964	NA	419	46.4 B	NA	NA	NA
ANTIMONY	MCP		27.6 B					NA		27.5 B	NA	NA	NA
ARSENIC	MCP	10.5 N	4 B	60.5 N	3.7 B	5.4 BN+	5.3 B	NA	9.7 B,NS	2 B	NA	NA	NA
BARIUM	MCP	517	567	396	425	212	253	NA	341	279	NA	NA	NA
BERYLLIUM	MCP						1.5 B	NA			NA	NA	NA
CADMIUM	MCP							NA			NA	NA	NA
CALCIUM	MCP	191000	181000	153000	141000	174000	182000	NA	200000	183000	NA	NA	NA
CHROMIUM	MCP	8.2 B		12.5		13.8		NA	14		NA	NA	NA
COBALT	MCP						4.7 B	NA			NA	NA	NA
COPPER	MCP			36.8				NA			NA	NA	NA
IRON	MCP	12700 NE	18600	13400 NE	18800	18900 NE	22400	NA	3520 NE	1550	NA	NA	NA
LEAD	MCP		10.2	37 NW	12.2		10.4	NA		1.5 B	NA	NA	NA
MAGNESIUM	MCP	74500	76800	56600	55500	66300	71100	NA	65000	59700	NA	NA	NA
MANGANESE	MCP	185 N	180	1540 N	1550	1670 N	1880	NA	1820 N	1310	NA	NA	NA
MERCURY	MCP	0.30				0.20		NA			NA	NA	NA
NICKEL	MCP			45.1			14.5 B	NA			NA	NA	NA
POTASSIUM	MCP	28000 B	27900	22000 B	19500	37000 B	40500	NA	25000 B	19900	NA	NA	NA
SELENIUM	MCP				3 B			NA	9.1 B		NA	NA	NA
SILVER	MCP							NA	91700	74900	NA	NA	NA
SODIUM	MCP	212000	225000	111000	112000	69900	142000	NA			NA	NA	NA
THALLIUM	MCP							NA			NA	NA	NA
VANADIUM	MCP				2.4 B		13.7 B	NA			NA	NA	NA
ZINC	MCP	2120	2400	4140	1930	5210	4480	NA	36.3	113	NA	NA	NA
CYANIDE	MCP							NA			NA	NA	NA
PHENOLS	MCP							NA			NA	NA	NA
CHEMICAL OXYGEN DEMAND (mg O2/L)	MISC	34.05	70.2	39.21	52.2	18.57	46.2	NA	22.36	28.2	NA	NA	NA
TOTAL DISSOLVED SOLIDS (mg/L)	MISC	1556	1540	1010	986	1154	1450	NA	1262	1110	NA	NA	NA
TOTAL SUSPENDED SOLIDS (mg/L)	MISC	184	64	69	51	45	101	NA	21	13.5	NA	NA	NA

All results reported in µg/L (ppb) unless otherwise specified. Only detected results are reported.

+ - Correlation coefficient for MSA is less than 0.995.

S - Value determined by the method of standard addition (NSA)

N - Spike sample % recovery out of control limits.

E - Estimated value due to interference.

NA - Not Analyzed

B - Less than quantitation limit but greater than or equal to instrument detection limit.

W - Post-digestion spike analysis is out of control limits.

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		OVER BURDEN		GRIMSBY FRM			
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT			
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE												
ALUMINUM	MCP	4690	322	80300		2550	964	NA		419	46.4 B	NA	NA
ANTIMONY	MCP		27.6 B					NA			27.5 B	NA	NA
ARSENIC	MCP	10.5 N	4 B	60.5 N	3.7 B	5.4 BN+	5.3 B	NA		9.7 B,NS	2 B	NA	NA
BARIUM	MCP	517	567	396	425	212	253	NA		341	279	NA	NA
BERYLLIUM	MCP						1.5 B	NA				NA	NA
CADMIUM	MCP							NA				NA	NA
CALCIUM	MCP	191000	181000	153000	141000	174000	182000	NA		200000	183000	NA	NA
CHROMIUM	MCP	8.2 B		12.5		13.8		NA		14		NA	NA
COBALT	MCP							NA				NA	NA
COPPER	MCP			36.8			4.7 B	NA				NA	NA
IRON	MCP	12700 NE	18600	13400 NE	18800	18900 NE	22400	NA		3520 NE	1550	NA	NA
LEAD	MCP		10.2	37 NW	12.2		10.4	NA			1.5 B	NA	NA
MAGNESIUM	MCP	74500	76800	56600	55500	66300	71100	NA		65000	59700	NA	NA
MANGANESE	MCP	185 N	180	1540 N	1550	1670 N	1880	NA		1820 N	1310	NA	NA
MERCURY	MCP	0.30				0.20		NA				NA	NA
NICKEL	MCP			45.1			14.5 B	NA				NA	NA
POTASSIUM	MCP	28000 B	27900	22000 B	19500	37000 B	40500	NA		25000 B	19900	NA	NA
SELENIUM	MCP							NA				NA	NA
SILVER	MCP				3 B			NA		9.1 B		NA	NA
SODIUM	MCP	212000	225000	111000	112000	69900	142000	NA		91700	74900	NA	NA
THALLIUM	MCP							NA				NA	NA
VANADIUM	MCP				2.4 B		13.7 B	NA				NA	NA
ZINC	MCP	2120	2400	4140	1930	5210	4480	NA		36.3	113	NA	NA
CYANIDE	MCP							NA				NA	NA
PHENOLS	MCP							NA				NA	NA
CHEMICAL OXYGEN DEMAND (mg O2/L)	MISC	34.05	70.2	39.21	52.2	18.57	46.2	NA		22.36	28.2	NA	NA
TOTAL DISSOLVED SOLIDS (mg/L)	MISC	1556	1540	1010	986	1154	1450	NA		1262	1110	NA	NA
TOTAL SUSPENDED SOLIDS (mg/L)	MISC	184	64	69	51	45	101	NA		21	13.5	NA	NA

All results reported in µg/L (ppb) unless otherwise specified. Only detected results are reported.

+ - Correlation coefficient for MSA is less than 0.995.

S - Value determined by the method of standard addition (NSA)

N - Spike sample % recovery out of control limits.

E - Estimated value due to interference.

NA - Not Analyzed

B - Less than quantitation limit but greater than or equal to instrument detection limit.

W - Post-digestion spike analysis is out of control limits.

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		OVER BURDEN		GRIMSBY FRM			
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT			
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE												
AMMONIA, AS N (mg/L)	MISC	23.5	18.8	6.33	7.39	5.0	2.49	NA	NA	9.0	3.45	NA	NA
NITRATE-NITROGEN (mg/L)	MISC			6.86		0.31		NA	NA			NA	NA
TOTAL KJELDAHL NITROGEN, AS N (mg/L)	MISC	24.64	19.2	12.88	13.2	5.6	3.16	NA	NA	9.8	5.52	NA	NA
pH UNITS	MISC	6.90		7.60		6.85		NA	NA	6.90		NA	NA
TOTAL ORGANIC CARBON (mg/L)	MISC	116.8	18.9	35.63	38.2	134.5	6.35	NA	NA	131.7	7.69	NA	NA
ACIDITY (mg CaCO3/L)	MISC		340		283		182	NA	NA		277	NA	NA
ALKALINITY (mg/L CaCO3)	MISC	435	656	550	595	186	426	NA	NA	331	598	NA	NA
BICARBONATE (mg CaCO3/L)	MISC	435	643	550	584	186	418	NA	NA	331	586	NA	NA
BIOLOGICAL OXYGEN DEMAND (mg/L)	MISC	6.4		38.7		5.1		NA	NA	24.3		NA	NA
CHLORIDE (mg Cl/L)	MISC	456.6	549	198.52	243	178.67	511	NA	NA	208.45	169	NA	NA
HARDNESS (mg/L CaCO3)	MISC	360.21	761	619.53	614	711.76	728	NA	NA	770.22	748	NA	NA
OIL & GREASE (mg/L)	MISC						13.2	NA	NA		9.6	NA	NA
PHOSPHATE (mg/L)	MISC	0.066		0.165		0.024		NA	NA	0.029		NA	NA
SULFATE (mg/L)	MISC	60.5	92.2	157.5	51.4	195	175	NA	NA	40	207	NA	NA
SULFIDE (mg/L)	MISC	6.4						NA	NA			NA	NA
SP CONDUCTANCE (µmho/CM)	MISC	2774.4		1938		1459		NA	NA	1795.2		NA	NA

All results reported in mg/L (ppm) unless otherwise specified. Only detected results are reported.

NA - Not Analyzed

LOCKPORT CITY LANDFILL
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-3S		MW-4S		MW-5S		MW-5S-RE		MW-5I		MW-5I-RE	
WELL SCREEN LOCATION		OVER BURDEN		OVER BURDEN		OVER BURDEN		OVER BURDEN		GRIMSBY FRM			
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT		DOWNGRADIENT			
COLLECTION DATE		3/19/90	4/1/91	3/20/90	4/1/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91	3/20/90	4/2/91
PARAMETER	TYPE												
AMMONIA, AS N (mg/L)	MISC	23.5	18.8	6.33	7.39	5.0	2.49	NA		9.0	3.45	NA	NA
NITRATE-NITROGEN (mg/L)	MISC			6.86		0.31		NA				NA	NA
TOTAL KJELDAHL NITROGEN, AS N (mg/L)	MISC	24.64	19.2	12.88	13.2	5.6	3.16	NA		9.8	5.52	NA	NA
pH UNITS	MISC	6.90		7.60		6.85		NA		6.90		NA	NA
TOTAL ORGANIC CARBON (mg/L)	MISC	116.8	18.9	35.63	38.2	134.5	6.35	NA		131.7	7.69	NA	NA
ACIDITY (mg CaCO3/L)	MISC		340		283		182	NA			277	NA	NA
ALKALINITY (mg/L CaCO3)	MISC	435	656	550	595	186	426	NA		331	598	NA	NA
BICARBONATE (mg CaCO3/L)	MISC	435	643	550	584	186	418	NA		331	586	NA	NA
BIOLOGICAL OXYGEN DEMAND (mg/L)	MISC	6.4		38.7		5.1		NA		24.3		NA	NA
CHLORIDE (mg Cl/L)	MISC	456.6	549	198.52	243	178.67	511	NA		208.45	169	NA	NA
HARDNESS (mg/L CaCO3)	MISC	360.21	761	619.53	614	711.76	728	NA		770.22	748	NA	NA
OIL & GREASE (mg/L)	MISC						13.2	NA			9.6	NA	NA
PHOSPHATE (mg/L)	MISC	0.066		0.165		0.024		NA		0.029		NA	NA
SULFATE (mg/L)	MISC	60.5	92.2	157.5	51.4	195	175	NA		40	207	NA	NA
SULFIDE (mg/L)	MISC	6.4						NA				NA	NA
SP CONDUCTANCE (µmho/CM)	MISC	2774.4		1938		1459		NA		1795.2		NA	NA

All results reported in mg/L (ppm) unless otherwise specified. Only detected results are reported.

NA - Not Analyzed

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-6I		MW-6D		MW-7S		MW-8I		MW-8D	
WELL SCREEN LOCATION		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		3/21/90	4/2/91	3/21/90	4/3/91	3/22/90	4/2/91	3/21/90	4/3/91	3/21/90	4/3/91
PARAMETER	TYPE										
CHLOROMETHANE	VOC										
BROMOMETHANE	VOC										
VINYL CHLORIDE	VOC										
CHLOROETHANE	VOC										
METHYLENE CHLORIDE	VOC	R		R				R		23 J	81
ACETONE	VOC	R		R				R		R	15 J
CARBON DISULFIDE	VOC					R					R
1,1-DICHLOROETHENE	VOC										
1,1-DICHLOROETHANE	VOC										
1,2-DICHLOROETHENE (TOTAL)	VOC										
CHLOROFORM	VOC									460	790
1,2-DICHLOROETHANE	VOC									R	
2-BUTANONE	VOC										
1,1,1-TRICHLOROETHANE	VOC										
CARBON TETRACHLORIDE	VOC										
VINYL ACETATE	VOC										
BROMODICHLOROMETHANE	VOC										
1,2-DICHLOROPROPANE	VOC										
CIS-1,3-DICHLOROPROPENE	VOC										
TRICHLOROETHENE	VOC									51	130
DIBROMOCHLOROMETHANE	VOC										
1,1,2-TRICHLOROETHANE	VOC										
BENZENE	VOC					R					
TRANS-1,3-DICHLOROPROPENE	VOC										
BROMOFORM	VOC										
4-METHYL-2-PENTANONE	VOC										
2-HEXANONE	VOC										
TETRACHLOROETHENE	VOC										
1,1,2,2-TETRACHLOROETHANE	VOC										
TOLUENE	VOC					2 J					
CHLOROBENZENE	VOC										
ETHYLBENZENE	VOC										
STYRENE	VOC										
TOTAL XYLENES	VOC										

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LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-6I		MW-6D		MW-7S		MW-8I		MW-8D	
WELL SCREEN LOCATION		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		3/21/90	4/2/91	3/21/90	4/3/91	3/22/90	4/2/91	3/21/90	4/3/91	3/21/90	4/3/91
PARAMETER	TYPE										
CHLOROMETHANE	VOC										
BROMOMETHANE	VOC										
VINYL CHLORIDE	VOC										
CHLOROETHANE	VOC										
METHYLENE CHLORIDE	VOC										
ACETONE	VOC										
CARBON DISULFIDE	VOC										
1,1-DICHLOROETHENE	VOC										
1,1-DICHLOROETHANE	VOC										
1,2-DICHLOROETHENE (TOTAL)	VOC										
CHLOROFORM	VOC										
1,2-DICHLOROETHANE	VOC										
2-BUTANONE	VOC										
1,1,1-TRICHLOROETHANE	VOC										
CARBON TETRACHLORIDE	VOC										
VINYL ACETATE	VOC										
BROMODICHLOROMETHANE	VOC										
1,2-DICHLOROPROPANE	VOC										
CIS-1,3-DICHLOROPROPENE	VOC										
TRICHLOROETHENE	VOC										
DIBROMOCHLOROMETHANE	VOC										
1,1,2-TRICHLOROETHANE	VOC										
BENZENE	VOC										
TRANS-1,3-DICHLOROPROPENE	VOC										
BROMOFORM	VOC										
4-METHYL-2-PENTANONE	VOC										
2-HEXANONE	VOC										
TETRACHLOROETHENE	VOC										
1,1,2,2-TETRACHLOROETHANE	VOC										
TOLUENE	VOC										
CHLOROBENZENE	VOC										
ETHYLBENZENE	VOC										
STYRENE	VOC										
TOTAL XYLENES	VOC										

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LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-6I		MW-6D		MW-7S		MW-8I		MW-8D	
WELL SCREEN LOCATION		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		3/21/90		3/21/90		3/22/90		3/21/90		3/21/90	
PARAMETER	TYPE										
PHENOL	SEMI										
BIS(2-CHLOROETHYL) ETHER	SEMI										
2-CHLOROPHENOL	SEMI										
1,3-DICHLOROBENZENE	SEMI										
1,4-DICHLOROBENZENE	SEMI										
BENZYL ALCOHOL	SEMI										
1,2-DICHLOROBENZENE	SEMI										
2-METHYLPHENOL	SEMI										
BIS(2-CHLOROISOPROPYL) ETHER	SEMI										
4-METHYLPHENOL	SEMI										
N-NITROSO-DI-N-PROPYLAMINE	SEMI										
HEXACHLOROETHANE	SEMI										
NITROBENZENE	SEMI										
ISOPHORONE	SEMI										
2-NITROPHENOL	SEMI										
2,4-DIMETHYLPHENOL	SEMI										
BENZOIC ACID	SEMI										
BIS(2-CHLOROETHOXY)METHANE	SEMI										
2,4-DICHLOROPHENOL	SEMI										
1,2,4-TRICHLOROBENZENE	SEMI										
NAPHTHALENE	SEMI										
4-CHLOROANILINE	SEMI										
HEXACHLOROBUTADIENE	SEMI										
4-CHLORO-3-METHYLPHENOL	SEMI										
2-METHYLNAPHTHALENE	SEMI										
HEXACHLOROCYCLOPENTADIENE	SEMI										
2,4,6-TRICHLOROPHENOL	SEMI										
2,4,5-TRICHLOROPHENOL	SEMI										
2-CHLORONAPHTHALENE	SEMI										
2-NITROANILINE	SEMI										
DIMETHYLPHTHALATE	SEMI										
ACENAPHTHYLENE	SEMI										
2,6-DINITROTOLUENE	SEMI										
3-NITROANILINE	SEMI										
ACENAPHTHENE	SEMI										
2,4-DINITROPHENOL	SEMI										
4-NITROPHENOL	SEMI										
DIBENZOFURAN	SEMI										
2,4-DINITROTOLUENE	SEMI										
DIETHYLPHTHALATE	SEMI										
4-CHLOROPHENYL-PHENYL ETHER	SEMI										

All results reported in µg/L (ppb).
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LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-6I		MW-6D		MW-7S		MW-8I		MW-8D	
WELL SCREEN LOCATION		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		3/21/90	4/2/91	3/21/90	4/3/91	3/22/90	4/2/91	3/21/90	4/3/91	3/21/90	4/3/91
PARAMETER	TYPE										
PHENOL	SEMI										
BIS(2-CHLOROETHYL) ETHER	SEMI										
2-CHLOROPHENOL	SEMI										
1,3-DICHLOROBENZENE	SEMI										
1,4-DICHLOROBENZENE	SEMI										
BENZYL ALCOHOL	SEMI										
1,2-DICHLOROBENZENE	SEMI										
2-METHYLPHENOL	SEMI										
BIS(2-CHLOROISOPROPYL) ETHER	SEMI										
4-METHYLPHENOL	SEMI										
N-NITROSO-DI-N-PROPYLAMINE	SEMI										
HEXACHLOROETHANE	SEMI										
NITROBENZENE	SEMI										
ISOPHORONE	SEMI										
2-NITROPHENOL	SEMI										
2,4-DIMETHYLPHENOL	SEMI										
BENZOIC ACID	SEMI										
BIS(2-CHLOROETHOXY)METHANE	SEMI										
2,4-DICHLOROPHENOL	SEMI										
1,2,4-TRICHLOROBENZENE	SEMI										
NAPHTHALENE	SEMI										
4-CHLOROANILINE	SEMI										
HEXACHLOROBUTADIENE	SEMI										
4-CHLORO-3-METHYLPHENOL	SEMI										
2-METHYLNAPHTHALENE	SEMI										
HEXACHLOROCYCLOPENTADIENE	SEMI										
2,4,6-TRICHLOROPHENOL	SEMI										
2,4,5-TRICHLOROPHENOL	SEMI										
2-CHLORONAPHTHALENE	SEMI										
2-NITROANILINE	SEMI										
DIMETHYLPHTHALATE	SEMI										
ACENAPHTHYLENE	SEMI										
2,6-DINITROTOLUENE	SEMI										
3-NITROANILINE	SEMI										
ACENAPHTHENE	SEMI										
2,4-DINITROPHENOL	SEMI										
4-NITROPHENOL	SEMI										
DIBENZOFURAN	SEMI										
2,4-DINITROTOLUENE	SEMI										
DIETHYLPHTHALATE	SEMI										
4-CHLOROPHENYL-PHENYL ETHER	SEMI										
		2 J	5 J							2 J	0.8 J

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LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-6I		MW-6D		MW-7S		MW-8I		MW-8D	
WELL SCREEN LOCATION		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		3/21/90		3/21/90		3/22/90		3/21/90		3/21/90	
PARAMETER	TYPE										
FLUORENE	SEMI										
4-NITROANILINE	SEMI										
4,6-DINITRO-2-METHYLPHENOL	SEMI										
N-NITROSODIPHENYLAMINE	SEMI										
4-BROMOPHENYL-PHENYL ETHER	SEMI										
HEXACHLOROBENZENE	SEMI										
PENTACHLOROPHENOL	SEMI										
PHENANTHRENE	SEMI										
ANTHRACENE	SEMI										
DI-N-BUTYLPHTHALATE	SEMI	4 J		1 J	3 J		8 J			2 J	4 J
FLUORANTHENE	SEMI	4 J									
PYRENE	SEMI	2 J									
BUTYLBENZYLPHTHALATE	SEMI	4 J									
3,3'-DICHLOROBENZIDINE	SEMI										
BENZO(A)ANTHRACENE	SEMI										
CHRYSENE	SEMI										
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	R		R	61 B	9 J	R			R	
DI-N-OCTYL PHTHALATE	SEMI	4 J									
BENZO(B)FLUORANTHENE	SEMI	4 J			0.3 J						
BENZO(K)FLUORANTHENE	SEMI										
BENZO(A)PYRENE	SEMI										
INDENO(1,2,3-CD)PYRENE	SEMI										
DIBENZ(A,H)ANTHRACENE	SEMI										
BENZO(G,H,I)PERYLENE	SEMI										

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LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-6I		MW-6D		MW-7S		MW-8I		MW-8D	
WELL SCREEN LOCATION		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		3/21/90	4/2/91	3/21/90	4/3/91	3/22/90	4/2/91	3/21/90	4/3/91	3/21/90	4/3/91
PARAMETER	TYPE										
FLUORENE	SEMI										
4-NITROANILINE	SEMI										
4,6-DINITRO-2-METHYLPHENOL	SEMI										
N-NITROSODIPHENYLAMINE	SEMI										
4-BROMOPHENYL-PHENYL ETHER	SEMI										
HEXACHLOROBENZENE	SEMI										
PENTACHLOROPHENOL	SEMI										
PHENANTHRENE	SEMI										
ANTHRACENE	SEMI										
DI-N-BUTYLPHTHALATE	SEMI	4 J		1 J	3 J		8 J			2 J	4 J
FLUORANTHENE	SEMI	4 J									
PYRENE	SEMI	2 J									
BUTYLBENZYLPHTHALATE	SEMI	4 J									
3,3'-DICHLOROBENZIDINE	SEMI										
BENZO(A)ANTHRACENE	SEMI										
CHRYSENE	SEMI										
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	R		R	6I B	9 J	R			R	
DI-N-OCTYL PHTHALATE	SEMI	4 J									
BENZO(B)FLUORANTHENE	SEMI	4 J			0.3 J						
BENZO(K)FLUORANTHENE	SEMI										
BENZO(A)PYRENE	SEMI										
INDENO(1,2,3-CD)PYRENE	SEMI										
DIBENZ(A,H)ANTHRACENE	SEMI										
BENZO(G,H,I)PERYLENE	SEMI										

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J - Indicates the result is less than the sample quantitation limit but greater than zero.

R - Analyte rejected due to blank contamination.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-6I		MW-6D		MW-7S		MW-8I		MW-8D	
WELL SCREEN LOCATION		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		3/21/90		3/21/90		3/22/90		3/21/90		3/21/90	
PARAMETER	TYPE										
ALPHA-BHC	PST										
BETA-BHC	PST										
DELTA-BHC	PST										
GAMMA-BHC (LINDANE)	PST										
HEPTACHLOR	PST										
ALDRIN	PST										
HEPTACHLOR EPOXIDE	PST										
ENDOSULFAN I	PST										
DIELDRIN	PST										
4,4'-DDE	PST										
ENDRIN	PST										
ENDOSULFAN II	PST										
4,4'-DDD	PST										
ENDOSULFAN SULFATE	PST										
4,4'-DDT	PST										
METHOXYCHLOR	PST										
ENDRIN KETONE	PST										
ALPHA-CHLORDANE	PST										
GAMMA-CHLORDANE	PST										
TOXAPHENE	PST										
AROCLOR-1016	PCB										
AROCLOR-1221	PCB										
AROCLOR-1232	PCB										
AROCLOR-1242	PCB										
AROCLOR-1248	PCB										
AROCLOR-1254	PCB										
AROCLOR-1260	PCB										

0.01 J

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Only detected results are reported.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-6I		MW-6D		MW-7S		MW-8I		MW-8D	
WELL SCREEN LOCATION		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		3/21/90		4/2/91		3/21/90		4/2/91		3/21/90	
PARAMETER											
		TYPE									
ALPHA-BHC		PST									
BETA-BHC		PST									
DELTA-BHC		PST									
GAMMA-BHC (LINDANE)		PST									
HEPTACHLOR		PST									
ALDRIN		PST									
HEPTACHLOR EPOXIDE		PST									
ENDOSULFAN I		PST									
DIELDRIN		PST									
4,4'-DDE		PST									
ENDRIN		PST									
ENDOSULFAN II		PST									
4,4'-DDD		PST									
ENDOSULFAN SULFATE		PST									
4,4'-DDT		PST									
METHOXYCHLOR		PST									
ENDRIN KETONE		PST									
ALPHA-CHLORDANE		PST									
GAMMA-CHLORDANE		PST									
TOXAPHENE		PST									
AROCOR-1016		PCB									
AROCOR-1221		PCB									
AROCOR-1232		PCB									
AROCOR-1242		PCB									
AROCOR-1248		PCB									
AROCOR-1254		PCB									
AROCOR-1260		PCB									

0.01 J

All results reported in µg/L (ppb).
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quantitation limit but greater than zero.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-6I		MW-6D		MW-7S		MW-8I		MW-8D	
WELL SCREEN LOCATION		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		3/21/90	4/2/91	3/21/90	4/3/91	3/22/90	4/2/91	3/21/90	4/3/91	3/21/90	4/3/91
PARAMETER	TYPE										
ALUMINUM	MCP	457	46.7 B	777	277	3930	351	257	264	1240	1200
ANTIMONY	MCP										29.2 B
ARSENIC	MCP									7.6 B,NS	2.4 B
BARIUM	MCP			5.7 B,N+	145 B	9.2 B	30 B			38.6 B	30 B
BERYLLIUM	MCP			122 B		71.8 B,N					
CADMIUM	MCP										
CALCIUM	MCP	83800	88300	112000	140000	211000	167000	106000	119000	128000	143000
CHROMIUM	MCP			48.5	48	22.9	44	13.3	12.7	31.7	17.9
COBALT	MCP					32.3 B	102				11.6 B
COPPER	MCP			29.1		69.8*	18.2 B				15.1 B
IRON	MCP	337 NE	183	3790 NE	1350	11900	1760	754 NE	855	7500 NE	4160
LEAD	MCP	7.3 N	6.3	22 B,NW	120 S	1.5 B	1.5 B	6.8 N	3.8 B		9.4 B+
MAGNESIUM	MCP	36200	34900	50000	48500	99000	97500	47700	47500	68900	77600
MANGANESE	MCP	2.5 B		40.6 N	36.4	2170	364	76.8 N	19	721 N	685
MERCURY	MCP	0.30				0.40					
NICKEL	MCP			32.8 B	21 B	61	124			42	48.9
POTASSIUM	MCP	3000 B	2950 B	25000 B	14000	18200	12900	4300 B	4330 B	23000 B	15200
SELENIUM	MCP										
SILVER	MCP										
SODIUM	MCP	4150 B	4350 B	86400	83200	47900	49700	5260	4630 B	178000	177000
THALLIUM	MCP										
VANADIUM	MCP										
ZINC	MCP	2930	3260	272	2.9 B	96.1	63.4	77.4	27.2	140	80.2
CYANIDE	MCP				128						
PHENOLS	MCP										
CHEMICAL OXYGEN DEMAND (mg O2/L)	MISC	11.0		19.6	82.2	60.66		12.72	22.3	50.41	0.015
TOTAL DISSOLVED SOLIDS (mg/L)	MISC	368	371	872	457	940		492	430	1042	43.2
TOTAL SUSPENDED SOLIDS (mg/L)	MISC	9		218	369	1189		26	141	504	1270
AMMONIA, AS N (mg/L)	MISC	0.108		1.48	1.34	20.7		14.75			97
NITRATE-NITROGEN (mg/L)	MISC	0.63	0.748			3.47		0.17			0.338
TOTAL KJELDAHL NITROGEN, AS N (mg/	MISC	1.12	0.612	1.98	5.07	22.12		15.4	1.4		7.78
pH UNITS	MISC	7.2		11.8		7.2		7.15			
TOTAL ORGANIC CARBON (mg/L)	MISC	80.7	1.54	71.67	17	178.2		91.22	2.52	6.95	5.48
ACIDITY (mg CaCO3/L)	MISC		63.6	NR	9.64				116	113.6	153
ALKALINITY (mg/L CaCO3)	MISC	261	339	282	224	523		251	423	310	483
BICARBONATE (mg CaCO3/L)	MISC	261	332	219	216	499		251	415	301	474
BIOLOGICAL OXYGEN DEMAND (mg/L)	MISC	5.5		53.4	19	17.5		2.5	3	34.2	4
CHLORIDE (mg Cl/L)	MISC	9.93	7.2	79.41	122	89.33		19.85	14.3	109.19	132
HARDNESS (mg/L CaCO3)	MISC	360.50	350	488.13	229	1353		463.20	466	606.56	642
OIL & GREASE (mg/L)	MISC		9.2	1.87	8	NR	10.8		8	1.25	1.2
PHOSPHATE (mg/L)	MISC	0.029		0.048		.601		0.034		0.139	
SULFATE (mg/L)	MISC	30	53.1	37.5	88.5	180		60.5	99.6	390	440
SP CONDUCTANCE (umho/cm)	MISC	563		2825		1673		605		1856	

All results reported in µg/L (ppb) unless otherwise specified.
 B - Less than quantitation limit but greater than or equal to instrument detection limit.
 N - Spike sample % recovery out of control limits.
 S - Value determined by the method of standard addition (MSA).
 NR - Not Required
 * - Duplicate analysis not within control limits.
 + - Correlation coefficient for method standard addition is less than 0.995
 W - Post digestion spike for analysis is out of control limits.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-6I		MW-6D		MW-7S		MW-8I		MW-8D	
WELL SCREEN LOCATION		ROCHESTER FRM		IRONDEQUOIT FRM		OVERBURDEN		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		3/21/90	4/2/91	3/21/90	4/3/91	3/22/90	4/2/91	3/21/90	4/3/91	3/21/90	4/3/91
PARAMETER	TYPE										
ALUMINUM	MCP	457	46.7 B	777	277	3930	351	257	264	1240	1200
ANTIMONY	MCP										29.2 B
ARSENIC	MCP										2.4 B
BARIUM	MCP			5.7 B,N+ 122 B	145 B	71.8 B,N	30 B		7.6 B,NS 38.6 B		30 B
BERYLLIUM	MCP										
CADMIUM	MCP										
CALCIUM	MCP	83800	88300	112000 48.5	140000 48	211000	167000	106000 13.3	119000 12.7	128000	143000
CHROMIUM	MCP					22.9	44			31.7	17.9
COBALT	MCP					32.3 B	102				11.6 B
COPPER	MCP			29.1		69.8*	18.2 B				15.1 B
IRON	MCP	337 NE	183	3790 NE	1350	11900	1760	754 NE	855	7500 NE	4160
LEAD	MCP	7.3 N	6.3	22 B,NW	120 S		1.5 B	6.8 N	3.8 B		9.4 B+
MAGNESIUM	MCP	36200	34900	50000	48500	99000	97500	47700	47500	68900	77600
MANGANESE	MCP		2.5 B	40.6 N	36.4	2170	364	76.8 N	19	721 N	685
MERCURY	MCP	0.30				0.40					
NICKEL	MCP			32.8 B	21 B	61	124			42	48.9
POTASSIUM	MCP	3000 B	2950 B	25000 B	14000	18200	12900	4300 B	4330 B	23000 B	15200
SELENIUM	MCP										
SILVER	MCP										
SODIUM	MCP	4150 B	4350 B	86400	83200	47900	49700	5260	4630 B	178000	177000
THALLIUM	MCP										
VANADIUM	MCP										
ZINC	MCP	2930	3260	272	128	96.1	63.4	77.4	27.2	140	80.2
CYANIDE	MCP										
PHENOLS	MCP										
CHEMICAL OXYGEN DEMAND (mg O2/L)	MISC	11.0		19.6	82.2	60.66		12.72	22.3	50.41	0.015
TOTAL DISSOLVED SOLIDS (mg/L)	MISC	368	371	872	457	940		492	430	1042	43.2
TOTAL SUSPENDED SOLIDS (mg/L)	MISC	9		218	369	1189		26	141	504	1270
AMMONIA, AS N (mg/L)	MISC	0.108		1.48	1.34	20.7		14.75			97
NITRATE-NITROGEN (mg/L)	MISC	0.63	0.748			3.47		0.17			0.338
TOTAL KJELDAHL NITROGEN, AS N (mg/L)	MISC	1.12	0.612	1.98	5.07	22.12		15.4	1.4		7.78
pH UNITS	MISC	7.2		11.8		7.2		7.15			
TOTAL ORGANIC CARBON (mg/L)	MISC	80.7	1.54	71.67	17	178.2		91.22	2.52	6.95	5.48
ACIDITY (mg CaCO3/L)	MISC		63.6	NR	9.64				116	113.6	153
ALKALINITY (mg/L CaCO3)	MISC	261	339	282	224	523		251	423	310	483
BICARBONATE (mg CaCO3/L)	MISC	261	332	219	216	499		251	415	301	474
BIOLOGICAL OXYGEN DEMAND (mg/L)	MISC	5.5		53.4	19	17.5		2.5	3	34.2	4
CHLORIDE (mg Cl/L)	MISC	9.93	7.2	79.41	122	89.33		19.85	14.3	109.19	132
HARDNESS (mg/L CaCO3)	MISC	360.50	350	488.13	229	1353		463.20	466	606.56	642
OIL & GREASE (mg/L)	MISC		9.2	1.87	8	NR	10.8		8	1.25	1.2
PHOSPHATE (mg/L)	MISC	0.029		0.048		.601		0.034		0.139	
SULFATE (mg/L)	MISC	30	53.1	37.5	88.5	180		60.5	99.6	390	440
SULFIDE (mg/L)	MISC					2.08					
SP CONDUCTANCE (umho/CM)	MISC	563		2825		1673		605		1856	

All results reported in µg/L (ppb) unless otherwise specified.
Only detected results are reported.
E - Estimated value due to interference.

B - Less than quantitation limit but greater than or equal to instrument detection limit.
N - Spike sample % recovery out of control limits.
S - Value determined by the method of standard addition (MSA).
NR - Not Required

+ - Correlation coefficient for method standard addition is less than 0.995
W - Post digestion spike for analysis is out of control limits.
* - Duplicate analysis not within control limits.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-9S		MW-9I		MW-10I		MW-10D		MW-11D		MW-12I		MW-12D	
WELL SCREEN LOCATION		OVERBURDEN		ROCKWAY FRM		ROCHESTER FRM		IRONDEQUOIT FRM		IRONDEQUOIT FRM		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		DOWNGRAIENT		DOWNGRAIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT	
COLLECTION DATE		4/1/91		4/1/91		4/3/91		4/3/91		7/10/91		5/2/91		5/2/91	
PARAMETER	TYPE	3/20/90	4/1/91	3/20/90	4/1/91	3/20/90	4/1/91	3/20/90	4/1/91	Total	Dissolved	3/20/90	4/1/91	3/20/90	4/1/91
ALUMINUM	MCP	833	1320	8630	41.6 B	47.5 B		43 B		35800		11600		485	
ANTIMONY	MCP		36 B					2.2 B		44	6.7 B	5.8 B		26.2 B	
ARSENIC	MCP	10.6 N+		16.4 NS	1.2 B			58.8 B		1350 E	744 E	107 B		66.5 B	
BARIUM	MCP	46.8 B	58.8 B	92.4 B	73.2 B					3.1 B					
BERYLLIUM	MCP														
CADMIUM	MCP	152000	164000	242000	142000	51600		542000		10900000	93800000	631000		337000	
CALCIUM	MCP	22		28				19.1		400 E		38			
CHROMIUM	MCP									29.4 B	5.0 B	7.3 B		10.2 B	
COBALT	MCP		3.5 B		21.6 B					224	4.2 B	22.3 B			
COPPER	MCP	130	14.5 B	76.6	1400	97.1 B		210		52400	695	13100		812	
IRON	MCP	3140 NE	3390	25500 NE	194 N+	82				90 B	36 B	38.9		1.1 B	
LEAD	MCP	721 N	22	194 N+	82					3780000	3900000 E	140000		139000	
MAGNESIUM	MCP	75000	77200	98400	68000	43300		215000		6480	846 E	493		256	
MANGANESE	MCP	1230 N	1270	1670 N	1030	11 B		168							
MERCURY	MCP	0.20													
NICKEL	MCP		13.8 B	37.1 B		23100		15 B		252	66.6	33.8 B		23 B	
POTASSIUM	MCP	66000	95200	100000	57000			51900		511000	559000	74800		58000	
SELENIUM	MCP										11.0 B				
SILVER	MCP														
SODIUM	MCP	93900	78100	868500	83900	41700		2160000		2970000	33900000	1300000		1870000	
THALLIUM	MCP														
VANADIUM	MCP		2.8 B			4.2 B		4.1 B		45.6 B	11.4 B	18.4 B		83.1	
ZINC	MCP	1950	77.5	268	645	14.2 B				440	136 N	53.7			
CYANIDE	MCP														
PHENOLS	MCP							0.131		0.154	NA				
CHEMICAL OXYGEN DEMAND (mg O2/L)	MISC	7.91	46.2	8.94	43.2	22.3		246		NA	NA	140		206	
TOTAL DISSOLVED SOLIDS (mg/L)	MISC	958	1200	1260	1050	496		12100		NA	NA	7080		8700	
TOTAL SUSPENDED SOLIDS (mg/L)	MISC	114	81	662	10	115		53		NA	NA	480		905	
AMMONIA, AS N (mg/L)	MISC	6.0	2.12	13.5	2.79	1.64		3.81		NA	NA	4.46		3.75	
NITRATE-NITROGEN (mg/L)	MISC	2.57	7.11	2.7	2.7					NA	NA	0.54			
TOTAL KJELDAHL NITROGEN, AS N (mg/L)	MISC	8.4	2.12	11.2	3.29	4.29		9.92		NA	NA	24.2		20.5	
pH UNITS	MISC	6.25		6.85						NA	NA				
TOTAL ORGANIC CARBON (mg/L)	MISC	125.9	12.5	36.41	24.1	1.73		10.5		NA	NA	12.2		2.26	
ACIDITY (mg CaCO3/L)	MISC	303	303	219	219	67.7		338		NA	NA	67		135	
ALKALINITY (mg/L CaCO3)	MISC	521	568	292	545	349		349		NA	NA	249		857	
BICARBONATE (mg CaCO3/L)	MISC	521	557	292	534	341		341		NA	NA	204		852	
BIOLOGICAL OXYGEN DEMAND (mg/L)	MISC	9.5		6.3		3		27		NA	NA	8		12	
CHLORIDE (mg Cl/L)	MISC	168.74	161	168.74	164	50.2		6050		NA	NA	2920		3820	
HARDNESS (mg/L CaCO3)	MISC	692.42	720	1015.7	641	329		3360		NA	NA	2130		1860	
OIL & GREASE (mg/L)	MISC					2		5.2		NA	NA	8.4		2.4	
PHOSPHATE (mg/L)	MISC	0.212		0.036	0.289					NA	NA				
SULFATE (mg/L)	MISC	155	289	265	208	81.5		1940		NA	NA	1810		1880	
SULFIDE (mg/L)	MISC	9.6		13.6		61.6		135		NA	NA				
SP CONDUCTANCE (umho/cm)	MISC	1999		2203.2						NA	NA				

All results reported in µg/L (ppb) unless otherwise specified.

B - Less than quantitation limit but greater than or equal to instrument detection limit.

N - Spike sample % recovery out of control limits.

S - Value determined by the method of standard addition (MSA).

Only detected results are reported.

E - Estimated value due to interference.

+ - Correlation coefficient for method standard addition is less than 0.995.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-9S		MW-9I		MW-10I		MW-10D		MW-11D		MW-12I		MW-12D	
WELL SCREEN LOCATION		OVERBURDEN		ROCKWAY FRM		ROCHESTER FRM		IRONDEQUOIT FRM		IRONDEQUOIT FRM		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIANT		DOWNGRADIANT		UPGRADIANT		UPGRADIANT		UPGRADIANT		DOWNGRADIANT		UPGRADIANT	
COLLECTION DATE		3/20/90		3/20/90		4/1/91		4/3/91		4/3/91					
PARAMETER	TYPE														
ALUMINUM	MCP	833	1320	8630	41.6 B	47.5 B						11600		485	
ANTIMONY	MCP		36 B											26.2 B	
ARSENIC	MCP	10.6 N+		16.4 NS	1.2 B							5.8 B			
BARIUM	MCP	46.8 B	58.8 B	92.4 B	73.2 B							107 B		66.5 B	
BERYLLIUM	MCP														
CADMIUM	MCP														
CALCIUM	MCP	152000	164000	242000	142000	51600						631000		337000	
CHROMIUM	MCP	22		28								38			
COBALT	MCP		3.5 B									7.3 B		10.2 B	
COPPER	MCP	130	14.5 B	76.6	21.6 B							22.3 B			
IRON	MCP	3140 NE	3390	25500 NE	1400	97.1 B						13100		812	
LEAD	MCP	721 N	22	194 N+	82							38.9		1.1 B	
MAGNESIUM	MCP	75000		98400	68000	43300						140000		139000	
MANGANESE	MCP	1230 N	1270	1670 N	1030	11 B						493		256	
MERCURY	MCP	0.20													
NICKEL	MCP		13.8 B	37.1 B								33.8 B		23 B	
POTASSIUM	MCP	66000	95200	100000	57000	23100						74800		58000	
SELENIUM	MCP														
SILVER	MCP				3.5 B										
SODIUM	MCP	93900	78100	868500	83900	41700						1300000		1870000	
THALLIUM	MCP														
VANADIUM	MCP		2.8 B		2.7 B	4.2 B						18.4 B			
ZINC	MCP	1950	77.5	268	645	14.2 B						53.7		83.1	
CYANIDE	MCP														
PHENOLS	MCP														
CHEMICAL OXYGEN DEMAND (mg O2/L)	MISC	7.91	46.2	8.94	43.2	22.3		0.131				140		206	
TOTAL DISSOLVED SOLIDS (mg/L)	MISC	958	1200	1260	1050	496		246				7080		8700	
TOTAL SUSPENDED SOLIDS (mg/L)	MISC	114	81	662	10	115		12100				480		905	
AMMONIA, AS N (mg/L)	MISC	6.0	2.12	13.5	2.79	1.64		3.81				4.46		3.75	
NITRATE-NITROGEN (mg/L)	MISC	2.57	7.11	2.7	2.7							0.54			
TOTAL KJELDAHL NITROGEN, AS N (mg/L)	MISC	8.4	2.12	11.2	3.29	4.29		9.92				24.2		20.5	
pH UNITS	MISC	6.25		6.85											
TOTAL ORGANIC CARBON (mg/L)	MISC	125.9	12.5	36.41	24.1	1.73		10.5				12.2		2.26	
ACIDITY (mg CaCO3/L)	MISC	303	303		219	67.7		338				67		135	
ALKALINITY (mg/L CaCO3)	MISC	521	568	292	545	349		349				249		857	
BICARBONATE (mg CaCO3/L)	MISC	521	557	292	534	341		341				204		852	
BIOLOGICAL OXYGEN DEMAND (mg/L)	MISC	9.5		6.3		3		27				8		12	
CHLORIDE (mg Cl/L)	MISC	168.74	161	168.74	164	50.2		6050				2920		3820	
HARDNESS (mg/L CaCO3)	MISC	692.42	720	1015.7	641	329		3360				2130		1860	
OIL & GREASE (mg/L)	MISC					2		5.2				8.4		2.4	
PHOSPHATE (mg/L)	MISC	0.212	289	0.036	0.289	81.5		1940				1810		1880	
SULFATE (mg/L)	MISC	155		265	208	61.6		135							
SULFIDE (mg/L)	MISC	9.6		13.6											
SP CONDUCTANCE (umho/cm)	MISC	1999		2203.2											

All results reported in µg/L (ppb) unless otherwise specified.
 B - Less than quantitation limit but greater than or equal to instrument detection limit.
 N - Spike sample % recovery out of control limits.
 S - Value determined by the method of standard addition (MSA).
 + - Correlation coefficient for method standard addition is less than 0.995

Only detected results are reported.
 E - Estimated value due to interference.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID	MW-9S	MW-9I	MW-10I	MW-10D	MW-11D	MW-12I	MW-12D
WELL SCREEN LOCATION	OVERBURDEN	ROCKWAY FRM	ROCHESTER FRM	IRONDEQUOIT FRM	IRONDEQUOIT FRM	ROCHESTER FRM	IRONDEQUOIT FRM
RELATIVE HORIZONTAL GRADIENT	DOWNGRADIENT	DOWNGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT
COLLECTION DATE	3/20/90	4/1/91	4/3/91	4/3/91	7/10/91	4/30/91	4/30/91
PARAMETER	TYPE						
ALPHA-BHC	PST						
BETA-BHC	PST						
DELTA-BHC	PST						
GAMMA-BHC (LINDANE)	PST						
HEPTACHLOR	PST						
ALDRIN	PST						
HEPTACHLOR EPOXIDE	PST						
ENDOSULFAN I	PST						
DIELDRIN	PST						
4,4'-DDE	PST						
ENDRIN	PST						
ENDOSULFAN II	PST						
4,4'-DDD	PST						
ENDOSULFAN SULFATE	PST						
4,4'-DDT	PST						
METHOXYCHLOR	PST						
ENDRIN KETONE	PST						
ALPHA-CHLORDANE	PST						
GAMMA-CHLORDANE	PST						
TOXAPHENE	PST						
AROCOR-1016	PCB						
AROCOR-1221	PCB						
AROCOR-1232	PCB						
AROCOR-1242	PCB						
AROCOR-1248	PCB						
AROCOR-1254	PCB						
AROCOR-1260	PCB						

J - Indicates the result is less than the sample
quantitation limit but greater than zero.

All results reported in µg/L (ppb).
Only detected results are reported.

PHASE I AND II

Data not yet available

J ~ Indicates the result is less than the sample quantitation limit but greater than zero.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID	WELL SCREEN LOCATION	MW-9S	MW-9I	MW-10I	MW-10D	MW-11D	MW-12I	MW-12D
RELATIVE HORIZONTAL GRADIENT		OVERBURDEN	ROCKWAY FRM	ROCHESTER FRM	IRONDEQUOIT FRM	IRONDEQUOIT FRM	ROCHESTER FRM	IRONDEQUOIT FRM
COLLECTION DATE		DOWNGRADIENT	DOWNGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT
PARAMETER	TYPE	3/20/90	4/1/91	4/3/91	4/3/91	7/10/91	4/30/91	4/30/91
FLUORENE	SEMI							
4-NITROANILINE	SEMI							
4,6-DINITRO-2-METHYLPHENOL	SEMI							
N-NITROSODIPHENYLAMINE	SEMI							
4-BROMOPHENYL-PHENYL ETHER	SEMI							
HEXACHLOROBENZENE	SEMI							
PENTACHLOROPHENOL	SEMI							
PHENANTHRENE	SEMI	0.5 J						
ANTHRACENE	SEMI	0.2 J						
DI-N-BUTYLPHTHALATE	SEMI	R		2 J				
FLUORANTHENE	SEMI	1 J						
PYRENE	SEMI	1 J						
BUTYLBENZYLPHTHALATE	SEMI	0.9 J						
3,3'-DICHLOROBENZIDINE	SEMI							
BENZO(A)ANTHRACENE	SEMI	1 J						
CHRYSENE	SEMI	0.4 J						
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	R		26 B				
DI-N-OCTYL PHTHALATE	SEMI	0.9 J	R					
BENZO(B)FLUORANTHENE	SEMI	0.6 J	0.6 J					
BENZO(K)FLUORANTHENE	SEMI	0.5 J						
BENZO(A)PYRENE	SEMI	0.5 J						
INDENO(1,2,3-CD)PYRENE	SEMI							
DIBENZ(A,H)ANTHRACENE	SEMI							
BENZO(G,H,I)PERYLENE	SEMI							

All results reported in µg/L (ppb).

Only detected results are reported.

B - Less than quantitation limit but greater than or equal to instrument detection limit.

J - Indicates the result is less than the sample quantitation limit but greater than zero.

R - Analyte rejected due to blank contamination.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID	MW-9S		MW-10I		MW-10D		MW-11D		MW-12I		MW-12D	
WELL SCREEN LOCATION	OVERBURDEN		ROCKWAY FRM		IRONDEQUOIT FRM		IRONDEQUOIT FRM		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT	DOWNGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT	
COLLECTION DATE	3/20/90	4/1/91	3/20/90	4/1/91	4/3/91	4/3/91	4/3/91	4/3/91				
PARAMETER	TYPE											
FLUORENE	SEMI											
4-NITROANILINE	SEMI											
4,6-DINITRO-2-METHYLPHENOL	SEMI											
N-NITROSODIPHENYLAMINE	SEMI											
4-BROMOPHENYL-PHENYL ETHER	SEMI											
HEXACHLOROBENZENE	SEMI											
PENTACHLOROPHENOL	SEMI											
PHENANTHRENE	SEMI	0.5 J										
ANTHRACENE	SEMI	0.2 J										
DI-N-BUTYLPHTHALATE	SEMI	R										
FLUORANTHENE	SEMI	1 J										
PYRENE	SEMI	1 J										
BUTYLBENZYLPHTHALATE	SEMI	0.9 J										
3,3'-DICHLOOROBENZIDINE	SEMI											
BENZO(A)ANTHRACENE	SEMI	1 J										
CHRYSENE	SEMI	0.4 J										
BIS(2-ETHYLHEXYL)PHTHALATE	SEMI	R										
DI-N-OCTYL PHTHALATE	SEMI	0.9 J										
BENZO(B)FLUORANTHENE	SEMI	0.6 J										
BENZO(K)FLUORANTHENE	SEMI	0.5 J										
BENZO(A)PYRENE	SEMI	0.5 J										
INDENO(1,2,3-CD)PYRENE	SEMI											
DIBENZ(A,H)ANTHRACENE	SEMI											
BENZO(G,H,I)PERYLENE	SEMI											

Data not yet available

All results reported in µg/L (ppb).
Only detected results are reported.
B - Less than the quantitation limit but greater than or equal to instrument detection limit.
J - Indicates the result is less than the sample quantitation limit but greater than zero.
R - Analyte rejected due to blank contamination.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID	WELL SCREEN LOCATION	MW-9S	MW-9I	MW-10I	MW-10D	MW-11D	MW-12I	MW-12D
RELATIVE HORIZONTAL GRADIENT	OVERBURDEN	ROCKWAY FRM	IRONDEQUOIT FRM	ROCHESTER FRM	IRONDEQUOIT FRM	IRONDEQUOIT FRM	ROCHESTER FRM	IRONDEQUOIT FRM
COLLECTION DATE	DOWNGRADIENT	DOWNGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT
PARAMETER	3/20/90	4/1/91	3/20/90	4/1/91	4/3/91	7/10/91	4/30/91	4/30/91
TYPE								
PHENOL	SEMI							
BIS(2-CHLOROETHYL) ETHER	SEMI							
2-CHLOROPHENOL	SEMI							
1,3-DICHLOROBENZENE	SEMI							
1,4-DICHLOROBENZENE	SEMI							
BENZYL ALCOHOL	SEMI							
1,2-DICHLOROBENZENE	SEMI							
2-METHYLPHENOL	SEMI							
BIS(2-CHLOROISOPROPYL) ETHER	SEMI							
4-METHYLPHENOL	SEMI							
N-NITROSO-DI-N-PROPYLAMINE	SEMI							
HEXACHLOROETHANE	SEMI							
NITROBENZENE	SEMI							
ISOPHORONE	SEMI							
2-NITROPHENOL	SEMI							
2,4-DIMETHYLPHENOL	SEMI							
BENZOIC ACID	SEMI							
BIS(2-CHLOROETHOXY)METHANE	SEMI							
2,4-DICHLOROPHENOL	SEMI							
1,2,4-TRICHLOROBENZENE	SEMI							
NAPHTHALENE	SEMI							
4-CHLOROANILINE	SEMI							
HEXACHLOROBUTADIENE	SEMI							
4-CHLORO-3-METHYLPHENOL	SEMI							
2-METHYLNAPHTHALENE	SEMI							
HEXACHLOROCYCLOPENTADIENE	SEMI							
2,4,6-TRICHLOROPHENOL	SEMI							
2,4,5-TRICHLOROPHENOL	SEMI							
2-CHLORONAPHTHALENE	SEMI							
2-NITROANILINE	SEMI							
DIMETHYLPHTHALATE	SEMI							
ACENAPHTHYLENE	SEMI							
2,6-DINITROTOLUENE	SEMI							
3-NITROANILINE	SEMI							
ACENAPHTHENE	SEMI							
2,4-DINITROPHENOL	SEMI							
4-NITROPHENOL	SEMI							
DIBENZOFURAN	SEMI							
2,4-DINITROTOLUENE	SEMI							
DIETHYLPHTHALATE	SEMI							
4-CHLOROPHENYL-PHENYL ETHER	SEMI							

R - Analyte rejected due to blank contamination (See Appendix O).

J - Indicates the result is less than the sample quantitation limit but greater than zero.

All results reported in µg/L (ppb).

Only detected results are reported.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID	MW-9S	MW-9I	MW-10I	MW-10D	MW-11D	MW-12I	MW-12D
WELL SCREEN LOCATION	OVERBURDEN	ROCKWAY FRM	ROCHESTER FRM	IRONDEQUOIT FRM	IRONDEQUOIT FRM	ROCHESTER FRM	IRONDEQUOIT FRM
RELATIVE HORIZONTAL GRADIENT	DOWNGRADIENT	DOWNGRADIENT	UPGRADIENT	UPGRADIENT	UPGRADIENT	DOWNGRADIENT	UPGRADIENT
COLLECTION DATE	3/20/90	3/20/90	4/3/91	4/3/91			
PARAMETER							
PHENOL	TYPE						
BIS(2-CHLOROETHYL) ETHER	SEMI						
2-CHLOROPHENOL	SEMI						
1,3-DICHLOROBENZENE	SEMI						
1,4-DICHLOROBENZENE	SEMI						
BENZYL ALCOHOL	SEMI						
1,2-DICHLOROBENZENE	SEMI						
2-METHYLPHENOL	SEMI						
BIS(2-CHLOROISOPROPYL) ETHER	SEMI						
4-METHYLPHENOL	SEMI						
N-NITROSO-DI-N-PROPYLAMINE	SEMI						
HEXACHLOROETHANE	SEMI						
NITROBENZENE	SEMI						
ISOPHORONE	SEMI						
2-NITROPHENOL	SEMI						
2,4-DIMETHYLPHENOL	SEMI						
BENZOIC ACID	SEMI						
BIS(2-CHLOROETHOXY)METHANE	SEMI						
2,4-DICHLOROPHENOL	SEMI						
1,2,4-TRICHLOROBENZENE	SEMI						
NAPHTHALENE	SEMI						
4-CHLOROANILINE	SEMI						
HEXACHLOROBUTADIENE	SEMI						
4-CHLORO-3-METHYLPHENOL	SEMI						
2-METHYLNAPHTHALENE	SEMI						
HEXACHLOROCYCLOPENTADIENE	SEMI						
2,4,6-TRICHLOROPHENOL	SEMI						
2,4,5-TRICHLOROPHENOL	SEMI						
2-CHLORONAPHTHALENE	SEMI						
2-NITROANILINE	SEMI						
DIMETHYLPHTHALATE	SEMI						
ACENAPHTHYLENE	SEMI						
2,6-DINITROTOLUENE	SEMI						
3-NITROANILINE	SEMI						
ACENAPHTHENE	SEMI						
2,4-DINITROPHENOL	SEMI						
4-NITROPHENOL	SEMI						
DIBENZOFURAN	SEMI						
2,4-DINITROTOLUENE	SEMI						
DIETHYLPHTHALATE	SEMI						
4-CHLOROPHENYL-PHENYL ETHER	SEMI						

Data not yet available

1 J

R - Analyte rejected due to blank contamination (See Appendix O).
J - Indicates the result is less than the sample quantitation limit but greater than zero.

All results reported in µg/L (ppb).
Only detected results are reported.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID	MW-9S		MW-9I		MW-10I	MW-10D		MW-11D		MW-12I		MW-12D
WELL SCREEN LOCATION	OVERBURDEN		ROCKWAY FRM		ROCHESTER FRM	IRONDEQUOIT FRM		IRONDEQUOIT FRM		ROCHESTER FRM		IRONDEQUOIT FRM
RELATIVE HORIZONTAL GRADIENT	DOWNGRADIENT		DOWNGRADIENT		UPGRADIENT	UPGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT
COLLECTION DATE	3/20/90	4/1/91	3/20/90	4/1/91	4/3/91	4/3/91	4/3/91	7/10/91	4/30/91	4/30/91	4/30/91	4/30/91
PARAMETER												
TYPE												
CHLOROMETHANE												
BROMOMETHANE												
VINYL CHLORIDE		4J	12	11								
CHLOROETHANE												
METHYLENE CHLORIDE					2 J	12 JB						
ACETONE	R	16	R	5 J	10 B	340 B		R		16 B		
CARBON DISULFIDE												
1,1-DICHLOROETHENE												
1,1-DICHLOROETHANE												
1,2-DICHLOROETHENE (TOTAL)	7	9	17	21								
CHLOROFORM												
1,2-DICHLOROETHANE										4 J		
2-BUTANONE												
1,1,1-TRICHLOROETHANE												
CARBON TETRACHLORIDE												
VINYL ACETATE												
BROMODICHLOROMETHANE												
1,2-DICHLOROPROPANE												
CIS-1,3-DICHLOROPROPENE												
TRICHLOROETHENE												
DIBROMOCHLOROMETHANE												
1,1,2-TRICHLOROETHANE												
BENZENE	R	3 J								3 J		
TRANS-1,3-DICHLOROPROPENE												
BROMOFORM												
4-METHYL-2-PENTANONE												
2-HEXANONE												
TETRACHLOROETHENE												
1,1,2,2-TETRACHLOROETHANE												
TOLUENE												
CHLOROBENZENE												
ETHYLBENZENE	1 J									8		
STYRENE												
TOTAL XYLENES	3 J		3 J							4 J		

J - Indicates the result is less than the sample quantitation limit but greater than zero.
B - Analyte is detected in method blank.
R - Analyte rejected due to blank contamination(See appendix O).

All results reported in µg/L (ppb).
Only detected results are reported.

LOCKPORT CITY LANDFILL:
GROUNDWATER ANALYTICAL RESULTS
PHASE I AND II

SAMPLE-ID		MW-9S		MW-9I		MW-10I		MW-10D		MW-11D		MW-12I		MW-12D	
WELL SCREEN LOCATION		OVERBURDEN		ROCKWAY FRM		ROCHESTER FRM		IRONDEQUOIT FRM		IRONDEQUOIT FRM		ROCHESTER FRM		IRONDEQUOIT FRM	
RELATIVE HORIZONTAL GRADIENT		DOWNGRADIENT		DOWNGRADIENT		UPGRADIENT		UPGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT	
COLLECTION DATE		3/20/90	4/1/91	3/20/90	4/1/91	4/3/91		4/3/91							
PARAMETER	TYPE														
CHLOROMETHANE	VOC														
BROMOMETHANE	VOC														
VINYL CHLORIDE	VOC	4J		12	11										
CHLOROETHANE	VOC														
METHYLENE CHLORIDE	VOC														
ACETONE	VOC	R	16	R	5 J	2 J	10 B	12 JB					16 B		
CARBON DISULFIDE	VOC							340 B							
1,1-DICHLOROETHENE	VOC														
1,1-DICHLOROETHANE	VOC														
1,2-DICHLOROETHENE (TOTAL)	VOC	7	9	17	21										
CHLOROFORM	VOC														
1,2-DICHLOROETHANE	VOC														
2-BUTANONE	VOC														
1,1,1-TRICHLOROETHANE	VOC														
CARBON TETRACHLORIDE	VOC														
VINYL ACETATE	VOC														
BROMODICHLOROMETHANE	VOC														
1,2-DICHLOROPROPANE	VOC														
CIS-1,3-DICHLOROPROPENE	VOC														
TRICHLOROETHENE	VOC														
DIBROMOCHLOROMETHANE	VOC														
1,1,2-TRICHLOROETHANE	VOC														
BENZENE	VOC	R	3 J												
TRANS-1,3-DICHLOROPROPENE	VOC														
BROMOFORM	VOC														
4-METHYL-2-PENTANONE	VOC														
2-HEXANONE	VOC														
TETRACHLOROETHENE	VOC														
1,1,2,2-TETRACHLOROETHANE	VOC														
TOLUENE	VOC														
CHLOROBENZENE	VOC														
ETHYLBENZENE	VOC	1 J													
STYRENE	VOC														
TOTAL XYLENES	VOC	3 J		3 J											4 J

Data not yet available

All results reported in µg/L (ppb).
Only detected results are reported.

J - Indicates the result is less than the sample quantitation limit but greater than zero.
B - Analyte is detected in method blank.
R - Analyte rejected due to blank contamination(See appendix O).

APPENDIX N
ENVIRONMENTAL MODEL CALCULATIONS

PROJECT LOCKPORT CITY LANDFILL
SUBJECT CONTAMINANT TRANSPORT

AGE _____ OF _____
SHEET NO. 0 OF _____
JOB NO. 35180.00
MADE BY _____ DATE _____
CHKD. BY _____ DATE _____

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SUMMARY

1) LIST OF ASSUMPTIONS

- GRIMSBY IS THE ONLY LAYER STRETCHING CONTINUOUSLY OVER THE AREA OF INTEREST
- DOWNWARD VERTICAL FLOW DIRECTION. THE MAGNITUDE OF VERTICAL FLOW ASSUMED TO BE EQUAL TO THE INFILTRATION
- HORIZONTAL FLOW IN GRIMSBY ASSUMED FROM THE LANDFILL TOWARDS THE RESIDENTIAL WELL. THE MAGNITUDE WAS ASSUMED AS EQUAL TO THE MAGNITUDE OF FLOW IN UPPER LAYERS.
- THE RESIDENTIAL WELL IS DRAINING WATER FROM THE GRIMSBY AQUIFER
- THE CONCENTRATION IN ALL LAYERS UNDERNEATH THE LANDFILL ASSUMED TO HAVE REACHED THE STEADY STATE.
- NO CONTAMINATION FROM OFF-SITE.

2) RESULTING CONC. IN THE PRIVATE WELL

BASED ON ASSUMPTIONS FROM 1) THE CONCENTRATION OF CONTAMINANT IN THE VICINITY OF THE PRIVATE WELL IS ABOUT 3% OF THE CONC. IN THE LANDFILL ($3E-2$ LANDFILL)

3) SENSITIVITY

IF THE HORIZ. AND VERT. FLOWS ARE VARIED FROM 10% TO 1000% OF THAT ASSUMED, THE RESULTING CONCENTRATIONS IN THE VICINITY OF PRIVATE WELL WERE FROM ~~FROM~~

$4E-6$ TO $9E-1$ OF THAT IN THE LANDFILL
($4E-6$ LANDFILL — $9E-1$ LANDFILL)

PROJECT LOCKPORT CITY LANDFILL
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SUMMARY

1) LIST OF ASSUMPTIONS

- GRIMSBY IS THE ONLY LAYER STRETCHING CONTINUOUSLY OVER THE AREA OF INTEREST
- DOWNWARD VERTICAL FLOW DIRECTION. THE MAGNITUDE OF VERTICAL FLOW ASSUMED TO BE EQUAL TO THE INFILTRATION
- HORIZONTAL FLOW IN GRIMSBY ASSUMED FROM THE LANDFILL TO TOWARDS THE RESIDENTIAL WELL. THE MAGNITUDE WAS ASSUMED AS EQUAL TO THE MAGNITUDE OF FLOW IN UPPER LAYERS.
- THE RESIDENTIAL WELL IS DRAINING WATER FROM THE GRIMSBY AQUIFER
- THE CONCENTRATION IN ALL LAYERS UNDERNEATH THE LANDFILL ASSUMED TO HAVE REACHED THE STEADY STATE.
- NO CONTAMINATION FROM OFF-SITE.

2) RESULTING CONC. IN THE PRIVATE WELL

BASED ON ASSUMPTIONS FROM 1) THE CONCENTRATION OF CONTAMINANT IN THE VICINITY OF THE PRIVATE WELL IS ABOUT 0.3% OF THE CONC. IN THE LANDFILL ($3E-3$ LANDFILL)

3) SENSITIVITY

IF THE HORIZ AND VERT. FLOWS ARE VARIED FROM 10% TO 1000% OF THAT ASSUMED, THE RESULTING CONCENTRATIONS IN THE VICINITY OF PRIVATE WELL WOULD BE FROM ~~FROM~~ $3E-7$ TO $8E-1$ OF THAT IN THE LANDFILL ($3E-7$ LANDFILL — $8E-1$ LANDFILL)

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1) PROBLEM STATEMENT, ASSUMPTIONS AND CONCEPTUALIZATION

A PRIVATE WELL IS BEING OPERATED ABOUT 600 FT NORTH OF THE LOCKPORT CITY LANDFILL. THE PURPOSE OF THIS CALCULATION WAS TO DETERMINE THE POSSIBILITY OF THE WELL WATER BEING CONTAMINATED BY THE LEACHATE FROM THE LANDFILL.

THE GEOLOGICAL CROSS SECTION FROM THE LANDFILL AREA TOWARDS THE WELL INDICATES THAT THE ONLY CONTINUOUS FORMATION SEEMS TO BE THE GRIMSBY SANDSTONE. ALL OTHER FORMATIONS PRESENT AT THE LANDFILL SITE (OVERBURDEN, ROCHESTER SHALE, IRONDEQUIT LIMESTONE AND ROCKAWAY DOLOSTONE) TERMINATE AT THE FACE OF THE CLIFF OR DISCHARGE TO THE GULF. SINCE NO GEOLOGICAL INFORMATION IS AVAILABLE FOR THE AREA ON THE OPPOSITE SIDE OF THE GULF, THE GRIMSBY FORMATION WILL BE ASSUMED AS THE ONLY POSSIBLE CONTAMINANT TRANSPORT ROUTE VIA GROUNDWATER.

(SEE SHEET 12 FOR THE CROSS SECTION)

AS NO WELLS WERE SCREENED IN GRIMSBY, THE DIRECTIONS AND MAGNITUDES OF FLOWS (BOTH VERTICAL AND HORIZONTAL) WITHIN THIS FORMATION ARE NOT KNOWN. ASSUMING THE WORST CASE SCENARIO, THE VERTICAL FLOW WILL BE ASSUMED AS HAVING DOWNWARD DIRECTION, I.E. LEACHING FROM THE LANDFILL THROUGH THE UNDERLYING FORMATIONS INTO THE GRIMSBY. BECAUSE OF THE LACK OF DATA, THE MAGNITUDE OF THAT FLOW WILL BE ASSUMED AS BEING EQUAL TO THE INFILTRATION. ALSO, AS A WORST CASE SCENARIO, THE HORIZONTAL FLOW WILL BE ASSUMED FROM THE LANDFILL TOWARDS THE RESIDENTIAL WELL. BECAUSE OF THE LACK OF DATA ITS MAGNITUDE WILL BE ASSUMED AS BEING

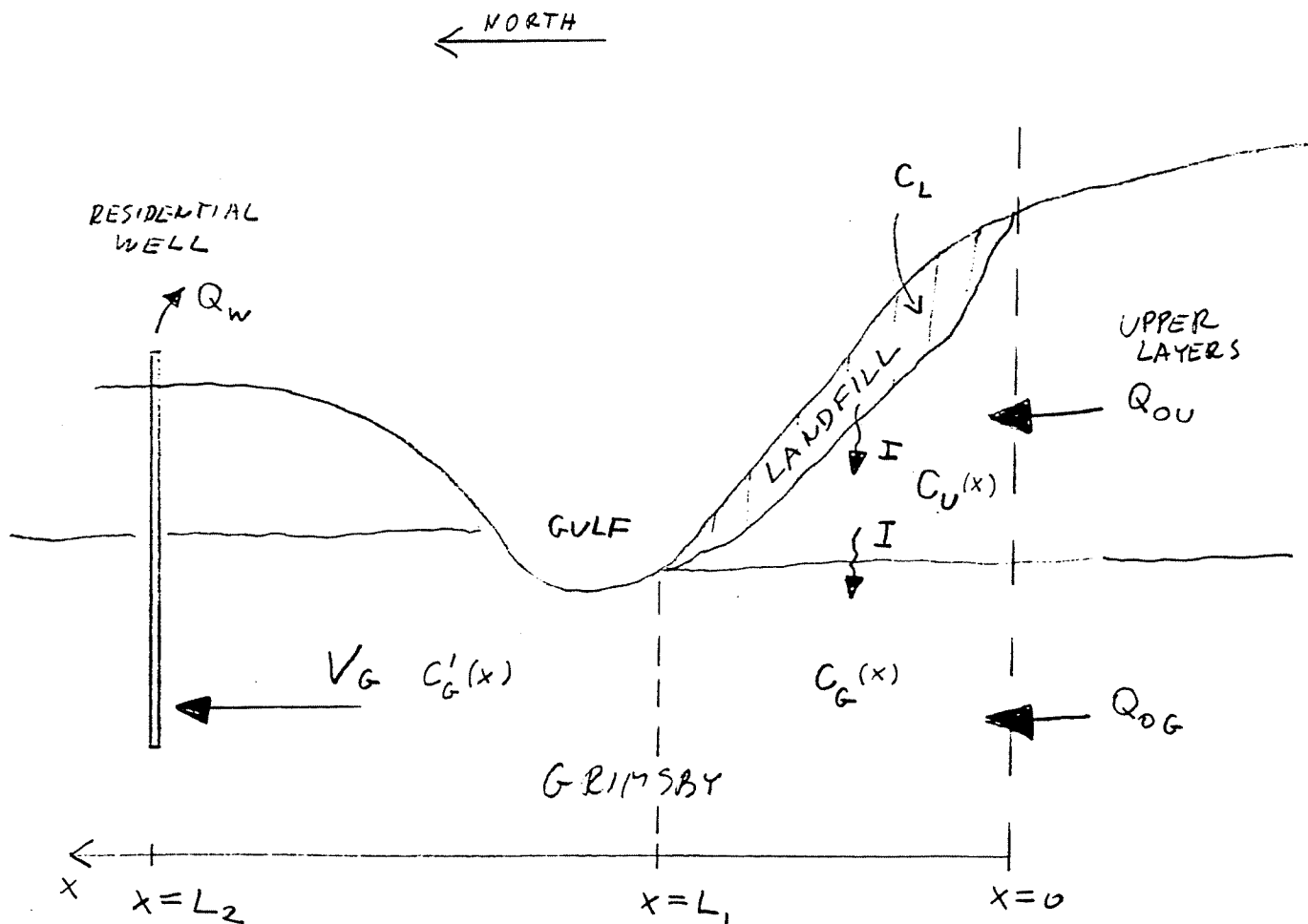
PROJECT LOCKPORT CITY LANDFILL
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EQUAL TO THAT OF THE FLOW VIA THE UPPER LAYERS. ANOTHER ASSUMPTION WHICH CORRESPONDS TO THE WORST CASE SCENARIO WILL BE THAT THE RESIDENTIAL WELL IS DRAWING WATER FROM THE GRIMSBY FORMATION.

NOTE: IF THE ACTUAL SITUATION DOES NOT AGREE WITH THE ASSUMED FLOW DIRECTIONS, MAGNITUDES AND WELL SCREEN LOCATION, THE PROCEEDING CALCULATIONS WILL NOT BE CORRECT IN DESCRIBING THE CONTAMINANT PROPAGATION.

THE ASSUMED SITUATION ON SITE CAN BE REPRESENTED AS FOLLOWS



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WHERE:

I - INFILTRATION

L_1 - LENGTH OF FLOW UNDERNEATH THE LANDFILL

L_2 - LENGTH OF FLOW UNDERNEATH THE LANDFILL AND TO
THE PRIVATE WELL

C_L - CONCENTRATION OF CONTAMINANT IN THE GROUNDWATER
WITHIN THE LANDFILL

C_U - CONCENTRATION OF CONTAMINANT IN THE
GROUNDWATER IN THE UPPER LAYERS UNDERNEATH
THE LANDFILL

C_G - CONCENTRATION OF CONTAMINANT ^{IN GW} IN GRIMSBY
UNDERNEATH THE LANDFILL

C'_G - CONCENTRATION OF CONTAMINANT IN THE
GROUNDWATER IN GRIMSBY BETWEEN THE
LANDFILL AND THE PRIVATE WELL

Q_{OU} - GROUNDWATER FLOW IN THE UPPER LAYERS
AT THE UPSTREAM EDGE OF LANDFILL

Q_{OG} - GROUNDWATER FLOW IN THE GRIMSBY AT
THE UPSTREAM EDGE OF LANDFILL

V_G - VELOCITY OF FLOW IN GRIMSBY BETWEEN
THE LANDFILL AND THE RESIDENTIAL WELL

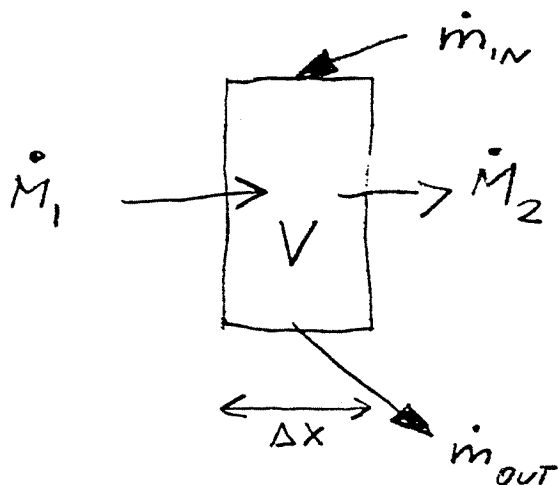
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2) CONTAMINANT CONCENTRATION

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A.) CONCENTRATION UNDERNEATH THE LANDFILL

THE CONCENTRATION UNDERNEATH THE LANDFILL WAS CALCULATED BASED ON THE 1-D APPROACH. THE MASS FLUX INCREMENT FOR THE STEADY STATE SITUATION WAS ASSUMED TO BE EQUAL TO THE SUM OF THE FLUXES DUE TO THE DISTRIBUTED SINKS/SOURCES.



V - CONTROL VOLUME
 $\dot{M}_1$ - MASS FLUX INTO THE CONTROL VOLUME
 $\dot{M}_2$ - MASS FLUX OUT OF THE CONTROL VOLUME
 $\dot{m}$ - DISTRIBUTED SINKS/SOURCES

$$\dot{M}_2 - \dot{M}_1 = (\dot{m}_{IN} - \dot{m}_{OUT}) \Delta x$$

$$\frac{\Delta \dot{M}}{\Delta x} = \dot{m}_{IN} - \dot{m}_{OUT}$$

$$\frac{d\dot{M}}{dx} = \dot{m}_{IN} - \dot{m}_{OUT} \quad (1)$$

NOTE: IN THIS APPROACH THE CONTROL VOLUME IS TREATED AS A COMPLETELY MIXED REACTOR

WHERE:

$$\begin{aligned} \dot{M} &= Q C \\ \dot{m}_{IN} &= q_{IN} C_{IN} \\ \dot{m}_{OUT} &= q_{OUT} C \end{aligned}$$

Q - FLOW THROUGH V
 C - CONC IN V
 C_{IN} - CONC IN DISTR. SOURCE
 q_{IN}, q_{OUT} - FLOWS OF SOURCE SINKS

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EQ (1) CAN BE WRITTEN AS

$$\frac{d(QC)}{dx} = q_{IN}C_{IN} - q_{OUT}C$$

$$\frac{dQ}{dx}C + \frac{dC}{dx}Q + q_{OUT}C = q_{IN}C_{IN}$$

$$\frac{dC}{dx} + \left(\frac{\frac{dQ}{dx} + q_{OUT}}{Q} \right) C = \frac{q_{IN}C_{IN}}{Q} \quad (2)$$

WHERE ALL C , Q , q_{OUT} , q_{IN} , C_{IN} CAN BE FUNCTIONS OF 'X'.

EQ (2) IS OF THE FORM

$$\frac{dy}{dx} + P(x)y = Q(x)$$

AND CAN BE SOLVED USING AN INTEGRATING FACTOR

$$\phi(x) = e^{\int P(x) dx} \quad \text{(FOR PROCEDURE SEE REF 1, SHEETS 13-15)}$$

FOR (2)

$$P(x) = \frac{\frac{dQ}{dx} + q_{OUT}}{Q}, \quad Q(x) = \frac{q_{IN}C_{IN}}{Q}$$

$$\begin{aligned} \phi(x) &= e^{\int \frac{\frac{dQ}{dx} + q_{OUT}}{Q} dx} = e^{\int \frac{\frac{dQ}{dx}}{Q} dx} e^{\int \frac{q_{OUT}}{Q} dx} = \\ &= e^{\ln Q} e^{\int \frac{q_{OUT}}{Q} dx} = Q e^{\int \frac{q_{OUT}}{Q} dx} \end{aligned}$$

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$$\frac{d}{dx} [\gamma \phi(x)] = Q(x) \phi(x)$$

WE HAVE

$$\frac{d}{dx} [CQ e^{\int \frac{q_{out}}{Q} dx}] = \frac{q_{in} C_{in}}{Q} Q e^{\int \frac{q_{out}}{Q} dx}$$

$$CQ e^{\int \frac{q_{out}}{Q} dx} = \int q_{in} C_{in} e^{\int \frac{q_{out}}{Q} dx} dx \quad (3)$$

CASE 1°: $Q(x) = Q_0$

$$\left. \begin{aligned} q_{out}(x) &= q_{in}(x) = q \\ C_{in}(x) &= C_{in} \end{aligned} \right\}$$

(THIS CASE IS FOR THE UPPER LAYERS).
SUBSTITUTE TO (3)

$$e^{\int \frac{q_{out}}{Q} dx} = e^{\int \frac{q}{Q_0} dx} = e^{\frac{q}{Q_0} x}$$

$$CQ_0 e^{\frac{q}{Q_0} x} = \int q C_{in} e^{\frac{q}{Q_0} x} dx$$

$$CQ_0 e^{\frac{q}{Q_0} x} = \frac{Q_0 q C_{in}}{q} e^{\frac{q}{Q_0} x} + A$$

$$CQ_0 e^{\frac{q}{Q_0} x} = Q_0 C_{in} e^{\frac{q}{Q_0} x} + A$$

$$C(x) = C_{in} + \frac{A}{Q_0} e^{-\frac{q}{Q_0} x}$$

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B.C.

$$C(x=0) = C_0$$

$$C_0 = C_{IN} + \frac{A}{Q_0}$$

$$A = (C_0 - C_{IN}) Q_0$$

AND

$$C(x) = C_{IN} + \frac{Q_0(C_0 - C_{IN})}{Q_0} e^{-\frac{q}{Q_0}x}$$

$$C(x) = C_{IN} + (C_0 - C_{IN}) e^{-\frac{q}{Q_0}x} \quad (3A)$$

$$C(x) = C_0 e^{-\frac{q}{Q_0}x} + C_{IN} (1 - e^{-\frac{q}{Q_0}x}) \quad (4)$$

FOR UPPER LAYERS FROM (3A)

$$C_U(x) = C_L + (C_{OU} - C_L) e^{-\frac{q_U}{Q_{OU}}x} \quad (5)$$

CASE 2° :

$$Q(x) = Q_0 + qx$$

$$q_{out}(x) = 0$$

$$q_{in}(x) = q$$

$$C_{IN}(x) = C_{IN}(x)$$

(THIS CASE IS FOR
GRIMSBY)

SUBSTITUTE TO

(3)

$$e^{\int \frac{q_0}{Q} dx} = e^{\int 0 dx} = e^{A^*} = A$$

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$$C(Q_0 + q_x) A = \int q C_{IN}(x) A dx$$

$$C(Q_0 + q_x) A = q A \int C_{IN}(x) dx$$

$$C(x) = \frac{q}{Q_0 + q_x} \int C_{IN}(x) dx \quad (6)$$

ASSUMING THE INPUT CONC. $C_{IN}(x)$ AS RESULTING FROM CASE 1, WE HAVE FROM (5)

$$C_{IN}(x) = C_L + (C_0 - C_L) e^{-\frac{q_U}{Q_0 U} x} = C_U(x)$$

AND, FOR GRIMSBY FROM (5) AND (6)

$$C_G(x) = \frac{q_G}{Q_0 G + q_G x} \int \left[C_L + (C_0 - C_L) e^{-\frac{q_U}{Q_0 U} x} \right] dx$$

SUBSCRIPTS U, G DENOTE UPPER AND LOWER (GRIMSBY) AQUIFER RESPECTIVELY

$$C_2(x) = \frac{q_G}{Q_0 G + q_G x} \left[C_L x - \frac{Q_0 U (C_0 - C_L)}{q_U} e^{-\frac{q_U}{Q_0 U} x} + B \right]$$

B. C.

$$C_G(x=0) = C_0 G$$

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$$C_{O_2} = \frac{q_G}{Q_{OG} + q_{GO}} \left[C_{L \cdot 0} - \frac{Q_{OV}(C_{OV} - C_L)}{q_U} e^{-\frac{q_U \cdot 0}{Q_{OV}}} + B \right]$$

$$C_{O_2} = \frac{q_G}{Q_{OG}} \left[-\frac{Q_{OV}(C_{OV} - C_L)}{q_U} + B \right]$$

$$B = \frac{C_{OG} Q_{OG}}{q_G} + \frac{Q_{OV}(C_{OV} - C_L)}{q_U}$$

AND

$$C_2(x) = \frac{q_G}{Q_{OG} + q_{GX}} \left[C_{L^x} - \frac{Q_{OV}(C_{OV} - C_L)}{q_U} e^{-\frac{q_U x}{Q_{OV}}} + \frac{C_{OG} Q_{OG}}{q_G} + \frac{Q_{OV}(C_{OV} - C_L)}{q_U} \right]$$

$$C_2(x) = \frac{q_G C_{L^x}}{Q_{OG} + q_{GX}} - \frac{q_G Q_{OV}(C_{OV} - C_L)}{q_U (Q_{OG} + q_{GX})} \left(1 - e^{-\frac{q_U x}{Q_{OV}}} \right) + \frac{C_{OG} Q_{OG}}{Q_{OG} + q_{GX}} \quad (7)$$

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 SUBSTITUTING THE SITE SPECIFIC VALUES TO (7)
 (SEE ASSUMPTIONS IN PART 1)

$$Q_G = Q_U = I = 8.16 \text{ IN/HR} = 1.9 \times 10^{-3} \text{ FT/DAY}$$

$$Q_{OU} = Q_{OG} = Q = 4.2 \text{ FT}^2/\text{DAY} \quad \left(\text{FOR SECTION CC, THE CLOSEST TO THE PRIVATE WELL SEE SHEET 16 OR SHEET 27 OF THE GW FLOW CALCS.} \right)$$

$$\text{FOR } L_1 = 650 \text{ FT}$$

 L_1 - LENGTH OF FLOW UNDERNEATH THE LANDFILL (SEE TOPO MAP)

$$C_{OU} = C_{OG} = 0 \quad - \text{NO INCOMING CONTAMINATION FROM OFF-SITE}$$

WE HAVE

$$C_2(L_1) = \left[\frac{IL_1}{Q + IL_1} - \frac{Q}{Q + IL_1} \left(1 - e^{-\frac{IL_1}{Q}} \right) \right] C_L$$

 WHERE C_L IS THE CONCENTRATION OF CONTAMINANT IN THE GROUNDWATER WITHIN THE LANDFILL

$$C_G(L_1) = \left[\frac{1.9 \times 10^{-3} \times 650 - 4.2 \left(1 - e^{-\frac{1.9 \times 10^{-3} \times 650}{4.2}} \right)}{4.2 + 1.9 \times 10^{-3} \times 650} \right] C_L$$

$$C_G(L_1) = 0.03 \times C_L$$

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• SENSITIVITY ANALYSIS

A SENSITIVITY TO TWO PARAMETERS - I AND Q - WAS INVESTIGATED. BOTH WERE CHANGED TO 10% AND 1000% OF ASSUMED VALUES.

$C_G(L_1)$ AS A FRACTION OF C_L

I [FT/DAY] Q [FT²/DAY]	1.9E-4	1.9E-3	1.9E-2
0.42	.03	.51	.93
4.20	.0004	<u>.03</u>	.51
42.00	.000004	.0004	.03

THIS REPRESENTS A REDUCTION OF THE 1 TO 7 ORDERS OF MAGNITUDE, WITH THE ASSUMED REDUCTION OF 3 ORDERS OF MAGNITUDE.

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B.) IN THE VICINITY OF THE PRIVATE WELL

THE FLOW VELOCITY IN THE GRIMBY FORMATION IS NOT KNOWN. HOWEVER, ASSUMING TYPICAL VALUES FOR GROUNDWATER FLOW VELOCITY E. EX.

$$V = 0.1 \text{ --- } 1.00 \text{ FT/DAY}$$

AND TAKING THE DISTANCE BETWEEN THE LANDFILL

$$L_D = L_2 - L_1 \cong 500 \text{ FT}$$

THE TIME OF TRAVEL FROM THE EDGE OF THE LANDFILL TO THE PRIVATE WELL IS

$$t = \frac{V}{L_D} = \frac{500}{0.1} \text{ OR } \frac{500}{1.00}$$

$$t = 5,000 \text{ --- } 500 \text{ DAYS}$$

$$t = 13.7 \text{ --- } 1.37 \text{ YEARS}$$

SINCE THE LANDFILL HAS BEEN OPERATED FOR MORE THAN 30 YRS, THE CONCENTRATION

$$\underline{\underline{C_G(L_1) = 0.03 * C_L}}$$

IS REACHING THE LOCATION OF THE PRIVATE WELL

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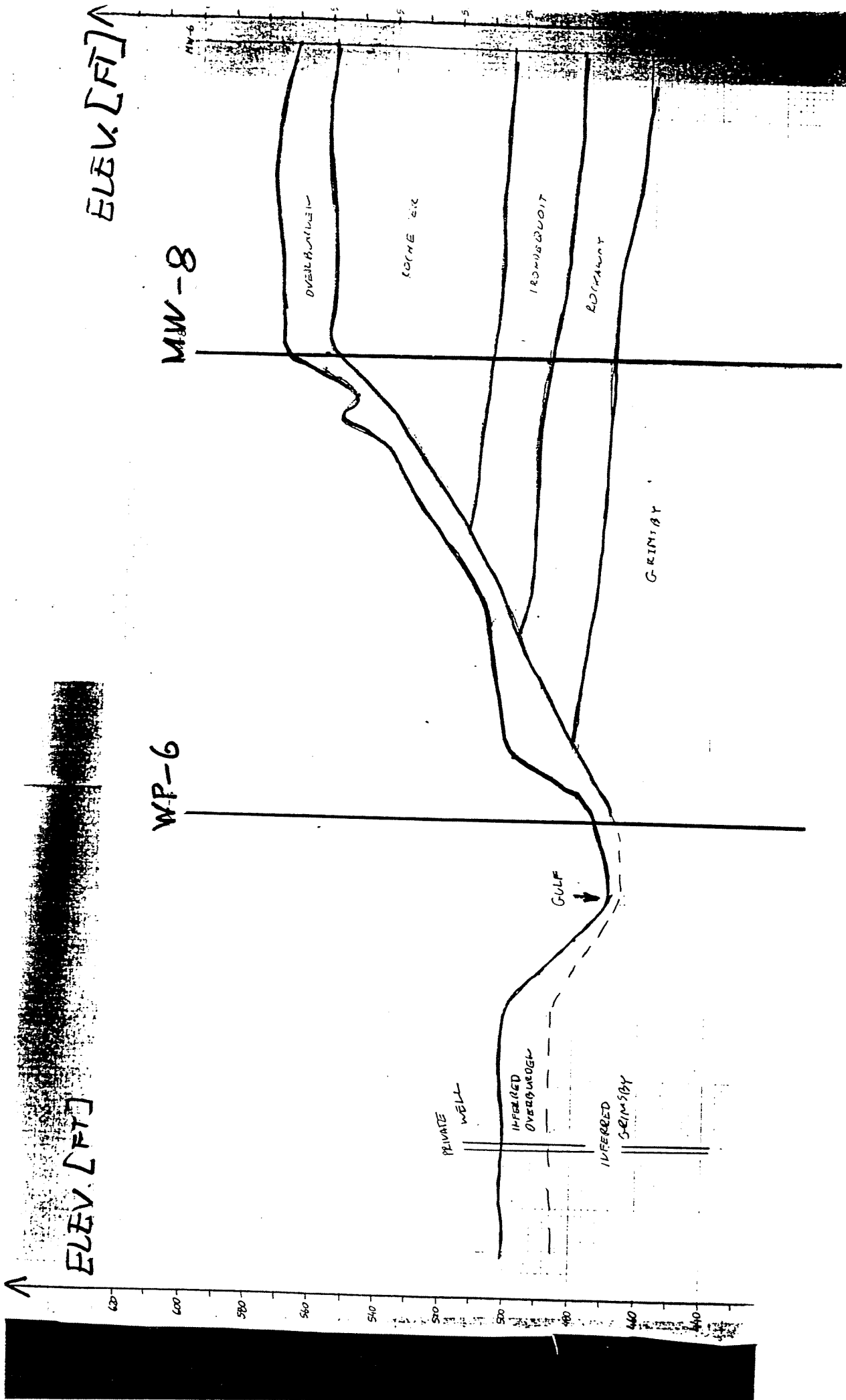
PROJECT LOCKPORT CITY LANDFILL
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JOB NO. 35180
MADE BY 170 DATE 05/06/13
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REFERENCES

- 1) ADVANCED ENGINEERING MATHEMATICS, FIFTH EDITION,
C.R. WYLIE, L.C. BARRET



ADVANCED ENGINEERING MATHEMATICS

FIFTH EDITION

C. RAY WYLIE

Emeritus Professor of Mathematics
Furman University

LOUIS C. BARRETT

Professor of Mathematics
Montana State University

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(c) If $a^2 + A^2 = 0$ or $b^2 + B^2 = 0$, the given equation is separable and, if $c^2 + C^2 = 0$, it is homogeneous.

Using appropriate substitutions, as described in Exercise 31, solve each of the following equations:

$$32 \quad y' = \frac{x - y + 5}{x + y - 1}$$

$$33 \quad y' = \frac{2x + 2y + 1}{3x + y - 2}$$

$$34 \quad y' = (y - x)/(x - y + 2)$$

$$35 \quad (2x + y)y' = 1$$

$$36 \quad y' = (y + 2)/(x + y + 1)$$

$$37 \quad (2x - y)y' = 4x - 2y - 5$$

38 Prove that $b + c = 0$ is a sufficient condition for all solution curves of the equation $y' = (ax + by)/(cx + ey)$ to be conics. Prove further that when this is the case, the conics are all ellipses if $c^2 + ae < 0$ and are all hyperbolas if $c^2 + ae > 0$.

39 Show that $b + c = 0$ is not a necessary condition for the solution curves of the equation $y' = (ax + by)/(cx + ey)$ to be conics. *Hint:* Construct a counterexample.

40 If $M(x, y) dx = N(x, y) dy$ is a homogeneous equation, prove that, if it is expressed in terms of the polar coordinates r and θ by means of the substitutions $x = r \cos \theta$ and $y = r \sin \theta$, it becomes separable.

Solve the next two equations, using the method described in Exercise 40.

$$41 \quad y' = \frac{x + y}{x - y}$$

$$42 \quad y' = \frac{x + 2y}{2x - y}$$

43 If $f(x, y)$ is a homogeneous function of degree n , show that

$$x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y} = nf$$

What is the generalization of this result to functions of more than two variables? (This result is commonly referred to as **Euler's theorem for homogeneous functions**.†)

44 Show that if the equation $M(x, y) dx + N(x, y) dy = 0$ is both homogeneous and exact, its solutions are given by $xM(x, y) + yN(x, y) = k$.

45 If the equation $M(x, y) dx + N(x, y) dy = 0$ is homogeneous, show that $1/(xM + yN)$ is an integrating factor. *Hint:* Observe that

$$\frac{M dx + N dy}{xM + yN} = \frac{dx}{x} + \frac{(x dy - y dx)N}{x(xM + yN)} = \frac{dx}{x} + \frac{(x dy - y dx)/x^2}{M/N + y/x}$$

1.11 Linear First-Order Equations

First-order equations which are linear form an important class of differential equations which can always be routinely solved by the use of an integrating factor. By definition, a linear, first-order differential equation cannot contain products, powers, or other nonlinear combinations of y or y' . Hence its most general form is

$$F(x) \frac{dy}{dx} + G(x)y = H(x)$$

If we divide this equation by $F(x)$ and rename the coefficients, it appears in the more usual form

$$(1) \quad \frac{dy}{dx} + P(x)y = Q(x)$$

† Named for the Swiss mathematician Leonard Euler (1707–1783), one of the most prolific, and one of the greatest, mathematicians of all time.

15

To determine whether this equation is, or can be made, exact, let us rewrite it in the form

$$(2) \quad [P(x)y - Q(x)] dx + dy = 0$$

Here $M(x,y) = P(x)y - Q(x)$, $N(x,y) = 1$, and the condition for exactness $\partial M/\partial y \equiv \partial N/\partial x$ becomes $P(x) \equiv 0$. This is surely not true in general; and when it is true, Eq. (1) can be solved immediately by integration, and no further investigation is necessary.

Assuming $P(x) \neq 0$, let us now attempt to find an integrating factor $\phi(x)$ for Eq. (2). Applying the test for exactness to the new equation

$$(3) \quad \phi(x)[P(x)y - Q(x)] dx + \phi(x) dy = 0$$

it follows that $\phi(x)$ will be an integrating factor provided

$$\phi(x)P(x) = \phi'(x)$$

This is a simple separable equation, any nontrivial solution of which will serve our purpose. Hence, we can write, in particular,

$$\frac{d\phi(x)}{\phi(x)} = P(x) dx \quad \ln|\phi(x)| = \int P(x) dx \quad \phi(x) = e^{\int P(x) dx}$$

Thus (2), or equally well (1), possesses the integrating factor $\phi(x) = e^{\int P(x) dx}$.

When (1) is multiplied by $e^{\int P(x) dx}$, it can be written in the form

$$\frac{d}{dx} (ye^{\int P(x) dx}) = Q(x)e^{\int P(x) dx}$$

The left-hand side is now an exact derivative and hence can be integrated at once. Moreover, the right-hand side is a function of x only and therefore can also be integrated, with at most practical difficulties requiring numerical integration. Thus we have, on performing these integrations,

$$ye^{\int P(x) dx} = \int Q(x)e^{\int P(x) dx} dx + c$$

and finally, after dividing by $e^{\int P(x) dx}$,

$$(4) \quad y = e^{-\int P(x) dx} \int Q(x)e^{\int P(x) dx} dx + ce^{-\int P(x) dx}$$

Equation (4) should *not* be remembered as a formula for the solution of (1). Instead, a linear first-order equation should be solved by actually carrying out the steps we have described:

1. Compute the integrating factor $e^{\int P(x) dx}$.

2. Multiply the right-hand side of the given equation by this factor and write the

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- UPSTREAM ELEVATION OF WATER TABLE (ASSUMED AT THE LOCATION OF B-2) AT 505 FT, WHICH WAS ASSUMED BASED ON THE STRATIGRAPHY OF SECTION CC

$$H_u = 505 \text{ FT}$$

- DOWNSTREAM WATER ELEVATION AT MW-55

$$H_D = 472 \text{ FT (REF 3, SHEET 36)}$$

- LENGTH OF FLOW BASED ON CROSS SECTION CC

$$L = 500 \text{ FT (SEE TOPO)}$$

- BOTTOM OF THE STRATA ASSUMED FROM CROSS SECTION CC

$$H_{\text{BOT}} = 465 \text{ FT (SEE CROSS SECTION CC SHEET 48)}$$

FLOW CALCULATED BASED ON

$$Q = K \frac{H_u^2 - H_D^2}{2L} \quad (\text{REF 2, SEE SHEET 35})$$

$$Q = 9.9 \frac{[(505-465)^2 - (472-465)^2]}{2 \cdot 500}$$

$$Q = 15.4 \text{ FT}^2/\text{DAY}$$

PROJECT ROCHESTER CITY LANDFILL

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SUBJECT GROUNDWATER FLOW

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CHKD. BY DATE

1) FLOW PATTERN

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PAGE

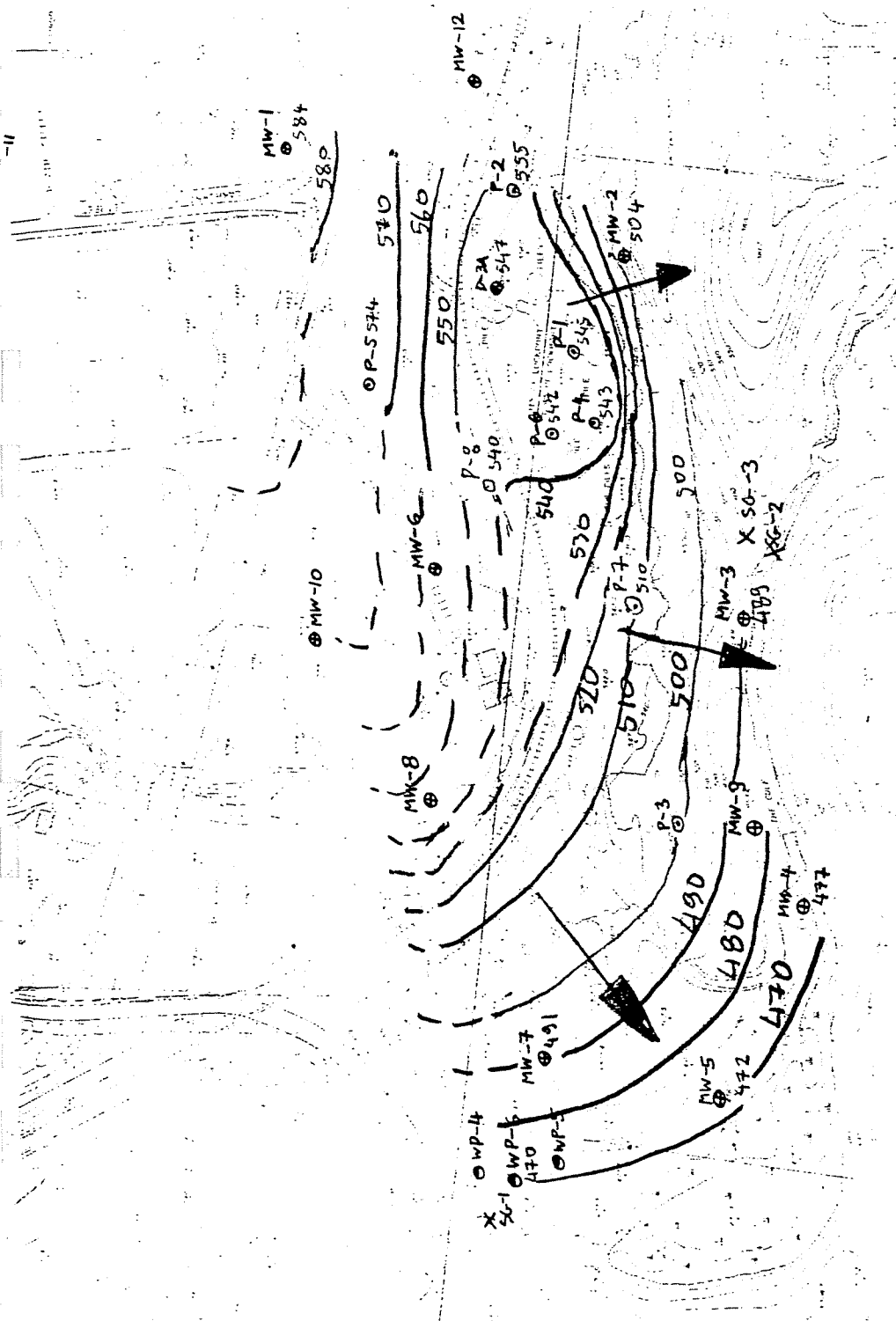
THE GROUNDWATER FLOW PATTERN WAS DETERMINED BASED ON THE MONITORING LEVELS RECORDED DURING THE SECOND ROUND OF RI, TO COME UP WITH ONE WATER ELEVATION REPRESENTATIVE OF EACH MONITORING LOCATION, THE RECORDED ELEVATIONS WERE AVERAGED OVER THE PERIOD OF MEASUREMENTS.

IT WAS DETERMINED THAT THE FLOW PATTERNS CAN BE DETERMINED FOR 3 STRATA: THE OVERBURDEN, THE ROCHESTER SHALE AND THE IRONDEQUOT LIMESTONE.

BASED ON THE MONITORED WATER LEVELS IT WAS ESTABLISHED THAT IN ALL OF THE ABOVE STRATA THE GROUNDWATER FLOW FOLLOWS ROUGHLY THE SAME PATTERN. IN THE SOUTHERN PORTION OF THE SITE (APPROXIMATELY FROM MW-12 TO MW-6) THE GROUNDWATER FLOWS FROM EAST TO WEST. IN THE NORTHERN PART (APPROXIMATELY FROM MW-5 TO THE GULF) THE FLOW DIRECTION CHANGES TO NORTH-WEST.

GENERALLY, THE FLOW IS ROUGHLY PERPENDICULAR TO THE CLIFF EDGE. (SEE SHEETS 1A-1D). ALSO, THE GROUNDWATER DIVIDE CAN BE OBSERVED ALONG THE WESTERN BOUNDARY OF THE SITE, APPROXIMATELY 500 - 700 FT FROM THE GULF, WITHIN THE ROCHESTER SHALE AND IRONDEQUOT LIMESTONE.

N



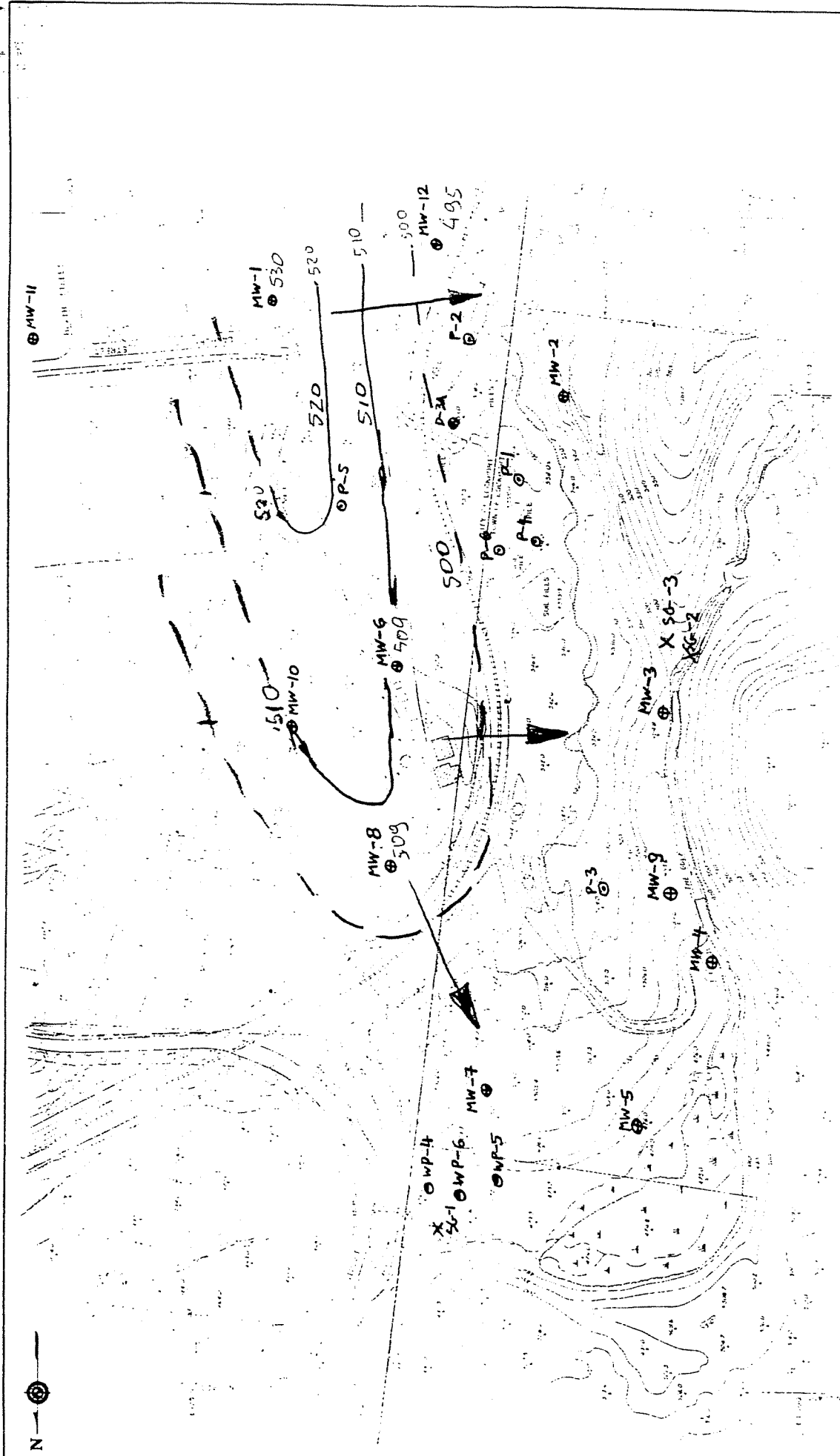
SCALE
0 100 FEET

— PIEZOMETRIC SURFACE
— INFERRED
— FLOW DIRECTION

DRAWN BY: CHECKED BY: DATE:		DATE: 2/21/91 4/26/91		LOCKPORT CITY LANDFILL CITY OF LOCKPORT, WISCONSIN		WATER TABLE AQ. PIEZOMETRIC SURF. Scale 1"=400'	
PROJECT NO.: SHEET NO.:		DATE: DATE:		DATE: DATE:		DATE: DATE:	

NOTE:
ALL PROPERTY LINES, BOUNDARY LINES, ETC. FROM CITY AND
COUNTY RECORDS. THIS MAP IS NOT TO BE USED FOR
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IT IS THE POLICY OF THE CITY OF LOCKPORT, WISCONSIN,
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1A

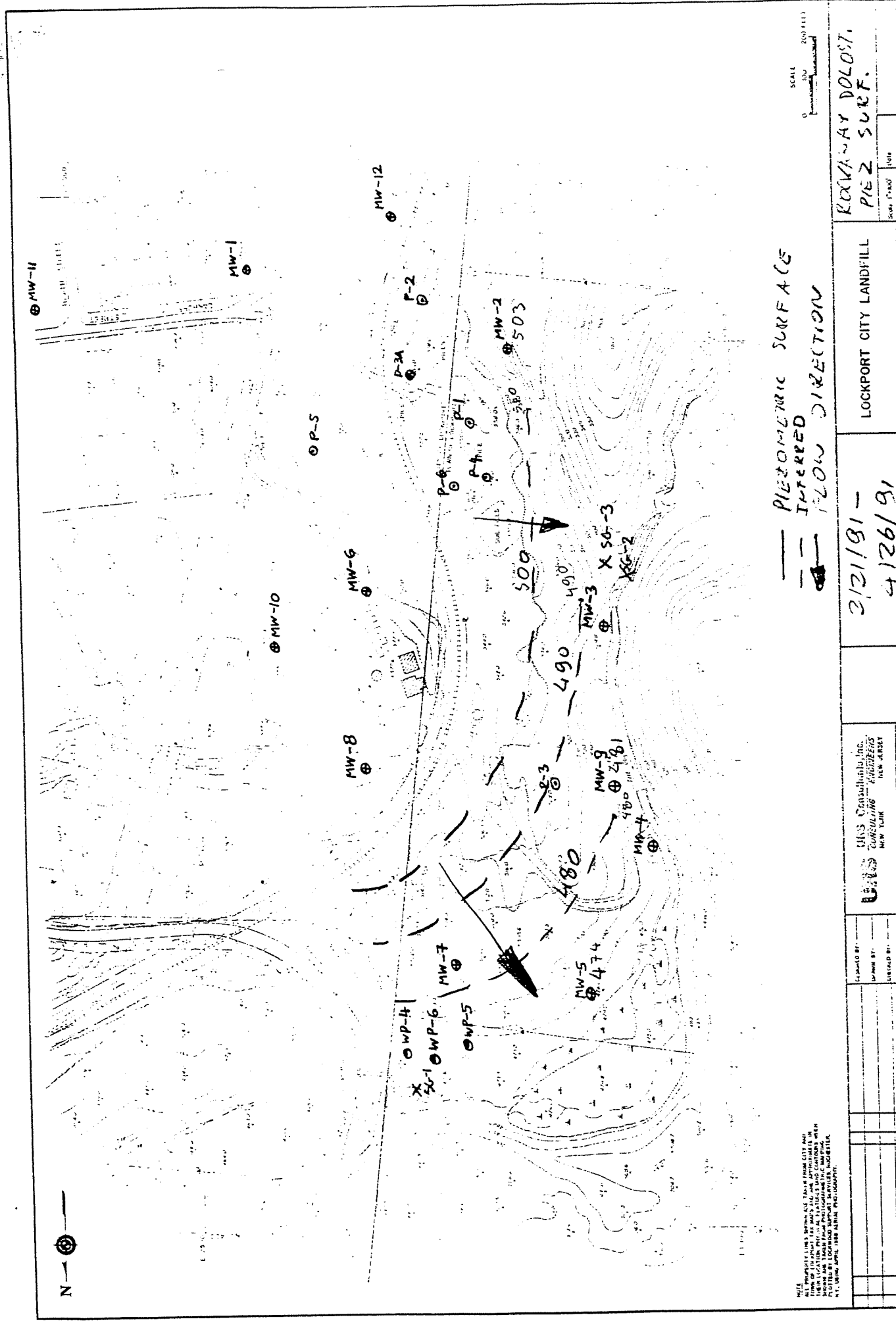


— PIEZOM. WATER SURFACE
 - - - INFERRED
 — DIRECTION OF FLOW

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SCALE
 0 100 200 FEET

LOCKPORT CITY LANDFILL WATER CURVE FILE NO.		IRIDIQUOIT LIMESTONE PIEZOM. SURF.	
2/21/91 - 4/26/91		LOCKPORT CITY LANDFILL WATER CURVE FILE NO.	
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REVISIONS NO. DATE DESCRIPTION		REVISIONS NO. DATE DESCRIPTION	



NOTE: ALL INFORMATION ON THIS MAP IS BASED ON DATA PROVIDED BY THE CLIENT. THE ENGINEER HAS CONDUCTED VISUAL INSPECTIONS OF THE LANDFILL AND HAS OBSERVED THE LOCATION OF THE MONITORING WELLS. THE ENGINEER HAS NOT CONDUCTED ANY OTHER INVESTIGATIONS. THE ENGINEER HAS NOT CONDUCTED ANY OTHER INVESTIGATIONS. THE ENGINEER HAS NOT CONDUCTED ANY OTHER INVESTIGATIONS.

LOCKPORT CITY LANDFILL CITY OF LOCKPORT WARDEN COUNTY NEW YORK		2/21/91 4/26/91		LOCKPORT CITY LANDFILL CITY OF LOCKPORT WARDEN COUNTY NEW YORK	
DATE: 2/21/91 TIME: 10:00 AM BY: J. J. J.		DATE: 4/26/91 TIME: 10:00 AM BY: J. J. J.		DATE: 2/21/91 TIME: 10:00 AM BY: J. J. J.	
PREPARED BY: J. J. J. CHECKED BY: J. J. J. DATE: 2/21/91		PREPARED BY: J. J. J. CHECKED BY: J. J. J. DATE: 4/26/91		PREPARED BY: J. J. J. CHECKED BY: J. J. J. DATE: 2/21/91	

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2. FLOW QUANTITIES

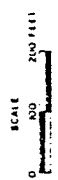
FLOW QUANTITIES WERE CALCULATED BASED ON A 1-D APPROXIM.
3 CROSS SECTIONS WERE SELECTED, BASED ON THE FLOW
PATTERNS AND AVAILABLE MONITORING DATA. FLOW RATE
CALCULATED FOR EACH CROSS SECTION WAS ASSIGNED
TO THE AREAL EXTENT OF WHICH THE CROSS SECTION
WAS ASSUMED TO BE REPRESENTATIVE.

THE PARAMETERS USED FOR CALCULATIONS (LIKE HYDRAULIC
CONDUCTIVITIES, LAYER THICKNESSES, RECHARGE ETC.)
WERE ASSUMED BASED ON THE R1 REPORT. THE
INFORMATION NOT FOUND IN THE R1 REPORT
WAS ASSUMED FROM THE LITERATURE.

THE FOLLOWING CROSS SECTIONS WERE USED:

- AA - FROM MW-1 TO MW-2. REPRESENTATIVE
OF THE AREAL EXTENT FROM THE SOUTHERN
BOUNDARY TO THE LOCATION OF WASTE SAMPLE
WS-1
- BB - FROM MW-6 TO MW-3. REPRESENTATIVE OF
THE AREAL EXTENT FROM WS-1 TO MW-4.
- CC - FROM MW-8 TO MW-5. REPRESENTATIVE OF
THE AREAL EXTENT FROM MW-4 TO NORTHERN
BOUNDARY

FOR THE LOCATIONS OF CROSS SECTIONS SEE
SHEET 2A.



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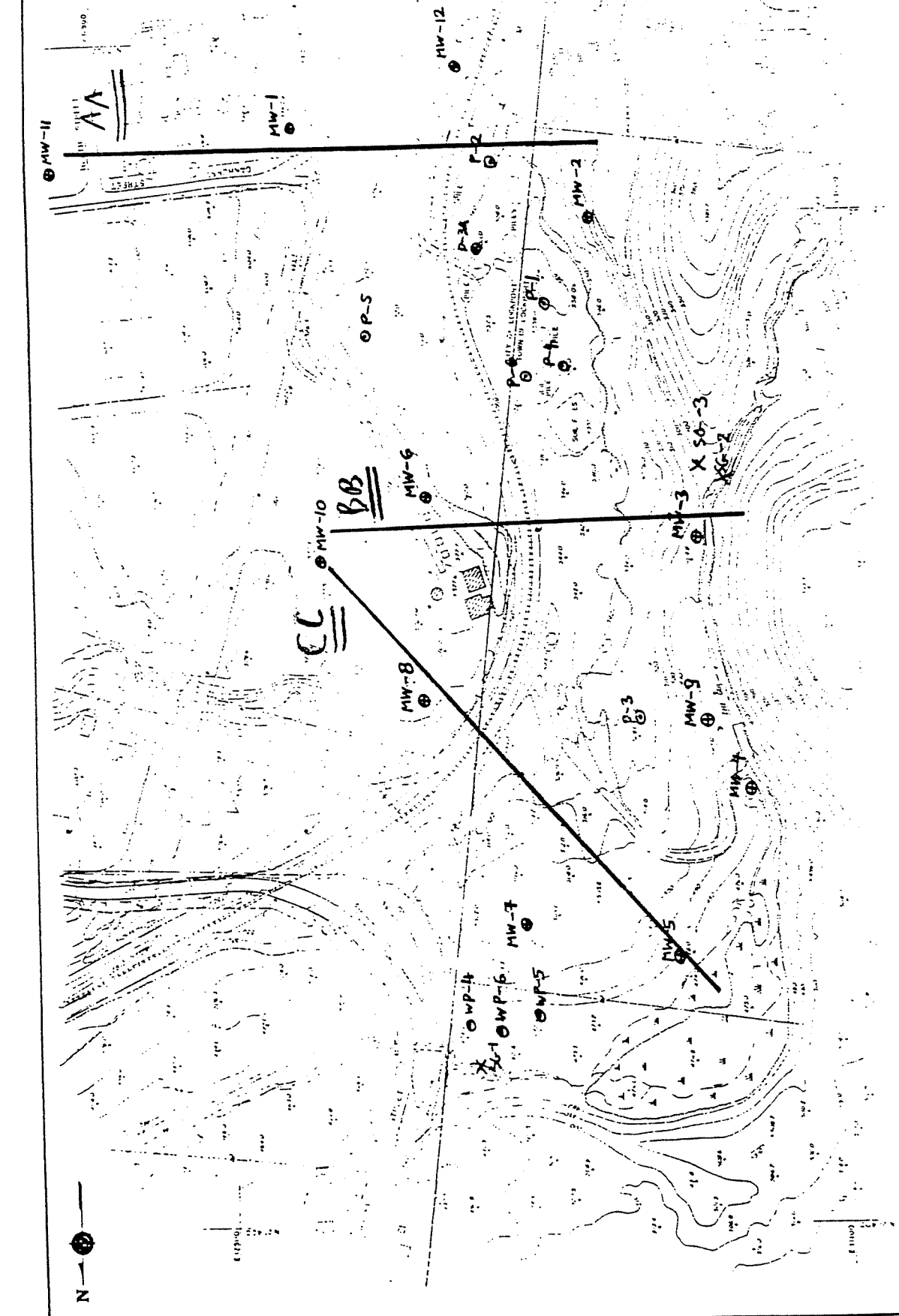
LOCKPORT CITY LANDFILL

LOCATIONS OF

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NEW YORK

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PROJECT: [blank]
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NEW YORK

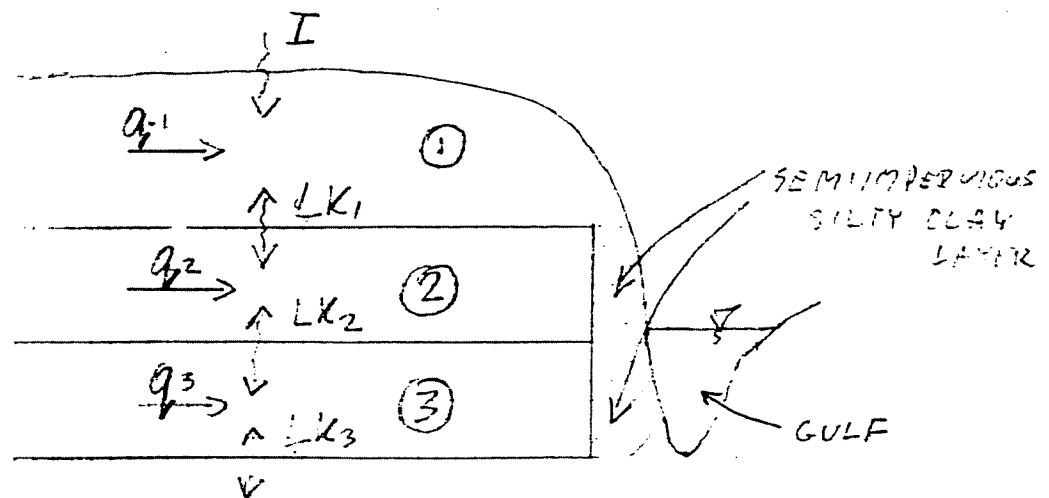
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 SUBJECT GROUNDED WATER FLOWS

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A.) SECTION "AA"

THE STRATIGRAPHY OF THE SECTION REPRESENTED BY FIG. 3 LAYERS:

- OVERBURDEN - UNCONFINED AQUIFER, UPSTREAM WATER LEVEL MEASURED BY MW-15, DOWNSTREAM WATER LEVEL MEASURED BY P-2. RECHARGE FROM THE RAINFALL INFILTRATION. LAYER (1).
- ROCHESTER SHALE - (CONFINED) UNCONFINED AQUIFER, UPSTREAM WATER TABLE MEASURED BY MW-11, DOWNSTREAM WATER TABLE REPRESENTED BY THE ATM. PRESS. OF THE OUTCROPPING LAYER. SEMIIMPERVIOUS SILTY CLAY LAYER AT THE DOWNSTREAM END. LAYER (2).
- IRONDEQUIT LIMESTONE - CONFINED AQUIFER, UPSTREAM WATER TABLE MEASURED BY MW-10, DOWNSTREAM REPRESENTED BY THE GULF. SEMIIMPERVIOUS SILTY CLAY LAYER AT THE DOWNSTREAM END. LAYER (3).



I - RECHARGE

 LK_1 - LEAKAGE BETWEEN LAYERS 1, 2

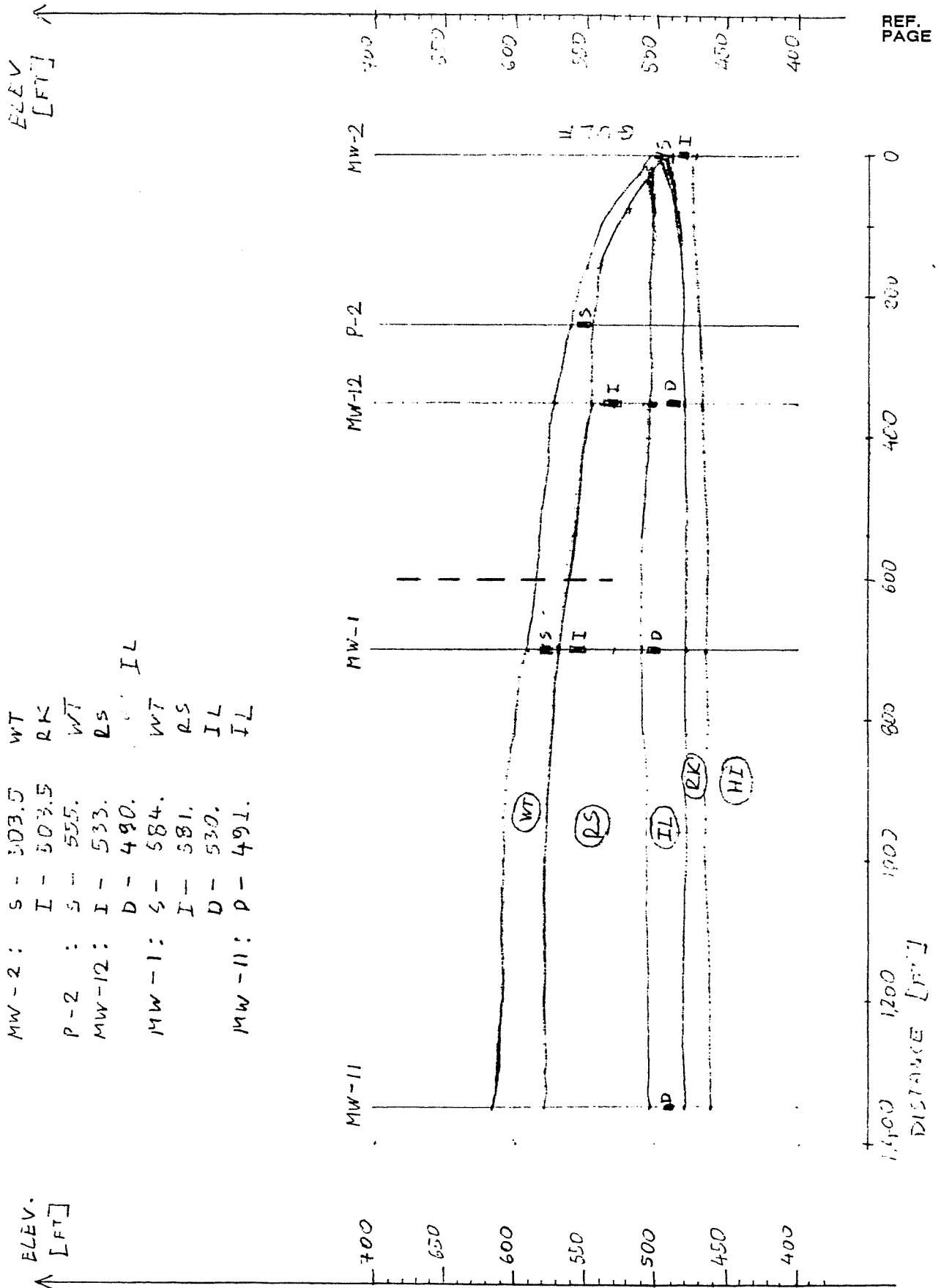
 LK_2 - LEAKAGE BETWEEN LAYERS 2, 3

 LK_3 - LEAKAGE FROM/INTO LAYER 3

 q_i - HORIZONTAL FLOWS IN LAYERS 1, 2, 3

PROJECT LOCKPORT CITY LANDFILL
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AA



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* LAYER 1 (OVERBURDEN)

- INFILTRATION $I = 8.16 \text{ IN/YR}$ (REF 1, SEE SHEET 33)
- HORIZONTAL HYDRAULIC CONDUCTIVITY
 ASSUMED AS A GEOMETRIC AVERAGE OF
 CLAY AND FILL

$$K_{\text{H CLAY}} = 10^{-5} \text{ CM/S} \quad (\text{REF 2, SEE SHEET 38})$$

$$K_{\text{H FILL}} = 7.4 \text{ E-3 CM/S} \quad (\text{REF 1, SEE SHEET 34})$$

$$K_{\text{avg}} = \sqrt{10^{-5} \times 7.4 \text{ E-3}} = 2.7 \text{ E-4 CM/S}$$

- ELEVATION OF GW AT MW-15

$$EL_{\text{UPSTR}} = 584 \text{ FT} \quad (\text{REF 3, SEE SHEET 40})$$

- ELEVATION OF GW AT P-2

$$EL_{\text{DOWNSTR}} = 555 \text{ FT} \quad (\text{REF 3, SEE SHEET 42})$$

- ELEVATION OF GW IN THE MIDDLE
 BETWEEN MW-15 AND P-2

$$EL_{\text{MIDDLE}} = 570 \text{ FT} \quad (\text{SEE SHEETS 1A, 2A})$$

- DISTANCE BETWEEN MW-15 AND P-2

$$L = 460 \quad (\text{SEE SHEET 4})$$

- BOTTOM OF LAYER ASSUMED AT

$$EL_{\text{BOT}} = 545 \text{ FT} \quad (\text{SEE SHEET 4})$$

FOLLOWING VALUES USED IN THE CALCS.

$$K = 2.7 \text{ E-4 CM/S} = 7.6 \text{ E-1 FT/DAY}$$

$$H_U = EL_{\text{UPSTR}} - EL_{\text{BOT}} = 584 - 545 = 39 \text{ FT}$$

$$H_D = EL_{\text{DOWNSTR}} - EL_{\text{BOT}} = 555 - 545 = 10 \text{ FT}$$

$$H_M = EL_{\text{MIDDLE}} - EL_{\text{BOT}} = 570 - 545 = 25 \text{ FT}$$

$$I = 8.16 \text{ IN/YR} = 1.9 \text{ E-3 FT/DAY}$$

$$L = 460 \text{ FT}$$

$$L_{\text{MIDDLE}} = 230 \text{ FT}$$

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CHKD. BY _____ DATE _____

THE NET RECHARGE / LEAKAGE FOR LAYER ① WAS FOUND USING A WATER TABLE MAP FOR LAYER ① (SEE SPOT 1A). THE ELEVATION OF GW IN THE TIGHTER BEDDED HWY-190 AREA WAS DETERMINED.

REF. PAGE

$$K(H^2 - H_U^2) - N \cdot x(L - x) + K \frac{x}{L}(H_U^2 - H_D^2) = 0$$

(REF 2, SEE SHEET 39A)

WHERE:

K - HORIZONTAL HYDR. COND.
 H - ELEVATION OF GW AT X
 N - NET RECHARGE / LEAKAGE
 x - DISTANCE FROM UPSTREAM
 L - LENGTH BETWEEN BOUNDARIES
 H_U - UPSTREAM GW ELEV.
 H_D - DOWNSTREAM GW ELEV.

$$K(H^2 - H_U^2) + K \frac{x}{L}(H_U^2 - H_D^2) = N \cdot x(L - x)$$

$$N = \frac{K[(H^2 - H_U^2) + \frac{x}{L}(H_U^2 - H_D^2)]}{x(L - x)}$$

FOR $x = \frac{L}{2}$

$$N = \frac{4K[(H_M^2 - H_U^2) + 0.5(H_U^2 - H_D^2)]}{L^2}$$

$$N = \frac{4 \cdot 0.76 \cdot [(25^2 - 33^2) + 0.5(33^2 - 10^2)]}{460^2}$$

$$N = -2.7 \text{ E-3 FT/DAY}$$

("—" SIGN INDICATES NET LEAKAGE)

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FLOW IN THE WATER TABLE WAS ESTIMATED
 AS FOLLOWS

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$$q(x) = \frac{K}{2L} (H_U^2 - H_D^2) - N \left(\frac{1}{2} - x \right)$$

(SEE 2, SEE 3-THAT 39A)

ASSUMING THAT DW-13 IS AT THE
 UPSTREAM END OF THE SITE

$$x = 0$$

$$q_{UPSTR} = Q(0) = \frac{K}{2L} (H_U^2 - H_D^2) - \frac{N \cdot L}{2}$$

$$q_{UPSTR} = \frac{0.76}{2 \cdot 460} (39^2 - 25^2) - \frac{(-2.7E-3) \cdot 460}{2}$$

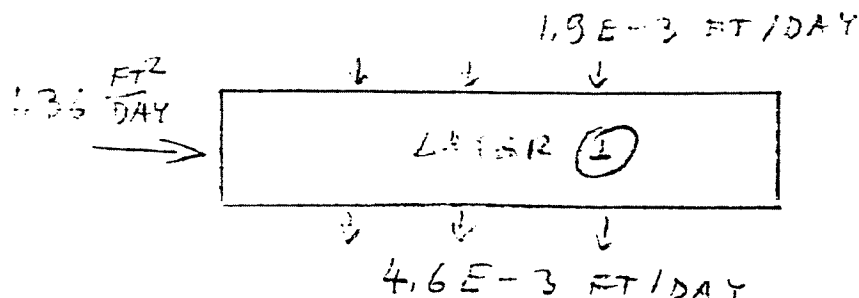
$$q_{UPSTR} = 1.36 \text{ FT}^2/\text{DAY}$$

LEAKAGE WAS CALCULATED BASED ON THE
 INFILTRATION AND CALCULATED NET DEMANDS/
 LEAKAGE

$$I - LK_1 = N$$

$$LK_1 = I - N$$

$$LK_1 = 1.9E-3 - (-2.7E-3) = 4.6E-3 \text{ FT/DAY}$$



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 SUBJECT GROUNWATER FLOWS

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LAYER 2 (PROPOSED SEAL):

- HORIZONTAL & VERTICAL COEFFICIENTS ASSUMED AS AN ARITHMETIC AVG. OF RESULTS FROM PACKER AND slug tests for unit II (REF 1, SEE SHEETS 35, 36)

$$K = \frac{7.3E-5 + 2.6E-4 + 0.0 + 3.34E-4}{4} = 1.7E-4 \text{ CM/S}$$

- ELEVATION OF GW AT MW-11

$$EL_{UPSTR} = 581 \text{ FT} \quad (\text{REF 3, SEE SHEET 40})$$

- DOWNSTREAM WATER ELEVATION ASSUMED AT THE BOTTOM OF THE OUTCROPPING LAYER

$$EL_{DOWNSTR} \approx 500 \text{ FT} \quad (\text{SEE SHEET 4})$$

- DISTANCE BETWEEN MW-1 AND OUTCROP

$$L = 700 \text{ FT} \quad (\text{SEE SHEET 4})$$

- ELEVATION OF GW AT MW-12

$$EL_M \approx 533 \text{ FT} \quad (\text{SEE SHEET 41, REF 3})$$

- DISTANCE FROM MW-1 TO MW-12

$$L_M = 350 \text{ FT} \quad (\text{SEE SHEET 4})$$

- COVERING SILTY CLAY LAYER

THICKNESS = 5 FT (AVG. FOR BORINGS IN THAT LOCATION)

$$K = 8 \times 10^{-6} \text{ CM/S} \quad (\text{SEE APPENDIX J OR 2I})$$

CONDUCTANCE G :

$$G = \frac{\text{THICKNESS}}{K} = \frac{5 \text{ FT}}{8 \times 10^{-6} \frac{\text{CM}}{\text{S}} \cdot 3600 \cdot 24 \frac{\text{S}}{\text{DAY}} \cdot \frac{1}{30.5} \frac{\text{FT}}{\text{CM}}}$$

$$G = 220 \text{ DAY}$$

- ELEV. OF THE BOTTOM OF THE UNIT

$$EL_{BOT} \approx 500 \text{ FT} \quad (\text{SEE SHEET 4})$$

PROJECT LOCKPORT CITY LANDFILLJOB NO. 35180SUBJECT GROUNDWATER FLOWSMADE BY MODATE 5/5/91

CHKD. BY _____ DATE _____

FOLLOWING VALUES WERE USED IN THE CALCOS.

REF.
PAGE

$$K = 1.71 \times 10^{-3} = 4.8 \text{ E-1 FT/DAY}$$

$$H_U = EL_{UPPER} - EL_{BOT} = 531 - 500 = 81 \text{ FT}$$

$$H_M = EL_M - EL_{BOT} = 533 - 500 = 33 \text{ FT}$$

$$L_M = 350 \text{ FT}$$

$$L = 700 \text{ FT}$$

$$G = 200 \text{ DAY}$$

$$H_D = EL_{DOWNY} - EL_{BOT} = 500 - 500 = 0 \text{ FT}$$

THE NET RECHARGE/LEAKAGE WAS CALCULATED AS FOLLOWS

$$N = \frac{(H_U^2 - H_D^2) L_M + (L + KG)(H_M^2 - H_U^2)}{\frac{L \cdot L_M}{K} (L - L_M) + 6 L_M (2L - L_M)}$$

(SEE SHEET 46 FOR
EXPLANATIONS)

$$N = \frac{81^2 \cdot 350 + (700 + 0.48 \cdot 220)(33^2 - 81^2)}{\frac{700 \cdot 350}{0.48} (700 - 350) + 220 \cdot 350 (2 \cdot 700 - 350)}$$

$$N = -8.1 \text{ E-3 FT/DAY} \quad ("-" \text{ SIGN INDICATES NET LEAKAGE})$$

FLOW IN LAYER 2 WAS ESTIMATED AS FOLLOWS

$$q(x) = Nx - \frac{K}{2} \left[\frac{NL(2G + \frac{L}{K}) - (H_U^2 - H_D^2)}{L + KG} \right]$$

(SEE SHEET 46)

PROJECT LOCKPORT CITY LANDFILL
 SUBJECT GROUNDWATER FLOWS

UPSTREAM AND DOWNSTREAM FLOWS ARE

REF.
PAGE

$$q_{UPSTR} = q(0) , \quad q_{DOWNSTR} = q(700)$$

$$q_{UPSTR} = -8.1E-3 \cdot 0 - \frac{0.48}{2} \left[\frac{-8.1E-3 \cdot 700(2.220 + \frac{700}{0.48}) - 31^2}{700 + 0.48 \cdot 220} \right]$$

$$= \underline{\underline{5.16 \text{ FT}^2/\text{DAY}}}$$

$$q_{DOWNSTR} = -8.1E-3 \cdot 700 - \frac{0.48}{2} \left[\frac{-8.1E-3 \cdot 700(2.220 + \frac{700}{0.48}) - 31^2}{700 + 0.48 \cdot 220} \right]$$

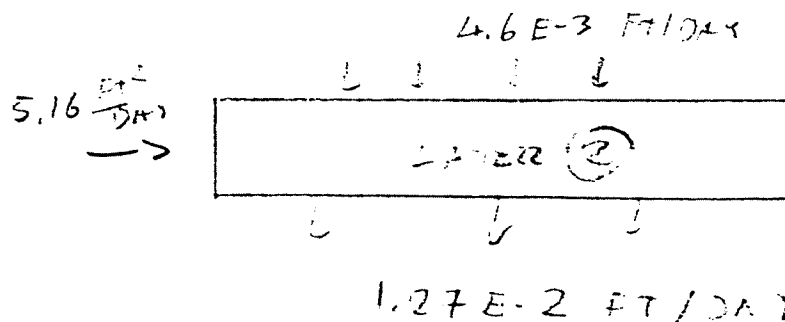
$$= -0.5 \text{ FT}^2/\text{DAY} < 0 \quad \text{SAT}$$

$$\underline{\underline{q_{NO-FLX} = 0}}$$

 LEAKAGE WAS CALCULATED USING 2 LEAKAGE VALUES
 FROM LAYER ① AND NET RECH/LEAK. FROM
 LAYER 2

$$LK_2 = LK_1 - N = 4.6E-3 - (-3.1E-3) =$$

$$= \underline{\underline{1.27E-2}}$$



PROJECT LOCKPORT CITY LANDFILL
 SUBJECT GROUNDWATER FLOWS

REF.
PAGE

LAYER 3 (CORRECTION LAYER)

- HORIZONTAL HYDRAULIC CONDUCTIVITY ASSUMED AS
 AN ARITHMETIC AVG. OF THE SLUG TEST
 AND PACKER TEST RESULTS FOR MW-1D

$$K_H = \frac{0.0 + 1.2E-4 + 3.6E-5 + 2.5E-5 + 1.0E-5}{5}$$

$$= 3.8E-5 \text{ CM/S}$$

(REF 1, SEE SHEETS 35, 36)

- ELEVATION OF GW AT MW-1D

$$EL_{UPSTR} = 530 \text{ FT} \quad (\text{REF 3, SEE SHEET 40})$$

- DOWNSTREAM WATER ELEV. ASSUMED AT THE
 THE GULF ELEV.

$$EL_{DOWNSTR} = 505 \text{ FT} \quad (\text{SEE TOPO})$$

- DISTANCE BETWEEN MW-1 AND GULF

$$L = 700 \text{ FT} \quad (\text{SEE SHEET 4})$$

- AVG THICKNESS OF A UNIT

$$B = 25 \text{ FT} \quad (\text{SEE CROSS SECTION 4A, SHEET 4})$$

FOLLOWING VALUES USED IN CALC

$$T = K_H \cdot B = 3.8E-5 \cdot 3600 \cdot 24 \cdot \frac{1}{30.5} \frac{\text{FT}}{\text{DAY}} \cdot 25 \text{ FT} =$$

$$G = 220 \text{ DAY}$$

$$= 2.59 \text{ FT}^2/\text{DAY}$$

$$L = 700 \text{ FT}$$

$$H_U = EL_{UPSTR} = 530 \text{ FT}$$

$$H_D = EL_{DOWNSTR} = 505 \text{ FT}$$

$$RECHARGE = \text{LEAKAGE FROM LAYER } \textcircled{2} = 1.27E-2 \text{ FT/DAY}$$

PROJECT LOCKPORT CITY LANDFILLSHEET NO. 12 OF _____SUBJECT GROUNDWATER FLOWSJOB NO. 35180MADE BY MO DATE 5/5/91

CHKD. BY _____ DATE _____

THE FLOW CALCULATED AT SECTION 2, ASSUMING A
WATER TABLE AT 11.2.REF.
PAGE

$$H = -\frac{N}{2T} x^2 - \frac{5NL}{B} + \frac{NL^2}{2T} - H_0 \quad (\text{SEE SHEET 50})$$

FOR SECTION 2, $H = H_{UPPER}$

$$N = \frac{H_0 - H_2}{\frac{L^2}{B} - \frac{L^2}{2T}} \quad (\text{SEE SHEET 50})$$

$$N = \frac{530 - 525}{\frac{700 \cdot 200}{25} - \frac{700^2}{2 \cdot 2.69}}$$

$$N = \underline{2.6E-4} \text{ FT/DAY}$$

$$q(x) = N \cdot x \quad (\text{SEE SHEET 50})$$

$$q_{UPPER} = q(0) = 0 ; \quad q_{DOWNER} = 2.6E-4 \cdot 700 = 0.2E-1$$

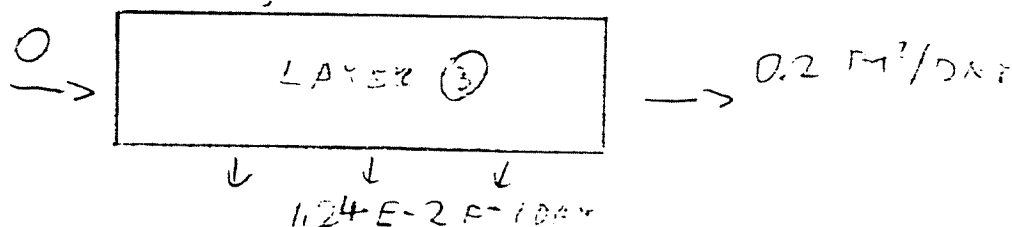
LEAKAGE CALCULATED USING A COEFFICIENT
VALUE FOR LAYER 2

$$LH_2 - LH_3 = N$$

$$LH_3 = LH_2 - N$$

$$LH_3 = 1.27E-2 - 2.6E-4 = 1.24E-2$$

$$1.27E-2 \text{ FT/DAY}$$



PROJECT LOCKPORT CITY LANDFILL
 SUBJECT GROUNDWATER FLOWS

 REF.
 PAGE

• 3-D FLOWS

3-D FLOWS CALCULATED BY MULTIPLYING THE HORIZONTAL FLOW BY THE TRIBUTARY LENGTH AND VERTICAL FLOW BY THE TRIBUTARY AREA FOR CROSS SECTION "A-A" THE TRIBUTARY LENGTH WAS ASSUMED TO BE FROM THE SOUTHERN BOUNDARY TO THE LOCATION OF SAMPLE MW-1

$$L_{TRIB} = 700 \text{ FT}$$

AND TRIBUTARY AREA

$$A_{TRIB} = L_{TRIB} \times \text{DISTANCE MW-1 TO GWS}$$

$$A_{TRIB} = 700 \times 700 = 490,000 \text{ FT}^2$$

LAYER ①

$$Q_{RECH} = K \cdot A_{TRIB} = 1.9E-3 \times 490,000 = 931 \text{ FT}^3/\text{DAY}$$

$$Q_{LEAK} = LK_1 \cdot A_{TRIB} = 4.6E-3 \times 490,000 = 2,254 \text{ FT}^3/\text{DAY}$$

$$Q_{UPSTR} = 1.36 \frac{\text{FT}^2}{\text{DAY}} \cdot 700 \text{ FT} = 952 \text{ FT}^3/\text{DAY}$$

$$Q_{DOWNSTR} = 0$$

LAYER ②

$$Q_{RECH} = LK_1 \cdot A_{TRIB} = 2,254 \text{ FT}^3/\text{DAY}$$

$$Q_{LEAK} = LK_2 \cdot A_{TRIB} = 1.27E-2 \cdot 490,000 = 6,222 \text{ FT}^3/\text{DAY}$$

$$Q_{UPSTR} = 5.16 \cdot 700 = 3,612 \text{ FT}^3/\text{DAY}$$

$$Q_{DOWNSTR} = 0$$

PROJECT LOCKPORT CITY LANDFILL
 SUBJECT GROUNDWATER FLOWS

LAYER (3)

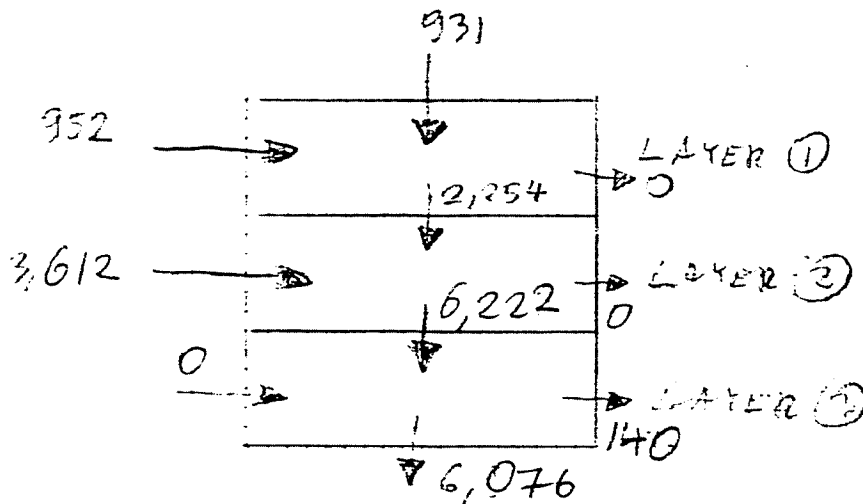
REF.
PAGE

$$Q_{RECH} = LK_2 \cdot H_{2-1B} = \underline{6,222 \text{ FT}^3/\text{DAY}}$$

$$Q_{LEAK} = LK_3 \cdot H_{1-2B} = 1.24 \text{E-2} \times 430,000 = \underline{6,076 \text{ FT}^3/\text{DAY}}$$

$$Q_{UPPER} = \underline{0}, \quad Q_{DOWNSIDE} = 0.2 \times 700 = \underline{140 \text{ FT}^3/\text{DAY}}$$

• SUMMARY OF FLOWS [FT³/DAY]



PROJECT LOCKPORT CITY LANDFILL

JOB NO. 35180

SUBJECT GROUNDWATER FLOW

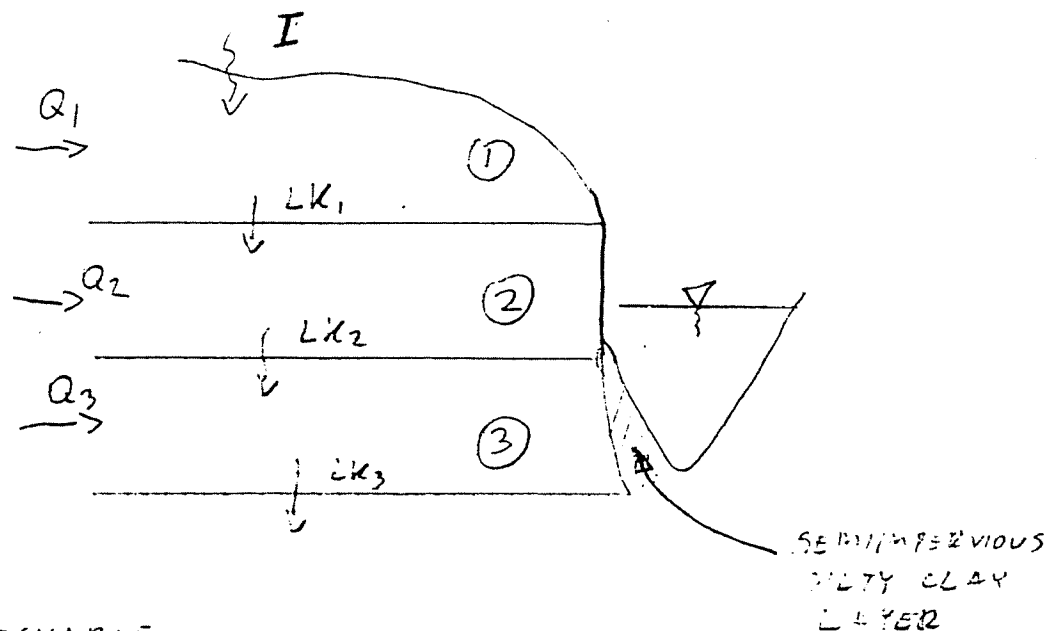
MADE BY MO DATE 5/5/91

CHKD. BY _____ DATE _____

REF.
PAGEB.) SECTION BB

THE STRATIFICATION OF THE SECTION REPRESENTED USING 3 LAYERS

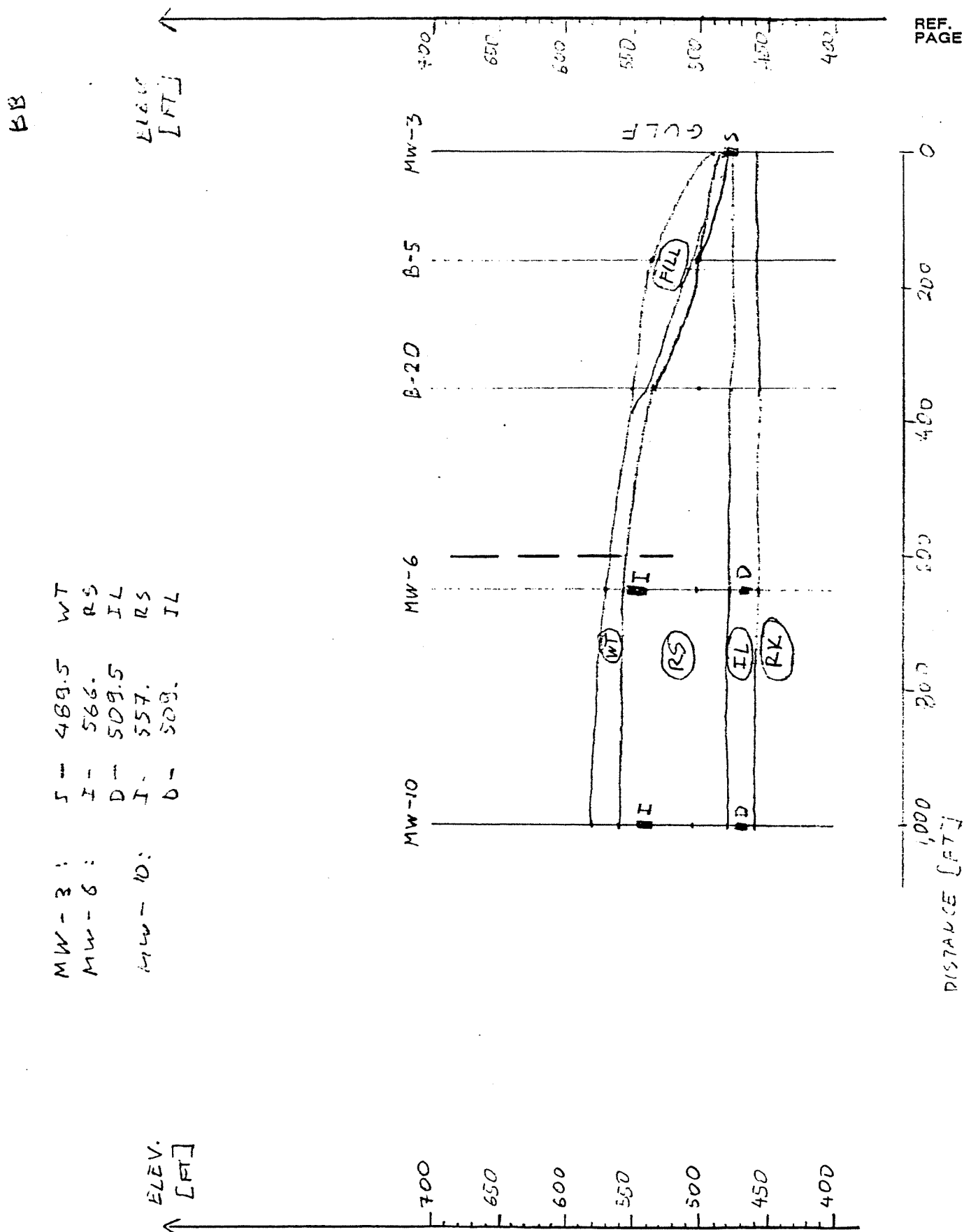
- OVERBURDEN - UNCONFINED AQUIFER, AS NO GW ELEVATIONS WERE RECORDED, THE FLOWS WILL BE ASSUMED AFTER THE RESULTS FOR SECTION AA
- ROCHESTER SHALE - CONFINED / UNCONFINED AQUIFER. UPSTREAM WATER TABLE RECORDED BY WELL MW-6 I, DOWNSTREAM WATER TABLE REPRESENTED BY THE GULF
- IRONDEQUOT LIMESTONE - CONFINED AQUIFER WITH THE SEMIIMPERVIOUS LAYER AT THE DOWNSTREAM END. UPSTREAM WATER TABLE RECORDED BY MW-6 D, DOWNSTREAM REPRESENTED BY THE GULF



I - RECHARGE

LK_i - LEAKAGE FROM LAYER "i"Q_i - HORIZONTAL FLOW IN LAYER "i"

PROJECT LOCKPORT CITY LANDFILL
 SUBJECT GROUNDWATER FLOW

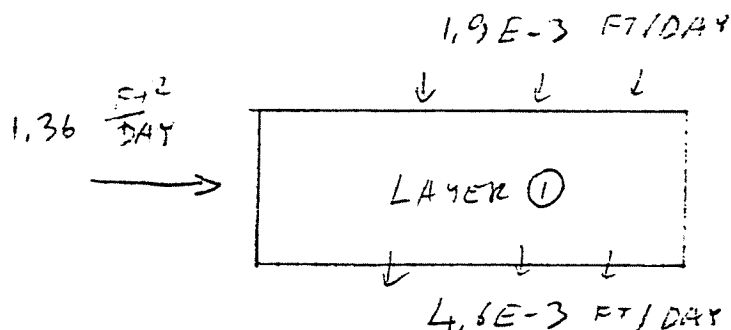


PROJECT LOCKPORT CITY LANDFILL
 SUBJECT GROUNDWATER FLOWS

• LAYER 1 (OVER BURDEN)

REF.
PAGE

AS NO MONITORED LEVELS ARE AVAILABLE FOR THIS LAYER, THE RESULTS FROM SECTION AA WILL BE USED (SEE SHEET 7)



• LAYER 2 (ROCHESTER SHALE)

- HORIZONTAL HYD CONDUCTIVITY ASSUMED AFTER THE RESULTS OF SLUG TEST FOR WELL MW-6 I
 $K_H = 6.16 E-4 \text{ CM/S}$ (REF 1, SEE SHEET 36)
- ELEVATION OF GW AT MW-6 I
 $EL_{UPSTR} = 566 \text{ FT}$ (REF 3, SEE SHEET 40)
- ELEVATION OF THE GULF
 $EL_{DOWNSTR} \approx 480 \text{ FT}$ (SEE TOPO)
- ELEV. OF THE BOTTOM OF LAYER
 $EL_{BOT} \approx 470 \text{ FT}$ (SEE CROSS SECTION SHEET 16)
- NET RECHARGE/LEAKAGE ASSUMED AFTER RESULTS FOR SECTION AA
 $N = -8.1 E-3 \text{ FT/DAY}$ (SEE SHEET 3)
- LENGTH
 $L = 650 \text{ FT}$ (SEE CROSS SECTION BB SHEET 16)

PROJECT LOCKPORT CITY LANDFILL
 SUBJECT GROUNDWATER FLOWS

FOLLOWING VALUES WERE USED IN THE CALC.

$$K = 6.16 \text{ E-4 CM/S} = \underline{1.74 \text{ FT/DAY}}$$

$$H_u = \text{EL}_{\text{UPSTR}} - \text{EL}_{\text{BOT}} = 565 - 470 = \underline{95 \text{ FT}}$$

$$H_D = \text{EL}_{\text{DOWNSTR}} - \text{EL}_{\text{BOT}} = 490 - 470 = \underline{20 \text{ FT}}$$

$$L = \underline{650 \text{ FT}}$$

$$N = \underline{-8.1 \text{ E-3 FT/DAY}}$$

FLOW CALCULATED AS FOLLOWS

$$Q(x) = -R/LK \cdot \left(\frac{L}{2} - x\right) + \frac{K}{2L} (H_u^2 - H_D^2)$$

(REF 2, SEE SHEET)

FOR THE UPSTR. FLOW

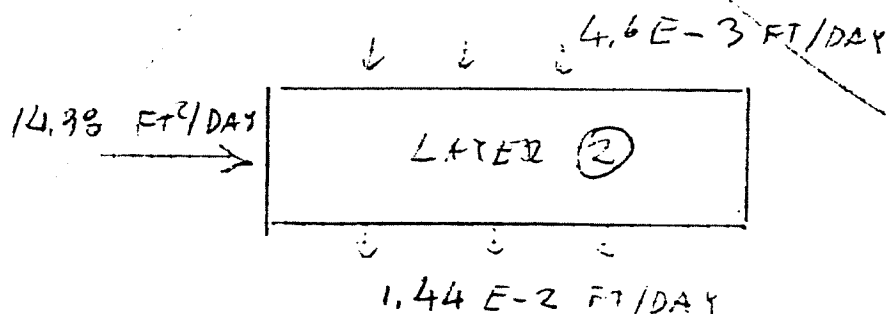
$$Q_{\text{UPSTR}} = Q(0) = \frac{K}{2L} (H_u^2 - H_D^2) - \frac{R/LK \cdot L}{2}$$

$$Q_{\text{UPSTR}} = \frac{1.74}{2 \cdot 650} (95^2 - 20^2) - \frac{(-8.1 \text{ E-3} \cdot 650)}{2}$$

$$Q_{\text{UPSTR}} = \underline{14.98 \text{ FT}^2/\text{DAY}}$$

VOID

VERTICAL FLOWS ASSUMED AFTER RESULTS FOR SECTION 4A



PROJECT LOCKPORT CITY LANDFILL
SUBJECT GROUNDWATER FLOWS

$$q(x) = -N \left(\frac{L}{2} - x \right) - \frac{K}{2L} (H_U^2 - H_D^2)$$

(REF 2, SEE SHEET 39A)

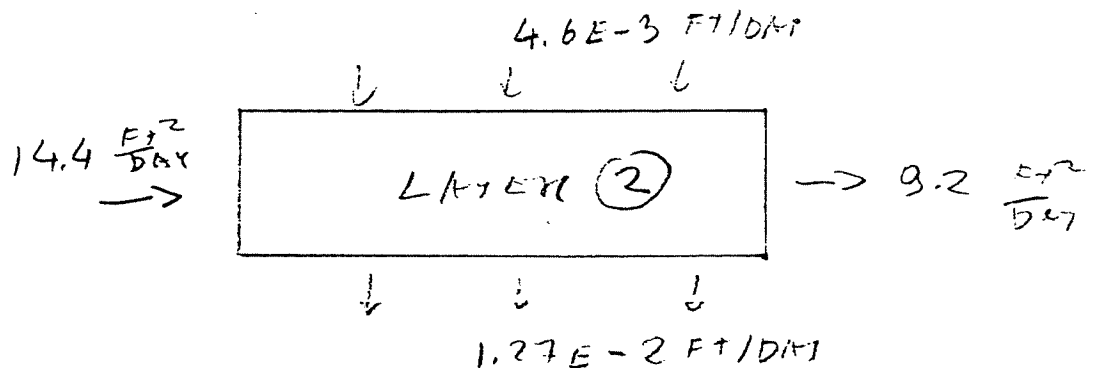
$$q_{UPPER} = q(0) = \left[-(-8.1E-3) \cdot \left(\frac{650}{2} - 0 \right) \right] + \frac{1.74}{2 \cdot 650} (96^2 - 20^2)$$

$$= \underline{14.4 \text{ FT}^2/\text{DAY}}$$

$$q_{DOWNER} = q(650) = \left[-(-8.1E-3) \cdot \left(\frac{650}{2} - 650 \right) \right] + \frac{1.74}{2 \cdot 650} (96^2 - 20^2)$$

$$= \underline{9.2 \text{ FT}^2/\text{DAY}}$$

VERTICAL FLOWS ASSUMED AFTER RESULTS FOR SECTION AA



PROJECT LOCKPORT CITY LANDFILLJOB NO. 39180SUBJECT GROUNDWATER FLOWSMADE BY MO DATE 5/5/91

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LAYER 3 (ROADSIDE SOIL (SANDSTONE))

- ESTIMATED HYDRAULIC CONDUCTIVITY BASED ON RESULTS OF THE PACKER AND SLUG TESTS FOR WELL MW-6D (REF 1, SEE SHEET 35)

$$K_H = \frac{0.0 + 0.0 + 4.6E-4 + 9.8E-5}{4} = 1.4E-4 \text{ CM/S}$$

- AVERAGE THICKNESS

$$B = 20 \text{ FT} \quad (\text{SEE CROSS SECTION EB, SHEET 16})$$

- ELEV. OF GW AT MW-6D

$$EL_{UPGR} = 509.5 \text{ FT} \quad (\text{REF 3, SEE SHEET 40})$$

- DOWNGR. ELEV. OF GW. REPRESENTED BY THE GULF

$$EL_{DOWNGR} \approx 490 \text{ FT} \quad (\text{SEE TOPO})$$

- NET RECHARGE/LEAKAGE ASSUMED AFTER RESULTS FOR CROSS SECTION AA (SEE SHEET 12)

$$N = 2.6E-4 \text{ FT/DAY}$$

- LENGTH

$$L = 650 \text{ FT} \quad (\text{SEE CROSS SECTION AB, SHEET 16})$$

FOLLOWING VALUES WERE USED IN THE CALCS.

$$K = 1.4E-4 \text{ CM/S} = 0.4 \text{ FT/DAY}$$

$$H_U = EL_{UPGR} = 509.5 \text{ FT}$$

$$H_D = EL_{DOWNGR} = 490 \text{ FT}$$

$$N = 2.6E-4 \text{ FT/DAY}$$

$$L = 650 \text{ FT}$$

$$G = 220 \text{ DAY}$$

$$B = 20 \text{ FT}$$

PROJECT

LOCKPORT CITY LANDFILL

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GROUNDWATER FLOWS

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FLOW WAS CALCULATED AS FOLLOWS

REF.
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$$q(x) = N \cdot x - T \left[\frac{N \cdot L \left(\frac{x}{B} + \frac{L}{2T} \right) - (H_L - H_D)}{L + \frac{T \cdot L}{B}} \right]$$

(SEE SHEET 52)

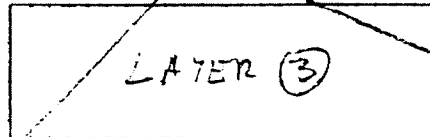
FOR q_{upstr} : $x = 0$

$$q(0) = q_{upstr} = \frac{T(H_L - H_D) - T \cdot N \cdot L \cdot \left(\frac{0}{B} + \frac{L}{2T} \right)}{L + \frac{T \cdot L}{B}}$$

$$q_{upstr} = \frac{0.4 \cdot 20 \cdot (508.5 - 480) - 0.4 \cdot 20 \cdot 2.6E-4 \cdot 650 \cdot \left(\frac{200}{20} + \frac{65}{2 \cdot 0.4} \right)}{650 + \frac{0.4 \cdot 20 \cdot 200}{20}}$$

$$= 0.12 \text{ FT}^2/\text{DAY}$$

VERTICAL FLOWS ASSUMED BETTER THE RESULTS FOR SECTION AA

0.12
FT²/DAY

LAYER (3)

1.41E-2 FT/DAY

VOID

PROJECT

LOCKPORT CITY LANDFILL

SUBJECT

GROUNDWATER FLOW

JOB NO. 35180

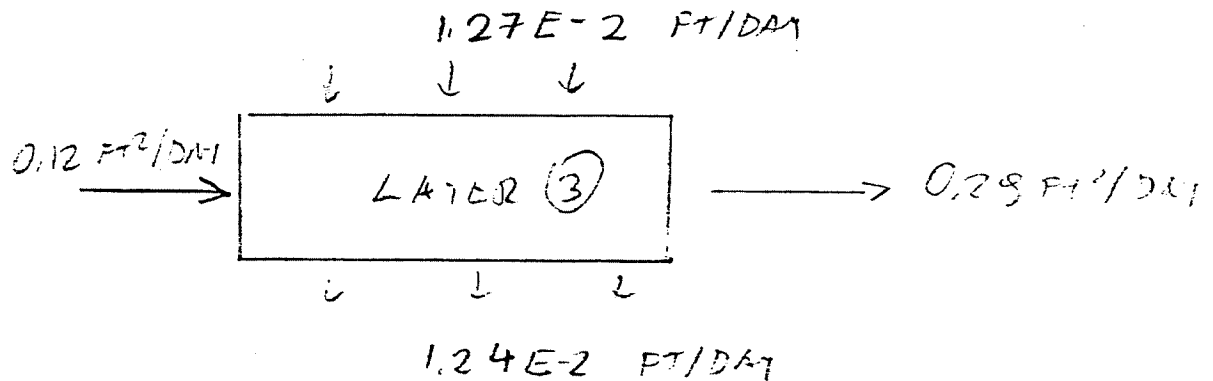
MADE BY MD DATE 5/5/91

CHKD. BY _____ DATE _____

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PAGE

$$\begin{aligned}
 q_{\text{Darcy}} &= q_y(650) = \\
 &= 2.6E-4 \cdot 650 - 24.20 \left[\frac{2.6E-4 \cdot 650 \cdot \left(\frac{220}{20} + 650 \right) - (509.5 - 490)}{650 + \frac{24.20 \cdot 220}{20}} \right] \\
 &= 0.29 \text{ FT}^2/\text{DAY}
 \end{aligned}$$

VERTICAL FLOWS ASSUMED AFTER RESULTS
FOR SECTION AA



PROJECT LOUPOUT CITY LANDFILL
 SUBJECT GROUNDWATER FLOW
REF.
PAGE

• 3-D FLOWS

THE 3-D FLOWS WERE CALCULATED BY MULTIPLYING THE HORIZONTAL FLOWS BY THE TRIBUTARY LENGTH AND THE VERTICAL FLOWS BY THE TRIBUTARY AREA.

THE TRIBUTARY LENGTH WAS ASSUMED TO BE FROM MW-1 TO MW-4

$$L_{TRIB} = 1,100 \text{ FT (SEE TOPO MAP)}$$

THE TRIBUTARY AREA IS

$$A_{TRIB} = L_{TRIB} \cdot \text{DISTANCE MW-1 TO MW-4}$$

$$\begin{aligned} A_{TRIB} &= 1,100 \text{ FT} \cdot 650 \text{ FT} \\ &= 715,000 \text{ FT}^2 \end{aligned}$$

LAYER ①

$$\begin{aligned} Q_{RECH} &= K_1 \cdot A_{TRIB} = 1.9E-3 \cdot 715,000 = \\ &= \underline{1,359 \text{ FT}^3/\text{DAY}} \end{aligned}$$

$$\begin{aligned} Q_{LEAK} &= K_1 \cdot A_{TRIB} = 4.6E-3 \cdot 715,000 = \\ &= \underline{3,289 \text{ FT}^3/\text{DAY}} \end{aligned}$$

$$Q_{UPTR} = 1.36 \frac{\text{FT}^2}{\text{DAY}} \cdot 1,100 \text{ FT} = \underline{1,496 \text{ FT}^3/\text{DAY}}$$

LAYER ②

$$\begin{aligned} Q_{RECH} &= K_1 \cdot A_{TRIB} = 4.6E-3 \cdot 715,000 = \\ &= \underline{3,289 \text{ FT}^3/\text{DAY}} \end{aligned}$$

PROJECT LOCKPORT CITY LANDFILL
 SUBJECT GROUNDWATER FLOWS
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$$Q_{LEAK} = LK_2 \cdot A_{TRB} = 1.27 E-3 \cdot 7,15,000 =$$

$$= \underline{9,080 \text{ FT}^3/\text{DAY}}$$

$$Q_{UPSTR} = 14.4 \times 1,100 = \underline{15,840 \text{ FT}^3/\text{DAY}}$$

LAYER (3) $Q_{DOWNTR} = 3.2 \times 1,100 = \underline{10,120 \text{ FT}^3/\text{DAY}}$

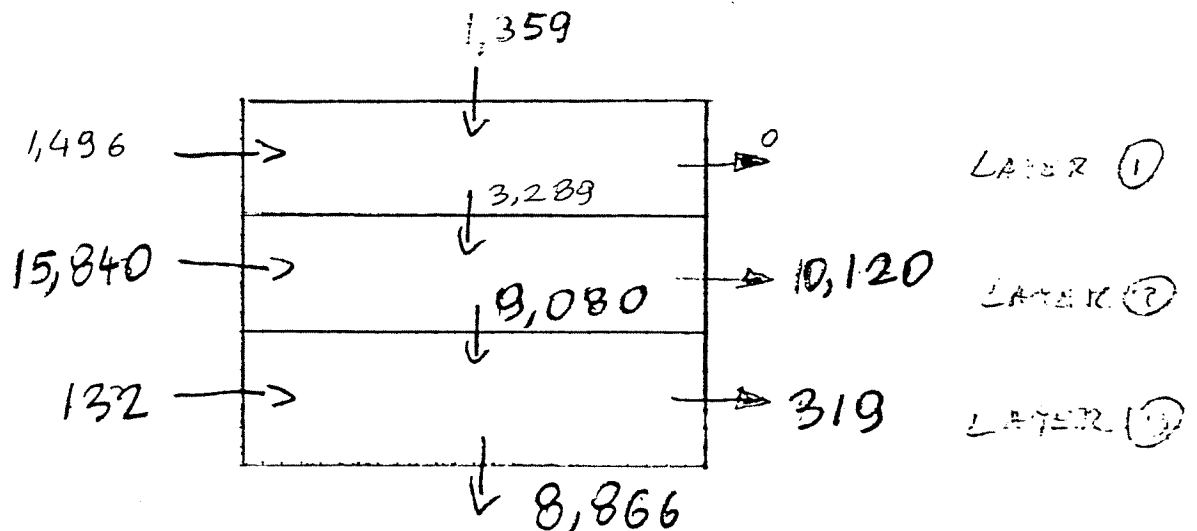
$$Q_{RECH} = LK_2 \cdot A_{TRB} = \underline{9,080 \text{ FT}^3/\text{DAY}}$$

$$Q_{LEAK} = LK_3 \cdot A_{TRB} = 1.24 E-2 \cdot 7,15,000 =$$

$$= \underline{8,866 \text{ FT}^3/\text{DAY}}$$

$$Q_{UPSTR} = 0.12 \frac{\text{FT}^2}{\text{DAY}} \cdot 1,100 \text{ FT} = \underline{132 \text{ FT}^3/\text{DAY}}$$

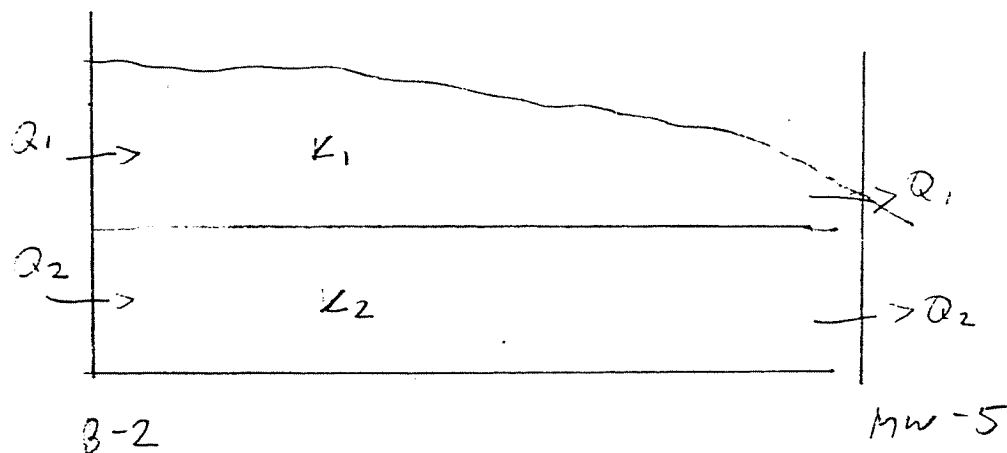
$$Q_{DOWNTR} = 0.29 \times 1,100 = \underline{319 \text{ FT}^3/\text{DAY}}$$

 • SUMMARY OF FLOWS IN [FT³/DAY]


PROJECT LOCKPORT CITY LANDFILL
 SUBJECT GROUNDWATER FLOWS
REF.
PAGEC.) SECTION CC

SECTION 'CC' REPRESENTS A VERY COMPLICATED HYDROGEOLOGIC SYSTEM - 5 LAYERS, SIGNIFICANT ELEVATION DIFFERENCES, DISCONTINUOUS LAYERS. ALSO, THE MONITORED ~~WATER~~ WATER LEVELS ARE NOT SUFFICIENT TO EVALUATE THE FLOW AS THE WATER LEVEL IN THE ROCKAWAY FORMATION WAS NOT MEASURED. THEREFORE, THE FLOW WILL BE ESTIMATED BASED MOSTLY ON JUDGMENT.

THE STRATIFICATION CAN BE APPROXIMATED AS FOLLOWS



K_1 - AVERAGE HYDR CONDUCTIVITY OF FILL/CLAY CLAY

$$K_1 = 0.76 \text{ FT/DAY} \quad (\text{SEE SHEET 5})$$

K_2 - HYDRAULIC CONDUCTIVITY OF THE ROCKAWAY FORMATION BASED ON WELL MW-31

$$K_2 = 3.3 \times 10^{-3} \text{ cm/s} = 9.3 \text{ FT/DAY}$$

$$K_{AVG} = \sqrt{9.3 \times 0.76} = 2.7 \text{ FT/DAY} \quad (\text{REF 1, SEE SHEET 36})$$

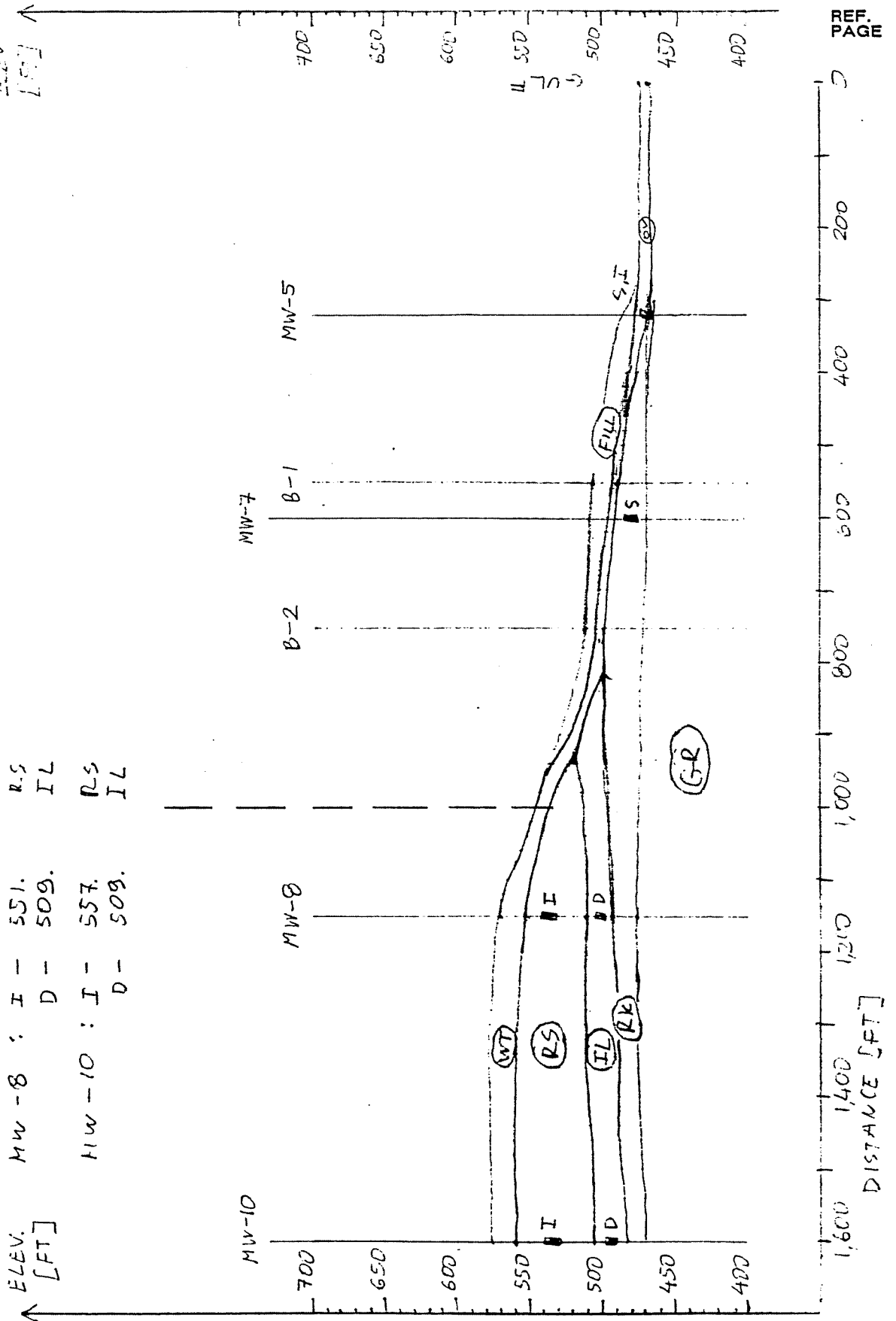
PROJECT
SUBJECT

LOCKPORT CITY LANDFILL
GROUNDWATER FLOWS

PAGE 26 OF
SHEET NO. 35180 OF
JOB NO. 35180
MADE BY M DATE 5/5/91
CHKD. BY DATE

CC

MW-5 : S - 472.5 WT
I - 474. CK
MW-7 : S - 491.5 WT
MW-8 : I - 551. RS
D - 509. IL
MW-10 : I - 557. RS
D - 509. IL



PROJECT LOCKPORT CITY LANDFILL
SUBJECT GROUNDWATER FLOWS

REF.
PAGE

- UPSTREAM ELEVATION OF WATER TABLE (ASSUMED AT THE LOCATION OF S-2) AT 505 FT, WHICH WAS DETERMINED BASED ON THE STRATIGRAPHY OF SECTION CC

$$H_u = 505 \text{ FT} \quad (\text{SEE SHEET 26})$$

- DOWNSTREAM WATER ELEVATION AT MW-35

$$H_D = 472 \text{ FT} \quad (\text{REF 3, SHEET 36})$$

- LENGTH OF FLOW BASED ON CROSS SECTION CC

$$L = 500 \text{ FT} \quad (\text{SEE TOPO})$$

- BOTTOM OF THE CLAY ASSUMED FROM CROSS SECTION CC

$$H_{\text{PORT}} = 465 \text{ FT} \quad (\text{SEE CROSS SECTION CC SHEET 26})$$

FLOW CALCULATED BASED ON

$$q = K \frac{H_u^2 - H_D^2}{2L} \quad (\text{REF 2, SEE SHEET 39})$$

$$q = 2.7 \frac{[(505-465)^2 - (472-465)^2]}{2 \times 500}$$

$$q = 4.2 \text{ FT}^2/\text{DAY}$$

NOTE: RECHARGE WAS NEGLECTED.

PROJECT LOCKPORT CITY LANDFILL

SUBJECT GROUNDWATER FLOWS

THE 3-D FLOW WAS CALCULATED BY MULTIPLYING
THE 2-D FLOW BY THE TRIBUTARY LENGTH L_T ,
WHICH FOR THIS SECTION OF WAS ASSUMED
 L_T

$$L_T = 1,200 \text{ FT}$$

WHICH CORRESPONDS TO THE DISTANCE FROM
MW-4 TO THE NORTHERN BOUNDARY OF
THE SITE

$$Q_{3-D} = L_T \cdot Q_{2-D} \quad (\text{FOR 2-D SEE} \\ \text{SHEET 27})$$

$$Q_{3-D} = 1,200 \text{ FT} \cdot 4.2 \text{ FT}^2/\text{DAY} = \\ = \underline{\underline{5,040 \text{ FT}^3/\text{DAY}}}$$

PROJECT LOCKPORT CITY LANDFILL
 SUBJECT GROUNDWATER FLOWS
D.) TOTAL FLOW REACHING THE SITEREF.
PAGE

TOTAL FLOW REACHING THE SITE WERE CALCULATED BY ADDING FLOWS AS CALCULATED FOR SECTIONS AA, BB AND CC.

$$Q_{UPST \text{ TOT}} = (952 + 3,612)_{AA} + (1,496 + 15,840 + 132)_{BB} + (5,040)_{CC}$$

 (SEE SHEETS
14,24,28

$$Q_{UPST \text{ TOTAL}} = \underline{\underline{27,072 \text{ FT}^3/\text{DAY}}} = \underline{\underline{140 \text{ GPM}}}$$

E.) FLOWS REACHING THE GULF

TOTAL FLOW REACHING THE GULF WAS CALCULATED BY ADDING FLOWS FOR CROSS SECTIONS AA, BB, CC.

$$Q_{DOWNST \text{ TOT}} = (140)_{AA} + (10,120 + 319)_{BB} + (5,040)_{CC} = \underline{\underline{15,619 \text{ FT}^3/\text{DAY}}} = \underline{\underline{81 \text{ GPM}}}$$

 (SEE SHEETS 14,24,28)

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PAGEF.) TOTAL RECHARGE

$$Q_{RECH} = (931)_{AA} + (1,359)_{BB} + (0)_{CC} =$$

$$= 2,290 \text{ FT}^3/\text{DAY} = \underline{12 \text{ GPM}}$$

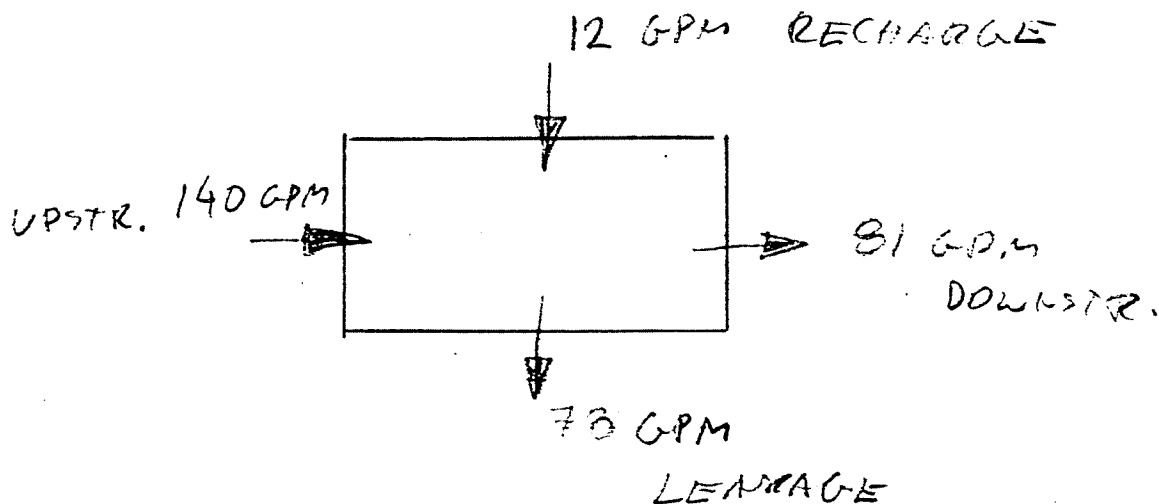
(SEE SHEETS 14, 24, 28)

G.) TOTAL LEAKAGE

$$Q_{LK} = (6,076)_{AA} + (8,866)_{BB} + (0)_{CC} =$$

$$= 14,942 \text{ FT}^3/\text{DAY} = \underline{78 \text{ GPM}}$$

(SEE SHEETS 14, 24, 28)

H.) FLOWS

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PAGE OF
SHEET NO. 31 OF
JOB NO. 35130
MADE BY MO DATE 09/02/91
CHKD. BY DATE

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REFERENCES

REF.
PAGE

- 1) FIRST PHASE REMEDIAL INVESTIGATION REPORT
AT THE LOCKPORT CITY LANDFILL, URS CONSULTANTS,
FEB 91
- 2) HYDRAULICS OF GROUNDWATER, JACOB BEAR, 1979
- 3) LOCKPORT CITY LANDFILL GROUNDWATER
ELEVATIONS

FIRST PHASE REMEDIAL INVESTIGATION REPORT

AT THE LOCKPORT CITY LANDFILL

LOCKPORT (C), NIAGARA (C), NEW YORK

NYSDEC SITE NO. 9-32-010

CITY OF LOCKPORT, NEW YORK

FEBRUARY 1991

Prepared For:

CITY OF LOCKPORT, NEW YORK
Lockport Municipal Building
One Locks Plaza
Lockport, New York

Prepared By:

URS CONSULTANTS, INC.
570 Delaware Avenue
Buffalo, New York 14202

TABLE 3-4

WATER BALANCE SUMMARY

Annual Precipitation:	35.70 inches
Surface Runoff:	5.35 inches (15.00 percent)
Evapotranspiration:	22.18 inches (62.13 percent)
Infiltration:	<u>8.16 inches</u> (22.87 percent)

All units examined at the site contain both horizontal and northeast/northwest-trending vertical fractures. The largest fractures usually occur in the top 10-25 feet of rock.

3.8.3 Hydraulic Conductivity

The hydraulic conductivity of each of the hydrogeologic units underlying the site area was estimated by conducting pressure tests and/or variable-head slug tests. Results of these analyses are summarized in Table 3-7 and 3-8.

The ranges of hydraulic conductivities measured were generally similar within the individual units defined. There was also reasonable agreement between pressure and slug test results. The widest range of conductivities occurred in the water table aquifer owing to differences in the strata immediately underlying the surface.

Specific properties of each unit are described below:

(a) Fill Material - Hydraulic conductivities for fill units have a wide range depending on the type of fill material and the grain size of any admixed natural material. The only measured values averaged 7.41×10^{-3} cm/s and were recorded at a location where the admixed material was a silty clay (MW-25).

(b) Glacial Till - Glacial tills have a wide range of hydraulic conductivities. The only measured value, 1.14×10^{-2} cm/s, was recorded at a location where the sand and gravel content was unusually high, and this figure probably represents the upper portion of that range (MW-9S).

(c) Rochester Shale - Hydraulic conductivity measurements from the Rochester Shale averaged from 2.5×10^{-5} to 6.16×10^{-4} cm/s. Shale conductivities are typically less than 10^{-7} cm/s (Freeze and Cherry, 1979),

TABLE 3-8

LOCKPORT RI/FS SUMMARY OF HYDRAULIC CONDUCTIVITY TESTS (SLUG TESTS)						
WELL NO.	SCREENED INTERVAL (ft.)	STRATIGRAPHIC UNIT	SCREEN LENGTH (ft.)	HYDRAULIC CONDUCTIVITY (cm/sec)		
				SLUG IN	SLUG OUT	AVERAGE
1-S	6.2 - 11.0	WATER TABLE	5	1.14E-04	3.97E-05	7.69E-05
1-I	17.0 - 27.0	ROCHESTER SHALE	10	3.65E-04	3.02E-04	3.34E-04
1-D	77.0 - 87.0	IRONDEQUOIT	10	NA	1.08E-05	1.08E-05
2-S	7.5 - 12.5	WATER TABLE	5	6.99E-03	7.82E-03	7.41E-03
2-I	20.0 - 25.0	ROCKWAY	5	1.42E-03	1.10E-03	1.26E-03
3-S	12.0 - 17.0	WATER TABLE	5	7.65E-04	6.18E-04	6.91E-04
4-S	5.0 - 10.0	WATER TABLE	5	3.20E-04	2.58E-04	2.89E-04
5-S	9.1 - 14.1	WATER TABLE	5	4.93E-04	5.77E-04	5.35E-04
5-I	18.8 - 23.8	GRIMSBY	5	9.26E-04	9.51E-04	9.38E-04
6-I	20.0 - 25.0	ROCHESTER SHALE	5	5.28E-04	7.04E-04	6.16E-04
7-S	8.0 - 13.0	WATER TABLE	5	3.91E-04	1.86E-04	2.89E-04
8-I	21.0 - 31.0	ROCHESTER SHALE	10	NA	1.63E-04	1.63E-04
8-D	64.0 - 74.0	IRONDEQUOIT	10	6.25E-05	4.17E-05	5.21E-05
9-S	4.0 - 9.0	WATER TABLE	5	9.60E-03	1.32E-02	1.14E-02
9-I	12.5 - 17.5	ROCKWAY	5	3.77E-03	2.78E-03	3.28E-03

Table 4-1 Typical values of hydraulic conductivity and permeability†

$-\log_{10} K (\text{cm/sec})$	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11
Permeability	Pervious				Semipervious				Impervious					
Aquifer	Good				Poor				None					
Soils	Clean gravel	Clean sand or sand and gravel				Very fine sand, silt, loess, loam, solonetz								
					Peat	Stratified clay				Unweathered clay				
Rocks					Oil rocks				Sandstone	Good limestone, dolomite	Breccia, granite			
$-\log_{10} k (\text{cm}^2)$	3	4	5	6	7	8	9	10	11	12	13	14	15	16
$\log_{10} k (\text{md})$	8	7	6	5	4	3	2	1	0	-1	-2	-3	-4	-5

† From Bear, Zaslavsky, and Irmay, 1968.

which tends to clog the matrix, thus reducing k with time. Clogging may also be caused by fines carried by the water (e.g., in artificial recharge).

Various units are used in the practice for the hydraulic conductivity K (dimensions L/T). Hydrologists prefer the unit m/day (meters per day). Soil scientists often use cm/sec. In the USA, as in many countries using the English system of units, two other units are commonly employed by hydrologists. One is a *laboratory*, or *standard*, *hydraulic conductivity* defined as the total discharge (Q) of water at 60°F, expressed in gallons per day, through a porous medium cross-sectional area (A) expressed in ft² under a hydraulic gradient $\{(\phi_1 - \phi_2)/L\}$ of 1 ft/ft. With this definition, the units of K are gal/day ft². In a similar way, a *field*, or *aquifer*, *hydraulic conductivity* is defined as the discharge of water at field temperature, through a cross-sectional area of an aquifer one foot thick and one mile wide under a hydraulic gradient of 1 ft/mile. The unit is the same as for the laboratory K . Following are some conversions among these units.

$$1 \text{ US gal/day ft}^2 = 4.72 \times 10^{-5} \text{ cm/sec} = 4.08 \times 10^{-2} \text{ m/d}$$

Permeability k (dims. L^2) is measured in the metric system in cm² or in m². In the English system, the unit is ft². For water at 20°C, we have the conversion

$$1 \text{ cm/sec} = 1.02 \times 10^{-5} \text{ cm}^2$$

Reservoir engineers use the unit *darcy* defined by

$$1 \text{ darcy} = \frac{1 \text{ cm}^3/\text{sec}/\text{cm}^2 \times 1 \text{ centipoise}}{1 \text{ atmosphere}/\text{cm}}$$

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4.3 AQ

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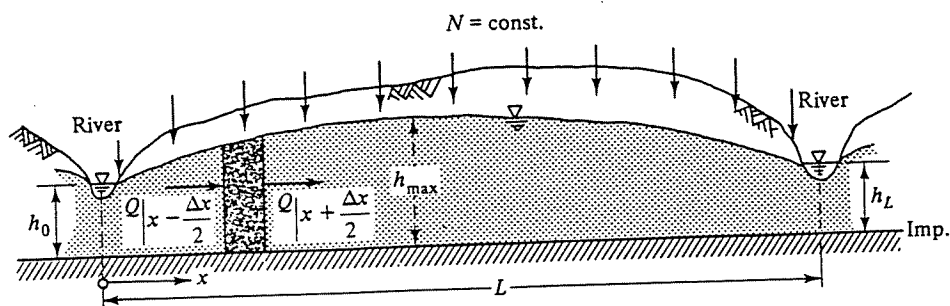


Figure 5-40 Flow in a phreatic aquifer with accretion.

bearing formation we assume that at $x = 0$ and $x = L$ we have vertical equipotentials $\phi = h_0$ ($\ll L$) and $\phi = h_L$ ($\ll L$), respectively, and that everywhere the flow is essentially horizontal. We know that in the vicinity of the water table peak and under the streams this assumption is incorrect (in fact the flow in these places is along the vertical), yet the regions of error are relatively small and the results based on the assumption of horizontal flow should be considered a good estimate for all practical purposes.

The continuity equation is obtained either from (5-70), or from a water balance written for the control box shown in Fig. 5-40

$$Q \Big|_{x-\Delta x/2} + N \Delta x - Q \Big|_{x+\Delta x/2} = 0; \quad -\frac{dQ}{dx} + N = 0;$$

$$K \frac{d}{dx} \left(h \frac{dh}{dx} \right) + N = 0 \quad (5-210)$$

By integration, we obtain

$$\frac{Kh^2}{2} + \frac{Nx^2}{2} + C_1x + C_2 = 0 \quad (5-211)$$

Using the boundary conditions $x = 0, h = h_0$; $x = L, h = h_L$, we obtain

$$C_2 = -\frac{K}{2}h_0^2; \quad C_1 = -\frac{K}{2L}(h_L^2 - h_0^2) - \frac{NL}{2}$$

Hence

$$K(h^2 - h_0^2) - Nx(L - x) + K \frac{x}{L}(h_0^2 - h_L^2) = 0 \quad (5-212)$$

gives the shape of the water table $h = h(x)$. By differentiating (5-212), we

$$Kh \frac{dh}{dx} \equiv -Q(x) = N \left(\frac{L}{2} - x \right) - \frac{K}{2L}(h_0^2 - h_L^2)$$

$$Q(x) = -\frac{NL}{2} - Nx + \frac{KL}{2L}(h_0^2 - h_L^2)$$

$$= -Nx + \frac{KL}{2L}(h_0^2 - h_L^2) - \frac{NL}{2} = -Nx + \frac{1}{2} \left[\frac{K}{L}(h_0^2 - h_L^2) - NL \right]$$

Table 3-4

LOCKPORT CITY LANDFILL GROUNDWATER ELEVATIONS

MONITOR LOCATION	MW-7S	MW-8I	MW-8D	MW-9S	MW-9I	MW-10I	MW-10D	MW-11D	MW-12I	MW-12D
HORIZON	WT	RS	IL	WT	RK	RS	IL	IL	RS	IL
RISER ELEVATION	503.82	576.96	577.3	488.01	486.53	580.25	579.76	614.9	580.79	580.76
GROUND ELEVATION	501.6	574.4	574.3	484.4	484.1	577.4	577.3	612.5	578.1	578.3
SCREEN LENGTH	5	10	10	5	5	10	10	10	10	10
2/21/91	491.60	550.72	508.62	481.49	481.17	NA	NA	NA	NA	NA
2/25/91	491.04	550.76	509.02	481.47	481.11	NA	NA	NA	NA	NA
2/27/91	490.98	550.70	508.88	481.46	481.08	NA	NA	NA	NA	NA
3/1/91	491.04	550.80	508.85	481.55	481.13	NA	513.46	NA	NA	NA
3/5/91	491.04	550.88	509.08	481.61	481.26	557.41	512.89	NA	NA	NA
3/7/91	492.00	550.98	509.57	NT	NT	558.03	512.89	NA	NA	NA
3/8/91	491.56	550.96	509.49	NT	481.29	557.97	505.32	NA	NA	NA
3/11/91	NT	550.94	509.51	NT	NT	557.77	509.61	NA	NA	NA
3/12/91	491.25	550.96	509.48	481.61	481.28	557.82	509.75	NA	NA	NA
3/14/91	491.15	550.89	509.38	NT	NT	557.55	509.86	NA	NA	508.38
3/15/91	491.12	550.78	509.07	481.59	481.20	557.26	509.68	NA	NA	NT
3/18/91	491.22	550.97	509.36	481.63	481.25	557.67	NT	NA	NA	509.56
3/19/91	491.37	550.88	509.25	481.63	481.28	557.55	NT	NA	554.37	509.52
3/20/91	491.37	550.78	509.05	481.60	481.23	557.28	NT	NA	552.46	509.20
3/21/91	491.29	550.95	509.28	481.60	481.22	557.59	NT	NA	534.43	509.01
3/22/91	491.22	550.78	509.02	481.59	481.21	556.54	509.84	NA	535.11	495.84
3/25/91	491.52	550.82	509.10	481.63	481.26	557.39	509.42	NA	539.13	501.09
3/26/91	491.49	550.93	509.13	481.65	481.31	557.62	509.14	NA	539.47	508.10
3/28/91	492.24	551.14	509.82	481.69	481.43	558.29	509.95	NA	532.43	491.54
3/29/91	491.89	551.12	509.74	481.66	481.39	558.10	509.80	NA	531.11	490.40
4/1/91	489.40	551.11	509.77	481.64	481.28	557.51	509.88	NA	534.09	493.54
4/2/91	491.39	550.90	509.41	481.62	481.23	557.51	510.46	NA	534.13	490.74
4/3/91	NT	564.86	509.27	NT	NT	557.41	509.31	NA	534.35	491.66
4/4/91	491.47	551.03	509.50	481.62	481.26	557.67	509.36	592.95	531.49	490.78
4/5/91	491.39	550.92	509.38	481.64	481.23	557.64	509.54	491.70	532.01	491.36
4/8/91	491.15	550.77	509.09	481.60	481.21	557.48	509.28	491.18	534.58	494.32
4/9/91	491.17	550.74	509.02	481.59	481.18	557.43	509.26	489.94	532.33	492.82
4/10/91	491.12	550.64	508.80	481.54	481.15	557.27	509.03	486.97	531.73	490.60
4/11/91	NT	550.49	518.42	NT	NT	556.87	508.56	486.80	531.74	491.16
4/12/91	491.14	550.52	508.30	481.57	481.15	556.84	508.43	487.14	532.33	490.41
4/15/91	491.17	548.88	508.80	481.65	481.24	557.45	509.16	487.30	533.44	491.59
4/17/91	491.12	548.62	508.44	481.59	481.16	557.21	508.68	487.14	532.55	490.92
4/25/91	491.74	550.90	509.59	481.67	481.40	557.95	509.65	597.02	530.44	488.96
4/26/91	491.54	550.95	509.68	481.67	481.37	557.91	509.83	596.77	531.17	490.45

WT = Water Table

IL = Irondequoit Limestone

RS = Rochester Shale

MS = Medina Sandstone

RK = Rockway Dolostone

Table 3-3
LOCKPORT CITY LANDFILL STREAM GAGES, WELL POINTS AND
PIEZOMETER ELEVATIONS

MONITOR LOCATION HORIZON RISER ELEVATION GROUND ELEVATION SCREENED INTERVAL	SG-1 STREAM NA 469.06	SG-2 STREAM NA 493.65	SG-3 STREAM NA 495.51	D-3A FILL/SILTY CLAY	WP-4 SHALLOW OVERBURDEN	WP-5 SHALLOW OVERBURDEN	WP-6 SHALLOW OVERBURDEN	P-1 PIEZOMETER FILL	P-2 PIEZOMETER CLAYEY SILT	P-3 PIEZOMETER FILL	P-4 PIEZOMETER FILL	P-5 PIEZOMETER FILL	P-6 PIEZOMETER FILL	P-7 PIEZOMETER FILL	P-8 PIEZOMETER FILL
2/21/91	NT	NT	NT	NA	NA	NA	NA	545.32	556.77	NA	542.90	NT	542.14	NA	NA
2/25/91	447.81	463.15	464.51	NA	NA	NA	NA	545.39	555.77	NA	542.87	572.75	542.37	NA	NA
2/27/91	454.06	486.90	490.95	NA	NA	NA	NA	545.37	555.42	NA	542.97	572.48	542.28	NA	NA
3/1/91	454.81	488.15	491.01	NA	NA	NA	NA	545.49	555.20	NA	543.06	572.30	542.44	NA	NA
3/5/91	449.06	485.15	489.76	NA	NA	NA	NA	545.46	556.64	NA	543.04	573.46	542.46	NA	NA
3/7/91	NT	NT	NT	NA	NA	NA	NA	545.46	557.44	NA	543.04	NT	542.54	NA	NA
3/8/91	449.31	485.15	489.51	NA	NA	NA	NA	545.49	557.02	NA	543.01	574.60	542.53	NA	NA
3/12/91	453.56	487.15	490.76	547.16	NA	NA	NA	545.60	556.05	NA	543.05	573.60	542.62	NA	NA
3/14/91	454.56	NT	NT	547.16	NA	NA	NA	545.39	555.73	NA	543.07	573.35	542.64	NA	NA
3/15/91	453.44	487.78	491.01	547.15	NA	470.52	469.70	545.52	555.55	NA	543.05	573.15	542.64	NA	NA
3/18/91	451.56	487.78	491.01	547.20	NA	470.68	470.36	545.58	555.15	NA	543.10	NT	542.68	NA	NA
3/19/91	451.19	486.90	490.51	547.21	NA	470.73	470.36	545.52	556.72	NA	543.10	573.33	542.66	NA	NA
3/20/91	452.19	486.15	491.01	547.21	NA	NT	470.04	545.47	556.45	NA	543.07	573.22	542.65	NA	NA
3/21/91	453.56	487.40	491.01	547.20	NA	470.67	469.91	545.52	556.23	NA	543.09	573.37	542.66	NA	NA
3/22/91	455.06	488.03	491.14	547.20	NA	470.59	469.79	545.40	556.03	NA	543.08	573.08	542.68	NA	NA
3/25/91	451.19	485.90	490.14	547.24	NA	470.69	470.14	545.47	556.70	NA	543.08	573.62	NT	NA	NA
3/26/91	452.94	486.03	490.76	547.26	NA	470.66	470.26	545.56	556.42	NA	543.10	573.77	542.71	NA	NA
3/28/91	447.06	482.15	488.01	547.26	NA	470.81	470.66	545.56	556.42	NA	543.10	573.77	542.71	NA	NA
3/29/91	452.56	487.15	488.76	547.27	NA	470.76	470.29	545.52	557.12	NA	543.09	575.19	575.19	NA	NA
4/1/91	451.81	485.28	490.39	547.31	NA	470.66	470.33	545.57	NT	NA	543.10	573.75	542.80	NA	NA
4/2/91	452.31	486.65	490.51	NT	NA	470.64	470.02	545.54	555.84	NA	543.09	573.78	542.76	NA	NA
4/4/91	453.56	488.15	490.76	547.28	NA	470.58	469.75	545.59	559.06	NA	543.13	NT	542.82	510.46	NA
4/5/91	455.06	487.15	490.76	547.23	470.11	470.56	469.75	545.50	555.43	NA	543.06	573.59	542.72	510.30	540.62
4/8/91	454.69	486.90	490.89	547.23	469.96	470.47	469.64	545.47	555.21	NA	543.06	573.21	542.67	510.30	540.48
4/9/91	454.06	489.40	491.14	547.22	469.95	470.48	469.62	545.44	554.91	NA	543.06	573.03	542.70	510.30	540.46
4/10/91	453.06	487.15	491.01	547.20	470.06	470.47	469.72	545.40	554.76	NA	543.06	572.89	542.68	510.28	540.39
4/12/91	453.94	488.03	491.26	547.14	469.90	470.39	469.53	545.39	554.55	NA	543.02	572.57	542.62	510.19	540.14
4/15/91	447.06	482.65	463.31	547.16	470.59	470.65	470.31	545.48	554.28	NA	543.07	572.82	542.61	NT	540.32
4/17/91	454.06	487.40	491.14	547.13	470.31	470.57	469.88	545.40	554.15	NA	543.02	572.85	542.58	510.23	540.12
4/25/91	453.56	487.15	489.76	547.24	470.70	470.69	470.09	545.47	556.56	NA	542.99	574.62	542.62	510.21	540.61
4/26/91	453.06	486.40	490.39	546.13	470.38	470.61	468.94	545.48	556.29	NA	543.00	574.42	542.63	510.24	540.66

PROJECT LOCKPORT CITY LANDFILL
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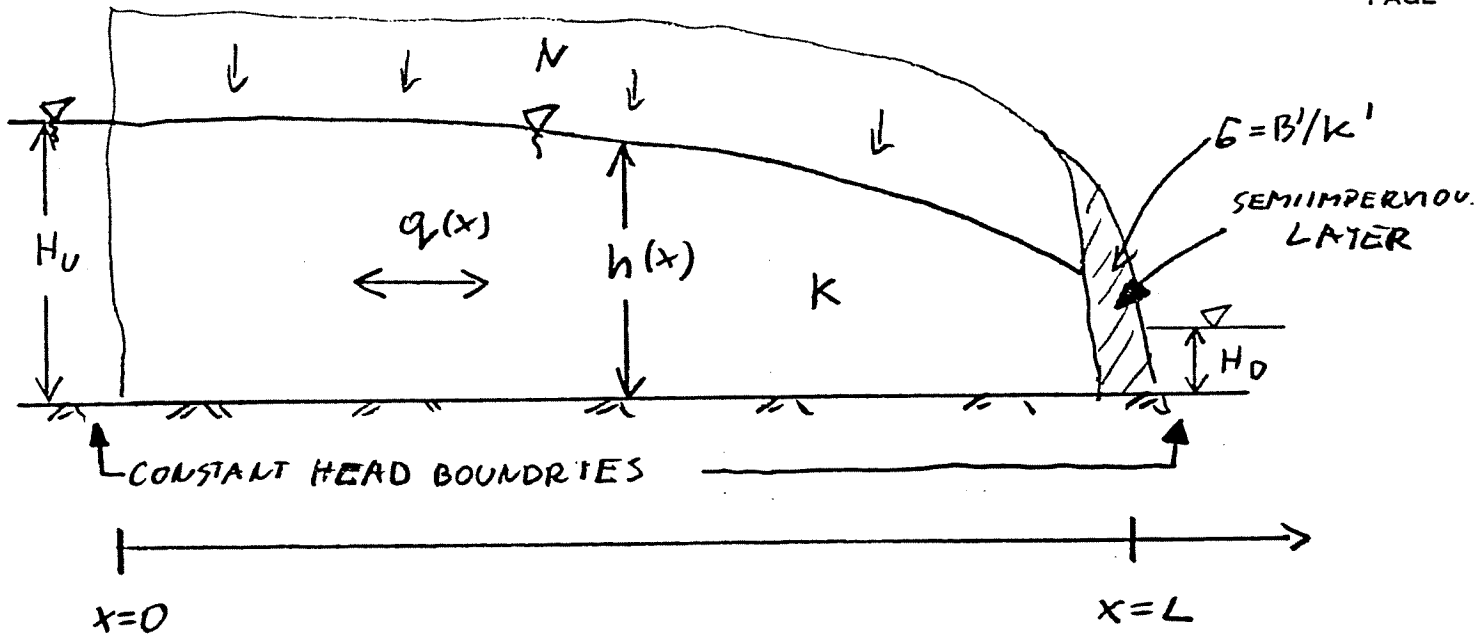
FLOW EQUATIONS DERIVED ON PROCEEDING PAGES (44 - 52) UTILIZE A 1-DIMENSIONAL, STEADY STATE APPROACH. THE GOVERNING EQUATIONS FOR BOTH CONFINED & UNCONFINED AQUIFERS WITH RECHARGE/LEAKAGE WERE ASSUMED AFTER BEAR, 1979. DIFFERENT BOUNDARY CONDITIONS WERE APPLIED TO FIND SOLUTIONS FOR PARTICULAR CASES.

DEFINITIONS OF TERMS:

- h - hydr head in unconf. aquifer
- ϕ - ~~hydr head~~ (confined) ~~hydr head~~
- x - distance
- L - length
- K - hydr. conductivity
- N - net recharge/Leakage
- T - transmissivity
- B - width of a confined aquifer
- b - conductance of a semipervious layer

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Governing Equation

$$\frac{K}{2} \frac{d^2(h^2)}{dx^2} = -N \quad (1)$$

$$h^2 = -\frac{N}{K}x + Ax + B$$

$$h = \sqrt{-\frac{N}{K}x^2 + Ax + B} \quad (2)$$

$$q = -Kh \frac{dh}{dx} \quad [USE (2)]$$

$$q = Nx - \frac{KA}{2} \quad (3)$$

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B. C.

$$1^{\circ}) \quad h|_{x=0} = H_u \quad (4)$$

USE (2)

$$H_u^2 = -\frac{N}{K} \cdot 0 + A \cdot 0 + B$$

$$B = H_u^2$$

$$2^{\circ}) \quad q|_{x=L} = \frac{h(L) - H_D}{b} \cdot \frac{h(L) + H_D}{2} \quad (5)$$

USE (2) AND (3)

$$NL - \frac{KA}{2} = \frac{-\frac{NL^2}{K} + AL + H_u^2 - H_D^2}{2b}$$

$$2bNL - KA = -\frac{NL^2}{K} + AL + H_u^2 - H_D^2$$

$$A(L + K/b) = 2bNL + \frac{NL^2}{K} + H_D^2 - H_u^2$$

$$A = \frac{NL(2b + \frac{L}{K}) - (H_u^2 - H_D^2)}{L + K/b}$$

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SO:

$$\text{FLOW } q(x) = Nx - \frac{K}{2} \left[\frac{NL(26 + \frac{L}{K}) - (H_U^2 - H_D^2)}{L + K6} \right] \quad (6) \quad \text{FROM (3)}$$

$$\text{HYDR HEAD } h(x) = \sqrt{-\frac{N}{K}x^2 + \left[\frac{NL(26 + \frac{L}{K}) - (H_U^2 - H_D^2)}{L + K6} \right]x + H_U^2} \quad (7) \quad \text{FROM (2)}$$

TO ESTIMATE "N", CALCULATE "N" FROM (7)

$$h^2 = -\frac{Nx^2}{K} + \frac{NLx(26 + \frac{L}{K})}{L + K6} - \frac{(H_U^2 - H_D^2)x}{L + K6} + H_U^2$$

$$N \left[\frac{26Lx + \frac{L^2x}{K}}{L + K6} - \frac{x^2}{K} \right] = \frac{(H_U^2 - H_D^2)x}{L + K6} + (h^2 - H_U^2)$$

$$N = \frac{(H_U^2 - H_D^2)x + (L + K6)(h^2 - H_U^2)}{26Lx + \frac{Lx}{K}(L - x) - 6x^2}$$

$$N = \frac{(H_U^2 - H_D^2)x + (L + K6)(h^2 - H_U^2)}{\frac{Lx}{K}(L - x) + 6x(2L - x)}$$

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CHECK

1) SATISFIES GOVERNING EQ

$$h^2 = -\frac{N}{K}x^2 + \left[\frac{NL(2G + \frac{L}{K}) - (H_U^2 - H_D^2)}{L + KG} \right]x + H_U^2$$

$$\frac{d^2(h^2)}{dx^2} = -\frac{2N}{K}$$

SUBSTITUTE TO (1)

$$\frac{K}{2} \left(-\frac{2N}{K} \right) = -N \quad \underline{\underline{OK!}}$$

2) B.C. AT $x=0$ [FROM (4)]

$$h|_{x=0} = \sqrt{-\frac{N}{K} \cdot 0 + \left[\frac{NL(2G + \frac{L}{K}) - (H_U^2 - H_D^2)}{L + KG} \right] \cdot 0 + H_U^2}$$

$$h|_{x=0} = H_U^2 \quad \underline{\underline{OK!}}$$

3) B.C. AT $x=L$

$$q|_{x=L} = NL - \frac{K}{2} \left[\frac{NL(2G + \frac{L}{K}) - (H_U^2 - H_D^2)}{L + KG} \right] \quad \text{FROM (1)}$$

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$$q_{x=L} = \frac{2NL^2 + 2KNL\delta - 2KNL\delta - \frac{KNL^2}{K} + K(H_0^2 - H_D^2)}{2(L + \delta K)}$$

$$= \frac{NL^2 + K(H_0^2 - H_D^2)}{2(L + \delta K)} \quad (8)$$

ALSO

$$h_{x=L} = \sqrt{-\frac{NL^2}{K} + \left[\frac{NL(2\delta + \frac{L}{K}) - (H_0^2 - H_D^2)}{L + \delta K} \right] L + H_0^2}$$

FROM (7)

$$q_{x=L} = \frac{h(L) - H_D}{\delta} \cdot \frac{h(L) + H_D}{2} \quad \text{FROM (5)}$$

SUBSTITUTE $h_{x=L}$

$$q_{x=L} = \frac{h(L)^2 - H_D^2}{2\delta} = \frac{-\frac{NL^2}{K} + \left[\frac{NL(2\delta + \frac{L}{K}) - (H_0^2 - H_D^2)}{L + \delta K} \right] L + H_0^2}{2\delta}$$

(+ $H_0^2 - H_D^2$)

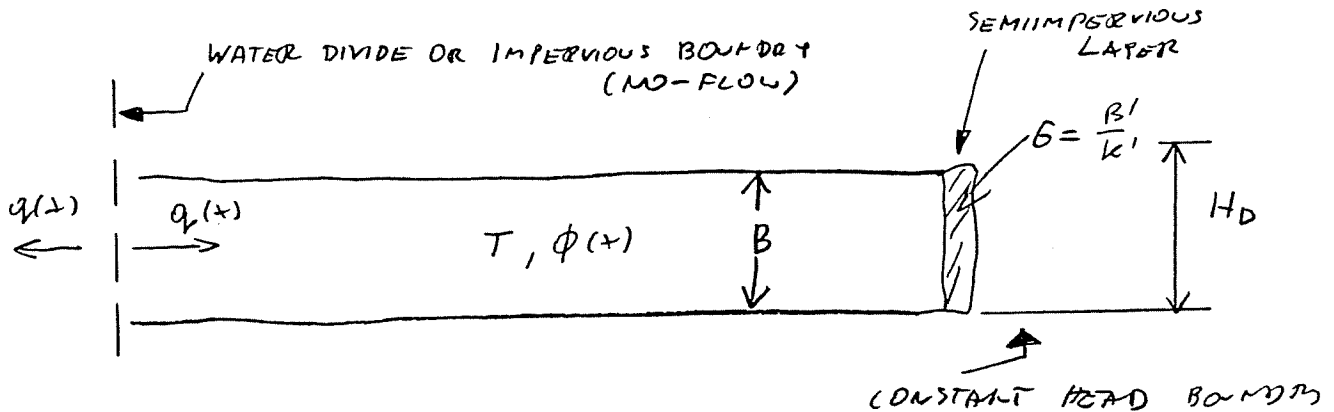
$$= \frac{-\frac{NL^3}{K} - \frac{NL^2\delta K}{K} + NL^2\delta + \frac{NL^3}{K} - L(H_0^2 - H_D^2) + L(H_0^2 - H_D^2) + \delta K(H_0^2 - H_D^2)}{2\delta(L + \delta K)}$$

$$= \frac{NL^2\delta + \delta K(H_0^2 - H_D^2)}{2\delta(L + \delta K)} = \frac{NL^2 + K(H_0^2 - H_D^2)}{2(L + \delta K)} = (8)$$

OK

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GOVERNING EQ:

$$\frac{d^2 \phi}{dx^2} = -\frac{N}{T}$$

$$\frac{d\phi}{dx} = -\frac{N}{T}x + A$$

$$\phi = -\frac{N}{2T}x^2 + Ax + C$$

$$q_v = -T \frac{d\phi}{dx} = -T \left(-\frac{N}{T}x + A \right) = Nx - TA$$

B. C.

$$1^{\circ}) \quad q_v|_{x=0} = 0$$

$$N \cdot 0 - T \cdot A = 0$$

$$A = 0$$

$$2^{\circ}) \quad q_v|_{x=L} = \frac{\phi(L) - H_D}{\delta} \cdot B$$

$$NL = \frac{-\frac{NL^2}{2} + C - H_D}{\delta} \cdot B$$

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$$GNL = -\frac{NL^2B}{2T} + BC - H_D B$$

$$C = \frac{GNL + \frac{NL^2B}{2T} + H_D B}{B}$$

$$C = \frac{NL^2}{2T} + \frac{GNL}{B} + H_D$$

SO

$$\phi(x) = -\frac{N}{2T}x^2 + \frac{NL^2}{2T} + \frac{GNL}{B} + H_D$$

$$q(x) = Nx$$

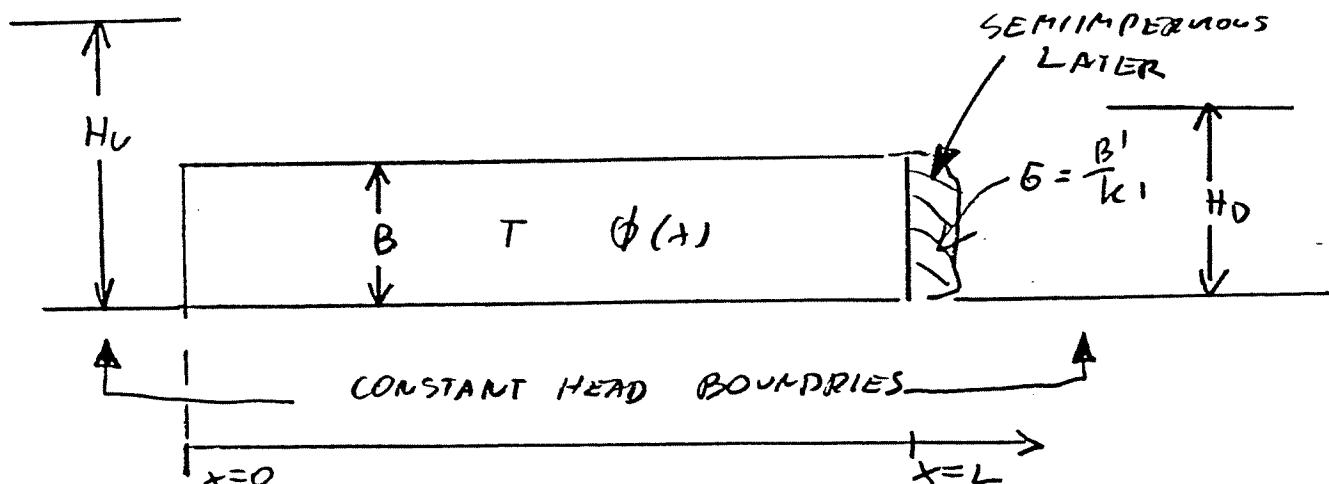
TO DETERMINE "N"

$$\phi(x) = N \left(\frac{L^2}{2T} + \frac{GL}{B} - \frac{x^2}{2T} \right) + H_D$$

$$N = \frac{\phi(x) - H_D}{\frac{L^2x^2}{2T} + \frac{GL}{B}}$$

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$$\frac{d^2\phi}{dx^2} = -\frac{N}{T}$$

$$\frac{d\phi}{dx} = -\frac{Nx}{r} + A$$

$$\phi = -\frac{M}{2I} x^2 + Ax + C$$

$$q_r = -T \frac{d\phi}{dx} = -T \left(-\frac{\mu}{T} x + A \right) = \mu x - TA$$

B.C.
1°)

$$\phi|_{t=0} = H_0$$

$$H_U = -\frac{1}{2\pi} \cdot 0 + A \cdot 0 + C$$

$$C = H_v$$

2°)

$$q|_{r=L} = \frac{\phi(L) - H_D}{\delta} \cdot B$$

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$$NL - TA = \frac{-\frac{NL^2}{2T} + AL + H_U - H_D}{B}$$

$$\frac{6NL}{B} - \frac{T6}{B} A = -\frac{NL^2}{2T} + AL + H_U - H_D$$

$$A \left(L + \frac{T6}{B} \right) = \frac{6NL}{B} + \frac{NL^2}{2T} - H_U + H_D$$

$$A = \frac{NL \left(\frac{6}{B} + \frac{L}{2T} \right) - (H_U - H_D)}{L + \frac{T6}{B}}$$

so

$$\phi(x) = -\frac{N}{2T} x^2 + \left[\frac{NL \left(\frac{6}{B} + \frac{L}{2T} \right) - (H_U - H_D)}{L + \frac{T6}{B}} \right] x + 1$$

$$q(x) = Nx - T \left[\frac{NL \left(\frac{6}{B} + \frac{L}{2T} \right) - (H_U - H_D)}{L + \frac{T6}{B}} \right]$$

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the concentration of contaminants in airborne particulates was estimated using modeling techniques from Rapid Assessment of Exposure to Particulate Emission from Surface Contamination (Cowherd, 1988). Only a "no action" scenario was ~~considered~~ modeled. As the vehicular traffic is neither present nor anticipated on site, only the wind emission was considered.

1) Estimation of Wind Erosion Emissions

a.) Determination of the governing equation

In accordance with Cowherd, sites can be characterized by the finite availability ("limited reservoir") of erodible material or by the infinite availability ("unlimited reservoir") of the erodible particles.

~~Based on~~ the dividing line for the two erodibility classes is the value of the threshold friction velocity of about 75 cm/sec.

The threshold friction velocity is determined based on the sieve analysis of the surface material and the physical characteristics of the surface. The sieve analysis of the surface material was not available for this site. Instead, the results of three shallowest samples were utilized ~~(2-3 ft)~~ (2-3 ft).

: B-5, MW-1 and MW-2.

Based on the standard sieve analysis it was determined that fines ~~are~~ of diameter smaller than 0.1 mm.

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constitute the bulk of soil matrix. (REF 1, SEE SHEET 13)
Therefore, the mode of the aggregate size distribution was assumed as being
 $d = 0.1 \text{ mm}$.

Based on the mode size of 0.1 mm , the threshold friction velocity was determined to be

$$u_* = 25 \text{ cm/s} \quad (\text{REF 2, SEE SHEET 14})$$

The physical characteristics of the surface were established by means of visual inspection. It was determined that large, nonerodible particles like stones, clumps of vegetation are present on site. Because of that, the threshold friction velocity was corrected based on photographs from Appendix A of the manual (REF 2, SEE SHEETS 15, 16).

The new, corrected threshold friction velocity was determined as

$$\frac{u_{* \text{ NEW}}}{u_*} = 5$$

$$u_{* \text{ NEW}} = 5 \times u_* = 5 \times 25 = 125 \text{ cm/s}$$

This is larger than 75 cm/s and indicates that the "limited reservoir" model should be used.

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b.) Calculation of the emission factor

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The calculation of the emission factor for the "limited reservoir" case was done based on the following equation:

$$E_{10} = 0.83 \frac{f \cdot P(u^+) \cdot (1-V)}{(PE/50)^2} \quad (\text{REF 2, SEE SHEETS 17, 18})$$

Where

- E_{10} - Emission factor [$\text{mg}/\text{m}^2\text{-hr}$]
 f - Frequency of disturbances [1/month]
 u^+ - Fastest mile of wind [m/s]
 V - Fraction of surface covered with vegetation [-]
 PE - Thornwaite's Precipitation Evaporation Index [-]
 $P(u^+)$ - Erosion potential [g/m^2]

$$P(u^+) = \begin{cases} 6.7(u^+ - u_t) & , u^+ \geq u_t \\ 0 & , u^+ < u_t \end{cases}$$

u_t - Erosion threshold wind speed at 7 m [m/s]

The following site specific values were used:

- The number of disturbances for the worst case scenario is given as 30/month (REF 2, SEE SHEET 19). For annual avg., the number of disturbances was assumed as 1/3 of that for the worst case

$$f = \frac{1}{3} \times 30 = 10/\text{month}$$

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 SUBJECT FUGITIVE DUST

- Fastest mile was assumed as for Buffalo, NY REF. PAGE

$$U^+ = 24.1 \text{ m/s} \quad (\text{REF 2, SEE SHEET 20})$$

- The fraction of the site's surface covered by vegetation was estimated based on the visual inspection

$$V = 0.7$$

- The Thornwaite's PE Index was assumed after the "Map of P-E Index for State Climatic Divisions"

$$PE = 110 \quad (\text{REF 2, SEE SHEET 21})$$

- The erosion potential was estimated as follows

$$U_t = \frac{U_*}{0.4} \ln(Z/Z_0) \quad (\text{REF 2, SEE SHEET 1})$$

$$U_* = 1.25 \text{ m/s} \quad (\text{SEE SHEET 2})$$

$$Z = 7.00 \text{ m}$$

$$Z_0 = 0.04 \text{ m} \quad (\text{As determined for grassland, REF 2, SEE SHEET 22})$$

$$U_t = \frac{1.25}{0.4} \ln\left(\frac{7.00}{0.04}\right)$$

$$U_t = 16.1 \text{ m/s}$$

$$P(U^+) = 6.7 (24.1 - 16.1)$$

$$P(U^+) = 53.6 \text{ g/m}^2$$

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Based on the above parameters, the emission factor was calculated as follows

$$E_{10} = 0.83 \times \frac{10 \times 53.6 \times (1 - 0.7)}{(110/50)^2}$$

$$\underline{\underline{E_{10} = 27.6 \text{ mg/m}^2\text{-hr}}}$$

c.) calculation of the emission rate
The emission rate for the annualized model is estimated based on

$$R_{10} = E_{10} \times A \times \alpha \quad (\text{REF 2, SEE SHEET 23})$$

where

R_{10} - Emission rate

α - Mass fraction of contaminant

A - Areal source extent

Note: Any consistent set of units can be used.

The following site-specific values were used:

- Emission factor

$$E_{10} = 27.6 \text{ mg/m}^2\text{-hr} \quad (\text{SEE 1b.})$$

- Areal source extent

The site is approximately 30 acres (REF 3, SEE SHEET 24) It was assumed that about 70% of the site is covered by the contaminated fill

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$$A = 0.7 \times 30 \text{ ACRES} \times 43,560 \frac{\text{FT}^2}{\text{ACRE}} \times \frac{1}{3.3^2} \frac{\text{M}^2}{\text{FT}^2}$$

$$A = 84,000 \text{ m}^2$$

- Mass fraction of contaminant was assumed to be equal to the contaminant conc. in soil and was treated as a generic quantity, different for each contaminant

$$x = C_{\text{SOIL}} [-]$$

Based on the above parameters, the emission rate was calculated as follows

$$R_{10} = 27.6 \times 84,000 \times C_{\text{SOIL}}$$

$$\left[\frac{\text{mg}}{\text{m}^2 \cdot \text{hr}} \times \text{m}^2 \cdot - = \frac{\text{mg}}{\text{hr}} \right]$$

$$R_{10} = 2,318,400 C_{\text{SOIL}} \cdot \text{mg/hr}$$

$$R_{10} = 0.644 C_{\text{SOIL}} \text{ g/s}$$

d.) Calculation of the contaminant air conc. at the receptor point

The air concentration at the receptor point results from the dispersion of emitted soil particles. Cowherd et al (1985) provides a series of previously obtained outputs for the ISC LT model for estimating dispersion. The model was run for seven climatic

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regions using average meteorological data. ^{REF. PAGE}
Two types of areal sources were used:
a 10x10 m and 100x100 m. The outputs
from those runs are the unscaled dispersion
factors that are used to estimate the
ambient air concentrations by multiplying
them by a scaling factor Q_I .
The Q_I is calculated as

$$Q_I = R/P_r \quad (\text{REF 2, SEE SHEET 25})$$

where P_r is based on the climatic
region.

Based on the climatic region map
(REF 2, SEE SHEET 26), Lockport is

in region 4. For region 4, the P_r
value is

$$P_r = 0.288 \quad (\text{REF 2, SEE SHEET 25})$$

The scaling factor was calculated as
follows

$$Q_I = 0.644 C_{soil} / 0.288$$

$$Q_I = 2.236 C_{soil} \text{ g/s}$$

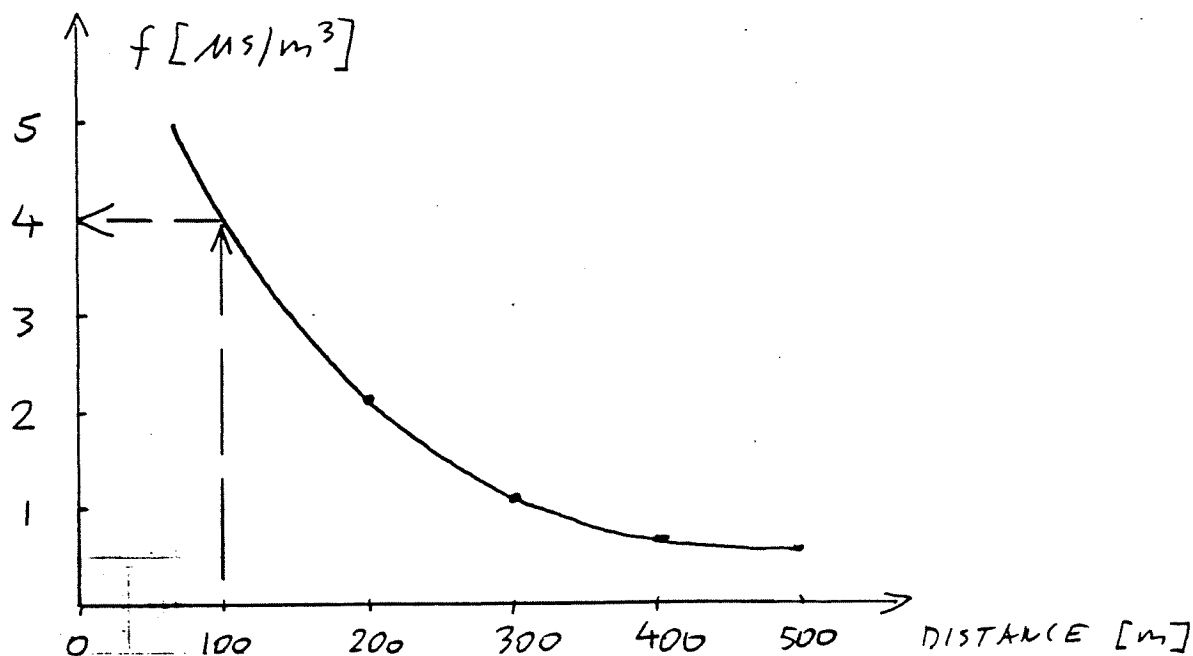
Based on the topo. map, the nearest receptor
is located about 100 m south of the site.
For a 100x100 m source and region 4,
the values of the unscaled dispersion
factors south of the site are as
follows: (REF 2, SEE SHEET 27)

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DISTANCE [m]	DISPERSION FACTOR [$\mu\text{s}/\text{m}^3$]
200	2.167
300	1.077
400	0.723
500	0.519

the value for 100 m is extrapolated as:



$$f(100\text{m}) = 4.000 \mu\text{s}/\text{m}^3$$

The respirable conc. is

$$X = Q_I f_I \quad (\text{REF 2, SEE SHEET 28})$$

and was calculated as follows:

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$$X = 2.236 C_{\text{SOIL}} * 4,000 \left[\frac{g}{s} * \frac{m \cdot s}{m^3} = \frac{mg}{m^3} \right]$$

$$X = 8.944 C_{\text{SOIL}} \text{ mg/m}^3$$

The calculated value of the respirable concentrations for all contaminants of concern was calculated by multiplying the dimensionless concentration of the contaminant in soil by the value of 8.944 mg/m³ obtained through the above calculation process. This was done using a spreadsheet program. The results are shown on sheets 10, 11.

TABLE 1

RESPIRABLE CONCENTRATIONS AT THE NEAREST RECEPTOR POINT
LOCPORT CITY LANDFILL SITE

PARAMETERS	CONCENTRATION IN SOIL (1)	DIMENSIONLESS CONC. IN SOIL	RESPIRABLE CONC. AT THE RECEPTOR
	[ppb]	[-]	[$\mu\text{g}/\text{m}^3$]
Carbon Disulfide	5.31E+00	5.31E-09	4.75E-08
Chloroform	1.00E+00	1.00E-09	8.94E-09
2-Butanone	1.00E+00	1.00E-09	8.94E-09
Ethylbenzene	6.59E+00	6.59E-09	5.89E-08
Xylenes (total)	4.15E+01	4.15E-08	3.71E-07
Benzoic Acid	4.65E+02	4.65E-07	4.16E-06
Napthalene	1.12E+03	1.12E-06	1.00E-05
2-Methylnaphthalene	4.89E+02	4.89E-07	4.38E-06
Dimethylphthalate	9.21E+02	9.21E-07	8.24E-06
Acenaphthylene	3.55E+02	3.55E-07	3.18E-06
Acenaphthene	8.21E+02	8.21E-07	7.34E-06
Dibenzofuran	6.13E+02	6.13E-07	5.48E-06
Diethylphthalate	6.30E+01	6.30E-08	5.63E-07
Fluorene	6.22E+02	6.22E-07	5.57E-06
Pentachlorophenol	3.40E+03	3.40E-06	3.04E-05
Phenanthrene	7.44E+03	7.44E-06	6.65E-05
Anthracene	8.18E+02	8.18E-07	7.31E-06
Di-n-butylphthalate	2.06E+03	2.06E-06	1.84E-05
Fluoranthene	5.74E+03	5.74E-06	5.13E-05
Pyrene	8.97E+03	8.97E-06	8.02E-05
Butylbenzylphthalate	2.60E+02	2.60E-07	2.33E-06
Benzo(a)anthracene	4.21E+03	4.21E-06	3.76E-05
Chrysene	4.90E+03	4.90E-06	4.38E-05
Bis(2-ethylhexyl)phthalate	1.45E+04	1.45E-05	1.30E-04
Di-n-octylphthalate	2.60E+02	2.60E-07	2.33E-06
Benzo(b)fluoranthene	4.35E+03	4.35E-06	3.89E-05
Benzo(k)fluoranthene	3.08E+03	3.08E-06	2.76E-05
Benzo(a)pyrene	4.13E+03	4.13E-06	3.69E-05
Indeno(1,2,3-cd)pyrene	2.71E+03	2.71E-06	2.42E-05

1 - AFTER "REPRESENTATIVE CONCENTRATIONS FOR SURFACE SOIL AND WASTE"
(SEE SHEETS 29, 30)

TABLE 1

RESPIRABLE CONCENTRATIONS AT THE NEAREST RECEPTOR POINT
LOCPORT CITY LANDFILL SITE

PARAMETERS	CONCENTRATION IN SOIL (1)	DIMENSIONLESS CONC. IN SOIL	RESPIRABLE CONC. AT THE RECEPTOR
	[ppb]	[-]	[$\mu\text{g}/\text{m}^3$]
Dibenz(a,h)anthracene	8.80E+02	8.80E-07	7.87E-06
Benzo(g,h,i)perylene	1.36E+03	1.36E-06	1.22E-05
Aldrin	4.20E+01	4.20E-08	3.75E-07
gamma-Chlordane	2.30E+02	2.30E-07	2.06E-06
Aroclor-1248	3.53E+03	3.53E-06	3.16E-05
Aroclor-1254	9.78E+02	9.78E-07	8.75E-06
Aluminum	1.61E+07	1.61E-02	1.44E-01
Antimony	1.15E+04	1.15E-05	1.03E-04
Arsenic	2.11E+04	2.11E-05	1.89E-04
Barium	3.63E+05	3.63E-04	3.25E-03
Beryllium	1.19E+03	1.19E-06	1.06E-05
Cadmium	8.48E+03	8.48E-06	7.58E-05
Calcium	1.07E+08	1.07E-01	9.60E-01
Chromium	6.32E+05	6.32E-04	5.66E-03
Cobalt	1.86E+04	1.86E-05	1.66E-04
Copper	8.00E+05	8.00E-04	7.16E-03
Iron	4.28E+07	4.28E-02	3.83E-01
Lead	2.50E+06	2.50E-03	2.24E-02
Magnesium	1.86E+07	1.86E-02	1.66E-01
Manganese	1.53E+06	1.53E-03	1.37E-02
Mercury	1.30E+03	1.30E-06	1.16E-05
Nickel	1.14E+05	1.14E-04	1.02E-03
Potassium	3.68E+06	3.68E-03	3.29E-02
Silver	4.86E+03	4.86E-06	4.34E-05
Sodium	1.37E+06	1.37E-03	1.22E-02
Vanadium	2.85E+04	2.85E-05	2.55E-04
Zinc	4.96E+06	4.96E-03	4.43E-02
Cyanide	2.59E+03	2.59E-06	2.31E-05

1 - AFTER "REPRESENTATIVE CONCENTRATIONS FOR SURFACE SOIL AND WASTE"
(SEE SHEETS 29, 30)

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 SUBJECT FUGITIVE DUST

REFERENCES

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- 1 LOCKPORT CITY LANDFILL, APPENICES
- 2 RAPID ASSESSMENT OF EXPOSURE TO PARTICULATE EMISSIONS FROM SURFACE CONTAMINATION SITES, Cowherd at 211, Feb 85
- 3 LOCKPORT FIRST PHASE RI REPORT, URS, Feb '91

PROJECT: LOCKPORT LANDFILL PROJECT NUMBER: 900333MOISTURE (ASTM D-2216-80) AND GRADATION (ASTM D-422-63) ANALYSIS

BORING NUMBER	DEPTH (FT.)	MOISTURE PERCENT	Gradation (% Retained on Standard Sieve)							CLAY	SILT	CLASSIFICATION
			4-75 #4	2.00 #10	.425 #40	.150 #100	.075 #200	.002				
B-5	3.0	44.8	9.8	3.9	5.0	1.9	1.6	24.7	53.1			CL
B-13	16.0	24.4	2.9	3.5	6.1	2.0	1.1	38.5	45.9			CL
B-15	22.0	20.7	0.3	1.7	3.7	1.9	1.4	43.1	47.9			CL
MM-1	2.0	30.2	32.5	2.4	5.5	5.2	6.1	30.6	17.7			GC
MM-2	2.0	50.4	1.6	0.5	2.9	3.1	2.9	30.5	58.5			CL
MM-5	17.5	17.4	23.1	8.3	13.3	5.6	3.0	28.8	17.9			SC
MM-6	10.0	11.5	1.4	3.9	6.2	1.9	1.1	47.5	38.0			CL
MM-7	8.0	8.6	33.0	8.7	12.2	4.7	2.6	23.0	15.8			SC
MM-8	16.0	20.4	3.2	3.8	5.9	1.5	0.9	44.7	40.0			CL
MM-9	8.0	20.2	31.0	7.4	10.0	3.1	1.8	26.8	19.9			GC

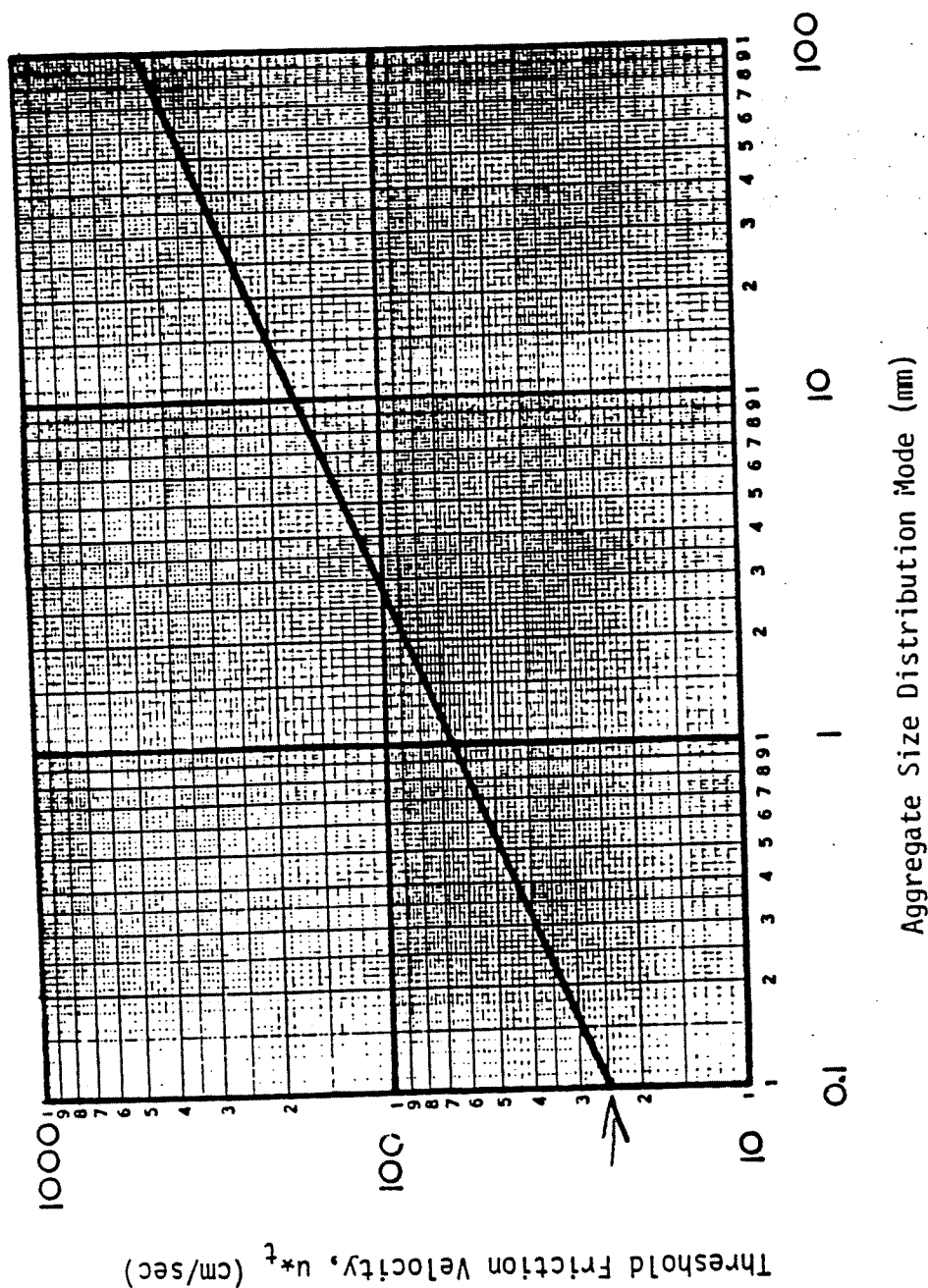


Figure 3-4. Relationship of Threshold Friction Velocity to Size Distribution Mode

This Appendix presents a series of photographs of nonerrodible element distributions along with the associated multipliers for correcting the threshold friction velocity (u_{*t}) determined only for the errodible material. The non-errodible elements are generally larger than about 1 cm in equivalent physical diameter. The appearance of the contaminated surface in question should be compared to the photographs for the purpose of determining the appropriate correction factor.

The correction factors for the subsequent figures are as follows:

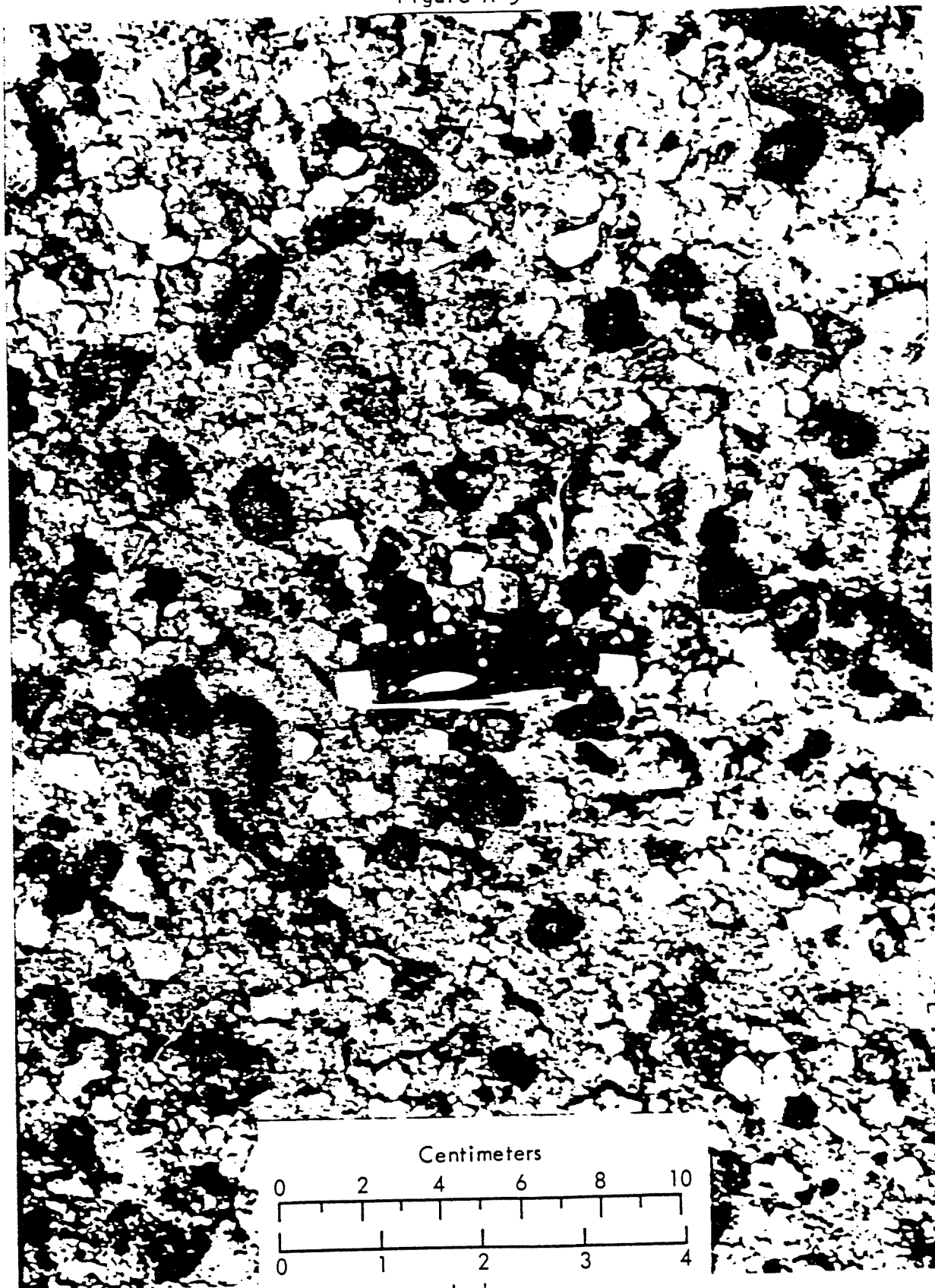
Figure A-1 No correction. $L_c < 10^{-3}$

Figure A-2 $\frac{(u_{*t}) \text{ corrected}}{(u_{*t}) \text{ uncorrected}} = 2$ $L_c \approx 0.01$

Figure A-3 $\frac{(u_{*t}) \text{ corrected}}{(u_{*t}) \text{ uncorrected}} = 5$ $L_c \approx 0.1$

The remaining photographs illustrate the appearance of dusted surfaces and a surface protected by dried vegetation. Figure A-4 shows a dusted surface covered with an appreciable amount of both errodible and nonerrodible particles. Figure A-5 shows a dusted surface with a negligible reservoir of loose errodible material; the quarter coin in the photograph indicates approximate scale. Figure A-6 shows a surface that is well protected by dried vegetation, rendering the surface nonerrodible; the white square in the photograph is of 1 m x 1 m inside dimensions.

Figure A-3



Inches
A-5

SECTION 4

CALCULATIONS AND GATHERING OF RESULTS

The assessment procedure developed in this manual follows a source-oriented approach. It requires the user first to estimate particulate emission rates for the contamination site, and then to link these estimates to the results of a general Gaussian dispersion algorithm in order to estimate ambient concentrations of contaminant in the form of respirable particulate matter. The following sections describe the emission factor models used to estimate contaminant emissions generated by wind erosion and mechanical entrainment, and the procedure for "translating" these results into ambient concentrations and associated exposures.

4.1 CALCULATION OF AVERAGE/WORST-CASE EMISSION RATES

This section describes the emission factor models used to estimate particulate emissions generated by mechanical entrainment and by wind erosion of contaminated surface material. Also this section describes the sources of data and the procedures used to estimate the parameters required for input to the emission models.

In the case of wind erosion emissions, there are no "ready-made" models fully capable of meeting the requirements of rapid assessment. As such, the information presented in Sections 4.1.1 and 4.1.2 provides best estimates for wind generated emissions, based on current knowledge of the suspension of surface material by wind action.

4.1.1 Wind Erosion from Surfaces with Limited Erosion Potential

For estimating respirable particulate emissions from surfaces characterized by a "limited reservoir" of erodible material, a predictive emission factor equation developed by Cowherd (1983) from field measurements using a portable wind tunnel at surface mines is recommended. In relating the annual average rate of respirable particulate emissions to surface and climatic factors, the equation takes the following form:

$$E_{10} = 0.83 \frac{f P(u^+) (1-V)}{(PE/50)^2} \quad (4-1)$$

where: E_{10} = PM_{10} emission factor, i.e., annual average PM_{10} emission rate per unit area of contaminated surface (mg/m^2-hr)

f = frequency of disturbance per month

u^+ = observed (or probable) fastest mile of wind for the period between disturbances (m/s)

$P(u^+)$ = erosion potential, i.e., quantity of erodible particles present on the surface prior to the onset of wind erosion (g/m^2)

V = fraction of contaminated surface area covered by continuous vegetative cover (equals 0 for bare soil)

PE = Thornthwaite's Precipitation Evaporation Index used as a measure of average soil moisture content

Although Equation 4-1 is based primarily on field tests of nonsoil surfaces (e.g., coal with a top size of 3 cm and a silt content exceeding 4%), subsoil and other crustal materials showed similar behavior. The erosion potential (in g/m^2) depends on the fastest mile (in m/s) as follows:

$$P(u^+) = \begin{cases} 6.7 (u^+ - u_t), & u^+ \geq u_t \\ 0, & u^+ < u_t \end{cases} \quad (4-2)$$

where u_t is the erosion threshold wind speed (in m/s), measured at a typical weather station sensor height of 7 m.

The threshold friction velocity determined from the site survey is converted to the equivalent wind speed at a height of 7 m using Figure 4-1. This figure assumes a logarithmic velocity profile near the earth's surface:

$$\frac{u(z)}{u_*} = \frac{1}{0.4} \ln(z/z_0) \quad (4-3)$$

where: u = wind speed at height z (m/s)
 z = height above surface (cm)
 u_* = friction velocity (m/sec)
 z_0 = roughness height (cm)

Mean annual fastest mile (u^+) values are presented in Table 4-1. The value for the weather station closest to the surface contamination site should be used.

Emissions generated by wind erosion of "limited reservoir" surfaces are also dependent on the frequency of disturbance (f) of the erodible surface, because each time that a surface is disturbed, its erosion potential is restored. A disturbance is defined as an action which results in the

exposure of fresh surface material. This would occur whenever aggregate material is either added to or removed from the old surface. A disturbance of an exposed area may also result from the turning of surface material to a depth exceeding the size of the largest pieces of material present.

Although vehicular traffic alters the surface by pulverizing surface material, several vehicle passes may be required to restore the full erosion potential, except for surfaces that crust before substantial wind erosion occurs. In that case, breaking of the crust over the area of the tire/surface contact once again exposes the erodible material beneath.

Thorntwaite's P-E (PE) Index is a useful indicator of average surface soil moisture conditions. In the present context, the P-E Index is applied as a correction parameter for wind generated emissions in the limited reservoir case. Figure 4-2 provides a basis for selecting an appropriate P-E value.

The worst-case emission rate is calculated by assuming that a disturbance occurs just prior to the annual fastest mile event, both within the 24-h period of interest. For this calculation, use Equation (4-1) with $f = 30 \text{ mo}^{-1}$.

4.1.2 Wind Erosion from Surfaces with Unlimited Erosion Potential

For estimating respirable particulate emissions from wind erosion of surfaces with an "unlimited reservoir" of erodible particles, a predictive emission factor equation developed from Gillette's (1981) field measurements of highly erodible soils is recommended. In relating the annual average rate of respirable particulate emissions (per unit area) to field and climatic factors, the equation takes the following form:

$$E_{10} = 0.036 (1-V) \left(\frac{[u]}{u_t} \right)^3 F(x) \quad (4-4)$$

where: E_{10} = PM_{10} emission factor, i.e., annual average PM_{10} emission rate per unit area of contaminated surface ($g/m^2\text{-hr}$)

V = fraction of contaminated surface vegetative cover
(equals 0 for bare soil)

$[u]$ = mean annual wind speed (m/s), taken from Table 4-1

$x = 0.886 u_t/[u]$ = dimensionless ratio

$F(x)$ = function plotted in Figure 4-3

u_t = threshold value of wind speed at 7 m (m/s)

This follows from the empirical relationship that the vertical flux of particles smaller than 10 μm diameter is proportional to the cube of wind speed. Because highly erodible soils do not readily retain moisture, no moisture-related parameter is included in the equation.

TABLE 4-1. FASTEST MILE^a [u^+] AND MEAN WIND SPEED^b [u]
FOR SELECTED UNITED STATES STATIONS

Station	State	[u^+] (m/s)	[u] (m/s)	Station	State	[u^+] (m/s)	[u] (m/s)
Birmingham	AL	20.8	3.3	Detroit	MI	21.8	4.6
Montgomery	AL	20.2	3.0	Grand Rapids	MI	21.6	4.5
Tucson	AZ	23.0	3.7	Lansing	MI	23.7	4.6
Yuma	AZ	21.8	3.5	Sault St. Marie	MI	21.6	4.3
Fort Smith	AR	20.8	3.4	Duluth	MN	22.8	5.1
Little Rock	AR	20.9	3.6	Minneapolis	MN	22.0	4.7
Fresno	CA	15.4	2.8	Jackson	MS	20.5	3.4
Red Bluff	CA	23.3	3.9	Columbia	MO	22.4	4.4
Sacramento	CA	20.6	3.7	Kansas City	MO	22.6	4.6
San Diego	CA	15.4	3.0	St. Louis	MO	21.2	4.2
Denver	CO	22.0	4.1	Springfield	MO	22.4	5.0
Grand Junction	CO	23.6	3.6	Billings	MT	26.6	5.1
Pueblo	CO	28.1	3.9	Great Falls	MT	26.4	5.9
Hartford	CT	20.2	4.0	Havre	MT	25.9	4.5
Washington	DC	21.6	3.4	Helena	MT	24.7	3.5
Jacksonville	FL	21.7	3.8	Missoula	MT	21.6	2.7
Tampa	FL	22.2	3.9	North Platte	NE	27.7	4.6
Atlanta	GA	21.2	4.1	Omaha	NE	24.6	4.8
Macon	GA	20.1	3.5	Valentine	NE	27.1	4.8
Savannah	GA	21.3	3.6	Ely	NV	23.6	4.7
Boise	ID	21.4	4.0	Las Vegas	NV	24.4	4.0
Pocatello	ID	23.8	4.6	Reno	NV	25.2	2.9
Chicago	IL	21.0	4.6	Winnemucca	NV	22.4	3.5
Moline	IL	24.5	4.4	Concord	NH	19.2	3.0
Peoria	IL	23.2	4.6	Albuquerque	NM	25.6	4.0
Springfield	IL	24.2	5.1	Roswell	NM	26.0	4.1
Evansville	IN	20.9	3.7	Albany	NY	21.4	4.0
Fort Wayne	IN	23.7	4.6	Binghamton	NY	22.0	4.6
Indianapolis	IN	24.8	4.3	Buffalo	NY	24.1	5.5
Burlington	IA	25.0	4.6	New York	NY	22.5	5.5
Des Moines	IA	25.8	5.0	Rochester	NY	23.9	4.3
Sioux City	IA	25.9	4.9	Syracuse	NY	22.5	4.4
Concordia	KS	25.7	5.4	Cape Hatteros	NC	25.9	5.1
Dodge City	KS	27.1	6.3	Charlotte	NC	20.0	3.4
Topeka	KS	24.4	4.6	Greensboro	NC	18.9	3.4
Wichita	KS	26.0	5.6	Wilmington	NC	22.3	4.0
Louisville	KY	22.0	3.8	Bismarck	ND	26.1	4.7
Shreveport	LA	19.9	3.9	Fargo	ND	26.6	5.7
Portland	ME	21.7	3.9	Cleveland	OH	23.6	4.8
Baltimore	MD	25.0	4.2	Columbus	OH	22.1	3.9
Boston	MA	25.2	5.6	Dayton	OH	24.0	4.6

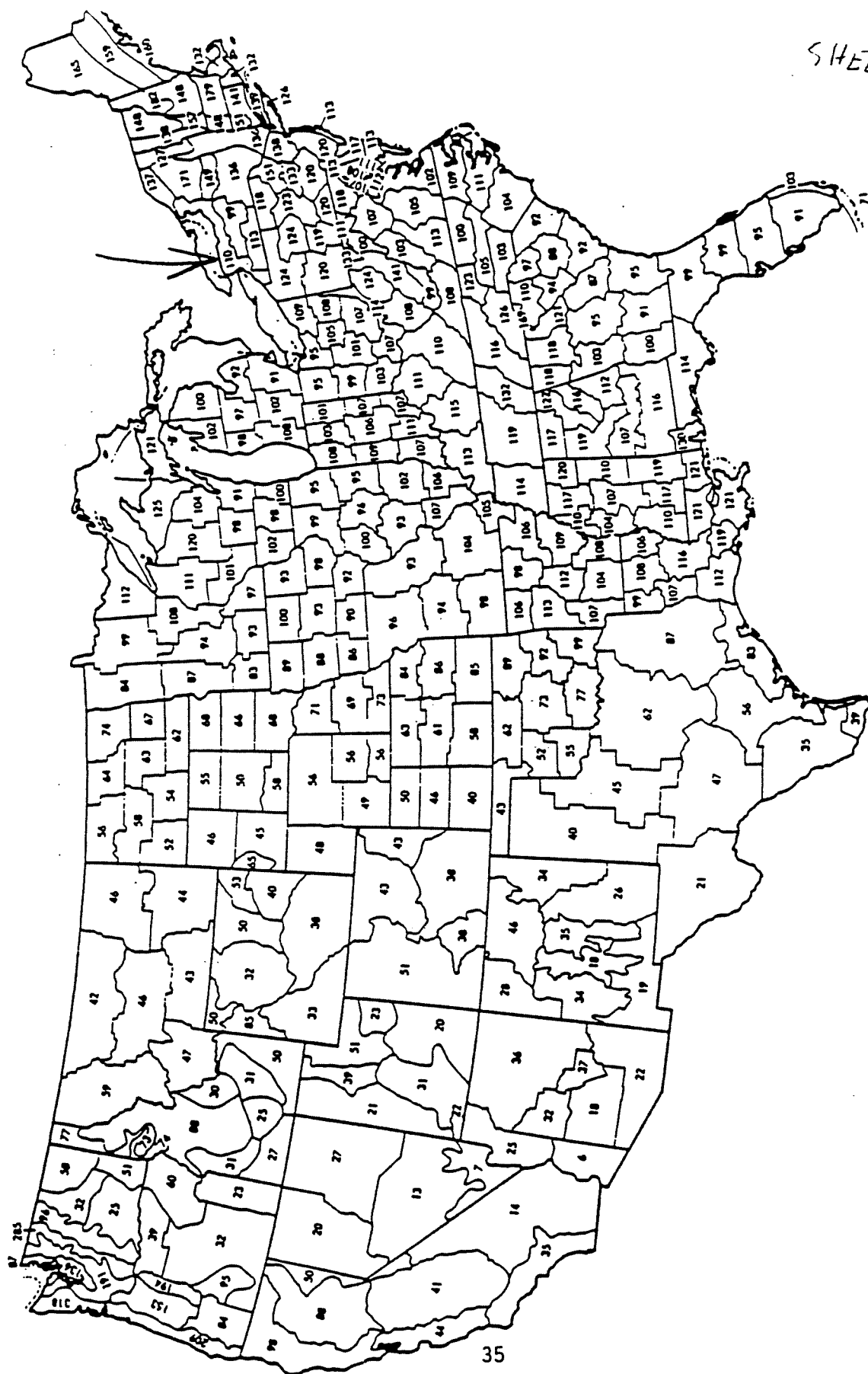


Figure 4-2. Map of P-E Index for State Climatic Divisions

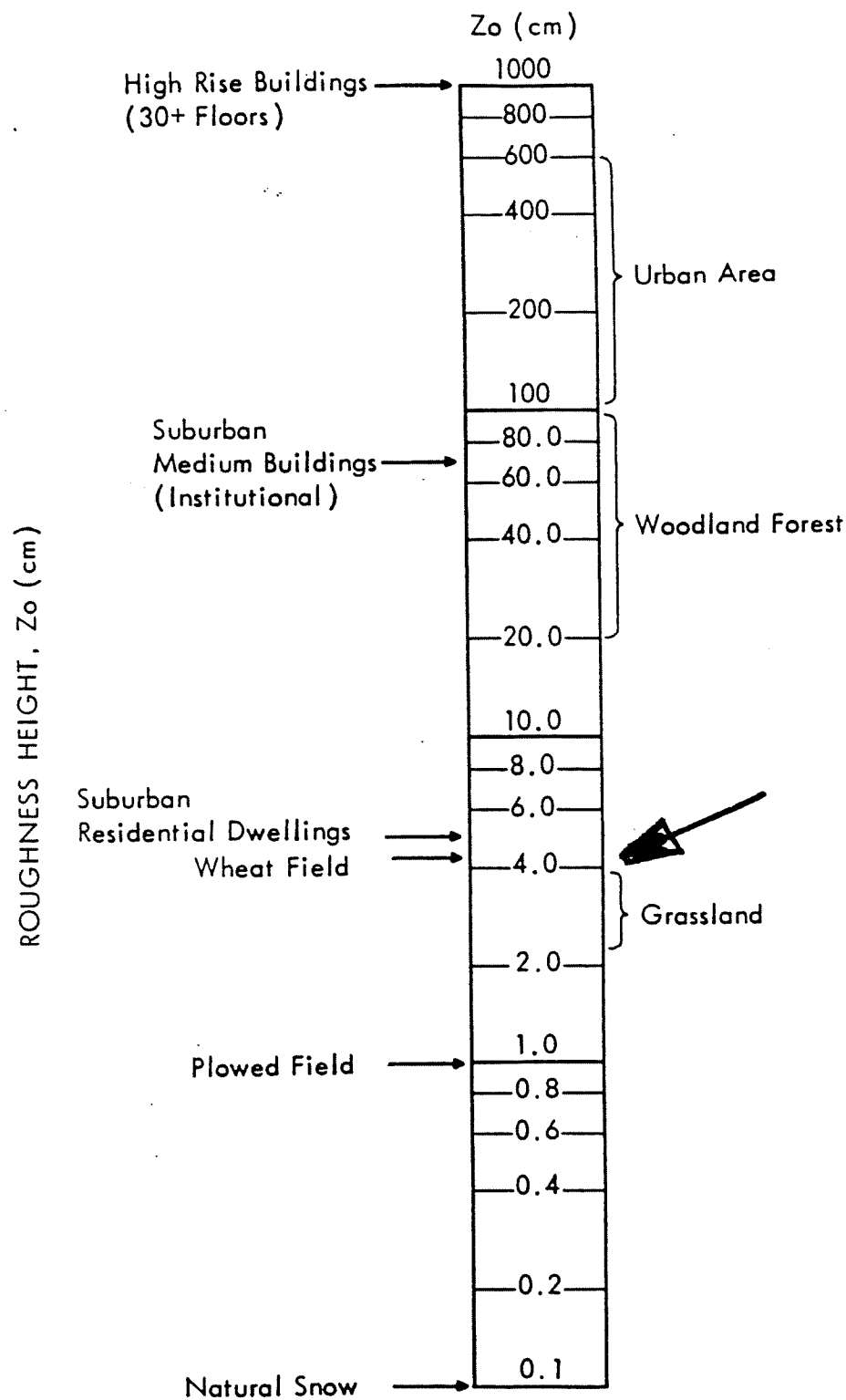


Figure 3-6. Roughness Heights for Various Surfaces (Cowherd and Guenther, 1976)

TABLE 4-2. DEFAULT VALUES FOR INDEPENDENT VARIABLES OF EQUATION 4-6^a

Site	<u>s(%)</u>		<u>S(km/hr)</u>		<u>W(Mg)</u>	<u>w</u>
Rural/Residential	15	(5-68)	48	(40-64)	2	4
Industrial	8	(2-29)	24	(8-32)	3	4
					15	6
					26	10

^a Numbers in parentheses are ranges of measured values.

Values for p (wet days per year) are obtained from Figure 4-4 or from a local source. Worst-case 24-hr emissions would occur on a dry day (p = 0) with the highest volume of traffic expressed as vehicle-kilometers traveled. If the vehicle mix varies, periods with a greater portion of larger vehicles produce greater emissions.

4.1.4 Determination of Emission Rates

Contaminant emission rates (R_{10}) are determined from the above emission factors (E_{10}) using Equation 2-1:

$$R_{10} = \alpha E_{10} A \quad (2-1)$$

where R_{10} = emission rate of contaminant as PM_{10}

α = mass fraction of contaminant in PM_{10} emissions

A = source extent (for a specified averaging time in the case of mechanical resuspension)

For wind erosion, the source extent is simply the contaminated area. For example, if an area of 2,000 m² is contaminated, the annual emission factor is 0.17 mg/m²-hr and α = 16 ppm, the annual contaminant emission rate is:

$$R_{10} = (16 \cdot 10^{-6}) (0.17 \text{ mg/m}^2\text{-hr}) (2,000 \text{ m}^2) = 5.4 \text{ } \mu\text{g/hr} \quad (4-9)$$

In the case of mechanical resuspension in the form of travel on unpaved surfaces, the source extent is found as the product of the contaminated travel length times the daily traffic count. Note that the daily traffic count for a worst-case would be greater than that for annual conditions. An example is provided in Section 5.2.

1.0 INTRODUCTION

1.1 Purpose of Report

The purpose of this Preliminary Remedial Investigation Report is to present, summarize, and provide interpretation and conclusions on data gathered during the First Phase Remedial Investigation (RI) activities at the Lockport City Landfill, City of Lockport, Niagara County, New York. This report contains results for the first phase of the RI, which includes activities performed from May 1989 through May 1990. The following activities have been completed and are discussed herein: preliminary literature reviews, a door-to-door community well water survey, topographic mapping, site entry air monitoring, and soil gas survey. Other activities included geophysical surveys, stream-surface-subsurface soil and waste investigations, installation of monitoring wells, exploratory borings through the fill material, one round of stream water and groundwater sampling, chemical analysis of samples, hydraulic conductivity tests, geotechnical analysis of selected soils, stream velocity profiles, and a habitat-based assessment.

Several data gaps were discovered as a result of this Phase I Remedial Investigation. A Phase II Field Investigation, required to fill these data gaps, is planned. The Scope of Work for this investigation is presented in Section 4.7.

1.2 Site Background

1.2.1 Site Description

The approximately 30-acre Lockport City Landfill is located partially in the City of Lockport, partially in the Town of Lockport, Niagara County, New York. The site location is shown in Figure 1-1, and the site plan in Plate 1-2. The site is bounded by The Gulf, a creek

DISPERSION MODELING WORKSHEET

Climatic
Region _____

Date _____
By _____
Checked _____

Source Size 10 m x 10 m _____
or
100 m x 100 m _____

ANNUAL ESTIMATES

I Annual Wind Erosion Scaling Factor, Q_I

A. Annual Wind Erosion Rate, R_{10} = _____ g/s

B. Select appropriate value of P_R from below

Climatic Region	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
P_R	0.152	0.262	0.396	0.288	0.182	0.134	0.296

C. Annual Scaling Factor, $Q_I = \frac{R_{10}}{P_R} =$ _____ g/s

II Annual Mechanical Resuspension Scaling Factor, Q_{II}

Q_{II} = Annual Mechanical Emission Rate, R_{10} = _____ g/s

Figure 4-7. Annual Dispersion Model Worksheet

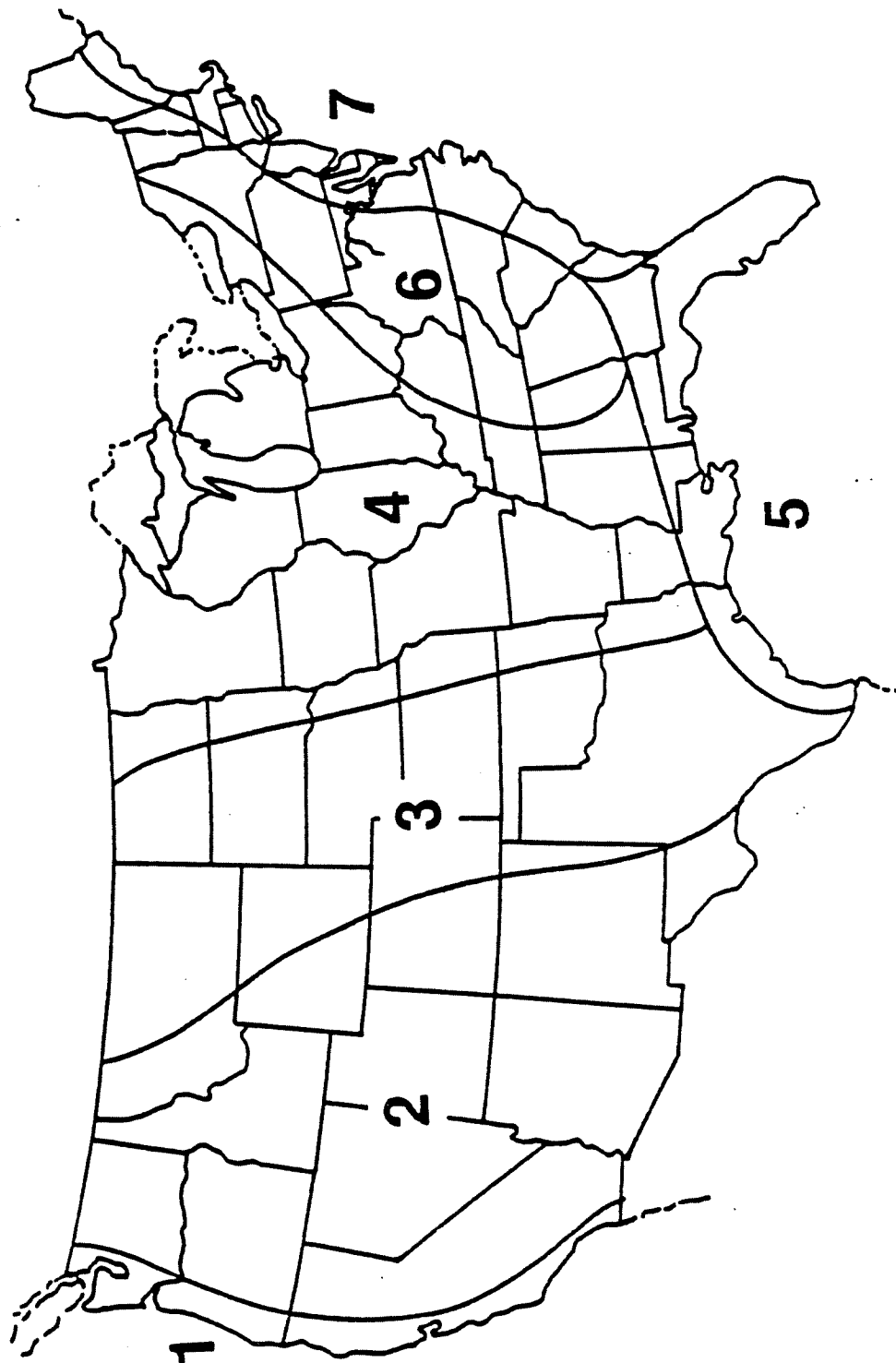


Figure 4-5. Climatic Region

REGION 4

FINE GRID

SOURCE SIZE 100M X 100M

WIND EROSION

=====

DIR	RANGE (M)			
	200	300	400	500
N	3.425	1.914	1.300	0.940
NE	2.564	1.090	0.720	0.509
E	2.937	1.463	0.978	0.699
SE	3.265	1.670	1.119	0.801
S	2.167	1.077	0.723	0.519
SW	0.983	0.396	0.260	0.183
W	1.007	0.486	0.324	0.231
NW	1.986	0.859	0.565	0.398

Q_r = SCALING FACTOR = -----
(UNITS)

MECHANICAL RESUSPENSION

=====

DIR	RANGE (M)			
	200	300	400	500
N	39.834	21.285	14.546	10.560
NE	27.546	12.712	8.486	6.043
E	23.777	12.025	8.093	5.801
SE	24.467	11.915	8.017	5.750
S	24.573	13.404	9.180	6.677
SW	15.717	6.491	4.321	3.070
W	24.926	12.302	8.251	5.896
NW	39.259	20.254	13.731	9.905

Q_{rx} = SCALING FACTOR = -----
(UNITS)

Climatic Region	-	Determine according to Figure 4-5
Source Size	-	Estimate according to the guidelines presented in the preceding subsection
Annual Wind Erosion Rate	-	Estimate as product of emission factor (based on the guidelines presented in Section 4.1) and annual source extent
P_R	-	Take value from the table on the worksheet (Figure 4-7) for the appropriate climate region. P_R represents the fraction of time in the model runs that wind erosion occurs.
Q_I	-	Wind erosion scaling factor.
Q_{II}	-	Mechanical scaling factor which equals annual mechanical emission rate.

After determining Q_I for wind erosion and Q_{II} for mechanical resuspension, the analyst may proceed to scale the model output (i.e., concentrations). The scaling process is represented as follows:

$$x = Q_I f_I + Q_{II} f_{II} \quad (4-11)$$

where x = respirable concentration (mass/volume)

Q_I = wind erosion scaling factor (mass/time), from Figure 4-7

Q_{II} = mechanical resuspension scaling factor (mass/time), from Figure 4-7

f_I = unscaled concentration (time/volume) due a unit erosion rate from Appendix D

f_{II} = unscaled concentration (time/volume) due to a unit mechanical emission rate from Appendix D

The concentration units depend on the units used for the scaling factors. It is critical that Q_I and Q_{II} be expressed in identical units. The most suitable units involve SI mass units and seconds. The following is a table of corresponding scaling factor and concentration units.

Q_I and Q_{II} Units	Respirable Concentration Units
g/s	$\mu\text{g}/\text{m}^3$
mg/s	ng/m^3
$\mu\text{g}/\text{s}$	pg/m^3
ng/s	fg/m^3
pg/s	ag/m^3

REPRESENTATIVE CONCENTRATIONS FOR SURFACE SOIL AND WASTE
Lockport City Landfill Site

PARAMETERS	AVG	STD DEV	n	SQRT n	(n-1)	t(0.95)	UCL95	max. conc.	value used
Carbon Disulfide	4.69E+00	9.23E-01	8	2.828	7	1.895	5.31E+00	6.00E+00	5.31E+00
Chloroform	3.25E+00	2.00E+00	8	2.828	7	1.895	4.59E+00	1.00E+00	1.00E+00
2-Butanone	7.94E+00	3.09E+00	8	2.828	7	1.895	1.00E+01	1.00E+00	1.00E+00
Ethylbenzene	5.19E+00	2.09E+00	8	2.828	7	1.895	6.59E+00	1.00E+01	6.59E+00
Xylenes (total)	1.69E+01	3.66E+01	8	2.828	7	1.895	4.15E+01	1.08E+02	4.15E+01
Benzoic Acid	1.38E+03	2.52E+03	8	2.828	7	1.895	3.05E+03	4.65E+02	4.65E+02
Napthalene	5.29E+02	8.78E+02	8	2.828	7	1.895	1.12E+03	2.70E+03	1.12E+03
2-Methylnapthalene	3.13E+02	2.63E+02	8	2.828	7	1.895	4.89E+02	9.55E+02	4.89E+02
Dimethylphthalate	5.45E+02	5.62E+02	8	2.828	7	1.895	9.21E+02	1.35E+03	9.21E+02
Acenaphthylene	4.05E+02	4.68E+02	8	2.828	7	1.895	7.18E+02	3.55E+02	3.55E+02
Acenaphthene	4.53E+02	5.49E+02	8	2.828	7	1.895	8.21E+02	1.80E+03	8.21E+02
Dibenzofuran	3.84E+02	3.72E+02	8	2.828	7	1.895	6.13E+02	1.28E+03	6.13E+02
Diethylphthalate	3.58E+02	4.91E+02	8	2.828	7	1.895	6.85E+02	6.30E+01	6.30E+01
Fluorene	3.81E+02	3.60E+02	8	2.828	7	1.895	6.22E+02	1.23E+03	6.22E+02
Pentachlorophenol	1.86E+03	2.30E+03	8	2.828	7	1.895	3.40E+03	7.50E+03	3.40E+03
Phenanthrene	3.42E+03	5.99E+03	8	2.828	7	1.895	7.44E+03	1.75E+04	7.44E+03
Anthracene	4.57E+02	5.38E+02	8	2.828	7	1.895	8.18E+02	8.25E+02	8.18E+02
Di-n-butylphthalate	9.62E+02	1.64E+03	8	2.828	7	1.895	2.06E+03	4.85E+03	2.06E+03
Fluoranthene	3.11E+03	3.93E+03	8	2.828	7	1.895	5.74E+03	1.11E+04	5.74E+03
Pyrene	4.41E+03	6.81E+03	8	2.828	7	1.895	8.97E+03	1.95E+04	8.97E+03
Butylbenzylphthalate	3.95E+02	4.69E+02	8	2.828	7	1.895	7.09E+02	2.60E+02	2.60E+02
Benzo(a)anthracene	2.17E+03	3.04E+03	8	2.828	7	1.895	4.21E+03	8.50E+03	4.21E+03
Chrysene	2.41E+03	3.72E+03	8	2.828	7	1.895	4.90E+03	1.08E+04	4.90E+03
Bis(2-ethylhexyl)phthalate	5.77E+03	1.31E+04	8	2.828	7	1.895	1.45E+04	3.80E+04	1.45E+04
Di-n-octylphthalate	3.73E+02	4.83E+02	8	2.828	7	1.895	6.97E+02	2.60E+02	2.60E+02
Benzo(b)fluoranthene	2.32E+03	3.02E+03	8	2.828	7	1.895	4.35E+03	8.10E+03	4.35E+03
Benzo(k)fluoranthene	1.47E+03	2.41E+03	8	2.828	7	1.895	3.08E+03	7.05E+03	3.08E+03
Benzo(a)pyrene	2.06E+03	3.08E+03	8	2.828	7	1.895	4.13E+03	8.85E+03	4.13E+03
Indeno(1,2,3-cd)pyrene	1.33E+03	2.05E+03	8	2.828	7	1.895	2.71E+03	6.15E+03	2.71E+03

All concentrations are reported in ppb.

One-half the sample quantitation limit (SQL) was used for non-detects.

REPRESENTATIVE CONCENTRATIONS FOR SURFACE SOIL AND WASTE
Lockport City Landfill Site

PARAMETERS	AVG	STD DEV	n	SQRT n	(n-1)	t(0.95)	UCL95	max. conc.	value used
Dibenz(a,h)anthracene	5.21E+02	5.36E+02	8	2.828	7	1.895	8.80E+02	1.20E+03	8.80E+02
Benzo(g,h,i)perylene	7.86E+02	8.62E+02	8	2.828	7	1.895	1.36E+03	2.55E+03	1.36E+03
Aldrin	2.42E+01	2.65E+01	8	2.828	7	1.895	4.20E+01	6.70E+01	4.20E+01
gamma-Chlordane	1.49E+02	2.13E+02	8	2.828	7	1.895	2.92E+02	2.30E+02	2.30E+02
Aroclor-1248	1.36E+03	3.23E+03	8	2.828	7	1.895	3.53E+03	9.30E+03	3.53E+03
Aroclor-1254	5.18E+02	6.87E+02	8	2.828	7	1.895	9.78E+02	1.90E+03	9.78E+02
Aluminum	1.26E+07	5.26E+06	8	2.828	7	1.895	1.61E+07	2.34E+07	1.61E+07
Antimony	8.68E+03	4.19E+03	8	2.828	7	1.895	1.15E+04	1.40E+04	1.15E+04
Arsenic	1.80E+04	4.65E+03	8	2.828	7	1.895	2.11E+04	2.48E+04	2.11E+04
Barium	2.01E+05	2.42E+05	8	2.828	7	1.895	3.63E+05	7.79E+05	3.63E+05
Beryllium	9.36E+02	3.76E+02	8	2.828	7	1.895	1.19E+03	1.40E+03	1.19E+03
Cadmium	5.13E+03	5.00E+03	8	2.828	7	1.895	8.48E+03	1.64E+04	8.48E+03
Calcium	7.97E+07	4.13E+07	8	2.828	7	1.895	1.07E+08	1.09E+08	1.07E+08
Chromium	2.94E+05	5.05E+05	8	2.828	7	1.895	6.32E+05	1.48E+06	6.32E+05
Cobalt	3.72E+04	7.53E+04	8	2.828	7	1.895	8.77E+04	1.86E+04	1.86E+04
Copper	5.09E+05	5.08E+05	8	2.828	7	1.895	8.50E+05	8.00E+05	8.00E+05
Iron	3.16E+07	1.68E+07	8	2.828	7	1.895	4.28E+07	6.73E+07	4.28E+07
Lead	1.42E+06	1.61E+06	8	2.828	7	1.895	2.50E+06	4.81E+06	2.50E+06
Magnesium	1.39E+07	6.99E+06	8	2.828	7	1.895	1.86E+07	2.44E+07	1.86E+07
Manganese	1.04E+06	7.26E+05	8	2.828	7	1.895	1.53E+06	2.66E+06	1.53E+06
Mercury	8.09E+02	7.27E+02	8	2.828	7	1.895	1.30E+03	2.40E+03	1.30E+03
Nickel	7.58E+04	5.66E+04	8	2.828	7	1.895	1.14E+05	1.63E+05	1.14E+05
Potassium	2.82E+06	1.29E+06	8	2.828	7	1.895	3.68E+06	5.90E+06	3.68E+06
Silver	3.37E+03	2.22E+03	8	2.828	7	1.895	4.86E+03	7.40E+03	4.86E+03
Sodium	8.06E+05	8.37E+05	8	2.828	7	1.895	1.37E+06	2.26E+06	1.37E+06
Vanadium	2.37E+04	7.27E+03	8	2.828	7	1.895	2.85E+04	3.05E+04	2.85E+04
Zinc	2.70E+06	3.37E+06	8	2.828	7	1.895	4.96E+06	9.57E+06	4.96E+06
Cyanide	1.45E+03	1.86E+03	8	2.828	7	1.895	2.59E+03	5.60E+03	2.59E+03

All concentrations are reported in ppb.

One-half the sample quantitation limit (SQL) was used for non-detects.

APPENDIX O
REJECTED COMPOUNDS AND DATA AUDITS

ANALYTICAL DATA ASSESSMENT
FOR
FIRST-ROUND CHEMICAL ANALYSES AT LOCKPORT LANDFILL
Performed by:
YORK LABORATORIES AND CHEMTECK CONSULTING GROUP LTD.

Prepared for:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
By:
URS CONSULTANTS, INC.

MAY 1990

INTRODUCTION: This assessment represents the best judgement of URS Consultants, Inc. (URS) concerning the useability and defensibility of chemical data produced by York Laboratories Inc. and Chemtech Consulting Group Ltd., subcontractors to URS, as part of a Remedial Investigation/Feasibility Study at Lockport City Landfill in the Town of Lockport, Niagara County, New York. This project is being funded by the New York State Department of Environmental Conservation (NYSDEC). The data being evaluated is from first-round sampling of surface waters, stream sediments, leachate seeps, soil borings, shallow probe soils, waste samples and groundwater samples. All analyses performed by York Laboratories and Chemtech Consulting Group Ltd., were subject to NYSDEC Contract Laboratory Protocol - November 1987.

Data documentation and Chain-of-Custody procedures were performed in accordance with NYSDEC Contract Laboratory Protocol - November 1987. Data validation, reduction, and determination of useability, were performed in accordance with USEPA SOP No. HW-3 CLP Organic Data Review. The inorganic data validation processes were performed in accordance with USEPA SOW No. 788 for Inorganic Analysis including Revisions 2/89 and 6/89.

CATEGORIES: The following table summarizes our assessment of data useability on a sample-by-sample and fraction-by-fraction basis. In

evaluating this data, we have established four (4) categories which are, for the most part, gradational in nature. The categories are defined as follows:

Category 1a - Useable and Defensible - Fully useable, despite possible minor deviations from CLP criteria.

Category 1b - Useable Though Not Fully Defensible - Useable with caution; cumulative deviations from CLP criteria are greater than Category 1a, though not considered so significant as to jeopardize the chemical representativeness of the sample results.

Category 2a - Rejected Fractions/Compounds Due to Holding Time Violations - Did not comply with CLP holding times.

Category 2b - Rejected Fraction(s)/Compound(s) Due to Various CLP Deviations - In a sample fraction, some compounds may be useable and defensible, other compounds may be rejected, or the sample fraction may be rejected due to various deviations from CLP. See Table Notes for rationale of rejected fractions and Tables for list of rejected compounds.

In Table's 1,3,5 and 7 some fractions are assigned single categories, indicating that they are either considered useable in their entirety or rejected in their entirety. The notes accompanying this table indicate the reason for rejections (Categories 2a and 2b) and for only conditional acceptances (Category 1b). Also on Tables 1, 3, 5, and 7 some fractions are assigned dual categories. This indicates that, while some compounds within the fraction are useable, others are rejected due to contamination in one or more of the QC blanks. Table's 2, 4, 6, and 8 identifies the specific compounds within each sample which are rejected due to blank contamination.

SUMMARY ASSESSMENT: In summary, we feel that the analytical data is useable. Of the total analyses performed (by sample and fraction), we would categorize the overall data package as follows:

Organic Summary

LCL-SPS-3/MW2-I-SB/DPW-1/SB-9/MW-5I-SB/SW1

1a	49
1b	5
1a, 2b	48
1b, 2b	6
2a	<u>2</u>
TOTAL	110

SB-9/SW-1

1a	30
1a, 2b	35
1b, 2b	<u>3</u>
TOTAL	68

WS-1

1a	12
1b	2
1a, 2b	4
1b, 2b	<u>2</u>
TOTAL	20

MW1-D/MW2-S

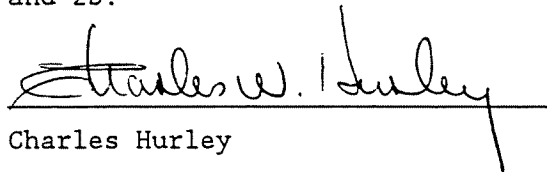
1a	22
1a, 2b	35
1b, 2b	5
2a	<u>2</u>
TOTAL	64

Inorganic Summary

<u>SS1</u>	<u>SW1/SW6</u>	<u>MW8-I-SB/SB5/SB18</u>	<u>DW1/JB0631</u>
1a <u>43</u>	1a <u>58</u>	1a <u>53</u>	1a <u>36</u>
TOTAL 43	TOTAL 58	TOTAL 53	TOTAL 36

<u>MW1-SB/MW8-I-SB/MW5-I</u>	<u>MW2-I/MW1-I</u>
1a <u>92</u>	1a 78
TOTAL 92	1b <u>4</u>
	TOTAL 82

We recommend acceptance and use of all data in Category 1a and 1b. It is understood, however, that the use of Category 1b data involves some risk in the event of a legalistic challenge based upon noncompliance with strict CLP criteria. We recommend rejection of all data in Category 2a and 2b.


Charles Hurley

Project Manager

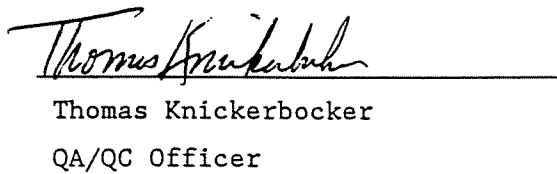

Thomas Knickerbocker
QA/QC Officer

TABLE 1.0

ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: SHALLOW PROBE SOIL AND SOIL BORINGS

Sample Delivery Group: LCL-SPS-3/MW2-I-SB/DPW-1/SB-9/MW5-I-SB/SW1
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	VOA	SVOA	Pest/PCB	EPTOX Pest	EPTOX Herb	Notes
SPS1	1a, 2b	1a, 2b	1a	--	--	1
SPS2	1a, 2b	1a	1b	--	--	1, 4
SPS3	1a, 2b	1b, 2b	1a	--	--	1, 2
SPS3-RE	--	1b, 2b	--	--	--	1, 2
SPS4	1a, 2b	1a, 2b	1a	--	--	1
SPS5	1a, 2b	1a, 2b	1a	--	--	1
SPS1-RB	1a, 2b	1a, 2b	1a	--	--	1
SB1	1a, 2b	1a	1b	1a	2a	1
SB5	1a, 2b	1a, 2b	1a	1a	2a	1
MW2-I-SB	1a, 2b	1a	1a	--	--	1
MW2-I-SB-MS	1a, 2b	1a	1a	--	--	1
MW2-I-SB-MSD	1a, 2b	1a	1a	--	--	1
DPW-1	1a, 2b	1a, 2b	1a	--	--	1
DPW-1-TB	1a, 2b	--	--	--	--	1
DPW-1-RB	1a, 2b	1a, 2b	--	--	--	1
SB9	1a, 2b	1a, 2b	1a	1a	1a	1
SB13	1a, 2b	1a, 2b	1a	1a	1a	1
SB13-MS	1a, 2b	1b, 2b	1a	1a	1a	1, 3
SB13-MSD	1a, 2b	1b	1a	1a	1a	1, 3
SB14	1a, 2b	1a	1a	1a	1a	1
SB18	1a, 2b	1a	1a	1a	1a	1
SB19	1a, 2b	1a, 2b	1a	1a	1a	1
MW5-S	1a, 2b	1a, 2b	1a	--	--	1
MW5-I	1a, 2b	1a, 2b	1b	--	--	1, 4

TABLE 1.0 (Continued)

Sample ID	VOA	SVOA	Pest/PCB	EPTOX Pest	EPTOX Herb	Notes
MW6-D	1a, 2b	1a, 2b	1a	--	--	1
MW7-S	1a, 2b	1a, 2b	1a	--	--	1
MW8-I	1a, 2b	1a, 2b	1a	--	--	1
MW8-I-MS	1a, 2b	1a, 2b	1a	--	--	1
MW8-I-MSD	1a, 2b	1a, 2b	1a	--	--	1
MW8-I-RB	1a	1a, 2b	1a	--	--	1
MW9-S	1a, 2b	1b, 2b	1b	--	--	1,2,4
MW9-S-RE	--	1b, 2b	--	--	--	1, 2
MW1-S	1a, 2b	1b, 2b	1a	--	--	1, 5

Abbreviation/Legend:

VOA - Target Compound List (TCL) Volatiles
 SVOA - TCL Semivolatiles
 Pest/PCB - TCL Pesticides/PCBs
 MW - Monitoring Well
 SB - Soil Boring
 DPW - Drill Pad Water
 EPTOX Pest - Extraction Procedure Toxicity Pesticides
 EPTOX Herb - Extraction Procedure Toxicity Herbicides
 RE - Reanalysis
 SPS - Shallow Probe Soil
 TB - Trip Blank
 RB - Rinse Blank
 S - Shallow
 I - Intermediate
 D - Deep
 MS - Matrix Spike
 MSD - Matrix Spike Duplicate

TABLE 1.0 (Continued)

Notes for Table 1.0

1. See Table 2.0 for list of rejected compounds
2. The internal standards are outside acceptable limits of recovery. The sample was reanalyzed as per NYSDEC CLP with the same results, indicating a matrix interference resulted in the suppressed internal standard recoveries.
3. The sample SB13 was diluted by a factor of 2.0, therefore, the matrix spike and matrix spike duplicate should have been analyzed the same way. This procedure was not followed. Also perylene-D₁₂ is outside acceptable limits of recovery in the matrix spike sample and was not reanalyzed.
4. The presence of PCBs in the sample extract required confirmation by GC/MS. The protocol for confirmation was not followed (i.e. neither the reference standard nor the method blank was analyzed) therefore, the data is useable with caution.
5. The internal standards in the semivolatile sample are outside acceptable limits of recovery, most likely due to matrix interferences. As per NYSDEC CLP protocol, the sample was reanalyzed but not within the holding time requirements. Only the initial analysis is reported and is useable with caution.

TABLE 2.0
REJECTED COMPOUNDS*

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Drill Water	Conc. (ppb) of Compound in the Method Blank	Note
MW2-I-SB	Methylene Chloride (VOA)	3	0	2	6	--
"	Acetone (VOA)	19	0	23	12	--
SB1	Methylene Chloride (VOA)	6	0	2	2	--
"	Acetone (VOA)	18	0	23	9	--
SB5	Acetone (VOA)	22	0	23	10	--
MW2-I-SB-MS	Methylene Chloride (VOA)	5	0	2	6	--
"	Acetone (VOA)	21	0	23	12	--
MW2-I-SB-MSD	Methylene Chloride (VOA)	4	0	2	6	--
"	Acetone (VOA)	24	0	23	12	--
SB5	Di-n-butylphthalate (SVOA)	1,200	0	0	19	1
SB9	Acetone (VOA)	36	0	23	8	--
"	2-Butanone (VOA)	7	0	3	0	--
"	Xylene (Total) (VOA)	5	0	2	0	--
SB13	Acetone (VOA)	33	0	23	10	--
"	2-Butanone	1	0	3	0	--
"	Xylene (Total) (VOA)	2	0	2	0	--
SB14	Methylene Chloride (VOA)	3	0	2	4	--

TABLE 2.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Drill Water	Conc. (ppb) of Compound in the Method Blank	Note
SB14	Acetone (VOA)	43	0	23	10	--
"	2-Butanone	10	0	3	0	--
SB18	Methylene Chloride (VOA)	3	0	2	1	--
"	Acetone (VOA)	20	0	23	5	--
SB19	Methylene Chloride (VOA)	3	0	2	1	--
"	Acetone (VOA)	20	20	23	5	--
"	2-Butanone (VOA)	2	0	3	0	--
SS6	Methylene Chloride (VOA)	5	0	--	4	--
SS7	Methylene Chloride (VOA)	5	0	--	4	--
"	Acetone (VOA)	18	0	--	3	--
SB13-MS	Methylene Chloride (VOA)	3	0	2	4	--
"	Acetone (VOA)	17	0	23	10	--
SB13-MSD	Acetone (VOA)	20	0	23	10	--
SB9	Di-n-butylphthalate (SVOA)	43	0	0	19	--
SB13	Di-n-butylphthalate (SVOA)	160	0	0	47	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	6,700	240	45	330	2
SB19	Bis(2-ethylhexyl)phthalate (SVOA)	660	240	45	100	--

TABLE 2.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Drill Water	Conc. (ppb) of Compound in the Method Blank	Note
SB13-MS	Di-n-butylphthalate (SVOA)	450	0	0	47	--
MW5-I	Methylene Chloride (VOA)	3	0	2	1	--
"	Acetone (VOA)	46	0	23	6	--
"	2-Butanone (VOA)	5	0	3	0	--
MW9-S	Methylene Chloride (VOA)	4	0	2	1	--
"	Acetone (VOA)	32	0	23	8	--
"	Carbon Disulfide (VOA)	2	0	0.9	0	--
MW5-S	Methylene Chloride (VOA)	4	0	2	1	--
"	Acetone (VOA)	7	0	23	8	--
MW7-S	Methylene Chloride (VOA)	2	0	2	1	--
"	Acetone (VOA)	14	0	23	8	--
MW6-D	Methylene Chloride (VOA)	5	0	2	2	--
"	Acetone (VOA)	23	0	23	15	--
"	2-Butanone (VOA)	1	0	3	0	--
MW8-I	Methylene Chloride (VOA)	3	0	2	3	--
"	Acetone (VOA)	23	0	23	17	--
MW8-I-MS	Methylene Chloride (VOA)	2	0	2	3	--
"	Acetone (VOA)	20	0	23	17	--
MW8-I-MSD	Methylene Chloride (VOA)	2	0	2	3	--

TABLE 2.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Drill Water	Conc. (ppb) of Compound in the Method Blank	Note
MW8-I-MSD	Acetone (VOA)	18	0	23	17	--
MW5-I	Bis(2-ethylhexyl)phthalate (SVOA)	2,100	240	45	370	3
MW9-S	Bis(2-ethylhexyl)phthalate (SVOA)	2,300	240	45	300	--
MW9-S-RE	Bis(2-ethylhexyl)phthalate (SVOA)	2,400	240	45	300	--
MW5-S	Diethylphthalate (SVOA)	65	0	0	65	--
"	Di-n-butylphthalate (SVOA)	76	0	0	45	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	490	240	45	230	--
MW7-S	Di-n-butylphthalate (SVOA)	55	0	0	29	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	690	240	45	300	--
MW6-D	Diethylphthalate (SVOA)	40	0	0	30	--
"	Di-n-butylphthalate (SVOA)	45	0	0	29	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	410	0	0	300	--
MW8-I	Diethylphthalate (SVOA)	49	0	0	80	--
"	Di-n-butylphthalate (SVOA)	240	0	0	120	--

TABLE 2.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Drill Water	Conc. (ppb) of Compound in the Method Blank	Note
MW8-I	Bis(2-ethylhexyl)phthalate (SVOA)	180	0	0	180	--
MW8-I-RB	Bis(2-ethylhexyl)phthalate (SVOA)	0	14	3	23	--
MW8-I-MS	Benzoic Acid (SVOA)	110	0	0	150	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	380	240	45	290	--
MW8-I-MSD	Benzoic Acid (SVOA)	120	0	0	150	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	340	240	45	290	--
MW1-S	Methylene Chloride (VOA)	2	0	2	2	--
"	Acetone (VOA)	150	0	23	16	--
"	2-Butanone (VOA)	4	0	3	0	--
SPS1	Methylene Chloride (VOA)	4	16	--	3	--
"	Acetone (VOA)	15	510	--	13	--
"	Chloroform (VOA)	2	8	--	0	--
"	2-Butanone (VOA)	2	0	--	1	--
"	Toluene (VOA)	4	0	--	4	--
SPS1-RB	Methylene Chloride (VOA)	--	16	--	5	--
SPS2	Methylene Chloride (VOA)	4	16	--	3	--

TABLE 2.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Drill Water	Conc. (ppb) of Compound in the Method Blank	Note
SPS2	Acetone (VOA)	12	510	--	13	--
"	2-Butanone (VOA)	1	0	--	1	--
"	Toluene (VOA)	6	0	--	4	--
MW1-S	Diethylphthalate (SVOA)	47	0	0	11	4
"	Di-n-butylphthalate (SVOA)	570	0	0	47	4
SPS1	Di-n-butylphthalate (SVOA)	71	0	--	20	--
SPS1-RB	Bis(2-ethylhexyl)phthalate (SVOA)	--	16	--	15	--
SPS5	Acetone (VOA)	9	510	--	0	--
SPS4	Methylene Chloride (VOA)	5	16	--	2	--
"	Acetone (VOA)	26	510	--	0	--
"	Toluene (VOA)	5	0	--	4	--
SPS3	Methylene Chloride (VOA)	4	16	--	2	--
"	Acetone (VOA)	13	510	--	5	--
"	Di-n-butylphthalate (SVOA)	110	0	--	20	--
SPS3-RE	Di-n-butylphthalate (SVOA)	140	0	--	20	--
SPS4	Di-n-butylphthalate (SVOA)	100	0	--	20	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	780	270	--	180	--

TABLE 2.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank	Note
SPS5	Di-n-butylphthalate (SVOA)	69	0	--	20	--
DPW-1	Chloroform (VOA)	3	1	1	0	--
DPW-1-RB	Methylene Chloride (VOA)	--	2	0	2	--
"	Chloroform (VOA)	--	1	1	0	--
DPW-1-TB	Chloroform (VOA)	--	1	1	0	--
DPW-1	Bis(2-ethylhexyl)phthalate (SVOA)	20	10	--	9	--
DPW-1-RB	Bis(2-ethylhexyl)phthalate (SVOA)	--	10	--	9	--

* For volatile and semivolatile samples, no positive results are reported unless the concentration of the compound in the sample exceeds ten times the concentration of any rinse, trip, or method blank for common laboratory contaminants (methylene chloride, acetone, 2-butanone, toluene, and phthalates), or five times the concentration for other compounds. Diluted samples and dry weights must be accounted for in the method blank. Rinse and trip blanks should be treated the same as samples, except that any rejected rinse or trip blank can still be utilized to reject sample data.

Notes for Table 2.0

1. The sample was diluted by a factor of 10.0.
2. The sample was diluted by a factor of 2.0.
3. The sample was diluted by a factor of 5.0.
4. The sample has a dry weight of 78 percent.

TABLE 3.0

ANALYTICAL DATA ASSESSMENT SUMMARY

MATRIX: STREAM SEDIMENT, SURFACE WATER AND LEACHATE SEEP

Sample Delivery Group: SB-9/SW1

Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	VOA	SVOA	Pest/PCB	Notes
SS1	1a, 2b	1b, 2b	1a	1, 3
SS2	1a, 2b	1a, 2b	1a	1
SS3	1a, 2b	1b, 2b	1a	1, 3
SS4	1a, 2b	1b, 2b	1a	1, 3
SS5	1a, 2b	1a, 2b	1a	1
SS5-MS	1a	--	--	
SS5-MSD	1a	--	--	
SS6	1a, 2b	1a	1a	1
SS7	1a, 2b	1a, 2b	1a	1
SS8	1a, 2b	1a, 2b	1a	1
SS8-MS	--	1a, 2b	1a	1
SS8-MSD	--	1a, 2b	1a	1
SW1	1a	1a, 2b	1a	1
SW2	1a, 2b	1a, 2b	1a	1
SW3	1a, 2b	1a, 2b	1a	1
SW4	1a, 2b	1a, 2b	1a	1
SW5	1a, 2b	1a, 2b	1a	1
SW5-MS	1a	1a, 2b	1a	1
SW5-MSD	1a	1a, 2b	1a	1
TB-1	1a, 2b	--	--	1
Trip Blank	1a, 2b	--	--	1
SW6	1a	1a, 2b	1a	1
SW7	1a	1a, 2b	1a	1
SW8	1b, 2b	1a, 2b	1a	1, 2

TABLE 3.0 (Continued)

Sample ID	VOA	SVOA	Pest/PCB	Notes
LS-1	1a, 2b	1a, 2b	1a	1
LS-2	1a, 2b	1a, 2b	1a	1

Abbreviation/Legend:

VOA - Target Compound List (TCL) Volatiles
 SVOA - TCL Semivolatiles
 Pest/PCB - TCL Pesticides/PCBs
 SS - Stream Sediment
 SW - Surface Water
 TB - Trip Blank
 LS - Leachate Seep
 MS - Matrix Spike
 MSD - Matrix Spike Duplicate

Notes for Table 3.0

1. See Table 4.0 for list of rejected compounds
2. In the volatile fraction acetone exceeded the linear calibration range. The analysis holding time would have been exceeded if the sample was diluted further.
3. The internal standards in the semivolatile sample are outside acceptable limits of recovery, most likely due to matrix interferences. As per NYSDEC CLP protocol, the sample was reanalyzed but not within the holding time requirements. Only the initial analysis is reported and is useable with caution.

TABLE 4.0
REJECTED COMPOUNDS*

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank	Note
SW2	Toluene (VOA)	0.6	--	0	0.9	--
SW3	Acetone (VOA)	3	--	7	32	--
SW4	Chloroform (VOA)	88	--	1	0	1
SS1	Methylene Chloride (VOA)	5	--	--	1	--
"	Acetone (VOA)	74	--	--	5	2
"	Toluene (VOA)	11	--	--	2	--
SS2	Methylene Chloride (VOA)	4	--	--	1	--
"	Acetone (VOA)	41	--	--	5	--
"	Toluene (VOA)	6	--	--	2	--
SS3	Methylene Chloride (VOA)	2	--	--	1	--
"	Acetone (VOA)	17	--	--	5	--
"	Toluene (VOA)	4	--	--	2	--
SS4	Methylene Chloride (VOA)	2	--	--	1	--
"	Acetone (VOA)	9	--	--	5	--
"	Toluene (VOA)	6	--	--	2	--
SW5	Methylene Chloride (VOA)	140	--	0	2	1
"	Chloroform (VOA)	140	--	1	0	1

TABLE 4.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank	Note
SW-8	Methylene Chloride (VOA)	210	--	0	2	1
LS-1	Acetone (VOA)	6	--	4	7	--
"	Toluene (VOA)	0.6	--	0	1	--
LS-2	Acetone (VOA)	5	--	4	7	--
"	Toluene (VOA)	0.8	--	0	1	--
SS5	Methylene Chloride (VOA)	17	--	--	2	3
"	Acetone (VOA)	360	--	--	18	3
"	2-Butanone (VOA)	15	--	--	2	3
SS8	Methylene Chloride (VOA)	7	--	--	2	--
"	Acetone (VOA)	52	--	--	18	--
"	2-Butanone (VOA)	1	--	--	2	--
Trip Blank	Acetone (VOA)	--	--	4	4	--
TB-1	Acetone (VOA)	--	--	7	6	--
SW1	Di-n-butylphthalate (SVOA)	46	--	--	18	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	26	--	--	12	--
SW2	Di-n-butylphthalate (SVOA)	5	--	--	18	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	11	--	--	12	--

TABLE 4.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank	Note
SW3	Di-n-butylphthalate (SVOA)	1	--	--	18	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	8	--	--	12	--
SW4	Bis(2-ethylhexyl)phthalate (SVOA)	15	--	--	12	--
SS1	Diethylphthalate (SVOA)	43	--	--	31	4
"	Di-n-butylphthalate (SVOA)	310	--	--	28	4
"	Bis(2-ethylhexyl)phthalate (SVOA)	5,500	--	--	320	4
SS2	Diethylphthalate (SVOA)	31	--	--	31	--
"	Di-n-butylphthalate (SVOA)	41	--	--	28	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	1,100	--	--	320	--
SS3	Diethylphthalate (SVOA)	31	--	--	31	--
"	Di-n-butylphthalate (SVOA)	75	--	--	28	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	1,900	--	--	320	--
SS4	Diethylphthalate (SVOA)	43	--	--	31	--
"	Di-n-butylphthalate (SVOA)	34	--	--	28	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	740	--	--	320	--

TABLE 4.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank	Note
SW5	Bis(2-ethylhexyl)phthalate (SVOA)	27	--	--	27	--
SW8	Bis(2-ethylhexyl)phthalate (SVOA)	5	--	--	27	--
LS1	Bis(2-ethylhexyl)phthalate (SVOA)	14	--	--	27	--
LS2	Bis(2-ethylhexyl)phthalate (SVOA)	16	--	--	27	--
SS5	Benzoic Acid (SVOA)	920	--	--	61	5
"	Di-n-butylphthalate (SVOA)	200	--	--	42	5
"	Bis(2-ethylhexyl)phthalate (SVOA)	1,300	--	--	260	5
SS8	Di-n-butylphthalate (SVOA)	86	--	--	42	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	850	--	--	260	--
SS8-MS	Benzoic Acid (SVOA)	190	--	--	61	--
"	Di-n-butylphthalate (SVOA)	76	--	--	42	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	1,300	--	--	260	--
SS8-MSD	Benzoic Acid (SVOA)	240	--	--	61	--
"	Di-n-butylphthalate (SVOA)	98	--	--	42	--

TABLE 4.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank	Note
SS8-MSD	Bis(2-ethylhexyl)phthalate (SVOA)	1,400	--	--	260	--
SW5-MS	Bis(2-ethylhexyl)phthalate (SVOA)	14	--	--	27	--
SW5-MSD	Bis(2-ethylhexyl)phthalate (SVOA)	15	--	--	27	--
SW6	Bis(2-ethylhexyl)phthalate (SVOA)	1	--	--	6	--
SW7	Bis(2-ethylhexyl)phthalate (SVOA)	3	--	--	6	--
SS7	Diethylphthalate (SVOA)	13	--	--	15	--
"	Di-n-butylphthalate (SVOA)	59	--	--	22	--
"	Butylbenzylphthalate (SVOA)	66	--	--	9	--
"	Bis(2-ethylhexyl)phthalate (SVOA)	270	--	--	210	--
"	Di-n-octylphthalate (SVOA)	62	--	--	19	--

* For volatile and semivolatile samples, no positive results are reported unless the concentration of the compound in the sample exceeds ten times the concentration of any rinse, trip, or method blank for common laboratory contaminants (methylene chloride, acetone, 2-butanone, toluene, and phthalates), or five times the concentration for other compounds. Diluted samples and dry weights must be accounted for in the method blank. Rinse and trip blanks should be treated the same as samples, except that any rejected rinse and trip blank can still be utilized to reject sample data.

TABLE 4.0* (Continued)

Notes for Table 4.0

1. The sample was diluted by a factor of 100.0.
2. The sample has a dry weight of 51 percent.
3. The sample has a dry weight of 26 percent.
4. The sample has a dry weight of 29 percent.
5. The sample has a dry weight of 34 percent and was diluted by a factor of 2.0.

TABLE 5.0

ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: WASTE SAMPLES

Sample Delivery Group: WS-1
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	VOA	SVOA	Pest/PCB	EPTOX Pest	EPTOX Herb	Notes
DW1	1a, 2b	1a, 2b	1a	--	--	1
WS1	1a, 2b	1a	1a	1a	1a	1
WS2	1a, 2b	1a	1a	1a	1a	1
WS3	1b, 2b	1b	1a	1a	1a	1, 2
WS3-RE	1b, 2b	1b	--	--	--	1, 2

Abbreviation/Legend:

VOA - Target Compound List (TCL) Volatiles
 SVOA - TCL Semivolatiles
 Pest/PCB - TCL Pesticides/PCBs
 EPTOX Pest - Extraction Procedure Toxicity Pesticides
 EPTOX Herb - Extraction Procedure Toxicity Herbicides
 DW - Drill Water
 RE - Reanalysis
 WS - Waste Sample

Notes for Table 5.0

1. See Table 6.0 for list of rejected compounds
2. For both the volatile and semivolatile fractions, the internal standards recoveries are outside acceptable limits of recovery. The sample was reanalyzed as per NYSDEC CLP, with the same results, indicating a matrix interference resulted in suppressed internal standards.

TABLE 6.0
REJECTED COMPOUNDS*

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank
WS1	Methylene Chloride (VOA)	10	--	--	3
"	Acetone (VOA)	11	--	--	11
WS2	Acetone (VOA)	9	--	--	13
WS3	Methylene Chloride (VOA)	12	--	--	3
"	Acetone (VOA)	42	--	--	11
"	2-Butanone (VOA)	2	--	--	4
WS3-RE	Methylene Chloride (VOA)	8	--	--	3
"	Acetone (VOA)	71	--	--	11
"	2-Butanone (VOA)	8	--	--	4
DW1	Methylene Chloride (VOA)	2	--	--	3
"	Acetone (VOA)	23	--	--	19
"	2-Butanone (VOA)	3	--	--	11
"	Toluene (VOA)	1	--	--	0.7
"	Bis(2-ethylhexyl)phthalate (SVOA)	3	--	--	2

* For volatile and semivolatile samples, no positive results are reported unless the concentration of the compound in the sample exceeds ten times the concentration of any rinse, trip, or method blank for common laboratory contaminants (methylene chloride, acetone, 2-butanone, toluene, and phthalates), or five times the concentration for other compounds. Diluted samples and dry weights must be accounted for in the method blank. Rinse and trip blanks should be treated the same as samples, except that any rejected rinse or trip blank can still be utilized to reject sample data.

TABLE 7.0

ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: GROUNDWATER

Sample Delivery Group: MW1-D/MW2-S
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	VOA	SVOA	Pest/PCB	Notes
MW1-S	1a, 2b	2a	1a	1, 3
MW1-S-RE	--	2a	--	1, 3
MW1-I	1a, 2b	1b, 2b	1a	1
MW1-D	1a, 2b	1a, 2b	1a	1
MW2-S	1a	1a, 2b	1a	1
MW2-I	1a, 2b	1a, 2b	1a	1
MW3	1a, 2b	1a, 2b	1a	1
MW4-S	1a, 2b	1a, 2b	1a	1
MW5-S	1a, 2b	1b, 2b	1a	1, 2
MW5-S-RE	--	1b, 2b	--	1, 2
MW5-I	1a, 2b	1b, 2b	1a	1, 2
MW5-I-RE	--	1b, 2b	--	1, 2
MW5-I-MS	1a, 2b	1a, 2b	1a	1
MW5-I-MSD	1a, 2b	1a, 2b	1a	1
MW6-I	1a, 2b	1a, 2b	1a	1
MW6-D	1a, 2b	1a, 2b	1a	1
MW7-S	1a, 2b	1a, 2b	1a	1
MW8-I	1a, 2b	1a	1a	1
MW8-D	1a, 2b	1a, 2b	1a	1
MW9-S	1a, 2b	1a, 2b	1a	1
MW9-I	1a, 2b	1a, 2b	1a	1
TB1	1a, 2b	--	--	1
TB2 (3/21/90)	1a, 2b	--	--	1
TB3	1a, 2b	--	--	1

TABLE 7.0 (Continued)

Sample ID	VOA	SVOA	Pest/PCB	Notes
RB1	1a, 2b	1a	1a	1
TB4	1a, 2b	--	--	1

Abbreviation/Legend:

VOA - Target Compound List (TCL) Volatiles
 SVOA - TCL Semivolatiles
 Pest/PCB - TCL Pesticides/PCBs
 MW - Monitoring Well
 I - Intermediate
 S - Shallow
 D - Deep
 RE - Reanalysis
 TB - Trip Blank
 RB - Rinse Blank
 MS - Matrix Spike
 MSD - Matrix Spike Duplicate

Notes for Table 7.0

1. See Table 8.0 for list of rejected compounds
2. The semivolatile fraction surrogate recoveries were not within CLP limits. Although the sample was reextracted outside holding times, the reanalysis substantiated poor surrogate recoveries in the original analysis were a result of sample matrix interferences.
3. The semivolatile fraction for this sample was initially extracted within the analytical holding time, but the surrogate recoveries were not within acceptable range of recovery. The sample was reextracted outside the holding time and upon reanalysis all surrogate recoveries were within acceptable criteria. The data is therefore not useable.

TABLE 8.0
REJECTED COMPOUNDS*

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank
MW1-D	Acetone (VOA)	36	24	18	22
"	Benzene (VOA)	9	1	3	0
TB4	Acetone (VOA)	--	24	18	22
"	Benzene (VOA)	--	1	3	0
MW1-D	Bis(2-ethylhexyl)phthalate (SVOA)	13	3	--	3
"	Di-n-octylphthalate	3	0	--	0.7
MW2-I	Acetone (VOA)	25	24	32	12
MW3	Benzene (VOA)	1	1	3	0
"	Xylene (Total) (VOA)	6	0	3	0
MW9-S	Acetone (VOA)	29	24	--	12
"	Benzene (VOA)	3	1	--	0
MW-9I	Acetone (VOA)	27	24	--	12
MW4-S	Methylene Chloride (VOA)	2	0	--	3
"	Acetone (VOA)	21	24	--	4
MW5-S	Methylene Chloride (VOA)	3	0	--	3
"	Acetone (VOA)	10	24	--	4
MW5-I	Methylene Chloride (VOA)	2	0	--	3

TABLE 8.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank
MW5-I	Acetone (VOA)	14	24	--	4
MW6-I	Methylene Chloride (VOA)	3	0	3	3
"	Acetone (VOA)	21	24	15	4
MW8-I	Methylene Chloride (VOA)	4	0	3	3
"	Acetone (VOA)	17	24	15	4
MW8-D	Methylene Chloride (VOA)	8	0	3	3
"	Acetone (VOA)	27	24	15	4
"	Chloroform (VOA)	3	110	0.9	0
MW6-D	Methylene Chloride (VOA)	2	0	3	3
"	Acetone (VOA)	13	24	15	4
MW1-S	Acetone (VOA)	17	24	23	22
MW1-I	Acetone (VOA)	9	24	23	22
RB1	Acetone (VOA)	--	24	23	22
"	Benzene (VOA)	--	1	2	0
MW7-S	Acetone (VOA)	21	24	23	22
"	Benzene (VOA)	2	1	2	0
TB1	Acetone (VOA)	--	24	32	12
"	Benzene (VOA)	--	1	3	0
TB2	Methylene Chloride (VOA)	--	0	3	3

TABLE 8.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank
TB2	Acetone (VOA)	--	24	15	4
"	Chloroform (VOA)	--	110	0.9	0
"	Toluene (VOA)	--	0	0.7	1
TB3	Acetone (VOA)	--	24	23	22
"	Benzene (VOA)	--	1	2	0
MW1-I-MS	Acetone (VOA)	9	24	23	22
MW1-I-MSD	Acetone (VOA)	10	24	23	22
MW2-S	Diethylphthalate (SVOA)	0.5	0	--	0.6
"	Di-n-butylphthalate (SVOA)	0.7	0	--	0.5
"	Bis(2-ethylhexyl)phthalate (SVOA)	8	3	--	1
MW2-I	Diethylphthalate (SVOA)	0.6	0	--	0
"	Bis(2-ethylhexyl)phthalate (SVOA)	7	3	--	1
MW3	Diethylphthalate (SVOA)	0.7	0	--	0.6
"	Di-n-butylphthalate (SVOA) (SVOA)	0.8	0	--	0.5
"	Bis(2-ethylhexyl)phthalate (SVOA)	5	3	--	1
MW9-S	Diethylphthalate (SVOA)	0.8	0	--	0.6

TABLE 8.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank
MW9-S	Di-n-butylphthalate (SVOA)	1	0	--	0.5
"	Bis(2-ethylhexyl)phthalate (SVOA)	8	3	--	1
MW9-I	Diethylphthalate (SVOA)	0.4	0	--	0.6
"	Di-n-butylphthalate (SVOA)	0.8	0	--	0.5
"	Bis(2-ethylhexyl)phthalate (SVOA)	12	3	--	1
MW4-S	Diethylphthalate (SVOA)	0.5	0	--	0.6
"	Di-n-butylphthalate (SVOA)	0.8	0	--	0.5
"	Bis(2-ethylhexyl)phthalate (SVOA)	6	3	--	1
MW5-S	Diethylphthalate (SVOA)	1	0	--	0.6
"	Bis(2-ethylhexyl)phthalate (SVOA)	4	3	--	1
MW5-S-RE	Diethylphthalate (SVOA)	2	0	--	3
"	Bis(2-ethylhexyl)phthalate (SVOA)	4	3	--	1
MW5-I	Diethylphthalate (SVOA)	1	0	--	0.6
"	Di-n-butylphthalate (SVOA)	0.9	0	--	0.5
"	Bis(2-ethylhexyl)phthalate (SVOA)	3	3	--	1

TABLE 8.0* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Method Blank
MW5-I-RE	Diethylphthalate (SVOA)	3	0	--	3
"	Bis(2-ethylhexyl)phthalate (SVOA)	3	3	--	1
MW6-I	Bis(2-ethylhexyl)phthalate (SVOA)	6	3	--	0
MW8-D	Bis(2-ethylhexyl)phthalate (SVOA)	6	3	--	0
MW6-D	Bis(2-ethylhexyl)phthalate (SVOA)	4	3	--	0
MW1-I	Bis(2-ethylhexyl)phthalate (SVOA)	8	3	--	0
MW1-S	Bis(2-ethylhexyl)phthalate (SVOA)	9	3	--	0
MW7-S	Bis(2-ethylhexyl)phthalate (SVOA)	9	3	--	0
MW1-I-MS	Bis(2-ethylhexyl)phthalate (SVOA)	10	3	--	0
MW1-I-MSD	Bis(2-ethylhexyl)phthalate (SVOA)	6	3	--	0

* For volatile and semivolatile samples, no positive results are reported unless the concentration of the compound in the sample exceeds ten times the concentration of any rinse, trip, or method blank for common laboratory contaminants (methylene chloride, acetone, 2-butanone, toluene, and phthalates), or five times the concentration for other compounds. Diluted samples and dry weights must be accounted for in the method blank. Rinse and trip blanks should be treated the same as samples, except that any rejected rinse or trip blank can still be utilized to reject sample data.

TABLE 9

ANALYTICAL DATA ASSESSMENT SUMMARY
 MATRIX: Stream Sediment

Sample Delivery Group: SS1
 Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	Metals	CN	Phenols	Wet Chem.	Notes
SS1	1a	1a	1a	1a	
SS1-Dup	1a	1a	1a	1a	
SS1-MS	1a	1a	1a	1a	
SS1-L	1a	-	-	-	
SS2	1a	1a	1a	1a	
SS3	1a	1a	1a	1a	
SS4	1a	1a	1a	1a	
SS5	1a	1a	1a	1a	
SS6	1a	1a	1a	1a	
SS6-Dup	-	-	-	1a	
SS6-MS	-	-	-	1a	
SS7	1a	1a	1a	1a	
SS8	1a	1a	1a	1a	

Abbreviation/Legend

Metals - Target Analyte List (TAL) Metals

CN - Cyanide

Phenols - Total Phenols

Wet Chem. - Includes Schedule B waters, Schedule C soils

L - Serial Dilution

SS - Stream Sediment

MS - Matrix Spike

DUP - Duplicate

TABLE 10
ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: Surface Water, Leachate Seep

Sample Delivery Group: SW1/SW6
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	Metals	CN	Phenols	Wet Chem.	Notes
SW1	1a	1a	1a	1a	
SW1-Dup	1a	1a	1a	1a	
SW1-MS	1a	1a	1a	1a	
SW1-L	1a	-	-	-	
SW2	1a	1a	1a	1a	
SW3	1a	1a	1a	1a	
SW4	1a	1a	1a	1a	
SW5	1a	1a	1a	1a	
SW6	1a	1a	1a	1a	
SW6-Dup	1a	1a	1a	1a	
SW6-MS	1a	1a	1a	1a	
SW6-L	1a	-	-	-	
SW7	1a	1a	1a	1a	
SW8	1a	1a	1a	1a	
LS-1	1a	1a	1a	1a	
LS-2	1a	1a	1a	1a	

Abbreviation/Legend

Metals - Target Analyte List (TAL) Metals

CN - Cyanide

Phenols - Total Phenols

Wet Chem. - Includes Schedule B waters, Schedule C soils

L - Serial Dilution

SW - Surface Water

LS - Leachate Seep

MS - Matrix Spike

DUP - Duplicate

TABLE 11
ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: Soil Borings

Sample Delivery Group: MW8-I-SB/SB5/SB18
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	Metals	CN	Phenols	Wet Chem.	RCRA	EP-Tox Metals	Notes
SB1	1a	1a	1a	1a	1a	1a	
SB13	1a	1a	1a	-	1a	1a	
SB13-Dup	1a	1a	1a	-	1a	1a	
SB13-MS	1a	1a	1a	-	-	1a	
SB13-L	1a	-	-	-	-	1a	
SB14	1a	1a	1a	-	1a	1a	
SB5	1a	1a	1a	-	1a	1a	
SB9	1a	1a	1a	-	1a	1a	
SB18	1a	1a	1a	-	1a	1a	
SB18-Dup	1a	1a	-	-	-	-	
SB18-MS	1a	1a	1a	-	-	-	
SB18-L	1a	-	-	-	-	-	
SB19	1a	1a	1a	-	1a	1a	

Abbreviation/Legend

Metals - Target Analyte List (TAL) Metals

CN - Cyanide

Phenols - Total Phenols

Wet Chem. - Wet Chemistry Parameters include Schedule B waters, Schedule C soils

RCRA - Schedule D parameters

EP-Tox Metals - Extraction Procedure Toxicity Metals

L - Serial Dilution

RB - Rinse Blank

SB - Soil Boring

MS - Matrix Spike

DUP - Duplicate

TABLE 12
ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: Drillwater, Waste Samples

Sample Delivery Group: DW1/JB0631
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	Metals	CN	Phenols	RCRA	EP-Tox Metals	Notes
DW1	1a	1a	1a	-	-	
DW1-Dup	1a	1a	1a	-	-	
DW1-MS	1a	1a	1a	-	-	
DW1-L	1a	-	-	-	-	
WS1	1a	1a	1a	1a	1a	
WS1-Dup	1a	1a	1a	-	1a	
WS1-MS	1a	1a	1a	-	1a	
WS1-L	1a	-	-	-	1a	
WS2	1a	1a	1a	1a	1a	
WS3	1a	1a	1a	1a	1a	
WS3-Dup	-	-	-	1a	-	

Abbreviation/Legend

Metals - Target Analyte List (TAL) Metals
 CN - Cyanide
 Phenols - Total Phenols
 RCRA - Schedule D parameters
 EP-Tox Metals - Extraction Procedure Toxicity Metals
 L - Serial Dilution
 MS - Matrix Spike
 DUP - Duplicate
 DRILL1 - Drill Water Supply
 WS - Waste Sample

TABLE 13
ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: Shallow Probe Soil, Soil Borings

Sample Delivery Group: MW1-SB/MW8-I-SB/MW5-I
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	Metals	CN	Phenols	Wet Chem.	Notes
SPSI	1a	1a	1a	1a	
SPSI-Dup	1a	1a	1a	1a	
SPSI-MS	1a	1a	1a	1a	
SPSI-L	1a	-	-	-	
SPS2	1a	1a	1a	1a	
SPS3	1a	1a	1a	1a	
SPS4	1a	1a	1a	1a	
SPS5	1a	1a	1a	1a	
SPS1-RB	1a	1a	1a	-	
MW1-SB	1a	1a	1a	1a	
MW2-I-SB	1a	1a	1a	1a	
MW2-I-SB-Dup	1a	1a	1a	-	
MW2-I-SB-MS	1a	1a	1a	-	
MW2-I-SB-L	1a	-	-	-	
MW8-I-SB	1a	1a	1a	1a	
MW8-I-SB-Dup	1a	1a	1a	1a	
MW8-I-SB-MS	1a	1a	1a	1a	
MW8-I-SB-L	1a	-	-	-	
MW8-I-SB-RB	1a	1a	1a	-	
MW5-I-SB-2'-4'	1a	1a	1a	1a	
MW5-I-SB-2'-4' Dup	1a	1a	1a	1a	

TABLE I3 (con't)

Sample ID	Metals	CN	Phenols	Wet Chem.	Notes
MW5-I-SB-2'-4'MS	1a	1a	1a	1a	
MW5-I-SB-2'-4'-L	1a	-	-	-	
MW5-I-SB	1a	1a	1a	1a	
MW6-D-SB	1a	1a	1a	1a	
MW7-SB	1a	1a	1a	1a	
MW9-SB	1a	1a	1a	1a	

Abbreviation/Legend

Metals - Target Analyte List (TAL) Metals

CN - Cyanide

Phenols - Total Phenols

Wet Chem. - Includes Schedule B waters, Schedule C soils

MW - Monitoring Well

SB - Soil Boring

L - Serial Dilution

MS - Matrix Spike

DUP - Duplicate

SPS - Shallow Probe Soil

I - Intermediate

D - Dup

TABLE 14
ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: Groundwater

Sample Delivery Group: MW2-I/MW1-I
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	Metals	CN	Phenols	Wet Chem.	Notes
MW2-I	1a	1a	1a	1a	
MW2-S	1a	1a	1a	1a	
MW3	1a	1a	1a	1a	
MW4-S	1a	1a	1a	1b	1
MW5-I	1a	1a	1a	1b	1
MW5-I-Dup	1a	1a	1a	1a	
MW5-I-MS	1a	1a	1a	1a	
MW5-I-L	1a	1a	1a	-	
MW5-S	1a	1a	1a	1a	
MW6-D	1a	1a	1a	1a	
MW6-I	1a	1a	1a	1a	
MW8-D	1a	1a	1a	1a	
MW8-I	1a	1a	1a	1a	
MW9-I	1a	1a	1a	1a	
MW9-S	1a	1a	1a	1b	1
MW1-D	1a	1a	1a	1a	
MW1-I	1a	1a	1a	1b	1
MW1-S	1a	1a	1a	1a	
MW7-S	1a	1a	1a	1a	
MW8-D	1a	1a	1a	1a	
MW-RB	1a	1a	1a	-	

Abbreviation/Legend

Metals - Target Analyte List (TAL) Metals
CN - Cyanide
(continued on next page)

Abbreviation/Legend (continued)

Phenols - Total Phenols

Wet Chem. - Includes Schedule B waters, Schedule C soils

MW - Monitoring Well

RB - Rinse Blank

L - Serial Dilution

MS - Matrix Spike

DUP - Duplicate

TABLE 14

NOTES

1. The BOD₅, COD, and TOC data do not correlate. In some instances, the reported BOD₅ values are higher than the COD value. This may be due to the fact that inadequate sample volume was used for the BOD₅ and no nitrogen inhibitors were used for the BOD test.

ANALYTICAL DATA ASSESSMENT
FOR
SECOND-ROUND CHEMICAL ANALYSES FOR LOCKPORT CITY LANDFILL

Performed by:
IEA, INC., MONROE, CT

Prepared for:
CITY OF LOCKPORT

By:
URS CONSULTANTS, INC.

JUNE 1991

INTRODUCTION: This assessment represents the best judgement of URS Consultants, Inc. (URS) concerning the useability and defensibility of chemical data produced by IEA, Inc., a subcontractor to URS, as part of a Remedial Investigation/Feasibility Study at Lockport City Landfill in the City of Lockport, New York. This project is being funded by the City of Lockport. The data being evaluated is from second-round sampling of drill water, surface waters, surface sediments, soil borings, and groundwater samples. All analyses performed by IEA, Inc. were subject to NYSDEC Analytical Services Protocol - September 1989.

Data documentation and chain-of-custody procedures were performed in accordance with NYSDEC Analytical Services Protocol - September 1989. Organic data validation, reduction, and determination of useability, were performed in accordance with USEPA SOP No. HW-3 CLP Organic Data Review. The inorganic data validation processes were performed in accordance with USEPA SOP No. HW-2 Evaluation of Metals Data for the Contract Laboratory Program, Revision IV, August 1986. Other non-ASP parameters was validated against the methods.

CATEGORIES: The following table summarizes our assessment of data useability on a sample-by-sample and fraction-by-fraction basis. In evaluating this data, we have established four (4) categories which are,

for the most part, gradational in nature. The categories are defined as follows:

Category 1a - Useable and Defensible - Fully useable, despite possible minor deviations from ASP criteria.

Category 1b - Useable Though Not Fully Defensible - Useable with caution; cumulative deviations from ASP criteria are greater than Category 1a, though not considered so significant as to jeopardize the chemical representativeness of the sample results.

Category 2a - Rejected Fractions/Compounds Due to Holding Time Violations - Did not comply with ASP holding times.

Category 2b - Rejected Fraction(s)/Compound(s) Due to Various ASP Deviations - In a sample fraction, some compounds may be useable and defensible, other compounds may be rejected, or the sample fraction may be rejected due to various deviations from ASP. See Table Notes for rationale of rejected fractions and Tables 2, 4, 6, and 8 for lists of rejected compounds.

In Tables 1, 3, 5, and 7 some fractions are assigned single categories, indicating that they are either considered useable in their entirety or rejected in their entirety. The notes accompanying this table indicate the reason for rejections (Categories 2a, 2b) and for only conditional acceptances (Category 1b). Also on Tables 1, 3, 5, and 7 some fractions are assigned dual categories. This indicates that, while some compounds within the fraction are useable, others are rejected due to contamination in one or more of the QC blanks. Tables 2, 4, 6, and 8 identify the specific compounds within each sample which are rejected due to blank contamination.

SUMMARY ASSESSMENT: In summary, we feel that the analytical data is useable for Category 1a, useable with caution for Category 1b and rejected for Categories 2a and 2b. It should be noted that the use of Category 1b involves some risk in the event of a legalistic challenge based upon noncompliance with strict ASP criteria. Of the total analyses performed (by sample and fraction), the overall data package is categorized as follows:

Laboratory Report No. 3091-0736

Category	VOA	SVOA	Pest/ PCB	Metals	Cyanide	Phenols	Wet Chem.
1a	3	0	5	7	5	5	3
1a,2b	5	5	0	0	0	0	0
1b	0	0	0	0	0	0	0
1b,2b	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	8	5	5	7	5	5	3

Laboratory Report No. 3091-0736A

Category	VOA	SVOA	Pest/ PCB	Metals	Cyanide	Phenols	Wet Chem.
1a	15	3	18	20	19	19	19
1b	0	0	2	0	0	0	0
1a,2b	10	18	0	0	0	0	0
1b,2b	0	0	0	0	0	0	0
2a	0	0	0	0	0	0	0
2b	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	25	21	20	20	19	19	19

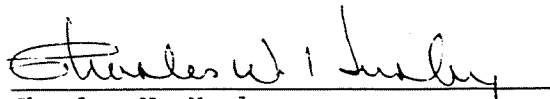
Laboratory Report No. 3091-0817

Category	VOA	TCLP VOA	SVOA	TCLP SVOA	Pest/ PCB	Metals	Cyanide	Phenols	Wet Chem.	RCRA	TCLP Metals	TCLP Pest.	TCLP Herb.
1a	6	2	1	3	17	16	14	14	11	1	3	3	3
1a,2b	13	0	16	0	0	0	0	0	0	0	0	0	0
1b	0	0	0	0	0	0	0	0	0	0	0	0	0
1b,2b	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	17	2	17	3	17	16	14	14	11	1	3	3	3

Laboratory Report No. 3091-0930

Category	VOA	SVOA	Pest/ PCB	Metals	Cyanide	Wet Chem.	TCLP VOA
1a	2	0	2	8	4	2	1
1a,2b	2	2	0	0	0	0	0
1b	0	0	0	0	0	0	0
1b,2b	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	4	2	2	8	4	2	1

The Laboratory Reports identified above are in compliance with the terms and conditions of the laboratory contract, other than the conditions detailed in the following tables. Release of the data for this phase of the investigation has been authorized by the Project Manager and QA/QC Officer by the following signatures.


Charles W. Hurley
Project Manager

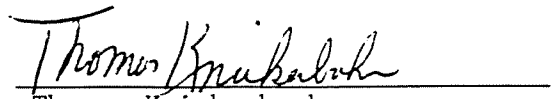

Thomas Knickerbocker
QA/QC Officer

TABLE 1

ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: LEACHATE, MANHOLE WATER AND STREAM SEDIMENTS

Laboratory Report Number: 3091-0736
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	VOA	SVOA	Pest/PCB	Metals	CN	Phenols	Wet Chem.	Notes
LCL-LL-1	1a,2b	1a,2b	1a	1a	1a	1a	1a	1
LCL-LL-2	1a,2b	1a,2b	1a	1a	1a	1a	1a	1
LCL-LL-2-L	--	---	--	1a	--	--	--	
LCL-MH-1	1a	1a,2b	1a	1a	1a	1a	--	1
LCL-MH-2	1a,2b	1a,2b	1a	1a	1a	1a	--	1
LCL-WSS-1	1a,2b	1a,2b	1a	1a	1a	1a	1a	1
LCL-WSS-1-L	--	---	--	1a	--	--	--	
LCL-LL-TB1 3/20/91	1a,2b	--	--	--	--	--	--	1
HB1 REF 34	1a	--	--	--	--	--	--	
HB2 REF 34	1a	--	--	--	--	--	--	

Abbreviation/Legend:

VOA - Target Compound List (TCL) Volatiles
SVOA - TCL Semivolatiles
Pest/PCB - TCL Pesticides/PCBs
Metals - Target Analyte List (TAL) Metals
CN - Cyanide
Phenols - Total Phenols
Wet Chem. - Includes Schedule B waters,
Schedule C soils

MH - Manhole Water
TB - Trip Blank
L - Serial Dilution
SS - Stream Sediment
LL - Leachate Seep
HB - Holding Blank
WSS - Wetland Sediment

NOTES FOR TABLE 1

- 1) See Table 2 for a list of rejected compounds.

TABLE 2 *

ORGANIC COMPOUNDS REJECTED FROM THE
SECOND ROUND OF SAMPLING OF THE LOCKPORT CITY LANDFILL

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Holding Blank	Conc. (ppb) of Compound in the Method Blank
LCL-LL-1	Acetone (VOA)	8	---	31	37	0
LCL-LL-2	Acetone (VOA)	62	---	31	37	0
LCL-WSS-1	Acetone (VOA)	33	5	72	88	24
LCL-MH-2	Acetone (VOA)	14	---	31	0	0
LCL-LL-TB1 3/20/91	Acetone (VOA)	---	---	31	37	0
LCL-LL-1	Bis(2-ethylhexyl) phthalate (SVOA)	10	---	---	---	10
LCL-LL-2	Bis(2-ethylhexyl) phthalate (SVOA)	17	---	---	--	10
LCL-WSS-1	Bis(2-ethylhexyl) phthalate (SVOA)	1400	310	---	---	1750
LCL-MH-1	Bis(2-ethylhexyl) phthalate (SVOA)	45	---	---	---	6
LCL-MH-2	Bis(2-ethylhexyl) phthalate (SVOA)	26	---	---	---	6

* For volatile and semivolatile samples, no positive results are reported unless the concentration of the compound in the sample exceeds ten times the concentration of any quality control blank for common laboratory contaminants (methylene chloride, acetone, 2-butanone, toluene, and phthalates), or five times the concentration for other compounds. Diluted samples and dry weights must be accounted for in the quality control blanks. Rinse, trip and holding blanks should be treated the same as samples, except that any rejected rinse, trip or holding blanks can still be utilized to reject sample data.

TABLE 3

ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: GROUNDWATER

Laboratory Report Number: 3091-0736A
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	VOA	SVOA	Pest/PCB	Metals	CN	Phenols	Wet Chem.	Notes
LCL-MW2-S	1a	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW2-S-L	--	--	--	1a	--	--	--	
LCL-MW2-I	1a	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW2-I-MS	1a,2b	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW2-I-MSD	1a,2b	1a,2b	1a	--	--	--	--	1
LCL-MW2-I-Dup	--	--	--	1a	1a	1a	1a	
LCL-MW2-I-MSB	1a,2b	1a,2b	1a	--	--	--	--	1
LCL-MW3-S	1a	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW4-S	1a	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW9-S	1a	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW9-I	1a	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW1-I	1a,2b	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW5-S	1a,2b	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW5-I	1a,2b	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW5-I-RE	--	1a,2b	--	--	--	--	--	1
LCL-MW7-S	1a	1a,2b	1a	1a	1a	1a	1a	1,3
LCL-MW1-S	1a,2b	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW6-I	1a	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW6-D	1a	1a	1a	1a	1a	1a	1a	
LCL-MW8-I	1a	1a	1b	1a	1a	1a	1a	2
LCL-MW8-D	1a	1a	1b	1a	1a	1a	1a	2
LCL-MW10-I	1a,2b	1a,2b	1a	1a	1a	1a	1a	1
LCL-MW10-D	1a,2b	1a,2b	1a	1a	1a	1a	1a	1
LCL-GWTB-3/28/91	1a	--	--	--	--	--	--	

TABLE 3 (Continued)

Sample ID	VOA	SVOA	Pest/PCB	Metals	CN	Phenols	Wet Chem.	Notes
LCL-GWTB-2	1a	--	--	--	--	--	--	
LCL-GWTB-3	1a, 2b	--	--	--	--	--	--	1
LCL-GWTB-4	1a	--	--	--	--	--	--	
HBI Ref 35	1a	--	--	--	--	--	--	

Abbreviation/Legend:

VOA	- Target Compound List (TCL Volatiles)	HB	- Holding Blank
SVOA	-- TCL Semivolatiles	TB	- Trip Blank
Pest/PCB	- TCL Pesticides/PCBs	I	- Intermediate
Metals	- Target Analyte List (TAL) Metals	L	- Serial Dilution
CN	- Cyanide	S	- Shallow
Phenols	- Total Phenols	D	- Deep
Wet Chem.	- Includes Schedule B waters, Schedule C soils	MSB	- Matrix Spike Blank
MW	- Monitoring Well	MS	- Matrix Spike
GW	- Groundwater	MSD	- Matrix Spike Duplicate
		DUP	- Duplicate

NOTES FOR TABLE 3

- 1) See Table 4 for a list of rejected compounds
- 2) The sample was injected on two 72 hour calibration sequences in which several compounds were in excess of the NYSDEC ASP limits. The compounds which were non-compliant were not found in the associated samples.
- 3) Wet Chemical analysis included oil and grease only.

TABLE 4*

ORGANIC COMPOUNDS REJECTED FROM THE
SECOND ROUND OF SAMPLING OF THE LOCKPORT CITY LANDFILL

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Holding Blank	Conc. (ppb) of Compound in the Method Blank
LCL-MW2-I-MS	Acetone (VOA)	18	--	0	0	22
LCL-MW2-I-MSD	Acetone (VOA)	9	--	0	0	22
LCL-MW2-I-MSB	Acetone (VOA)	12	--	--	0	8
LCL-MW2-I-MSB	1,1,1-Trichloroethane (VOA)	3	--	--	0	3
LCL-MW1-I	Acetone (VOA)	7	--	14	0	8
LCL-MW1-I	Toluene (VOA)	1	--	2	0	4
LCL-MW5-S	Acetone (VOA)	4	--	14	0	8
LCL-MW5-I	Acetone (VOA)	10	--	14	0	8
LCL-MW1-S	Acetone (VOA)	3	--	14	0	12
LCL-MW8-D	Acetone (VOA)	110	--	0	0	60
LCL-MW10-I	Acetone (VOA)	10	--	0	0	12
LCL-MW10-D	Methylene Chloride (VOA)	12	--	0	0	12
LCL-GWTB-3	Acetone (VOA)	--	--	14	0	8
LCL-GWTB-3	Toluene (VOA)	--	--	2	0	4
LCL-MW2-S	Bis(2-ethylhexyl)phthalate (SVOA)	6	--	--	--	8

TABLE 4* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Holding Blank	Conc. (ppb) of Compound in the Method Blank
LCL-MW2-I	Bis(2-ethylhexyl)phthalate (SVOA)	8	--	--	--	8
LCL-MW2-I-MSB	Diethylphthalate (SVOA)	3	--	--	--	1
LCL-MW2-I-MSB	Bis(2-ethylhexyl)phthalate (SVOA)	3	--	--	--	8
LCL-MW2-I-MS	Bis(2-ethylhexyl)phthalate (SVOA)	4	--	--	--	8
LCL-MW2-I-MSD	Bis(2-ethylhexyl)phthalate (SVOA)	8	--	--	--	8
LCL-MW3-S	Bis(2-ethylhexyl)phthalate (SVOA)	13	--	--	--	11
LCL-MW4-S	Bis(2-ethylhexyl)phthalate (SVOA)	11	--	--	--	11
LCL-MW9-S	Bis(2-ethylhexyl)phthalate (SVOA)	37	--	--	--	11
LCL-MW9-I	Bis(2-ethylhexyl)phthalate (SVOA)	10	--	--	--	11
LCL-MW1-I	Bis(2-ethylhexyl)phthalate (SVOA)	11	--	--	--	16
LCL-MW5-S	Bis(2-ethylhexyl)phthalate (SVOA)	29	--	--	--	16
LCL-MW5-I	Bis(2-ethylhexyl)phthalate (SVOA)	24	--	--	--	16

TABLE 4* (Continued)

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Holding Blank	Conc. (ppb) of Compound in the Method Blank
LCL-MW5-I-RE	Bis(2-ethylhexyl)phthalate (SVOA)	4	--	--	--	2
LCL-MW7-S	Bis(2-ethylhexyl)phthalate (SVOA)	20	--	--	--	16
LCL-MW1-S	Bis(2-ethylhexyl)phthalate (SVOA)	10	--	--	--	16
LCL-MW6-I	Bis(ethylhexyl)phthalate (SVOA)	11	--	--	--	4
LCL-MW10-I	Bis(2-ethylhexyl)phthalate (SVOA)	26	--	--	--	4
LCL-MW10-D	Bis(2-ethylhexyl)phthalate (SVOA)	12	--	--	--	4

* For volatile and semivolatile samples, no positive results are reported unless the concentration of the compound in the sample exceeds ten times the concentration of any quality control blank for common laboratory contaminants (methylene chloride, acetone, 2-butanone, toluene, and phthalates), or five times the concentration for other compounds. Diluted samples and dry weights must be accounted for in the quality control blanks. Rinse, trip, and holding blanks should be treated the same as samples, except that any rejected rinse, trip, or holding blank can still be utilized to reject sample data.

TABLE 5

ANALYTICAL DATA ASSESSMENT SUMMARY

MATRIX: Soil Borings, Stream Sediments, and Surface Waters

Laboratory Report Number: 3091-0817

Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	VOA	TCLP VOA	SVOA	TCLP SVOA	Pest/ PCB	Metals	CN	Phenols	Wet Chem.	RCRA	TCLP Metals	TCLP Pest	TCLP Herb	Notes
LCL-SS-4	1a, 2b	-	1a, 2b	-	1a	1a	1a	1a	1a	-	-	-	-	1
LCL-SS-9	1a, 2b	-	1a, 2b	-	1a	1a	1a	1a	1a	-	-	-	-	1
LCL-SS-9-Dup	-	-	-	-	-	1a	1a	1a	1a	-	-	-	-	
LCL-SS-9-MS	1a, 2b	-	1a, 2b	-	1a	1a	1a	1a	1a	-	-	-	-	1
LCL-SS-9-MSD	1a, 2b	-	1a, 2b	-	1a	-	-	-	-	-	-	-	-	1
LCL-SS-9-MSB	1a, 2b	-	1a	-	1a	-	-	-	-	-	-	-	-	1
LCL-SS-10	1a, 2b	-	1a, 2b	-	1a	1a	1a	1a	1a	-	-	-	-	1
LCL-SS-10-L	-	-	-	-	-	1a	-	-	-	-	-	-	-	
LCL-SS-RB-1	1a, 2b	-	1a, 2b	-	1a	1a	1a	1a	-	-	-	-	-	1
001-HB1-R34	1a, 2b	-	-	-	-	-	-	-	-	-	-	-	-	1
LCL-SW-4	1a	-	1a, 2b	-	1a	1a	1a	1a	1a	-	-	-	-	1
LCL-SW-9	1a	-	1a, 2b	-	1a	1a	1a	1a	1a	-	-	-	-	1
LCL-SW-9-Dup	-	-	-	-	-	1a	1a	1a	1a	-	-	-	-	
LCL-SW-9-MS	1a	-	1a, 2b	-	1a	1a	1a	1a	1a	-	-	-	-	1
LCL-SW-9-MSD	1a	-	1a, 2b	-	1a	-	-	-	-	-	-	-	-	1
LCL-SW-9-MSB	1a	-	1a, 2b	-	1a	-	-	-	-	-	-	-	-	1
LCL-SW-10	1a	-	1a, 2b	-	1a	1a	1a	1a	1a	-	-	-	-	1
LCL-SW-10-L	-	-	-	-	-	1a	-	-	-	-	-	-	-	
LCL-TB-1	1a, 2b	-	-	-	-	-	-	-	-	-	-	-	-	1

TABLE 5 (Continued)

ANALYTICAL DATA ASSESSMENT SUMMARY

MATRIX: Soil Borings, and Drill Water

Laboratory Report Number: 3091-0817

Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	VOA	TCLP VOA	SVOA	TCLP SVOA	Pest/PCB	Metals	CN	Phenols	Wet Chem.	RCRA	TCLP Metals	TCLP Pest	TCLP Herb	Notes
LCL-SB-25	1a, 2b	-	1a, 2b	-	1a	1a	1a	1a	1a	1a	-	-	-	1
LCL-SB-25-TC	-	1a	-	1a	-	-	-	-	-	-	1a	1a	1a	2
LCL-SB-25-Dup	-	-	-	-	-	1a	1a	1a	-	-	-	-	-	
LCL-SB-25-L	-	-	-	-	-	1a	-	-	-	-	-	-	-	
LCL-SB-25-MS-TC	-	1a	-	1a	-	-	-	-	-	-	1a	1a	1a	2
LCL-SB-25-MS	1a, 2b	-	1a, 2b	-	1a	1a	1a	1a	-	-	-	-	-	1
LCL-SB-25-MSD	1a, 2b	-	1a, 2b	-	1a	-	-	-	-	-	-	-	-	1
LCL-SB-25-MSB	1a, 2b	-	1a, 2b	-	1a	-	-	-	-	-	-	-	-	1
LCL-DTW-PII	-	-	-	1a	-	-	-	-	-	-	1a	1a	1a	2

Abbreviation/Legend

VOA - Target Compound List (TCL) Volatiles

SVOA - TCL Semivolatiles

Pest/PCB - TCL Pesticides/PCBs

Metals - Target Analyte List (TAL) Metals

CN - Cyanide

Phenols - Total Phenols

Wet Chem. - Includes Schedule B waters, Schedule C soils

TCLP Metals - Toxicity Characteristic Leaching Procedure (TCLP) Metals

TCLP Pesticides - Toxicity Characteristic Leaching Procedure (TCLP) Pesticides

TCLP Herbicides - Toxicity Characteristic Leaching Procedure (TCLP) Herbicides

TCLP VOA - Toxicity Characteristic Leaching Procedure (TCLP) Volatiles

TCLP VOA - Toxicity Characteristic Leaching Procedure (TCLP) Semivolatiles

RCRA - Corrosivity, Ignitability, Reactivity, Heat of Combustion, Ash Weight, & Chlorine and % Sulfur

TC - TCLP

SB - Soil Boring

MW - Monitoring Well

MS - Matrix Spike

MSD - Matrix Spike Duplicate

DUP - Duplicate

DTW - Drill Tank Water

MSB - Matrix Spike Blank

TB - Trip Blank

SW - Surface Water

SS - Stream Sediment

HB - Holding Blank

RB - Rinse Blank

Notes For Table 5

- 1) See Table 8 for list of rejected compounds.
- 2) The TCLP sample volumes for semivolatile and pesticide analyses were not in accordance with SW-846 methodologies. Neither the sample detection limits or the detected compounds concentrations exceeded the regulatory limits.

Table 6*

ORGANIC COMPOUNDS REJECTED FROM THE SECOND ROUND OF SAMPLING OF
THE LOCKPORT CITY LANDFILL

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Holding Blank	Conc. (ppb) of Compound in the Method Blank
LCL-SB-25	Methylene Chloride (VOA)	7900	-	-	3200	0
LCL-SB-25	Acetone (VOA)	13000	-	-	7700	0
LCL-SS-4	Acetone (VOA)	10	10	-	6	23
LCL-SS-10	Methylene Chloride (VOA)	7	3	-	3	8
LCL-SS-10	Acetone (VOA)	12	9	-	5	13
LCL-SS-9	Acetone (VOA)	6	10	-	6	6
LCL-SS-RB-1	Methylene Chloride (VOA)	-	2	-	-	3
LCL-SS-RB-1	Acetone (VOA)	-	7	-	-	10
LCL-SW-TB-1	Methylene Chloride (VOA)	-	-	2	-	4
LCL-SW-TB-1	Acetone (VOA)	-	-	6	-	14
001-HB-1-R34	Methylene Chloride (VOA)	-	-	-	2	4
001-HB-1-R34	Acetone (VOA)	-	-	-	4	14

Table 6* (Continued)

ORGANIC COMPOUNDS REJECTED FROM THE SECOND ROUND OF SAMPLING OF
THE LOCKPORT CITY LANDFILL

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Holding Blank	Conc. (ppb) of Compound in the Method Blank
LCL-SB-25-MS	Methylene Chloride (VOA)	6400	-	-	3200	0
LCL-SB-25-MSD	Methylene Chloride (VOA)	7100	-	-	3200	0
LCL-SB-25-MSD	Acetone (VOA)	36000	-	-	7700	0
MSB-LCL-SB-25	Methylene Chloride (VOA)	810	-	-	250	0
MSB-LCL-SB-25	Acetone (VOA)	6300	-	-	500	0
LCL-SS-9-MS	Acetone (VOA)	14	10	-	-	6
LCL-SS-9-MSD	Methylene Chloride (VOA)	4	3	-	-	4
LCL-SS-9-MSD	Acetone (VOA)	6	10	-	-	6
MSB-LCL-SS-9	Acetone (VOA)	12	7	-	-	4
MSB-LCL-SW-9	Methylene Chloride (VOA)	2	-	2	-	4
MSB-LCL-SW-9	Acetone (VOA)	13	-	6	-	14
LCL-SB-25	Di-n-butylphthalate (SVOA)	2700	-	-	-	1100

Table 6* (Continued)

ORGANIC COMPOUNDS REJECTED FROM THE SECOND ROUND OF SAMPLING OF
THE LOCKPORT CITY LANDFILL

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Holding Blank	Conc. (ppb) of Compound in the Method Blank
LCL-SB-25	Bis(2-ethylhexyl)phthalate (SVOA)	5100	-	-	-	3300
LCL-SS-4	Bis(2-ethylhexyl)phthalate (SVOA)	510	280	-	-	530
LCL-SS-10	Di-n-butylphthalate (SVOA)	3600	170	-	-	770
LCL-SS-9	Bis(2-ethylhexyl)phthalate (SVOA)	750	120	-	-	230
LCL-SW-4	Di-n-butylphthalate (SVOA)	0.5	-	-	-	0.5
LCL-SW-4	Bis(2-ethylhexyl)phthalate (SVOA)	4	-	-	-	3
LCL-SW-4	Di-n-octylphthalate (SVOA)	0.2	-	-	-	0.3
LCL-SW-10	Di-n-butylphthalate (SVOA)	0.4	-	-	-	0.5
LCL-SW-10	Bis(2-ethylhexyl)phthalate (SVOA)	4	-	-	-	3
LCL-SW-10	Di-n-octylphthalate (SVOA)	0.2	-	-	-	0.5
LCL-SW-9	Di-n-butylphthalate (SVOA)	3	-	-	-	0.5
LCL-SW-9	Bis(2-ethylhexyl)phthalate (SVOA)	9	-	-	-	3

Table 6* (Continued)

ORGANIC COMPOUNDS REJECTED FROM THE SECOND ROUND OF SAMPLING OF
THE LOCKPORT CITY LANDFILL

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Holding Blank	Conc. (ppb) of Compound in the Method Blank
LCL-SW-9	Di-n-octylphthalate (SVOA)	2	-	-	-	0.3
LCL-SW-9	Benzo(b)fluoranthene (SVOA)	3	-	-	-	0.5
LCL-SW-9	Benzo(a)pyrene (SVOA)	2	-	-	-	0.6
LCL-SS-RB-1	Di-n-butylphthalate (SVOA)	-	0.4	-	-	0.5
LCL-SS-RB-1	Bis(2-ethylhexyl)phthalate (SVOA)	-	3	-	-	3
LCL-SB-25-MS	Di-n-butylphthalate (SVOA)	2000	-	-	-	1100
LCL-SB-25-MS	Bis(2-ethylhexyl)phthalate (SVOA)	2900	-	-	-	3300
LCL-SB-25-MSD	Di-n-butylphthalate (SVOA)	2300	-	-	-	1100
LCL-SB-25-MSD	Bis(2-ethylhexyl)phthalate (SVOA)	4600	-	-	-	3300
MSB-LCL-SB-25	Di-n-butylphthalate (SVOA)	110	-	-	-	62
MSB-LCL-SB-25	Bis(2-ethylhexyl)phthalate (SVOA)	270	-	-	-	190
LCL-SS-9-MS	Di-n-butylphthalate (SVOA)	43	16	-	-	75

Table 6* (Continued)

ORGANIC COMPOUNDS REJECTED FROM THE SECOND ROUND OF SAMPLING OF
THE LOCKPORT CITY LANDFILL

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Holding Blank	Conc. (ppb) of Compound in the Method Blank
LCL-SS-9-MS	Bis(2-ethylhexyl)phthalate (SVOA)	1200	120	-	-	230
LCL-SS-9-MSD	Di-n-butylphthalate (SVOA)	36	16	-	-	75
LCL-SS-9-MSD	Bis(2-ethylhexyl)phthalate (SVOA)	400	120	-	-	230
LCL-SW-9-MS	Bis(2-ethylhexyl)phthalate (SVOA)	3	-	-	-	3
LCL-SW-9-MSD	Di-n-octylphthalate (SVOA)	0.6	-	-	-	0.5
LCL-SW-9-MSD	Bis(2-ethylhexyl)phthalate (SVOA)	5	-	-	-	3
LCL-SW-9-MSD	Di-n-octylphthalate (SVOA)	0.4	-	-	-	0.3
LCL-SW-9-MSD	Benzo(b)fluoranthene (SVOA)	0.4	-	-	-	0.5
MSB-LCL-SW-9	Bis(2-ethylhexyl)phthalate (SVOA)	7	-	-	-	3

* For volatile and semivolatile samples, no positive results are reported unless the concentration of the compound in the sample exceeds ten times the concentration of any quality control blank for common laboratory contaminants (methylene chloride, acetone, 2-butanone, toluene, and phthalates), or five times the concentration for other compounds. Diluted samples and dry weights must be accounted for in the quality control blanks. Rinse, trip, and holding blanks should be treated the same as samples, except that any rejected rinse, trip or holding blank can still be utilized to reject sample data.

TABLE 7

ANALYTICAL DATA ASSESSMENT SUMMARY
MATRIX: Groundwaters

Laboratory Report Number: 3091-0930
Assessment Categories: 1a, 1b, 2a, 2b

Sample ID	VOA	SVOA	Pest/ PCB	Metals	CN	Wet Chem.	TCLP VOA	Notes
LCL-MW12-D	1a	1a,2b	1a	1a	1a	1a	-	1
LCL-MW12-D-DUP	-	-	-	1a	1a	-	-	
LCL-MW12-D-MS	-	-	-	1a	-	-	-	
LCL-MW12-D-L	-	-	-	1a	-	-	-	
LCL-MW12-I	1a,2b	1a,2b	1a	1a	1a	1a	-	1
LCL-MW12-I-DUP	-	-	-	1a	-	-	-	
LCL-MW12-I-MS	-	-	-	1a	1a	-	-	
LCL-MW12-I-L	-	-	-	1a	-	-	-	
LCL-GWTB-5	1a	-	-	-	-	-	-	
0930001HB1	1a,2b	-	-	-	-	-	-	1
LCL-DW-PII	-	-	-	-	-	-	1a	

Abbreviation/Legend

VOA - Target Compound List (TCL) Volatiles
 SVOA - TCL Semivolatiles
 Pest/PCB - TCL Pesticides/PCBs
 Metals - Target Analyte List (TAL) Metals
 CN - Cyanide
 GW - Groundwater
 I - Intermediate
 Wet Chem. - Includes Schedule B waters
 TCLP VOA - Toxicity Characteristic Leaching Procedure Volatiles
 MW - Monitoring Well
 D - Deep

TB - Trip Blank
 L - Serial Dilution
 MS - Matrix Spike
 DUP - Duplicate
 L - Serial Dilution
 HB - Holding Blank
 DW - Drill Water

Notes for Table 7

- 1) See Table 6 for a list of rejected compounds.

TABLE 8*

ORGANIC COMPOUNDS REJECTED FROM THE SECOND ROUND OF SAMPLING OF
THE LOCKPORT CITY LANDFILL

Sample ID	Compound Rejected	Conc. (ppb) of Compound in the Sample	Conc. (ppb) of Compound in the Rinse Blank	Conc. (ppb) of Compound in the Trip Blank	Conc. (ppb) of Compound in the Holding Blank	Conc. (ppb) of Compound in the Method Blank
LCL-MW12-I	Acetone (VOA)	16	-	0	9	19
0930001HB1	Acetone (VOA)	-	-	0	9	19
LCL-MW12-D	Bis(2-ethylhexyl)phthalate (SVOA)	15	-	-	-	4
LCL-MW12-I	Bis(2-ethylhexyl)phthalate (SVOA)	10	-	-	-	4

* For volatile and semivolatile samples, no positive results are reported unless the concentration of the compound in the sample exceeds ten times the concentration of any quality control blank for common laboratory contaminants (methylene chloride, acetone, 2-butanone, toluene, and phthalates), or five times the concentration for other compounds. Diluted samples and dry weights must be accounted for in the quality control blanks. Rinse, trip, and holding blanks should be treated the same as samples, except that any rejected rinse, trip or holding blank can still be utilized to reject sample data.

APPENDIX P

TOXICOLOGICAL PROFILES

APPENDIX P
TOXOLOGICAL PROFILES

This appendix provides brief descriptions of all contaminants detected in the onsite surficial soil/waste with relevant information about toxicity and health effects. The characteristics of these chemicals are discussed in general terms, as are the potential toxic effects. It should be noted that the following profiles discuss potential toxic effects of chemical in pure form, and do not imply that these effects will be experienced at the concentrations found at the Lockport City Landfill site.

ACENAPHTHENE

Acenaphthene, $C_{12}H_{10}$, is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. Acenaphthene is found in coal tar pitch, used by industry as an adhesive. It is also used as a dye intermediate, insecticide, and fungicide, and in the manufacture of some plastics. People may be exposed to acenaphthene from environmental sources such as air, water, and soil, and from cigarette smoke, gasoline exhaust condensates, and flame-broiled meat. Typical exposures are not usually to acenaphthene alone, but to a mixture of similar chemicals.

Classification

This substance/agent has not been evaluated by the USEPA for human carcinogenic potential.

Health Effects

Acenaphthene is a skin and mucous membrane irritant. If swallowed in large quantities it may cause vomiting.

ACENAPHTHYLENE

Acenaphthylene, $C_{12}H_8$, is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. The chemical combines with dust particles in the air and is carried into water and soil and onto crops. Acenaphthylene is found in coal tar pitch, used by industry as an adhesive.

People may be exposed to acenaphthylene from environmental sources such as air, water, and soil, and from cigarette smoke and flame-broiled meat. Typical exposures are not usually to acenaphthylene alone, but to a mixture of similar chemicals.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity. This is based upon lack of human data and inadequate data from animal bioassays.

Health Effects

Vascular disorders, degeneration of internal organs and central nervous system. Lung inflammation and spleen degeneration has also been observed.

ALDRIN

Aldrin, $C_{12}H_8Cl_6$, is a colorless, crystalline solid. Aldrin was widely used from the 1950s to the early 1970s to control root worms, beetles, and termites. Most uses of aldrin were banned in 1975. It is no longer produced in or imported into the United States.

Classification

Aldrin has a weight-of-evidence classification of B2. It is a probable human carcinogen.

Health Effects

Aldrin is toxic by ingestion, inhalation, and skin absorption. Acute effects of aldrin exposure include: headache, dizziness, irritability, appetite loss, nausea, muscle twitching, convulsions and loss of consciousness. An extremely high exposure may cause coma and death.

Chronic exposure has caused liver cancer in mice and thyroid cancer in rats. While inadequate evidence exists to evaluate whether aldrin is carcinogenic to humans, USEPA considers it a probable carcinogen based on animal evidence.

Dogs and rats have developed liver and kidney degeneration as a result of administration of aldrin. Oral administration to pregnant mice and rats has increased the number of fetal deaths and congenital abnormalities, and caused growth retardation in the offspring. In humans aldrin has been shown to cause electroencephalogram abnormalities following short- or long-term exposures.

ALUMINUM

Aluminum, the second most common metal of the in natural environment, where constitutes up to 10 percent of the earth's crust. As with all metals, solubility of aluminum increases at low pH. In acidic waters, therefore, such as bogs, or in areas of precipitation, aluminum concentrations can increase to levels toxic to fish.

Aluminum has many uses including: corrosion-resistant chemical equipment, electrical components, photoengraving plates, and protective coatings. It is also used as a catalyst, and ingredient of incendiary mixtures.

Classification

USEPA classifies aluminum as E, a non-carcinogen.

Health Effects

Aluminum salts may cause dermatitis, eczema, conjunctivitis, and mucous membrane irritation. Inhalation of fine aluminum powder has been reported to cause pulmonary fibrosis. Aluminum may also be implicated in Alzheimer's disease.

ANTHRACENE

Anthracene, $C_6H_4(CH)_2C_6H_4$, is a polycyclic aromatic hydrocarbon (PAH). It is a yellow crystal with blue fluorescence, insoluble in water, but soluble in alcohol and ether. Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air and is carried into water and soil and onto crops. Anthracene is found in coal tar pitch, used by industry as an adhesive. It is used in dyes, calico printing, and in scintillation counters.

People may be exposed to anthracene from environmental sources such as air, water, and soil, and from cigarette smoke and flame-broiled food. Typical exposures are not usually to anthracene alone, but to a mixture of similar chemicals.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity. This is based upon lack of human data, and inadequate data from animal bioassay.

Health Effects

Anthracene is a skin irritant and an allergen. It is an experimental equivocal tumorigenic agent and has experimental neoplastic effects.

ANTIMONY

Antimony is a silver-white, lustrous, hard, brittle metal. It does not tarnish in dry air and only slowly in moist air. It is used in the manufacture of alloys, such as Britannia or Babbitt metal; in fireworks; for thermoelectric piles; and coating metals. A highly toxic gas, stibine, may be released from the metal under certain conditions.

Classification

This chemical has not been evaluated for evidence of human carcinogenicity.

Health Effects

Most antimony compounds are poisons by ingestion, inhalation, and intraperitoneal routes. Antimony and its compounds are regarded as primary skin irritants. Lesions generally appear on exposed moist areas of the body, but rarely on the face. The dust and fumes are also irritants to the eyes, nose, and throat, and may be associated with gingivitis, anemia, and ulceration of the nasal septum and larynx. Antimony and its compounds have been reported to cause dermatitis, keratitis, conjunctivitis, and nasal septal ulceration by contact with fumes of dust. Stibine causes symptoms of nausea, vomiting, headache, hemolysis, hematuria, abdominal pain, and death. Stibine can be liberated from storage batteries. Liver and kidney degenerative changes are late manifestations.

Antimony compounds are less toxic than antimony. Antimony trisulfide, however, has been noted to cause myocardial changes in man and animal studies. Antimony trichloride and pentachloride are highly toxic and can irritate and corrode the skin. Antimony fluoride is extremely toxic, particularly to pulmonary tissue and skin.

ARSENIC

Arsenic is an element present as an impurity in many metal ores. It is produced as a by-product in the smelting of these ores, particularly of copper. It is labelled as a poison and is used in a variety of industries: insecticides, herbicides, pharmaceuticals, pigment production, and glass manufacturing.

Classification

The USEPA weight-of-evidence classification is A, a human carcinogen. This is based upon observation of increased lung cancer mortality in human populations exposed primarily through inhalation, and an increased incidence of skin cancer in human populations consuming drinking water with high arsenic concentrations.

Health Effects

Arsenic can be inhaled or ingested through dust and fumes. Acute toxic effects are generally seen following ingestion of the compound. Symptoms may develop within one-half to four hours following ingestion and are characterized by constriction of the throat, followed by dysphagia, epigastric pain, vomiting, and watery diarrhea. If large amounts are ingested, shock may develop due to severe fluid loss, and death may ensue within 24 hours. Exfoliative dermatitis and peripheral neuritis may develop. Acute cases due to inhalation are rare. [Chronic arsenic poisoning due to ingestion is also rare.] It can, however, be inhaled, resulting in weight loss, nausea, skin eruptions, loss of hair, and peripheral neuritis. Horizontal white lines (striations) on the fingernails and toenails are commonly seen in chronic arsenic poisoning. Liver damage from chronic poisoning is still debated. Arsenic has a depressant effect upon bone marrow, in addition to its known carcinogenic effects upon lung and skin.

BARIUM

Barium is a silver-white, slightly lustrous, somewhat malleable metal. It is produced by the reduction of barium oxide, the primary sources of which are the minerals barite (BaSO_4) and witherite (BaCO_3). Barium may ignite spontaneously in air in the presence of moisture, evolving hydrogen. It is highly reactive in water. Metallic barium is used for the removal of residual gas in vacuum tubes. It is also used in alloys with nickel, lead, calcium, magnesium, sodium, and lithium. Barium compounds are used in x-ray diagnostic work and in a number of manufacturing operations, including glassmaking, papermaking, and animal and vegetable oil refining.

Classification

This chemical has not been evaluated by USEPA for human carcinogenic potential.

Health Effects

The soluble barium salts, such as chloride and sulfide, are poisonous when ingested. The insoluble sulfate, used in radiography, is not acutely toxic. Few cases of systemic poisoning have been reported. Soluble barium compounds, when ingested or given orally, exert a profound effect on all muscles, but especially on smooth muscles, markedly increasing their contractility. The heart rate is slowed and may stop in systole. Other effects are: increased intestinal peristalsis, vascular constriction, bladder contraction, and increased voluntary muscle tension. The inhalation of barium sulfate dust may lead to deposition in the lungs in sufficient quantities to produce "baritosis", a benign pneumoconiosis. Barium and its compounds may affect the heart, lungs, central nervous system, skin, eyes, and respiratory system.

BETA-BENZENE HEXACHLORIDE (BHC)

Beta-BHC, $C_6H_6Cl_6$, is an isomer of 1,2,3,4,5,6-hexachloro-cyclohexane, a white or yellowish powder or flake with a musty odor. [The color, odor, and melting point of the compound vary with the isomeric composition.] Beta-BHC is insoluble in water, but soluble in 100 percent alcohol, chloroform, and ether. It has insecticidal properties.

Classification

The USEPA weight-of-evidence classification for beta-BHC is C, a possible human carcinogen. This is based upon limited evidence of carcinogenicity in animals and inadequate or lack of human data.

Health Effects

Beta-BHC has a low acute oral but relatively high chronic and cumulative toxicity. It is absorbed through the skin. When heated to decomposition, it emits very toxic chloride fumes.

BENZO(A)ANTHRACENE

Benzo[a]anthracene is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air and is carried into water and onto soil and crops. Benzo[a]anthracene is found in coal tar pitch, used by industry as an adhesive.

People may be exposed to benzo[a]anthracene from environmental sources such as air, water, and soil, and from cigarette smoke and flame-broiled food. Typical exposures are not usually to benzo[a]anthracene alone, but to a mixture of similar chemicals.

Classification

The USEPA weight-of-evidence classification for benzo[a]anthracene is B2, a probable human carcinogen. This is based upon lack of human data but upon sufficient data from animal bioassay.

Health Effects

Benzo[a]anthracene has produced tumors in mice exposed by gavage; intraperitoneal, subcutaneous, or intramuscular injection; and topical application. Benzo[a]anthracene produces mutations in bacteria and in mammalian cells, and has transformed mammalian cells in culture.

Although no human data specifically link exposure to benzo[a]anthracene to human cancers, benzo[a]anthracene is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions, and cigarette smoke.

BENZO(A)PYRENE

Benzo(a)pyrene (B(a)P) is a polycyclic aromatic hydrocarbon (PAH). Since it is formed when any organic material burns, it is usually found in smoke and soot as a combustion by-product. B(a)P is found in coal tar pitch used by industry, as well as in creosote.

Classification

The USEPA weight-of-evidence classification is B2, a probable human carcinogen. This is because of sufficient evidence of carcinogenicity in experimental animals, but inadequate evidence of cancer in humans from epidemiological studies.

Health Effects

Short-term and intermediate oral exposure to very high levels of B(a)P resulted in death in experimental animals fed B(a)P in the diet. The induction of cancer is the key endpoint of toxicity following chronic exposures to lower doses of B(a)P in the diet. Lethal effects from high doses of B(a)P were caused by bone marrow depression. No information is available for the potential of human carcinogenicity following oral B(a)P exposure. Leukemia and tumors of the forestomach and lung have been produced following intermediate exposures in mice. No short-term or intermediate inhalation exposure effects are available for B(a)P. The induction of cancer is the key long-term effect.

B(a)P is a moderately potent experimental carcinogen in many species by many routes of exposure. No reports directly correlate human B(a)P exposure and tumor development, although humans are likely to be exposed by all routes. A number of reports associate human cancer and exposure to mixtures of PAHs that include B(a)P. In view of these observations and the compound's well established carcinogenic activity in laboratory animals, it is reasonable to conclude that B(a)P is carcinogenic to humans by all routes of exposure.

BENZO(B)FLUORANTHENE

Benzo(b)fluoranthene is a polycyclic aromatic hydrocarbon (PAH). In its pure form, it is a colorless crystalline solid at room temperature. It appears to have poor mobility in the environment. Benzo(b) fluoranthene is formed during combustion of fossil fuels and organic material. Environmentally, it occurs in mixtures with other PAH compounds, including benzo(a)pyrene.

Classification

The USEPA weight-of-evidence classification for benzo(b)fluoranthene is B2, a probable human carcinogen. This is based upon sufficient evidence of carcinogenicity in animals, even in the absence of positive human data.

Health Effects

No data are available to assess significant exposure levels of benzo(b)fluoranthene alone for humans. Reports of adverse health effects, such as carcinogenicity, by the inhalation and dermal routes of exposure do exist for mixtures that include this compound, thus providing some information to assess its role as a human carcinogen.

The carcinogenicity of benzo(b)fluoranthene has not been adequately studied. A number of reports associate human cancer with exposure to mixtures of PAHs that include this compound. In animals, benzo(b)fluoranthene is a skin carcinogen (following dermal application), as well as a lung carcinogen (following intratracheal instillation). It is likely that benzo(b)fluoranthene could cause cancer in humans as well.

BENZO(G,H,I)PERYLENE

Benzo[g,h,i]perylene is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air, and is carried into water and onto soil and crops. Benzo[g,h,i]perylene is found in coal tar pitch, used by industry as an adhesive.

People may be exposed to benzo[g,h,i]perylene from environmental sources such as air, water, and soil, and from cigarette smoke and flame-broiled food. Typical exposures are not usually to benzo[g,h,i]perylene alone, but to a mixture of similar chemicals.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity. This is based upon lack of human data and upon inadequate animal data from lung implant, skin-painting and subcutaneous injection bioassays.

Health Effects

Benzo[g,h,i]perylene has appeared to increase lung epidermoid tumors when administered with trioctanonin in a lung implant study, but the apparent increased incidence of tumors was not statistically significant, and no distant tumors were seen.

BENZO(K) FLUORANTHENE

Benzo[k]fluoranthene is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air, and is carried into water and onto soil and crops. Benzo[k]fluoranthene is found in coal tar pitch, used by industry as an adhesive.

People may be exposed to benzo[k]fluoranthene from environmental sources such as air, water, and soil, and from cigarette smoke and flame-broiled food. Typical exposures are not usually to benzo[k]fluoranthene alone, but to a mixture of similar chemicals.

Classification

The USEPA weight-of-evidence classification for benzo[k]fluoranthene is B2, a probable human carcinogen. This is based upon lack of human data, sufficient data from animal bioassay.

Health Effects

Benzo[k]fluoranthene has produced tumors after lung implantation in mice and when administered with a promoting agent in skin-painting studies. Equivocal results have been found in a lung adenoma assay in mice. Benzo[k]fluoranthene is mutagenic in bacteria. Although no human data specifically link exposure to benzo[k]fluoranthene to human cancers, benzo[k]fluoranthene is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions, and cigarette smoke.

BENZOIC ACID

Benzoic Acid, $C_7H_6O_2$, is a benzene carboxylic acid, a crystalline solid, at room temperature. Benzoic acid is used in preserving foods, fats, juices, dyes, and as a standard in chemical analysis.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity. This is based upon lack of human data, and inadequate data from animal bioassay.

Health Effects

Benzoic acid is a mild irritant to the skin, eyes, and mucous membranes. It is a poison by vapor inhalation. Benzoic acid and sodium benzoate have been tested for mutagenicity or genotoxicity with no positive results reported. Sodium benzoate appears to have no maternal toxicity, fetal toxicity, or teratogenic potency in mice, rats, hamsters, or rabbits. Both benzoic acid and sodium benzoate are absorbed rapidly and completely by the gastrointestinal tract.

BERYLLIUM

Beryllium is a gray metal that combines the properties of light weight and high tensile strength. Beryllium is used as a neutron reflector and neutron moderator in nuclear reactors. It is also used in the manufacture of beryllium alloys, namely beryllium copper and beryllium aluminum. Beryllium is also used for radio components, in aerospace structures, and in inertial guidance systems.

Classification

The USEPA weight-of-evidence classification for human carcinogenicity is Group B2: a probable human carcinogen. This is based upon limited evidence from studies in humans and sufficient studies in animals. Beryllium has been shown to induce lung cancer via inhalation in rats and monkeys and to induce osteosarcomas in rabbits via intravenous or intramedullary injection. Human epidemiology studies are considered to be inadequate.

Health Effects

Death may result from short exposure to very low concentrations of the element and its salts. Contact dermatitis, chemical conjunctivitis, corneal burns, nonhealing ulceration at the site of injury, and subcutaneous nodules may occur following exposure. Acute effects include pneumonitis, which may result from single exposure to beryllium, and which occasionally is fatal. Pulmonary granulomatous disease may appear in three months to 15 years, often after a short exposure. The death rate is approximately 25 percent.

Studies of workers at a beryllium processing plant reported significant increases of lung cancer. There is evidence for induction of tumors by a variety of beryllium compounds via inhalation and intratracheal instillation, and the induction of osteosarcomas in rabbits by intravenous or intramedullary injection in multiple studies.

BIS(2-ETHYLHEXYL)PHTHALATE

Bis(2-ethylhexyl)phthalate, $C_6H_4(COOCH_2C_2H_5CH_2CH_2CH_2CH_3)_2$, is a colorless, oily liquid with almost no odor. The compound is produced by the reaction of 2-ethylhexyl alcohol and phthalic anhydride. It is used as a plasticizer for resin and in the manufacture of organic pump fluids.

Classification

The USEPA weight-of-evidence classification is B₂, a probable human carcinogen. This is based on studies where orally administered bis(2-ethylhexyl) phthalate produced significant dose-related increases in liver tumor responses in rats and mice of both sexes.

Health Effects

Bis(2-ethylhexyl)phthalate, when inhaled or ingested, may affect the upper respiratory and gastrointestinal systems. Complete symptoms may include irritation of the eyes and mucous membranes, nausea, and diarrhea.

2-BUTANONE

2-Butanone, C_4H_8O , is known as methyl ethyl ketone (MEK). It is a colorless liquid with a fragrant, mintlike, moderately sharp odor. It is used as a solvent in coating industries, in the manufacturing of synthetic resins, in cements and adhesives, and in the dewaxing of lubricating oils.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as a human carcinogen. This is based upon lack of human data, and upon inadequate data from animal bioassay.

Health Effects

MEK may affect the central nervous system and the lungs. It may be inhaled, absorbed through the skin, or ingested. Headaches, dizziness, or vomiting may develop. It is moderately toxic by ingestion. MEK irritates the eyes at concentrations in the range of 350 ppm. No other adverse effects have been observed.

BUTYLBENZYLPHTHALATE

Butylbenzylphthalate, $C_4H_9OOC C_6H_4 OOC C_2H_5$, is a clear, oily liquid with a slight odor. It is also known as benzylbutylphthalate. Butylbenzylphthalate is used as a plasticizer for polyvinyl and cellulosic resins, and as an organic intermediate.

Classification

Butylbenzylphthalate has a weight-of-evidence classification of C, a possible human carcinogen. This is based upon a significant increase in mononuclear cell leukemia in female rats. No data are available on human carcinogenicity.

Health Effects

Oral administration of butylbenzylphthalate to rats resulted in decreased body weight gain, small testes, testicular lesions, and decreased hemoglobin, hematocrit, and red blood cell count. Liver and kidney effects were also reported. No information on human health effects was found.

CADMIUM

Cadmium is a naturally occurring metal in zinc, copper, and lead ores. Since cadmium is very corrosion-resistant it is used as a protective coating for iron, steel, and copper. Cadmium is used in alkaline batteries, as a stabilizer for polyvinyl chloride plastics, in nickel plating, and in the manufacture of semiconductors, photocells, and jewelry. Cadmium compounds are used as pesticides, polymerization catalysts, pigments, paints, and in the photographic industry.

Classification

The USEPA weight-of-evidence classification for inhaled cadmium is B1, a probable carcinogen. This is based upon limited evidence. Cadmium is also considered a teratogen and an experimental carcinogen.

Health Effects

The substance may attack the respiratory system, lungs, kidney, prostate, and blood. Cadmium compounds are well absorbed by inhalation but poorly absorbed from the intestinal tract. Skin absorption appears negligible. After being absorbed, cadmium has a very long half-life. It is stored in the kidneys and liver.

Acute health effects are usually delayed a few hours after exposure. There is irritation of the upper respiratory tract, possibly followed by coughing, chest pain, sweating, and chills. 8 to 24 hours after exposure, severe pulmonary irritation may develop, with shortness of breath and general weakness. Breath may become shorter as pulmonary edema develops. There is an approximately 15% mortality rate in acute cases. Survivors may have emphysema and corpulmonale.

Chronic effects of cadmium poisoning include kidney damage and mild hypochronic anemia. In experimental animals chronic effects have included liver damage, central nervous system damage, testicular atrophy, teratogenic effects (rodents), decrease in red blood cell count, sarcomata, and testicular neoplasms.

CALCIUM

Calcium, Ca, is an alkaline-earth element, which, in its metallic form, is moderately soft, silver-white, and crystalline. It is soluble in acid. It is used as an alloying agent, a reducing agent, a deoxidizer, and a fertilizer ingredient, among other things. It is an essential compound of bones and teeth, and occurs in trace amounts in milk.

Classification

Not yet classified as to human carcinogenicity.

Health Effects

Health effects vary with the compound of calcium.

CARBON DISULFIDE

Carbon disulfide, CS_2 , is a mobile, clear, or faintly yellow liquid. Pure distillates have a sweet, pleasing, ethereal odor. Reagent and commercial grades are foul-smelling. The compound is used in the manufacture of soil disinfectants and vacuum tubes, as well as for dry cleaning and oil extractions, especially in metal treatment and electroplating. It is used as a fumigant for commodities, a corrosion inhibitor, and a polymerization inhibitor for vinyl chloride.

Classification

This chemical has not been evaluated by USEPA for human carcinogenic potential.

Health Effects

Poisoning usually occurs from inhalation but may also be caused by ingestion or skin absorption. Acute toxicity shows itself in euphoria, restlessness, mucous membrane irritation, nausea, vomiting, unconsciousness, and terminal convulsions. Chronic toxicity results in marked psychic disturbances, ranging from extreme irritability to mania with hallucinations, tremors, auditory and visual disturbances, weight loss, and blood dyscrasis. Dermal contact with concentrated solutions may cause burning, pain, erythema, and exfoliation.

GAMMA-CHLORDANE

Gamma-chlordane, $C_{10}H_6Cl_8$, is an isomer of 1,2,4,5,6,7,8,8-octochloro-4,7-methano-3a,4,7,7a-tetrahydroindane. Chlordane is a pale yellow, odorless, viscous (non-volatile) liquid that is soluble in many organic solvents but insoluble in water. It is miscible in deodorized kerosene, and decomposes in weak alkalies. It has been used as a broad-spectrum insecticide, but is currently used mainly for termite control.

Classification

Chlordane has a weight-of-evidence classification of B2, a probable human carcinogen. This is based upon incidence of liver tumors in mice. Human carcinogenicity data are inadequate.

Health Effects

Chlordane isomers are an oral, intravenous, inhalation, and intraperitoneal poison. Chlordane is also absorbed by the skin. It is implicated in aplastic anemia, and is a central nervous system stimulant, causing loss of appetite and neurological symptoms. On heat decomposition it emits highly toxic chloride fumes.

Signs and symptoms of exposure include increased sensitivity to stimuli, tremors, muscular incoordination, and convulsions with or without a coma. There are some reports of delayed development of liver disease, blood disorders, and upset stomach. Chlordane is considered to be moderately to highly toxic.

CHLOROFORM

Chloroform, CHCl_3 , is a colorless, heavy, volatile liquid with a characteristic odor and sweet taste. It is used in fluorocarbon refrigerants, fluorocarbon plastics, fumigants, insecticides, and analytical chemistry. It is also used as a solvent. It was formerly used as an anesthetic.

Classification

The USEPA weight-of-evidence classification is B2, a probable human carcinogen. This is based upon increased incidence of several tumor types in rats and mice. Human carcinogenicity data are inadequate.

Health Effects

Acute health effects may include: vomiting, dizziness, salivation, nausea, fatigue, headache, eye and skin irritation, coma, and rapid death caused by cardiac arrest.

Effects of chronic exposure include loss of appetite, hallucinations, moodiness, physical and mental sluggishness, enlargement of the liver, and kidney damage. Alcoholics seem especially susceptible to the effects of exposure to chloroform.

CHROMIUM

Chromium is a naturally occurring element that is found in soil and in volcanic dusts and gases. It is found in the environment in two major oxidation states: chromium (III) and chromium (VI). Trivalent chromium occurs naturally in the environment, while hexavalent chromium is more often the result of industrial processes. Other chromium compounds are made by the chemical industry for use as pigments, and in leather tanning, rubber making, wood treatment, and water treatment.

Classification

The USEPA weight-of-evidence classification for hexavalent chromium is A, a human carcinogen by the inhalation route. Results of epidemiological studies are consistent across investigators and locations. Dose-response relationships for lung tumors have been established. Evidence of carcinogenicity of chromium in other oxidation states is inconclusive.

Health Effects

Hexavalent chromium is irritating. Acute effects may include: skin ulcers, irritation of the nasal mucosa, perforation of the septum, and gastrointestinal irritation. Kidney and liver damage, and inflammation and ulceration of the gastrointestinal tract, are also possible. Chronic effects may occur as well.

Trivalent chromium is an essential nutrient. A daily ingestion of 50-200 micrograms is considered safe and adequate. Chromium (III) may be harmful at very high doses.

Epidemiologic studies of chromate production facilities in the United States, Great Britain, Japan, and West Germany have established an association between chromium exposure and lung cancer. Most of these studies did not attempt to determine whether Cr III or Cr VI compounds were the etiologic agents. Three studies of the chrome pigment industry, one in Norway, one in England, and the third in the Netherlands and Germany, also found an association between

CHROMIUM (Continued)

occupational chromium exposure (predominantly to hexavalent chromium) and lungcancer. Hexavalent chromium compounds were carcinogenic in animal assays, producing the following tumor types: intramuscular injection site tumors, intrapleural implant site tumors (for various chromium VI compounds), intrabronchial implantation site tumors (for various chromium VI compounds), and subcutaneous injection site sarcomas.

CHRYSENE

Chrysene is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air, and is carried into water and onto soil and crops. Chrysene is found in coal tar pitch, used by industry as an adhesive.

People may be exposed to chrysene from environmental sources such as air, and water, and from tobacco smoke and flame-broiled food. Typical exposures are not usually to chrysene alone, but to mixtures of similar compounds.

Classification

The USEPA weight-of-evidence classification for chrysene is B2, a probable human carcinogen. This is based upon lack of human data, but sufficient data from animal bioassay.

Health Effects

Chrysene has produced carcinomas and malignant lymphoma in mice after intraperitoneal injection, and skin carcinomas in mice following dermal exposure. It has been shown to be a complete carcinogen.

Although no human data specifically link exposure to chrysene to human cancers, chrysene is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions and cigarette smoke.

COBALT

Cobalt is a metallic element that occurs naturally in various valence states (+1, +2, +3 rarely +4, +5), but in only a single isotopic form. Cobalt appears to be essential to life, with pernicious anemia developing in its absence.

Classification

Not classified as to carcinogenicity.

Health Effects

Naturally occurring cobalt is essential to plant and animal life. Ingestion of soluble cobalt salts produces nausea and vomiting by local irritation. Inhalation of metallic dust may cause pulmonary symptoms. Powder may cause dermatitis.

COPPER

Copper, Cu, is a metallic element with a distinctive reddish color. It is ductile, and dissolves readily in nitric and hot concentrated sulfuric acid. It is readily attacked by alkalies, but more resistant to atmospheric corrosion than is iron. Since it conducts electricity well, metallic copper has wide applications in the electrical industry. Copper compounds are used as insecticides, algacides, fungicides, paint pigments, and as a solvent in cellulose and rayon manufacture.

Classification

Not yet classified as to human carcinogenicity.

Health Effects

Copper salts act as skin irritants. Metallic copper may cause keratinization of the hands and soles of the feet. Copper-containing fumes and dust can cause irritation to the respiratory tract, nausea, skin discoloration, and occasionally perforation of the nasal septum. Ingested copper salts can produce nausea, vomiting, and diarrhea. Chronic human intoxication occurs rarely and then only to those who are genetically predisposed (Wilson's disease).

CYANIDE (NOS)

Cyanide (NOS) is used primarily in the extraction of ores, electroplating, metal treatment, and various manufacturing processes. Cyanide is commonly found in certain pest poisons, silver and metal polishes, photographic solutions, and fumigating products.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity. Pertinent data regarding human and animal carcinogenicity have not been located.

Health Effects

Cyanides are extremely poisonous. Death can occur within seconds of inhalation or ingestion. Death is due to respiratory arrest of central origin. Cyanide is readily absorbed from all routes, including the skin, and by inhalation. Alkali salts are toxic when ingested. Death may occur with absorption of even small amounts of cyanide compounds and can occur within minutes or hours depending on route of exposure. Inhalation of toxic fumes represents a potentially rapid fatal type of exposure.

Symptoms of cyanide poisoning include: salivation, nausea, anxiety, confusion, vertigo, giddiness, lower jaw stiffness, convulsions, paralysis, coma, cardiac arrhythmias and transient respiratory stimulation followed by respiratory failure.

DIBENZ(A,H)ANTHRACENE

Dibenz(a,h)anthracene is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when fossil fuels, garbage, or any other plant or animal material is burned, it is usually found in smoke and soot. This chemical combines with dust particles in the air and is carried into water and onto soil and crops. Dibenz(a,h)anthracene is found in coal tar pitch, used by industry as an adhesive.

Although no human data specifically link exposure to dibenz(a,h)anthracene with human cancers, it is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions, flame-broiled food, and tobacco smoke.

Classification

The USEPA weight-of-evidence classification for dibenz(a,h)anthracene is B2, a probable human carcinogen. This is based upon lack of human data, but sufficient data from animal bioassay.

Health Effects

PAHs are highly soluble in adipose tissue and lipids. Most PAHs taken in by mammals are oxidized and the metabolite excreted. Effects of that portion remain in the body at low levels have not been documented. No human data specifically link exposure to benzo(a,h)anthracene with human cancers. Benzo(a,h)anthracene is however, a component of mixture that have been associated with human cancer.

DIBENZOFURAN

Dibenzofuran is formed as a by-product in the manufacture of chlorinated herbicides, and is produced during the combustion of PCBs. It is not found in a pure form, but as a component of mixtures of dioxins and furans produced in a similar fashion.

Classification

The USEPA weight-of-evidence classification of dibenzofuran is D, not classifiable as to human carcinogenicity. This is based upon inadequate human and animal data for dibenzofuran alone.

Health Effects

No data exists on the possible carcinogenicity of dibenzofuran alone in humans. Studies have evaluated exposure to a mixture of polychlorinated biphenyls (PCBs), polychlorinated dibenzofurans (PCDFs) and polychlorinated quinones (PCQs) by consumption of contaminated rice oil. However, these studies have limited value because they do not assess dibenzofuran or correlate exposure with cancer risk. Additionally, because of the multiple exposures, the extent to which the various components contributed to the increase in cancer mortality cannot be determined.

No animal carcinogenicity data on dibenzofuran is currently available. Since the biological activity of PCDFs varies greatly, risk assessment of dibenzofuran by analogy to any of these more widely studied compounds is not recommended.

DI-N-BUTYLPHTHALATE

Di-n-butylphthalate, $C_{16}H_{22}O_4$, is a colorless, oily liquid with a weak aromatic odor. It is used in plasticizing vinyl acetate emulsion systems, in plasticizing cellulose esters, and as an insect repellent.

Classification

The USEPA weight-of-evidence classification for this compound is D, not classifiable as to human carcinogenicity. This is based upon lack of data to evaluate di-n-butylphthalate for carcinogenicity either in humans or animals.

Health Effects

Di-n-butylphthalate can irritate the nasal passages, upper respiratory system, and stomach. No medical conditions are known to have been caused by this substance.

DIETHYLPHTHALATE

Diethylphthalate, (DEP), $C_{12}H_{14}O_4$, is a clear, colorless liquid used as a solvent for cellulose esters; as a vehicle in pesticidal sprays; as a fixative and solvent in perfumery; as an alcohol denaturant; and as a plasticizer in solid rocket propellants.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity. No human carcinogenic data are available, and animal carcinogenic data are inadequate.

Health Effects

DEP can be poisonous by intravenous route. It is also known as an experimental teratogen and may be moderately toxic if ingested. Conjunctivitis, corneal necrosis, respiratory tract irritation, dizziness, nausea, and eczema are symptoms. It can be an eye irritant and an systemic irritant by inhalation. DEP is a narcotic in high concentrations.

DEP has few chronic toxic properties and seems to be devoid of any major irritating or sensitizing effects on the skin.

DIMETHYLPHTHALATE

Dimethylphthalate, $C_6H_4(COOCH_3)_2$, is a colorless, oily liquid with a slightly aromatic odor. It is also known as phthalic acid dimethyl ester. Dimethylphthalate is used as a plasticizer for nitrocellulose and cellulose acetate, and in resins, rubber, solid rocket fuels, lacquers, plastics, coating agents, safety glass, molding powders, and insect repellent.

Classification

The USEPA weight-of-evidence classification for dimethylphthalate is D, not classifiable as to human carcinogenicity. This is due to a lack of both human and animal data.

Health Effects

Health effects include irritation of the nasal passages and upper respiratory system, stomach irritation, eye pain, gastrointestinal irritation, central nervous system depression, coma, and hypotension.

DI-N-OCTYLPHTHALATE

Di-n-octylphthalate, $C_6H_4(COOC_8H_{17})_2$, is a liquid at room temperature. It is used as a plasticizer in the manufacture of plastic products.

Classification

Not classified for carcinogenicity by USEPA.

Health Effects

Di-n-octylphthalate is an eye and skin irritant. As a group, the phthalic acid esters are generally toxic in high concentrations, and some are considered to be potentially carcinogenic.

ENDOSULFAN I

Endosulfan I, or alpha-endosulfan, is one of two isomers of endosulfan, a chlorinated cyclodiene insecticide with the formula $C_9Cl_6H_6O_3S$. It is a light to dark brown crystalline solid with a terpene-like odor. It is insoluble in water, but soluble in xylene, kerosene, $CHCl_3$, acetone, and alcohol. It is used as an insecticide.

Classification

Not yet classified as to human carcinogenicity.

Health Effects

Toxic by ingestion, inhalation, and skin absorption. Attacks central nervous system. Considered highly toxic. Symptoms may include vomiting, convulsions, loss of consciousness, or death.

ETHYLBENZENE

Ethylbenzene, C_8H_{10} , is a colorless liquid with a pungent, aromatic odor. It is used in the manufacture of cellulose acetate, styrene, and synthetic rubber.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity. This is based on lack of both animal bioassay and human studies.

Health Effects

Ethylbenzene is moderately toxic by irritation to skin, eyes, and mucous membranes, and by ingestion and inhalation routes. The liquid is an irritant to the skin and mucous membranes. A concentration of 0.1 percent of vapor in the air is an irritant to human eyes, and a concentration of 0.2 percent can causes dizziness, irritation of the nose and throat, and a sense of constriction in the chest. Exposure to 1 percent concentration has been reported as causing anoxia, loss of consciousness, tremor of the extremities, and finally death through respiratory failure. Pathological findings were congestion of the brain and lungs, with edema. Ethylbenzene is an experimental teratogen.

FLUORANTHENE

Fluoranthene is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air, and is carried into water and onto soil and crops. Fluoranthene is found in coal tar pitch, used by industry as an adhesive.

People may be exposed to fluoranthene from environmental sources such as air, and water, and from tobacco smoke and flame-broiled food. Typical exposures are not usually to fluoranthene alone, but to mixtures of similar compounds.

Classification

The USEPA weight-of-evidence classification for fluoranthene is D, not classifiable as to human carcinogenicity. This is based upon lack of human data and inadequate data from animal bioassay.

Health Effects

Although fluoranthene has not exhibited the properties of a mutagen or primary carcinogen, there is concern about its toxicity. This concern is based on the fact that it is widespread in the environment and that it belongs to the PAH group, which includes numerous potent carcinogens.

In a 13 week mouse oral subchronic toxicity study where mice were gauged with a range of doses of fluoranthene, all treated mice exhibited nephropathy, increased salivation, increased liver enzyme levels and increased liver weights in a dose-dependent manner. Microscopic liver lesions (indicated by pigmentation) were observed in 65 and 87.5% of the mid- and high-dose mice, respectively.

FLUORENE

Fluorene is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when fossil fuels, garbage, or any other plant or animal material is burned, it is usually found in smoke and soot. This chemical combines with dust particles in the air, and is carried into water and onto soil and crops. Fluorene is found in coal tar pitch, used by industry as an adhesive.

Although no human data specifically link exposure to fluorene with human cancers, it is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions, flame-broiled food and tobacco smoke.

Classification

USEPA weight-of-evidence classification for fluorene is D, not classifiable as to human carcinogenicity. This is based upon lack of human data and inadequate data from animal bioassay.

Health Effects

Mice were exposed to fluorene suspended in corn oil by gavage for 13 weeks. Increase salivation, hypoactivity, and urine-wet abdomens in males were observed in all treated animals. The percentage of mice exhibiting hypoactivity was dose-related. Labored respiration, ptosis (drooping eyelids), and unkempt appearance were also observed. A significant decrease in red blood cell count, packed cell volume, and hemoglobin concentration was observed. Increased total serum bilirubin levels were also observed. A dose-related increase in relative liver weight was observed in treated mice. A significant increase in absolute and relative spleen and kidney weight was observed in mice exposed to fluorene. Increases in the absolute and relative liver and spleen weights in high-dose males and females were accompanied by histopathological increases in the amounts of hemosiderin in the spleen and in the Kupffer cells of the liver. No other histopathological lesions were observed.

HEXACHLOROBENZENE

Hexachlorobenzene (HCB) or perchlorobenzene, C_6Cl_6 , is a solid at standard conditions, crystallizing in white needles. It is insoluble in water, but soluble in benzene and boiling alcohol. It is used as a fungicide for seeds, and as a starting material for the production of pentachlorophenol, a wood preservative. USEPA studies indicate that about 95 percent of the U.S. population has trace amounts of HCB in adipose tissue. HCB is very stable, readily vaporizing from soil to air, with air emissions in turn contaminating soil.

Classification

The USEPA weight-of-evidence classification for hexachlorobenzene is B2, a probable human carcinogen. This is based upon lack of human data but upon sufficient data from animal bioassay.

Health Effects

Toxic by inhalation, ingestion, and eye and skin contact. Clinical manifestations include weight loss, enlargement of the thyroid and lymph nodes, skin photosensitization, and abnormal growth of body hair.

INDENO(1,2,3-C,D)PYRENE

Indeno(1,2,3-c,d)pyrene is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when fossil fuels, garbage, or any other plant or animal material is burned, it is usually found in smoke and soot. This chemical combines with dust particles in the air, and is carried into water and onto soil and crops. Indeno(1,2,3-c,d)pyrene is found in coal tar pitch, used by industry as an adhesive.

Classification

The USEPA weight-of-evidence classification for indeno(1,2,3-c,d)pyrene is B2, a probable human carcinogen. This is based upon lack of human data but sufficient data from animal bioassay.

Health Effects

Data from animal studies specifically link exposure to indeno(1,2,3-c,d)pyrene with cancers. It has produced tumors in mice following lung implants, subcutaneous injection, and dermal exposure. Indeno(1,2,3-c,d)pyrene is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions, flame-broiled food, and tobacco smoke.

IRON

Iron has four naturally occurring valences (+2, +3, rarely +4, +6), and four stable isotopes. After oxygen, iron is the most commonly used element in manufacturing. Iron and its compounds have a multitude of uses.

Classification

Not classified for carcinogenicity by USEPA.

Health Effects

Because of the large number of compounds, the range of toxicity of iron compounds by oral exposure is from non-toxic to highly toxic. Iron is essential to most plants and animals in its naturally occurring valences (+2, +3). Inhalation of iron dusts can cause irritation of mucous membranes.

LEAD

Lead is a bluish-white, silvery-gray metal. It is used as a construction material for tank linings, piping, and other equipment handling corrosive gases and liquids used in the manufacture of sulfuric acid, petroleum refining, halogenation, sulfonation, extraction, condensation for x-ray and atomic radiation protection, manufacture of tetraethyl lead, pigments for paint, organic and inorganic lead compounds, bearing metal and alloys; storage batteries; in ceramics, plastics, and electronic devices; in building construction; in solder; and in other lead alloys.

Classification

The USEPA weight-of-evidence classification is B2, a probable human carcinogen. This is based on the results of animal bioassay. Human data on carcinogenicity are inadequate. Ten rat bioassays and one mouse assay have shown statistically significant increases in renal tumors with dietary and subcutaneous exposure to several soluble lead salts. Animal assays have provided reproducible results in multiple rat strains, with some evidence of multiple tumor sites. Short-term studies show that lead affects gene expression. Human evidence is considered to be inadequate to refute or to demonstrate potential carcinogenicity for humans from lead exposure.

Health Effects

Lead poisoning is one of the commonest of occupational diseases. The presence of lead-bearing materials or lead compounds in an industrial plant, however, does not necessarily result in exposure on the part of the worker. The lead must be in such form, and so distributed, as to gain entrance into the body or tissues of the worker in measurable quantity. Some forms are experimental neoplastigens and tumorigens. The modes of entry into the body are by inhalation of dusts, fumes, mists or vapors; by ingestion of lead compounds trapped in the upper respiratory tract or introduced into the mouth on food, tobacco, fingers, or other objects; and through the skin. This route is of special importance in the case of organic compounds of lead, such as lead tetraethyl. In the case of inorganic forms of lead, this route is of no practical importance.

LEAD (Continued)

Upon inhalation, absorption of lead takes place easily from the respiratory tract and symptoms tend to develop more quickly. From the point of view of industrial poisoning, inhalation of lead is much more important than ingestion. Lead is a cumulative poison. Increasing amounts build up in the body and eventually a point is reached where symptoms and disability occur. Systemic effects include decreased physical fitness, fatigue, sleep, headache, aching bones and muscles, digestive symptoms, abdominal pains, and decreased appetite. Later findings include anemia, palloer, and "lead line" of the gums. Lead colic produces an intense periodic abdominal cramping associated with severe constipation, nausea, and vomiting. Alcohol ingestion and physical exertion may precipitate these symptoms. When the central nervous system is affected, it may result in severe headache, convulsions, coma, delirium, and possibly death. The kidneys can also be damaged after long periods of exposure to lead, with loss of kidney function and progressive azotemia.

MAGNESIUM

Magnesium is considered to be the lightest structural metal. It is found in nature in the +2 valence state. It is essential to life. Magnesium is used as a constituent of light alloys; in the manufacture of precision instruments, optical mirrors, and pyrotechnics; in metallurgy; in dry batteries; for flash bulbs and flares; for Grignard reagents, and in the recovery of titanium.

Classification

Magnesium is not classified as to carcinogenicity.

Health Effects

Magnesium and magnesium compounds are mild irritants to the conjuction and nasal mucosa but are not specifically toxic. Magnesium in the form of nascent magnesium oxide can cause metal fume fever if inhaled in sufficient quantity. Symptoms include cough, oppression in the chest, fever, and leucocytosis.

MANGANESE

Manganese is a steel-gray, lustrous, hard, brittle metal. It is a widely distributed element which constitutes 0.085% of the earth's crust. It is primarily used in the manufacture of steel, for rock crushers, railway points and crossings, and as a constituent of several alloys.

Classification

The USEPA weight-of-evidence classification is not classifiable as to human carcinogenicity. This is based upon the limitation of evidence of carcinogenicity in both humans and animals.

Health Effects

Manganese compounds can cause central nervous system and pulmonary system damage by inhalation of fumes and dust. It is an experimental tumorigen. Chronic manganese poisoning is a clearly characterized disease which results from the inhalation of fumes or dusts of manganese. Exposure to heavy concentrations of dusts or fumes for as little as three months may produce the condition, but usually cases develop after 1-3 years of exposure. The central nervous system is the chief site of damage. If cases are removed from exposure shortly after the appearance of symptoms, some improvement in the patients' condition frequently occurs, although there may be some residual disturbances in gait and speech. When well established, however, the disease results in permanent disability. Exposure to dusts and fumes can increase the incidence of upper respiratory infections and pneumonia. Chronic manganese poisoning begins usually with complaints of languor and sleepiness. This is followed by weakness in the legs and the development of a stolid mask-like face. The patient speaks with a slow monotonous voice. The muscular twitchings appear, varying from a fine tremor of the hands to coarse, rhythmical movements of the arms, legs, and trunk. Nocturnal cramps of the leg appear about the same time. There is a slight increase in the tendon reflexes, ankle and patellar clonus, and a typical Parkinsonian slopping gait. The handwriting may be quite minute. The systems may simulate progressive bulbar paralysis, postencephalitic Parkinsonism,

MANGANESE (Continued)

multiple sclerosis, amyotrophic lateral sclerosis, and progressive lenticulae degeneration (Wilson's Disease).

MERCURY

Mercury is a silver-white, heavy, mobile, liquid metal utilized in gold, silver, and bronze tin-plating; tanning and dyeing; feltmaking; taxidermy; textile manufacturing; photography; extracting gold and silver from ores; paints and pigments; the preparation of drugs and disinfectants in the pharmaceutical industry; and as a chemical reagent. It is also used in barometers, thermometers, fluorescent lamps, as a catalyst in the oxidation of organic compounds, and in agricultural chemicals.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity. No human data are available to evaluate carcinogenicity are animal carcinogenicity studies are inadequate.

Health Effects

Mercury can be inhaled, ingested, or absorbed through the skin. It is a primary irritant of skin and mucous membranes. It may be a skin sensitizer. Either acute or chronic exposure may produce permanent changes in organs and organ systems. Soluble mercury salts have violent corrosive effects on skin and mucous membranes, cause severe nausea, vomiting, abdominal pain, and bloody diarrhea; kidney damage, and death usually within 10 days. Chronic effects produce four classical signs: gingivitis, sialorrhea, increased irritability, and muscular tremors. Rarely are all four seen together in an individual case. Symptoms may include inflammation of the mouth or gums, excessive salivation, bracing of teeth, kidney damage, muscle tremors, personality changes, depression, irritability, and nervousness.

2-METHYLNAPHTHALENE

2-Methylnaphthalene is a polycyclic aromatic hydrocarbon (PAH). It is formed when fossil fuels, garbage, or any plant or animal material is burned, and therefore is usually found in smoke and soot. 2-Methylnaphthalene is found in cigarette smoke, power plant emissions, and coal tar pitch.

Classification

Although not classified by USEPA, 2-methylnaphthalene is structurally similar to non-carcinogenic PAH compounds.

Health Effects

2-Methylnaphthalene is a component of PAH mixtures that occur in coal tar, tobacco smoke, and emissions from power plants and foundries. Although specific information on 2-methylnaphthalene is not available, these mixtures have toxicological effects including death, cancer, and reproductive failure.

NAPHTHALENE

Naphthalene is a polycyclic aromatic hydrocarbon (PAH). Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air, and is carried into water and onto soil and crops. Naphthalene is found in coal tar pitch, used by industry as an adhesive. It may be used as insecticide.

People may be exposed to naphthalene from environmental sources such as air, water, and soil, and from cigarette smoke and flame-broiled food. Typical exposures are not usually to naphthalene alone, but to a mixture of similar chemicals.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity. This is based upon lack of human data and inadequate data from animal bioassay.

Health Effects

Naphthalene is a primary irritant. It will cause erythema and dermatitis upon repeated contact. Eye contact with naphthalene dust has caused irritation and cataracts. Ingestion or inhalation of high-vapor concentrations may cause intravascular hemolysis. Eye irritation, headache, confusion, excitement, malaise, profuse sweating, nausea, vomiting, abdominal pain, and bladder irritation are the initial symptoms. Progressive jaundice, hematuria, hemoglobinuria, a blockage of the renal tubules, and acute renal shutdown may occur. Blood effects include: red cell fragmentation, icterus, severe anemia, leukocytosis, and decreases in hemoglobin, hematocrit, and red blood cell count. Liver damage is another effect of naphthalene.

NICKEL

Nickel is a lustrous, hard, ferromagnetic material. It is used for plating, for various alloys, for coins, storage batteries, magnets, lightning rod tips, machinery parts, and as a catalyst for the hydrogenation of oils and other organic substances. Probably the largest use of nickel is in the manufacture of Manel metal, stainless steels, nickel-chrome resistance wires, and in alloys for electronic and space applications.

Classification

The USEPA weight-of-evidence classification is A, a human carcinogen. This classification is based upon human data in which exposure to nickel refinery dust caused lung and nasal tumors in refinery workers, and on animal data in which carcinomas were produced in rats by inhalation and injection.

Sufficient human carcinogenicity data exist. Nickel refinery dust from pyrometallurgical sulfide nickel matte refineries is considered a human carcinogen when inhaled. Evidence of carcinogenicity includes a consistency of findings across different countries in several epidemiological studies. Specific tumor sites (lung and nose), high relative risks (particularly for nasal cancer), and dose-response relationships by length of exposure have been examined. Excess risks are greatest in the dustier areas of the respective refineries.

Health Effects

Nickel and most of its salts are generally considered not to cause acute systemic poisoning. However, ingestion of large doses of nickel compounds has been shown to cause intestinal disorders, convulsions, and asphyxia. Many nickel compounds are experimental carcinogens and some are human carcinogens by inhalation. All nickel-contaminated dusts are regarded as carcinogenic by inhalation. The most common effect resulting from exposure to nickel compounds is the development of the "nickel itch". This form of dermatitis occurs chiefly in persons doing nickel-plating. There is marked variation in individual susceptibility to the dermatitis. It occurs more frequently under conditions of high temperature and

NICKEL (Continued)

humidity, when the skin is moist, and chiefly affects the hands and arms. Nickel carbonyl is highly irritating to the lungs and also can produce asphyxia by decomposing with the formation of carbon monoxide. These compounds are common air contaminants.

4-NITROANILINE

4-nitroaniline, or para-nitroaniline, $\text{NO}_2\text{C}_6\text{H}_4\text{NH}_2$, consists of yellow crystals (needle-shaped), with a pungent, faint, ammonialike odor. It is soluble in alcohol and ether, but insoluble in water. It is used as an intermediate in the manufacture of dyes, antioxidants, pharmaceuticals, and pesticides.

Classification

Not yet classified as to human carcinogenicity.

Health Effects

Attacks blood, heart, lungs, and liver. Acute symptoms of exposure are headache, nausea, vomiting, weakness and stupor, cyanosis, and methemoglobinemia. Chronic exposure can cause liver damage. Heat decomposition emits toxic NO_x fumes.

N-NITROSODIPHENYLAMINE

N-Nitrosodiphenylamine, $(C_6H_5)_2NNO$, is also known as diphenylnitrosamine. A greenish crystal, it is used as a rubber accelerator. N-nitrosodiphenylamine is structurally related to the carcinogenic nitrosamines.

Human exposure to nitrosamines results from contact with mixtures containing these compounds (e.g., cutting oils, tobacco products). Because of potential confounding by the other substances in these mixtures, data are of limited use in the evaluation of carcinogenicity of individual nitrosamines.

Classification

The USEPA weight-of-evidence classification for n-nitrosodiphenylamine is B2, a probable human carcinogen. This is based upon the increased incidence of bladder tumors in male and female rats exposed to this compound(s) upon, reticulum cell sarcomas in mice, and upon the compound's structural relationship to carcinogenic nitrosamines.

Health Effects

N-Nitrosodiphenylamine is an eye irritant and a probable human carcinogen.

PENTACHLOROPHENOL

Pentachlorophenol (PCP), C_6Cl_5OH , is one of a class of aromatic hydrocarbons with a hydroxyl group attached directly to the benzene ring. It is a light brown solid with a phenolic odor, pungent when hot. It is slightly soluble in water, and fully soluble in alcohol, ether, benzene, or dilute alkali. It is used principally as a bactericide, fungicide, and slimicide for the preservation of wood.

Classification

The USEPA weight-of-evidence classification is B2, a probable human carcinogen. This is based upon sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans.

Health Effects

A poison via inhalation, skin, and ingestion. Acute poisoning is marked by weakness and respiratory difficulties, and blood pressure and urinary output changes. Also causes dermatitis, convulsion, and collapse. Chronic exposure may cause liver and kidney injury. Heat decomposition emits highly toxic fumes of chlorine.

PHENANTHRENE

Phenanthrene, $C_{14}H_{10}$, is a polycyclic aromatic hydrocarbon (PAH). It is a colorless, shining, crystalline solid. Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air, and is carried into water and onto soil and crops. Phenanthrene is found in coal tar pitch, used by industry as an adhesive. It is used in dyestuffs, explosives, drug synthesis, and biochemical research.

People may be exposed to phenanthrene from environmental sources such as air, water, and soil, and from cigarette smoke and flame-broiled food. Typical exposures are not usually to phenanthrene alone, but to a mixture of similar chemicals.

Classification

The USEPA weight-of-evidence classification for phenanthrene is D, not classifiable as to human carcinogenicity. This is based upon lack of human data and inadequate data from animal studies.

Health Effects

Phenanthrene is a skin photosensitizer.

PHENOLS (TOTAL)

Phenols are a class of aromatic organic compounds in which one or more hydroxy groups are attached directly to the benzene ring. This group includes phenol, pyrocatechol, resorcinol, hydroquinone, quinone, pyrogallol, o-, m-, and p-cresol, creosote, pentachlorophenol, other chlorophenols, bromo- and iodophenols, o-phenylphenol, d-tert-butylmethylphenol, p-tert-butylphenol, and dodecylthiophenol. Phenols are used in a large variety of organic compounds, including explosives, fertilizers, wood preservatives, paints, rubber, synthetic resins, and pharmaceuticals.

Classification

Phenols as a group are not classified. Several phenols have been found to cause papillomas and carcinomas in mice. There is no specific evidence of cancer in humans attributable to phenolic compounds.

Health Effects

In general the health effects of the phenolic compounds are similar to those of phenol itself. The following are effects of some phenolic compounds which differ from the effects of phenol:

Pyrocatechol - large doses can cause depression of the central nervous system and a prolonged blood pressure rise. It is more toxic than phenol except by inhalation.

Resorcinol - intoxication symptoms similar to those of phenol but the antipyretic action is more marked.

Hydroquinone - more toxic than phenol. Methemoglobin formation is marked, therefore oxygen carrying capacity of the blood is greatly reduced and anoxia may result.

POLYCHLORINATED BIPHENYLS (PCBs)

AROCLOR-1260-1242, -1248, -1254

Polychlorinated biphenyls (PCBs), $C_{12}H_{10-x}Cl_x$, are a complex mixture of isomers of chlorobiphenyls with different chlorine content. Aroclor is a trade name, with the final two digits of the identifying number designating the percent of chlorine in each mix -e.g. 42%, 48%, 54%, 60%. There are 209 compounds obtainable by substituting chlorine for hydrogen on different positions of the biphenyl ring system. Because of their chemical and thermal stability, and low conductivity, PCBs are used in oils within electrical capacitors and electrical transformers. They are also used in hydraulic fluids, and have been used in plasticizers, adhesives, fire retardants, wax extenders, inks, and lubricants.

Classification

The USEPA weight-of-evidence classification is B2, a probable human carcinogen. This is based upon hepatocellular carcinomas in animal studies and inadequate yet suggestive evidence of excess risk of liver cancer in humans by ingestion and inhalation or dermal contact.

Health Effects

PCBs can be inhaled, ingested, and absorbed through the skin. Toxic effects in humans include chloracne, pigmentation of skin and nails, excessive eye discharge, swelling of eyelids, distinctive hair follicles, and gastrointestinal disturbances. Generally, toxic effects are dependent upon the degree of chlorination, the higher degrees of chlorination causing more toxic effects.

Acute and chronic exposure can cause liver damage. Signs and symptoms include edema, jaundice, vomiting, anorexia, nausea, fatigue, and abdominal pains. Studies of accidental oral intake indicate that chlorinated biphenyls are embryotoxic, causing stillbirths and increased eye discharges in infants born to women exposed during pregnancy.

POTASSIUM

Potassium is an alkali metal, widespread in the environment. It occurs in all soils. Potassium is used in the preparation of potassium peroxide, in heat-exchange alloys, as a laboratory reagent, and as a component of fertilizer.

Classification

Potassium has not been classified as to human carcinogenicity.

Health Effects

The toxicity of potassium compounds is almost always that of the anion. Potassium is a fire and explosion hazard. Potassium metal may explode violently when cut or handled. It can ignite spontaneously in moist air. Burning potassium is difficult to extinguish.

PYRENE

Pyrene, $C_{16}H_{10}$, is a condensed-ring polycyclic aromatic hydrocarbon (PAH). It is a colorless solid which is derived from coal tar. Pyrene is used for biochemical research.

Classification

The USEPA weight-of-evidence classification for pyrene is D, not classifiable as to human carcinogenicity. This is based upon lack of human data and inadequate data from animal bioassay.

Health Effects

Pyrene is absorbed by the skin and is a skin irritant. The acute toxicity of pure PAHs like pyrene appears low when administered orally or dermally to rats or mice. PAHs as a class show definite carcinogenic effects in animal bioassay, although data on pure pyrene are lacking. Human exposure to PAHs is almost exclusively via the gastrointestinal and respiratory tracts, with about 99 percent being ingested. Despite the high concentrations of pyrene to which humans may be exposed through food, there is currently little information available to implicate diet-derived PAHs as the cause of serious health effects.

SILVER

Silver, Ag, is a white metal that is more malleable and ductile than any other metal except gold. It is an excellent conductor of heat and electricity. It is used for coinage, most frequently alloyed with copper or gold; for manufacturing tableware, mirrors, jewelry, and ornaments; for electroplating; in the manufacture of medicinal chemicals; in processing foods and beverages; in handling organic acids; as a catalyst in hydrogenation and oxidation processes; and as an ingredient of dental and oxidation processes; and as an ingredient of dental alloys. Silver is soluble in hot sulfuric and nitric acids, but insoluble in water.

Classification

The USEPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity. The basis of this classification is the lack of evidence of cancer in humans despite frequent therapeutic use of the compound over the years. Animal carcinogenicity data are inadequate. In animals, local sarcomas have been induced after implementation of foils and discs of silver. However, the interpretation of these findings has been questioned due to the phenomenon of solid-state carcinogenesis in which even insoluble solids, such as plastic, have been shown to result in local fibro sarcomas.

Health Effects

Elemental silver implanted in the skin causes local argyria. Silver nitrate dust and solutions are highly corrosive to skin, eyes, and intestinal tract. All forms of silver are extremely cumulative once they enter body tissues; very little is excreted. Inhalation of silver oxide or salts may lead to permanent pigmentation of skins or eyes. Uncovered parts of the body may take on a slate-gray color. Silver nitrate dust may be deposited in the lungs, and may be regarded as a form of pneumoconiosis.

SODIUM

Sodium is a silvery white alkali metal that, in the form of its compounds, comprises three percent of the earth's crust. Sodium is highly reactive and not likely to be found in its elemental form in the environment. Sodium's major source is sodium chloride, the principal inorganic component of sea water. Sodium is used in the manufacture of sodium compounds and tetraethyl lead, in organic synthesis, and for photoelectric cells and sodium lamps.

Classification

Sodium is not classified for carcinogenicity.

Health Effects

Sodium is essential to life in its ionic form. Some sodium compounds are toxic and are dealt with specifically rather than generally. Elemental sodium is extremely caustic.

TOLUENE

Toluene, C_7H_8 , is also known as methylbenzene. It is a colorless liquid, with a sweet, pungent, benzene-like odor. It is derived from coal tar. Toluene is used in the manufacture of benzene, as chemical feed, as a solvent for paints and coatings, and as a fuel component.

Classification

The USEPA weight-of-evidence classification is Group D, not classifiable as to human carcinogenicity. This is based upon lack of human data and inadequate animal data.

Health Effects

Toluene is a poison by intraperitoneal routes. It is moderately toxic by inhalation and subcutaneous routes. It is known to be a skin, eye, and respiratory tract irritant. Toluene affects the central nervous system, the kidney, the liver, and skin. Inhalation of 200 ppm of toluene for eight hours may cause impairment of coordination. With higher concentrations, these effects are increased. Acute exposure to toluene may lead to symptoms of headache, dizziness, fatigue, drowsiness, and lack of coordination. Chronic effects are anemia and leukopenia, with biopsies showing bone marrow hypoplasia.

VANADIUM

Vanadium is a metal used in the manufacture of rust-resistant steel. It occurs naturally in mineral ores.

Classification

Not classified as to human carcinogenicity.

Health Effects

Vanadium compounds are toxic to humans and animals, and are considered to be an industrial hazard. Dust from vanadium and its compounds is irritating to the respiratory tract, but the effects are not long-lasting or cumulative.

XYLENES (TOTAL)

Xylene, C_8H_{10} , commonly known as dimethylbenzene, is used as a solvent, a raw material for production of benzoic acid, phthalic anhydride, isophthalic, and terephthalic acids, and their dimethyl esters used in the manufacture of polyester fibers, dyes, and other organics. It is also used for sterilizing catgut. Xylene exists in three isomeric forms: ortho-, meta-, and para-xylene.

Classification

The weight of evidence classification for human carcinogenicity is Class D: not classifiable as to human carcinogenicity. No human data are available and animal data is inadequate.

Health Effects

Xylene is a poison by ingestion and inhalation. It may affect the central nervous system, eyes, gastrointestinal tract, blood, liver, kidneys, and skin. Xylene vapors may cause irritation to the eyes, nose, and throat. Repeated or prolonged skin contact with xylene may cause drying and defatting of the skin, which may lead to dermatitis. Liquid xylene is irritating to the eyes and mucous membranes, and aspiration may cause chemical pneumonitis, pulmonary edema, and hemorrhage. Repeated exposure of the eyes to high concentrations of xylene vapor may cause reversible eye damage.

Acute exposure to xylene vapor may cause central nervous system depression and minor reversible effects on liver and kidneys. At high concentrations xylene vapor may cause dizziness, staggering, drowsiness, and unconsciousness. At extremely high concentrations, breathing xylene vapors may cause pulmonary edema, anorexia, nausea, vomiting, and abdominal pain.

ZINC

Zinc is a metal with many uses in industry. It can be found in pure form or mixed with other metals to form alloys such as brass, or chemical salts such as zinc chloride. Zinc compounds are found naturally in air, soil, and water, and are present in most foods.

Classification

The USEPA weight-of-evidence classification for zinc is D, not classifiable as to human carcinogenicity. This is based upon inadequate evidence in both humans and animals.

Health Effects

Zinc is an essential element needed by the body in low doses. It can be harmful to the body in high doses. The effects of zinc compounds are variable but generally of low toxicity.

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