Feasibility Study Report - Final

Volume II of II - Appendices

Peter Cooper Landfill Site
Gowanda, New York

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FEASIBILITY STUDY REPORT
for
PETER COOPER LANDFILL NPL SITE

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STRATIFICATION SUMMARY

Peter Cooper Site
Gowanda, New York

Boring Number	*Surface Elevation (fmsl)*	*Cover Soil $^{(1)}$ Thickness (ft)*	*Fill $^{(2)}$ Thickness (ft)*	*Alluvial Deposit $^{(3)}$ Thickness (ft)*	*Top of Bedrock*	
					Elevation (fmsl)	*Depth (ft)*
Unit Screened: Alluvial Deposits						
MW-1S	778.1	not encountered	not encountered	10.0	768.1	10.0
MW-3(R)	768.1	0.5	3.5	3.5	760.6	7.5
MW-7S	786.1	2.5	3.5	10.0	not encountered	not encountered
MW-8S	778.1	not encountered	8.5	10.0	not encountered	not encountered
MWFP-3S	778.5	0.5	3.5	7.5	767.0	11.5
Unit Screened: Fill						
-Cindery Fill						
MW-5S	779.1	0.5	11.5*	not encountered	764.1	12.0
MWFP-2S	784.3	0.2	10.8	not encountered	773.3	11.0
-Sludge Fill						
MW-2S(R)	768.2	2.0	5.5	not encountered	760.7	7.5
MW-4S(R)	765.2	0.5	5.0	not encountered	759.7	5.5
MW-6	781.5	3.0	12.0	3.0	763.5	18.0
PZ-1	770.0	0.5	>13.5	not encountered	not encountered	not encountered
GMW-1	787.1	1.0	23.0	1.4	761.7	25.4
GMW-2	787.1	1.0	18.0	5.9	763.2	23.9
GMW-3	788.4	1.5	16.5	3.2	767.2	21.2
Unit Screened: Shallow Bedrock						
MW-1D	777.6	not encountered	not encountered	10.0	767.6	10.0
MW-2D	781.3	3.0	11.0	5.0	763.2	18.1
MW-4D(R)	765.0	0.5	5.0	not encountered	759.5	5.5
MW-5D	779.3	0.5	11.5	not encountered	761.3	12.0
MW-7D	785.8	2.5	3.5	10.0	769.8	16.0
MW-8D	778.0	not encountered	8.5	10.0	759.5	18.5
MWFP-1D	785.2	0.5	not encountered	4.0	780.7	4.5
MWFP-2D	784.1	0.2	10.8	not encountered	773.1	11.0
MWFP-3D	778.7	0.5	3.5	7.5	767.2	11.5
Unit Screened: Deep Bedrock						
MW-4D2	765.1	0.5	5.0	not encountered	759.6	5.5
Former Manufacturing Plant Soil Borings						
SB-1	789.9	1.0	9.0	not encountered	779.0	10.0
SB-2	784.0	not encountered	8.0	not encountered	776.0	8.0
SB-3	782.0	concrete pad	6.0	>2.0	not encountered	not encountered
SB-4	783.6	0.5	9.0	>2.5	not encountered	not encountered
SB-5	785.4	0.5	5.0	>6.5	not encountered	not encountered
SB-6	780.3	concrete pad	4.5	3.5	not encountered	not encountered
SB-7	789.9	0.5	>11.5	not encountered	not encountered	not encountered
SB-8	787.6	0.5	7.5	>4.0	not encountered	not encountered
SB-9	778.4	0.5	4.5	>7.0	not encountered	not encountered
SB-10	779.3	0.5	5.0	>6.5	not encountered	not encountered

Notes:
1. Cover soil consist of sandy silty topsoil layer.
2. Fill consists of poorly graded granular soil with cinders and other anthropogenic material or sludge-like fill found in the Inactive Landfill Area.
3. Alluvial deposits consist of native clay, silt, sand, and gravel.

ft = feet
fmsl = feet mean sea level
* = indicates estimated from O'Brien and Gere boring logs.

TABLE 3-5

HYDRAULIC CONDUCTIVITY ESTIMATES

Peter Cooper Site
Gowanda, New York

Well I.D.	Material Screened	*Screen Interval*		*Estimated Hydraulic Conductivity*[2]	
		Elevation[1] *(famsl)*	*Depth (fbgs)*	*(cm/sec)*	*(ft/day)*
Alluvial Depostits				**Range: 2.9x10^{-6} to 4.3x10^{-3} cm/sec : 0.008 to 12.2 ft/day**	
MW-1S	sand, gravel	772.6-767.6	5.5-10.5	4.3x10^{-3}	12.2
MW-3(R)	silt, sand and gravel	763.6-759.1	4.5-9.0	6.5x10^{-4}	1.84
MW-7S	silt	782.1-769.6	4.0-16.5	2.9x10^{-6}	0.008
MW-8S	silt, sand and gravel	772.1-762.1	6.0-16.0	1.8x10^{-3}	5.10
MWFP-3S	silt, sand and gravel	773.5-767.0	5.0-11.5	2.4x10^{-3}	6.80
Fill *-Cindery Fill*				**Range: 1.3x10^{-4} to 2.2x10^{-2} cm/sec : 0.37 to 62.4 ft/day**	
MW-5S	sandfill/bedrock	766.1-764.1	13.0-15.0	2.2x10^{-2}	62.4
MWFP-2S	cindery fill	779.3-772.3	5.0-12.0	1.3x10^{-4}	0.37
-Sludge Fill				**Range: 3.8x10^{-4} to 3.3x10^{-2} cm/sec : 1.08 to 93.6 ft/day**	
MW-2S	sludge fill	763.7-759.7	4.5-8.5	1.2x10^{-3}	3.40
MW-4S(R)	sludge/bedrock	760.7-756.2	4.5-9.0	3.8x10^{-4}	1.08
MW-6	sludge/silt and sand	768.5-763.5	13.0-18.0	3.3x10^{-2}	93.6
Shallow Bedrock				**Range: 2.2x10^{-6} to 3.4x10^{-2} cm/sec : 0.00615 to 96.4 ft/day**	
MW-1D	shale	745.7-740.7	31.9-36.9	2.5x10^{-4}	0.71
MW-2D	shale	748.0-743.0	33.3-38.3	1.2x10^{-3}	3.40
MW-4D(R)	shale	747.0-742.0	18.0-23.0	1.1x10^{-4}	0.31
MW-5D	shale	760.8-750.8	18.5-28.5	3.4x10^{-2}	96.4
MW-7D	shale	760.3-750.3	25.5-35.5	1.3x10^{-3}	3.69
MW-8D	shale	743.0-733.0	35.0-45.0	2.2x10^{-6}	0.006
MWFP-1D	shale	772.7-762.7	12.5-22.5	4.1x10^{-4}	1.16
MWFP-2D	shale	766.1-756.1	18.0-28.0	6.4x10^{-4}	1.81
MWFP-3D	shale	762.7-752.7	16.0-26.0	6.7x10^{-3}	19.0
Deep Bedrock				**5.5x10^{-6} cm/sec; 0.016 ft/day**	
MW-4D2	shale	735.1-725.1	30.0-40.0	5.5x10^{-6}	0.016

Notes:

1. Survey completed by TVGA Engineering, Surveying P.C., August 28, 2000.
2. Hydraulic conductivity estimated by Geomatrix Consultants, Inc. using Bouwer and Rice Methods.

famsl = feet above mean sea level
fbgs = feet below ground surface
cm/sec = centimeters per second
ft/day = feet per day

TABLE 3-6

LANDFILL WASTE LIMITS

Peter Cooper Site
Gowanda, New York

Date	*Test Pit Location*	*Description*
10/05/00	Elevated Fill Area Waste Limit A	0-2' clay cover soil w/some light brown sandy material. Railroad spur and ties encountered at 2 ft w/ black cindery material, creosote-type odor. Transition from black sludge type material to black cindery material at the elevated fill area limit.
10/12/2000	Elevated Fill Area Waste Limit B	Black waste sludge with transition to cindery brick slag material
10/12/2000	Elevated Fill Area Landfill Waste Limit C	Black waste sludge material with transition to ash ballast slag material. Cover soil decrease from approximately 1.5'on the elevated fill area to < 6" off the elevated fill area.
10/12/2000	Elevated Fill Area Landfill Waste Limit D	Silty/clay cover soils w/black sludge material underlying to a transition of cindery sand and gravel cover soils with railroad tie and ballast. Tar-like odor detected.
10/12/2000	Elevated Fill Area Landfill Waste Limit E	Transition of black sludge material to cindery ash ballast material.

TABLE 3-7

SLUDGE FILL MATERIAL TESTING SUMMARY

Peter Cooper Site
Gowanda, New York

Sample Type	*Sample Number*	*Dry Density pcf*		*Water Content %*		*Hydraulic Conductivity cm/s*
		Before	*After*	*Before*	*After*	
Discrete(Shelby Tube)	ST-2	54.2	54.2	40.9	41.0	1.7 E-5

Sample Type	*Sample Number*	*Gravel %*	*Sand %*	*Silt %*	*Clay %*	*Liquid Limit %*	*Plasticity Index %*
Grab	# 1	27.5	33.2	31.3	8	62.1	17.5

TABLE 3-8

SUMMARY OF TEST HOLES TO EVALUATE EXISTING COVER SOIL THICKNESS

Peter Cooper Site
Gowanda, New York

Test Hole No.	*Cover Soil Thickness (inches)*	*Test Hole Depth (inches)*	*Depth Range (inches)*	*Description of Lithology*
TH-1	13	> 13	0-13" 13-?"	Grayish Brown silty sand, trace gravel & sand Waste cinders
TH-2	18	30	0-18" 18-30"	Gray sandy silt, trace clay, gravel Dark brown sand & gravel fill with little brick, wood
TH-3	18	44	0-18" 18-32" 32-44"	Gray silt & fine sand Brown sandy waste material Black waste with sand & brick
TH-4	22	32	0-22" 22-32"	Olive gray sandy silt, trace clay & gravel Brown and rust colored fill with wood, glass, gravel
TH-5	7	10	0-7" 7-10"	Gray silt and sand, trace clay and gravel Black sludge, very strong odor
TH-6	12	13	0-12" 12-13"	Gray & dark gray silt and sand, trace clay and gravel Black sludge
TH-7	48	53	0-48" 48-53"	Gray silt and sand, trace clay and gravel Black sludge
TH-8	38	43	0-38" 38-43"	Olive gray sandy silt, trace clay & gravel Black sludge
TH-9	18	21	0-18" 18-21"	Gray silty sand with trace clay and gravel Black sludge
TH-10	14.4	16.8	0-14.4" 14.4-16.8"	Olive brown to gray silt with trace clay, little sand Grayish black sandy material with odor
TH-11	18	> 18	0-18" 18-?"	Gray silt and sand, trace gravel Black waste
TH-12	15	> 15	0-15" 15-?"	Silt and fine sand, trace gravel Black waste
TH-13	18	24	0-18" 18-24"	Gray fine sand and silt with trace gravel Black sludge
TH-14	18	> 18	0-18" 18-?"	Sand and gray silt, trace gravel Black sludge with odor
TH-15	23	26	0-23" 23-26"	Gray silt and sand, trace clay and gravel Black sludge
TH-16	32	34	0-32" 32-34"	Gray silt and sand, trace clay and trace-little gravel Black sludge
TH-17	31.2	31.2	0-31.2" 31.2"	Brownish gray sandy silt with little gravel & silty sand Refusal on metal, likely bottom of 'cover'
TH-18	17	20	0-17" 17-20"	Brownish gray/gray sandy silt w/trace clay & gravel Black waste
TH-19	12	> 12	0-12" 12-?"	Gray/brown fine sand and silt, trace gravel Black waste sludge with odor
TH-20	24	26	0-24" 24-26"	Gray sand and silt Black sludge
TH-21	18	> 18	0-18" 18-?"	Silt and fine sand, trace gravel Black sludge waste
TH-22	22	25	0-22" 22-25"	Gray sandy silt with trace clay and gravel Black sludge
TH-23	41	44	0-41" 41-44"	Gray silt and fine sand, little gravel, trace clay Black sludge
TH-24	20	25	0-20" 20-25"	Gray sandy silt with trace clay and gravel Cinders

TABLE 3-9

EXISTING COVER SOIL TESTING SUMMARY

Peter Cooper Site
Gowanda, New York

Sample Number [1]	ASTM [3] D421,422				ASTM D4318		ASTM D1557		ASTM D5084	Compaction	ASTM D2216	USCS
	Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plasticity Index %	Maximum Dry Density (pcf)	Optimum Water Content (%)	Recompacted Permeability (cm/s)	% of MDD	Water Content %	
Comp-1, TH-1 through TH-4	6.6	38.3	45.1	10	27.4	7.3	125.7	10.3	1.1 E-6	88.5	12.5	CL-ML
Comp-2, TH-5 through TH-8	4.8	26.2	52.6	16.4	25.4	7.9	125.9	10.4	3.9 E-7	89.4	11.3	CL-ML
Comp-3, TH-9 through TH-12	4.1	28.1	45.7	22.1	26.5	9.1	128.0	10.4	9.0 E-7	88.3	12.1	CL
Comp-4, TH-13 through TH-16	2.7	26.8	50.5	20.0	23.0	6.0	130.1	9.0	1.8 E-6	86.5	12.4	CL-ML
Comp-5, TH-17 through TH-20	5.3	36.7	40.8	17.2	23.9	4.7	124.7	11.4	3.2 E-6	85.9	11.6	CL-ML
Comp-6, TH-21 through TH-24	5.4	27.5	45.7	21.4	22.9	6.9	130.3	9.2	3.8 E-7	87.3	10.9	CL-ML

Sample Number [2]	ASTM D3080		ASTM D2216		ASTM D5084
	Dry Density pcf		Water Content %		Hydraulic Conductivity cm/s
	Before	After	Before	After	
ST-1	117.2	115.5	15.9	16.1	1.1 E-5
ST-2	105.6	102.1	20.4	24.5	7.5 E-7
ST-3	112.5	119.2	19.1	15.7	9.0 E-8
ST-4	107.6	114.3	20.5	15.9	1.0 E-6
ST-5	126.2	123.9	11.0	13.1	2.4 E-7
ST-6	103.0	105.1	19.5	20.4	3.6 E-5

Notes:

1. Samples identified as "Comp-#" represent composites of the identified test hole (TH) locations
2. Samples identified as "ST-#" represent shelby tube samples
3. ASTM followed by the letter D#### is the Method used for testing

pcf = pounds per cubic foot	cm\s = centimeters per second
USCS = Unified Soil Classification System	% = percentage
MDD = Maximun Dry Density	

TABLE 3-10

FORMER MANUFACTURING PLANT AREA GEOTECHNICAL TESTING SUMMARY

Peter Cooper Site
Gowanda, New York

Sample Number	*Depth*	*Strata*	*Gravel*	*Sand*	*Fines*	
			%	*%*	*Silt %*	*Clay %*
Surface						
SB-1	0-2'	Fill	23.9	57.4	14.8	3.9
SB-2	0-2'	Fill	49.3	43.1	7.6*	
SB-4	0-2'	Fill	26.3	35.6	24.6	13.5
SB-5	0-2'	Fill	18.0	30.4	36.6	15.0
SB-6	0-2'	Fill	10.6	24.2	38.4	26.8
SB-7	0-2'	Fill	21.4	52.7	15.4	10.5
SB-8	0-2'	Fill	26.8	30.8	28.7	13.7
SB-10	0-2'	Fill	29.6	37.7	22.4	10.3
Subsurface						
SB-1	5-7'	Fill	27.0	61.1	11.9*	
SB-4	4-6'	Fill	32.5	57.2	10.3*	
SB-2	6-8'	Fill	42.4	43.5	14.1*	
SB-5	6-8'	Alluvial	17.5	62.1	16.4**	4.0**
SB-3	3-5'	Alluvial	0.0	42.0	39.3	18.7
MW-FP-2	0.5-2.5'	Fill	56.3	28.9	14.8*	
MW-FP-2	5-7'	Fill	17.9	69.9	12.2*	
SB-7	7-9'	Fill	15.0	58.8	16.2**	10.0**
SB-8	10-12'	Alluvial	11.8	35.2	39.0	14.0
SB-9	0.5-2.5'	Fill	35.2	29.5	25.0	10.3
SB-9	7-9'	Alluvial	1.1	58.2	32.7**	8**
SB-10	7-9'	Alluvial	0.0	56.6	35.2	8.2
MW-FP-3	0.5-2.5'	Fill	39.5	40.5	16.0	4.0
MW-FP-3	5-7'	Alluvial	17.1	54.0	23.9	5.0
SB-6	4-6'	Fill	15.9	52.4	22.7	9.0
Wetland Sediment						
# 1			0.2	45.8	47.5	6.5
# 2			0.7	35.8	55.9	7.6
# 3			0.3	42.1	44.2	13.4
Creek Sediment						
# 1			16	82.3	1.7	
# 2			20.1	78.9	1	
# 3			3.9	94.5	1.6	
# 4			0.3	95.4	4.3	

Notes:
% = Percent
* Predominantly Silt
** Approximate percentages based on shape of curve.

TABLE 3-11

WETLAND AND CREEK SEDIMENT GEOTECHNICAL TESTING SUMMARY

Peter Cooper Site
Gowanda, New York

Wetland Sediment

Sample Number	*Gravel %*	*Sand %*	*Silt %*	*Clay %*
Wetland Sediment #1	0.2	45.8	47.5	6.5
Wetland Sediment #2	0.7	35.8	55.9	7.6
Wetland Sediment #3	0.3	42.1	44.2	13.4

Creek Sediment

Sample Number	*Gravel %*	*Sand %*	*Silt & Clay %*
Creek Sediment #1	16.0	82.3	1.7
Creek Sediment #2	20.1	78.9	1.0
Creek Sediment #3	3.9	94.5	1.6
Creek Sediment #4	0.3	95.4	4.3

TABLE 4-1

ANALYTICAL RESULTS FOR INACTIVE LANDFILL SLUDGE FILL SAMPLES VOLATILE ORGANIC COMPOUNDS

Peter Cooper Site
Gowanda, New York

	Sample Location, Identification, Depth, and Date Collected[1]		
Constituent	*GMW-3* *100900042* *16-20 (ft-bgs)* *10/9/2000*	*GMW-2* *100900043* *8-12 (ft-bgs)* *10/9/2000*	*GMW-1* *100900045* *4-8 (ft-bgs)* *10/9/2000*
Volatile Organic Compounds, milligrams per kilogram			
Acetone	15 J	15 J	2.5 DJ
Benzene	0.0067 J	0.013 J	0.034 J
Bromodichloromethane	0.026 UJ	0.024 UJ	0.03 UJ
Bromoform	0.026 UJ	0.024 UJ	0.03 UJ
Bromomethane	0.026 UJ	0.024 UJ	0.03 UJ
2-Butanone (MEK)	2.4 J	3.2 J	1 DJ
Methyl tert-Butyl Ether	0.026 UJ	0.024 UJ	0.03 UJ
Carbon Disulfide	0.079 J	0.22 J	0.24 J
Carbon Tetrachloride	0.026 UJ	0.024 UJ	0.03 UJ
Chlorobenzene	0.026 UJ	0.024 UJ	0.059 J
Chloroethane	0.026 UJ	0.024 UJ	0.03 UJ
Chloroform	0.026 UJ	0.024 UJ	0.03 UJ
Chloromethane	0.026 UJ	0.024 UJ	0.03 UJ
1,2-Dibromo-3-Chloropropane	0.026 UJ	0.024 UJ	2.8 UJ
Cyclohexane	0.026 UJ	0.024 UJ	0.03 UJ
Dibromochloromethane	0.026 UJ	0.024 UJ	0.03 UJ
1,2-Dibromoethane	0.026 UJ	0.024 UJ	0.03 UJ
1,2-Dichlorobenzene	0.026 UJ	0.024 UJ	0.54 J
1,4-Dichlorobenzene	0.026 UJ	0.024 UJ	2.2 DJ
1,3-Dichlorobenzene	0.026 UJ	0.024 UJ	2.8 UJ
Dichlorodifluoromethane	0.026 UJ	0.024 UJ	0.03 UJ
1,1-Dichloroethane	0.026 UJ	0.024 UJ	0.01 J
1,2-Dichloroethane	0.026 UJ	0.024 UJ	0.03 UJ
1,1-Dichloroethene	0.026 UJ	0.024 UJ	0.03 UJ
trans-1,2-Dichloroethene	0.026 UJ	0.024 UJ	0.03 UJ
cis-1,2-Dichloroethene	0.026 UJ	0.024 UJ	0.03 UJ
1,2-Dichloropropane	0.026 UJ	0.024 UJ	0.03 UJ
trans-1,3-Dichloropropene	0.026 UJ	0.024 UJ	0.03 UJ
cis-1,3-Dichloropropene	0.026 UJ	0.024 UJ	0.03 UJ
Ethylbenzene	0.019 J	0.054 J	0.12 J
2-Hexanone	0.076 J	0.078 J	0.1 J
Isopropylbenzene	0.026 UJ	0.024 UJ	0.03 UJ
Methyl Acetate	0.026 UJ	0.024 UJ	0.03 UJ
Methylcyclohexane	0.0054 J	0.0096 J	0.03 UJ
Methylene Chloride	0.026 UJ	0.024 UJ	0.03 UJ
4-Methyl-2-Pentanone	0.086 J	0.016 J	0.24 J
Styrene	0.0034 J	0.024 UJ	0.03 UJ
1,1,2,2-Tetrachloroethane	0.026 UJ	0.024 UJ	2.8 UJ
Tetrachloroethene	0.026 UJ	0.024 UJ	0.054 J
Toluene	1.7 DJ	0.12 J	0.37 J

TABLE 4-1

ANALYTICAL RESULTS FOR INACTIVE LANDFILL SLUDGE FILL SAMPLES VOLATILE ORGANIC COMPOUNDS

Peter Cooper Site
Gowanda, New York

	Sample Location, Identification, Depth, and Date Collected [1]		
Constituent	***GMW-3 100900042 16-20 (ft-bgs) 10/9/2000***	***GMW-2 100900043 8-12 (ft-bgs) 10/9/2000***	***GMW-1 100900045 4-8 (ft-bgs) 10/9/2000***
1,2,4-Trichlorobenzene	0.026 UJ	0.024 UJ	2.8 UJ
1,1,1-Trichloroethane	0.026 UJ	0.024 UJ	0.03 UJ
1,1,2-Trichloroethane	0.026 UJ	0.024 UJ	0.03 UJ
Trichloroethene	0.026 UJ	0.024 UJ	0.03 UJ
Trichlorofluoromethane	0.026 UJ	0.024 UJ	0.03 UJ
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.026 UJ	0.024 UJ	0.03 UJ
Vinyl Chloride	0.026 UJ	0.024 UJ	0.03 UJ
m-/p-Xylene	0.014 J	0.046 J	0.16 J
o-Xylene	0.0067 J	0.027 J	0.047 J

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.

J = indicates an estimated value.

U = indicates compound was not at or above the listed detection limit.

D = indicates spike diluted out.

UJ = indicates compound was not detected above the listed detection limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the compound in the sample.

TABLE 4-2

ANALYTICAL RESULTS FOR INACTIVE LANDFILL AREA SLUDGE FILL SAMPLES SEMI-VOLATILE ORGANIC COMPOUNDS AND METALS

Peter Cooper Site
Gowanda, New York

Constituent	*Sample Location, Identification, Depth, and Date Collected*[1] *COMP GMW-1,-2-3* *100900046* *Composite 4-20 fbgs* *10/9/2000*
Semi-Volatile Organic Compounds, milligrams per kilogram	
Acenaphthene	5.6 U
Acenaphthylene	5.6 U
Acetophenone	5.6 U
Anthracene	5.6 U
Atrazine	5.6 U
Benzaldehyde	5.6 U
Benzo(a)anthracene	5.6 UJ
Benzo(a)pyrene	5.6 U
Benzo(b)fluoranthene	5.6 UJ
Benzo(g,h,i)perylene	5.6 UJ
Benzo(k)fluoranthene	5.6 UJ
1,1-Biphenyl	5.6 U
Butyl Benzyl Phthalate	5.6 U
di-N-Butylphthalate	5.6 U
Caprolactam	5.6 U
Carbazole	5.6 U
Indeno(1,2,3-cd)pyrene	5.6 UJ
4-Chloroaniline	5.6 U
bis(2-chloroethoxy)methane	5.6 U
bis(2-chloroethyl)ether	5.6 U
2-Chloronaphthalene	5.6 U
2-Chlorophenol	5.6 U
2,2-oxybis(1-chloropropane)	5.6 U
Chrysene	5.6 U
Dibenzo(a,h)anthracene	5.6 UJ
Dibenzofuran	5.6 U
3,3-Dichlorobenzidine	(5600 U) R
2,4-Dichlorophenol	5.6 U
Diethylphthalate	5.6 U
Dimethyl Phthalate	5.6 U
2,4-Dimethylphenol	5.6 U
2,4-Dinitrophenol	14 UJ
2,4-Dinitrotoluene	5.6 U
2,6-Dinitrotoluene	5.6 U
bis(2-Ethylhexyl)phthalate	5.6 U
Fluoranthene	5.6 U
Fluorene	5.6 U
Hexachlorobenzene	5.6 U

TABLE 4-2

ANALYTICAL RESULTS FOR INACTIVE LANDFILL AREA SLUDGE FILL SAMPLES SEMI-VOLATILE ORGANIC COMPOUNDS AND METALS

Peter Cooper Site
Gowanda, New York

	Sample Location, Identification, Depth, and Date Collected [1]
Constituent	*COMP GMW-1,-2-3* *100900046* *Composite 4-20 fbgs* *10/9/2000*
Hexachlorobutadiene	5.6 U
Hexachlorocyclopentadiene	28 U
Hexachloroethane	5.6 U
Isophorone	5.6 U
2-Methylnaphthalene	5.6 U
4,6-Dinitro-2-Methylphenol	14 U
4-Chloro-3-Methylphenol	5.6 U
2-Methylphenol	5.6 U
4-Methylphenol	150 D
Naphthalene	22
2-Nitroaniline	14 U
3-Nitroaniline	(14000 U) R
4-Nitroaniline	14 U
Nitrobenzene	5.6 U
2-Nitrophenol	5.6 U
4-Nitrophenol	14 UJ
n-Nitrosodiphenylamine	5.6 U
di-n-Octyl Phthalate	5.6 UJ
Pentachlorophenol	6.8 J
Phenanthrene	1 J
Phenol	15
4-Bromophenyl-Phenylether	5.6 U
4-Chlorophenyl-Phenylether	5.6 U
n-Nitroso-di-n-Propylamine	5.6 U
Pyrene	5.6 U
2,4,6-Trichlorophenol	5.6 U
2,4,5-Trichlorophenol	14 U
Metals, mg/kg	
Aluminum	3780
Antimony	57.6 J
Arsenic	34.8
Barium	175
Beryllium	0.83 U
Cadmium	1.5
Calcium	122,000
Chromium	9280
Cobalt	8.3 U
Copper	156
Hexavalent Chromium	6.75 U

TABLE 4-2

ANALYTICAL RESULTS FOR INACTIVE LANDFILL AREA SLUDGE FILL SAMPLES SEMI-VOLATILE ORGANIC COMPOUNDS AND METALS

Peter Cooper Site
Gowanda, New York

Constituent	*Sample Location, Identification, Depth, and Date Collected* [1]
	COMP GMW-1,-2-3 *100900046* *Composite 4-20 fbgs* *10/9/2000*
Iron	14800 J
Lead	97.4
Magnesium	9740
Manganese	250
Mercury	6.2
Nickel	10.6
Potassium	334 U
Selenium	1.8 J
Silver	1.7 U
Sodium	1020
Thallium	1.7 U
Vanadium	8.3 U
Zinc	6060
Other	
Percent Solids, %	59.3
pH	7.86
Total Organic Carbon, %	10.0

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.

J = indicates an estimated value.
U = indicates compound was not detected.
D = indicates spike diluted out.
UJ = indicates compound was not detected above the listed detection limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the compound in the sample.

TA[illegible]3

ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES FROM THE INACTIVE LANDFILL AREA

Peter Cooper Site
Gowanda, New York

Constituent[2]	Soil Criteria[3]			Sample Location, Identification, Depth, and Date Collected[1]									
	Eastern USA Background	Region 9 PRGs	Soil Screening Levels	*LFSS-1* *101100058* *0-6 in. bgs* *10/11/2000*	*LFSS-2* *101100059* *0-6 in. bgs* *10/11/2000*	*LFSS-3* *101100060* *0-6 in. bgs* *10/11/2000*	*LFSS-4* *101100061* *0-6 in. bgs* *10/11/2000*	*LFSS-5* *101100062* *0-6 in. bgs* *10/11/2000*	*LFSS-6* *101100069* *0-6 in. bgs* *10/11/2000*	*LFSS-7* *101100064* *0-6 in. bgs* *10/11/2000*	*LFSS-8* *101100065* *0-6 in. bgs* *10/11/2000*	*LFSS-9* *101100066* *0-6 in. bgs* *10/11/2000*	*LFSS-10* *101100067* *0-6 in. bgs* *10/11/2000*
Volatile Organic Compounds, milligrams per kilogram													
1,2-dichlorobenzene		370	17	0.013 U J	0.014 U J	0.014 U J	0.012 U	0.01 U	0.015 U J	(0.015 U) R	0.021 U J	0.015 U J	0.014 U J
1,4-dichlorobenzene		7.9	2	0.013 U J	0.014 U J	0.014 U J	0.012 U	0.01 U	0.015 U J	(0.015 U) R	0.021 U J	0.015 U J	0.014 U J
Benzene		1.3	0.03	0.013 U J	0.0016 J	0.0042 J	0.0051 J	0.0032 J	0.0029 J	0.015 U J	0.0022 J	0.015 U	0.014 U J
Chlorobenzene		530	1	0.013 U J	0.014 U J	0.014 U J	0.012 U	0.01 U	0.015 U J	0.015 U J	0.021 U	0.015 U	0.014 U J
Ethylbenzene		20	13	0.013 U J	0.014 U J	0.0018 J	0.012 U	0.01 U	0.015 U J	0.015 U J	0.021 U	0.015 U	0.014 U J
m/p-Xylene		420	210	0.0016 J	0.0023 J	0.006 J	0.0047 J	0.004 J	0.015 U J	0.015 U J	0.0028 J	0.015 U	0.014 U J
o-Xylene		420	210	0.013 U J	0.014 U J	0.002 J	0.0015 J	0.01 U	0.015 U J	0.015 U J	0.021 U	0.015 U	0.014 U J
Toluene		520	12	0.002 J	0.0037 J	0.0082 J	0.0086 J	0.0052 J	0.015 U J	0.015 U J	0.0058 J	0.0016 J	0.014 U J
Metals, milligrams per kilogram													
Arsenic	3-12**	1.6	29.0	9.3	8.7	10.2	6.6	10.6	▨ 919	▨ 211	7.2	11	8.7
Chromium	1.5-40**	210	38	18.4	15.4	▨ 267	13	32.8	▨ 341	▨ 208	▨ 550	33.8	36.4
Hexavalent Chromium	--	64	38	5.03 U	5.35 U	5.03 U	5.28 U	5.1 U	5.17 U	5.12 U	5.62 U	5.42 U	5.44 U
Zinc	9-50	100,000	12,000	▨ 81.8	▨ 79.3	▨ 163	▨ 55.4	▨ 91.4	▨ 165	▨ 77.5	▨ 137	▨ 196.6	▨ 89.2
Other													
Percent Solids, %				79.5	74.8	79.5	75.8	78.4	77.3	78.1	71.2	73.8	73.5
Total Organic Carbon, %				2.30	2.40	2.80	2.10	2.70	5	5.60	3.40	2.40	3.70
pH				7.42	7.36	7.78	8.07	7.97	6.61	7.53	7.35	7.18	5.76

Notes:
1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Soil criteria from U.S.EPA, Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (October 2002) and from range of background metals concentrations measured in soil found in the eastern United States from NYSDEC Division of Technical and Administrative Guidance Memorandum (TAGM) #4046.

** A New York State Background value

in. bgs =inches below ground surface.
-- = indicates value does not exist.
SB = Site Background
UJ = indicates compound was not detected above the listed detection limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the compound in the sample.

J = indicates an estimated value.
U = indicates compound was not detected.
R = indicates data rejected by data validator.
(values) = indicates value reported before rejected.
▨ indicates concentration above soil criteria.

TABLE 4-3

ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES FROM THE INACTIVE LANDFILL AREA

Peter Cooper Site
Gowanda, New York

Constituent[2]	Soil Criteria[3]			Sample Location, Identification, Depth, and Date Collected[1]										Maximum Conc.	Minimum Conc.
	Eastern USA Background	Region 9 PRGs	Soil Screening Levels	LFSS-11 101100068 0-6 in. bgs 10/11/2000	LFSS-12 101100070 0-6 in. bgs 10/11/2000	LFSS-13 101100071 0-6 in. bgs 10/11/2000	LFSS-14 101100072 0-6 in. bgs 10/11/2000	LFSS-15 101100073 0-6 in. bgs 10/11/2000	LFSS-16 101100074 0-6 in. bgs 10/11/2000	LFSS-17 101100075 0-6 in. bgs 10/11/2000	LFSS-18 101100076 0-6 in. bgs 10/11/2000	LFSS-19 101100077 0-6 in. bgs 10/11/2000	LFSS-20 101200078 0-6 in. bgs 10/12/2000		
Volatile Organic Compounds, milligrams per kilogram															
1,2-dichlorobenzene		370	17	0.016 U J	0.015 U J	0.01 U J	0.013 U J	0.012 U J	0.013 U J	0.015 U J	0.012 U J	0.015 U J	0.012 U J	0.021 UJ	0.01 UJ
1,4-dichlorobenzene		7.9	2	0.016 U J	0.015 U J	0.01 U J	0.013 U J	0.012 U J	0.013 U J	0.015 U J	0.012 U J	0.015 U J	0.012 U J	0.021 UJ	0.01 UJ
Benzene		1.3	0.03	0.016 U J	0.015 U J	0.0021 J	0.0025 J	0.0026 J	0.0019 J	0.015 U J	0.0036 J	0.005 J	0.004 J	0.016 UJ	0.0016 J
Chlorobenzene		530	1	0.016 U J	0.015 U J	0.01 U J	0.013 U J	0.012 U J	0.013 U J	0.015 U J	0.012 U J	0.015 U J	0.012 U J	0.021 U	0.01 UJ
Ethylbenzene		20	13	0.016 U J	0.015 U J	0.01 U J	0.0014 J	0.012 U J	0.013 U J	0.015 U J	0.0012 J	0.015 U J	0.001 J	0.021 U	0.0012 J
m/p-Xylene		420	210	0.016 U J	0.015 U J	0.0023 J	0.0041 J	0.0037 J	0.0031 J	0.015 U J	0.0049 J	0.015 U J	0.006 J	0.016 J	0.0016 J
o-Xylene		420	210	0.003 J	0.015 U J	0.01 U J	0.0018 J	0.012 U J	0.013 U J	0.015 U J	0.0016 J	0.015 U J	0.002 J	0.021 U	0.0015 J
Toluene		520	12	0.005 J	0.015 U J	0.0033 J	0.0051 J	0.0051 J	0.0041 J	0.015 U J	0.007 J	0.015 U J	0.01 J	0.015 UJ	0.0016 J
Metals, milligrams per kilogram															
Arsenic	3-12**	1.6	29.0	9.1 J	7.5 J	7.2 J	21.5 J	6.5 J	9.4 J	38.8 J	6.9 J	128 J	4 J	919	4 J
Chromium	1.5-40**	210	38	40.1 J	92 J	15.5 J	134 J	11 J	17.2 J	117 J	17.1 J	169 J	10.6 J	550	10.6 J
Hexavalent Chromium	–	64	38	5.53 U J	5.49 U J	4.67 U J	5.1 U J	4.88 U J	4.94 U J	5.78 U J	4.83 U J	5.31 U J	4.73 U J	5.78 UJ	4.67 UJ
Zinc	9-50	100,000	12,000	75.1 J	96.9 J	54 J	67.1 J	46.9 J	61.3 J	85.9 J	53.8 J	103 J	522 J	165	46.9 J
Other															
Percent Solids, %				72.3	72.8	85.6	78.5	82.0	81.0	69.2	82.9	75.3	84.6	85.6	69.2
Total Organic Carbon, %				1.80	2.60	0.680	1.90	1.70	1.90	3.40	1.10	4.10	0.990	5.6	0.68
pH				6.92	7.02	8.23	8.42	8.50	7.92	7.62	8.16	7.31	7.64	8.5	5.76

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Soil criteria from U.S.EPA, Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (October 2002) and from range of background metals concentrations measured in soil found in the eastern United States from NYSDEC Division of Technical and Administrative Guidance Memorandum (TAGM) #4046.

** A New York State background value.

in. bgs =inches below ground surface.
– = indicates value does not exist.
SB = Site Background
UJ = indicates compound was not detected above the listed detection limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitiation necessary to accurately and precisely measure the compound in the sample.

J = indicates an estimated value.
U = indicates compound was not detected.
R = indicates data rejected by data validator.
(values) = indicates value reported before rejected.
▨ indicates concentration above soil criteria.

TABLE 4-4

ANALYTICAL RESULTS FOR SUBSURFACE SOIL FROM THE INACTIVE LANDFILL AREA

Peter Cooper Site
Gowanda, New York

	Soil Criteria[3]			Sample Location, Identification, Depth and Date Collected[1]												
Constituent	Eastern USA Background	Region 9 PRGs	Soil Screening Levels	TP-1 10090025 6.5-7 fbgs 10/6/2000	TP-2 10090024 12.5 fbgs 10/6/2000	TP-3 10090023 8.5-9 fbgs 10/6/2000	TP-4 10090026 7 fbgs 10/6/2000	TP-5 10100028 9.5 fbgs 10/6/2000	TP-6 10100030 5 fbgs 10/6/2000	TP-7 10060022 3-4 fbgs 10/6/2000	TP-8 10060021 4-5 fbgs 10/6/2000	TP-9 10060020 6.5 fbgs 10/6/2000	TP-10 10120031 1 fbgs 10/6/2000	settling basin 101060029 7 fbgs 10/6/2000	Maximum Conc.	Minimum Conc.
Volatile Organic Compounds, milligrams per kilogram																
Benzene		1.3	0.03	0.021 UJ	0.014 UJ	0.017 UJ	0.003 J	0.0023 J	0.025 U	0.021 UJ	0.013 UJ	0.03 UJ	0.0032 J	0.0046 J	0.03 UJ	0.0023 J
Chlorobenzene		530	1	0.021 UJ	0.014 U	0.017 UJ	0.011 UJ	0.01 UJ	0.025 U	0.021 UJ	0.013 UJ	0.03 UJ	0.017 UJ	(0.012) R	0.03 UJ	(0.012 U) R
1,2-Dichlorobenzene		370	17	0.021 UJ	0.014 U	0.017 UJ	0.011 UJ	0.01 UJ	0.025 U	0.021 UJ	0.013 UJ	0.03 UJ	0.017 UJ	(0.012) R	0.03 UJ	(0.012 U) R
1,4-Dichlorobenzene		7.9	2	0.021 UJ	0.014 U	0.017 UJ	0.011 UJ	0.01 UJ	0.025 U	0.021 UJ	0.013 UJ	0.03 UJ	0.017 UJ	(0.012) R	0.03 UJ	(0.012 U) R
Ethylbenzene		20	13	0.021 UJ	0.014 U	0.017 UJ	0.011 UJ	0.01 UJ	0.025 U	0.021 UJ	0.013 UJ	0.03 UJ	0.017 UJ	0.0013 J	0.03 UJ	0.0013 J
Toluene		520	12	0.031 J	0.0015 J	0.0069 J	0.005 J	0.0039 J	0.029	0.021 UJ	0.013 UJ	0.03 UJ	0.0074 J	0.0082 J	0.031 J	0.0015 J
m-/p-Xylene		420	210	0.021 UJ	0.014 U	0.017 UJ	0.004 J	0.0023 J	0.025 U	0.021 UJ	0.013 UJ	0.03 UJ	0.005 J	0.0063 J	0.03 UJ	0.0023 J
o-Xylene		420	210	0.021 UJ	0.014 U	0.017 UJ	0.011 UJ	0.01 UJ	0.025 U	0.021 UJ	0.013 UJ	0.03 UJ	0.017 UJ	0.0019 J	0.03 UJ	0.0019 J
Metals, milligrams per kilogram																
Arsenic	3-12**	1.6	29.0	13.5	9.1	60.5	4.3	6.5	29.8	58.4	29.2	22.1	67.1 U	9.8	67.1 U	4.3
Chromium	1.5-40**	210	38	270	9.1	137	10.3 J	15.3	149	623	55	7.9	8610 U	12.5	8610 U	7.9
Hexavalent Chromium	–	64	38	5.41 U	4.76 U	5.87 U	4.78 U	4.55 U	5.49 U	4.83 U	4.98 U	4.6 U	5.58 UJ	4.85 U	5.87 U	4.55 U
Zinc	9-50	100,000	12,000	277	58.6	214	57.3	70.2	1390	77.9 J	58.6 J	99 J	445	68.6	1390	57.3
Others																
Percent Solids				74.0	84.1	68.2	83.7	88.0	72.8	82.8	80.4	86.9	71.7	82.5	88	68.2
pH				8.05	7.88	6.61	8.35	8.10	9.24	7.31	8.43	7.47	7.80	8.05	9.24	6.61
Total Organic Carbon				0.900	0.570	2.00	0.1 UJ	0.330	2.80	0.620	1.00	0.220	1.50	0.390	2.8	0.1 UJ

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Soil criteria from U.S.EPA, Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (October 2002) and from range of background metals concentrations measured in soil found in the eastern United States from NYSDEC Division of Technical and Administrative Guidance Memorandum (TAGM) #4046.

** A New York State Background value

fbgs = feet below ground surface
SB = Site Background
– = indicates value does not exist.
J = indicates an estimated value.
U = indicates compound was not detected above the listed detection limit.
R= indicates data rejected by data validator.
UJ = indicates compound was not detected above the listed detection limit.
However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitiation necessary to accurately and precisely measure the compound in the sample.

(value) = indicates value reported before rejected.
▨ indicates concentration above soil criteria.

TA[illegible]

ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

	Soil Criteria[3]			Sample Location, Identification, Depth, and Date Collected[1]											
		Region 9		SB-1	SB-2	SB-4	SB-5	SB-7	SB-8	SB-9	SB-10	MWFP-2	MWFP-3		
	Eastern USA Background	PRGs	Soil Screening Levels	1005000006	100500008	100500010	100600012	100600018	100600032	100600034	100600036	100600015	100900038	Maximum	Minimum
				0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0.5-2.5'	0-2'	0.5-2.5'	0.5-2.5		
Constituent[2]				10/05/00	10/05/00	10/05/00	10/06/00	10/06/00	10/06/00	10/06/00	10/06/00	10/06/00	10/09/00	Conc.	Conc.
Volatile Organic Compounds, milligrams per kilogram															
Acetone		6000	16	0.045 J	0.053 J	0.12	0.056	0.053 J	0.058 J	1.4 J	0.21 J	0.056 J	1.4 U	1.4 J	0.045 J
Benzene		1.3	0.03	0.0027 J	0.0021 J	0.01 UJ	0.0036 J	0.0025 J	0.0016 J	0.0023 J	0.0082 J	0.0076 J	1.4 U	1.4 U	0.0016 J
Bromodichloromethane		1.8	0.6	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Bromoform		220	0.8	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Bromomethane		13	0.2	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 UJ	1.4 UJ	0.0094 UJ
2-Butanone (MEK)		27000	–	0.0088 J	0.0094 J	0.018 J	0.011	0.0071 J	0.0057 J	0.28 J	0.017 J	0.022 UJ	1.4 U	1.4 U	0.0057 J
Methyl tert-Butyl Ether		160	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Carbon Disulfide		720	32	0.013 J	0.0023 J	0.0072 J	0.01	0.072 J	0.015 J	0.0031 J	0.016 UJ	0.01 J	1.4 U	1.4 U	0.0023 J
Carbon Tetrachloride		0.55	0.07	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	10	10	0.0094 UJ
Chlorobenzene		530	1	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Chloroethane		6.5	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Chloroform		12	0.6	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	5.7	5.7	0.0094 UJ
Chloromethane		2.6	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
1,2-Dibromo-3-Chloropropane		2	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Cyclohexane		140	–	0.013 J	0.011 J	0.01 UJ	0.0058 J	0.0065 J	0.003 J	0.0036 J	0.016 UJ	0.0095 J	0.47 J	0.47 J	0.003 J
Dibromochloromethane		2.6	0.4	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
1,2-Dibromoethane		0.028	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
1,2-Dichlorobenzene		370	17	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
1,4-Dichlorobenzene		7.9	2	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.0017 J	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0017 J
1,3-Dichlorobenzene		63	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Dichlorodifluoromethane		310	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
1,1-Dichloroethane		1700	23	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	0.16 J	0.16 J	0.0094 UJ
1,2-Dichloroethane		0.6	0.02	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	0.24 J	0.24 J	0.0094 UJ
1,1-Dichloroethene		410	0.06	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
trans-1,2-Dichloroethene		230	0.7	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
cis-1,2-Dichloroethene		150	0.4	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	0.26 J	0.26 J	0.0094 UJ
1,2-Dichloropropane		0.71	0.03	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
trans-1,3-Dichloropropene		1.8	0.004	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
cis-1,3-Dichloropropene		1.8	0.004	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Ethylbenzene		20	13	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
2-Hexanone		–	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.064 J	0.025 J	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Isopropylbenzene		2000	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Methyl Acetate		92000	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.0048 J	0.21 J	0.022 UJ	1.4 U	1.4 U	0.0048 J
Methylcyclohexane		8700	–	0.022 J	0.014 J	0.01 UJ	0.0096 J	0.01 J	0.0042 J	0.0023 J	0.0021 J	0.015 J	1.6	1.6	0.0021 J
Methylene Chloride		21	0.02	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
4-Methyl-2-Pentanone		–	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.005 J	0.039 J	0.022 UJ	1.4 U	1.4 U	0.005 J
Styrene		1700	4	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
1,1,2,2-Tetrachloroethane		0.93	0.003	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Tetrachloroethene		3.4	0.06	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0031 J	0.0094 UJ	0.0097 J	0.18 J	0.022 UJ	54	54	0.0031 J
Toluene		520	12	0.005 J	0.0032 J	0.01 UJ	0.0061 J	0.0046 J	0.0032 J	0.0023 J	0.019 J	0.015 J	0.38 J	0.38 J	0.0023 J
1,2,4-Trichlorobenzene		3000	5	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	0.36 J	0.36 J	0.0094 UJ
1,1,1-Trichloroethane		1200	2	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.0064 J	0.022 UJ	5.5	5.5	0.0064 J
1,1,2-Trichloroethane		1.6	0.02	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ

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ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

	Soil Criteria[3]			Sample Location, Identification, Depth, and Date Collected[1]											
		Region 9		SB-1	SB-2	SB-4	SB-5	SB-7	SB-8	SB-9	SB-10	MWFP-2	MWFP-3		
				1005000006	100500008	100500010	100600012	100600018	100600032	100600034	100600036	100600015	100900038		
				0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0.5-2.5'	0-2'	0.5-2.5'	0.5-2.5		
Constituent[2]	Eastern USA Background	PRGs	Soil Screening Levels	10/05/00	10/05/00	10/05/00	10/06/00	10/06/00	10/06/00	10/06/00	10/06/00	10/06/00	10/09/00	Maximum Conc.	Minimum Conc.
Trichloroethene		0.1	0.06	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	0.51 J	0.51 J	0.0094 UJ
Trichlorofluoromethane		2000	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
1,1,2-Trichloro-1,2,2-Trifluoroethane		5600	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
Vinyl Chloride		0.75	–	0.0094 UJ	0.011 UJ	0.01 UJ	0.01 UJ	0.0099 UJ	0.0094 UJ	0.014 UJ	0.016 UJ	0.022 UJ	1.4 U	1.4 U	0.0094 UJ
m-/p-Xylene		420	210	0.0045 UJ	0.0031 UJ	0.01 UJ	0.0036 J	0.0048 J	0.0033 J	0.003 J	0.0044 J	0.0071 J	0.52 J	0.52 J	0.003 J
o-Xylene		420	210	0.0014 UJ	0.0011 UJ	0.01 UJ	0.0011 J	0.0015 J	0.00098 J	0.014 UJ	0.004 J	0.0039 J	0.42 J	0.42 J	0.00098 J
Semi-Volatile Organic Compounds, milligrams per kilogram															
Acenaphthene		29000	570	0.37 U	1.8 J	0.16 J	0.36 U	2.6 J	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	2.6 J	0.16 J
Acenaphthylene		--	–	0.37 U	3.9 U	0.4 U	0.36 U	0.4 J	0.38 U	0.41 U	0.39 U	0.29 J	0.38 U	0.41 U	0.29 J
Acetophenone		–	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Anthracene		100000	12000	0.04 J	5.9	0.47 J	0.36 U	14	0.38 U	0.044 J	0.055 J	0.24 J	0.049 J	14	0.04 J
Atrazine		7.8	–	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Benzaldehyde		62000	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Benzo(a)anthracene		2.1	2	0.16 J	10	1.6 J	0.36 U	24	0.38 U	0.11 J	0.23 J	0.47	0.26 J	24	0.11 J
Benzo(a)pyrene		0.21	8	0.16 J	8.3	1.5 J	0.36 U	20	0.38 U	0.087 J	0.25 J	0.46	0.27 J	20	0.087 J
Benzo(b)fluoranthene		2.1	5	0.14 J	6.4	1.3 J	0.36 U	15	0.38 U	0.079 J	0.24 J	0.3 J	0.23 J	15	0.079 J
Benzo(g,h,i)perylene		–	–	0.11 J	4.4	1 J	0.36 U	14	0.38 U	0.41 U	0.24 J	0.33 J	0.21 J	14	0.11 J
Benzo(k)fluoranthene		21	49	0.14 J	7.2	1.3 J	0.36 U	18	0.38 U	0.09 J	0.25 J	0.38 J	0.23 J	18	0.09 J
1,1-Biphenyl		350	–	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Butyl Benzyl Phthalate		100000	930	0.37 UJ	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
di-N-Butylphthalate		–	–	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Caprolactam		100000	–	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Carbazole		86	0.6	0.37 U	2.3 J	0.39 J	0.36 U	3.5 J	0.38 U	0.41 U	0.044 J	0.42 U	0.38 U	3.5 J	0.044 J
Indeno(1,2,3-cd)pyrene		2.1	14	0.084 J	4.0	0.92 J	0.36 U	13	0.38 U	0.043 J	0.19 J	0.2 J	0.19 J	13	0.043 J
4-Chloroaniline		2500	0.7	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
bis(2-chloroethoxy)methane		–	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
bis(2-chloroethyl)ether		0.55	0.0004	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
2-Chloronaphthalene		–	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
2-Chlorophenol		240	4	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
2,2-oxybis(1-chloropropane)		–	–	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Chrysene		210	160	0.17 J	9.3	1.7 J	0.36 U	22	0.38 U	0.14 J	0.36 J	0.6	0.29 J	22	0.14 J
Dibenzo(a,h)anthracene		0.21	2	0.37 U	1.9 J	0.35 J	0.36 U	5.2	0.38 U	0.41 U	0.076 J	0.13 J	0.078 J	5.2	0.076 J
Dibenzofuran		3100	--	0.37 U	1.1 J	0.12 J	0.36 U	2.2 J	0.38 U	0.41 U	0.055 J	0.42 U	0.38 U	2.2 J	0.055 J
3,3-Dichlorobenzidine		3.8	0.007	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	R	3.9 U	0.36 U
2,4-Dichlorophenol		1800	1	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Diethylphthalate		100000	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Dimethyl Phthalate		100000	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
2,4-Dimethylphenol		12000	9	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
2,4-Dinitrophenol		1200	0.3	0.93 U	9.8 U	1 U	0.92 U	9.8 U	0.95 U	1 U	0.98 U	1.1 U	0.97 U	3.9 U	0.36 U
2,4-Dinitrotoluene		1200	0.0008	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
2,6-Dinitrotoluene		620	0.0007	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
bis(2-Ethylhexyl)phthalate		120	--	0.068 J	3.9 U	0.069 J	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.068 J
Fluoranthene		22,000	4300	0.31 J	23	3.8 J	0.36 U	60	0.38 U	0.26 J	0.51	0.62	0.41	60	0.26 J

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ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

	Soil Criteria[3]			*Sample Location, Identification, Depth, and Date Collected*[1]											
		Region 9		*SB-1* *1005000006* *0-2'*	*SB-2* *100500008* *0-2'*	*SB-4* *100500010* *0-2'*	*SB-5* *100600012* *0-2'*	*SB-7* *100600018* *0-2'*	*SB-8* *100600032* *0-2'*	*SB-9* *100600034* *0.5-2.5'*	*SB-10* *100600036* *0-2'*	*MWFP-2* *100600015* *0.5-2.5'*	*MWFP-3* *100900038* *0.5-2.5*	*Maximum*	*Minimum*
Constituent[2]	*Eastern USA Background*	*PRGs*	*Soil Screening Levels*	*10/05/00*	*10/05/00*	*10/05/00*	*10/06/00*	*10/06/00*	*10/06/00*	*10/06/00*	*10/06/00*	*10/06/00*	*10/09/00*	*Conc.*	*Conc.*
Fluorene		26,000	560	0.37 U	2.3 J	0.17 J	0.36 U	4.2	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	4.2	0.17 J
Hexachlorobenzene		1.1	2	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Hexachlorobutadiene		22	2	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Hexachlorocyclopentadiene		3700	400	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	1.9 U	3.9 U	0.36 U
Hexachloroethane		120	0.5	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Isophorone		1800	0.5	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
2-Methylnaphthalene		--	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.1 J	0.18 J	0.083 J	0.079 J	3.9 U	0.079 J
4,6-Dinitro-2-Methylphenol		--	--	0.93 U	9.8 U	1 U	0.92 U	9.8 U	0.95 U	1 U	0.98 U	1.1 U	0.97 U	9.8 U	0.92 U
4-Chloro-3-Methylphenol		--	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
2-Methylphenol		--	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
4-Methylphenol		3100	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.059 J	0.42 U	0.38 U	3.9 U	0.059 J
Naphthalene		190	84	0.37 U	3.9 U	0.051 J	0.36 U	3.9 U	0.38 U	0.069 J	0.11 J	0.044 J	0.047 J	3.9 U	0.044 J
2-Nitroaniline		18	--	0.93 U	9.8 U	1 U	0.92 U	9.8 U	0.95 U	1 U	0.98 U	1.1 U	0.97 U	9.8 U	0.92 U
4-Nitroaniline		--	--	0.93 U	9.8 U	1 U	0.92 U	9.8 U	0.95 U	1 U	0.98 U	1.1 U	0.97 U	9.8 U	0.92 U
Nitrobenzene		100	0.1	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
2-Nitrophenol		--	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
4-Nitrophenol		--	--	0.93 U	9.8 U	1 U	0.92 U	9.8 U	0.95 U	1 U	0.98 U	1.1 U	0.97 U	9.8 U	0.92 U
n-Nitrosodiphenylamine		350	1	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
di-n-Octyl Phthalate		25000	10000	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Pentachlorophenol		9	0.03	0.93 U	9.8 U	1 U	0.92 U	9.8 U	0.95 U	1 U	0.98 U	1.1 U	0.97 U	9.8 U	0.92 U
Phenanthrene		--	--	0.18 J	21	2.4 J	0.36 U	45	0.38 U	0.23 J	0.34 J	0.3 J	0.24 J	45	0.18 J
Phenol		100,000	100	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
4-Bromophenyl-Phenylether		--	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
4-Chlorophenyl-Phenylether		--	--	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
n-Nitroso-di-n-Propylamine		0.25	0.00005	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
Pyrene		29,000	4,290	0.32 J	20	3.4 J	0.36 U	44	0.38 U	0.22 J	0.49	0.86	0.43	44	0.22 J
2,4,6-Trichlorophenol		62	0.2	0.37 U	3.9 U	0.4 U	0.36 U	3.9 U	0.38 U	0.41 U	0.39 U	0.42 U	0.38 U	3.9 U	0.36 U
2,4,5-Trichlorophenol		62000	270	0.93 U	9.8 U	1 U	0.92 U	9.8 U	0.95 U	1 U	0.98 U	1.1 U	0.97 U	9.8 U	0.92 U
Metals, milligrams per kilogram															
Aluminum	33,000	100,000	--	6210	5440	7570	8000	8280	6810	2010	4220	6490	5190	8280	2010
Antimony	--	410	5	6.5 UJ	6.9 UJ	7.2 UJ	6.5 UJ	6.9 UJ	6.8 UJ	7.2 UJ	7 UJ	7.6 UJ	7 UJ	7.6 UJ	6.5 UJ
Arsenic	3-12**	1.6	29.0	8.5	168	10.7	8	9.5	6.6	16.2	16.2	29.9	22.7	168	6.6
Barium	15-600	67,000	1,600	72.8	65.1	80.2	58.4	92.8	63.9	68.7	59.2	64.2	117	117	58.4
Beryllium	0-1.75	1,900	63	0.54 U	0.58 U	0.6 U	0.54 U	0.57 U	0.57 U	0.6 U	0.58 U	0.87	0.64	0.87	0.54 U
Cadmium	0.1-1	450	8	0.54 U	0.58 U	0.6 U	0.54 U	0.57 U	0.57 U	0.6 U	0.58 U	0.64 U	1.6	1.6	0.54 U
Calcium	130-35,000**	--	--	29000	6880	23800	44200	30200	33600	1050	1870	2490 J	8210	44200	1050
Chromium	1.5-40**	210	38	34.2	59.7	18.2	10.8	33.3	9	59.3	54.5	198 J	52.5	198	9 J
Cobalt	2.5-60**	1,900	--	6.4	6.9	8.2	7.7	7.2	6.6	6 U	6.6	7.1	7.6	8.2	6 U
Copper	1-50	41,000	--	26.6	37	43.6	21	73.3	20.9	56.7	30.7	29.3	171	171	20.9
Hexavalent Chromium	--	64	38	4.46 UJ	4.74 UJ	4.9 UJ	4.42 UJ	4.71 UJ	4.57 UJ	4.92 UJ	4.74 UJ	5.08 UJ	4.66 U	5.08 UJ	4.42 UJ
Iron	2,000-550,000	100,000	--	18200	18900	23000	16900	12600	15300	31300	18500	18900	30100 J	31300	12600
Lead	4-61***	750	--	50.1 J	79.4 J	169 J	8.2 J	94.2 J	8.2 J	193 J	269 J	41 J	202	269 J	8.2 J
Magnesium	100-5,000	--	--	4470	3130	6260	12600	5740	9300	225	1520	1730	2270	12600	225
Manganese	50-5,000	19,000	--	332	251	449	489	451	469	64.7	132	160	314	489	64.7

ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

Constituent [2]	*Soil Criteria* [3]			*Sample Location, Identification, Depth, and Date Collected* [1]										*Maximum*	*Minimum*
	Eastern USA Background	*Region 9*		*SB-1* *1005000006* *0-2'*	*SB-2* *100500008* *0-2'*	*SB-4* *100500010* *0-2'*	*SB-5* *100600012* *0-2'*	*SB-7* *100600018* *0-2'*	*SB-8* *100600032* *0-2'*	*SB-9* *100600034* *0.5-2.5'*	*SB-10* *100600036* *0-2'*	*MWFP-2* *100600015* *0.5-2.5'*	*MWFP-3* *100900038* *0.5-2.5*		
		PRGs	*Soil Screening Levels*	*10/05/00*	*10/05/00*	*10/05/00*	*10/06/00*	*10/06/00*	*10/06/00*	*10/06/00*	*10/06/00*	*10/06/00*	*10/09/00*	*Conc.*	*Conc.*
Mercury	0.001-0.2	310	--	0.08	0.13	0.13	0.05 U	0.17	0.06 U	▨ 3.1	▨ 0.47	0.16 J	▨ 0.4	3.1	ND
Nickel	0.5-25	20,000	130	17.8	17.9	19.4	18	19.1	15.9	13.1	14.7	17.9	▨ 27.2	27.2	13.1
Potassium	8,500-43,900**	--	--	951	527	805	1060	912	755	239 U	399	542	622	1060	239 U
Selenium	0.1-3.9	5,100	5	1.6	1.8	1.3	1.4	0.95	1.6	1.7	2	2.7	2.1 J	2.7	0.95
Silver	--	5100	34	1.1 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.3 U	1.2 U	1.3 U	1.1 U
Sodium	6,000-8,000	--	--	377	372	439	425	479	389	398	458	411	514	514	372
Thallium	--	67	--	1.1 U	1.1 U	1.2 U	1.1 U	1.2 U	1.1 U	1.2 U	1.2 U	1.3 U	1.1 U	1.3 U	1.1 U
Vanadium	1-300	7,200	6,000	14.8	12.8	16.7	18	17.7	14.6	17.5	17.8	15.3	20.2	20.2	12.8
Zinc	9-50	100,000	12,000	▨ 152 J	▨ 109 J	▨ 132 J	45.6 J	▨ 124 J	▨ 51.6 J	▨ 116 J	▨ 728 J	▨ 84.6 J	▨ 246	728	45.6 J
Others															
Percent Solids, %				89.7	84.3	81.7	90.6	84.9	87.6	81.3	84.4	78.7	85.8	90.6	78.7
pH				8.01	8.2	8.34	7.85	8.24	7.81	7.34	7.61	7.7	7.46	8.34	7.34
TOC, %				0.47	0.94	1.8	0.25	1.3	0.35	1.1	1.7	1.7	1.5	1.8	0.25

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services. The analytical results for the SVOC, 3-Nitroaniline, was rejected during data validation for each sample.
3. Soil criteria from U.S.EPA, 2000 Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (October 2002) and from range of background metals concentrations measured in soil found in the eastern United States from NYSDEC Division of Technical and Administrative Guidance Memorandum (TAGM) #4046.

** *A New York State Background value*

*** Background levels for lead vary widely, average levels in undeveloped, rural areas range from 4-61 ppm while metropolitan/suburban areas range from 200-500 ppm.

J = indicates a laboratory estimated value or estimated as a result of data validation.
U = indicates compound was not detected at or above the listed detection limit.
R= indicates data rejected by data validator.
UJ = indicates compound was not detected above the listed detection limit.
However, the reported quantitation limit is approximate and may or may
not represent the actual limit of quantitiation necessary to accurately
and precisely measure the compound in the sample.

SB = Site Background
-- = indicates value does not exist.
fbgs = feet below ground surface
▨ indicates concentration above soil criteria.

TAB[illegible]

ANALYTICAL RESULTS FOR SUBSURFACE SOILS FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

	Soil Criteria[3]			Sample Location, Identification, Depth, and Date Collected[1]													
Constituent[2]	Eastern USA Background	Region 9 PRGs	Soil Screening Levels	SB-1 100500007 5-7' 10/05/00	SB-2 100500009 6-8' 10/05/00	SB-3 100600014 3-5' 10/06/00	SB-4 100500011 4-6' 10/05/00	SB-5 100600013 6-8' 10/06/00	SB-6 100900040 4-6' 10/9/2000	SB-7 100600019 7-9' 10/06/00	SB-8 100600033 10-12' 10/06/00	SB-9 100600035 7-9' 10/06/00	SB-10 100600037 7-9' 10/06/00	MWFP-2 100600017 5-7' 10/06/00	MWFP-3 100900039 5-7' 10/09/00	Maximum Conc.	Minimum Conc.
Volatile Organic Compounds, milligrams per kilogram																	
Acetone		6000	16	0.07 J	0.033	0.089 J	0.029 J	0.49 J	0.14 J	0.06 J	0.042 J	0.064	0.065 J	0.12	0.098 J	0.49 J	0.029 J
Benzene		1.3	0.03	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UI	0.013 UI	0.017 UI	0.0096 UI	0.0033 J	0.0021 J	0.014 U	0.011 UJ	0.031 UJ	0.0021 J
Bromodichloromethane		1.8	0.6	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Bromoform		220	0.8	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Bromomethane		13	0.2	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
2-Butanone (MEK)		27000	–	0.0096 J	0.0088 U	0.011 J	0.0069 J	0.12 J	0.026 J	0.01 J	0.0076 J	0.013 J	0.014 J	0.031	0.016 J	0.12 J	0.0069 J
Methyl tert-Butyl Ether		160	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Carbon Disulfide		720	32	0.0021 J	0.0088 U	0.0092 UJ	0.0055 J	0.031 UJ	0.024 J	0.017 UJ	0.0044 J	0.032	0.014 J	0.014 U	0.011 UJ	0.032	0.0021 J
Carbon Tetrachloride		0.55	0.07	0.008 J	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.012 J	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.025 J	0.031 UJ	0.008 J
Chlorobenzene		530	1	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Chloroethane		6.5	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Chloroform		12	0.6	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.0067 J	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.0081 J	0.031 UJ	0.0067 J
Chloromethane		2.6	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
1,2-Dibromo-3-Chloropropane		2	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 UJ	0.011 UJ	0.014 UJ	0.011 UJ	0.031 UJ	0.0088 U
Cyclohexane		140	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.0047 J	0.0096 UJ	0.0095 J	0.0035 J	0.014 U	0.011 UJ	0.031 UJ	0.0035 J
Dibromochloromethane		2.6	0.4	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
1,2-Dibromoethane		0.028	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
1,2-Dichlorobenzene		370	17	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 UJ	0.011 UJ	0.014 UJ	0.011 UJ	0.031 UJ	0.0088 U
1,4-Dichlorobenzene		7.9	2	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 UJ	0.011 UJ	0.014 UJ	0.011 UJ	0.031 UJ	0.0088 U
1,3-Dichlorobenzene		63	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 UJ	0.011 UJ	0.014 UJ	0.011 UJ	0.031 UJ	0.0088 U
Dichlorodifluoromethane		310	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
1,1-Dichloroethane		1700	23	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.03 J	0.0096 UJ	0.0140 J	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.014 U
1,2-Dichloroethane		0.6	0.02	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
1,1-Dichloroethene		410	0.06	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
trans-1,2-Dichloroethene		230	0.7	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UI	0.017 UI	0.0096 UJ	0.014 U	0.011 UI	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
cis-1,2-Dichloroethene		150	0.4	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.0041 J	0.014 U	0.011 UJ	0.031 UJ	0.0041 J
1,2-Dichloropropane		0.71	0.03	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
trans-1,3-Dichloropropene		1.8	0.004	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
cis-1,3-Dichloropropene		1.8	0.004	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Ethylbenzene		20	13	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
2-Hexanone		–	–	0.0094 J	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Isopropylbenzene		2000	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Methyl Acetate		92000	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Methylcyclohexane		8700	–	0.0029 J	0.0088 U	0.0092 UJ	0.0047 J	0.031 UJ	0.0082 J	0.0076 J	0.0096 UJ	0.015	0.0049 J	0.014 U	0.011 UJ	0.031 UJ	0.0029 J
Methylene Chloride		21	0.02	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
4-Methyl-2-Pentanone		–	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UI	0.031 UJ	0.0088 U
Styrene		1700	4	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
1,1,2,2-Tetrachloroethane		0.93	0.003	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 UJ	0.011 UJ	0.014 UJ	0.011 UJ	0.031 UJ	0.0088 U
Tetrachloroethene		3.4	0.06	0.015 UJ	0.0088 U	0.0092 UI	0.0081 J	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.0038 J	0.011 UJ	0.014 U	1 J	1 J	0.0038 J
Toluene		520	12	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.0310 J	0.09 J	0.017 UJ	0.0038 J	0.0063 J	0.0036 J	0.014 U	0.011 UJ	0.09 J	0.0032 J
1,2,4-Trichlorobenzene		3000	5	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 UJ	0.011 UJ	0.014 UJ	0.011 UJ	0.031 UJ	0.0088 U
1,1,1-Trichloroethane		1200	2	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.023 J	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.055 J	0.055 J	0.0088 U
1,1,2-Trichloroethane		1.6	0.02	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Trichloroethene		0.1	0.06	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Trichlorofluoromethane		2000	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
1,1,2-Trichloro-1,2,2-Trifluoroethane		5600	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
Vinyl Chloride		0.75	–	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.014 U	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0088 U
m-/p-Xylene		420	210	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.0043 J	0.0029 J	0.014 U	0.011 UJ	0.031 UJ	0.0029 J
o-Xylene		420	210	0.015 UJ	0.0088 U	0.0092 UJ	0.019 UJ	0.031 UJ	0.013 UJ	0.017 UJ	0.0096 UJ	0.0014 J	0.011 UJ	0.014 U	0.011 UJ	0.031 UJ	0.0014 J
Semi-Volatile Organic Compounds, milligrams per kilogram																	
Acenaphthene		29000	570	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Acenaphthylene		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.061 J	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.061 J
Acetophenone		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	ND
Anthracene		100000	12000	0.75	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.32 J	0.041 J	0.42 U	0.39 U	0.46 U	0.41 U	0.75	0.041 J
Atrazine		7.8	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U

TABL

ANALYTICAL RESULTS FOR SUBSURFACE SOILS FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

	Soil Criteria[3]			*Sample Location, Identification, Depth, and Date Collected*[1]													
Constituent[2]	*Eastern USA Background*	*Region 9 PRGs*	*Soil Screening Levels*	*SB-1 100500007 5-7' 10/05/00*	*SB-2 100500009 6-8' 10/05/00*	*SB-3 100600014 3-5' 10/06/00*	*SB-4 100500011 4-6' 10/05/00*	*SB-5 100600013 6-8' 10/06/00*	*SB-6 100900040 4-6' 10/9/2000*	*SB-7 100600019 7-9' 10/06/00*	*SB-8 100600033 10-12' 10/06/00*	*SB-9 100600035 7-9' 10/06/00*	*SB-10 100600037 7-9' 10/06/00*	*MWFP-2 100600017 5-7' 10/06/00*	*MWFP-3 100900039 5-7' 10/09/00*	*Maximum Conc.*	*Minimum Conc.*
Benzaldehyde		62000	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Benzo(a)anthracene		2.1	2	1.3 J	0.36 U	0.4 U	0.069 J	0.062 J	0.4 U	1.1	0.068 J	0.42 U	0.39 U	0.29 J	0.41 U	1.3 J	0.062 J
Benzo(a)pyrene		0.21	8	2.3 J	0.36 U	0.4 U	0.45 U	0.067 J	0.4 U	1.2	0.058 J	0.42 U	0.39 U	0.33 J	0.41 U	2.3	0.058 J
Benzo(b)fluoranthene		2.1	5	2.5 J	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	1.1	0.049 J	0.42 U	0.39 U	0.26 J	0.41 U	2.5 J	0.049 J
Benzo(g,h,i)perylene		–	–	1.7 J	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	1.1	0.38 U	0.42 U	0.39 U	0.31 J	0.41 U	1.7 J	0.31 J
Benzo(k)fluoranthene		21	49	2.3 J	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	1.2	0.057 J	0.42 U	0.39 U	0.26 J	0.41 U	2.3 J	0.057 J
1,1-Biphenyl		350	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Butyl Benzyl Phthalate		100000	930	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
di-N-Butylphthalate		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Caprolactam		100000	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Carbazole		86	0.6	0.38 U	0.36 U	0.4 U	0.45 U	0.12 J	0.4 U	0.11 J	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.46 U	0.11 J
Indeno(1,2,3-cd)pyrene		2.1	14	1.4 J	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.91	0.38 U	0.42 U	0.39 U	0.24 J	0.41 U	1.4 J	0.24 J
4-Chloroaniline		2500	0.7	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
bis(2-chloroethoxy)methane		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
bis(2-chloroethyl)ether		0.55	0.0004	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
2-Chloronaphthalene		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
2-Chlorophenol		240	4	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
2,2-oxybis(1-chloropropane)		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Chrysene		210	160	1.3	0.36 U	0.4 U	0.088 J	0.061 J	0.058 J	1.4	0.073 J	0.42 U	0.39 U	0.29 J	0.41 U	1.4	0.058 J
Dibenzo(a,h)anthracene		0.21	2	0.64 J	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.37 J	0.38 U	0.42 U	0.39 U	0.11 J	0.41 U	0.64 J	0.11 J
Dibenzofuran		3100	–	0.25 J	0.36 U	0.4 U	0.051 J	0.072 J	0.4 U	0.11 J	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.46 U	0.051 J
3,3-Dichlorobenzidine		3.8	0.007	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	R	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	R	0.48	0.38 U
2,4-Dichlorophenol		1800	1	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Diethylphthalate		100000	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Dimethyl Phthalate		100000	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
2,4-Dimethylphenol		12000	9	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
2,4-Dinitrophenol		1200	0.3	0.96 U	0.91 U	1 U	1.1 U	1.2 U	1 U	1.1 U	0.94 U	1.1 U	0.97 U	1.2 U	1 U	0.48 U	0.36 U
2,4-Dinitrotoluene		1200	0.0008	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
2,6-Dinitrotoluene		620	0.0007	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
bis(2-Ethylhexyl)phthalate		120	–	0.076 J	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.049 J	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.049 J
Fluoranthene		22,000	4300	3.1	0.36 U	0.4 U	0.12 J	0.075 J	0.073 J	2.5	0.15 J	0.42 U	0.39 U	0.38 J	0.41 U	3.1	0.073 J
Fluorene		26,000	560	0.45	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.12 J	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.12 J
Hexachlorobenzene		1.1	2	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Hexachlorobutadiene		22	2	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Hexachlorocyclopentadiene		3700	400	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	2 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	2 U	2 U	0.36 U
Hexachloroethane		120	0.5	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Isophorone		1800	0.5	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
2-Methylnaphthalene		–	–	0.16 J	0.36 U	0.4 U	0.15 J	0.2 J	0.043 J	0.15 J	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.46 U	0.043 J
4,6-Dinitro-2-Methylphenol		–	–	0.96 U	0.91 U	1 U	1.1 U	1.2 U	1 U	1.1 U	0.94 U	1.1 U	0.97 U	1.2 U	1 U	1.2 U	0.91 U
4-Chloro-3-Methylphenol		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
2-Methylphenol		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
4-Methylphenol		3100	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.47	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Naphthalene		190	84	0.13 J	0.36 U	0.4 U	0.1 J	0.11 J	0.37 J	0.086 J	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.46 U	0.086 J
2-Nitroaniline		18	–	0.96 U	0.91 U	1 U	1.1 U	1.2 U	1 U	1.1 U	0.94 U	1.1 U	0.97 U	1.2 U	1 U	1.2 U	0.91 U
4-Nitroaniline		–	–	0.96 U	0.91 U	1 U	1.1 U	1.2 U	1 U	1.1 U	0.94 U	1.1 U	0.97 U	1.2 U	1 U	1.2 U	0.91 U
Nitrobenzene		100	0.1	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
2-Nitrophenol		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
4-Nitrophenol		–	–	0.96 U	0.91 U	1 U	1.1 U	1.2 U	1 U	1.1 U	0.94 U	1.1 U	0.97 U	1.2 U	1 U	1.2 U	0.91 U
n-Nitrosodiphenylamine		350	1	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
di-n-Octyl Phthalate		25000	10000	0.38 UJ	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Pentachlorophenol		9	0.03	0.96 U	0.91 U	1 U	1.1 U	1.2 U	1 U	1.1 U	0.94 U	1.1 U	0.97 U	1.2 U	1 U	1.2 U	0.91 U
Phenanthrene		–	–	3.6	0.36 U	0.4 U	0.12 J	0.14 J	0.088 J	1.6	0.17 J	0.42 U	0.39 U	0.15 J	0.41 U	3.6	0.088 J
Phenol		100,000	100	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.36 J	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 J
4-Bromophenyl-Phenylether		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
4-Chlorophenyl-Phenylether		–	–	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
n-Nitroso-di-n-Propylamine		0.25	0.00005	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U
Pyrene		29,000	4,200	2.5	0.36 U	0.4 U	0.1 J	0.09 J	0.072 J	2.2	0.15 J	0.42 U	0.39 U	0.38 J	0.41 U	2.5	0.072 J
2,4,6-Trichlorophenol		62	0.2	0.38 U	0.36 U	0.4 U	0.45 U	0.48 U	0.4 U	0.42 U	0.38 U	0.42 U	0.39 U	0.46 U	0.41 U	0.48 U	0.36 U

TAB[illegible]

ANALYTICAL RESULTS FOR SUBSURFACE SOILS FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

	Soil Criteria³			Sample Location, Identification, Depth, and Date Collected¹													
Constituent²	Eastern USA Background	Region 9 PRGs	Soil Screening Levels	SB-1 100500007 5-7' 10/05/00	SB-2 100500009 6-8' 10/05/00	SB-3 100600014 3-5' 10/06/00	SB-4 100500011 4-6' 10/05/00	SB-5 100600013 6-8' 10/06/00	SB-6 100900040 4-6' 10/9/2000	SB-7 100600019 7-9' 10/06/00	SB-8 100600033 10-12' 10/06/00	SB-9 100600035 7-9' 10/06/00	SB-10 100600037 7-9' 10/06/00	MWFP-2 100600017 5-7' 10/06/00	MWFP-3 100900039 5-7' 10/09/00	Maximum Conc.	Minimum Conc.
2,4,5-Trichlorophenol		62000	270	0.96 U	0.91 U	1 U	1.1 U	1.2 U	1 U	1.1 U	0.94 U	1.1 U	0.97 U	1.2 U	1 U	1.2 U	0.91 U
Metals, milligrams per kilogram																	
Aluminum	33,000	100,000	–	7210	6570	6700	3210	3940	6310	3280	6670	8050	5990	3900	5890	8050	3210
Antimony	–	410	5	6.6 UJ	6.5 UJ	7.1 UJ	8.3 UJ	8.5 UJ	7.1 UJ	7.4 UJ	6.6 UJ	7.4 UJ	6.7 UJ	9.7 J	7.1 UJ	9.7	6.5
Arsenic	3-12**	1.6	29.0	12.5	8.9	8.8	12.8	3.7	6.1	6.6	5.8	14.6	6.9	23.6	10	23.6	3.7
Barium	15-600	67,000	1,600	76.4	69	56.7	51.4	71.8	54.8	550	53.2	47.2	41.2	145	46	550	41.2
Beryllium	0-1.75	1,900	63	0.55 U	0.54 U	0.59 U	0.69 U	0.71 U	0.59 UJ	0.62 U	0.55 U	0.61 U	0.56 U	0.69 U	0.59 U	0.71	0.54
Cadmium	0.1-1	450	8	0.55 U	0.54 U	0.59 U	0.69 U	0.71 U	0.59 UJ	1.3	0.55 U	0.61 U	0.56 U	0.96	0.59 U	1.3	0.54
Calcium	130-35,000**	–	–	4800	2020	1270	6600	4600	14200	10100	1930	7110	5640	67000 J	1550	67000	1270
Chromium	1.5-40**	210	38	11.2	9.5	8.9	25.5	6.2	9	83	8.2	13.2	8.5	155	10.7	155	6.2
Hexavalent Chromium	–	1,900	–	4.63 UJ	4.4 J	4.9 UJ	5.5 UJ	5.79 UJ	4.81 U	5.07 UJ	4.55 UJ	5.12 UJ	4.67 UJ	5.56 UJ	4.91 U	5.79	4.4
Cobalt	2.5-60**	41,000	–	7.5	7.6	7.6	6.9 U	7.1 U	7.5	6.2 U	6.7	7.5	6.6	6.9 U	7.4	7.6	6.2
Copper	1-50	64	38	17.8	19.9	11.5	111	11.3	19	187	13.5	25.8	15.2	94.6	22.3	187	11.3
Iron	2,000-550,000	100,000	–	18400	19400	18200	12600	6650	17600 J	18100	15800	16800	15700	24900	17800 J	24900	6650
Lead	4-61***	750	–	37 J	8.8 J	8.4 J	37.1 J	7.2 J	8.8	457 J	10 J	12.9 J	11.9 J	1950 J	9.1	1950	7.2
Magnesium	100-5,000	–	–	2370	2760	2340	851	1250	3070	1790	1750	5620	3800	4710	2340	5620	851
Manganese	50-5,000	19,000	–	328	453	366	63.4	59.6	351	173	290	126	278	373	243	453	59.6
Mercury	0.001-0.2	310	–	0.06 U	0.05 U	0.06 U	0.17	0.07 U	0.17	0.18	0.06 U	0.06 U	0.06 U	3.1	0.06 U	3.1	0.05
Nickel	0.5-25	20,000	130	16.5	17.3	16.8	10.5	13	16	13.3	13.7	21.1	15.5	13.1	17.2	21.1	10.5
Potassium	8,500-43,900**	–	–	764	767	675	337	354	516	818	452	767	762	411	534	818	337
Selenium	0.1-3.9	5,100	5	2	1.7	2.2	1.1	1.2	2 J	1.9	1.4	1.6	2	1.5	1.7 J	2.2	1.1
Silver	–	5100	34	1.1 U	1.1 U	1.2 U	1.4 U	1.4 U	1.2 U	1.2 U	1.1 U	1.2 U	1.1 U	1.4 U	1.2 U	1.4	1.1
Sodium	6,000-8,000	–	–	302	345	393	608	538	757	476	409	563	422	762	460	762	302
Thallium	–	67	–	1.2 U	1.1 U	1.2 U	1.4 U	1.4 U	1.2 U	1.2 U	1.1 U	1.2 U	1.1 U	1.3 U	1.2 U	1.4	1.1
Vanadium	1-300	7,200	6,000	15.8	12.3	13.8	13.4	9.3	12.4	10.1	15.5	16.4	13.7	17	12.5	17	9.3
Zinc	9-50	100,000	12,000	81.3 J	405 J	48.7 J	294 J	37.8 J	69.6	154 J	47.7 J	222 J	84.2 J	605 J	64.2 J	605	37.8
Others																	
Percent Solids, %				86.3	90.9	81.6	72.7	69.1	83.1	78.9	87.9	78.2	85.6	72	81.4	90.9	69.1
pH				8.32	8.46	7.14	8.49	7.05	10.1	7.74	7.69	7.91	7.26	7.95	7.5	10.1	7.05
Total Organic Carbon, %				0.56	0.18	0.5	1.8	1.6	1.3	0.63	0.35	0.49	0.48	1.7	0.29	1.8	0.18

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services. The analytical results for the SVOC, 3-Nitroaniline, was rejected during data validation for each sample.
3. Soil criteria from U.S.EPA, Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (October 2002) and from range of background metals concentrations measured in soil found in the eastern United States from NYSDEC Division of Technical and Administrative Guidance Memorandum (TAGM) #4046.

** A New York State Background value

*** Background levels for lead vary widely, average levels in undeveloped, rural areas range from 4-61 ppm while metropolitan/suburban areas range from 200-500 ppm.

J = indicates a laboratory estimated value or estimated as a result of data validation.

U = indicates compound was not detected at or above the listed detection limit.

UJ = indicates compound was not detected above the listed detection limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the compound in the sample.

R= indicates data rejected by data validator.

fbgs = feet below ground surface

SB = Site Background

– = indicates value does not exist.

▨ indicates concentration above soil criteria.

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TABLE 4-7

SUMMARY OF LANDFILL GAS ANALYTICAL RESULTS

Peter Cooper Site
Gowanda, New York

		Sample ID and Landfill Gas Monitoring Well Location		
		101200081	*101200080*	*101200082*
		GMW-1	*GMW-2*	*GMW-3*
Constituent	*Unit*	*10/12/00*	*10/12/00*	*10/12/00*
Field Measured Parameters				
Lower Explosive Limit	%	>100	45	>100
Hydrogen Sulfide Gas	ppm	>1000	>1000	710
Oxygen	%, v/v	0.5	21.3	17.5
Carbon Monoxide	ppm	1	0	6
PID Measurements	ppm	2.5	325	13
Laboratory Parameters				
Oxygen + Argon	%, v/v	6.58	22.1	12.9
Nitrogen	%, v/v	52.5	77.6	57.2
Methane	%, v/v	31.1	0.145	18.7
Carbon Dioxide	%, v/v	9.8	0.136	11.2
Chloromethane	ug/m^3	<25	<2	<25
Vinyl Chloride	ug/m^3	<25	<2	<25
Bromomethane	ug/m^3	<25	<2	<25
Chloroethane	ug/m^3	<25	<2	<25
Acetone	ug/m^3	1200	150	2900
Trichlorofluoromethane	ug/m^3	<25	1.7 TR	<25
1,1-Dichloroethene	ug/m^3	<25	<2	<25
Methylene chloride	ug/m^3	<25	<2	<25
Trichlorotrifluoroethane	ug/m^3	<25	<2	<25
Carbon Disulfide	ug/m^3	250	93	3200
trans-1,2-Dichloroethene	ug/m^3	<25	<2	<25
1,1-Dichloroethane	ug/m^3	<25	<2	<25
Methyl tert-Butyl Ether	ug/m^3	<25	<2	<25
Vinyl Acetate	ug/m^3	<25	14	<25
2-Butanone	ug/m^3	290	43	1100
cis-1,2-Dichloroethene	ug/m^3	<25	<2	<25
Chloroform	ug/m^3	<25	<2	<25
1,2-Dichloroethane	ug/m^3	<25	<2	<25
1,1,1-Trichloroethane	ug/m^3	<25	<2	<25
Benzene	ug/m^3	180	<2	74
Carbon Tetrachloride	ug/m^3	<25	<2	<25
1,2-Dichloropropane	ug/m^3	<25	<2	<25
Bromodichloromethane	ug/m^3	<25	<2	<25
Trichloroethene	ug/m^3	<25	<2	<25
cis-1,3-Dichloropropene	ug/m^3	<25	<2	<25
4-Methyl-2-pentanone	ug/m^3	370	3.4	140
trans-1,3-Dichloropropene	ug/m^3	<25	<2	<25
1,1,2-Trichloroethane	ug/m^3	<25	<2	<25
Toluene	ug/m^3	2600	41	270
2-Hexanone	ug/m^3	<25	7	<25
Dibromochloromethane	ug/m^3	<25	<2	<25

TABLE 4-7

SUMMARY OF LANDFILL GAS ANALYTICAL RESULTS

Peter Cooper Site
Gowanda, New York

		Sample ID and Landfill Gas Monitoring Well Location		
		101200081	*101200080*	*101200082*
		GMW-1	*GMW-2*	*GMW-3*
Constituent	*Unit*	*10/12/00*	*10/12/00*	*10/12/00*
1,2-Dibromoethane	ug/m^3	<25	<2	<25
Tetrachloroethene	ug/m^3	<25	<2	<25
Chlorobenzene	ug/m^3	<25	<2	<25
Ethylbenzene	ug/m^3	66	3.5	84
m- & p-Xylenes	ug/m^3	99	3.3	130
Bromoform	ug/m^3	<25	<2	<25
Styrene	ug/m^3	<25	<2	20 TR
o-Xylene	ug/m^3	51	1.4 TR	60
1,1,2,2-Tetrachloroethane	ug/m^3	<25	<2	<25
1,3-Dichlorobenzene	ug/m^3	<25	<2	<25
1,4-Dichlorobenzene	ug/m^3	48	<2	<25
1,2-Dichlorobenzene	ug/m^3	<25	<2	<25

Notes:
1. Qualifications reflect the 100% data validation performed by Data Validation Services.
2. Sample locations shown on Plate 1.
< = none detected
TR = trace value

TAB

ANALYTICAL RESULTS FOR OVERBURDEN GROUNDWATER SAMPLES FROM THE INACTIVE LANDFILL AREA

Peter Cooper Site
Gowanda, New York

Compound[2]	Groundwater Criteria[3]	Sample Location, Identification and Date Collected[1]																Maximum Conc.	Minimum Conc.
		MW-1SR		MW-2SR		MW-3SR		MW-4S		MW-5S		MW-6S		MW-7S		MW-8S			
		111000120 11/10/2000	050101123 5/1/2001	110700108 11/7/2000	050401147 5/4/2001	110700109 11/7/2000	050201136 5/2/2001	111000117 11/10/2000	050301144 5/3/2001	110900112 11/9/2000	050301143 5/3/2001	110700110 11/7/2000	050401152 5/4/2001	111000116 11/10/2000	050401151 5/4/2001	110800091 11/8/2000	043001121 4/30/2001		
Volatile Organic Compounds, micrograms per liter																			
Benzene	1	10 U	10 U	100 U	10 U	100 U	10 UJ	100 U	1.3 J	10 U	10 U	1.6 J	1.5 J	10 U	10 U	10 U	10 U	100 U	1.3 J
Chlorobenzene	5	10 U	10 U	100 U	10 U	100 U	10 UJ	100 U	47	10 U	10 U	160	190	10 U	10 U	10 U	10 U	190	10 UJ
1,2-Dichlorobenzene	3	10 U	10 U	100 U	10 U	100 U	10 UJ	100 U	5 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	5 J
1,4-Dichlorobenzene	3	10 U	10 U	100 U	10 U	100 U	10 UJ	100 U	2.4 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	2.4 J
Ethylbenzene	5	10 U	10 U	100 U	10 U	100 U	1.6 J	100 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	1.6
m/p-Xylene	5	10 U	10 U	100 U	10 U	100 U	10 UJ	100 U	1 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	1 J
o-Xylene	5	10 U	10 U	100 U	10 U	100 U	10 UJ	100 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U
Toluene	5	10 U	10 U	100 U	10	17 J	10 J	100 U	3.2 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	3.2 J
Semi-Volatile Organic Compounds, micrograms per liter																			
2-Chlorophenol	--	R	9.4 U	10 U	9.4 U	20 U	9.7 U	10 U	9.4 U	10 U	9.4 U	1.4 J	1.8 J	10 U	9.4 U	10 U	9.4 U	20 U	1.4 J
2,4-Dichlorophenol	5*	R	9.4 U	10 U	69.4 U	20 U	9.7 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	69.4 U	9.4 U
2,4-Dimethylphenol	50*	R	9.4 U	10 U	9.4 U	2.6 J	3 J	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	2.6 J
2,4-Dinitrophenol	10*	R	24 U	50 U	24 U	100 UJ	24 U	50 UJ	24 U	50 UJ	24 U	50 UJ	24 U	50 UJ	24 U	50 U	24 U	100 UJ	24 U
4,6-Dintiro-2-methylphenol	--	R	24 U	50 U	24 U	100 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	100 U	24 U
4-Chloro-3-Methylphenol	--	R	9.4 U	10 U	9.4 U	20 U	9.7 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	20 U	9.4 U
2-Methylphenol	--	R	9.4 U	1.3 J	8.2 J	18 J	8.1 J	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	18 J	1.3 J
4-Methylphenol	--	R	9.4 U	96	1400 D	210	2400 D	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	2400 D	9.4 U
2-Nitrophenol	--	R	9.4 U	10 U	9.4 U	20 U	9.7 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	20 U	9.4 U
4-Nitrophenol	--	R	24 U	50 U	24 U	100 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	100 U	24 U
Pentachlorophenol	1	R	24 U	50 U	24 U	100 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	100 U	24 U
Phenol	1	R	9.4 U	15	220 DJ	38	480 DJ	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	480 DJ	9.4 U
2,4,6-Trichlorophenol	--	R	9.4 U	10 U	9.4 U	20 U	9.7 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	20 U	9.4 U
2,4,5-Trichlorophenol	--	R	24 U	10 U	24 U	20 U	24 U	10 U	24 U	10 U	24 U	10 U	24 U	10 U	24 U	10 U	24 U	24 U	10 U
Total Metals, milligrams per liter																			
Arsenic	0.025	0.01 U	0.01 U	0.151	0.196	0.0621	0.0479 J	0.0714	0.0582	0.01 U	0.01 U	0.0338	0.025 U	0.0172	0.025 U	0.01 U	0.01 U	0.196	0.01 U
Calcium	--	286	213	160	209	127	164	116	209	323	473	203	213	106	235	179	167	473	106
Chromium	0.05	0.01 U	0.01 U	0.143	0.251	0.436	0.366	0.209	0.371	0.01 U	0.01 U	0.0293	0.0228	0.0137	0.01 UJ	0.01 U	0.01 U	0.436	0.01 U
Hexavalent Chromium	0.05	0.01 U	(0.01 U) R	0.01 U	(0.02 U) R	0.04 U	(0.01 U) R	0.0215	(0.04 U) R	0.01 U	(0.01 U) R	0.01 U	(0.01 U) R	0.01 UJ	0.0172 J	0.01 U	(0.01 U) R	0.04 U	0.01 U
Iron	0.3	0.1 U	0.1 U	0.107	0.1 U	0.1 U	0.13	0.1 U	0.14	23	41	13.4	16.6	9.04	2.29	10.5	11.7	41	0.1 U
Magnesium	35*	25	16.8	90.2	154	167	136	83.6	150	41.6	37	73.9	61.8	22.9	34	25.7	20.7	167	16.8
Potassium	--	6.4	4.28	4.07	5.74	5.83	5.93	8.88	9.49	9.86	7.87	5.85	4.67	37.6	22.2	5.1	4.28	37.6	4.07
Sodium	20	11.6	9.08	17.6	22.1	20.9	18.5	22.1	26.1	25.8	12.4	8.31	5 U	1670	229	28.2	28.6	1670	5 U
Zinc	2*	0.0223	0.0297	0.0208	0.03 U	0.02 U	0.0234 J	0.02 U	0.02 U	0.178	0.02 U	0.02 U	0.03 U	0.151	0.03 U	0.0656	0.204	0.204	0.02 U
Soluble Metals[4], milligrams per liter																			
Arsenic	0.025	NA	NA	NA	NA	NA	0.0538 J	NA	NA	NA	NA	NA	NA	0.0145	NA	NA	NA	0.0538 J	0.0145
Calcium	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	114	NA	NA	NA	114	114
Chromium	0.05	NA	NA	NA	NA	NA	0.354	NA	NA	NA	NA	NA	NA	0.01 UJ	NA	NA	NA	0.354	0.01 UJ
Hexavalent Chromium	0.05	NA	NA	NA	NA	NA	(0.01 U) R	NA	NA	NA	NA	NA	NA	0.013 J	NA	NA	NA	0.013 J	0.013 J
Iron	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.61	NA	NA	NA	4.61	4.61
Magnesium	35*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	23.7	NA	NA	NA	23.7	23.7
Potassium	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	38.5	NA	NA	NA	38.5	38.5
Sodium	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1630	NA	NA	NA	1630	1630
Zinc	2*	NA	NA	NA	NA	NA	0.105 J	NA	NA	NA	NA	NA	NA	0.079	NA	NA	NA	0.105 J	0.079

ANALYTICAL RESULTS FOR OVERBURDEN GROUNDWATER SAMPLES FROM THE INACTIVE LANDFILL AREA

Peter Cooper Site
Gowanda, New York

Compound[2]	*Groundwater Criteria[3]*	*Sample Location, Identification and Date Collected[1]*																*Maximum Conc.*	*Minimum Conc.*
		MW-1SR		*MW-2SR*		*MW-3SR*		*MW-4S*		*MW-5S*		*MW-6S*		*MW-7S*		*MW-8S*			
		111000120 *11/10/2000*	*050101123* *5/1/2001*	*110700108* *11/7/2000*	*050401147* *5/4/2001*	*110700109* *11/7/2000*	*050201136* *5/2/2001*	*111000117* *11/10/2000*	*050301144* *5/3/2001*	*110900112* *11/9/2000*	*050301143* *5/3/2001*	*110700110* *11/7/2000*	*050401152* *5/4/2001*	*111000116* *11/10/2000*	*050401151* *5/4/2001*	*110800091* *11/8/2000*	*043001121* *4/30/2001*		
Other Geochemical Data, milligrams per liter																			
Ammonia	2	3.26	1.05	523	633	837	693	NA	810	23.9	6.32	219	153	151	93.7	2.49	2.29	837	1.05
Bicarbonate Alkalinity	--	469	433	2250	3200	3720	3350	2570	3850	622	410	1610	1280	1480	1000	371	321	3850	321
Carbonate Alkalinity	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Chloride	250	8.13	9.74	21.7	17.2	32.8	22.7	NA	26.4	6.82	6.9	10.6	3.82	2310	587	22.3	61.5	2310	3.82
Ferrous Iron	--	NA	0.1 U	0.128 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.128 J	0.1 U
Nitrate Nitrogen	10	1.16	1.72	0.5 U	0.04 U	0.5 U	0.05 U	NA	0.05 U	0.5 UJ	0.05 U	0.5 UJ	0.0502	22.7	0.05 U	0.5 U	0.5 U	22.7	0.04 U
Soluble Organic Carbons	--	4.2225 U	NA	56.0	NA	113	102.5	57.4	NA	5.98	NA	16.5	NA	78.3	NA	5.72 U	NA	112.75	4.2225 U
Sulfate	250	416	168	463	48.2	24.0	99.3	NA	209	575	966	2.64	4.22	127	236	260	181	966	2.64
Total Alkalinity	--	469	433	2250	3200	3720	3350	2570	3850	622	410	1610	1280	1480	1000	371	321	3850	321
Total Dissolved Solids	--	1070	NA	729	NA	995	NA	NA	NA	1290	NA	839	NA	4900	NA	770	NA	4900	729
Total Hardness	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	570	NA	570	570
Total Kjeldahl Nitrogen	--	3.2	1.51	494	625	762	698	NA	839	22.8	6.41	227	148	165	90.3	2.37	2.65	839	1.51
Total Organic Carbon	--	2.8775 U	2.62	56.45	187.50	112.75	105.00	55.35	90.03	5.85 U	7.59	15.45	12.08	70.13	21.25	3.36 U	2.43	187.5	2.43
Total Sulfide	0.05*	1 U	2 U	38.0	55	52.0	37.0 J	34.0	19 J	1 U	2 UJ	1 U	1 UJ	1 U	1 UJ	1.1 U	2 U	55	1 UJ
Total Suspended Solids	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	13.1	NA	13.1	13.1
Turbidity, NTU	--	NA	0.37	NA	NA	NA	150	NA	NA	NA	NA	NA	NA	NA	NA	NA	43.8	150	0.37
Field Measured Parameters[5]																			
Conductivity (uS/cm)	--	998	1063	3684	5780	5119	5704	3993	7117	1376	2185	2244	2230	6358	2986	1102	1085	7117	998
Dissolved Oxygen (ppm)	--	4.34	1.04	1.43	3.33	1.63	0.28	3.79	5.37	2.28	5.26	9.34	0.2	--	1.22	0.63	0.5	9.34	0.2
Ferrous Iron (mg/l)	--	0	0	NA	0	0	0	0	0	17.5 (5x dil)	6	12	5	--	2	--	6	17.5 (5X dil)	0
Oxidation Reduction Potential (mV)	--	11.9	291.1	-371.6	-291.4	-369.1	-327.8	-365.5	-356.3	-95.2	-27.9	-196.4	-60.3	-96.9	53.5	-74.7	-37.7	291.1	-371.6
pH (pH units)	--	6.41	6.63	7.03	7.9	7.08	5.21	7.16	6.01	6.68	4.39	6.69	5.55	7.18	5.79	6.71	6.08	7.9	4.39
Temperature (°C)	--	12.91	11.6	14.19	11.32	15.46	15.96	11.77	13.7	15.53	11.35	14.93	10.31	12.81	12.26	16.7	14.93	16.7	10.31
Turbidity, NTU	--	3	127.9	4.72	46.1	3.24	25.5	26	1.5	14	3.4	1.07	--	>1000	--	0.84	70.6	127.9	0.84

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Groundwater critiera for Class GA groundwater as provided in Division of Water Technical and Operational Series (1.1.1). Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, October 22, 1993, reissued June 1998.
   * values are guidance values.
4. Samples collected for soluble metals analysis were field filtered.
5. The YSI 600XL was used in the November and May sampling events for temperature, pH, specific electrical conductance, dissolved oxygen,and redox potential measurements.
   Ferrous iron was field measured with the HACH18-R field kit (for QC, 10% were sent to analytical laboratory). The turbidity measurements on the YSI 600 XL were not accurate during the May sampling event and as such, the LaMotte turbidity meter was used to measure turbidity. Turbidity measurements were collected with the TURB2020 meter during the November sampling event.
   November sampling events.

mg/l = milligrams per liter
NA = not analyzed
(values) = laboratory reported value prior to data validation.
NTU = Nephelometric Turbidity Unit
uS/cm = microsiemens per centimeter at 25°C.
mV = millivolts
ppm = parts per million

J = indicates an estimated value.
U = indicates compound was not detected.
D = indicates spike diluted out.
R= indicates value was rejected by data validator.
▨ indicates exceedance of groundwater criteria.
UJ = indicates compound was not detected above the listed detection limit.
However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitiation necessary to accurately and precisely measure the compound in the sample.

ANALYTICAL RESULTS FOR BEDROCK GROUNDWATER SAMPLES FROM THE INACTIVE LANDFILL AREA

Peter Cooper Site
Gowanda, New York

Constituent[2]	Groundwater Criteria[3]	*Sample Location and Date Collected*[1]														Maximum Conc.	Minimum Conc.
		MW-1D		*MW-2D*		*MW-4D2*		*MW-4D(R)*		*MW-5D*		*MW-7D*		*MW-8D*			
		111000119 *11/10/2000*	*050101124* *5/1/2001*	*110800107* *11/8/2000*	*050401148* *5/4/2001*	*110900115* *11/9/2000*	*050301146* *5/3/2001*	*111000118* *11/10/2000*	*050301145* *5/3/2001*	*110900111* *11/9/2000*	*050301141* *5/3/2001*	*110700105* *11/7/2000*	*050401149* *5/4/2001*	*110900114* *11/9/2000*	*040301122* *4/30/2001*		
Volatile Organic Compounds, micrograms per liter																	
Benzene	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10	6.8 J	10 U	10 U	10 U	10 U	10 U	10 U	10	6.8 J
1,2-Dichlorobenzene	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
m/p-Xylene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
o-Xylene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	5	10 U	10 U	10 U	10 U	1.5 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1.5 J
Semi-Volatile Organic Compounds, micrograms per liter																	
2-Chorophenol	--	10 U	9.4 U	10 U	9.4 U	10 U	10 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U
2,4,5-Trichlorophenol	--	10 U	24 U	10 U	24 U	10 U	26 U	10 U	24 U	10 U	24 U	10 U	24 U	10 U	24 U	26 U	10 U
2,4,6-Trichlorophenol	--	10 U	9.4 U	10 U	9.4 U	10 U	10 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U
2,4-Dichlorophenol	5*	10 U	9.4 U	10 U	9.4 U	10 U	10 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U
2,4-Dimethylphenol	50*	10 U	9.4 U	10 U	9.4 U	10 U	10 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U
2,4-Dinitrophenol	10*	50 UJ	24 U	50 U	24 U	50 UJ	26 U	50 UJ	24 U	50 UJ	24 U	50 U	24 U	50 UJ	24 U	50 UJ	24 U
2-Methylphenol	--	10 U	9.4 U	10 U	9.4 U	10 U	10 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U
2-Nitrophenol	--	10 U	9.4 U	10 U	9.4 U	10 U	10 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U
4,6-Dintiro-2-Methylphenol	--	50 U	24 U	50 U	24 U	50 U	26 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U
4-Chloro-3-Methylphenol	--	10 U	9.4 U	10 U	9.4 U	10 U	10 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U
4-Methylphenol	--	10 U	9.4 U	10 U	9.4 U	10 U	10 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U
4-Nitrophenol	--	50 U	24 U	50 U	24 U	50 U	26 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U
Pentachlorophenol	1	50 U	24 U	50 U	24 U	50 U	26 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U	50 U	24 U
Phenol	1	10 U	9.4 U	10 U	9.4 U	10 U	10 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U	10 U	9.4 U
Total Metals, milligrams per liter																	
Arsenic	0.025	0.01 U	0.01 U	0.0248	0.0283 U	0.01 U	0.0483 J	0.0192	0.01 U	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.01 U	0.0483 J	0.01 U
Calcium	--	18.8	28.3	232	252	49.9	59.8	206	211	562	586	21.6	54	27.5	45.2	586	18.8
Chromium	0.05	0.01 U	0.0113	0.0524	0.0551	0.0134	0.0492	0.133	0.088	0.01 U	0.01 U	0.01 U	0.01 UJ	0.01 U	0.0155	0.133	0.01 U
Hexavalent Chromium	0.05	0.01 U	(0.01 U) R	40 U	0.0592 J	0.01 U	(0.01 U) R	(0.01 U) R	(0.01 U) R	0.01 U	(0.01 U) R	0.01 U	0.0225 J	0.01 U	(0.01 U) R	40 U	0.01 U
Iron	0.3	13.5	16.1 J	0.146	0.115	8.45	70	1.98	4.81	66.9	71.4	0.378	1.81	6.92	8.4	71.4	0.115
Magnesium	35*	6.81	8.3	104	107	15.9	22.5	89.4	75.2	36	35.4	5.84	15.7	9.05	2.6	107	2.6
Potassium	--	2.59	2.66	24.3	25.2	7.69	13.9	23.7	20.8	3.43	3.76	3.33	4.69	4.24	5.28	25.2	2.59
Sodium	20	154	144	295	297	950	1030	197	185	21.2	27	384	347	163	109	1030	21.2
Zinc	2*	0.042	0.0652	0.14	0.03 U	0.118	0.416	0.02 U	0.0451	0.0348	0.02 U	0.02 U	0.03 U	0.0655	0.561	0.561	0.02 U
Soluble Metals[4], milligrams per liter																	
Arsenic	0.025	0.01 U	0.01 U	NA	NA	NA	0.025 U	0.0152	0.025 U	NA	NA	NA	NA	NA	0.01 U	0.025 U	0.01 U
Calcium	--	14.9	24.5	NA	NA	NA	NA	209	NA	NA	NA	NA	NA	NA	NA	209	14.9
Chromium	0.05	0.01 U	0.01 U	NA	NA	NA	0.0114	0.134	0.0821	NA	NA	NA	NA	NA	(0.01 U) UJ	0.134	0.01 U
Hexavalent Chromium	0.05	0.01 U	(0.01 U) R	NA	NA	NA	0.0103 J	0.01 U	(0.01 U) R	NA	NA	NA	NA	NA	0.0118 J	0.0118 J	0.01 U
Iron	0.3	0.708	0.105	NA	NA	NA	NA	0.926	NA	NA	NA	NA	NA	NA	NA	0.926	0.105
Magnesium	35*	4.76	6.88	NA	NA	NA	NA	90.8	NA	NA	NA	NA	NA	NA	NA	90.8	4.76
Potassium	--	2 U	2.07	NA	NA	NA	NA	24.4	NA	NA	NA	NA	NA	NA	NA	24.4	2 U
Sodium	20	154	140	NA	NA	NA	NA	203	NA	NA	NA	NA	NA	NA	NA	203	140
Zinc	2*	0.02 U	0.0236	NA	NA	NA	0.0784	0.02 U	0.03 U	NA	NA	NA	NA	NA	0.02 U	0.0784	0.02 U

ANALYTICAL RESULTS FOR BEDROCK GROUNDWATER SAMPLES FROM THE INACTIVE LANDFILL AREA

Peter Cooper Site
Gowanda, New York

		Sample Location and Date Collected[1]															
		MW-1D		*MW-2D*		*MW-4D2*		*MW-4D(R)*		*MW-5D*		*MW-7D*		*MW-8D*			
	Groundwater	*111000119*	*050101124*	*110800107*	*050401148*	*110900115*	*050301146*	*111000118*	*050301145*	*110900111*	*050301141*	*110700105*	*050401149*	*110900114*	*040301122*	***Maximum***	***Minimum***
Constituent[2]	***Criteria***[3]	*11/10/2000*	*5/1/2001*	*11/8/2000*	*5/4/2001*	*11/9/2000*	*5/3/2001*	*11/10/2000*	*5/3/2001*	*11/9/2000*	*5/3/2001*	*11/7/2000*	*5/4/2001*	*11/9/2000*	*4/30/2001*	***Conc.***	***Conc.***
Other Geochemical Data, milligrams per liter																	
Ammonia	2	0.826	0.8	353	349	9.35	8.99	241	186	10.4	10.5	1.31	1.8	0.762	0.716	353	0.716
Bicarbonate Alkalinity	--	274	260	1980	1980	1100	2000	2010	1550	289	275	902	620	350	4.67	2010	4.67
Carbonate Alkalinity	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	85.3	85.3	2 U
Chloride	250	111	98.5	177	148	579	914	62.5	44.6	14.2	11	249	444	87.1	148	914	11
Ferrous Iron	--	NA	NA	NA	NA	NA	NA	0.524	NA	NA	22	NA	NA	NA	NA	22	0.524
Nitrate Nitrogen	10	0.5 U	0.5 U	0.5 U	0.0548	0.5 U	0.715	0.5 U	0.05 U	0.5 UJ	0.484	0.5 U	0.0753	0.5 UJ	0.548	0.715	0.05 U
Soluble Organic Carbon	--	1.43 U	7.87 J	42.1	NA	12.275	12.7 J	40.925	39.625 J	3.5325 U	NA	3.835 U	NA	2.5925 U	16.15	42.1	1.43 U
Sulfate	250	2.07	10.4	715	745	13.2	3.4	162	266	1620	1460	30.5	50.8	17.4	30.7	1620	2.07
Total Alkalinity	--	274	260	1980	1980	1100	2000	2010	1550	289	275	902	620	350	90	2010	90
Total Dissolved Solids	--	451	NA	1930	NA	1980	NA	1170	NA	2460	NA	1070	NA	533	NA	2460	451
Total Kjeldahl Nitrogen	--	1.37	1.37	336	351	11.3	10.4	238	181	10.1	10.2	2.06	2.73	1.29	2.05	351	1.29
Total Organic Carbon	--	1.06 U	3.165 J	38.9	31.45	11.675	10.6 J	41.775	31.625 J	3.6975 U	5.31	3.775 U	5.495	1.61	15.45	41.775	1.06 U
Total Sulfide	0.05*	1 U	1.2	9.7	6.4 J	1 U	2 UJ	7.6	6.8	1 U	2 U	1 U	1.2 J	1 U	2 U	9.7	1 U
Field Measured Parameters[5]																	
pH (pH units)	--	7.77	5.98	6.59	6.54	7.2	6.12	6.73	6.47	6.19	4.83	7.23	6.28	7.9	10.68	10.68	4.83
Conductivity (uS/cm)	--	528	826	4802	1595	2454	5006	2672	3214	1920	2538	1689	1642	994	711	5006	528
Temperature (°C)	--	11.37	15.48	13.51	13.59	14.82	12.14	13.01	19.75	13.4	12.23	12.05	12.97	14.94	17.15	19.75	11.37
Turbidity (NTU)	--	>1000	579	2	9.6	51.8	276.5	72	321	3.34	16.1	2.89	35.8	33	1049	1049	2
Oxidation Reduction Potential (mV)	--	-191.6	-149	-283.3	-112.2	-92.8	-46.9	-330.5	-266.6	-94.9	6.6	-146.5	-9.1	-35.9	202.5	202.5	-330.5
Dissolved Oxygen (ppm)	--	2.94	0.77	0.63	7.32	3.1	7.9	8.31	1.26	1.73	0.45	0.91	0.91	4.49	2.82	8.31	0.45
Ferrous Iron (mg/l)	--	0.6	0	0	0	0	0.6	0.2	0	4.5	6.4	0.2	0	0	0	6.4	0

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Groundwater criteria for Class GA groundwater as provided in Division of Water Technical and Operational Series (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, October 22, 1993, reissued June 1998.
   * Values are guidance values.
4. Samples collected for soluble metals analysis were field filtered.
5. The YSI 600XL was used in the November and May sampling events for temperature, pH, specific electrical conductance, dissolved oxygen,and redox potential measurements. Ferrous iron was field measured with the HACH18-R field kit (for QC, 10% were sent to analytical laboratory). The turbidity measurements on the YSI 600 XL were not accurate during the May sampling event and as such, the LaMotte turbidity meter was used to measure turbidity. Turbidity measurements were collected with the TURB2020 meter during the November sampling event.

NA = not analyzed
-- = indicates value does not exist.
mg/l = milligrams per liter
NTU = Nephelometric Turbidity Unit
uS/cm = microsiemens per centimeter at 25°C.
ppm = parts per million
mV = millivolts

J = indicates an estimated value.
U = indicates compound was not detected.
R= indicates data rejected by data validator.
(value) = indicates value reported before data validation.
▨ indicates exceedance of groundwater criteria.
UJ = indicates compound was not detected above the listed detection limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitiation necessary to accurately and precisely measure the compound in the sample.

TABLE 4-10

ANALYTICAL RESULTS FOR OVERBURDEN GROUNDWATER FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

		Sample Location, Identification and Date Collected [1]					
		MWFP-2S		*MWFP-3S*			
Constituent [2]	*Groundwater Criteria* [3]	*110700106 11/7/2000*	*050301140 5/3/2001*	*110700088 11/7/2000*	*050201128 5/2/2001*	*Maximum Conc.*	*Minimum Conc.*
Volatile Organic Compounds, micrograms per liter							
Acetone	50*	22	NA	10 U	NA	22	10 U
Benzene	1	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	50*	10 U	NA	10 U	NA	10 U	10 U
Bromoform	50*	10 U	NA	10 U	NA	10 U	10 U
Bromomethane	5	10 U	NA	10 U	NA	10 U	10 U
2-Butanone (MEK)	50*	10 U	NA	10 U	NA	10 U	10 U
Methyl tert-Butyl Ether	--	10 U	NA	10 U	NA	10 U	10 U
Carbon Disulfide	--	10 U	NA	10 U	NA	10 U	10 U
Carbon Tetrachloride	5	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	5	10 U	NA	10 U	NA	10 U	10 U
Chloroethane	5	10 U	NA	10 U	NA	10 U	10 U
Chloroform	7	10 U	10 U	10 U	10 U	10 U	10 U
Chloromethane	--	10 U	NA	10 U	NA	10 U	10 U
1,2-Dibromo-3-chloropropane	0.04	10 U	NA	10 U	NA	10 U	10 U
Cyclohexane	--	11	NA	10 U	NA	11	10 U
Dibromochloromethane	50*	10 U	NA	10 U	NA	10 U	10 U
1,2-Dibromoethane	--	10 U	NA	10 U	NA	10 U	10 U
1,2-Dichlorobenzene	3	10 U	NA	10 U	NA	10 U	10 U
1,4-Dichlorobenzene	3	10 U	NA	10 U	NA	10 U	10 U
1,3-Dichlorobenzene	3	10 U	NA	10 U	NA	10 U	10 U
Dichlorodifluoromethane	5	10 U	NA	10 U	NA	10 U	10 U
1,1-Dichloroethane	5	10 U	NA	2 J	NA	10 U	2 J
1,2-Dichloroethane	0.6	10 U	NA	10 U	NA	10 U	10 U
1,1-Dichloroethene	5	10 U	NA	10 U	NA	10 U	10 U
trans-1,2-Dichloroethene	5	10 U	NA	10 U	NA	10 U	10 U
cis-1,2-Dichloroethene	5	10 U	NA	5 J	NA	10 U	5 J
1,2-Dichloropropane	1	10 U	NA	10 U	NA	10 U	10 U
trans-1,3-Dichloropropene	0.4	10 U	NA	10 U	NA	10 U	10 U
cis-1,3-Dichloropropene	0.4	10 U	NA	10 U	NA	10 U	10 U
Ethylbenzene	5	10 U	NA	10 U	NA	10 U	10 U
2-Hexanone	50*	10 U	NA	10 U	NA	10 U	10 U
Isopropylbenzene	5	10 U	NA	10 U	NA	10 U	10 U
Methyl Acetate	--	10 U	NA	10 U	NA	10 U	10 U
Methylcyclohexane	--	16	NA	10 U	NA	16	10 U
Methylene Chloride	5	10 U	NA	10 U	NA	10 U	10 U
4-Methyl-2-Pentanone	--	10 U	NA	10 U	NA	10 U	10 U
Styrene	5	10 U	NA	10 U	NA	10 U	10 U
1,1,2,2-Tetrachloroethane	5	10 U	NA	10 U	NA	10 U	10 U
Tetrachloroethene	5	10 U	10 U	5.5 J	3.1 J	10 U	3.1 J
Toluene	5	10 U	NA	10 U	NA	10 U	10 U
1,2,4-Trichlorobenzene	5	10 U	NA	10 U	NA	10 U	10 U
1,1,1-Trichloroethane	5	10 U	NA	10 U	NA	10 U	10 U
1,1,2-Trichloroethane	1	10 U	NA	10 U	NA	10 U	10 U
Trichloroethene	5	10 U	10 U	2.9 J	3.6 J	10 U	2.9 J
Trichlorofluoromethane	5	10 U	NA	10 U	NA	10 U	10 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	10 U	NA	10 U	NA	10 U	10 U
Vinyl Chloride	2	10 U	NA	10 U	NA	10 U	10 U
m-/p-Xylene	5	4.6	NA	10 U	NA	10 U	4.6
o-Xylene	5	1.9	NA	10 U	NA	10 U	1.9
Semi-Volatile Organic Compounds, micrograms per liter							
Acenaphthene	20*	10 U	NA	10 U	NA	10 U	10 U
Acenaphthylene	--	10 U	NA	10 U	NA	10 U	10 U
Acetophenone	--	10 U	NA	10 U	NA	10 U	10 U
Anthracene	50*	10 U	NA	10 U	NA	10 U	10 U
Atrazine	7.5	10 U	NA	10 U	NA	10 U	10 U
Benzaldehyde	--	10 U	NA	10 U	NA	10 U	10 U
Benzo(a)anthracene	0.002	10 U	9.5 U	10 U	9.4 U	10 U	9.4 U
Benzo(a)pyrene	--	10 U	9.5 U	10 U	9.4 U	10 U	9.4 U
Benzo(b)fluoranthene	0.002*	10 U	9.5 U	10 U	9.4 U	10 U	9.4 U
Benzo(g,h,i)perylene	--	10 U	NA	10 U	NA	10 U	10 U
Benzo(k)fluoranthene	0.002*	10 U	NA	10 U	NA	10 U	10 U

TABLE 4-10

ANALYTICAL RESULTS FOR OVERBURDEN GROUNDWATER FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

Constituent[2]	*Groundwater Criteria*[3]	*Sample Location, Identification and Date Collected*[1]				*Maximum Conc.*	*Minimum Conc.*
		MWFP-2S		*MWFP-3S*			
		110700106 11/7/2000	*050301140 5/3/2001*	*110700088 11/7/2000*	*050201128 5/2/2001*		
1,1-Biphenyl	5	10 U	NA	10 U	NA	10 U	10 U
Butyl Benzyl Phthalate	50*	10 U	NA	10 U	NA	10 U	10 U
di-N-Butylphthalate	--	10 U	NA	1.1 J	NA	10 U	1.1 J
Caprolactam	--	290 D	NA	10 U	NA	290 D	10 U
Carbazole	--	10 U	NA	10 U	NA	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002*	10 U	9.5 U	10 U	9.4 U	10 U	9.4 U
4-Chloroaniline	5	10 U	NA	10 U	NA	10 U	10 U
bis(2-chloroethoxy)methane	--	10 U	NA	10 U	NA	10 U	10 U
bis(2-chloroethyl)ether	--	10 U	NA	10 U	NA	10 U	10 U
2-Chloronaphthalene	10*	10 U	NA	10 U	NA	10 U	10 U
2-Chlorophenol	--	10 U	NA	10 U	NA	10 U	10 U
2,2-oxybis(1-chloropropane)	--	10 U	NA	10 U	NA	10 U	10 U
Chrysene	0.002*	10 U	NA	10 U	NA	10 U	10 U
Dibenzo(a,h)anthracene	--	10 U	9.5 U	10 U	9.4 U	10 U	9.4 U
Dibenzofuran	--	10 U	NA	10 U	NA	10 U	10 U
3,3-Dichlorobenzidine	--	10 U	NA	10 U	NA	10 U	10 U
2,4-Dichlorophenol	5	10 U	NA	10 U	NA	10 U	10 U
Diethylphthalate	50*	10 U	NA	10 U	NA	10 U	10 U
Dimethyl Phthalate	50*	10 U	NA	10 U	NA	10 U	10 U
2,4-Dimethylphenol	50*	10 U	NA	10 U	NA	10 U	10 U
2,4-Dinitrophenol	10*	25 U	NA	25 U	NA	25 U	25 U
2,4-Dinitrotoluene	50	10 U	NA	10 U	NA	10 U	10 U
2,6-Dinitrotoluene	5	10 U	NA	10 U	NA	10 U	10 U
bis(2-Ethylhexyl)phthalate	--	4 J	NA	10 U	NA	10 U	4 J
Fluoranthene	50*	10 U	NA	10 U	NA	10 U	10 U
Fluorene	50*	10 U	NA	10 U	NA	10 U	10 U
Hexachlorobenzene	0.04	10 U	NA	10 U	NA	10 U	10 U
Hexachlorobutadiene	0.5	10 U	NA	10 U	NA	10 U	10 U
Hexachlorocyclopentadiene	5	10 U	NA	10 U	NA	10 U	10 U
Hexachloroethane	5	10 U	NA	10 U	NA	10 U	10 U
Isophorone	50*	10 U	NA	10 U	NA	10 U	10 U
2-Methylnaphthalene	--	10 U	NA	10 U	NA	10 U	10 U
4,6-Dinitro-2-Methylphenol	--	25 U	NA	25 U	NA	25 U	25 U
4-Chloro-3-Methylphenol	--	10 U	NA	10 U	NA	10 U	10 U
2-Methylphenol	--	10 U	NA	10 U	NA	10 U	10 U
4-Methylphenol	--	10 U	NA	10 U	NA	10 U	10 U
Naphthalene	10*	10 U	NA	10 U	NA	10 U	10 U
2-Nitroaniline	5	25 U	NA	25 U	NA	25 U	25 U
3-Nitroaniline	5	25 U	NA	25 U	NA	25 U	25 U
4-Nitroaniline	5	25 U	NA	25 U	NA	25 U	25 U
Nitrobenzene	0.4	10 U	NA	10 U	NA	10 U	10 U
2-Nitrophenol	--	10 U	NA	10 U	NA	10 U	10 U
4-Nitrophenol	--	25 U	NA	25 U	NA	25 U	25 U
n-Nitrosodiphenylamine	50*	10 U	NA	10 U	NA	10 U	10 U
di-n-Octyl Phthalate	--	10 U	NA	10 U	NA	10 U	10 U
Pentachlorophenol	1	25 U	NA	25 U	NA	25 U	25 U
Phenanthrene	50*	10 U	NA	10 U	NA	10 U	10 U
Phenol	1	10 U	NA	10 U	NA	10 U	10 U
4-Bromophenyl-Phenylether	--	10 U	NA	10 U	NA	10 U	10 U
4-Chlorophenyl-Phenylether	--	10 U	NA	10 U	NA	10 U	10 U
n-Nitroso-di-n-Propylamine	--	10 U	NA	10 U	NA	10 U	10 U
Pyrene	50*	10 U	NA	10 U	NA	10 U	10 U
2,4,6-Trichlorophenol	--	10 U	NA	10 U	NA	10 U	10 U
2,4,5-Trichlorophenol	--	25 U	NA	25 U	NA	25 U	25 U
Total Metals, milligrams per liter							
Aluminum	--	0.331	NA	0.406	NA	0.406	0.331
Antimony	0.003	0.06 U	NA	0.06 U	NA	0.06 U	0.06 U
Arsenic	0.025	0.01 U	NA	0.01 U	NA	0.01 U	0.01 U
Barium	1.0	0.112	NA	0.103	NA	0.112	0.103
Beryllium	0.003*	0.005 U	NA	0.005 U	NA	0.005 U	0.005 U
Cadmium	0.005	0.005 U	NA	0.005 U	NA	0.005 U	0.005 U
Calcium	--	313	337	360	312	360	312
Chromium	0.050	0.0114	14	0.01 U	0.01 U	14	0.01 U
Hexavalent Chromium	0.050	0.01 U	(0.02 U) R	0.01 U	(0.01 U) R	0.01 U	(0.01 U) R

TABLE 4-10

ANALYTICAL RESULTS FOR OVERBURDEN GROUNDWATER FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

		Sample Location, Identification and Date Collected[1]					
		MWFP-2S		*MWFP-3S*			
	Groundwater	*110700106*	*050301140*	*110700088*	*050201128*	*Maximum*	*Minimum*
Constituent[2]	*Criteria*[3]	*11/7/2000*	*5/3/2001*	*11/7/2000*	*5/2/2001*	*Conc.*	*Conc.*
Cobalt	--	0.05 U	NA	0.05 U	NA	0.05 U	0.05 U
Copper	0.200	0.02 U	NA	0.02 U	NA	0.02 U	0.02 U
Iron	0.300	0.535	4.21	16	5.51	16	0.535
Lead	0.025	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Magnesium	35*	32.8	26.4	17.5	17	32.8	17
Manganese	0.300	0.43	0.68	2.08	1.49	2.08	0.43
Mercury	0.0007	0.0003 U	NA	0.0003 U	NA	0.0003 U	0.0003 U
Nickel	0.100	0.04 U	NA	0.04 U	NA	0.04 U	0.04 U
Potassium	--	10.7	6.41	6.6	4.63	10.7	4.63
Selenium	0.010	0.005 U	NA	0.0061	NA	0.0061	0.005 U
Silver	0.050	0.01 U	NA	0.01 U	NA	0.01 U	0.01 U
Sodium	20	18.7	9.98	122	45.9	122	9.98
Thallium	0.0005*	0.01 U	NA	0.01 U	NA	0.01 U	0.01 U
Vanadium	--	0.05 U	NA	0.05 U	NA	0.05 U	0.05 U
Zinc	2*	0.124	NA	0.0551	NA	0.124	0.0551
Other Geochemical Parameters, milligrams per liter							
Total Organic Carbon	--	8.6375 U	4.77 U	5.19 U	3.15 U	8.6375 U	3.15 U
Bicarbonate Alkalinity	--	700	680	558	435	700	435
Carbonate Alkalinity	--	2 U	2 U	2 U	2 U	2 U	2 U
Chloride	250	NA	10	NA	63.5	63.5	10
Ferrous Iron	--	NA	4.95	NA	NA	4.95	4.95
Soluble Organic Carbons	--	9.22 U	NA	5.405 U	NA	9.22 U	5.405 U
Sulfate	250	346	301	651	448	651	301
Total Alkalinity	--	700	680	558	435	700	435
Total Dissolved Solids	--	1190	1170	1570	1180	1570	1170
Total Sulfide	0.05*	1 U	2 UJ	1.1 U	2 UJ	2 UJ	1 U
Field Measured Parameters[4]							
Conductivity (uS/cm)	--	1588	1559	2136	1513	2136	1513
Dissolved Oxygen (ppm)	--	3.1	4.81	0.35	0.42	4.81	0.42
Ferrous Iron (mg/l)	--	0	3.0	6.50	5.2	5.2	0
Oxidation Reduction Potential (mV)	--	82	-31.6	-89.7	-17	82	-31.6
pH (pH units)	--	7.01	6.16	6.70	5.9	7.01	5.9
Temperature (°C)	--	12.83	13.9	14.27	12	14.27	12
Turbidity (NTU)	--	NA	59	35.1	191	191	59

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Groundwater criteria for Class GA groundwater as provided in Division of Water Technical and Operational Series (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, October 22, 1993, reissued June 1998.
   * Values are guidance values.
4. The YSI 600XL was used in the November and May sampling events for temperature, pH, specific electrical conductance, dissolved oxygen, and redox potential measurements. Ferrous iron was field measured with the HACH18-R field kit (for QC, 10% were sent to analytical laboratory). The turbidity measurements on the YSI 600 XL were not accurate during the May sampling event and as such, the LaMotte turbidity meter was used to measure Turbidity. Turbidity measurements were collected with the TURB 2020 meter during the November sampling events.

mg/l = milligrams per liter
NA = not analyzed
NTU = Nephelometric Turbidity Unit
uS/cm = microsiemens per centimeter at 25°C.
ppm = parts per million
mV = millivolts
(values) = laboratory reported value prior to data validation

J = an estimated concentration.
U = compound was not detected at or above the listed detection limit.
R = value was rejected by data validator.
D = indicates spike diluted out.
-- = indicates value does not exist.
▨ indicates exceedance of groundwater criteria.
UJ = indicates compound was not detected above the listed detection limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the compound in the sample.

TABLE 4-11

ANALYTICAL RESULTS FOR BEDROCK GROUNDWATER FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

Compound[2]	Groundwater Criteria[3]	Sample Location, Identification, and Date Collected[1]						Maximum Conc.	Minimum Conc.
		MWFP-1D		MWFP-2D		MWFP-3D			
		110600086 11/6/2000	050101125 5/1/2001	110600087 11/6/2000	050201135 5/2/2001	110700090 11/7/2000	050101126 5/1/2001		
Volatile Organic Compounds, micrograms per liter									
Acetone	50*	10 U	NA	80	NA	6.7 J	NA	80	6.7 J
Benzene	1	10 U	10 U	3.6 J	2.4 J	10 U	1.2 J	10 U	1.2 J
Bromodichloromethane	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Bromoform	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Bromomethane	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Butanone (MEK)	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Methyl tert-Butyl Ether	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Carbon Disulfide	--	10 U	NA	1.3 J	NA	10 U	NA	10 U	1.3 J
Carbon Tetrachloride	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Chloroethane	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Chloroform	7	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloromethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,2-Dibromo-3-chloropropane	0.04	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Cyclohexane	--	10 U	NA	14	NA	8.8 J	NA	14	8.8 J
Dibromochloromethane	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,2-Dibromoethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,2-Dichlorobenzene	3	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,4-Dichlorobenzene	3	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,3-Dichlorobenzene	3	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Dichlorodifluoromethane	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1-Dichloroethane	5	10 U	NA	10 U	NA	2.3 J	NA	10 U	2.3 J
1,2-Dichloroethane	0.6	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1-Dichloroethene	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
trans-1,2-Dichloroethene	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
cis-1,2-Dichloroethene	5	10 U	NA	10 U	NA	8.2 J	NA	10 U	8.2 J
1,2-Dichloropropane	1	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
trans-1,3-Dichloropropene	0.4	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
cis-1,3-Dichloropropene	0.4	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Ethylbenzene	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Hexanone	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Isopropylbenzene	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Methyl Acetate	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Methylcyclohexane	--	10 U	NA	15	NA	4.9 J	NA	15	4.9 J
Methylene Chloride	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
4-Methyl-2-Pentanone	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Styrene	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1,2,2-Tetrachloroethane	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Tetrachloroethene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	5	10 U	NA	6.8 J	NA	10 U	NA	10 U	6.8 J
1,2,4-Trichlorobenzene	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1,1-Trichloroethane	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1,2-Trichloroethane	1	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Trichloroethene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichlorofluoromethane	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Vinyl Chloride	2	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
m-/p-Xylene	5	10 U	NA	6.4 J	NA	10 U	NA	10 U	6.4 J
o-Xylene	5	10 U	NA	3.7 J	NA	10 U	NA	10 U	3.7 J
Semi-Volatile Organic Compounds, microgram per liter									
Acenaphthene	20*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Acenaphthylene	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Acetophenone	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Anthracene	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Atrazine	7.5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Benzaldehyde	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Benzo(a)anthracene	0.002	10 U	9.4 U	10 U	9.5 U	10 U	9.4 U	10 U	9.4 U
Benzo(a)pyrene	--	10 U	9.4 U	10 U	9.5 U	10 U	9.4 U	10 U	9.4 U
Benzo(b)fluoranthene	0.002*	10 U	9.4 U	10 U	9.5 U	10 U	9.4 U	10 U	9.4 U
Benzo(g,h,i)perylene	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Benzo(k)fluoranthene	0.002*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1-Biphenyl	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Butyl Benzyl Phthalate	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
di-N-Butylphthalate	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Caprolactam	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Carbazole	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002*	10 U	9.4 U	10 U	9.5 U	10 U	9.4 U	10 U	9.4 U
4-Chloroaniline	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
bis(2-chloroethoxy)methane	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
bis(2-chloroethyl)ether	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Chloronaphthalene	10*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Chlorophenol	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,2-oxybis(1-chloropropane)	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Chrysene	0.002*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U

TABLE 4-11

ANALYTICAL RESULTS FOR BEDROCK GROUNDWATER FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

Compound[2]	Groundwater Criteria[3]	*Sample Location, Identification, and Date Collected*[1]						Maximum Conc.	Minimum Conc.
		MWFP-1D		MWFP-2D		MWFP-3D			
		110600086 11/6/2000	050101125 5/1/2001	110600087 11/6/2000	050201135 5/2/2001	110700090 11/7/2000	050101126 5/1/2001		
Dibenzo(a,h)anthracene	--	10 U	9.4 U	10 U	9.5 U	10 U	9.4 U	10 U	9.4 U
Dibenzofuran	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
3,3-Dichlorobenzidine	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,4-Dichlorophenol	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Diethylphthalate	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Dimethyl Phthalate	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,4-Dimethylphenol	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,4-Dinitrophenol	10*	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
2,4-Dinitrotoluene	50	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,6-Dinitrotoluene	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
bis(2-Ethylhexyl)phthalate	--	10 U	NA	3.7 J	NA	10 U	NA	10 U	3.7 J
Fluoranthene	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Fluorene	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Hexachlorobenzene	0.04	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Hexachlorobutadiene	0.5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Hexachlorocyclopentadiene	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Hexachloroethane	5	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Isophorone	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Methylnaphthalene	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
4,6-Dinitro-2-Methylphenol	--	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
4-Chloro-3-Methylphenol	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Methylphenol	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
4-Methylphenol	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Naphthalene	10*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Nitroaniline	5	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
3-Nitroaniline	5	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
4-Nitroaniline	5	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
Nitrobenzene	0.4	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Nitrophenol	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
4-Nitrophenol	--	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
N-Nitrosodiphenylamine	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
di-n-Octyl Phthalate	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Pentachlorophenol	1	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
Phenanthrene	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Phenol	1	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
4-Bromophenyl-Phenylether	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
4-Chlorophenyl-Phenylether	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
n-Nitroso-di-n-Propylamine	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Pyrene	50*	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,4,6-Trichlorophenol	--	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,4,5-Trichlorophenol	--	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
Metals, milligrams per liter									
Aluminum	--	0.12	NA	0.641	NA	0.116	NA	0.641	0.116
Antimony	0.003	0.06 U	NA	0.06 U	NA	0.06 U	NA	0.06 U	0.06 U
Arsenic	0.025	0.01 U	NA	0.01 U	NA	0.01 U	NA	0.01 U	0.01 U
Barium	1	0.275	NA	0.0775	NA	0.0722	NA	0.275	0.0722
Beryllium	0.003	0.005 U	NA	0.005 U	NA	0.005 U	NA	0.005 U	0.005 U
Cadmium	0.005	0.005 U	NA	0.005 U	NA	0.005 U	NA	0.005 U	0.005 U
Calcium	--	62	64.5	18.9	28.8	370	348	370	18.9
Chromium	0.05	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Hexavalent Chromium	0.05	0.01 U	(0.01 U) R	0.01 U	(0.01 U) R	0.01 U	(0.01 U) R	0.01 U	0.01 U
Cobalt	--	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.05 U	0.05 U
Copper	0.2	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	0.02 U
Iron	0.3	0.417	0.211	1.89	0.348	21.5	17.7	21.5	0.211
Lead	0.025	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Magnesium	35*	11	10.6	4.25	5.97	18.7	17.9	18.7	4.25
Manganese	0.3	0.112	0.122	0.0446	0.0579	2.06	1.96	2.06	0.0446
Mercury	0.0007	0.0003 U	NA	0.0003 U	NA	0.0003 U	NA	0.0003 U	0.0003 U
Nickel	0.1	0.04 U	NA	0.04 U	NA	0.04 U	NA	0.04 U	0.04 U
Potassium	--	2 U	2 U	3.72	3.04	7.04	5.68	7.04	2 U
Selenium	0.01	0.005 U	NA	0.005 U	NA	0.005 U	NA	0.005 U	0.005 U
Silver	0.05	0.01 U	NA	0.01 U	NA	0.01 U	NA	0.01 U	0.01 U
Sodium	20	26.7	25	293	352	119	78.9	352	25
Thallium	0.005*	0.01 U	NA	0.01 U	NA	0.01 U	NA	0.01 U	0.01 U
Vanadium	--	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.05 U	0.05 U
Zinc	2*	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	0.02 U
Soluble Metals[4], milligrams per liter									
Chromium	0.05	NA	NA	NA	NA	NA	0.01 U	0.01 U	0.01 U
Hexavalent Chromium	0.05	NA	NA	NA	NA	NA	(0.01 U) R	(0.01 U) R	(0.01 U) R
Iron	0.3	NA	NA	NA	NA	NA	16.4	16.4	16.4
Lead	0.025	NA	NA	NA	NA	NA	0.005 U	0.005 U	0.005 U
Manganese	0.3	NA	NA	NA	NA	NA	1.89	1.89	1.89
Other Geochemical Parameters, milligrams per liter									
Total Organic Carbon	--	1.29 U	1.78 U	3.40 U	6.41 U	5.02 U	4.36 U	6.41 U	1.2875 U
Bicarbonate Alkalinity	--	200	187	288	355	575	480	575	187
Carbonate Alkalinity	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U

TABLE 4-11

ANALYTICAL RESULTS FOR BEDROCK GROUNDWATER FROM THE FORMER MANUFACTURING PLANT AREA

Peter Cooper Site
Gowanda, New York

Compound[2]	*Groundwater Criteria*[3]	*Sample Location, Identification, and Date Collected*[1]						*Maximum Conc.*	*Minimum Conc.*
		MWFP-1D		*MWFP-2D*		*MWFP-3D*			
		110600086 11/6/2000	*050101125 5/1/2001*	*110600087 11/6/2000*	*050201135 5/2/2001*	*110700090 11/7/2000*	*050101126 5/1/2001*		
Chloride	250	NA	22.5	NA	166	NA	77.7	166	22.5
Soluble Organic Carbons	--	9.11 U	NA	3.31 U	NA	6.02 U	4.92	9.1075 U	3.3125 U
Sulfate	250	45.5	47.2	56.7	241	695	544	695	45.5
Total Alkalinity	--	200	187	288	355	575	480	575	187
Total Dissolved Solids	--	290	293	917	1000	1660	1350	1660	290
Total Sulfide	0.05*	1.1 U	2 UJ	1.1 U	2 UJ	1.1 U	2 UJ	2UJ	1.1 U
Turbidity, NTU	--	NA	0.8	NA	NA	NA	79.7	79.7	0.8
Field Measured Parameters[5]									
Conductivity (uS/cm)	--	495	503	1616	1595	2316	2159	2316	495
Dissolved Oxygen (ppm)	--	2.70	0.96	0.29	0.6	0.95	1.70	2.7	0.29
Ferrous Iron (mg/l)	--	0.1	0	0	0	10	6.6	10	0
Oxidation Reduction Potential (mV)	--	-219.5	-3.2	-223.5	-112.2	-94.9	-68.2	-3.2	-223.5
pH (pH units)	--	7.01	5.59	8.62	6.54	6.7	6.61	8.62	5.59
Temperature (°C)	--	13.75	17.47	13.06	13.59	14.35	11.46	17.47	11.46
Turbidity (NTU)	--	3.5	12.2	3.6	9.6	8.55	24	24	3.5

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Groundwater criteria for Class GA groundwater as provided in Division of Water Technical and Operational Series (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, October 22, 1993, reissued June 1998.
   * Values are guidance values.
4. Samples collected for soluble metals analysis were field filtered.
5. The YSI 600XL was used in the November and May sampling events for temperature, pH, specific electrical conductance, dissolved oxygen, and redox potential measurements. Ferrous iron was field measured with the HACH18-R field kit (for QC, 10% were sent to analytical laboratory). The turbidity measurements on the YSI 600 XL were not accurate during the May sampling event and as such, the LaMotte turbidity meter was used to measure turbidity. Turbidity measurements were collected with the TURB 2020 meter during the November sampling events.

mg/l = milligrams per liter
NA = not analyzed
NTU = Nephelometric Turbidity Unit
uS/cm = microsiemens per centimeter at 25°C.
ppm = parts per million
mV = millivolts
(values) = laboratory reported value prior to data validation

J = an estimated concentration.
U = compound was not detected at or above the listed detection limit.
R = value was rejected by data validator.
-- = indicates value does not exist.
▨ indicates exceedance of groundwater criteria.
UJ = indicates compound was not detected above the listed detection limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the compound in the sample.

TABLE 4-12

ANALYTICAL RESULTS FOR SEEP SAMPLES FROM THE INACTIVE LANDFILL AREA

Peter Cooper Site
Gowanda, New York

		Sample Location, Identification and Date Collected[1]							
		Seep #1		*Seep #2*		*Seep #3*			
Constituent[2]	*Surface Water Criteria*[3]	*110800102 11/8/2000*	*052001137 5/20/2001*	*110800103 11/8/2000*	*052001138 5/20/2001*	*110800104 11/8/2000*	*052001139 5/20/2001*	*Maximum Conc.*	*Minimum Conc.*
Volatile Organic Compounds, micrograms per liter									
Benzene	210*	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ
Chlorobenzene	5	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ
1,2-Dichlorobenzene	5	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ
1,4-Dichlorobenzene	5	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ
Ethylbenzene	17*	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ
Toluene	100*	3.1 J	2.8 J	2 J	3.5 J	10 U	10 UJ	10 UJ	2 J
m/p-Xylene	5	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ
o-Xylene	5	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ
Semi-Volatile Organic Compounds, micrograms per liter									
2-Chorophenol	--	10 U	9.4 U	10 U	10 U	10 U	16 U	16 U	9.4 U
2,4-Dichlorophenol	--	10 U	9.4 U	10 U	10 U	10 U	16 U	16 U	9.4 U
2,4-Dimethylphenol	--	10 U	9.4 U	10 U	10 U	10 U	16 U	16 U	9.4 U
2,4-Dinitrophenol	--	50 U	24 U	50 U	25 U	50 U	40 U	50 U	24 U
4,6-Dintiro-2-methylphenol	--	50 U	24 U	50 U	25 U	50 U	40 U	50 U	24 U
4-Chloro-3-Methylphenol	--	10 U	9.4 U	10 U	10 U	10 U	16 U	16 U	9.4 U
2-Methylphenol	--	10 U	9.4 U	10 U	10 U	10 U	16 U	16 U	9.4 U
4-Methylphenol	--	10 U	9.4 U	10 U	10 U	10 U	16 U	16 U	9.4 U
2-Nitrophenol	--	10 U	9.4 U	10 U	10 U	10 U	16 U	16 U	9.4 U
4-Nitrophenol	--	50 U	24 U	50 U	25 U	50 U	40 U	50 U	24 U
Pentachlorophenol[4]	20.2	50 U	24 U	50 U	25 U	50 U	40 U	50 U	24 U
Phenol	--	10 U	9.4 U	1.8 J	10 U	1.8 J	16 U	16 U	1.8 J
2,4,6-Trichlorophenol	--	10 U	9.4 U	10 U	10 U	10 U	16 U	16 U	9.4 U
2,4,5-Trichlorophenol	--	10 U	24 U	10 U	25 U	10 U	40 U	40 U	10 U
Total Metals, milligrams per liter									
Arsenic	0.150	0.071	0.052	0.0520	0.038	0.062	0.0314	0.071	0.0314
Calcium	--	156	171	150	156	116	170	171	116
Chromium	0.120	0.374	0.221	0.423	0.312	0.0949	0.129	0.423	0.0949
Hexavalent Chromium	0.011	0.04 U	(0.01 U) R	0.04 U	(0.01 U) R	0.01 U	(0.01 U) R	0.04 U	0.01 U
Iron	0.300	3.01	1.18	28.6	0.1 U	0.39	0.123	28.6	0.1 U
Magnesium	--	190	102	163	123	82.9	90.5	190	82.9
Potassium	--	10.9	7.71	8.79	6.19	3.56	4.12	10.9	3.56
Sodium	--	26.8	18.1	19.7	18.3	17.5	18	26.8	17.5
Zinc	0.200	0.02 U	0.02 U	0.0747	0.02 U	0.02 U	0.02 U	0.0747	0.02 U
Soluble Metals[5], milligrams per liter									
Arsenic	0.15	0.0665	NA	0.0528	NA	0.0599	NA	0.0665	0.0528
Calcium	--	155	NA	132	NA	113	NA	155	113
Chromium	0.120	0.369	NA	0.325	NA	0.0969	NA	0.369	0.0969
Hexavalent Chromium	0.011	0.04 U	(0.01 U) R	0.04 U	(0.01 U) R	0.04 U	(0.01 U) R	0.04 U	(0.01 U) R
Iron	0.3	4.78	NA	0.914	NA	0.107	NA	4.78	0.107
Magnesium	--	184	NA	144	NA	84.1	NA	184	84.1
Potassium	--	10.5	NA	6.4	NA	3.7	NA	10.5	3.7
Sodium	--	26	NA	19.6	NA	17	NA	26	17
Zinc	0.200	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	0.02 U

TABLE 4-12

ANALYTICAL RESULTS FOR SEEP SAMPLES FROM THE INACTIVE LANDFILL AREA

Peter Cooper Site
Gowanda, New York

		Sample Location, Identification and Date Collected [1]							
		Seep #1		*Seep #2*		*Seep #3*			
Constituent [2]	*Surface Water Criteria* [3]	*110800102 11/8/2000*	*052001137 5/20/2001*	*110800103 11/8/2000*	*052001138 5/20/2001*	*110800104 11/8/2000*	*052001139 5/20/2001*	*Maximum Conc.*	*Minimum Conc.*
Other Geochemical Data, milligrams per liter									
Ammonia	1.1 Nov./1.3 Apr.[6]	891	627	734	678	381	393	891	381
Bicarbonate Alkalinity	--	4000	2800	3150	3100	1340	1550	4000	1340
Carbonate Alkalinity	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Chloride	--	33.9	17.3	29.9	20.6	17.5	20.3	33.9	17.3
Nitrate Nitrogen	--	2.35	0.545	0.746	0.05 U	2.84	1.74	2.84	0.05 U
Soluble Organic Carbon	--	97.875	NA	81.925	NA	31.025	NA	97.875	31.025
Sulfate	--	241	242	157	150	595	632	632	150
Total Alkalinity	--	4000	2800	3150	3100	1340	1550	4000	1340
Total Dissolved Solids	--	1060	NA	1030	NA	855	NA	1060	855
Total Hardness	--	1100	NA	800	NA	608	NA	1100	608
Total Kjeldahl Nitrogen	--	836	602	721	667	380	392	836	380
Total Organic Carbon	--	100.675	55.525	81.425	64.875	NA	38.425	100.675	38.425
Total Sulfide	2	9.00	5.9	3.70	5.2	1 U	2 U	9	1 U
Turbidity, NTU	--	NA	120	NA	137	NA	4.38	137	4.38
Field Measured Parameters[7]	--								
Conductivity (uS/cm)	--	>1990	>1990	>1990	>1990	>1990	>1990	>1990	>1990
Dissolved Oxygen (ppm)	--	7.11	NA	8.48	NA	8.53	NA	8.53	7.11
Oxidation Reduction Potential (mV)	--	<-50 and >1050	<-50 and >1050	<-50 and >1050	<-50 and >1050	75	-40	>1050	<-50
pH (pH units)	--	7.92	7.88	8.21	7.9	8.25	8.2	8.25	7.88
Temperature (°C)	--	11.1	12.8	14.3	20	14.3	18.3	20	11.1
Turbidity (NTU)	--	212	NA	110	NA	5.8	NA	212	5.8

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Surface water criteria for Class A, A-S, AA, AA-S, B, C fresh water fish propogation as provided in Division of Water Technical and Operational Series (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, October 22, 1993, reissued June 1998.
   * Values are guidance values.
4. pH dependent criteria; pH = 8.1 was used to calculate Pentachlorophenol guidance value.
5. Samples collected for soluble metals analysis were field filtered.
6. Total Ammonia calculated with the (T) or (TS) Specifications (most conservative) using an average pH of 8.1 (Nov) and 8.0 (Apr) and average temp of 13.2 °C (Nov) and 17.0°C (Apr).
7. The YSI 600XL was used in the November and May sampling events for temperature, pH, specific electrical conductance, dissolved oxygen,and redox potential measurements.
   Ferrous iron was field measured with the HACH18-R field kit (for QC, 10% were sent to analytical laboratory).
   Turbidity measurements were collected with the TURB2020 meter during the November sampling events.

NA = not analyzed
-- = indicates value does not exist.
NTU = Nephelometric Turbidity Unit
uS/cm = microsiemens per centimeter at 25°C.
ppm = parts per million
mV = millivolts

J = indicates an estimated value.
U = indicates compound was not detected.
R= indicates value was rejected by data validator.
UJ = indicates compound was not detected above the listed detection limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitiation necessary to accurately and precisely measure the compound in the sample.
▨ indicates exceedance of surface water criteria.
(values) = laboratory reported value prior to data validation rejection.

TABLE 4-13

ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES FROM CATTARAUGUS CREEK

Peter Cooper Site
Gowanda, New York

Constituent [2]	*Surface Water Criteria* [3]	*Sample Location, Identification, and Date Collected* [1]								*Maximum Conc*	*Minimum Conc.*
		Creek Water #1		*Creek Water #2*		*Creek Water #3*		*Creek Water #4*			
		110700101 *11/7/2000*	*050201134* *5/2/2001*	*110700100* *11/7/2000*	*050201130* *5/2/2001*	*110700098* *11/7/2000*	*050201131* *5/2/2001*	*110700097* *11/7/2000*	*050201132* *5/2/2001*		
Volatile Organic Compounds, micrograms per liter											
Acetone	--	3.5 J	NA	10 U	NA	10 U	NA	3.2 J	NA	10 U	3.2 J
Benzene	210*	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Bromoform	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Bromomethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Butanone (MEK)	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Methyl tert-Butyl Ether	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Carbon Disulfide	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Carbon Tetrachloride	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Chloroform	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloromethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,2-Dibromo-3-chloropropane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Cyclohexane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Dibromochloromethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,2-Dibromoethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,2-Dichlorobenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	5	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Dichlorodifluoromethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1-Dichloroethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,2-Dichloroethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1-Dichloroethene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
trans-1,2-Dichloroethene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
cis-1,2-Dichloroethene	--	2.7 J	NA	10 U	NA	10 U	NA	10 U	NA	10 U	2.7 J
1,2-Dichloropropane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
trans-1,3-Dichloropropene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
cis-1,3-Dichloropropene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Ethylbenzene	17*	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Isopropylbenzene	2.6*	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Methyl Acetate	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Methylcyclohexane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Methylene Chloride	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
4-Methyl-2-Pentanone	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Styrene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1,2,2-Tetrachloroethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Tetrachloroethene	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	100*	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	5	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1,1-Trichloroethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1,2-Trichloroethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Trichloroethene	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichlorofluoromethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Vinyl Chloride	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
m-/p-Xylene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
o-Xylene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Semi-Volatile Organic Compounds, micrograms per liter											
Acenaphthene	5.3*	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Acenaphthylene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Acetophenone	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Anthracene	3.8*	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Atrazine	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Benzaldehyde	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Benzo(a)anthracene	0.03	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
Benzo(a)pyrene	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
Benzo(b)fluoranthene	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
Benzo(g,h,i)perylene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Benzo(k)fluoranthene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
1,1-Biphenyl	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Butyl Benzyl Phthalate	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
di-N-Butylphthalate	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Caprolactam	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Carbazole	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Indeno(1,2,3-cd)pyrene	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
4-Chloroaniline	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
bis(2-chloroethoxy)methane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
bis(2-chloroethyl)ether	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Chloronaphthalene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Chlorophenol	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U

TABLE 4-13

ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES FROM CATTARAUGUS CREEK

Peter Cooper Site
Gowanda, New York

Constituent[2]	Surface Water Criteria[3]	*Sample Location, Identification, and Date Collected*[1]								Maximum Conc	Minimum Conc.
		Creek Water #1		*Creek Water #2*		*Creek Water #3*		*Creek Water #4*			
		110700101 *11/7/2000*	*050201134* *5/2/2001*	*110700100* *11/7/2000*	*050201130* *5/2/2001*	*110700098* *11/7/2000*	*050201131* *5/2/2001*	*110700097* *11/7/2000*	*050201132* *5/2/2001*		
2,2-oxybis(1-chloropropane)	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Chrysene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Dibenzo(a,h)anthracene	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
Dibenzofuran	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
3,3-Dichlorobenzidine	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,4-Dichlorophenol	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
Diethylphthalate	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Dimethyl Phthalate	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,4-Dimethylphenol	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
2,4-Dinitrophenol	--	25 U	26 U	25 U	25 U	25 U	25 U	25 U	24 U	26 U	24 U
2,4-Dinitrotoluene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,6-Dinitrotoluene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
bis(2-Ethylhexyl)phthalate	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Fluoranthene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Fluorene	0.54*	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Hexachlorobenzene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Hexachlorobutadiene	1	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Hexachlorocyclopentadiene	0.45	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Hexachloroethane	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Isophorone	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Methylnaphthalene	4.7*	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
4,6-Dinitro-2-Methylphenol	--	25 U	26 U	25 U	25 U	25 U	25 U	25 U	24 U	26 U	24 U
4-Chloro-3-Methylphenol	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
2-Methylphenol	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
4-Methylphenol	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
Naphthalene	13*	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Nitroaniline	--	25 U	NA	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
3-Nitroaniline	--	25 U	NA	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
4-Nitroaniline	--	25 U	NA	25 U	NA	25 U	NA	25 U	NA	25 U	25 U
Nitrobenzene	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2-Nitrophenol	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
4-Nitrophenol	--	25 U	26 U	25 U	25 U	25 U	25 U	25 U	24 U	26 U	24 U
n-Nitrosodiphenylamine	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
di-n-Octyl Phthalate	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Pentachlorophenol[4]	24.7	25 U	26 U	25 U	25 U	25 U	25 U	25 U	24 U	26 U	24 U
Phenanthrene	5.0*	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Phenol	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	10 U	9.5 U
4-Bromophenyl-Phenylether	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
4-Chlorophenyl-Phenylether	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
n-Nitroso-di-n-Propylamine	--	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
Pyrene	4.6*	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	10 U
2,4,6-Trichlorophenol	--	10 U	10 U	10 U	10	10 U	10	10 U	9.5 U	10 U	9.5 U
2,4,5-Trichlorophenol	--	25 U	26 U	25 U	25	25 U	25	25 U	24 U	26 U	24 U
Metals, milligrams per liter											
Aluminum	0.1	0.1 U	NA	0.1 U	NA	0.1 U	NA	0.1 U	NA	0.1 U	0.1 U
Antimony	--	0.06 U	NA	0.06 U	NA	0.06 U	NA	0.06 U	NA	0.06 U	0.06 U
Arsenic	0.15	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Barium	--	0.0641	NA	0.0647	NA	0.0618	NA	0.0693	NA	0.0693	0.0618
Beryllium[5]	1.1	0.005 U	NA	0.005 U	NA	0.005 U	NA	0.005 U	NA	0.005 U	0.005 U
Cadmium[5]	0.0035	0.005 U	NA	0.005 U	NA	0.005 U	NA	0.005 U	NA	0.005 U	0.005 U
Calcium	--	57.8	51.8	59.6	51.9	58.3	53.4	59.1	56.6	59.6	51.8
Chromium[5]	0.1200	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Hexavalent Chromium	0.0110	0.04 U	(0.01 U) R	0.01 U	(0.01 U) R	0.01 U	(0.01 U) R	0.01 U	(0.01 U) R	0.04 U	(0.01 U) R
Cobalt	0.0050	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.05 U	0.05 U
Copper[5]	0.0158	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	0.02 U
Iron	0.3000	0.129	0.39	0.126	0.403	0.143	0.47	0.151	0.344	0.47	0.126
Lead[5]	0.0078	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Magnesium	--	10.3	9.25	10.3	9.45	9.88	9.21	10.8	9.99	10.8	9.21
Manganese	--	0.0115	0.0161	0.0138	0.0149	0.0129	0.0216	0.0184	0.0206	0.0216	0.0115
Mercury	0.0008	0.0003 U	NA	0.0003 U	NA	0.0003 U	NA	0.0003 U	NA	0.0003 U	0.0003 U
Nickel[5]	0.0915	0.04 U	NA	0.04 U	NA	0.04 U	NA	0.04 U	NA	0.04 U	0.04 U
Potassium	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Selenium	0.0046	0.005 U	NA	0.005 U	NA	0.005 U	NA	0.005 U	NA	0.005 U	0.005 U
Silver	0.0001	0.01 U	NA	0.01 U	NA	0.01 U	NA	0.01 U	NA	0.01 U	0.01 U
Sodium	--	13.7	NA	13.9	NA	13.4	NA	16.2	NA	16.2	13.4
Thallium	0.008	0.01 U	NA	0.01 U	NA	0.01 U	NA	0.01 U	NA	0.01 U	0.01 U
Zinc[5]	0.0094	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Vanadium	0.0140	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.05 U	0.05 U
Other Geochemical Data, milligrams per liter											
Ammonia	0.58 Nov./0.44 Apr.[6]	0.05 U	0.05 U	0.05 U	0.05 U	0.234	0.306	0.17	0.442	0.442	0.05 U
Bicarbonate Alkalinity	--	167	270 J	166	133	164	135	169	140	270 J	133
Carbonate Alkalinity	--	2 U	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 UJ	2 UJ

TABLE 4-13

ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES FROM CATTARAUGUS CREEK

Peter Cooper Site
Gowanda, New York

		Sample Location, Identification, and Date Collected[1]									
		Creek Water #1		*Creek Water #2*		*Creek Water #3*		*Creek Water #4*			
Constituent[2]	*Surface Water Criteria*[3]	*110700101* *11/7/2000*	*050201134* *5/2/2001*	*110700100* *11/7/2000*	*050201130* *5/2/2001*	*110700098* *11/7/2000*	*050201131* *5/2/2001*	*110700097* *11/7/2000*	*050201132* *5/2/2001*	*Maximum Conc*	*Minimum Conc.*
Chloride	--	24	26.4	22.9	27	23.4	27.1	28.7	46.9	46.9	22.9
Ferrous Iron	--	NA	NA	NA	0.1 U	NA	NA	NA	NA	0.1 U	0.1 U
Nitrate Nitrogen		1.78	1.07	1.81	1.11	1.81	1.07	1.9	1.12	1.9	1.07
Sulfate	--	28.8	24.8	27.6	25.9	27.5	24.9	28.5	28	28.8	24.8
Total Alkalinity	--	167	270 J	166	133	164	135	169	140	270 J	133
Total Dissolved Solids	--	254	216	250	221	249	216	255	264	264	216
Total Hardness	--	191	166	198	164	195	161	200	175	200	161
Total Kjeldahl Nitrogen	--	0.308	0.345	0.412	0.2 U	0.417	0.445	0.344	0.648	0.648	0.2
Total Organic Carbon	--	1.975 U	1.665	1.8875	1.6525	2.135	1.675	1.9875	1.7225	2.135	1.6525
Total Sulfide	2	1 U	2 UJ	1 U	2	1 U	2 UJ	1 U	2 UJ	2 UJ	1 U
Total Suspended Solids	--	1.3	6.6	1.6	7.1	1.3 J	8.2	1.9	4.9	8.2	1.3 J
Field Measured Parameters[7]											
Conductivity (uS/cm)	--	440	350	390	340	320	340	340	390	440	320
Dissolved Oxygen (ppm)	--	NA	NA	9.8	NA	8.65	NA	13.6	NA	13.6	8.65
Ferrous Iron (mg/l)	--	NA	NA	NA	0	NA	0	NA	0	0	0
Oxidation Reduction Potential (mV)	--	30	-40	35	-60	35	-60	-5	-45	35	-60
pH (pH units)	--	8.52	8.5	8.3	8.42	8.37	8.4	8.36	8.5	8.52	8.3
Temperature (°C)	--	16.5	14.4	7.9	14.4	7.8	14.4	5.3	14.4	16.5	5.3
Turbidity (NTU)	--	2.43	NA	NA	NA	5.18	NA	4.14	NA	5.18	2.43

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Surface water criteria for Class A, A-S, AA, AA-S, B, C fresh water fish propogation as provided in Division of Water Technical and Operational Series (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, October 22, 1993, reissued June 1998.
   - * Values are guidance values.
4. pH dependent criteria: pH = 8.3 was used to calculate Pentachlorophenol guidance value
5. Hardness dependent criteria. Hardness value of 181 ppm was used.
6. Total Ammonia calculated with the (T) or (TS) Specifications (most conservative) using an average pH of 8.4 (Nov) and 8.5 (Apr) and average temp of 9.4 °C (Nov) and 14.4°C (Apr).
7. The YSI600XL was used in the November and May sampling events for temperature, pH, specific electrical conductance, dissolved oxygen and redox potential measurements.
   Ferrous iron was field measured with the HACH18-R field kit (for QC, 10% were sent to analytical laboratory).
   Turbidity measurements were collected with the TURB2020 meter during the November sampling events.

NA = not analyzed
(values) = laboratory reported value prior to data validation.
mg/l = milligrams per liter
NTU = Nephelometric Turbidity Unit
uS/cm = microsiemens per centimeter at 25°C.
-- = indicates guidance value does not exist.
ppm = parts per million
mV = millivolts

J = indicates an estimated value.
U = indicates compound was not detected.
R= indicates value was rejected by data validator.
UJ = indicates compound was not detected above the listed detection limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitiation necessary to accurately and precisely measure the compound in the sample.
-- = indicates value does not exist.
▨ indicates exceedance of surface water criteria.

TABLE 4-14

ANALYTICAL RESULTS FOR WETLAND SEDIMENT SAMPLES

Peter Cooper Site
Gowanda, New York

	Sediment/Soil Criteria[3]				*Sample Location, Identification, and Date Collected*[1]											
Constituent[2]	*NYSDEC Sediment Criteria*	*TAGM*		*Region 9 PRGs*	*WSS-1 101000047 10/10/2000*	*WSS-2 101000048 10/10/2000*	*WSS-3 101000049 10/10/2000*	*WSS-4 101000050 10/10/2000*	*WSS-5 101000051 10/10/2000*	*WSS-6 101000052 10/10/2000*	*WSS-7 101000054 10/10/2000*	*WSS-8 101000055 10/10/2000*	*WSS-9 101000056 10/10/2000*	*WSS-10 10100057 10/10/2000*	*Maximum Conc.*	*Minimum Conc.*
Volatile Organic Compounds, milligrams per kilogram																
Benzene	--	0.06		1.5	0.0065 J	0.0085 J	0.0037 J	0.0058 J	0.005 J	0.004 J	0.0068 J	0.0082 J	0.0035 J	0.0026 J	0.0085 J	0.0026 J
Chlorobenzene	--	1.7		54	0.0120 U	0.023 UJ	0.0063 UJ	0.013 UJ	0.014 UJ	0.018 UJ	0.012 U	0.014 UJ	0.023 UJ	0.017 UJ	0.023 UJ	0.0063 UJ
1,2-dichlorobenzene	--	7.9		370	0.0120 UJ	0.023 UJ	0.0063 UJ	0.013 UJ	0.014 UJ	0.018 UJ	0.012 U	0.014 UJ	0.023 UJ	0.017 UJ	0.023 UJ	0.0063 UJ
1,4-dichlorobenzene	--	8.5		8.1	0.0120 UJ	0.023 UJ	0.0063 UJ	0.013 UJ	0.014 UJ	0.018 UJ	0.012 U	0.014 UJ	0.023 UJ	0.017 UJ	0.023 UJ	0.0063 UJ
Ethylbenzene	--	5.5		230	0.0015 J	0.0034 J	0.0009 J	0.013 UJ	0.014 UJ	0.018 UJ	0.0014 J	0.0021 J	0.023 UJ	0.0033 J	0.023 UJ	0.00094 J
m/p-Xylene	--	1.2		--	0.0082 J	0.015 J	0.0044 J	0.0058 J	0.006 J	0.0053 J	0.0083 J	0.011 J	0.023 UJ	0.017 UJ	0.023 UJ	0.0044 J
o-Xylene	--	1.2		--	0.0027 J	0.0044 J	0.0013 J	0.0017 J	0.0019 J	0.018 U	0.0023 J	0.0033 J	0.023 UJ	0.017 UJ	0.023 UJ	0.0013 J
Toluene	--	1.5		520	0.0120	0.018 J	0.0066 J	0.011 J	0.0082 J	0.0082 J	0.011 J	0.015 J	0.016 J	0.0041 J	0.018 UJ	0.0041 J
Metals, milligrams per kilogram		*Eastern USA*	*Rec. Soil Objective*													
Arsenic	6	3-12	7.5 or SB	2.7	7.4	16.3	8.7	8.5	9.4	10.7	5.2	5.6	9.9	8.6	16.3	5.2
Chromium	26	1.5-40**	10 or SB	450	6.5	44.9	11.8	28.4	30.6	31.2	8.9	13.7	17.2	55.3	55.3	6.5
Hexavalent Chromium	--	--	--	64	5.07 U	7.12 U	5.35 U	5.29 U	5.43 U	5.87 U	4.68 U	5.55 U	6.34 U	5.81 U	7.12 U	4.68 U
Zinc	120	9-50	0.2	100,000	45.7	227	69.8	80.5	74.9	92.5	58.8	65.6	290	110	290	45.7
Other																
Percent Solids, %	--	--	--	--	78.9	56.2	74.8	75.6	73.6	68.2	85.5	72.1	63.1	68.8	85.5	56.2
pH	--	--	--	--	8.17	7.56	7.68	7.76	7.48	7.74	7.91	7.47	7.30	6.92	8.17	6.92
Total Organic Carbon, %	--	--	--	--	0.29	3.4	1.50	1.70	1.90	2.70	0.290	1.50	3.80	4.40	4.4	0.29

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Soil criteria from NYSDEC Division of Technical and Administrative Guidance Memorandum #4046 (TAGM) and U.S.EPA, Region 9 Preliminary Remediation Golas (PRGs) for Industrial Soil (October 2002).
   Sediment criteria from NYSDEC Technical Guidance for Screening Contaminated Sediments, Division of Fish and Wildlife.

** A New York State Background value

J = indicates a laboratory estimated value or estimated as a result of data validation.
U = indicates compound was not detected at or above the listed detection limit.
UJ = indicates compound was not detected above the listed detection limit.
However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the compound in the sample.

SB = Site Background
-- = indicates value does not exist.
▨ indicates exceedance of upper range of US Eastern Soils.

TABLE 4-15

ANALYTICAL RESULTS FOR CATTARAUGUS CREEK SEDIMENTS

Peter Cooper Site
Gowanda, New York

		Sample Location, Identification, and Date Collected[1]					
Constituents[2]	*Sediment Criteria*[3]	*Creek Sed. #1 110700096 11/7/2000*	*Creek Sed. #2 110700095 11/7/2000*	*Creek Sed. #3 110700093 11/7/2000*	*Creek Sed. #4 110700092 11/7/2000*	*Maximum Conc.*	*Minimum Conc.*
Volatile Organic Compounds, milligrams per kilogram							
Acetone		0.024	0.078	0.019	0.022	0.078	0.019
Benzene		0.017 U	0.0025 J	0.0015 J	0.0014 J	0.017 U	0.0014
Bromodichloromethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Bromoform		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Bromomethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
2-Butanone (MEK)		0.017 U	0.0095 J	0.011 U	0.011 U	0.017 U	0.0095 J
Methyl tert-Butyl Ether		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Carbon Disulfide		0.01 J	0.025	0.019	0.02	0.025	0.01
Carbon Tetrachloride		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Chlorobenzene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Chloroethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Chloroform		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Chloromethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
1,2-Dibromo-3-Chloropropane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
Cyclohexane		0.017 U	0.0045 J	0.0022 J	0.0022 J	0.017 U	0.0022
Dibromochloromethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
1,2-Dibromoethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
1,2-Dichlorobenzene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
1,4-Dichlorobenzene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
1,3-Dichlorobenzene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
Dichlorodifluoromethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
1,1-Dichloroethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
1,2-Dichloroethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
1,1-Dichloroethene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
trans-1,2-Dichloroethene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
cis-1,2-Dichloroethene		0.017 U	0.0035 J	0.011 U	0.011 U	0.017 U	0.0035
1,2-Dichloropropane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
trans-1,3-Dichloropropene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
cis-1,3-Dichloropropene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Ethylbenzene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
2-Hexanone		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Isopropylbenzene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Methyl Acetate		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Methylcyclohexane		0.017 U	0.0072 J	0.0033 J	0.0034 J	0.017 U	0.0033
Methylene Chloride		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
4-Methyl-2-Pentanone		0.017 U	0.0025 J	0.011 U	0.011 U	0.017 U	0.0025
Styrene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
1,1,2,2-Tetrachloroethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
Tetrachloroethene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Toluene		0.0059 J	0.0068 J	0.0045 J	0.0041 J	0.0068 J	0.0041
1,2,4-Trichlorobenzene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
1,1,1-Trichloroethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
1,1,2-Trichloroethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
Trichloroethene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
Trichlorofluoromethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
1,1,2-Trichloro-1,2,2-Trifluoroethane		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011 U
Vinyl Chloride		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011
m-/p-Xylene		0.017 U	0.0027 J	0.0015 J	0.0015 J	0.017 U	0.0015
o-Xylene		0.017 U	0.012 U	0.011 U	0.011 U	0.017 U	0.011

TABLE 4-15

ANALYTICAL RESULTS FOR CATTARAUGUS CREEK SEDIMENTS

Peter Cooper Site
Gowanda, New York

		Sample Location, Identification, and Date Collected[1]					
Constituents[2]	*Sediment Criteria*[3]	*Creek Sed. #1 110700096 11/7/2000*	*Creek Sed. #2 110700095 11/7/2000*	*Creek Sed. #3 110700093 11/7/2000*	*Creek Sed. #4 110700092 11/7/2000*	*Maximum Conc.*	*Minimum Conc.*
Semi-Volatile Organic Constituents, milligrams per kilogram							
Acenaphthene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Acenaphthylene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Acetophenone		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Anthracene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Atrazine		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Benzaldehyde		0.4 UJ	0.42 UJ	0.4 UJ	0.41 UJ	0.42	0.4
Benzo(a)anthracene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Benzo(a)pyrene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Benzo(b)fluoranthene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Benzo(g,h,i)perylene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Benzo(k)fluoranthene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
1,1-Biphenyl		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Butyl Benzyl Phthalate		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
di-N-Butylphthalate		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Caprolactam		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Carbazole		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Indeno(1,2,3-cd)pyrene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
4-Chloroaniline		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
bis(2-chloroethoxy)methane		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
bis(2-chloroethyl)ether		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2-Chloronaphthalene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2-Chlorophenol		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2,2-oxybis(1-chloropropane)		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Chrysene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Dibenzo(a,h)anthracene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Dibenzofuran		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
3,3-Dichlorobenzidine		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2,4-Dichlorophenol		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Diethylphthalate		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Dimethyl Phthalate		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2,4-Dimethylphenol		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2,4-Dinitrophenol		1 U	1 U	1 U	1 U	1	1
2,4-Dinitrotoluene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2,6-Dinitrotoluene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
bis(2-Ethylhexyl)phthalate		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Fluoranthene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Fluorene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Hexachlorobenzene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Hexachlorobutadiene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Hexachlorocyclopentadiene		0.4 UJ	0.42 UJ	0.4 UJ	0.41 UJ	0.42	0.4
Hexachloroethane		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Isophorone		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2-Methylnaphthalene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
4,6-Dinitro-2-Methylphenol		1 U	1 U	1 U	1 U	1	1
4-Chloro-3-Methylphenol		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2-Methylphenol		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
4-Methylphenol		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Naphthalene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2-Nitroaniline		1 U	1 U	1 U	1 U	1	1
3-Nitroaniline		1 U	1 U	1 U	1 U	1	1
4-Nitroaniline		1 U	1 U	1 U	1 U	1	1

TABLE 4-15

ANALYTICAL RESULTS FOR CATTARAUGUS CREEK SEDIMENTS

Peter Cooper Site
Gowanda, New York

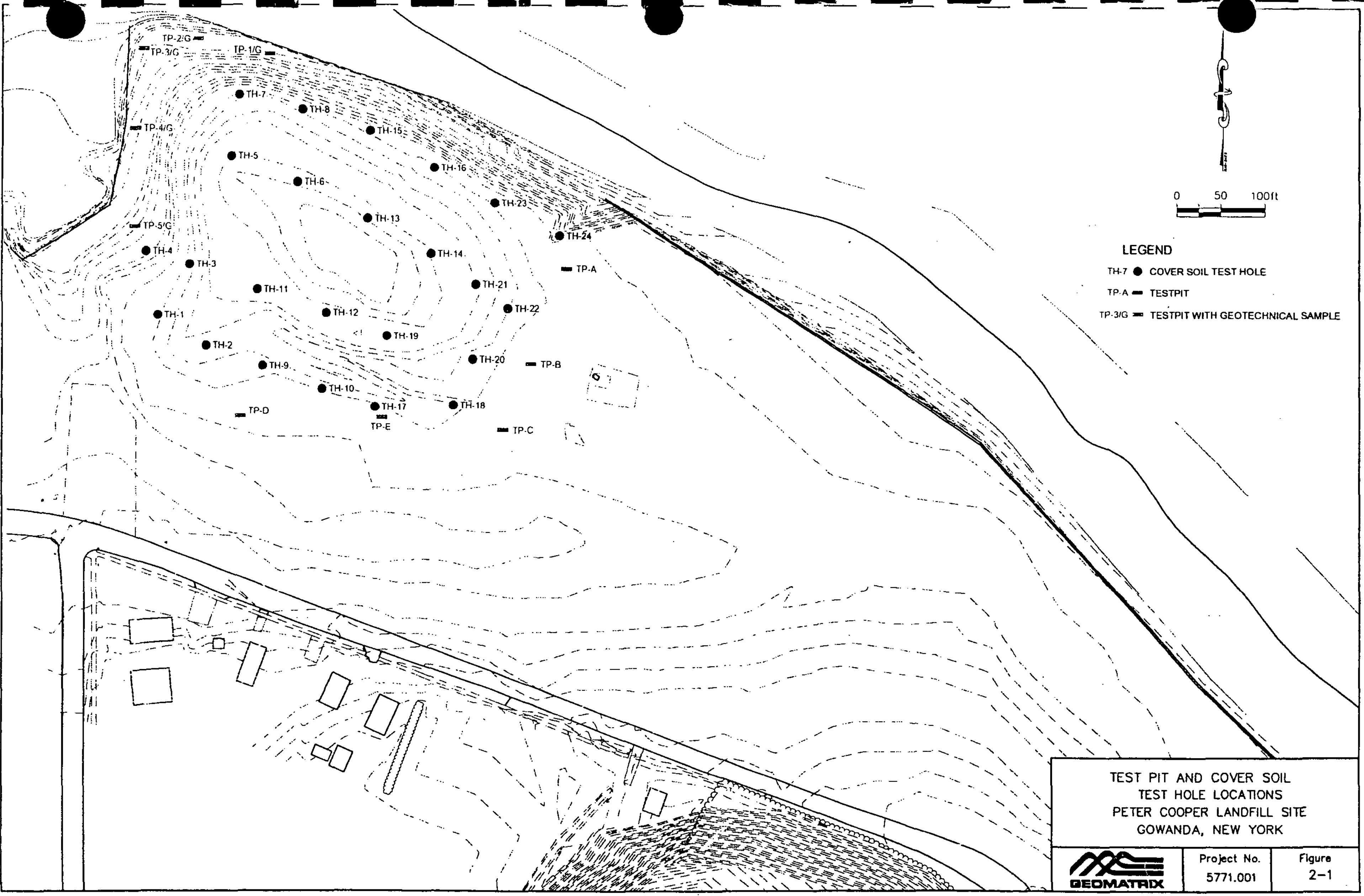
Constituents [2]	Sediment Criteria [3]	*Sample Location, Identification, and Date Collected* [1] *Creek Sed. #1* *110700096* *11/7/2000*	*Creek Sed. #2* *110700095* *11/7/2000*	*Creek Sed. #3* *110700093* *11/7/2000*	*Creek Sed. #4* *110700092* *11/7/2000*	*Maximum Conc.*	*Minimum Conc.*
Nitrobenzene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2-Nitrophenol		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
4-Nitrophenol		1 U	1 U	1 U	1 U	1	1
n-Nitrosodiphenylamine		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
di-n-Octyl Phthalate		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Pentachlorophenol		1 U	1 U	1 U	1 U	1	1
Phenanthrene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Phenol		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
4-Bromophenyl-Phenylether		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
4-Chlorophenyl-Phenylether		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
n-Nitroso-di-n-Propylamine		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
Pyrene		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2,4,6-Trichlorophenol		0.4 U	0.42 U	0.4 U	0.41 U	0.42	0.4
2,4,5-Trichlorophenol		1 U	1 U	1 U	1 U	1	1
Metals, milligrams per kilogram							
Aluminum		4820	4960	5730	6160	6160	4820
Antimony		6.9 UJ	7.5 UJ	7 UJ	7.04 UJ	7.5	6.9
Arsenic	6	7.2 J	6.7 J	7.1 J	9.6 J	9.6	6.7
Barium		31.5	36.1	38.6	41.4	41.4	31.5
Beryllium		0.57 U	0.63 U	0.58 U	0.59 U	0.63	0.57
Cadmium		0.57 U	0.63 U	0.58 U	0.59 U	0.63	0.57
Calcium		7490	10500	11700	5080	11700	5080
Chromium	26	6.3	6.5	7.1	8.6	8.6	6.3
Cobalt		5.7 U	6.25 U	6.7	7.5	7.5	5.7
Copper	16	13.7	11.3	13.9	14.8	14.8	11.3
Hexavalent Chromium		4.8 U	5.05 U	4.85 U	4.93 U	5.05	4.8
Iron	20000	14400	18100	16900	18400	18400	14400
Lead	31	7.9	9.2	8.8	9.8	9.8	7.9
Magnesium		3290	3240	3160	3350	3350	3160
Manganese	460	250	356	401	246	401	246
Mercury		0.06 U	0.06 U	0.06 U	0.06 U	0.06	0.06
Nickel	16	12.6	13.6	15.5	18.2	18.2	12.6
Potassium		525	591	617	786	786	525
Selenium		1.1	0.71	0.58 U	0.59 U	1.1	0.58
Silver		1.1 UJ	1.3 UJ	1.17 UJ	1.2 UJ	1.3	1.1
Sodium		333	226	240	201	333	201
Thallium		1.1 U	1.3 U	1.2 U	1.17 U	1.3	1.1
Vanadium		10.9	12.3	12.2	13.8	13.8	10.9
Zinc	120	39.2	40.2	47.1	52.8	52.8	39.2
Others							
Percent Solids, %		83.3	79.2	82.5	81.2	83.3	79.2
pH		8.6	8.2	8.21	8.18	8.6	8.18
Total Organic Carbon, %		0.1 U	0.1 U	0.1 U	0.1 U	0.1	0.1

Notes:

1. Sample locations provided on Plate 1.
2. Data qualifications reflect 100% data validation performed by Data Validation Services.
3. Guidance values from NYSDEC Technical Guidance for Screening Contaminated Sediments, Division of Fish and Wildlife

J = indicates an estimated value.
U = compound was not detected at or above the listed detection limit.
UJ = indicates compound was not detected above the listed detection limit.
However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitiation necessary to accurately and precisely measure the compound in the sample.

2003 RI Figures



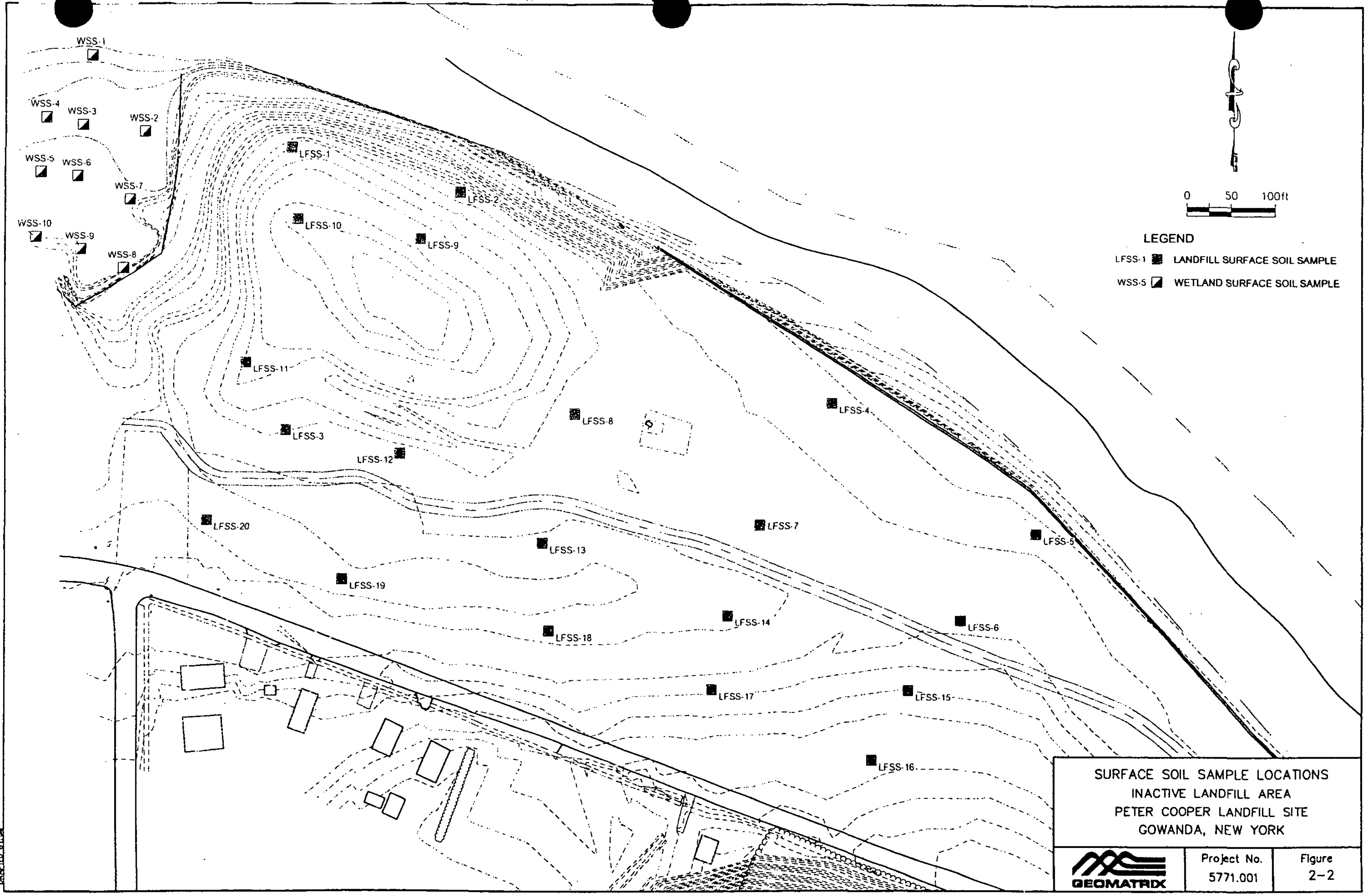
TEST PIT AND COVER SOIL
TEST HOLE LOCATIONS
PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

GEOMATRIX

Project No.
5771.001

Figure
2-1

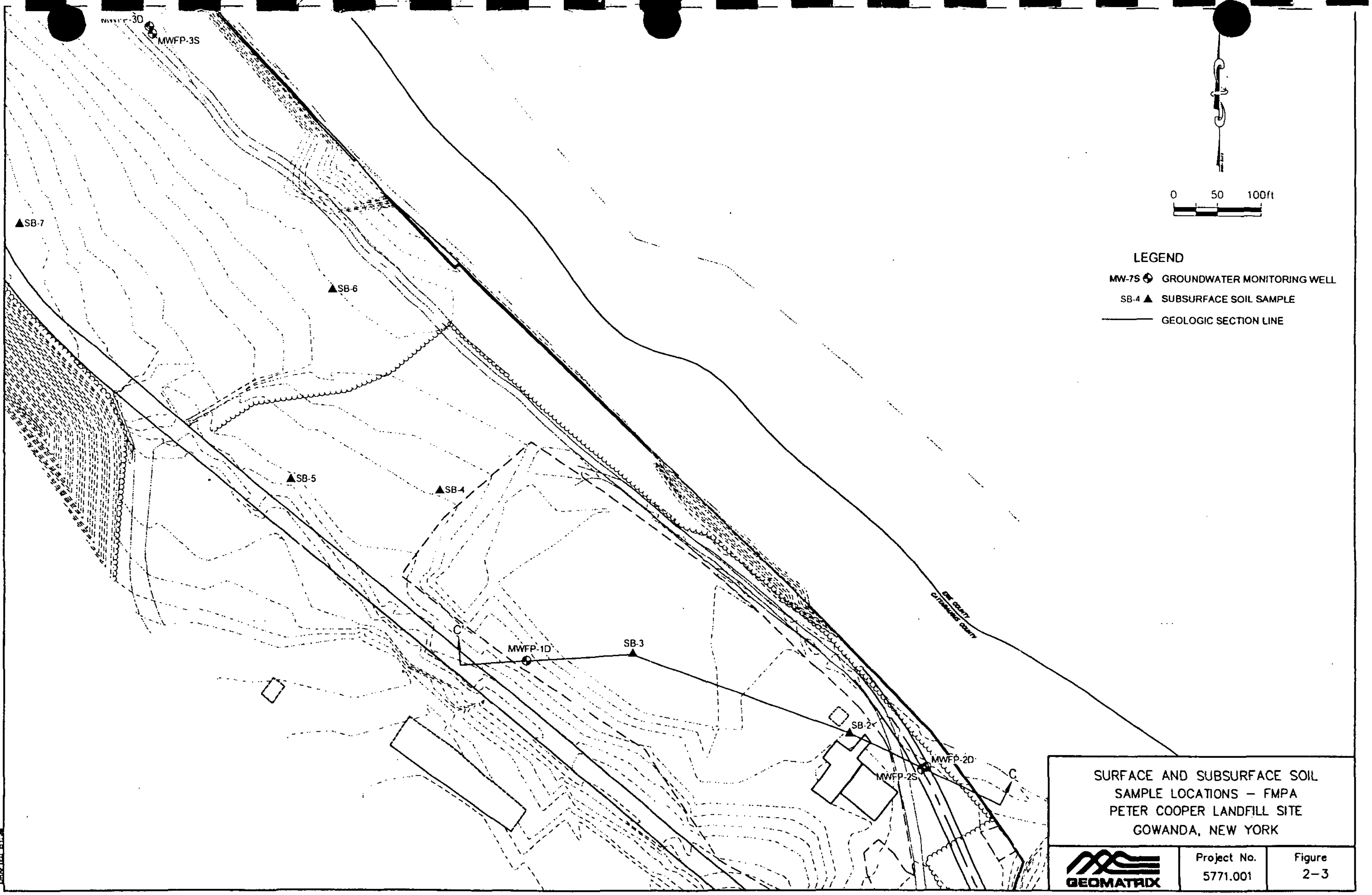
DATE: 11/21/03
FILEPATH: G:\GEOMATRIX\5771.001 TASK E\5771 figure 2-1.dwg
DRAFTED BY: JN



SURFACE SOIL SAMPLE LOCATIONS
INACTIVE LANDFILL AREA
PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

Project No.	Figure
5771.001	2-2

DATE: 11/21/03
FILEPATH: C:\GEOMATRIX\5771.001 TASK E\5771 figure 2-2.DWG
DRAFTED BY: JM



SURFACE AND SUBSURFACE SOIL
SAMPLE LOCATIONS – FMPA
PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

GEOMATRIX

Project No.	Figure
5771.001	2-3

DATE: 11/21/2003
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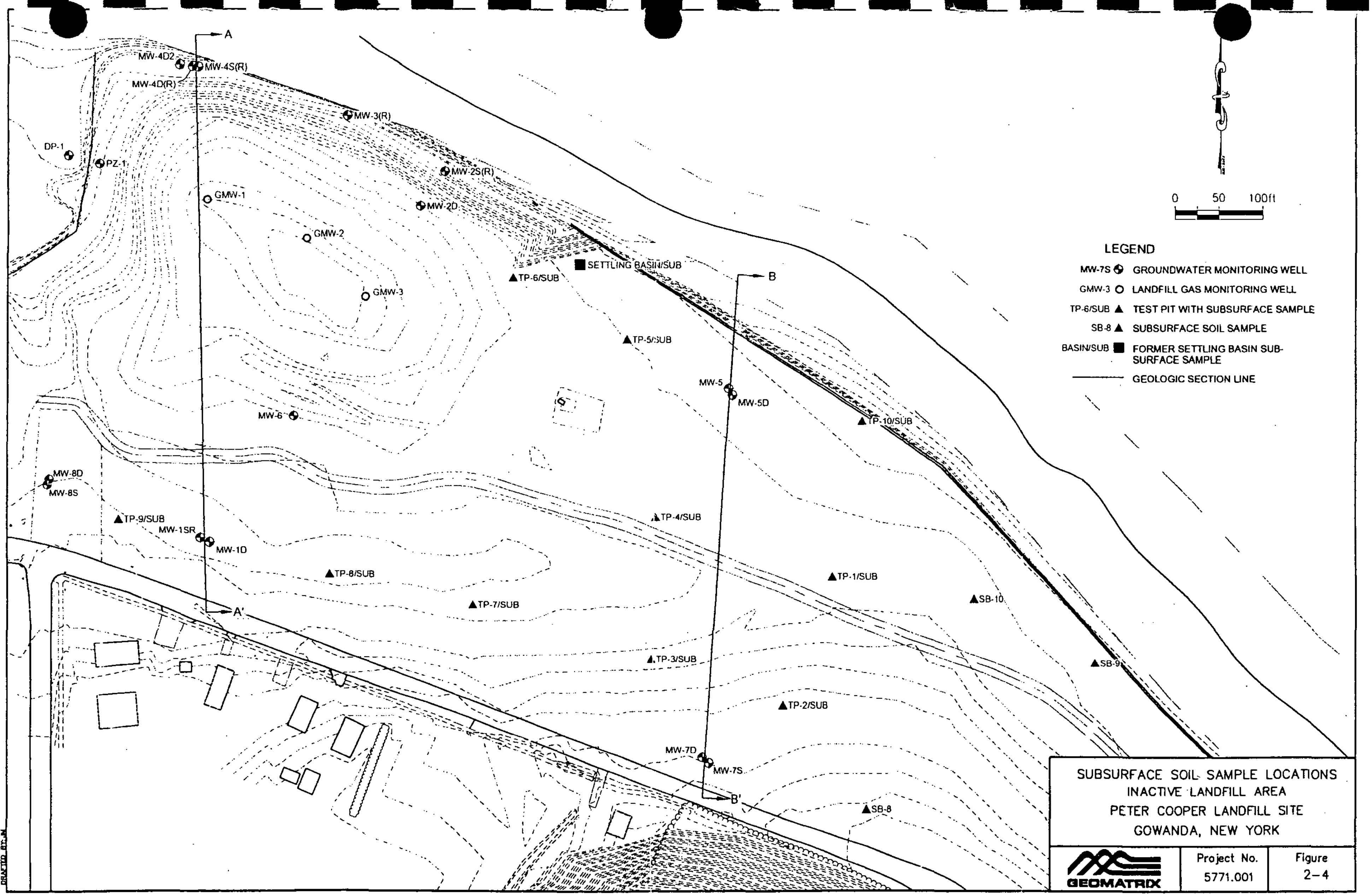

SUBSURFACE SOIL SAMPLE LOCATIONS
INACTIVE LANDFILL AREA
PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

GEOMATRIX

Project No.	Figure
5771.001	2-4

DATE: 11/21/03
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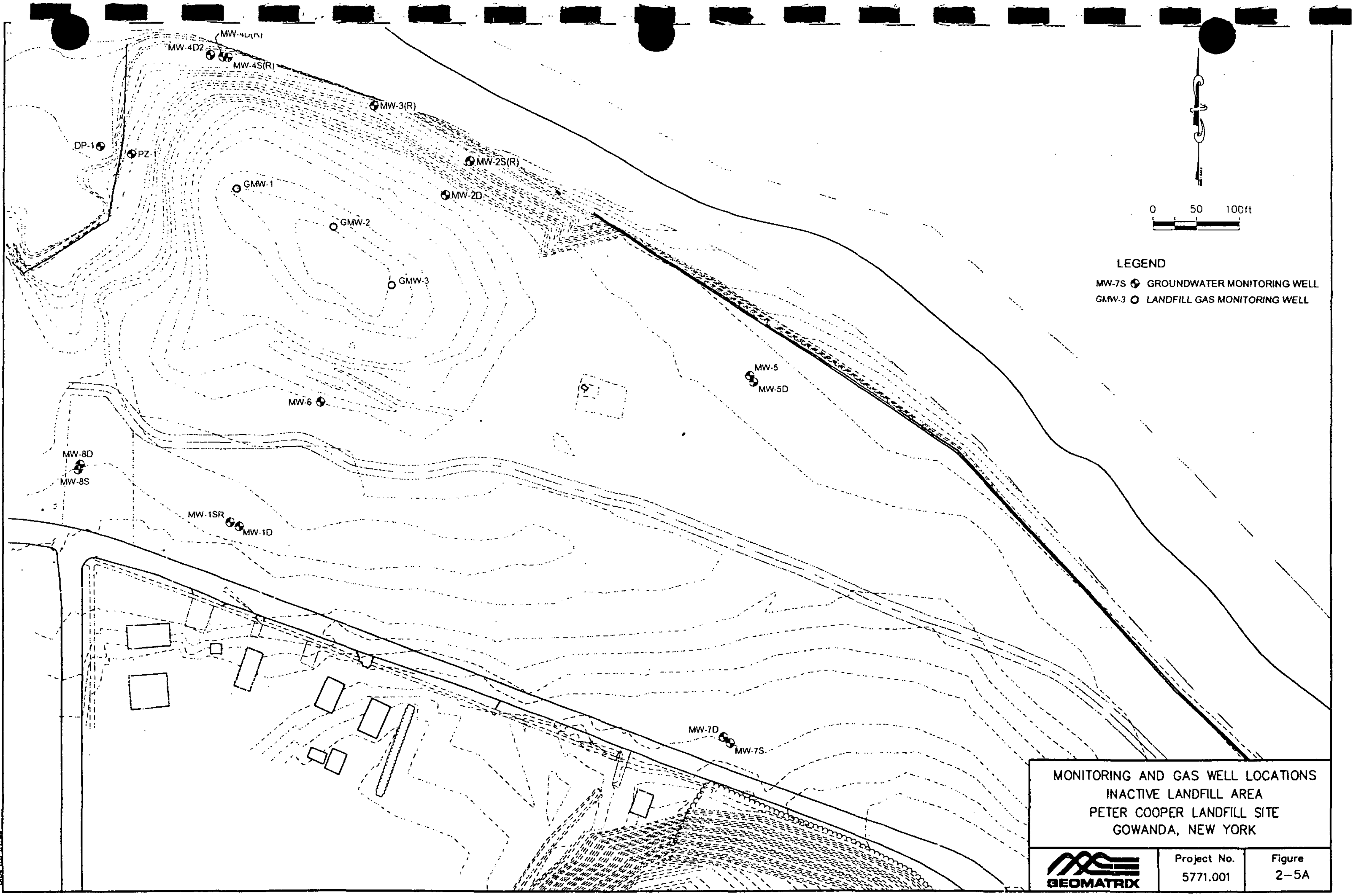
DRAFTED BY: JM



MONITORING AND GAS WELL LOCATIONS
INACTIVE LANDFILL AREA
PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

GEOMATRIX	Project No. 5771.001	Figure 2–5A

DATE: 11/21/03
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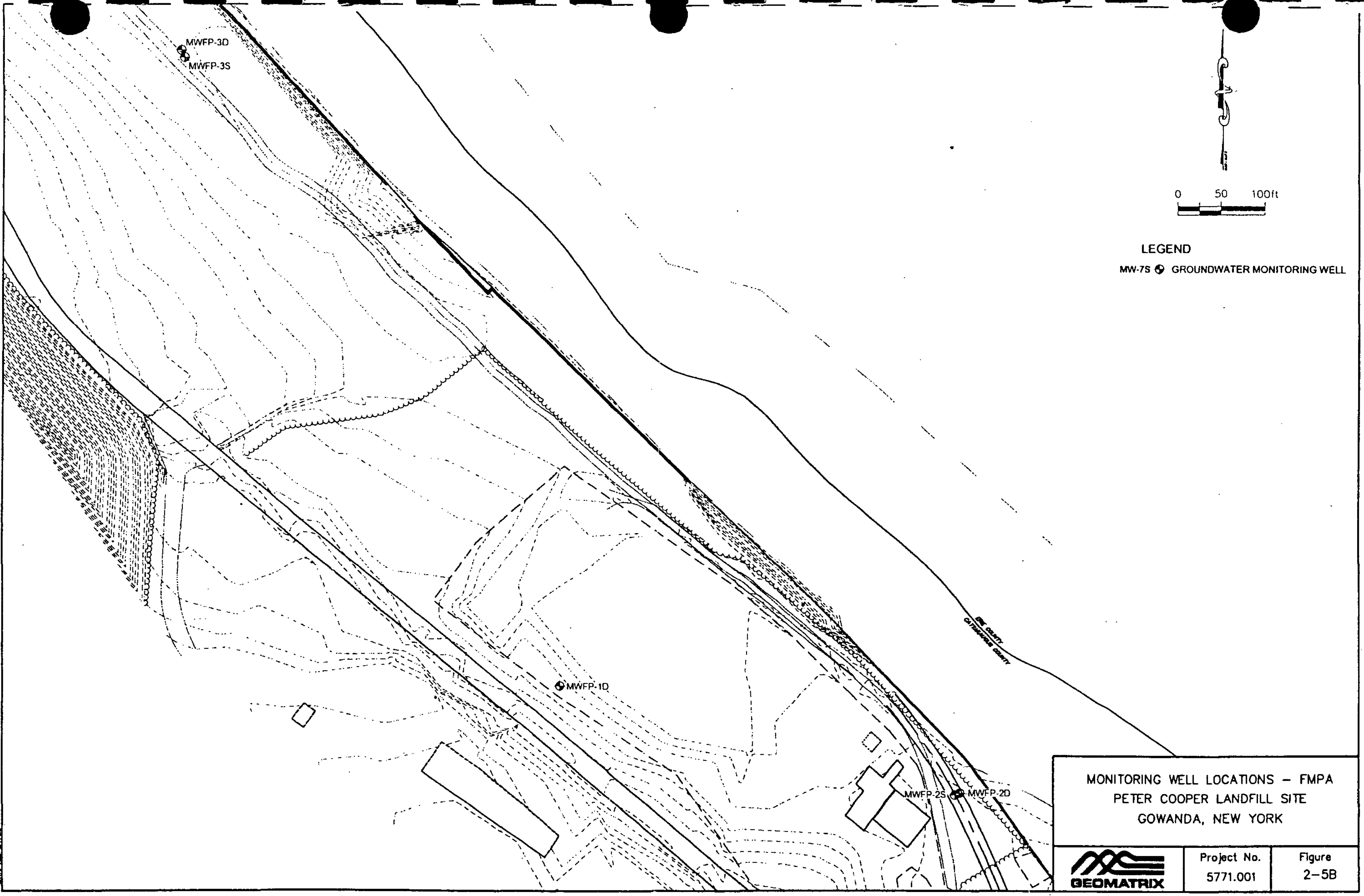


MONITORING WELL LOCATIONS – FMPA
PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

GEOMATRIX

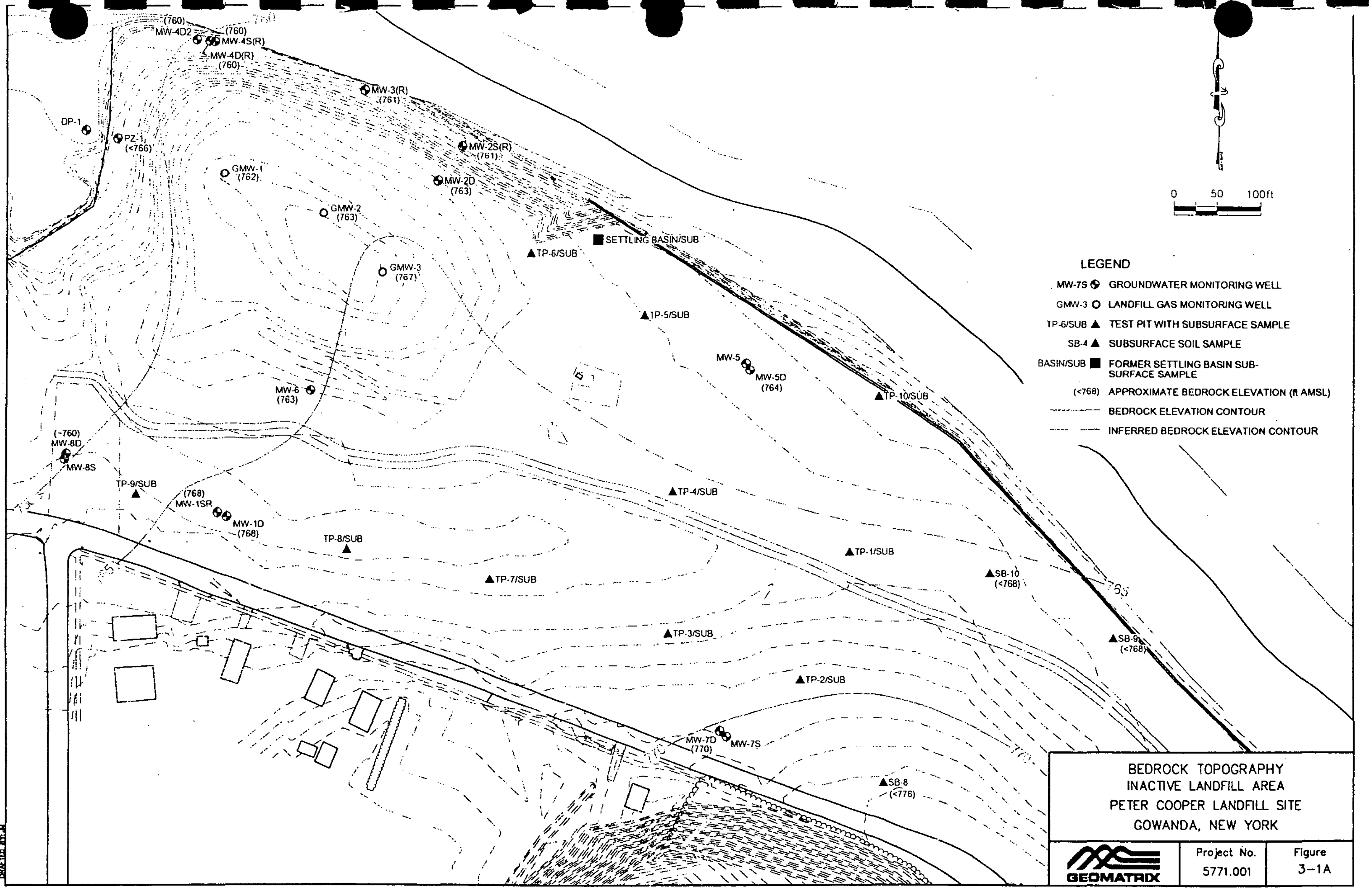
Project No.	Figure
5771.001	2–5B

DATE: 11/21/03
FILEPATH: C:\GEOMATRIX\5771.001 TASK E\5771 figure 2-5B.DWG
DRAFTED BY: JM

SURFACE WATER/SEDIMENT AND
SEEP SAMPLE LOCATIONS
PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

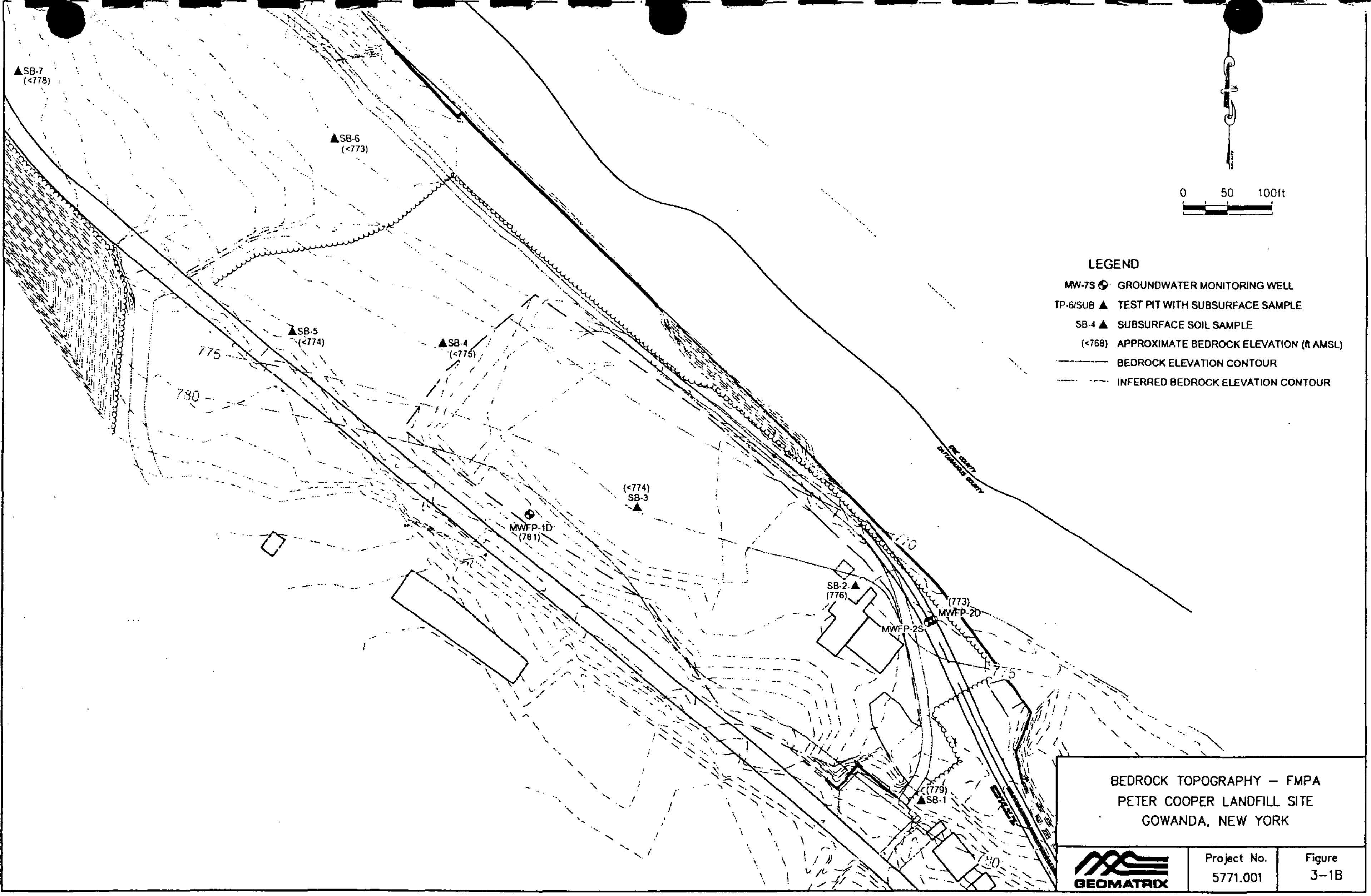
GEOMATRIX	Project No. 5771.001	Figure 2–6

DATE: 11/21/03
FILEPATH: C:\GEOMATRIX\5771.001 TASK E\5771 figure 2-6.DWG
DRAFTED BY: JM



BEDROCK TOPOGRAPHY
INACTIVE LANDFILL AREA
PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

Project No.	Figure
5771.001	3-1A



LEGEND

MW-7S ⊕	GROUNDWATER MONITORING WELL
TP-6/SUB ▲	TEST PIT WITH SUBSURFACE SAMPLE
SB-4 ▲	SUBSURFACE SOIL SAMPLE
(<768)	APPROXIMATE BEDROCK ELEVATION (ft AMSL)
———	BEDROCK ELEVATION CONTOUR
— - —	INFERRED BEDROCK ELEVATION CONTOUR

BEDROCK TOPOGRAPHY – FMPA
PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

GEOMATRIX

Project No.	Figure
5771.001	3–1B

DATE: 11/21/03
FILEPATH: C:\GEOMATRIX\5771.001 TASK E\5771 figure 3–1B.DWG
DRAFTED BY: JH

APPENDIX B

B1 – Seep/Groundwater Flow

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

Sheet 1 of 1
Project No. 0021-001-400
By BCH Date 7/15/04
Checked Date
Subject Groundwater Discharge Rate to Creek

Taken from RI Report (rev. Nov. 2003) Appendix N

Rate of Discharge (FLUX) from site to Creek

$Q_{TOTAL} = 1433.8 \text{ ft}^3/\text{day}$

Accounting for elevated fill subarea portion of inactive landfill area.

$Q_{TOTAL} \times 42\% = 602.2 \text{ ft}^3/\text{day}$

USEPA HELP Model Version 3.07 (1 Nov 1997) Output Summary - SEE APPENDIX G

Existing 1.5 acres leakage/percolation $= 28{,}883.301 \text{ ft}^3/\text{yr}$

Existing 3.5 acres leakage/perolation $= 35{,}229.430 \text{ ft}^3/\text{yr.}$

5-acre TOTAL $= 64{,}112.731 \text{ ft}^3/\text{yr.}$

$= 175.7 \text{ ft}^3/\text{day}$

Groundwater FLUX + HELP Model Output

$Q_{TOTAL (42\%)} + \text{5-acre TOTAL} = 602.2 \text{ ft}^3/\text{day} + 175.7 \text{ ft}^3/\text{day}$

$$\boxed{= 777.9 \text{ ft}^3/\text{day}}$$

B2 – Elevated Fill Subarea Sludge Volume

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

Sheet 1 of 1
Project No. 0021-001-400
By SMA / BCH Date 1/23/04 / 7/12/04
Checked THF Date 7/12/04
Subject Peter Cooper, Calculation of Sludge Wet Density

Calculation of Wet Density (in-place) of Sludge-Fill Material

from Discrete shelby tube, ST-2

Dry Density = 54.2 pcf
Moisture Content = 40.9 %

$= 54.2 * (1 + {}^{40.9}/_{100})$

$= 54.2 * 1.409$

$= 76.4$ pcf

Total Sludge (TS)

RI reported value = 100,000 CY

TS = 100,000 CY × 76.4 pcf

= 2,700,000 ft^3 × 76.4 pcf

= 206,280,000 pounds

$\boxed{\text{TS} = 103,140 \text{ tons}}$

B3 – LFSS-6 Subarea Volume

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

Sheet 1 of 2
Project No. 0021-001-400
By BCH Date 7/12/04
Checked Date
Subject LFSS-6 Area

LFSS-6 Area - Arsenic Impacts

Approx. radius of arsenic impacts = 100 ft. = r

Area of arsenic impacts = $A = \pi r^2$

$= \pi \times (100\text{ ft})^2$

$A = 31,415.9\text{ ft}^2$

Anticipated maximum depth of future construction = 5 fbgs

Estimated Volume of soil to remove from LFSS-6 Area

$V = \text{Area} \times \text{depth}$

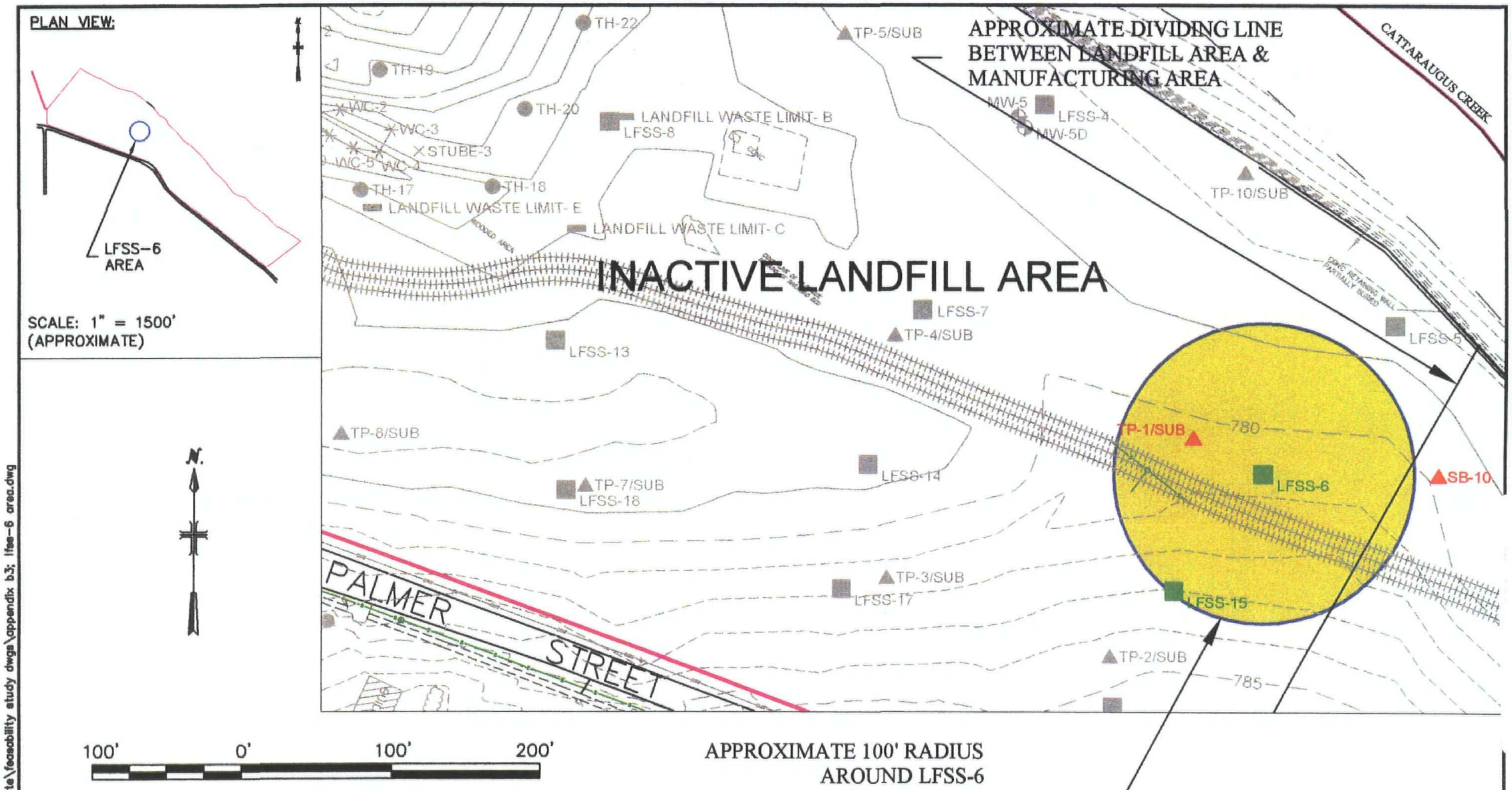
$V = 31,415.9\text{ ft}^2 \times 5\text{ ft.}$

$V = 157,079.5\text{ ft}^3$

or

$\boxed{V = 5,817.8\text{ CY}}$

SEE ATTACHED FIGURE FOR ILLUSTRATION. (p. 2 of 2)



APPROXIMATE 100' RADIUS
AROUND LFSS-6

APPROX. DEPTH = 5 FBGS
APPROX. VOLUME = 5,800 CY

BENCHMARK
ENVIRONMENTAL
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SCIENCE, PLLC

726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

PROJECT NO.: 0021-001-400
DATE: JULY 2004
DRAFTED BY: BCH

AREA OF ARENIC IMPACTS AROUND LFSS-6

FEASIBILITY STUDY

PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

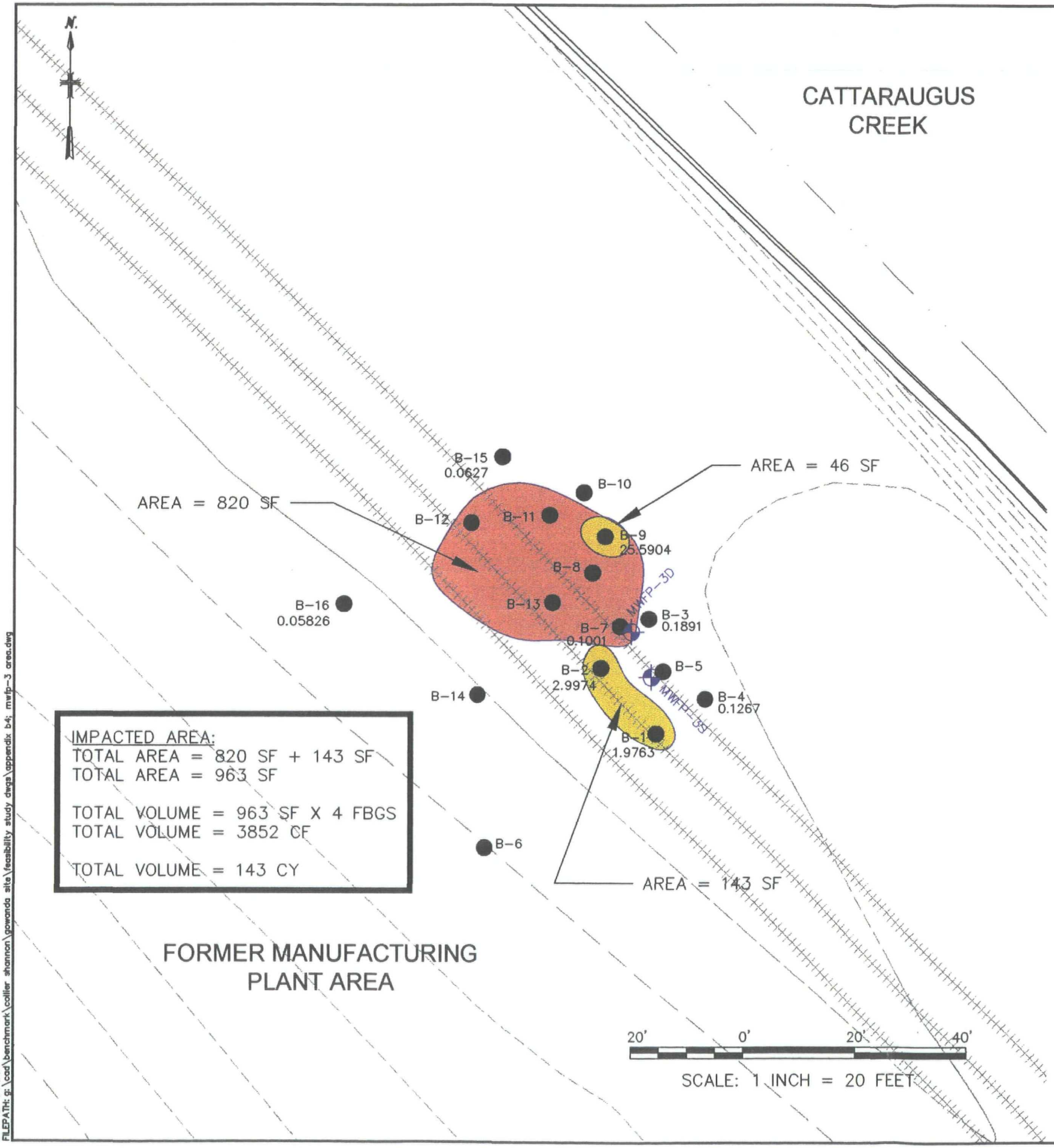
PREPARED FOR
PETER COOPER CORPORATION, INC.

FIGURE B3

FILEPATH: g:\cad\benchmark\collier shannon\gowanda site\feasibility study dwgs\appendix b3; lfss-6 area.dwg

2 of 2

B4 – MWFP-3 Subarea Volume



IMPACTED AREA:
TOTAL AREA = 820 SF + 143 SF
TOTAL AREA = 963 SF

TOTAL VOLUME = 963 SF X 4 FBGS
TOTAL VOLUME = 3852 CF

TOTAL VOLUME = 143 CY

LEGEND

MWFP-3S ⊕ GROUNDWATER MONITORING WELL

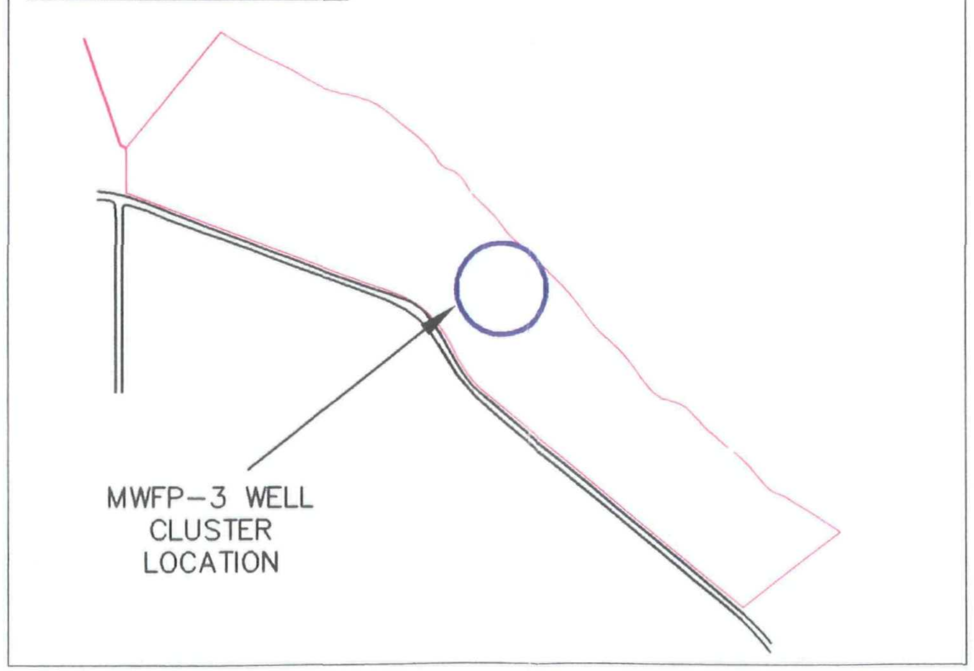
B-7 0.1001 ● GEOPROBE LOCATION WITH TOTAL VOC CONCENTRATION (MG/KG)

🟥 AREAL EXTENT OF VOC IMPACTED SOIL AS PER HEADSPACE DETERMINATIONS MEASURED IN THE FIELD
APPROXIMATE AREA = 820 SF
APPROXIMATE THICKNESS = 4.0 FBGS
APPROXIMATE VOLUME = 3280 CF
APPROXIMATE VOLUME = 121 CY

🟨 AREAL EXTENT OF VOC IMPACTED SOIL AS PER LABORATORY ANALYTICAL RESULTS EXCEEDING NYSDEC TAGM #4046 SOIL CLEANUP OBJECTIVES
(SEE TABLE B4 FOR ANALYTICAL RESULTS])
APPROXIMATE AREA = 189 SF
APPROXIMATE THICKNESS = 4.0 FBGS
APPROXIMATE VOLUME = 756 CF
APPROXIMATE VOLUME = 28 CY

LOCATION	HEADSPACE DETERMINATIONS (PPM)
B-1	0.0
B-2	0.0
B-3	0.0
B-4	0.0
B-5	0.0
B-6	0.0
B-7	3.7
B-8	24.5
B-9	0.0
B-10	0.0
B-11	31.7
B-12	0.5
B-13	223
B-14	0.0
B-15	0.0
B-16	0.0

SITE MAP: PLAN VIEW



DATE: JULY 2004
DRAFTED BY: BCH
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BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC
50 FOUNTAIN PLAZA
SUITE 1350
BUFFALO, NEW YORK 14202
(716) 856-0599

JOB NO.: 0021-001-400

EXTENT OF VOC-IMPACTED SOIL IN MWFP-3 SUBAREA

FEASIBILITY STUDY

PETER COOPER GOWANDA SITE
GOWANDA, NEW YORK

PREPARED FOR
RESPONDENTS FOR PETER COOPER GOWANDA SITE

FIGURE B4

TABLE B4

SUMMARY OF SOIL ANALYTICAL RESULTS

PETER COOPER LANDFILL NPL SITE
GOWANDA, NEW YORK

Parameter	B-1 (2.0 - 4.0 fbgs)	B-2 (2.0 - 4.0 fbgs)	B-3 (2.0 - 4.0 fbgs)	B-4 (2.0 - 4.0 fbgs)	Blind Duplicate B-4 (2.0 - 4.0 fbgs)	B-4 (0.5 - 1.5 fbgs)	B-7 (0.5 - 1.5 fbgs)	B-9 (0.5 - 1.5 fbgs)	B-15 (0.5 - 1.5 fbgs)	B-16 (0.7 - 1.1 fbgs)	NYSDEC TAGM 4046 (ppm)
TCL Volatile Organic Compounds (VOCs) - mg/kg [2]											
Acetone	0.02	0.023	0.031	0.029	0.023	0.019 B	0.014	0.15 J	0.036	0.021	0.2
Benzene					0.0033 J			0.0024 J			0.06
2-Butanone (Methyl ethyl ketone)	0.0029 J			0.0046 J	0.0045 J			0.015	0.0026 J		0.3
Carbon disulfide				0.004 J	0.017			0.0017 J			2.7
Carbon tetrachloride	0.003 J	0.017	0.0095	0.008 J	0.014	0.018	0.0085 J	0.021			0.6
Chloroform	0.0055 J	0.018	0.0049 J	0.003 J	0.0042 J	0.0044 J	0.015	0.014			0.3
Cyclohexane				0.0021 J	0.011			0.0052 J	0.0039 J		--
1,4-Dichlorobenzene								0.0019 J			8.5
1,3-Dichlorobenzene								0.0016 J			1.6
Ethylbenzene			0.0025 J	0.0017 J	0.0024 J			0.0086 J			5.5
2-Hexanone (MBK)				0.0017 J							--
Cumene (isopropylbenzene)								0.45 J	0.0011 J		--
Methyl acetate								1.1 J	0.0028 J		--
Methylcyclohexane				0.0031 J	0.017		0.0011 J	0.0092 J	0.0058 J	0.00096 J	--
Methyl isobutyl ketone (MIBK, 4-Methyl-2-Pentanone)									0.003 J	0.0021 J	1
Tetrachloroethylene (PCE)	**1.9**	**2.9**	0.11	0.039	0.075	0.0033 J	0.044	**15**	0.0011 J	0.031	1.4
Toluene				0.0015 J	0.0071 J			**3.7**	0.0017 J		1.5
1,2,4-Trichlorobenzene		0.001 J						0.0035 J			3.4
1,1,1-Trichloroethane	0.041	0.031	0.014	0.023	0.036	0.026	0.016	0.098	0.0024 J	0.0016 J	0.8
1,1,2-Trichloroethane											--
Trichloroethylene (TCE)	0.0025 J	0.0074 J	0.0039 J	0.0011 J	0.0017 J		0.0026 J	0.0046 J			0.7
m,p-Xylenes	0.0014 J		0.0097	0.0049 J	0.0048 J			**5**	0.0023	0.0016 J	1.2
o-Xylene			0.0036 J		0.0036 J			**0.0037 J**			
TOTAL VOCs	**1.9763**	**2.9974**	**0.1891**	**0.1267**	**0.2246**	**0.0707**	**0.1001**	**25.5904**	**0.0627**	**0.05826**	10
HEADSPACE DETERMINATION (ppm)	**0.0**	**0.0**	**0.0**	**0.0**	**--**	**0.0**	**3.7**	**0.0**	**0.0**	**0.0**	--

Notes:

1. J = inicates an estimated value.
2. Analytical results were reported in ug/kg and converted to mg/kg for comparison to the NYSDEC TAGM 4046 values.
3. NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives, January 1994.
4. A blank value indicates the compound was not detected above laboratory reporting limit.
5. Headspace determinations were performed in the field with a calibrated photoionization detector equipped with a 10.6 eV lamp.

BOLD = Indicates value has exceeded the NYSDEC TAGM #4046 Recommended Soil Cleanup Objective value.

BOLD = Indicates value has exceeded the NYSDEC TAGM #4046 Recommended Soil Cleanup Objective value for total VOCs.

B5 – Elevated Fill Subarea Gas

E-Plus Analysis

Summary Report

Landfill: Peter Cooper Gowanda - Inactive Landfill Area
Design Scenario: <Scenario Name>
Author: BCH
Date: January 2004

Summary Results

Based on the project definition, landfill characteristics, and financial assumptions provided, the following summary results are estimated:

Project Start Year:	2004
Project Lifetime:	15
Electricity Capacity:	0 kW for electricity sales
Average Electricity Price:	$0.0000 per kWh, averaged over the life of the project
Gas Sales Capacity:	447 MMBTU/year for gas sales
Average Gas Price:	$2.43 per MMBTU, averaged over the life of the project
Financial Results:	
Net Present Value:	$- 314,497
IRR:	0
Simple Payback:	9,999.9 years
Capital Costs:	$ 316,113
O&M Costs:	$ 36,593 per year, averaged over the life of the project

These financial results include the costs associated with the gas collection and flaring system. As defined, the landfill does not trigger the recently promulgated NSPS/EG emissions control requirements using the Tier 1 calculation method.

Landfill Characteristics

Open Year:	1925
Close Year:	1970
Current Year:	2004
Waste in Place:	103,000 tons, in 2004
Waste Acceptance Rate:	2,584 tons per year, from current year onward
Depth:	14 feet, maximum during landfill lifetime
Area:	5 acres, maximum during landfill lifetime

Gas Generation and Collection

Gas Generation from 1925 to 2039:

Annual Average:	3 mmcf/year of methane 11 mmcf/year of landfill gas
Maximum:	7 mmcf/year of methane 25 mmcf/year of landfill gas

Gas Generation During the Project: 2004 to 2019:

Annual Average:	1 mmcf/year of methane 4 mmcf/year of landfill gas
Maximum:	2 mmcf/year of methane 6 mmcf/year of landfill gas

Gas Collection Efficiency: 85 percent

Financial Assumptions

Project Start Year:	2004
Project End Year:	2019
Base Year for NPV Estimate:	2004
Downpayment Percent:	20 percent of total capital costs (remainder is borrowed)
Loan Rate:	4 percent
Loan Period:	10 years
Project Discount Rate:	12 percent
Marginal Tax Rate:	35 percent
Depreciation Method:	Straight Line
Inflation Rate for Costs:	4.0 percent per year
Collect and Flare Costs:	The costs associated with the gas collection and flaring system are included from the financial analysis.

Project Configuration Summary

Collection:	Included
Flare:	Included
Gas Treatment:	Included
Compression:	Included
Gas Enrichment:	Not Included
Electricity Production:	
Generation:	Not Included
Intertie:	Not Included
Sales	Not Included
Gas Production:	
Pipeline:	Included
Sales:	Included

Electricity Production and Sales Summary

Total Capacity:	0 kW
Average Generation:	0 kWh/year over the life of the project
Engine Load Factor:	0.00 percent over the life of the project
Average Electricity Price:	$0.0000 per kWh, averaged over the life of the project

Gas Production and Sales Summary

Gas Sales Capacity:	447 MMBTU/year for gas sales
Average Gas Price:	$2.43 per MMBTU, averaged over the life of the project
Average Production:	343 MMBTU/year over the life of the project

Price Analysis

Electricity Price: To achieve an IRR equal to the project evaluation discount rate of 12 percent, an average electricity price of $30.0000 per kWh is needed, average over the life of the project (assuming that the price for gas sales, if any, remains as defined in the project specification).

Gas Price: To achieve an IRR equal to the project evaluation discount rate of 12 percent, an average gas price of $30.00 per MMBTU is needed, average over the life of the project (assuming that the price for electricity sales, if any, remains as defined in the project specification).

Environmental Benefits Analysis

Annual Average Environmental Benefits From Recovering the Landfill Gas:

Methane Emissions:	2.32 thousand tons avoided/year, averaged over the life of the project
	34.84 thousand tons avoided total during the project
CO2 Equivalent:	48.78 thousand tons avoided/year, averaged over the life of the project
	731.63 thousand tons avoided total during the project

Annual Average Environmental Benefits From Generating Electricity from Landfill Gas:

CO2 Emissions:	0.00 thousand tons avoided/year, averaged over the life of the project
	0.00 thousand tons avoided total during the project
SO2 Emissions:	0.00 thousand tons avoided/year, averaged over the life of the project
	0.00 thousand tons avoided total during the project

Annual Average Environmental Benefits From Using Landfill Gas Directly:

CO2 Emissions:	0.08 thousand tons avoided/year, averaged over the life of the project
	1.13 thousand tons avoided total during the project

Methane Flows

End of Year	Total Waste tons	Methane cf/hr	Landfill Gas cf/hr	NMOC (Tier I) grams/hr
1925	2,290	40.2	134	55.3
1926	4,580	78.8	262	107
1927	6,870	115	386	157
1928	9,160	151	505	205
1929	11,400	185	619	250
1930	13,700	218	729	293
1931	16,000	250	835	334
1932	18,300	280	936	373
1933	20,600	310	1,030	410
1934	22,900	338	1,120	446
1935	25,200	365	1,210	479
1936	27,500	391	1,300	511
1937	29,700	415	1,380	542
1938	32,000	439	1,460	570
1939	34,300	462	1,540	598
1940	36,600	484	1,610	624
1941	38,900	506	1,680	649
1942	41,200	526	1,750	672
1943	43,500	546	1,820	695
1944	45,800	564	1,880	716
1945	48,100	582	1,940	737
1946	50,400	600	2,000	756
1947	52,700	616	2,050	774
1948	55,000	633	2,110	792
1949	57,300	648	2,160	809
1950	59,500	663	2,210	824
1951	61,800	677	2,250	840
1952	64,100	691	2,300	854
1953	66,400	704	2,340	868
1954	68,700	716	2,380	881
1955	71,000	728	2,420	893
1956	73,300	740	2,460	905
1957	75,600	751	2,500	916
1958	77,900	762	2,540	926
1959	80,200	772	2,570	936
1960	82,500	782	2,600	946
1961	84,800	792	2,640	955
1962	87,000	801	2,670	964
1963	89,300	810	2,700	972
1964	91,600	818	2,720	980
1965	93,900	826	2,750	988
1966	96,200	834	2,780	995
1967	98,500	842	2,800	1,000
1968	100,000	849	2,830	1,000
1969	103,000	856	2,850	1,010
1970	103,000	822	2,740	965
1971	103,000	790	2,630	917
1972	103,000	759	2,530	873
1973	103,000	729	2,430	830
1974	103,000	701	2,330	790
1975	103,000	673	2,240	751
1976	103,000	647	2,150	714
1977	103,000	621	2,070	680
1978	103,000	597	1,990	646
1979	103,000	573	1,910	615
1980	103,000	551	1,830	585
1981	103,000	529	1,760	556
1982	103,000	509	1,690	529
1983	103,000	489	1,630	503
1984	103,000	469	1,560	479
1985	103,000	451	1,500	455
1986	103,000	433	1,440	433
1987	103,000	416	1,380	412
1988	103,000	400	1,330	392
1989	103,000	384	1,280	373
1990	103,000	369	1,230	355
1991	103,000	355	1,180	337
1992	103,000	341	1,130	321

1993	103,000	327	1,090	305
1994	103,000	314	1,040	290
1995	103,000	302	1,000	276
1996	103,000	290	969	263
1997	103,000	279	931	250
1998	103,000	268	894	237
1999	103,000	257	859	226
2000	103,000	247	825	215
2001	103,000	238	793	204
2002	103,000	228	762	194
2003	103,000	219	732	185
2004	103,000	211	703	176
2005	103,000	202	676	167
2006	103,000	194	649	159
2007	103,000	187	624	151
2008	103,000	179	599	144
2009	103,000	172	576	137
2010	103,000	166	553	130
2011	103,000	159	531	124
2012	103,000	153	511	118
2013	103,000	147	491	112

TABLE 1

USEPA LANDFILL AIR EMISSIONS ESTIMATION MODEL OUTPUT USING E-PLUS (VERSION 1.0)

FEASABILITY STUDY
PETER COOPER GOWANDA SITE
GOWANDA, NEW YORK

End of Year	Total Waste (tons)	Methane (cf/hr)	Landfill Gas (cf/hr)	NMOC (Tier 1) (grams/hr)
1925	2,280	40.1	133.0	55.2
1926	4,570	78.7	262.0	107.0
1927	6,860	115.0	386.0	157.0
1928	9,150	151.0	504.0	205.0
1929	11,400	185.0	618.0	250.0
1930	13,700	218.0	728.0	293.0
1931	16,000	250.0	833.0	334.0
1932	18,300	280.0	935.0	373.0
1933	20,600	309.0	1030.0	410.0
1934	22,800	337.0	1120.0	445.0
1935	25,100	364.0	1210.0	479.0
1936	27,400	390.0	1300.0	510.0
1937	29,700	415.0	1380.0	541.0
1938	32,000	439.0	1460.0	570.0
1939	34,300	462.0	1540.0	597.0
1940	36,600	484.0	1610.0	623.0
1941	38,900	505.0	1680.0	648.0
1942	41,200	525.0	1750.0	672.0
1943	43,400	545.0	1810.0	694.0
1944	45,700	564.0	1880.0	715.0
1945	48,000	582.0	1940.0	736.0
1946	50,300	599.0	1990.0	755.0
1947	52,600	616.0	2050.0	773.0
1948	54,900	632.0	2100.0	791.0
1949	57,200	647.0	2150.0	808.0
1950	59,500	662.0	2200.0	823.0
1951	61,800	676.0	2250.0	838.0
1952	64,000	690.0	2300.0	853.0
1953	66,300	703.0	2340.0	866.0
1954	68,600	715.0	2380.0	879.0
1955	70,900	727.0	2420.0	892.0
1956	73,200	739.0	2460.0	903.0
1957	75,500	750.0	2500.0	915.0
1958	77,800	761.0	2530.0	925.0
1959	80,100	771.0	2570.0	935.0
1960	82,400	781.0	2600.0	945.0
1961	84,600	791.0	2630.0	954.0
1962	86,900	800.0	2660.0	963.0
1963	89,200	809.0	2690.0	971.0
1964	91,500	817.0	2720.0	979.0
1965	93,800	825.0	2750.0	986.0
1966	96,100	833.0	2770.0	993.0
1967	98,400	840.0	2800.0	1000.0
1968	100,000	848.0	2820.0	1000.0
1969	103,000	855.0	2850.0	1010.0
1970	103,000	821.0	2730.0	963.0
1971	103,000	789.0	2630.0	916.0

TABLE 1

USEPA LANDFILL AIR EMISSIONS ESTIMATION MODEL OUTPUT
USING E-PLUS (VERSION 1.0)

FEASABILITY STUDY
PETER COOPER GOWANDA SITE
GOWANDA, NEW YORK

End of Year	Total Waste (tons)	Methane (cf/hr)	Landfill Gas (cf/hr)	NMOC (Tier 1) (grams/hr)
1972	103,000	758.0	2520.0	872.0
1973	103,000	728.0	2420.0	829.0
1974	103,000	700.0	2330.0	789.0
1975	103,000	672.0	2240.0	750.0
1976	103,000	646.0	2150.0	713.0
1977	103,000	620.0	2060.0	679.0
1978	103,000	596.0	1980.0	646.0
1979	103,000	573.0	1910.0	614.0
1980	103,000	550.0	1830.0	584.0
1981	103,000	529.0	1760.0	556.0
1982	103,000	508.0	1690.0	528.0
1983	103,000	488.0	1620.0	503.0
1984	103,000	469.0	1560.0	478.0
1985	103,000	450.0	1500.0	455.0
1986	103,000	433.0	1440.0	433.0
1987	103,000	416.0	1380.0	411.0
1988	103,000	399.0	1330.0	391.0
1989	103,000	384.0	1280.0	372.0
1990	103,000	369.0	1230.0	354.0
1991	103,000	354.0	1180.0	337.0
1992	103,000	340.0	1130.0	320.0
1993	103,000	327.0	1090.0	305.0
1994	103,000	314.0	1040.0	290.0
1995	103,000	302.0	1000.0	276.0
1996	103,000	290.0	967.0	262.0
1997	103,000	278.0	929.0	249.0
1998	103,000	268.0	893.0	237.0
1999	103,000	257.0	858.0	226.0
2000	103,000	247.0	824.0	215.0
2001	103,000	237.0	792.0	204.0
2002	103,000	228.0	761.0	194.0
2003	103,000	219.0	731.0	185.0
2004	**103,000**	**210.0**	**702.0**	**176.0**
2005	103,000	202.0	675.0	167.0
2006	103,000	194.0	648.0	159.0
2007	103,000	187.0	623.0	151.0
2008	103,000	179.0	598.0	144.0
2009	103,000	172.0	575.0	137.0
2010	103,000	165.0	552.0	130.0
2011	103,000	159.0	531.0	124.0
2012	103,000	153.0	510.0	118.0
2013	103,000	147.0	490.0	112.0
2014	103,000	141.0	471.0	106.0
2015	103,000	135.0	452.0	101.0
2016	103,000	130.0	434.0	96.6
2017	103,000	125.0	417.0	91.9
2018	103,000	120.0	401.0	87.4

TABLE 1

USEPA LANDFILL AIR EMISSIONS ESTIMATION MODEL OUTPUT USING E-PLUS (VERSION 1.0)

FEASABILITY STUDY
PETER COOPER GOWANDA SITE
GOWANDA, NEW YORK

End of Year	Total Waste (tons)	Methane (cf/hr)	Landfill Gas (cf/hr)	NMOC (Tier 1) (grams/hr)
2019	103,000	115.0	385.0	83.1
2020	103,000	111.0	370.0	79.1
2021	103,000	106.0	356.0	75.2
2022	103,000	102.0	342.0	71.5
2023	103,000	98.6	328.0	68.0
2024	103,000	94.7	315.0	64.7
2025	103,000	91.0	303.0	61.6
2026	103,000	87.4	291.0	58.6
2027	103,000	84.0	280.0	55.7
2028	103,000	80.7	269.0	53.0
2029	103,000	77.5	258.0	50.4
2030	103,000	74.5	248.0	47.9
2031	103,000	71.6	238.0	45.6
2032	103,000	68.7	229.0	43.4
2033	103,000	66.1	220.0	41.2
2034	103,000	63.5	211.0	39.2
2035	103,000	61.0	203.0	37.3
2036	103,000	58.6	195.0	35.5
2037	103,000	56.3	187.0	33.8
2038	103,000	54.1	180.0	32.1
Minimum	**–**	**40.1**	**133.0**	**32.1**
Maximum	**–**	**855.0**	**2850.0**	**1010.0**
Mean	**–**	**392.3**	**1306.2**	**441.1**

RI Sludge Quantity (cubic yard):	100,000
RI Sludge Density (pounds per cubic foot):	76.4
RI Sludge Density (pounds per cubic yard):	2062.8
RI Sludge Density (tons per cubic yard):	1.0314
RI Sludge Quantity (tons):	103,140

FIGURE 1

METHANE VERSUS TIME

FEASABILITY STUDY
PETER COOPER GOWANDA SITE

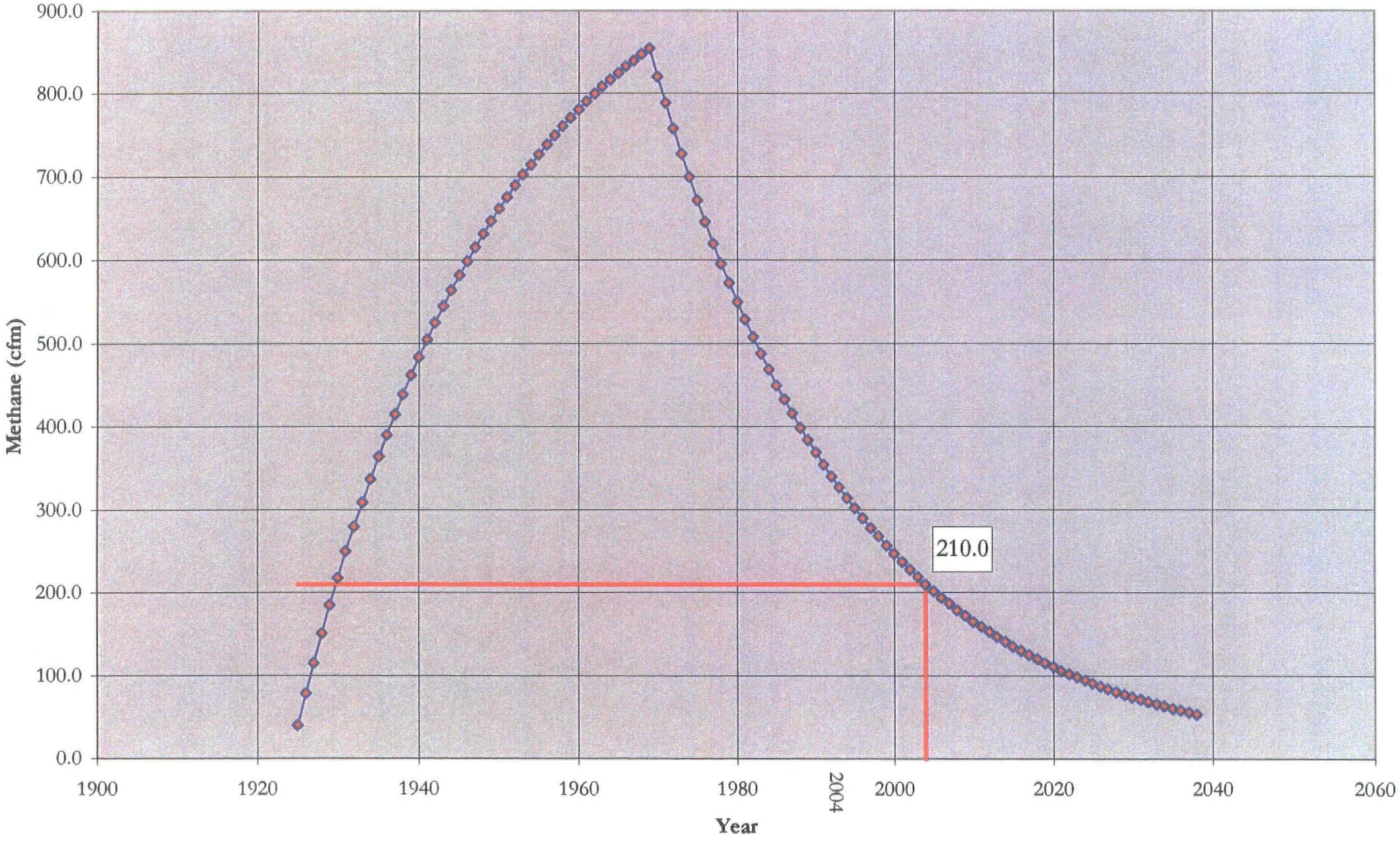


FIGURE 2

LANDFILL GAS VERSUS TIME

FEASABILITY STUDY
PETER COOPER GOWANDA SITE

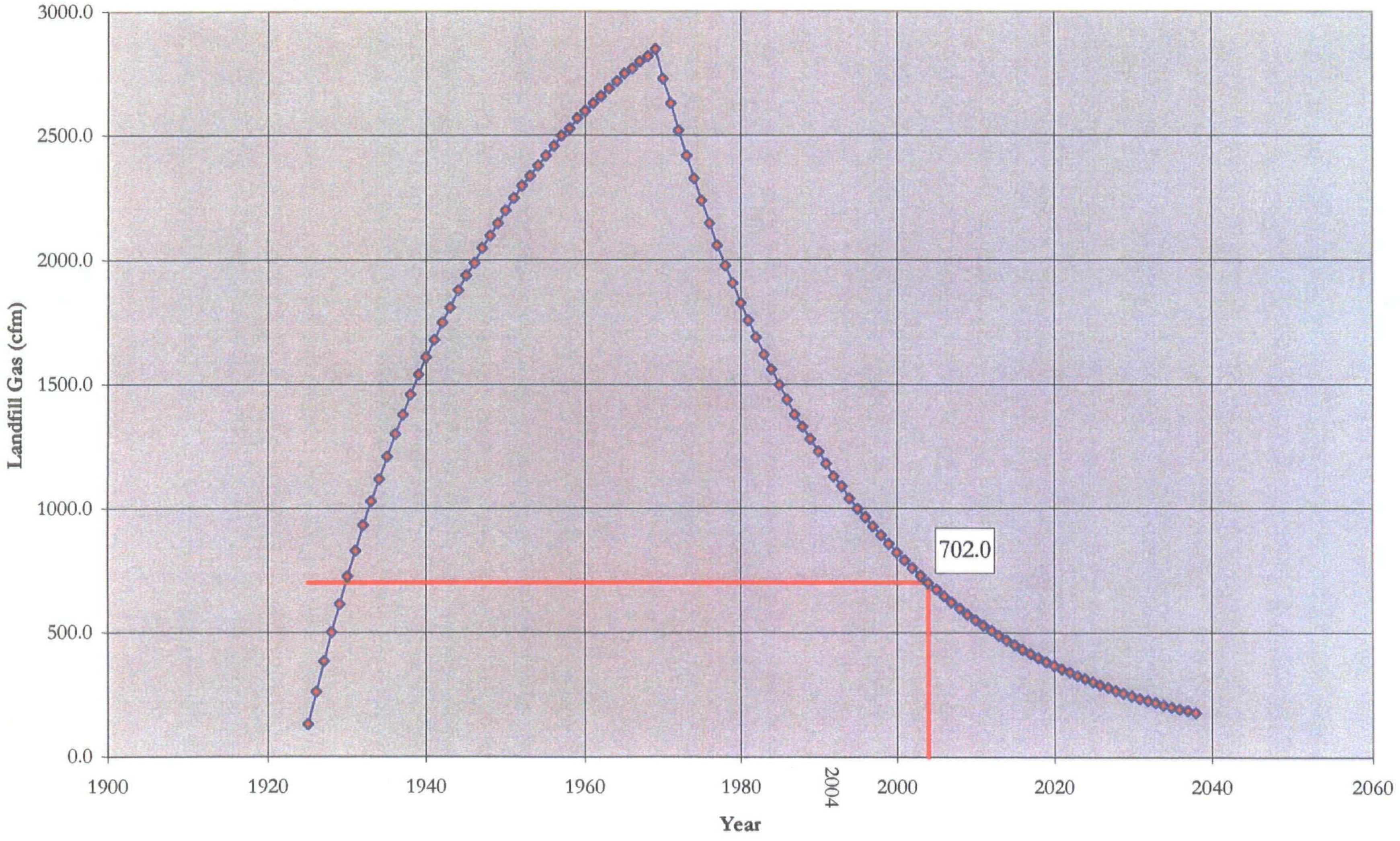
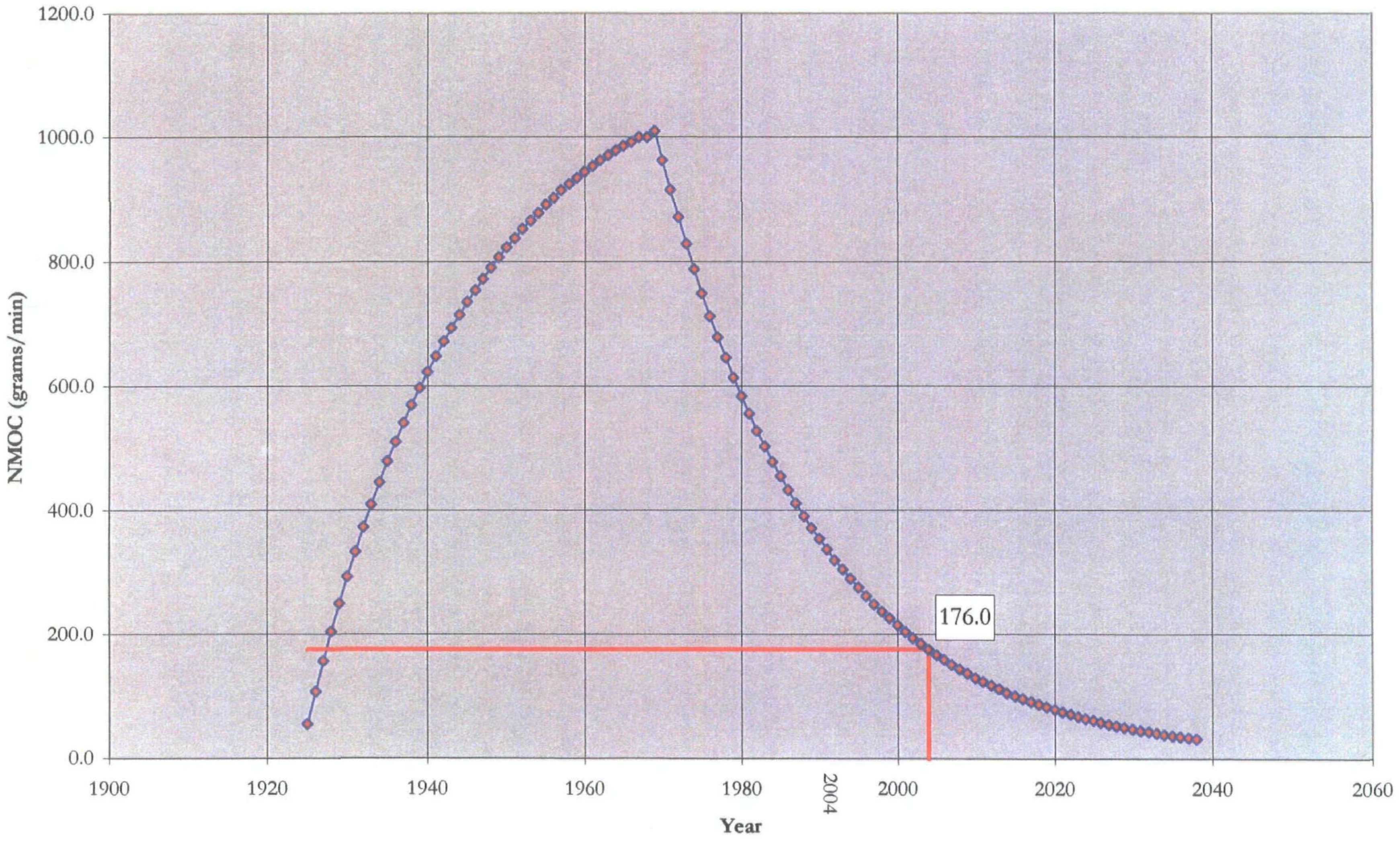


FIGURE 3

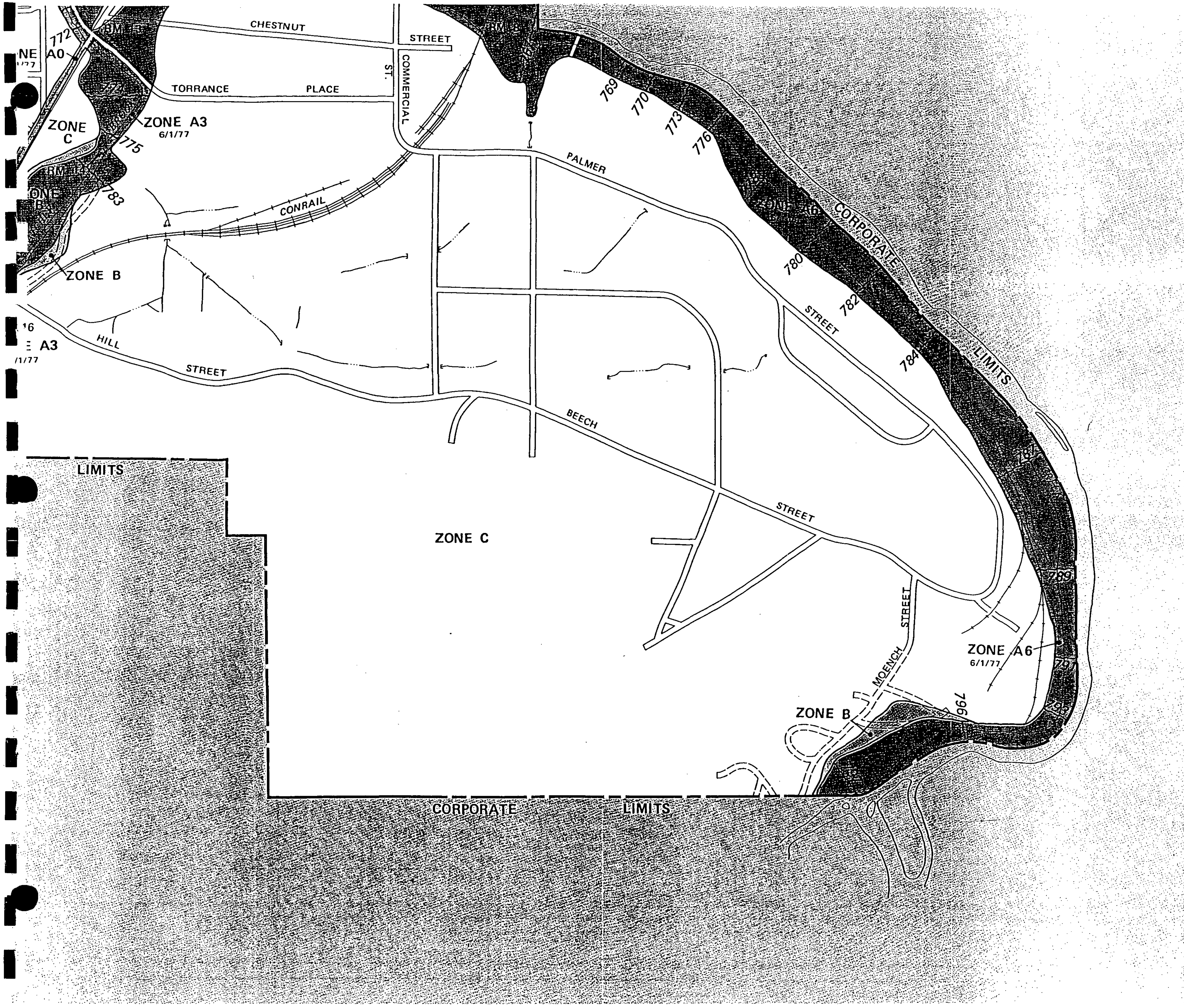
NON-METHANE ORGANIC COMPOUNDS VERSUS TIME

FEASABILITY STUDY
PETER COOPER GOWANDA SITE



APPENDIX C

400276



FLOOD HAZARD BOUNDARY MAP H- 01
FLOOD INSURANCE RATE MAP I- 01

VILLAGE OF GOWANDA, NEW YORK

CATTARAUGUS COUNTY
ERIE COUNTY

PANEL H&I-01

PAGE 1 OF 1 PRINTED

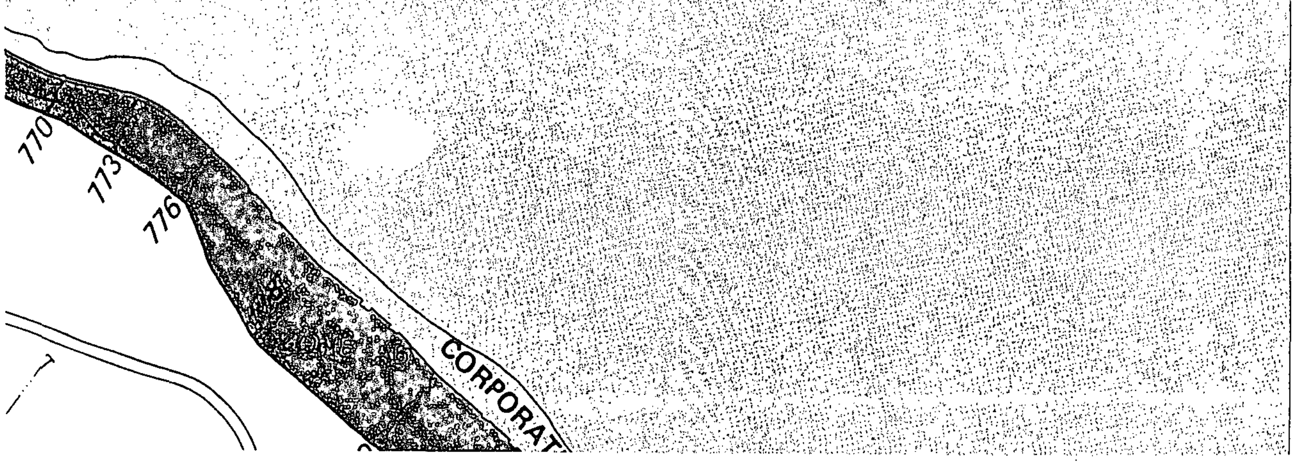
EFFECTIVE DATE:
JUNE 1, 1977

COMMUNITY NUMBER:
360075A

U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (MSL)	DESCRIPTION OF LOCATION
RM 1	753.02	Union Street – two file marks on top of railing upstream side of bridge, 22 feet from right upstream bridge opening.
RM 2	768.28	Buffalo Street – chiseled square on sidewalk on upstream side of bridge, 3.5 feet from right end.
RM 3	768.26	Intersection of Perry Street and Buffalo Street – west flange bolt of fire hydrant, S.E. corner of intersection.
RM 4	792.23	CONRAIL Bridge – top of 16p nail in R.R. bridge deck, at upstream right bridge opening.
RM 5	789.03	Cemetery Road – two file marks on top of 2 foot corregated metal pipe at left bank, 10 feet from upstream side of bridge.
RM 6	756.39	Aldrich Street – painted arrow on right downstream side of bridge opposite the 11th guardrail post from the right end of the bridge, use bottom of bevel.
RM 7	762.16	West Main Street – chiseled square on top of the left upstream wing wall, near head wall.
RM 8	784.05	CONRAIL Bridge – filed arrow (painted red) on top of the steel downstream handrail, about 36 feet from the left downstream bridge opening.
RM 9	750.40	North Water Street – two file marks on top of downstream side of steel I girder over center of stream.
RM 10	763.21	West Main Street – two file marks on top of guardrail girder, at upstream side, over the center of the stream.
RM 11	762.18	Johnson Street – two file marks on the downstream side of the sidewalk I girder, at third guard post from right bridge opening.
RM 12	770.82	South Chapel Street – two file marks on top of the upstream side steel guardrail, highest one at center of the bridge.
RM 13	778.04	Jamestown Street – chiseled square on top of concrete rail, upstream side near center of bridge.
RM 14	778.19	Small Concrete Dam – two file marks on top of the right upstream steel piling, at upstream side of crest of dam.
RM 15	791.60	Hill Street – two file marks on top of steel plate (2' x 2' x 3/8") at right downstream side of bridge.
RM 16	801.69	CONRAIL Bridge – two file marks on 3/4" bolt head at fourth post from right upstream end of bridge.
RM 17	800.32	Private Bridge – first private bridge upstream from R.R. bridge, two file marks on top of downstream guardrail at center of bridge.



KEY TO SYMBOL

ZONE DESIGNATIONS* WITH DATE OF IDENTIFICATION ie., 12/2/74	ZONE B ZONE B
Base Flood Elevation Line with elevation in feet	~~~~513~~~~
Base Flood Elevation where uniform within zone	(EL. 987' MSL)
Elevation Reference Mark	RM7 ×
River Mile	• M1.5

*EXPLANATION OF ZONE DESIGNATIONS

A flood insurance map displays the zone designations for a community according to areas of designated flood hazards. The zone designations used by FIA are:

Zone	Explanation
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding; flood depth 1 to 3 feet; product of flood depth (feet) and velocity (feet per second) less than 15.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by a flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Area between limits of 100-year flood and 500-year flood; areas of 100-year shallow flooding where depths less than 1 foot.
C	Areas outside 500-year flood.
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V0	Areas of 100-year shallow flooding with velocity; flood depth 1 to 3 feet; product of depth (feet) and velocity (feet per second) more than 15.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

CONSULT NIFA SERVICING COMPANY OR LOCAL INSURANCE AGENT OR BROKER TO DETERMINE IF PROPERTIES IN THIS COMMUNITY ARE ELIGIBLE FOR FLOOD INSURANCE.

INITIAL IDENTIFICATION DATE:
FEBRUARY 8, 1973
CONVERSION TO REGULAR PROGRAM:
JUNE 1, 1977

APPROXIMATE SCALE IN FEET:
500 250 0 500 1000

400277

APPENDIX D

TABLE 1

SUMMARY SVE SYSTEM DAR-1 ANALYSIS

PETER COOPER LANDFILL NPL SITE
GOWANDA, NEW YORK

Parameter	Measured Concentration (mg/kg)			Soil Mass (tons)	Parameter Mass (lbs)	Removal Time (years)	Q_a (lbs/yr)	Q_b (lbs/yr)	h_s (ft)	h_b (ft)	h_e (ft)	Ca (ug/m^3)	Revised Ca (ug/m^3) (75%)	AGC (ug/m^3)	Is Ca < AGC ??
	Geoprobe Borings	MWFP-3 (0.5 - 2.5)	MWFP-3 (5.0 - 7.0)												
Acetone	0.15	ND	0.098	200.2	0.06006	0.5	0.12012	1.37E-05	16	8	16.9	1.24E-03	9.33E-04	28000	yes
Benzene	0.0033	ND	ND	200.2	0.00132132	0.5	0.00264264	3.02E-07	16	8	16.9	2.74E-05	2.05E-05	0.13	yes
2-Butanone (MEK)	0.015	ND	0.016	200.2	0.0064064	0.5	0.0128128	1.46E-06	16	8	16.9	1.33E-04	9.96E-05	5000	yes
Carbon disulfide	0.017	ND	ND	200.2	0.0068068	0.5	0.0136136	1.55E-06	16	8	16.9	1.41E-04	1.06E-04	700	yes
Carbon Tetrachloride	0.021	10	0.025	200.2	4.004	0.5	8.008	9.14E-04	16	8	16.9	8.30E-02	6.22E-02	0.067	yes
Chloroform	0.018	5.7	0.0081	200.2	2.28228	0.5	4.56456	5.21E-04	16	8	16.9	4.73E-02	3.55E-02	0.043	yes
Cyclohexane	0.011	0.47	ND	200.2	0.188188	0.5	0.376376	4.30E-05	16	8	16.9	3.90E-03	2.92E-03	6000	yes
1,4 Dichlorobenzene	0.0019	ND	ND	200.2	0.00076076	0.5	0.00152152	1.74E-07	16	8	16.9	1.58E-05	1.18E-05	0.009	yes
1,3 Dichlorobenzene	0.0016	ND	ND	200.2	0.00064064	0.5	0.00128128	1.46E-07	16	8	16.9	1.33E-05	9.96E-06	360	yes
1,1-Dichloroethane	ND	0.16	ND	200.2	0.064064	0.5	0.128128	1.46E-05	16	8	16.9	1.33E-03	9.96E-04	0.63	yes
1,2-Dichloroethane	ND	0.24	ND	200.2	0.096096	0.5	0.192192	2.19E-05	16	8	16.9	1.99E-03	1.49E-03	0.038	yes
cis-1,2-Dichloroethane	ND	0.26	ND	200.2	0.104104	0.5	0.208208	2.38E-05	16	8	16.9	2.16E-03	1.62E-03	--	yes
Ethylbenzene	0.0086	ND	ND	200.2	0.00344344	0.5	0.00688688	7.86E-07	16	8	16.9	7.14E-05	5.35E-05	1000	yes
2-Hexanone (MBK)	0.0017	ND	ND	200.2	0.00068068	0.5	0.00136136	1.55E-07	16	8	16.9	1.41E-05	1.06E-05	48	yes
Cumene (Isopropylbenzene)	0.45	ND	ND	200.2	0.18018	0.5	0.36036	4.11E-05	16	8	16.9	3.73E-03	2.80E-03	400	yes
Methyl acetate	1.1	ND	ND	200.2	0.44044	0.5	0.88088	1.01E-04	16	8	16.9	9.13E-03	6.85E-03	1400	yes
Methylcyclohexane	0.017	1.6	ND	200.2	0.64064	0.5	1.28128	1.46E-04	16	8	16.9	1.33E-02	9.96E-03	3800	yes
Methyl isobutyl ketone (MIBK), 4-Methyl-2-Pentanone	0.003	ND	ND	200.2	0.0012012	0.5	0.0024024	2.74E-07	16	8	16.9	2.49E-05	1.87E-05	3000	yes
Tetrachloroethene (PCE)	15	54	1	200.2	21.6216	0.5	43.2432	4.94E-03	16	8	16.9	4.48E-01	3.36E-01	1	yes
Toluene	3.7	0.38	ND	200.2	1.48148	0.5	2.96296	3.38E-04	16	8	16.9	3.07E-02	2.30E-02	400	yes
1,2,4-Trichlorobenzene	0.0035	0.36	ND	200.2	0.144144	0.5	0.288288	3.29E-05	16	8	16.9	2.99E-03	2.24E-03	--	yes
1,1,1-Trichloroethane	0.098	5.5	0.055	200.2	2.2022	0.5	4.4044	5.03E-04	16	8	16.9	4.56E-02	3.42E-02	1000	yes
Trichloroethene (TCE)	0.0074	0.51	ND	200.2	0.204204	0.5	0.408408	4.66E-05	16	8	16.9	4.23E-03	3.17E-03	0.45	yes
Xylene (m,p)	5	0.52	ND	200.2	2.002	0.5	4.004	4.57E-04	16	8	16.9	4.15E-02	3.11E-02	700	yes
Xylene (o)	0.0037	0.42	ND	200.2	0.168168	0.5	0.336336	3.84E-05	16	8	16.9	3.48E-03	2.61E-03	700	yes

Notes:

1. Based on laboratory analytical results of geoprobe samples collected on 07/29/02 and MWFP-3 samples collected on 10/09/00. Maximum concentrations are used in the calculations from the Measured Concentration columns.
2. Conservatively assumes continuous (year-round) operation.

▨ = maximum concentration
░ = Ca exceeds the AGC

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Project No. 0021-001-400
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Subject SVE System DAR-1 Analysis
Standard Point Source Method

Determine Soil Mass for MWFP-3 Subarea

Per FS Appendix B, MWFP-3 Subarea encompasses 143 CY of soil

$$143 \text{ CY} \times 1.4 \frac{\text{tons}}{\text{CY}} = 200.2 \text{ tons}$$

$$200.2 \text{ tons} \times \frac{2000 \text{ lbs}}{\text{ton}} = 400,400 \text{ lbs.}$$

Determine Contaminant Mass (Table 1, attached)

Multiply maximum soil concentration for all VOCs identified within MWFP-3 Subarea × soil mass

e.g. Tetrachloroethene

$$54 \text{ mg/Kg (ppm)} \times \frac{400,400 \text{ lbs}}{1,000,000} = 21.62 \text{ lbs.}$$

Determine Removal Rate Qa (lbs/yr.)

- Assume 6 month (½ year) cleanup time, w/ 100% of VOCs transferred during that period

e.g. Tetrachloroethene 21.62 lbs / 0.5 yrs. = 43.2 lbs/yr.

Calculate Maximum Annual Impact (Ca)

- Assume enclosure (trailer) height (hb) = 8'
- Assume stack height (hs) = 16'
- Plume Momentum Rise

effective stack height (he) = hs + 1.1 (momentum flux (Fm))$^{1/3}$

so, $he = hs + 1.1\,(Fm)^{1/3}$

where $Fm = \frac{Ta}{T} V^2 R^2$

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Subject SVE System DAR-1 Analysis Standard Point Source Method

F_m = Momentum Flux, ft^4/sec^2
T = exit temperature, °R
V = exit velocity, ft/sec
R = Stack outlet radius, ft.
T_a = ambient temperature = 510°R (assumption)

so,
T_a = 510°R
T = assume typical heating by blower = 25°F = 534.7°R
V = 250 cfm (typical blower velocity) = 4.167 ft^3/sec
R = 2" = 0.17' (4" diameter)

$$\therefore F_m = \frac{T_a}{T} V^2 R^2$$
$$= \frac{510°R}{534.7°R} \times \left(4.167 \frac{ft^3}{sec}\right)^2 \times (0.17)^2$$
$$= 0.95 \times 17.36 \times 0.0289$$
$$F_m = 0.48$$

taking F_m,

$$h_e = h_s + 1.1 (F_m)^{1/3}$$
$$= 16 + 1.1 (0.48)^{1/3}$$
$$= 16 + 0.86$$
$$h_e = 16.86 \text{ ft.}$$

* Per DAR-1 : Ca, If stack height to building height ratio (h_s/h_b) is > 1.5, but < 2.5, then reduce Ca by a factor of 0.75

$\therefore$ h_s = 16'
h_b = 8
$$h_s/h_b = \frac{16'}{8'} = 2 \quad ok$$

Sheet 3 of 3
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Subject SVE System DAR-1 Analysis Standard Point Source Method

* Per DAR-1: (cont'd)

e.g. Tetrachloroethane

$$Ca = (6 \times Qa) / he^{2.25}$$

Ca = maximum Actual Annual Impact ($\mu g/m^3$)
Qa = annual emission rate (lbs/yr.)
he = effective stack height (ft.)

$$Ca = (6 \times 43.2432) / (16.9)^{2.25}$$
$$Ca = 259.4592 / 579.09$$
$$Ca = 0.45 \ \mu g/m^3$$

Reducing Ca by a factor of 0.75

revised Ca × 0.75 = 0.34 $\mu g/m^3$

revised Ca < AGC, 0.34 $\mu g/m^3$ < 1 $\mu g/m^3$ → yes

∴ complies w/o controls

APPENDIX E

Table 1A

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Seep Remediation

No Action

Item	Quantity	Units	Unit Cost	Total Cost
Annual Operation Maintenance & Monitoring (OM&M):				
Seep Sampling / Reporting	2	Event	$ 1,100	$ 2,200
Total Annual OM&M Cost				**$ 2,200**
Number of years (n):				30
Interest rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 33,820**

Total Present Worth (PW): ***Capital Cost + OM&M PW***	**$ 33,820**

Notes:

Table 1B

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Seep Remediation

Institutional Controls

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 2,500.00	$ 2,500
Health and Safety/Community Air Monitoring	1	LS	$ 3,000.00	$ 3,000
Subtotal:				**$ 5,500**
<u>Institutional Controls</u>				
Clearing/Grubbing	1	LS	$ 5,000.00	$ 5,000
Fencing (6' high C.L.)	630	LF	$ 20.00	$ 12,600
Signage	1	LS	$ 1,500.00	$ 1,500
Subtotal:				**$ 19,100**
Subtotal				**$ 24,600**
Engineering/Contingency (35%)				$ 8,610
Total Capital Cost				**$ 33,210**
<u>Annual Operation Maintenance & Monitoring (OM&M):</u>				
Seep Sampling / Reporting	2	Event	$ 1,100	$ 2,200
Fence Maintenance/Repairs	1	Yr	$ 500	$ 500
Total Annual OM&M Cost				**$ 2,700**
Number of years (n):				30
Interest rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 41,506**
Total Present Worth (PW): ***Capital Cost + OM&M PW***				**$ 74,716**

Notes:

Table 1C

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Seep Remediation

Groundwater Diversion/Elevated Fill Area Cover System w / Bank Stabilization

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 175,000.00	$ 175,000
Health and Safety/Community Air Monitoring	1	LS	$ 50,000.00	$ 50,000
Subtotal:				**$ 225,000**
Bank Stabilization:				
Restore Former Haul Road	1	LS	$ 20,000.00	$ 20,000
Temporary Boulder Removal	1	LS	$ 10,000.00	$ 10,000
Bank Regrading	1	LS	$ 15,000.00	$ 15,000
Riprap Anchor Trench Excavation	305	CY	$ 60.00	$ 18,300
6 oz. Geotextile (purchase/install)	5500	SY	$ 0.50	$ 2,750
4' Riprap (2' diameter)	4500	Tons	$ 40.00	$ 180,000
Subtotal:				**$ 246,050**
Fill Area Cover System				
Clearing/Grubbing	5	Acre	$ 3,000.00	$ 15,000
Subgrade Preparation	5	Acre	$ 5,000.00	$ 25,000
12" Gas Venting Stone Layer (purchase/install)	14520	Ton	$ 15.00	$ 217,800
4" Perforated Gas Vents	90	LF	$ 50.00	$ 4,500
Geotextile (purchase/install)	48400	SY	$ 0.50	$ 24,200
18" Low Perm. Soil (purchase/install)	12100	CY	$ 20.00	$ 242,000
40 mil Liner (purchase/install)	5	Acre	$ 25,000.00	$ 125,000
24" Barrier Protection Layer (purchase/install)	16130	CY	$ 20.00	$ 322,600
6" Topsoil (purchase/install)	5	Acre	$ 15,000.00	$ 75,000
Seeding (purchase/install)	5	Acre	$ 2,500.00	$ 12,500
Subtotal:				**$ 1,063,600**
Containment Slurry Wall				
Slurry Wall (excavate/backfill)	19000	SF	$ 10.00	$ 190,000
Subtotal:				**$ 190,000**
Subtotal Capital Cost				**$ 1,724,650**
Engineering/Contingency (35%)				**$ 603,628**
Total Capital Cost				**$ 2,328,278**
Annual Operation Maintenance & Monitoring (OM&M):				
Groundwater Sampling / Reporting	2	Event	$ 4,500	$ 9,000
Site Maintenance/Mowing	2	Yr	$ 2,000	$ 4,000
Total Annual OM&M Cost				$ 13,000
Number of years (n):				30
Interest rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 199,843**

Total Present Worth (PW): *Capital Cost + OM&M PW*	**$ 2,528,120**

Notes:

Table 1D

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Seep Remediation
Seep Collection/Bank Stabilization/Off-Site Discharge to POTW

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 100,000.00	$ 100,000
Health and Safety/Community Air Monitoring	1	LS	$ 50,000.00	$ 50,000
Subtotal:				**$ 150,000**
Seep Collection/Bank Stabilization:				
Restore Former Haul Road	1	LS	$ 20,000.00	$ 20,000
Temporary Boulder Removal	1	LS	$ 10,000.00	$ 10,000
Bank Regrading / Excavation	1	LS	$ 25,000.00	$ 25,000
Seep Collection Trench Excavation	200	CY	$ 75.00	$ 15,000
Dewatering	20	Days	$ 500.00	$ 10,000
Temporary Bank Cover	1	LS	$ 5,000.00	$ 5,000
Washed Stone Collection Pipe Bedding(del.&place)	220	CY	$ 25.00	$ 5,500
6" Perforated LCS Piping	500	LF	$ 15.00	$ 7,500
Manholes (w/locking covers)	3	EA	$ 2,500.00	$ 7,500
Riprap Anchor Trench Excavation	305	CY	$ 60.00	$ 18,300
Geosynthetics:				
Mobilization	1	LS	$ 10,000.00	$ 10,000
40-mil LLDPE Geomembrane (purchase/install)	22700	SF	$ 0.60	$ 13,620
6 oz. Geotextile (purchase/install)	5500	SY	$ 0.25	$ 1,375
6" Riprap Bedding Stone	450	CY	$ 25.00	$ 11,250
4' Riprap (2' diameter)	4500	Tons	$ 40.00	$ 180,000
Temporary Siltation & Erosion Control	1	LS	$ 10,000.00	$ 10,000
Subtotal:				**$ 350,045**
Seep/Leachate Management:				
Packaged FRP Lift Station (15 gpm), installed	2	LS	$ 32,000.00	$ 64,000
Electrical Service	2	LS	$ 8,000.00	$ 16,000
Instrumentation/Valves/Appurtenances	2	LS	$ 5,000.00	$ 10,000
Force Main Trench Excavation	250	CY	$ 10.00	$ 2,500
Force Main Granular Bedding	60	CY	$ 40.00	$ 2,400
1" HDPE Force Main to Sanitary Sewer	650	LF	$ 10.00	$ 6,500
Force Main Backfill	166	CY	$ 5.00	$ 830
Force Main Topsoil & Seeding	1.5	AC	$ 3,500.00	$ 5,250
Flow Sensor Meter Pit/Meter Enclosure	1	LS	$ 1,500.00	$ 1,500
Flow Sensor/Meter	1	LS	$ 4,500.00	$ 4,500
POTW Sewer Permitting/Tie-in	1	LS	$ 5,000.00	$ 5,000
Subtotal:				**$ 118,480**
Subtotal Capital Cost				**$ 618,525**
Engineering/Contingency (35%)				**$ 216,484**
Total Capital Cost				**$ 835,009**
Annual Operation Maintenance & Monitoring (OM&M):				
Discharge Monitoring / Reporting	2	Event	$ 1,500	$ 3,000
Groundwater Sampling / Reporting	2	Event	$ 4,500	$ 9,000
Pump Station Maintenance, Power	12	Mo	$ 250	$ 3,000
Total Annual OM&M Cost				**$ 15,000**
Number of years (n):				30
Interest rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 230,588**
Total Present Worth (PW): ***Capital Cost + OM&M PW***				**$ 1,065,596**

Notes:

1. O&M costs exclude sewer use fees.

Table 1E

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Seep Remediation

Seep Collection/Bank Stabilization/On-Site Aeration/Off-Site Disposal to POTW

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 100,000.00	$ 100,000
Health and Safety/Community Air Monitoring	1	LS	$ 50,000.00	$ 50,000
Subtotal:				**$ 150,000**
Seep Collection/Bank Stabilization:				
Restore Former Haul Road	1	LS	$ 20,000.00	$ 20,000
Temporary Boulder Removal/Bank Regrading	1	LS	$ 10,000.00	$ 10,000
Bank Regrading / Excavation	1	LS	$ 25,000.00	$ 25,000
Seep Collection Trench Excavation	200	CY	$ 75.00	$ 15,000
Dewatering	20	Days	$ 500.00	$ 10,000
Temporary Bank Cover	1	LS	$ 5,000.00	$ 5,000
Washed Stone Collection Pipe Bedding	220	CY	$ 25.00	$ 5,500
6" Perforated LCS Piping	500	LF	$ 15.00	$ 7,500
Manholes	3	EA	$ 2,500.00	$ 7,500
Riprap Anchor Trench Excavation	305	CY	$ 60.00	$ 18,300
Geosynthetics:				
Mobilization	1	LS	$ 10,000.00	$ 10,000
40-mil LLDPE Geomembrane (purchase/install)	22700	SF	$ 0.60	$ 13,620
6 oz. Geotextile (purchase/install)	5500	SY	$ 0.25	$ 1,375
6" Riprap Bedding Stone	450	CY	$ 25.00	$ 11,250
4' Riprap (2' diameter)	4500	Tons	$ 40.00	$ 180,000
Temporary Siltation & Erosion Control	1	LS	$ 10,000.00	$ 10,000
Subtotal:				**$ 350,045**
Seep/Leachate Management:				
Packaged FRP Lift Station (15 gpm), installed	2	LS	$ 32,000.00	$ 64,000
Electrical Service	2	LS	$ 8,000.00	$ 16,000
Instrumentation/Valves/Appurtenances	2	LS	$ 5,000.00	$ 10,000
Force Main Trench Excavation	200	CY	$ 10.00	$ 2,000
Force Main Granular Bedding	23	CY	$ 25.00	$ 575
1" HDPE Force Main to Sanitary Sewer	600	LF	$ 8.00	$ 4,800
Force Main Backfill	153	CY	$ 5.00	$ 765
Force Main Topsoil	23	CY	$ 25.00	$ 575
Force Main Seeding	133	SY	$ 0.45	$ 60
Pretreatment:				
PreCast 12' x 20' Pretreatment Shelter, Delivered	1	LS	$ 28,000.00	$ 28,000
Pretreatment Shelter Site Work	1	LS	$ 3,000.00	$ 3,000
550 gal Influent Tank w/ fittings	1	EA	$ 1,200.00	$ 1,200
Transfer Pump	2	EA	$ 1,100.00	$ 2,200
Blower, Diffuser, Equipment	1	EA	$ 25,000.00	$ 25,000
HVAC	1	LS	$ 3,500.00	$ 3,500
Lighting	1	EA	$500	$500
Electrical Service	1	LS	$4,500	$4,500
Instrumentation	1	LS	$7,500	$7,500
Process Piping	1	LS	$2,500	$2,500
Flow Sensor/Meter	1	LS	$ 4,500.00	$ 4,500
Gravity Drain to Sewer	50	LF	$ 30.00	$ 1,500
POTW Sewer Permitting/Tie-in	1	LS	$ 5,000.00	$ 5,000
Subtotal:				**$ 187,675**
Subtotal				$ 687,720
Engineering/Contingency (35%)				$ 240,702
Total Capital Cost				**$ 928,422**

Table 1E

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Seep Remediation

Seep Collection/Bank Stabilization/On-Site Aeration/Off-Site Disposal to POTW

Item	*Quantity*	*Units*	*Unit Cost*	*Total Cost*
Annual Operation Maintenance & Monitoring (OM&M):				
Discharge Monitoring / Reporting	2	Event	$ 1,500	$ 3,000
Groundwater Sampling / Reporting	2	Event	$ 4,500	$ 9,000
Pretreatment System Operate, Maintenance, Utilities	12	Mo	$ 1,000	$ 12,000
Pump Station Maintenance, Power	12	Mo	$ 300	$ 3,600
Total Annual OM&M Cost				**$ 27,600**
Number of years (n):				30
Interest rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 424,281**

Total Present Worth (PW): ***Capital Cost + OM&M PW***	**$ 1,352,703**

Notes:

1. Costs exclude emissions controls.
2. O&M costs exclude sewer use fees.

Table 1F

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Seep Remediation

Seep Collection/Bank Stabilization/On-Site SBR Treatment/Discharge to Cattaraugus Creek

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 100,000.00	$ 100,000
Health and Safety/Community Air Monitoring	1	LS	$ 50,000.00	$ 50,000
Subtotal:				**$ 150,000**
Seep Collection/Bank Stabilization:				
Restore Former Haul Road	1	LS	$ 20,000.00	$ 20,000
Temporary Boulder Removal/Bank Regrading	1	LS	$ 10,000.00	$ 10,000
Bank Regrading / Excavation	1	LS	$ 25,000.00	$ 25,000
Seep Collection Trench Excavation	200	CY	$ 75.00	$ 15,000
Dewatering	20	Days	$ 500.00	$ 10,000
Temporary Bank Cover	1	LS	$ 5,000.00	$ 5,000
Washed Stone Collection Pipe Bedding	220	CY	$ 25.00	$ 5,500
6" Perforated LCS Piping	500	LF	$ 15.00	$ 7,500
Manholes	3	EA	$ 2,500.00	$ 7,500
Riprap Anchor Trench Excavation	305	CY	$ 60.00	$ 18,300
Geosynthetics:				
Mobilization	1	LS	$ 10,000.00	$ 10,000
40-mil LLDPE Geomembrane (purchase/install)	22700	SF	$ 0.60	$ 13,620
6 oz. Geotextile (purchase/install)	5500	SY	$ 0.25	$ 1,375
6" Riprap Bedding Stone	450	CY	$ 25.00	$ 11,250
4' Riprap (2' diameter)	4500	Tons	$ 40.00	$ 180,000
Temporary Siltation & Erosion Control	1	LS	$ 10,000.00	$ 10,000
Subtotal:				**$ 350,045**
Seep / Leachate Management				
Packaged FRP Lift Station (15 gpm), installed	2	LS	$ 32,000.00	$ 64,000
Treatment:				
Treatment Shelter, 24' x 36'	1	LS	$ 60,000.00	$ 60,000
Pretreatment Shelter Site Work	1	LS	$ 5,500.00	$ 5,500
Asphalt Drive	600	SY	$ 6.50	$ 3,900
SBR Tankage - 20,000 gals	2	EA	$ 20,000.00	$ 40,000
SBR Equipment - supplied	1	LS	$ 175,000.00	$ 175,000
SBR Equipment Installation	1	LS	$ 10,000.00	$ 10,000
Flow Sensor/Meter	1	LS	$ 4,500.00	$ 4,500
HVAC	1	LS	$ 4,000.00	$ 4,000
Lighting	1	LS	$ 1,000.00	$ 1,000
Utility Trench Excavation	200	CY	$ 10.00	$ 2,000
Water Service	600	LF	$ 11.00	$ 6,600
Gas Service	600	LF	$ 11.00	$ 6,600
Utility Trench Bedding	23	CY	$ 25.00	$ 575
Utility Trench Backfill	153	CY	$ 10.00	$ 1,530
Utility Trench Topsoil/Seeding	23	CY	$ 26.00	$ 598
Electrical Service	1	LS	$ 4,500.00	$ 4,500
Electrical/Instrumentation	1	LS	$ 75,000.00	$ 75,000
Process Piping	1	LS	$ 50,000.00	$ 50,000
Gravity Outfall to Creek	1	LS	$ 5,000.00	$ 5,000
SPDES Permitting	1	LS	$ 5,000.00	$ 5,000
Subtotal:				**$ 525,303**
Subtotal				$ 1,025,348
Engineering/Contingency (35%)				$ 358,872
Total Capital Cost				**$ 1,384,220**

Table 1F

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Seep Remediation

Seep Collection/Bank Stabilization/On-Site SBR Treatment/Discharge to Cattaraugus Creek

Item	Quantity	Units	Unit Cost	Total Cost
Annual Operation Maintenance & Monitoring (OM&M):				
Discharge Monitoring / Reporting	12	Mo	$ 1,000	$ 12,000
Pump Station Maintenance, Power	12	Mo	$ 250	$ 3,000
Groundwater Sampling / Reporting	2	Event	$ 6,000	$ 12,000
SBR Treatment System Operations, Maint., Power	12	Mo	$ 3,000	$ 36,000
SBR Treatment System Sampling/Reporting	12	Mo	$ 400	$ 4,800
Sludge Disposal	12	Mo	$ 350	$ 4,200
Total Annual OM&M Cost				**$ 72,000**
Number of years (n):				30
Interest rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 1,106,820**
Total Present Worth (PW): ***Capital Cost + OM&M PW***				**$ 2,491,040**

Notes:

1. Calculations indicate SVE will not require emissions controls to comply with NY State DAR-1 guidance.

Table 2A

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Soil/Fill

No Action

Item	Quantity	Units	Unit Cost	Total Cost
Annual Operation Maintenance & Monitoring (OM&M): Groundwater Sampling / Reporting	2	Events	$ 4,500.00	$ 9,000
Total Annual OM&M Cost				**$ 9,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 138,353**

Total Present Worth (PW): Capital Cost + OM&M PW	**$ 138,353**

Table 2B

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Soil/Fill

Institutional Controls

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 2,500.00	$ 2,500
Health and Safety/Community Air Monitoring	1	LS	$ 3,000.00	$ 3,000
Subtotal:				**$ 5,500**
Institutional Controls				
Clearing/Grubbing	1	LS	$ 5,000.00	$ 5,000
Fencing	1100	LF	$ 20.00	$ 22,000
Subtotal:				**$ 27,000**
Subtotal Capital Cost				**$ 32,500**
Engineering/Contingency (35%)				**$ 11,375**
Total Capital Cost				**$ 43,875**
Annual Operation Maintenance & Monitoring (OM&M):				
Groundwater Sampling / Reporting	2	Events	$ 4,500.00	$ 9,000
Fence Maintenance, Repairs	1	Yr	$ 500.00	$ 500
Total Annual OM&M Cost				**$ 9,500**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 146,039**
Total Present Worth (PW): Capital Cost + OM&M PW				**$ 189,914**

Table 2C

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Soil/Fill

Containment / Isolation with Soil Cover Enhancement

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 10,000.00	$ 10,000
Health and Safety/Community Air Monitoring	1	LS	$ 10,000.00	$ 10,000
Subtotal:				**$ 20,000**
Elevated Fill Area Cover System Enhancements				
Clearing/Grubbing	5	Acres	$ 3,000.00	$ 15,000
12" Low Perm Soil, Place & Compact	8100	CY	$ 20.00	$ 162,000
Seeding	5	Acre	$ 2,500.00	$ 12,500
Subtotal:				**$ 189,500**
Subtotal Capital Cost				**$ 209,500**
Engineering/Contingency (35%)				**$ 73,325**
Total Capital Cost				**$ 282,825**
Annual Operation Maintenance & Monitoring (OM&M):				
Groundwater Sampling / Reporting	2	Events	$ 4,500.00	$ 9,000
Site Maintenance, Mowing	2	Yr	$ 1,500.00	$ 3,000
Total Annual OM&M Cost				**$ 12,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 184,470**
Total Present Worth (PW): Capital Cost + OM&M PW				**$ 467,295**

Table 2D

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Soil/Fill

Excavation/Bank Stabilization/Off-Site Disposal of Sludge Fill to Permitted Landfill

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 200,000.00	$ 200,000
Health and Safety/Community Air Monitoring	1	LS	$ 50,000.00	$ 50,000
Subtotal:				**$ 250,000**
Bank Stabilization:				
Restore Former Haul Road	1	LS	$ 20,000.00	$ 20,000
Temporary Boulder Removal	1	LS	$ 10,000.00	$ 10,000
Bank Regrading	1	LS	$ 15,000.00	$ 15,000
Riprap Anchor Trench Excavation	305	CY	$ 60.00	$ 18,300
6 oz. Geotextile (purchase/install)	5500	SY	$ 0.50	$ 2,750
4' Riprap (2' diameter)	4500	Tons	$ 40.00	$ 180,000
Subtotal:				**$ 246,050**
Sludge Fill Removal:				
Clearing/Grubbing	5	Acre	$ 3,000.00	$ 15,000
Removal and stockpiling of existing cover soil	5	Acre	$ 5,000.00	$ 25,000
Sludge excavation	100000	CY	$ 10.00	$ 1,000,000
Sludge disposal[1]	150000	TON	$ 30.00	$ 4,500,000
Backfill (includes material and placement)	80000	CY	$ 10.00	$ 800,000
6" Topsoil (includes material/placement)	4030	CY	$ 20.00	$ 80,600
Seeding (includes material and placement)	5	Acre	$ 2,500.00	$ 12,500
Leachate handling	150	Day	$ 2,000.00	$ 300,000
Sludge Stabilization	50000	TON	$ 10.00	$ 500,000
Odor control measures	1	LS	$ 100,000.00	$ 100,000
Subtotal:				**$ 7,333,100**
Subtotal Capital Cost				**$ 7,829,150**
Engineering/Contingency (35%)				**$ 2,740,203**
Total Capital Cost				**$ 10,569,353**

Annual Operation Maintenance & Monitoring (OM&M):				
Groundwater Sampling / Reporting	2	Events	$ 4,500.00	$ 9,000
Total Annual OM&M Cost				**$ 9,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 138,353**
Total Present Worth (PW): Capital Cost + OM&M PW				**$ 10,707,705**

1. Includes admixing wet sludge w/dry soil

Table 2E

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Soil/Fill

Containment / Isolation with Geosynthetic (Part 360) Cover

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 40,000.00	$ 30,000
Health and Safety/Community Air Monitoring	1	LS	$ 20,000.00	$ 20,000
Subtotal:				**$ 50,000**
Elevated Fill Area Geosynthetic Cover				
Clearing/Grubbing	5	Acre	$ 4,500.00	$ 22,500
Subgrade Preparation	5	Acre	$ 5,000.00	$ 25,000
Monitoring Well Extensions/Abandonment	6	Ea	$ 400.00	$ 2,400
4" Perforated Gas Vents	40	LF	$ 50.00	$ 2,000
Geocomposite Venting Layer (purchase/install)	220000	SF	$ 0.60	$ 132,000
18" Low Perm. Soil	12100	CY	$ 20.00	$ 242,000
40 mil Geomembrane	220000	SF	$ 0.60	$ 132,000
Geocomposite Drainage Layer (purchase/install)	220000	SF	$ 0.60	$ 132,000
24" Barrier Prot. Layer	16130	CY	$ 15.00	$ 241,950
6" Topsoil	4033	CY	$ 20.00	$ 80,660
Seeding	5	Acre	$ 2,500.00	$ 12,500
Subtotal:				**$ 1,025,010**
Subtotal Capital Cost				**$ 1,075,010**
Engineering/Contingency (35%)				**$ 376,254**
Total Capital Cost				**$ 1,451,264**

Annual Operation Maintenance & Monitoring (OM&M):				
Groundwater Sampling / Reporting	2	Events	$ 4,500.00	$ 9,000
Site Maintenance/Mowing	2	Yr	$ 2,500.00	$ 5,000
Total Annual OM&M Cost				**$ 14,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 215,215**

Total Present Worth (PW): Capital Cost + OM&M PW	**$ 1,666,479**

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Table 2F

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Soil/Fill

Low Permeability Barrier w/ 6NYCRR Part 360 Variance

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 20,000.00	$ 20,000
Health and Safety/Community Air Monitoring	1	LS	$ 15,000.00	$ 15,000
Subtotal:				**$ 35,000**
Elevated Fill Area Geosynthetic Cover				
Clearing/Grubbing	5	Acre	$ 4,500.00	$ 22,500
Subgrade Preparation	5	Acre	$ 5,000.00	$ 25,000
Monitoring Well Extensions/Abandonment	6	Ea	$ 400.00	$ 2,400
24" 1x10^{-5} Barrier Soil	16133	CY	$ 20.00	$ 322,660
6" Topsoil	4033	CY	$ 20.00	$ 80,660
Seeding	5	Acre	$ 2,500.00	$ 12,500
Subtotal:				**$ 465,720**
Subtotal Capital Cost				**$ 500,720**
Engineering/Contingency (35%)				**$ 175,252**
Total Capital Cost				**$ 675,972**

Annual Operation Maintenance & Monitoring (OM&M):				
Groundwater Sampling / Reporting	2	Events	$ 4,500.00	$ 9,000
Site Maintenance/Mowing	2	Yr	$ 2,500.00	$ 5,000
Total Annual OM&M Cost				**$ 14,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 215,215**

Total Present Worth (PW): Capital Cost + OM&M PW	**$ 891,187**

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Table 3A

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for LFSS-6 Subarea Soils

No Action

Item	Quantity	Units	Unit Cost	Total Cost
Annual Operation Maintenance & Monitoring (OM&M):				
Well Sampling/Reporting	1	, Events	$ 1,500.00	$ 1,500
Total Annual OM&M Cost				**$ 1,500**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 23,059**

Total Present Worth (PW): Capital Cost + OM&M PW	**$ 23,059**

Table 3B

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for LFSS-6 Subarea Soils

Institutional Controls

Item	Quantity	Units	Unit Cost	Total Cost
Institutional Controls				
Develop Soils Management Plan	1	LS	$ 3,500.00	$ 3,500
Deed Restrictions	1	LS	$ 6,500.00	$ 6,500
Subtotal:				**$ 10,000**
Subtotal Capital Cost				**$ 10,000**
Engineering/Contingency - **N/A**				**$ -**
Total Capital Cost				**$ 10,000**
Annual Operation Maintenance & Monitoring (OM&M):				
Well Sampling / Reporting	2	Yr	$ 1,000.00	$ 2,000
Total Annual OM&M Cost				**$ 2,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 30,745**
Total Present Worth (PW): Capital Cost + OM&M PW				**$ 40,745**

Table 3C

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for LFSS-6 Subarea Soils
Insitu Solidification/Stabilization

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 20,000.00	$ 20,000
Health and Safety/Community Air Monitoring	1	LS	$ 12,000.00	$ 12,000
Subtotal:				***$ 32,000***
<u>**Solidification/Stabilization**</u>				
Bench/Pilot Testing	1	LS	$ 10,000.00	$ 10,000
Additional Sample Analyses	15	Ea	$ 25.00	$ 375
Clearing/Grubbing	0.75	Acres	$ 4,500.00	$ 3,375
Temp. Utilities	1	LS	$ 5,000.00	$ 5,000
Processing	5800	CY	$ 125.00	$ 725,000
Subtotal:				**$ 743,750**
<u>**Restoration**</u>				
6" Topsoil	580	CY	$ 20.00	$ 11,600
Seeding	0.75	Acres	$ 2,500.00	$ 1,875
Subtotal:				**$ 13,475**
Subtotal Capital Cost				**$ 789,225**
Engineering/Contingency (35%)				**$ 276,229**
Total Capital Cost				**$ 1,065,454**
<u>Annual Operation Maintenance & Monitoring (OM&M):</u>				
Groundwater Sampling / Reporting	2	Events	$ 1,000.00	$ 2,000
Total Annual OM&M Cost				**$ 2,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 30,745**
Total Present Worth (PW): Capital Cost + OM&M PW				**$ 1,096,199**

Table 3D

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for LFSS-6 Subarea Soils

Excavation / Off-Site Disposal at TSDF

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 10,000.00	$ 10,000
Health and Safety/Community Air Monitoring	1	LS	$ 7,500.00	$ 7,500
Subtotal:				**$ 17,500**
<u>**LFSS-6 Soil Removal:**</u>				
Soil Excavation	5800	CY	$ 20.00	$ 116,000
Disposal (incl. trucking & stabilization)	8140	Ton	$ 118.00	$ 960,520
Backfill	5220	CY	$ 15.00	$ 78,300
6" Topsoil	580	CY	$ 25.00	$ 14,500
Seeding	0.75	Acres	$ 2,500.00	$ 1,875
Verification Sampling	20	Ea	$ 25.00	$ 500
Subtotal:				**$ 1,171,695**
Subtotal Capital Cost				**$ 1,189,195**
Engineering/Contingency (35%)				**$ 416,218**
Total Capital Cost				**$ 1,605,413**

Table 3E

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for LFSS-6 Subarea Soils

Excavation / On-Site Consolidation in Elevated Fill Subarea

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 10,000.00	$ 10,000
Health and Safety/Community Air Monitoring	1	LS	$ 7,500.00	$ 7,500
Subtotal:				**$ 17,500**
<u>**LFSS-6 Soil Removal:**</u>				
Soil Excavation	5800	CY	$ 20.00	$ 116,000
On-Site Consolidation (incl. trucking, place & compact)	5800	CY	$ 5.00	$ 29,000
Backfill	5220	CY	$ 15.00	$ 78,300
6" Topsoil	580	CY	$ 25.00	$ 14,500
Seeding	0.75	Acres	$ 2,500.00	$ 1,875
Verification Sampling	20	Ea	$ 25.00	$ 500
Subtotal:				**$ 240,175**
Institutional Controls				
Deed Restrictions	1	LS	$ 6,500.00	$ 6,500
Subtotal:				**$ 6,500**
Subtotal Capital Cost				**$ 264,175**
Engineering/Contingency (35%)				**$ 90,186**
Total Capital Cost				**$ 354,361**

Table 4A

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for MWFP-3 Subarea Soils

No Action

Item	Quantity	Units	Unit Cost	Total Cost
Annual Operation Maintenance & Monitoring (OM&M):				
Soil/Gas Sampling / Reporting	1	Events	$ 500.00	$ 500
Well Sampling/Reporting	1	Events	$ 1,500.00	$ 1,500
Total Annual OM&M Cost				**$ 2,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 30,745**
Total Present Worth (PW): Capital Cost + OM&M PW				**$ 30,745**

Table 4B

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for MWFP-3 Subarea Soils

Institutional Controls

Item	Quantity	Units	Unit Cost	Total Cost
Institutional Controls				
Develop Soils Management Plan	1	LS	$ 3,500.00	$ 3,500
Deed Restrictions	1	LS	$ 6,500.00	$ 6,500
Subtotal:				**$ 10,000**
Subtotal Capital Cost				**$ 10,000**
Engineering/Contingency - **N/A**				**$ -**
Total Capital Cost				**$ 10,000**
Annual Operation Maintenance & Monitoring (OM&M):				
Well Sampling / Reporting	2	Yr	$ 1,000.00	$ 2,000
Total Annual OM&M Cost				**$ 2,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 30,745**
Total Present Worth (PW): Capital Cost + OM&M PW				**$ 40,745**

Table 4C

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for MWFP-3 Subarea Soils

Soil Vapor Extraction

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 1,000.00	$ 1,000
Health and Safety/Community Air Monitoring	1	LS	$ 1,000.00	$ 1,000
Subtotal:				**$ 2,000**
<u>MWFP-3 SVE:</u>				
Extraction Wells	15	LF	$ 52.00	$ 780
2" PVC Lateral	160	LF	$ 15.00	$ 2,400
Piezometers	4	EA	$ 750.00	$ 3,000
Poly Sheeting and Ballast	1	LS	$ 500.00	$ 500
Trailer-Mounted SVE System, delivered	1	LS	$ 30,000.00	$ 30,000
Temp. Electrical Service	1	LS	$ 2,500.00	$ 2,500
SVE (Operator, Maintenance, Power, Report)	6	Mo	$ 1,500.00	$ 9,000
Air Samples (1)	3	EA	$ 300.00	$ 900
Decommission/reseeding	1	LS	$ 2,500.00	$ 2,500
Subtotal:				**$ 51,580**
Subtotal Capital Cost				**$ 53,580**
Engineering/Contingency (35%)				**$ 18,753**
Total Capital Cost				**$ 72,333**

Table 4D

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for MWFP-3 Subarea Soils

Excavation / Off-Site Disposal at TSDF

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 2,000.00	$ 2,000
Health and Safety/Community Air Monitoring	1	LS	$ 2,500.00	$ 2,500
Subtotal:				**$ 4,500**
MWFP-3 Soil Removal:				
Soil Excavation	143	CY	$ 20.00	$ 2,860
Disposal (incl. trucking)	200	Ton	$ 284.00	$ 56,800
Backfill	125	CY	$ 15.00	$ 1,875
6" Topsoil	18	CY	$ 25.00	$ 450
Seeding (50' x 20')	1	LS	$ 500.00	$ 500
Verification Sampling	1	LS	$ 2,000.00	$ 2,000
Subtotal:				**$ 64,485**
Subtotal Capital Cost				**$ 68,985**
Engineering/Contingency (35%)				**$ 24,145**
Total Capital Cost				**$ 93,130**

Table 4E

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for MWFP-3 Subarea Soils

Excavation / On-Site Consolidation in Elevated Fill Subarea

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 2,000.00	$ 2,000
Health and Safety/Community Air Monitoring	1	LS	$ 2,500.00	$ 2,500
Subtotal:				**$ 4,500**
MWFP-3 Soil Removal:				
Soil Excavation	143	CY	$ 20.00	$ 2,860
On-Site Consolidation (incl. Trucking, place & compact)	143	CY	$ 5.00	$ 715
Backfill	125	CY	$ 15.00	$ 1,875
6" Topsoil	18	CY	$ 25.00	$ 450
Seeding (50' x 20')	1	LS	$ 500.00	$ 500
Verification Sampling	1	LS	$ 2,000.00	$ 2,000
Subtotal:				**$ 8,400**
Institutional Controls				
Deed Restrictions	1	LS	$ 6,500.00	$ 6,500
Subtotal:				**$ 6,500**
Subtotal Capital Cost				**$ 19,400**
Engineering/Contingency (35%)				**$ 4,515**
Total Capital Cost				**$ 23,915**

Table 5A

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Gas

No Action

Item	Quantity	Units	Unit Cost	Total Cost
Annual Operation Maintenance & Monitoring (OM&M):				
Ambient Air Monitoring/Reporting (field instruments)	1	Event	$ 1,500.00	$ 1,500
Total Annual OM&M Cost				**$ 1,500**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 23,059**

Total Present Worth (PW): Capital Cost + OM&M PW	**$ 23,059**

Table 5B

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Gas

Passive Gas Venting

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 2,500.00	$ 2,500
Health and Safety/Community Air Monitoring	1	LS	$ 5,000.00	$ 5,000
Subtotal:				**$ 7,500**
<u>Gas Management</u>				
Limited Clearing/Grubbing	5	Acres	$ 500.00	$ 2,500
4" Passive Gas Vent + Extended Risers	120	LF	$ 60.00	$ 7,200
Subtotal:				**$ 9,700**
Subtotal Capital Cost				**$ 17,200**
Engineering/Contingency (35%)				**$ 6,020**
Total Capital Cost				**$ 23,220**
<u>Annual Operation Maintenance & Monitoring (OM&M):</u>				
Routine Sampling of Vents	1	Yr	$ 1,500.00	$ 1,500
Site Maintenance	1	Yr	$ 500.00	$ 500
Total Annual OM&M Cost				**$ 2,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 30,745**
Total Present Worth (PW): Capital Cost + OM&M PW				**$ 53,965**

Table 5C

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Gas
Collection / On-Site Treatment w / Flare System

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 25,000.00	$ 25,000
Health and Safety/Community Air Monitoring	1	LS	$ 10,000.00	$ 10,000
Subtotal:				**$ 35,000**
<u>**Landfill Gas Management:**</u>				
4" Perf Gas Vents	60	LF	$ 55.00	$ 3,300
4" PVC Manifold Piping	800	LF	$ 5.00	$ 4,000
Manifold Trench Excavation (800' trench)	350	CY	$ 10.00	$ 3,500
Manifold Trench Bedding	40	CY	$ 25.00	$ 1,000
Manifold Trench Backfill	170	CY	$ 5.00	$ 850
Manifold Trench Topsoil	30	CY	$ 25.00	$ 750
Trench Seeding	0.5	AC	$ 2,200.00	$ 1,100
Gas Blower w/ valve appurtenances	1	EA	$ 20,000.00	$ 20,000
Flare Unit	1	EA	$ 100,000.00	$ 100,000
PreCast 10' x 12' Control Bldg, Delivered	1	LS	$ 25,000.00	$ 25,000
Flare Site work (incl. concrete pad)	1	LS	$ 15,000.00	$ 15,000
Electrical Work	1	LS	$ 10,000.00	$ 10,000
HVAC (intrinsically safe)	1	LS	$ 5,000.00	$ 5,000
Lighting	1	LS	$ 1,000.00	$ 1,000
Controls, incl. pressure, flow and temp recorders	1	LS	$ 10,000.00	$ 10,000
Subtotal:				**$ 200,500**
Subtotal Capital Cost				**$ 235,500**
Engineering/Contingency (35%)				**$ 82,425**
Total Capital Cost				**$ 317,925**

<u>Annual Operation Maintenance & Monitoring (OM&M):</u>				
Flare System Maintenance/Supplemental Gas	12	Mo	$ 1,500.00	$ 18,000
Total Annual OM&M Cost				**$ 18,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 276,705**

Total Present Worth (PW): Capital Cost + OM&M PW	**$ 594,630**

Table 5D

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Gas

Collection / On-Site Treatment w / Biofiltration

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 25,000.00	$ 25,000
Health and Safety/Community Air Monitoring	1	LS	$ 10,000.00	$ 10,000
Subtotal:				**$ 35,000**
<u>**Landfill Gas Management:**</u>				
4" Perf Gas Vents	60	LF	$ 55.00	$ 3,300
4" PVC Manifold Piping	800	LF	$ 5.00	$ 4,000
Manifold Trench Excavation (800' trench)	350	CY	$ 10.00	$ 3,500
Manifold Trench Bedding	40	CY	$ 25.00	$ 1,000
Manifold Trench Backfill	170	CY	$ 5.00	$ 850
Manifold Trench Topsoil	30	CY	$ 25.00	$ 750
Trench Seeding	0.5	AC	$ 2,200.00	$ 1,100
Blower	2	EA	$ 3,000.00	$ 6,000
Pre-Engineered Biofilter - Installed	2	EA	$ 35,000.00	$ 70,000
PreCast 16' x 20' Biofilter Shelter, Delivered	1	LS	$ 35,000.00	$ 35,000
Biofilter Shelter Site Work	1	LS	$ 3,000.00	$ 3,000
Electrical Work	1	LS	$ 4,000.00	$ 4,000
Water Service	1	LS	$ 2,500.00	$ 2,500
HVAC (intrinsically safe)	1	LS	$ 5,000.00	$ 5,000
Lighting	1	LS	$ 1,000.00	$ 1,000
Controls, incl. H_2S and Combustible Gas Monitor	1	LS	$ 7,500.00	$ 7,500
Subtotal:				**$ 148,500**
Subtotal Capital Cost				**$ 183,500**
Engineering/Contingency (35%)				**$ 64,225**
Total Capital Cost				**$ 247,725**

<u>Annual Operation Maintenance & Monitoring (OM&M):</u>				
Biofilter Maintenance, Utilities, Media Changeout	12	Mo	$ 1,600.00	$ 19,200
Total Annual OM&M Cost				**$ 19,200**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 295,152**

Total Present Worth (PW): Capital Cost + OM&M PW	**$ 542,877**

Table 5E

Peter Cooper Landfill NPL Site, Gowanda NY
Cost Estimate for Elevated Fill Subarea Gas
Collection / On-Site Treatment w / GAC

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 25,000.00	$ 25,000
Health and Safety/Community Air Monitoring	1	LS	$ 10,000.00	$ 10,000
Subtotal:				**$ 35,000**
Landfill Gas Management:				
4" Perf Gas Vents	60	LF	$ 55.00	$ 3,300
4" PVC Manifold Piping	800	LF	$ 5.00	$ 4,000
Manifold Trench Excavation (800' trench)	350	CY	$ 10.00	$ 3,500
Manifold Trench Bedding	40	CY	$ 25.00	$ 1,000
Manifold Trench Backfill	170	CY	$ 5.00	$ 850
Manifold Trench Topsoil	30	CY	$ 25.00	$ 750
Trench Seeding	0.5	AC	$ 2,200.00	$ 1,100
Blower	2	EA	$ 3,000.00	$ 6,000
Vapor-Phase GAC Units - Installed	2	EA	$ 10,500.00	$ 21,000
PreCast 16' x 20' Shelter, Delivered	1	LS	$ 35,000.00	$ 35,000
Shelter Site Work	1	LS	$ 3,000.00	$ 3,000
Electrical Work	1	LS	$ 4,000.00	$ 4,000
Water Service	1	LS	$ 2,500.00	$ 2,500
HVAC (intrinsically safe)	1	LS	$ 5,000.00	$ 5,000
Lighting	1	LS	$ 1,000.00	$ 1,000
Controls, incl. H_2S and Combustible Gas Monitor	1	LS	$ 7,500.00	$ 7,500
Subtotal:				**$ 99,500**
Subtotal Capital Cost				**$ 134,500**
Engineering/Contingency (35%)				**$ 47,075**
Total Capital Cost				**$ 181,575**

Annual Operation Maintenance & Monitoring (OM&M):				
GAC Unit Maintenance, Utilities, GAC regeneration	12	Mo	$ 2,000.00	$ 24,000
Total Annual OM&M Cost				**$ 24,000**
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 368,940**

Total Present Worth (PW): Capital Cost + OM&M PW	**$ 550,515**

Table 6A

Peter Cooper Landfill NPL Site, Gowanda NY
Groundwater Remediation

No Action

Item	Quantity	Units	Unit Cost	Total Cost
Annual Operation Maintenance & Monitoring (OM&M):	0	Event	$ -	$ -
Total Annual OM&M Cost				**$ -**
Number of years (n):				30
Interest rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ -**

Total Present Worth (PW): ***Capital Cost + OM&M PW***	**$ -**

Notes:
1. Groundwater remediation alternatives are developed to mitigate risks due to potential future ingestion. Environmental monitoring costs associated with residual soil/fill contaminants are included with other alternatives.

Table 6B

Peter Cooper Landfill NPL Site, Gowanda NY
Groundwater Remediation

Institutional Controls

Item	Quantity	Units	Unit Cost	Total Cost
<u>Institutional Controls</u>				
Deed Restrictions	1	LS	$ 6,500.00	$ 6,500
Subtotal:				**$ 6,500**
Total Capital Cost				**$ 6,500**
<u>Annual Operation Maintenance & Monitoring (OM&M):</u>				
	0	Event	$ -	$ -
Total Annual OM&M Cost				$ -
Number of years (n):				30
Interest rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ -**

Total Present Worth (PW): ***Capital Cost + OM&M PW*** **$ 6,500**

Notes:
1. Groundwater remediation alternatives are developed to mitigate risks due to potential future ingestion. Environmental monitoring costs associated with residual soil/fill contaminants are included with other alternatives.

Table 6C

Peter Cooper Landfill NPL Site, Gowanda NY
Groundwater Remediation

Point of Use Groundwater Treatment System

Item	Quantity	Units	Unit Cost	Total Cost
Contractor Mobilization/Demobilization	1	LS	$ 500.00	$ 500
Subtotal:				**$ 500**
Point-of-Use System (single location)				
Softening System	1	LS	$ 1,700.00	$ 1,700
Filtration/RO/GAC System	1	LS	$ 950.00	$ 950
Subtotal:				**$ 2,650**
Enclosure for Treatment System				
Shed Installation	1	LS	$ 1,000.00	$ 1,000
Electric/plumbing	1	LS	$ 1,000.00	$ 1,000
Subtotal:				**$ 2,000**
Subtotal Capital Cost				**$ 5,150**
Engineering/Contingency (35%)				**$ 1,803**
Total Capital Cost				**$ 6,953**
Annual Operation Maintenance & Monitoring (OM&M):				
Potable Water Sampling	2	Event	$ 400	$ 800
Salt for Softener	6	Event	$ 25	$ 150
Change filters/check system	1	Yr	$ 250	$ 250
Total Annual OM&M Cost				$ 1,200
Number of years (n):				30
Interest rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				**$ 18,447**
Total Present Worth (PW): ***Capital Cost + OM&M PW***				**$ 25,400**

Notes:
1. Groundwater remediation alternatives are developed to mitigate risks due to potential future ingestion. Environmental monitoring costs associated with residual soil/fill contaminants are included with other alternatives.

APPENDIX F

APPENDIX F

EVALUATION OF VILLAGE OF GOWANDA POTW CAPACITY TO TREAT COLLECTED SEEPS FROM ELEVATED FILL SUBAREA
PETER COOPER NPL SITE
GOWANDA, NEW YORK

August 2004 0021-001-400

EVALUATION OF VILLAGE OF GOWANDA POTW CAPACITY TO TREAT COLLECTED SEEPS FROM ELEVATED FILL SUBAREA

PETER COOPER NPL SITE, GOWANDA, NEW YORK

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1.0 INTRODUCTION

1.1 Background

The Peter Cooper Landfill National Priority List (NPL) Site is located along Palmer Street in the Village of Gowanda, NY on the bank of Cattaraugus Creek (Figure 1). As part of the Feasibility Study being performed by certain potentially responsible parties (PRPs) under an Administrative Order by the United States Environmental Protection Agency, alternative methods of treating groundwater and leachate that may potentially be collected from the Elevated Fill Subarea of the Site are being evaluated. Some of this groundwater and leachate from the Elevated Fill is visible as discolored and sometimes odorous seeps into the Creek. One alternative for the handling of collected seepage water is to discharge it, either untreated or after partial on-site treatment (i.e. pretreatment), into the Village sanitary sewer along Palmer Street. Under this alternative, the seepage would be conveyed along with other sanitary sewage for final treatment at the Village wastewater treatment plant, prior to discharge to Cattaraugus Creek.

1.2 Purpose and Scope

The purpose of this evaluation is to assess the capability of the Village publicly owned treatment works (POTW) to handle the seepage that may be collected from the Elevated Fill Subarea of the Site. More specifically, the ability of the POTW to handle the additional flows and pollutant loads associated with the collected seeps without: upsetting or interfering with the POTW operation; bypassing or passing through the POTW without adequate treatment; or adversely impacting POTW sludge and composting operations will be assessed.

2.0 SEEP CHARACTERIZATION

2.1 General

The seeps are groundwater and/or leachate breakouts that are visible as "springs" along the Creek bank. The seeps being considered for collection as part of this Feasibility Study are impacted by soluble constituents in the sludge fill of the Inactive Landfill Area of the Site. The seeps are typically white, from calcium-rich precipitates, and/or black from reduced iron precipitates and may have an ammonia- or sulfur-type odor.

2.2 Key Chemical Constituents in Seeps

Three seeps from the inactive landfill area were each sampled on two occasions (i.e. November 2000 and May 2001) during the Remedial Investigation (RI). The sampling events represented seasonal wet weather and dry weather conditions. The samples were analyzed for a broad range of organic, inorganic and water quality parameters.

No volatile or semi-volatile organic compounds were detected above surface water criteria in any of the seep samples. The primary chemical constituents detected in the seeps that represent a potential to pass through, upset, or otherwise interfere with the operation of the POTW are arsenic, chromium, iron, ammonia, and sulfides as summarized in attached Table 1. A more comprehensive tabulation of the seep analyses are presented in Table 4-12 of the RI Report.

2.3 Estimated Seep Flow Volumes

The Feasibility Study (FS) estimates the annual average flow of seepage that would be collected in conjunction with the enhancement of the Elevated Fill Subarea cover system is approximately 5,800 gallons per day. Considering seasonal and weather-dependant fluctuations, the estimated maximum daily flow of collected seepage for that same remedial alternative is approximately 15,000 gallons per day.

2.4 Estimated Mass Loadings of Key Seep Constituents to POTW

Based upon the estimated collected seepage flows and average constituent concentrations, the estimated mass loadings of key seep constituents to the Village of Gowanda POTW are presented in Table 2.

3.0 POTW TREATMENT CAPACITY EVALUATION

3.1 Description of POTW Facilities

3.1.1 General

The Village of Gowanda wastewater treatment plant consists of: primary treatment facilities constructed in 1960 and upgraded in the late 1980s including grit chambers with sewage grinders, two rectangular primary settling tanks; secondary treatment facilities constructed in the late 1980s including two covered high-rate biological trickling filters, two center-feed hopper-bottom secondary clarifiers with chemical feed equipment for phosphorus removal, two rectangular baffled contact chambers with chlorinators; and sludge handling and treatment facilities including a gravity sludge thickener, two complete-mix anaerobic digesters, a 1-meter wide belt filter press, and covered static bed sludge composting facility.

3.1.2 Assessment of Hydraulic Capacity

The Design Report dated May 1986 states that the POTW is designed to treat a wet weather flow of 2.2 million gallons per day (MGD) with a hydraulic peak flow of 5.1 MGD. Facilities Operations Reports provided by the Village for the 12-month period ending May 2004 indicate that the average daily flow through the plant was 1.328 MGD with a peak daily flow of 3.223 MGD. Based upon this data, the available (i.e. unused) wet weather treatment capacity of the POTW is 0.872 MGD and the available hydraulic capacity is 1.877 MGD.

The projected maximum wet weather discharge to the POTW from the collected seeps is approximately 15,000 gallons per day, which represents only 1.7% of the unused available wet weather treatment capacity of the POTW.

3.1.3 Assessment of Potential to Pass Through the POTW

This assessment addresses the degree to which each of the key seep constituents could potentially pass through the POTW and potentially result in violations of the Villages SPDES discharge permit and/or adversely impact water quality in the POTW receiving stream, Cattaraugus Creek.

The concentrations of key seep parameters that are currently detected in the untreated influent to the POTW are summarized in Table 3. Table 3 also shows the average and maximum estimated increases in POTW influent concentrations predicted to result from the collection and discharge of seeps to the Village sewerage system. The estimated maximum POTW influent concentrations are based upon the estimated maximum daily loadings in Table 2 being added to the current POTW influent concentrations at current average daily POTW flow rates.

Examination of the estimated maximum POTW influent concentrations in Table 3 indicate that the key inorganic and sulfide constituents would likely be below or at the limits of analytical detection. As such, even with only nominal or no reduction of these inorganic parameters through treatment, the predicted POTW effluent concentrations would be below applicable New York State Water Quality Standards and therefore does not represent a concern.

Ammonia concentrations in the POTW influent are estimated to increase by 2.69 to 6.97 mg/l to a maximum concentration of 18.32 mg/l as a result of elevated fill area seep collection and discharge to the POTW. Evaluation of Facility Operation Reports for the 12 months ending May 2004 indicates the average ammonia removal at the POTW was 82.7%. Applying this average removal efficiency to the estimated maximum influent ammonia concentration predicted to result from seep collection would result in a maximum POTW effluent concentration of approximately 3.17 mg/l. This predicted maximum concentration of ammonia in the POTW effluent would not contravene the Village POTW SPDES permit or adversely impact the water quality in Cattaraugus Creek. The net water quality impact on Cattaraugus Creek resulting from seep collection is positive, as an average of approximately 25 lbs./day of ammonia that currently discharges directly to the Creek will be removed by the POTW.

3.1.4 Assessment of Potential to Upset POTW Operations

Examination of Table 3 shows the maximum POTW influent concentrations of key parameters predicted to result from the discharge of seeps from the Elevated Fill Area to the POTW. These concentrations are not toxic to treatment plant biota and therefore do not represent a potential to upset Village wastewater treatment operations.

3.1.5 Assessment of Potential to Interfere with POTW Operations

One element of this assessment addresses the potential for the discharge of collected seeps to the POTW to accumulate in the sludge in sufficient amounts to adversely impact the use of finished compost product.

Table 4 illustrates the current average and maximum concentrations of arsenic and chromium based on the most recent annual sludge compost operation report prepared by the Village. Table 4 also shows the estimated average and maximum concentrations of these same parameters in the finished compost that could potentially result from collected seep discharge to the POTW. These estimated concentrations conservatively assume that the entire mass loading of these parameters in the seeps (See Table 2) end up in the sludge and compost. These estimated concentrations in finished compost predicted to result from seep collection and discharge to the POTW are well below New York State Part 360 compost pollutant criteria and therefore will not affect compost operations or finished compost use.

The ammonia and sulfides are biologically degraded and therefore do not concentrate in the sludge. Iron was not evaluated as this is not considered a toxic metal and is not analyzed in the Village POTW sludge and compost.

Another element of this assessment is consideration of whether or not the sulfide concentrations and mass loadings to the POTW could potentially adversely impact POTW operations. More specifically, the Village Sewer Use Ordinance prohibits the discharge of wastes or waters containing sulfides and other substances that could be a hazard to the POTW, unless explicitly allowed by permit. In this instance, the concern is whether sulfides contained in the seeps could result in hydrogen sulfide gas concentrations in the sewer system that would be potentially hazardous to Village sewer workers. Another concern is whether these same sulfide concentrations could potentially result in odorous conditions in the basements of houses located adjacent to the sewers conveying the collected seeps from the site along Palmer Street to the Village sewage treatment plant. The Village Public Works Superintendent, Mr. Michael Hutchinson, raised this concern based upon odor complaints he currently receives from some older residences in the Village during summer months. According to Mr. Hutchinson, many older homes in the Village have basement drains that connect to the Village sewer system. The traps in these basement drains sometimes dry out and allow sewer gases to enter the basement resulting in the odor complaints.

Table 1 summarizes the concentrations of sulfides in the seeps. Table 2 shows the estimated mass loadings of sulfides in the seeps that would be discharged to the sewer.

Whether this discharge of less than 1 pound of sulfides per day could potentially result in significant hydrogen sulfide gas concentrations in the Village sewers depends upon a number of factors including: the amount of dilution from sewage flow; pH in the combined sewage and seep flows; sewage temperature; and sewer flow conditions (e.g. velocity and residence time). The pH of the seeps is alkaline which reduces the potential for hydrogen sulfide gas formation. Higher summertime temperatures increase biological activity and reduce dissolved oxygen concentrations in the sewage, which promotes hydrogen sulfide gas formation. Low velocities and long residence time in sewers can also promote hydrogen sulfide gas formation. The Village has no sewer flow or other data necessary to determine if existing flows in the sewer would effectively dilute the seep discharge or could otherwise result in significant hydrogen sulfide gas formation in the sewers. As such, insufficient data exists to determine if the collected seeps discharged to the POTW without pretreatment could potentially result in conditions in the Village sewerage system that may contribute to: hazardous concentrations of hydrogen sulfide gases within the sewer system and/or odors in building basements located along the sewer lines conveying the seepage down gradient of the site. A determination of the need for pretreatment of sulfides in the seeps could better be made after existing flows and other data in the Palmer Street sewer are collected and evaluated during remedial design. Alternatively, the seeps could be collected and discharged to the Village sewerage system and resulting hydrogen sulfide gas concentrations and odor potential could be accurately determined based on actual operational data. If deemed necessary, pretreatment for sulfide in the seeps prior to discharge could be readily implemented by addition of chemical oxidant (e.g. potassium permanganate).

4.0 SUMMARY AND CONCLUSIONS

This evaluation has concluded that:

- The Village POTW has adequate treatment and hydraulic capacity to accept the discharge of seeps being considered for collection along the Elevated Fill Subarea of the Peter Cooper NPL Site in Gowanda, New York.
- The key parameters in the collected seeps, if discharged to the POTW, would not be expected to pass through the POTW in concentrations that would contravene the Village SPDES permit or water quality standards in Cattaraugus Creek.
- The discharge of collected seeps to the POTW would not be expected to upset the Village wastewater treatment plant operations.
- The discharge of collected seeps to the POTW would not be expected to adversely affect the quality or use of finished compost produced at the POTW from sewage sludge.
- Insufficient Village sewer flow and other data exist to determine whether the collected seeps, if discharged to the POTW without pretreatment, could potentially result in hazardous concentrations of hydrogen sulfide gas in the sewers and/or odors in the basements of buildings located along the sewer lines down stream of the Site. The determination of whether to pretreat the seeps for sulfide removal could better be made based on Village sewer flow and other data collected and evaluated during remedial design or based upon actual operating data after the seeps are initially collected and discharged to the sewerage system.

TABLE 1

SEEP ANALYTICAL CHARACTERIZATION SUMMARY

Peter Cooper Landfill NPL Site
Gowanda, New York

Parameter	Average Concentration (mg/L)	Maximum Concentration (mg/L)	Minimum Concentration (mg/L)
Total Arsenic	0.051	0.071	0.0314
Soluble Arsenic	0.0598	0.0665	0.0528
Total Chromium	0.259	0.423	0.0949
Soluble Chromium	0.264	0.369	0.0969
Total Iron	5.57	28.6	0.10
Soluble Iron	1.934	4.78	0.107
Ammonia	617	891	381
Total Sulfides	4.47	9.0	1.00
pH	8.06	8.25	7.88

TABLE 2

ESTIMATED MASS LOADINGS TO POTW FROM COLLECTED SEEPS

Peter Cooper Landfill NPL Site
Gowanda, New York

Parameter	Average Daily Loading (lb./day)	Maximum Daily Loading (lb./day)
Total Arsenic	0.0025	0.0064
Soluble Arsenic	0.0029	0.0075
Total Chromium	0.013	0.032
Soluble Chromium	0.013	0.033
Total Iron	0.27	0.70
Soluble Iron	0.094	0.24
Ammonia	29.7	77
Total Sulfides	0.22	0.56

TABLE 3

ESTIMATED POTW INFLUENT CONCENTRATIONS RESULTING FROM COLLECTED SEEPS

Peter Cooper Landfill NPL Site
Gowanda, New York

Parameter	Current POTW Influent Conc. [1] (mg/L)	Average Increase in POTW Influent Conc. (mg/L)	Maximum Increase in POTW Influent Conc. (mg/L)	Estimated Maximum POTW Influent Conc. (mg/L)	NYS Water Quality Standards (mg/L)
Total Arsenic	< 0.009	0.0002	0.0005	< 0.0095	0.050
Total Chromium	< 0.005	0.0011	0.0029	< 0.0079	0.050
Total Iron	unknown	0.024	0.063	> 0.063	0.300
Ammonia	11.35 [2]	2.69	6.97	18.32	n.a.
Total Sulfides	unknown	0.0016	0.05	> 0.05	n.a.

Notes:
1. Based on 01/28/00 sampling by the Village of Gowanda.
2. Based on average measured concentration of samples collected by the Village of Gowanda (06/03 – 07/04).

n.a.- not applicable

TABLE 4

ESTIMATED POTW COMPOST CONCENTRATIONS RESULTING FROM COLLECTED SEEPS

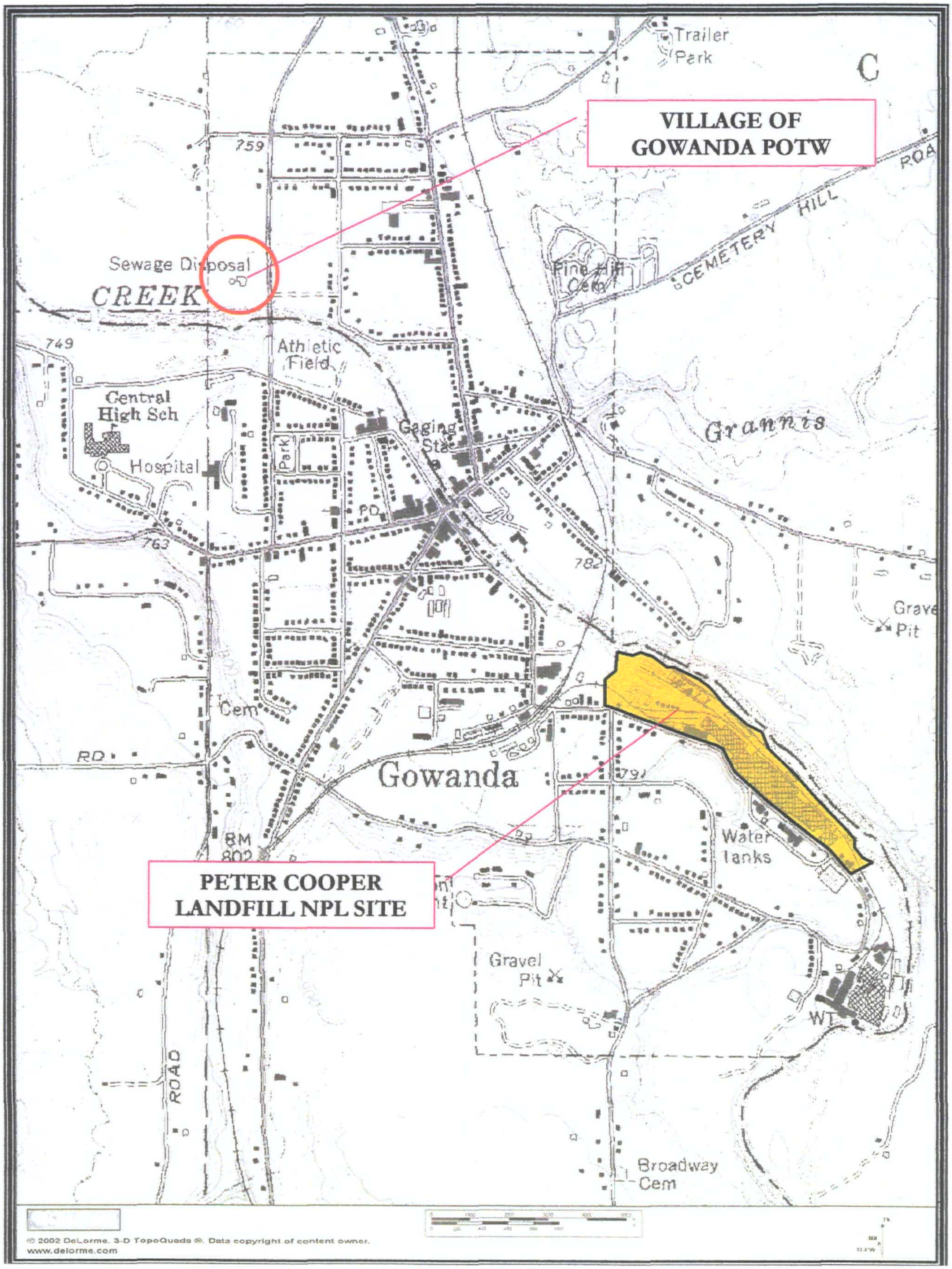
Peter Cooper Landfill NPL Site
Gowanda, New York

Parameter	Current Avg. Conc. in Finished Compost [1] (mg/kg)	Estimated Avg. Conc. In Finished Compost w/ Seeps [2] (mg/kg)	NYS Part 360 Compost Avg. Pollutant Limit (mg/kg)	Current Max. Conc. in Finished Compost [1] (mg/kg)	Estimated Max. Conc. in Finished Compost w/ Seeps [2] (mg/kg)	NYS Part 360 Compost Max. Pollutant Limit (mg/kg)
Total Arsenic	<5.95	<6.58	41	10.2	11.8	75
Total Chromium	85.9	89.1	1,000	123	131	1,000

Notes:

1. Based on 08/20/02 & 02/07/03 sampling by the Village of Gowanda.
2. Based on addition of average and maximum parameter loads from seeps (Table 2-2) in 237 dry tons of sludge and 2,000 yds^3 tree trimmings @ assumed 474 lb./yd.^{3}

FIGURE 1
VILLAGE POTW LOCATION MAP
PETER COOPER LANDFILL NPL SITE
GOWANDA, NEW YORK



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APPENDIX G

PETER COOPER LANDFILL NPL SITE
FEASIBILITY STUDY

ENHANCED COVER SYSTEM/
6NYCRR PART 360 FINAL COVER SYSTEM
EQUIVALENT PERFORMANCE ANALYSIS

1.0 INTRODUCTION

The purpose of a cover system is to mitigate the potential for groundwater impacts by promoting precipitation runoff and evapotranspiration to reduce surface infiltration, and to minimize potential for direct contact with waste and/or contaminated media. The generic 6NYCRR Part 360 final cover system incorporates a geosynthetic liner, barrier protection layer soils, and vegetated topsoil cover system to meet these criteria. However, the Part 360 regulations allow for variances from the generic Part 360 landfill cover system if "equivalent performance" can be demonstrated by an alternative cover system. Equivalent performance may include equivalent reductions in mitigating potential for groundwater quality impacts to receptors. The Enhanced Cover System approach described in the FS Report for the Peter Cooper Landfill NPL Site will meet this equivalent performance requirement by supplementing existing low permeability cover soils in combination with implementation of seep/groundwater collection measures at the downgradient (Cattaraugus Creek) perimeter of the Elevated Fill Subarea, and retrofitting an active gas collection and treatment system into the cover system.

2.0 COVER SYSTEM ANALYSIS

To evaluate the difference in infiltration rates under the generic Part 360 cover system and the enhanced cover system, these cover systems were simulated using USEPA's Hydrologic Evaluation of Landfill Performance (HELP) Model (Version 3.07). HELP model simulations were also performed for the existing Elevated Fill Subarea cover to establish baseline conditions. For the existing and enhanced cover system approach, cover system performance, as measured by annual average percolation/leakage through the barrier layer soils during the first five (5) years of placement, was evaluated on a subarea-specific basis due to the differences in existing barrier layer soil cover thicknesses and hydraulic conductivity values. These areas included the approximate 1.5-acre were the portion of the

Elevated Fill Subarea of the site where cover soils are less than 1-foot thick, and the approximately 3.5-acre area where existing cover soils are greater than 1-foot thick.

The HELP Model can be operated to incorporate a number of default values for precipitation, evapotranspiration, and atmospheric conditions. However, a number of inputs and cover system features, including configuration, slope, materials of construction and soil properties, are largely at the discretion of the user. Selection of "best case" or "worst case" values for any of these data significantly impact program output. To provide the most realistic comparison of the existing and enhanced cover system approaches to the Part 360-equivalent cover system, a series of assumptions and estimates were made to account for site-specific characteristics and best professional judgment. Where possible, these assumptions were applied universally to all of the modeled cover systems. Key assumptions and estimates are identified on Table 1, attached, and summarized below.

- **Precipitation, Atmospheric and Evapotranspiration Data:** This information was entered for the existing, enhanced, and Part 360 cover systems using identical default values for Buffalo, NY, as derived from the HELP model database. Buffalo is approximately 30 miles from Gowanda, and is the closest location to the site for which a default database exists.

- **Landfill Area, Slope and Slope Length:** This information was derived through Figure 6 and Plate 1 of the FS, which present the Elevated Fill Subarea isopach and contour maps, respectively.

- **Cover Soil Layers and Physical Properties – Existing Cover:** This information was derived based on cover system isopach map and in-place hydraulic conductivity testing of existing cover soils performed during the RI. For existing cover, average existing soil thicknesses within the 1.5 and 3.5-acre areas were used in the Model (6-inches and 22-inches, respectively). The hydraulic conductivity values for the existing cover soils were estimated as the average of actual measurements from Shelby tube samples collected across the Elevated Fill Subarea during the RI. Default values for porosity, field capacity, and wilting point for the existing soils were therefore obtained from the HELP model database for soils with similar hydraulic conductivity characteristics (i.e., Soil Type #26). For both the 1.5 and 3.5-acre areas, a fair stand of grass was assumed.

- **Cover Soil Layers and Physical Properties – Enhanced Cover Alternative**: For the enhanced cover system alternative, the 3.5-acre area was assumed to have no changes from the current condition. Filling in of low spots, moderate regrading and reseeding to provide a good vegetative cover will be performed, but this was conservatively assumed to have no substantial impacts. For the 1.5-acre parcel, an additional 1-foot of soil having a target hydraulic conductivity of approximately 2x10-5 (i.e., HELP Model default Soil Type #22) will be placed over the existing cover soils.

- **Soil/Geomembrane Layers and Physical Properties - Generic Part 360 Cover:** Soil properties for the generic Part 360 Cover were assumed based on Part 360 requirements. Topsoil properties were entered as the default values for HELP Model Soil Type #6. Barrier protection layer soils were conservatively assumed to have properties identical to the default values for Soil Type #28, with a hydraulic conductivity of approximately (1 x 10^{-6} cm/s). Geomembrane properties were entered as the HELP Model default values for HDPE. Membrane integrity properties, including average installation and manufacturing defect rates of 0.5 pinholes per acre and 1 pinholes per acre, respectively, placement over a geotextile/geonet gas venting layer, and good placement quality were also selected from the HELP Model menu.

2.1 Results of HELP Model Simulations

Results of the HELP Model simulations for the preferred and generic Part 360 cover systems are summarized below.

Cover System	Estimated Annual Infiltration (CF/year)	Average Daily Infiltration (CF/day)
Existing	64,100	176
Enhanced	59,100	162
Part 360-Equivalent	2,890	8

Detailed output from each of the model runs is attached. As indicated, approximately 64,100 cubic feet of precipitation per year are estimated to infiltrate the existing cover system. The annual average surface infiltration value for the enhanced cover system approach following the first five years of cover system placement is conservatively estimated at 59,100 cubic feet per year, and the five year average surface infiltration value for the generic Part 360 cover system is approximately 2,890 cubic feet per year.

3.0 UPGRADIENT GROUNDWATER FLOWS

In addition to the infiltration of precipitation through the Elevated Fill Subarea cover, overburden groundwater flows through the site subsurface and contacts sludge fill material within the Elevated Fill Subarea. Section 2.5 of the FS estimates that, independent of mounding from infiltration, overburden groundwater flow from upgradient sources through the Elevated Fill Subarea to the creek represents average flows of approximately 600 cubic feet per day.

4.0 NET HYDRAULIC FLOWS AND PERFORMANCE ANALYSIS

Based on the above analyses, the combined contributions of infiltration and upgradient groundwater flow to seep/groundwater migration to Cattaraugus Creek are presented below for the current scenario, the enhanced cover alternative (absent collection) and the Part 360-equivalent alternative.

Cover System	Estimated Average Daily Infiltration Flow (CF/day)	Estimated Average Daily Groundwater Flow (CF/day)	Total Flow from Elevated Fill Subarea to Cattaraugus Creek (CF/day)
Existing	176	600	776
Enhanced Cover without seep/groundwater collection	162	600	762
Part 360-Equivalent	8	600	608
Enhanced Cover with seep/groundwater collection			<<608

As indicated, in the absence of a collection system the enhanced cover system approach allows approximately 762 cubic feet per day of groundwater/seep flow to the

Creek, whereas the Part 360-equivalent approach allows for flows of approximately 608 cubic feet per day, or 80% of the flows predicted for the enhanced cover system. However, the enhanced alternative, when employed in conjunction with downgradient seep/groundwater collection, is predicted to mitigate nearly all contaminant loadings from seep flows, lowering the rate of discharge to the Creek significantly greater than the 20% decrease necessary to match the Part 360-equivalent approach. Thus, the enhanced cover system in combination with seep/groundwater collection provides superior protection to the creek than does the Part 360 cover system alone. This can be demonstrated following construction through collection of flows greater than the difference between the predicted Part 360 cover system and the enhanced cover system (i.e., collection of greater than 154 CF/day) and/or observance of no discernible seepage from the Elevated Fill Subarea to Cattaraugus Creek.

In addition to providing greater reduction of off-site flows and loadings to Cattaraugus Creek, the enhanced cover system with seep/groundwater collection approach will provide this benefit immediately upon construction. The full effects of the Part 360 cover system approach in reducing off-site loadings are not likely to be observed for several years due to slow release of mounded groundwater from saturated sludge fill beneath the cover and continued releases to the creek from this source.

As discussed in the FS Report and in Appendix F, the seep collection and treatment system will be designed to collect up to 2,000 gallons per day of combined seep and groundwater flow to assure an adequate margin of safety during wet weather conditions and seasonal high water table conditions.

TABLE 1

SUMMARY OF HELP MODEL INPUT DATA

ENHANCED COVER SYSTEM EVALUATION
PETER COOPER LANDFILL NPL SITE - ELEVATED FILL SUBAREA
GOWANDA, NEW YORK

Cover Type	Area (acres)	Final Cover Layers	Slope	Slope Length (feet)	Porosity (vol/vol)	Field Cap. (vol/vol)	Wilt. Pt. (vol/vol)	Sat. Hyd. Conductivity (cm/sec)
Enhanced Cover System:								
supplement 6" exist BL w/ additional 12" BL	1.5	Exist BL - 6" New BL - 12"	2%	155	0.4450 0.4190	0.3930 0.3070	0.2770 0.1800	1.9E-06 1.9E-05
22" exist BL	3.5	Exist BL - 22"	4%	170	0.4450	0.3930	0.2770	1.9E-06
Existing Cover System:								
6" exist BL	1.5	Exist BL - 6"	2%	155	0.4450	0.3930	0.2770	1.9E-06
22" exist BL	3.5	Exist BL - 22"	4%	170	0.4450	0.3930	0.2770	1.9E-06
Part 360 Cover System								
6" topsoil 24" barrier protection layer (BPL) geocomposite 60-mil LLDPE geomembrane	5	Topsoil - 6" BPL - 24" geocomposite - 0.20" 60 mil LLDPE - 0.04"	6%	290	0.4530 0.4520 0.8500 0.0000	0.1900 0.4110 0.0100 0.0000	0.0850 0.3110 0.0050 0.0000	7.2E-04 1.2E-06 1.0E+01 4.0E-13

Notes:

1. All scenarios were run using HELP model default climatological and evapotransformation data for Buffalo, NY.
2. All covers assume a fair stand of grass.
3. Barrier layer (BL) porosity, field capacity and wilting point taken from default values for compacted silty clay soils (HELP Model Type #26). Saturated hydraulic conductivity values for existing soils were calculated geometric mean of shelby-tube samples collected and analyzed during the RI. For the preferred alternative, saturated hydraulic conductivity values were conservatively estimated to be an order of magnitude less than existing cover soils.
4. Part 360 LLDPE membrane assumes 1.00 pinholes/acre each for installation and manufacturing defects, and a placement quality of 3 (good).

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:    C:\HELP3\EXISTING\DATA4.D4
TEMPERATURE DATA FILE:      C:\HELP3\EXISTING\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\HELP3\EXISTING\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\HELP3\EXISTING\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\HELP3\EXISTING\SOIL15.D10
OUTPUT DATA FILE:           C:\HELP3\EXISTING\15OUT.OUT


TIME:  13:30     DATE:   7/ 1/2004


******************************************************************************

     TITLE:  Peter Cooper Gowanda Site - Existing Cover System 1.5 Acres

******************************************************************************
```

Existing 1.5

- 1.5 Acres
- 2% slope
- 155 ft. slope length
- 1 layer - 6" (ave. existing)
- K= 1.9 x 10^{-6} cm/sec (geometric mean of STs)
- Fair grass
- Soil type #26

```
NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
         COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                              LAYER  1
                              --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  26
      THICKNESS                  =      6.00   INCHES
      POROSITY                   =      0.4450 VOL/VOL
      FIELD CAPACITY             =      0.3930 VOL/VOL
      WILTING POINT              =      0.2770 VOL/VOL
      INITIAL SOIL WATER CONTENT =      0.4425 VOL/VOL
      EFFECTIVE SAT. HYD. COND.  =  0.190000003000E-05 CM/SEC
    NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  3.00
             FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.



                GENERAL DESIGN AND EVAPORATIVE ZONE DATA
                ----------------------------------------

    NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
             SOIL DATA BASE USING SOIL TEXTURE #26 WITH A
             FAIR STAND OF GRASS, A SURFACE SLOPE OF  2.%
             AND A SLOPE LENGTH OF  155. FEET.

   SCS RUNOFF CURVE NUMBER            =    90.50
   FRACTION OF AREA ALLOWING RUNOFF   =   100.0    PERCENT
   AREA PROJECTED ON HORIZONTAL PLANE =     1.500  ACRES
   EVAPORATIVE ZONE DEPTH             =     6.0    INCHES
   INITIAL WATER IN EVAPORATIVE ZONE  =     2.655  INCHES
   UPPER LIMIT OF EVAPORATIVE STORAGE =     2.670  INCHES
   LOWER LIMIT OF EVAPORATIVE STORAGE =     1.662  INCHES
   INITIAL SNOW WATER                 =     0.000  INCHES
   INITIAL WATER IN LAYER MATERIALS   =     2.655  INCHES
   TOTAL INITIAL WATER                =     2.655  INCHES
   TOTAL SUBSURFACE INFLOW            =     0.00   INCHES/YEAR
```

```
                 EVAPOTRANSPIRATION AND WEATHER DATA
                 -----------------------------------

     NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
              BUFFALO               NEW YORK

         STATION LATITUDE                         =  42.93 DEGREES
         MAXIMUM LEAF AREA INDEX                  =   2.00
         START OF GROWING SEASON (JULIAN DATE)    =    126
         END OF GROWING SEASON (JULIAN DATE)      =    285
         EVAPORATIVE ZONE DEPTH                   =    6.0  INCHES
         AVERAGE ANNUAL WIND SPEED                =  12.10 MPH
         AVERAGE 1ST QUARTER RELATIVE HUMIDITY    =  76.00 %
         AVERAGE 2ND QUARTER RELATIVE HUMIDITY    =  68.00 %
         AVERAGE 3RD QUARTER RELATIVE HUMIDITY    =  72.00 %
         AVERAGE 4TH QUARTER RELATIVE HUMIDITY    =  76.00 %


     NOTE:  PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
              COEFFICIENTS FOR    BUFFALO             NEW YORK

              NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

  JAN/JUL      FEB/AUG      MAR/SEP      APR/OCT      MAY/NOV      JUN/DEC
  -------      -------      -------      -------      -------      -------
    3.02         2.40         2.97         3.06         2.89         2.72
    2.96         4.16         3.37         2.93         3.62         3.42


     NOTE:  TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
              COEFFICIENTS FOR    BUFFALO             NEW YORK

         NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

  JAN/JUL      FEB/AUG      MAR/SEP      APR/OCT      MAY/NOV      JUN/DEC
  -------      -------      -------      -------      -------      -------
   23.60        26.10        31.70        44.70        55.20        65.50
   72.20        66.80        59.10        52.60        45.50        27.00


     NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
              COEFFICIENTS FOR    BUFFALO             NEW YORK
                AND STATION LATITUDE  =  42.93 DEGREES
```

```
*******************************************************************************

                     ANNUAL TOTALS FOR YEAR    1
-------------------------------------------------------------------------------
                                          INCHES          CU. FEET     PERCENT
                                         --------        ----------    -------
  PRECIPITATION                            42.58         231848.047    100.00

  RUNOFF                                   13.034         70968.555     30.61

  EVAPOTRANSPIRATION                       20.884        113712.977     49.05

  PERC./LEAKAGE THROUGH LAYER  1            8.659276      47149.758     20.34

  CHANGE IN WATER STORAGE                   0.003            16.787      0.01

  SOIL WATER AT START OF YEAR               2.655         14457.861

  SOIL WATER AT END OF YEAR                 2.658         14474.648

  SNOW WATER AT START OF YEAR               0.000             0.000      0.00

  SNOW WATER AT END OF YEAR                 0.000             0.000      0.00

  ANNUAL WATER BUDGET BALANCE               0.0000           -0.031      0.00

*******************************************************************************


*******************************************************************************

                     ANNUAL TOTALS FOR YEAR    2
-------------------------------------------------------------------------------
                                          INCHES          CU. FEET     PERCENT
                                         --------        ----------    -------
  PRECIPITATION                            38.30         208543.531    100.00

  RUNOFF                                   11.671         63546.957     30.47

  EVAPOTRANSPIRATION                       19.860        108137.898     51.85

  PERC./LEAKAGE THROUGH LAYER  1            4.673125      25445.168     12.20

  CHANGE IN WATER STORAGE                   2.096         11413.473      5.47

  SOIL WATER AT START OF YEAR               2.658         14474.648

  SOIL WATER AT END OF YEAR                 2.463         13412.977

  SNOW WATER AT START OF YEAR               0.000             0.000      0.00

  SNOW WATER AT END OF YEAR                 2.291         12475.145      5.98

  ANNUAL WATER BUDGET BALANCE               0.0000            0.042      0.00

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                      ANNUAL TOTALS FOR YEAR     3
-------------------------------------------------------------------------------
                                          INCHES          CU. FEET     PERCENT
                                         --------        ----------    -------
  PRECIPITATION                           33.70          183496.562    100.00

  RUNOFF                                  13.277          72295.523     39.40

  EVAPOTRANSPIRATION                      18.309          99694.469     54.33

  PERC./LEAKAGE THROUGH LAYER  1           3.081294       16777.645      9.14

  CHANGE IN WATER STORAGE                 -0.968          -5271.065     -2.87

  SOIL WATER AT START OF YEAR              2.463          13412.977

  SOIL WATER AT END OF YEAR                2.607          14195.462

  SNOW WATER AT START OF YEAR              2.291          12475.145      6.80

  SNOW WATER AT END OF YEAR                1.179           6421.594      3.50

  ANNUAL WATER BUDGET BALANCE              0.0000            -0.006      0.00

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                      ANNUAL TOTALS FOR YEAR     4
-------------------------------------------------------------------------------
                                          INCHES          CU. FEET     PERCENT
                                         --------        ----------    -------
  PRECIPITATION                           39.77          216547.562    100.00

  RUNOFF                                  13.756          74901.289     34.59

  EVAPOTRANSPIRATION                      20.152         109726.617     50.67

  PERC./LEAKAGE THROUGH LAYER  1           5.541042       30170.973     13.93

  CHANGE IN WATER STORAGE                  0.321           1748.786      0.81

  SOIL WATER AT START OF YEAR              2.607          14195.462

  SOIL WATER AT END OF YEAR                2.640          14375.992

  SNOW WATER AT START OF YEAR              1.179           6421.594      2.97

  SNOW WATER AT END OF YEAR                1.467           7989.850      3.69

  ANNUAL WATER BUDGET BALANCE              0.0000            -0.091      0.00

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                      ANNUAL TOTALS FOR YEAR     5
-------------------------------------------------------------------------------
                                        INCHES          CU. FEET      PERCENT
                                       --------        ----------     -------
  PRECIPITATION                          37.99          206855.562     100.00

  RUNOFF                                 14.606          79527.828      38.45

  EVAPOTRANSPIRATION                     20.234         110176.570      53.26

  PERC./LEAKAGE THROUGH LAYER  1          4.568038       24872.967      12.02

  CHANGE IN WATER STORAGE                -1.418          -7721.820      -3.73

  SOIL WATER AT START OF YEAR             2.640          14375.992

  SOIL WATER AT END OF YEAR               2.601          14164.917

  SNOW WATER AT START OF YEAR             1.467           7989.850       3.86

  SNOW WATER AT END OF YEAR               0.088            479.105       0.23

  ANNUAL WATER BUDGET BALANCE             0.0000             0.016       0.00

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      AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH    5
-------------------------------------------------------------------------------

                         JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                         -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                 3.43     2.16     2.96     3.00     3.13     2.57
                           3.32     4.19     3.91     3.05     3.51     3.24

    STD. DEVIATIONS        1.02     1.02     1.20     1.32     0.99     1.09
                           0.91     2.45     1.69     1.29     2.18     0.79

  RUNOFF
  ------
    TOTALS                 1.389    1.174    4.337    3.330    0.213    0.140
                           0.310    0.360    0.335    0.299    0.567    0.814

    STD. DEVIATIONS        1.346    0.750    2.665    2.938    0.329    0.132
                           0.241    0.498    0.360    0.417    0.781    0.886

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                 0.410    0.491    0.459    1.105    3.085    2.254
                           2.546    3.409    2.576    1.641    1.352    0.559

    STD. DEVIATIONS        0.052    0.032    0.160    0.724    1.130    0.888
                           0.694    1.619    0.765    0.382    0.143    0.155

  PERCOLATION/LEAKAGE THROUGH LAYER  1
  ------------------------------------
    TOTALS                 0.0000   0.0000   0.0000   0.2111   0.2724   0.1696
                           0.4559   0.4766   0.6267   0.9750   1.5628   0.5546

    STD. DEVIATIONS        0.0000   0.0000   0.0000   0.1311   0.1984   0.2214
                           0.2781   0.5755   0.5861   0.9443   1.2927   0.4956

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```

1.5 acres existing

```
*******************************************************************************

    AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH    5
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET     PERCENT
                                 ------------------    ------------   ---------
 PRECIPITATION                  38.47     (   3.225)     209458.2     100.00

 RUNOFF                         13.269    (  1.0763)      72248.03     34.493

 EVAPOTRANSPIRATION             19.888    (  0.9584)     108289.72     51.700

 PERCOLATION/LEAKAGE THROUGH     5.30455 (  2.07329)      28883.301    13.78953
   LAYER  1

 CHANGE IN WATER STORAGE         0.007    (  1.3643)         37.23      0.018
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               PEAK DAILY VALUES FOR YEARS    1 THROUGH    5
      -----------------------------------------------------------------------
                                                  (INCHES)      (CU. FT.)
                                                 ----------    -------------
         PRECIPITATION                             2.14         11652.301

         RUNOFF                                    2.784        15161.0771

         PERCOLATION/LEAKAGE THROUGH LAYER  1      0.634121      3452.79102

         SNOW WATER                                7.57         41216.2422

         MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.4450

         MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.2770

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                   FINAL WATER STORAGE AT END OF YEAR    5
    ----------------------------------------------------------------------
                    LAYER        (INCHES)       (VOL/VOL)
                    -----        ---------      ----------
                      1            2.6015         0.4336

                  SNOW WATER       0.088

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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******************************************************************************


PRECIPITATION DATA FILE:     C:\HELP3\EXISTING\DATA4.D4
TEMPERATURE DATA FILE:       C:\HELP3\EXISTING\DATA7.D7
SOLAR RADIATION DATA FILE:   C:\HELP3\EXISTING\DATA13.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3\EXISTING\DATA11.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3\EXISTING\SOIL35.D10
OUTPUT DATA FILE:            C:\HELP3\EXISTING\35OUT.OUT


TIME:  13:42     DATE:   7/ 1/2004


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     TITLE:  Peter Cooper Gowanda Site - Existing Cover System 3.5 Acres

******************************************************************************
```

Existing 3.5

- 3.5 acres
- 4% slope
- 170 ft slope length
- 1 layer - 22" (ave. existing)
- $K = 1.9 \times 10^{-6}$ cm/sec (geometric mean of STs)
- Fair Grass
- Soil type #26

```
NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
         COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                              LAYER  1
                              --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER  26
      THICKNESS                      =     22.00   INCHES
      POROSITY                       =      0.4450 VOL/VOL
      FIELD CAPACITY                 =      0.3930 VOL/VOL
      WILTING POINT                  =      0.2770 VOL/VOL
      INITIAL SOIL WATER CONTENT     =      0.4366 VOL/VOL
      EFFECTIVE SAT. HYD. COND.      =  0.190000003000E-05 CM/SEC
    NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  3.00
             FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.



              GENERAL DESIGN AND EVAPORATIVE ZONE DATA
              ----------------------------------------

    NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
             SOIL DATA BASE USING SOIL TEXTURE #26 WITH A
             FAIR STAND OF GRASS, A SURFACE SLOPE OF  4.%
             AND A SLOPE LENGTH OF  170. FEET.

   SCS RUNOFF CURVE NUMBER            =     90.60
   FRACTION OF AREA ALLOWING RUNOFF   =    100.0    PERCENT
   AREA PROJECTED ON HORIZONTAL PLANE =      3.500  ACRES
   EVAPORATIVE ZONE DEPTH             =     20.0    INCHES
   INITIAL WATER IN EVAPORATIVE ZONE  =      8.820  INCHES
   UPPER LIMIT OF EVAPORATIVE STORAGE =      8.900  INCHES
   LOWER LIMIT OF EVAPORATIVE STORAGE =      5.540  INCHES
   INITIAL SNOW WATER                 =      0.000  INCHES
   INITIAL WATER IN LAYER MATERIALS   =      9.606  INCHES
   TOTAL INITIAL WATER                =      9.606  INCHES
   TOTAL SUBSURFACE INFLOW            =      0.00   INCHES/YEAR
```

```
                EVAPOTRANSPIRATION AND WEATHER DATA
                -----------------------------------

     NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
              BUFFALO               NEW YORK

         STATION LATITUDE                         =  42.93 DEGREES
         MAXIMUM LEAF AREA INDEX                  =   2.00
         START OF GROWING SEASON (JULIAN DATE)    =    126
         END OF GROWING SEASON (JULIAN DATE)      =    285
         EVAPORATIVE ZONE DEPTH                   =  20.0  INCHES
         AVERAGE ANNUAL WIND SPEED                =  12.10 MPH
         AVERAGE 1ST QUARTER RELATIVE HUMIDITY    =  76.00 %
         AVERAGE 2ND QUARTER RELATIVE HUMIDITY    =  68.00 %
         AVERAGE 3RD QUARTER RELATIVE HUMIDITY    =  72.00 %
         AVERAGE 4TH QUARTER RELATIVE HUMIDITY    =  76.00 %


     NOTE:  PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
              COEFFICIENTS FOR    BUFFALO             NEW YORK

              NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

   JAN/JUL      FEB/AUG      MAR/SEP      APR/OCT      MAY/NOV      JUN/DEC
   -------      -------      -------      -------      -------      -------
     3.02         2.40         2.97         3.06         2.89         2.72
     2.96         4.16         3.37         2.93         3.62         3.42


     NOTE:  TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
              COEFFICIENTS FOR    BUFFALO             NEW YORK

         NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

   JAN/JUL      FEB/AUG      MAR/SEP      APR/OCT      MAY/NOV      JUN/DEC
   -------      -------      -------      -------      -------      -------
    23.60        26.10        31.70        44.70        55.20        65.50
    72.20        66.80        59.10        52.60        45.50        27.00


     NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
              COEFFICIENTS FOR    BUFFALO             NEW YORK
                AND STATION LATITUDE  =  42.93 DEGREES
```

```
*******************************************************************************

                      ANNUAL TOTALS FOR YEAR    1
-------------------------------------------------------------------------------
                                          INCHES         CU. FEET     PERCENT
                                         --------       ----------    -------
  PRECIPITATION                            42.58         540978.750    100.00

  RUNOFF                                   14.258        181153.734     33.49

  EVAPOTRANSPIRATION                       22.782        289446.625     53.50

  PERC./LEAKAGE THROUGH LAYER  1            5.538829      70370.820     13.01

  CHANGE IN WATER STORAGE                   0.001             7.742      0.00

  SOIL WATER AT START OF YEAR               9.606        122047.250

  SOIL WATER AT END OF YEAR                 9.607        122054.992

  SNOW WATER AT START OF YEAR               0.000             0.000      0.00

  SNOW WATER AT END OF YEAR                 0.000             0.000      0.00

  ANNUAL WATER BUDGET BALANCE               0.0000           -0.158      0.00

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                      ANNUAL TOTALS FOR YEAR    2
-------------------------------------------------------------------------------
                                          INCHES         CU. FEET     PERCENT
                                         --------       ----------    -------
  PRECIPITATION                            38.30         486601.594    100.00

  RUNOFF                                   11.781        149673.922     30.76

  EVAPOTRANSPIRATION                       23.387        297128.812     61.06

  PERC./LEAKAGE THROUGH LAYER  1            1.479144      18792.520      3.86

  CHANGE IN WATER STORAGE                   1.653         21006.207      4.32

  SOIL WATER AT START OF YEAR               9.607        122054.992

  SOIL WATER AT END OF YEAR                 8.969        113952.523

  SNOW WATER AT START OF YEAR               0.000             0.000      0.00

  SNOW WATER AT END OF YEAR                 2.291         29108.672      5.98

  ANNUAL WATER BUDGET BALANCE               0.0000            0.118      0.00

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                       ANNUAL TOTALS FOR YEAR    3
------------------------------------------------------------------------------
                                       INCHES         CU. FEET      PERCENT
                                      --------       ----------     -------
  PRECIPITATION                         33.70         428158.656    100.00

  RUNOFF                                12.573        159739.250     37.31

  EVAPOTRANSPIRATION                    20.753        263661.500     61.58

  PERC./LEAKAGE THROUGH LAYER  1         1.263635      16054.487      3.75

  CHANGE IN WATER STORAGE               -0.889        -11296.795     -2.64

  SOIL WATER AT START OF YEAR            8.969        113952.523

  SOIL WATER AT END OF YEAR              9.192        116780.680

  SNOW WATER AT START OF YEAR            2.291         29108.672      6.80

  SNOW WATER AT END OF YEAR              1.179         14983.719      3.50

  ANNUAL WATER BUDGET BALANCE            0.0000            0.200      0.00

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                       ANNUAL TOTALS FOR YEAR    4
------------------------------------------------------------------------------
                                       INCHES         CU. FEET      PERCENT
                                      --------       ----------     -------
  PRECIPITATION                         39.77         505277.656    100.00

  RUNOFF                                13.564        172335.922     34.11

  EVAPOTRANSPIRATION                    22.325        283641.125     56.14

  PERC./LEAKAGE THROUGH LAYER  1         3.458324      43938.012      8.70

  CHANGE IN WATER STORAGE                0.422          5362.568      1.06

  SOIL WATER AT START OF YEAR            9.192        116780.680

  SOIL WATER AT END OF YEAR              9.326        118483.984

  SNOW WATER AT START OF YEAR            1.179         14983.719      2.97

  SNOW WATER AT END OF YEAR              1.467         18642.982      3.69

  ANNUAL WATER BUDGET BALANCE            0.0000            0.042      0.00

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                          ANNUAL TOTALS FOR YEAR    5
-----------------------------------------------------------------------------------
                                            INCHES        CU. FEET       PERCENT
                                           --------      ----------      -------
 PRECIPITATION                              37.99        482662.969      100.00

 RUNOFF                                     14.611       185632.797       38.46

 EVAPOTRANSPIRATION                         22.714       288576.281       59.79

 PERC./LEAKAGE THROUGH LAYER  1              2.124464     26991.309        5.59

 CHANGE IN WATER STORAGE                    -1.459       -18537.617       -3.84

 SOIL WATER AT START OF YEAR                 9.326       118483.984

 SOIL WATER AT END OF YEAR                   9.246       117471.437

 SNOW WATER AT START OF YEAR                 1.467        18642.982        3.86

 SNOW WATER AT END OF YEAR                   0.088         1117.912        0.23

 ANNUAL WATER BUDGET BALANCE                 0.0000           0.197        0.00

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      AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH    5
------------------------------------------------------------------------------

                        JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                        -------  -------  -------  -------  -------  -------
 PRECIPITATION
 -------------
   TOTALS                 3.43     2.16     2.96     3.00     3.13     2.57
                          3.32     4.19     3.91     3.05     3.51     3.24

   STD. DEVIATIONS        1.02     1.02     1.20     1.32     0.99     1.09
                          0.91     2.45     1.69     1.29     2.18     0.79

 RUNOFF
 ------
   TOTALS                 1.308    1.104    4.284    3.287    0.311    0.156
                          0.250    0.311    0.337    0.400    0.831    0.778

   STD. DEVIATIONS        1.327    0.723    2.674    2.910    0.300    0.201
                          0.168    0.501    0.461    0.553    0.996    0.802

 EVAPOTRANSPIRATION
 ------------------
   TOTALS                 0.412    0.494    0.466    1.178    3.292    3.056
                          3.922    3.600    2.570    1.623    1.230    0.549

   STD. DEVIATIONS        0.050    0.030    0.156    0.763    1.068    0.919
                          1.043    1.767    0.492    0.098    0.176    0.149

 PERCOLATION/LEAKAGE THROUGH LAYER  1
 ------------------------------------
   TOTALS                 0.0000   0.0000   0.0000   0.3899   0.3290   0.0280
                          0.0053   0.0069   0.0016   0.3568   1.0450   0.6102

   STD. DEVIATIONS        0.0000   0.0000   0.0000   0.3336   0.2572   0.0278
                          0.0022   0.0040   0.0015   0.4917   1.0725   0.3303

******************************************************************************
```

3.5 acres existing

```
*******************************************************************************

   AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH    5
-------------------------------------------------------------------------------
                                     INCHES             CU. FEET      PERCENT
                               -------------------   -------------   ---------
 PRECIPITATION                  38.47     (   3.225)    488735.9     100.00

 RUNOFF                         13.358    (  1.1756)    169707.11     34.724

 EVAPOTRANSPIRATION             22.392    (  0.9921)    284490.87     58.210

 PERCOLATION/LEAKAGE THROUGH     2.77288 (  1.76722)     35229.430     7.20827
   LAYER  1

 CHANGE IN WATER STORAGE        -0.054    (  1.2059)      -691.58     -0.142

*******************************************************************************
```

```
*****************************************************************************

          PEAK DAILY VALUES FOR YEARS    1 THROUGH    5
-------------------------------------------------------------------------
                                              (INCHES)      (CU. FT.)
                                             ----------    -------------
   PRECIPITATION                               2.14         27188.701

   RUNOFF                                      2.783        35358.7852

   PERCOLATION/LEAKAGE THROUGH LAYER  1        0.232536      2954.37134

   SNOW WATER                                  7.57         96171.2344

   MAXIMUM VEG. SOIL WATER (VOL/VOL)                    0.4443

   MINIMUM VEG. SOIL WATER (VOL/VOL)                    0.2770

*****************************************************************************
```

```
*******************************************************************************

            FINAL WATER STORAGE AT END OF YEAR     5
    ------------------------------------------------------------------------
             LAYER         (INCHES)        (VOL/VOL)
             -----         --------        ---------
               1            9.2461           0.4203

           SNOW WATER       0.088

*******************************************************************************
*******************************************************************************
```

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                     USAE WATERWAYS EXPERIMENT STATION                    **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:     C:\HELP3\ENHANCED\DATA4.D4
TEMPERATURE DATA FILE:       C:\HELP3\ENHANCED\DATA7.D7
SOLAR RADIATION DATA FILE:   C:\HELP3\ENHANCED\DATA13.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3\ENHANCED\DATA11.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3\ENHANCED\SOIL155.D10
OUTPUT DATA FILE:            C:\HELP3\ENHANCED\15OUT.OUT


TIME:  14:36     DATE:   7/ 1/2004


******************************************************************************

     TITLE:  Peter Cooper Gowanda Site - Enhanced Cover System 1.5 Acres

******************************************************************************
```

Enhanced 1.5

- 1.5 acres
- 2% slope
- 155 ft slope length
- 2 layers — 12 inches (percolation) Type 22
  - 6 inches (existing) Type 26
- $K_{12} = 1.9 \times 10^{-5}$ cm/sec
  $K_6 = 1.9 \times 10^{-6}$ cm/sec
- Fair grass

```
NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
         COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                              LAYER  1
                              --------

                 TYPE 1 - VERTICAL PERCOLATION LAYER
                     MATERIAL TEXTURE NUMBER  22
      THICKNESS                    =     12.00   INCHES
      POROSITY                     =      0.4190 VOL/VOL
      FIELD CAPACITY               =      0.3070 VOL/VOL
      WILTING POINT                =      0.1800 VOL/VOL
      INITIAL SOIL WATER CONTENT   =      0.3833 VOL/VOL
      EFFECTIVE SAT. HYD. COND.    =  0.189999992000E-04 CM/SEC
    NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  3.00
           FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                              LAYER  2
                              --------

                 TYPE 1 - VERTICAL PERCOLATION LAYER
                     MATERIAL TEXTURE NUMBER  26
      THICKNESS                    =      6.00   INCHES
      POROSITY                     =      0.4450 VOL/VOL
      FIELD CAPACITY               =      0.3930 VOL/VOL
      WILTING POINT                =      0.2770 VOL/VOL
      INITIAL SOIL WATER CONTENT   =      0.4410 VOL/VOL
      EFFECTIVE SAT. HYD. COND.    =  0.190000003000E-05 CM/SEC
```

```
                  GENERAL DESIGN AND EVAPORATIVE ZONE DATA
                  ----------------------------------------

          NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
                   SOIL DATA BASE USING SOIL TEXTURE #22 WITH A
                   FAIR STAND OF GRASS, A SURFACE SLOPE OF  2.%
                   AND A SLOPE LENGTH OF  155. FEET.

         SCS RUNOFF CURVE NUMBER                =     90.50
         FRACTION OF AREA ALLOWING RUNOFF       =    100.0    PERCENT
         AREA PROJECTED ON HORIZONTAL PLANE     =      1.500  ACRES
         EVAPORATIVE ZONE DEPTH                 =     18.0    INCHES
         INITIAL WATER IN EVAPORATIVE ZONE      =      7.246  INCHES
         UPPER LIMIT OF EVAPORATIVE STORAGE     =      7.698  INCHES
         LOWER LIMIT OF EVAPORATIVE STORAGE     =      3.822  INCHES
         INITIAL SNOW WATER                     =      0.000  INCHES
         INITIAL WATER IN LAYER MATERIALS       =      7.246  INCHES
         TOTAL INITIAL WATER                    =      7.246  INCHES
         TOTAL SUBSURFACE INFLOW                =      0.00   INCHES/YEAR


                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   BUFFALO              NEW YORK

              STATION LATITUDE                           =  42.93 DEGREES
              MAXIMUM LEAF AREA INDEX                    =   2.00
              START OF GROWING SEASON (JULIAN DATE)      =    126
              END OF GROWING SEASON (JULIAN DATE)        =    285
              EVAPORATIVE ZONE DEPTH                     =  18.0  INCHES
              AVERAGE ANNUAL WIND SPEED                  =  12.10 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY      =  76.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY      =  68.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY      =  72.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY      =  76.00 %


          NOTE:  PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    BUFFALO             NEW YORK

                   NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

      JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
      -------     -------     -------     -------     -------     -------
        3.02        2.40        2.97        3.06        2.89        2.72
        2.96        4.16        3.37        2.93        3.62        3.42
```

```
NOTE:  TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
          COEFFICIENTS FOR    BUFFALO              NEW YORK

     NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
-------     -------     -------     -------     -------     -------
 23.60       26.10       31.70       44.70       55.20       65.50
 72.20       66.80       59.10       52.60       45.50       27.00


NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
          COEFFICIENTS FOR    BUFFALO              NEW YORK
            AND STATION LATITUDE  =  42.93 DEGREES
```

```
*******************************************************************************

                      ANNUAL TOTALS FOR YEAR    1
-------------------------------------------------------------------------------
                                        INCHES         CU. FEET      PERCENT
                                       --------       ----------     -------
  PRECIPITATION                          42.58        231848.047     100.00

  RUNOFF                                 11.326        61671.168      26.60

  EVAPOTRANSPIRATION                     22.823       124273.437      53.60

  PERC./LEAKAGE THROUGH LAYER  2          8.429547     45898.887      19.80

  CHANGE IN WATER STORAGE                 0.001            4.650       0.00

  SOIL WATER AT START OF YEAR             7.246        39451.824

  SOIL WATER AT END OF YEAR               7.246        39456.477

  SNOW WATER AT START OF YEAR             0.000            0.000       0.00

  SNOW WATER AT END OF YEAR               0.000            0.000       0.00

  ANNUAL WATER BUDGET BALANCE             0.0000          -0.088       0.00

*******************************************************************************


*******************************************************************************

                      ANNUAL TOTALS FOR YEAR    2
-------------------------------------------------------------------------------
                                        INCHES         CU. FEET      PERCENT
                                       --------       ----------     -------
  PRECIPITATION                          38.30        208543.531     100.00

  RUNOFF                                 10.518        57271.906      27.46

  EVAPOTRANSPIRATION                     23.652       128786.922      61.76

  PERC./LEAKAGE THROUGH LAYER  2          2.765185     15056.431       7.22

  CHANGE IN WATER STORAGE                 1.364         7428.325       3.56

  SOIL WATER AT START OF YEAR             7.246        39456.477

  SOIL WATER AT END OF YEAR               6.319        34409.656

  SNOW WATER AT START OF YEAR             0.000            0.000       0.00

  SNOW WATER AT END OF YEAR               2.291        12475.145       5.98

  ANNUAL WATER BUDGET BALANCE             0.0000          -0.042       0.00

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                        ANNUAL TOTALS FOR YEAR    3
-------------------------------------------------------------------------------
                                          INCHES          CU. FEET    PERCENT
                                         --------        ----------   -------
  PRECIPITATION                            33.70         183496.562    100.00

  RUNOFF                                   11.507         62654.629     34.14

  EVAPOTRANSPIRATION                       20.730        112872.844     61.51

  PERC./LEAKAGE THROUGH LAYER  2            2.284674      12440.051      6.78

  CHANGE IN WATER STORAGE                  -0.821         -4470.999     -2.44

  SOIL WATER AT START OF YEAR               6.319         34409.656

  SOIL WATER AT END OF YEAR                 6.610         35992.207

  SNOW WATER AT START OF YEAR               2.291         12475.145      6.80

  SNOW WATER AT END OF YEAR                 1.179          6421.594      3.50

  ANNUAL WATER BUDGET BALANCE               0.0000            0.043      0.00

*******************************************************************************

*******************************************************************************

                        ANNUAL TOTALS FOR YEAR    4
-------------------------------------------------------------------------------
                                          INCHES          CU. FEET    PERCENT
                                         --------        ----------   -------
  PRECIPITATION                            39.77         216547.562    100.00

  RUNOFF                                   10.962         59686.684     27.56

  EVAPOTRANSPIRATION                       22.849        124413.914     57.45

  PERC./LEAKAGE THROUGH LAYER  2            5.351845      29140.795     13.46

  CHANGE IN WATER STORAGE                   0.607          3306.259      1.53

  SOIL WATER AT START OF YEAR               6.610         35992.207

  SOIL WATER AT END OF YEAR                 6.929         37730.211

  SNOW WATER AT START OF YEAR               1.179          6421.594      2.97

  SNOW WATER AT END OF YEAR                 1.467          7989.850      3.69

  ANNUAL WATER BUDGET BALANCE               0.0000           -0.078      0.00

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                        ANNUAL TOTALS FOR YEAR    5
-------------------------------------------------------------------------------
                                              INCHES        CU. FEET    PERCENT
                                             --------      ----------   -------
  PRECIPITATION                                37.99       206855.562   100.00

  RUNOFF                                      13.422        73080.070    35.33

  EVAPOTRANSPIRATION                          23.162       126114.539    60.97

  PERC./LEAKAGE THROUGH LAYER  2               3.120914     16993.379     8.22

  CHANGE IN WATER STORAGE                     -1.714        -9332.444    -4.51

  SOIL WATER AT START OF YEAR                  6.929        37730.211

  SOIL WATER AT END OF YEAR                    6.595        35908.512

  SNOW WATER AT START OF YEAR                  1.467         7989.850     3.86

  SNOW WATER AT END OF YEAR                    0.088          479.105     0.23

  ANNUAL WATER BUDGET BALANCE                  0.0000           0.013     0.00

*******************************************************************************
```

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*******************************************************************************

        AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH    5
-------------------------------------------------------------------------------

                         JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                         -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                 3.43     2.16     2.96     3.00     3.13     2.57
                           3.32     4.19     3.91     3.05     3.51     3.24

    STD. DEVIATIONS        1.02     1.02     1.20     1.32     0.99     1.09
                           0.91     2.45     1.69     1.29     2.18     0.79

  RUNOFF
  ------
    TOTALS                 1.175    0.978    4.165    3.222    0.208    0.040
                           0.193    0.200    0.246    0.163    0.385    0.572

    STD. DEVIATIONS        1.261    0.674    2.629    2.879    0.329    0.057
                           0.115    0.303    0.377    0.258    0.534    0.623

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                 0.411    0.493    0.464    1.560    3.890    2.855
                           3.120    3.623    2.749    1.696    1.237    0.545

    STD. DEVIATIONS        0.051    0.031    0.157    1.071    1.265    1.089
                           1.048    1.809    0.483    0.144    0.199    0.159

  PERCOLATION/LEAKAGE THROUGH LAYER  2
  ------------------------------------
    TOTALS                 0.0000   0.0000   0.0000   1.1270   0.3655   0.0061
                           0.0025   0.0903   0.0213   0.6684   1.4746   0.6347

    STD. DEVIATIONS        0.0000   0.0000   0.0000   0.6511   0.6295   0.0049
                           0.0053   0.1960   0.0295   0.9038   1.4746   0.4204

*******************************************************************************
```

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*******************************************************************************

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS     1 THROUGH    5
-------------------------------------------------------------------------------
                                         INCHES            CU. FEET    PERCENT
                                   -------------------  -------------  ---------
 PRECIPITATION                      38.47    (   3.225)    209458.2     100.00

 RUNOFF                             11.547   (  1.1141)     62872.89     30.017

 EVAPOTRANSPIRATION                 22.643   (  1.1207)    123292.33     58.862

 PERCOLATION/LEAKAGE THROUGH         4.39043 (  2.54588)    23905.910    11.41321
   LAYER  2

 CHANGE IN WATER STORAGE            -0.113   (  1.2019)      -612.84     -0.293
*******************************************************************************
```

```
******************************************************************************

          PEAK DAILY VALUES FOR YEARS    1 THROUGH    5
   ------------------------------------------------------------------------
                                               (INCHES)      (CU. FT.)
                                              ----------   -------------
      PRECIPITATION                              2.14        11652.301

      RUNOFF                                     2.770       15082.8281

      PERCOLATION/LEAKAGE THROUGH LAYER  2       1.169886     6370.02686

      SNOW WATER                                 7.57        41216.2422


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.4241

      MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.2123

******************************************************************************
```

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******************************************************************************

                  FINAL WATER STORAGE AT END OF YEAR    5
     -----------------------------------------------------------------------
                    LAYER         (INCHES)         (VOL/VOL)
                    -----         --------         ---------
                      1             4.0628           0.3386

                      2             2.5320           0.4220

                   SNOW WATER       0.088

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```

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*******************************************************************************
*******************************************************************************
**                                                                           **
**                                                                           **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                 **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                    USAE WATERWAYS EXPERIMENT STATION                      **
**              FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                           **
**                                                                           **
*******************************************************************************
*******************************************************************************


PRECIPITATION DATA FILE:     C:\HELP3\ENHANCED\DATA4.D4
TEMPERATURE DATA FILE:       C:\HELP3\ENHANCED\DATA7.D7
SOLAR RADIATION DATA FILE:   C:\HELP3\ENHANCED\DATA13.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3\ENHANCED\DATA11.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3\ENHANCED\SOIL35.D10
OUTPUT DATA FILE:            C:\HELP3\ENHANCED\355OUT.OUT


TIME:  14:23     DATE:   7/ 1/2004


*******************************************************************************

     TITLE:  Peter Cooper Gowanda Site - Enhanced Cover System 3.5 Acres

*******************************************************************************
```

Enhanced 3.5

Same as existing 3.5

```
NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
         COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                               LAYER  1
                               --------

                 TYPE 1 - VERTICAL PERCOLATION LAYER
                     MATERIAL TEXTURE NUMBER  26
      THICKNESS                    =     22.00    INCHES
      POROSITY                     =      0.4450 VOL/VOL
      FIELD CAPACITY               =      0.3930 VOL/VOL
      WILTING POINT                =      0.2770 VOL/VOL
      INITIAL SOIL WATER CONTENT   =      0.4366 VOL/VOL
      EFFECTIVE SAT. HYD. COND.    =  0.190000003000E-05 CM/SEC
    NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  3.00
             FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.



                 GENERAL DESIGN AND EVAPORATIVE ZONE DATA
                 ----------------------------------------

    NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
             SOIL DATA BASE USING SOIL TEXTURE #26 WITH A
             FAIR STAND OF GRASS, A SURFACE SLOPE OF  4.%
             AND A SLOPE LENGTH OF  170. FEET.

   SCS RUNOFF CURVE NUMBER                =     90.60
   FRACTION OF AREA ALLOWING RUNOFF       =    100.0     PERCENT
   AREA PROJECTED ON HORIZONTAL PLANE     =      3.500   ACRES
   EVAPORATIVE ZONE DEPTH                 =     20.0     INCHES
   INITIAL WATER IN EVAPORATIVE ZONE      =      8.820   INCHES
   UPPER LIMIT OF EVAPORATIVE STORAGE     =      8.900   INCHES
   LOWER LIMIT OF EVAPORATIVE STORAGE     =      5.540   INCHES
   INITIAL SNOW WATER                     =      0.000   INCHES
   INITIAL WATER IN LAYER MATERIALS       =      9.606   INCHES
   TOTAL INITIAL WATER                    =      9.606   INCHES
   TOTAL SUBSURFACE INFLOW                =      0.00    INCHES/YEAR
```

```
                 EVAPOTRANSPIRATION AND WEATHER DATA
                 -----------------------------------

       NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                BUFFALO               NEW YORK

           STATION LATITUDE                          =  42.93 DEGREES
           MAXIMUM LEAF AREA INDEX                   =   2.00
           START OF GROWING SEASON (JULIAN DATE)     =    126
           END OF GROWING SEASON (JULIAN DATE)       =    285
           EVAPORATIVE ZONE DEPTH                    =  20.0  INCHES
           AVERAGE ANNUAL WIND SPEED                 =  12.10 MPH
           AVERAGE 1ST QUARTER RELATIVE HUMIDITY     =  76.00 %
           AVERAGE 2ND QUARTER RELATIVE HUMIDITY     =  68.00 %
           AVERAGE 3RD QUARTER RELATIVE HUMIDITY     =  72.00 %
           AVERAGE 4TH QUARTER RELATIVE HUMIDITY     =  76.00 %


       NOTE:  PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
                COEFFICIENTS FOR    BUFFALO              NEW YORK

                NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

   JAN/JUL      FEB/AUG      MAR/SEP      APR/OCT      MAY/NOV      JUN/DEC
   -------      -------      -------      -------      -------      -------
    3.02         2.40         2.97         3.06         2.89         2.72
    2.96         4.16         3.37         2.93         3.62         3.42


       NOTE:  TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
                COEFFICIENTS FOR    BUFFALO              NEW YORK

           NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

   JAN/JUL      FEB/AUG      MAR/SEP      APR/OCT      MAY/NOV      JUN/DEC
   -------      -------      -------      -------      -------      -------
    23.60        26.10        31.70        44.70        55.20        65.50
    72.20        66.80        59.10        52.60        45.50        27.00


       NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                COEFFICIENTS FOR    BUFFALO              NEW YORK
                  AND STATION LATITUDE  =  42.93 DEGREES
```

```
******************************************************************************

                     ANNUAL TOTALS FOR YEAR    1
------------------------------------------------------------------------------
                                     INCHES        CU. FEET       PERCENT
                                    --------      ----------      -------
  PRECIPITATION                       42.58       540978.750      100.00

  RUNOFF                              14.258      181153.734       33.49

  EVAPOTRANSPIRATION                  22.782      289446.625       53.50

  PERC./LEAKAGE THROUGH LAYER  1       5.538829    70370.820       13.01

  CHANGE IN WATER STORAGE              0.001           7.742        0.00

  SOIL WATER AT START OF YEAR          9.606      122047.250

  SOIL WATER AT END OF YEAR            9.607      122054.992

  SNOW WATER AT START OF YEAR          0.000           0.000        0.00

  SNOW WATER AT END OF YEAR            0.000           0.000        0.00

  ANNUAL WATER BUDGET BALANCE          0.0000         -0.158        0.00

******************************************************************************

******************************************************************************

                     ANNUAL TOTALS FOR YEAR    2
------------------------------------------------------------------------------
                                     INCHES        CU. FEET       PERCENT
                                    --------      ----------      -------
  PRECIPITATION                       38.30       486601.594      100.00

  RUNOFF                              11.781      149673.922       30.76

  EVAPOTRANSPIRATION                  23.387      297128.812       61.06

  PERC./LEAKAGE THROUGH LAYER  1       1.479144    18792.520        3.86

  CHANGE IN WATER STORAGE              1.653       21006.207        4.32

  SOIL WATER AT START OF YEAR          9.607      122054.992

  SOIL WATER AT END OF YEAR            8.969      113952.523

  SNOW WATER AT START OF YEAR          0.000           0.000        0.00

  SNOW WATER AT END OF YEAR            2.291       29108.672        5.98

  ANNUAL WATER BUDGET BALANCE          0.0000          0.118        0.00

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```

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*******************************************************************************

                    ANNUAL TOTALS FOR YEAR    3
-------------------------------------------------------------------------------
                                      INCHES          CU. FEET        PERCENT
                                     --------        ----------       -------
 PRECIPITATION                         33.70         428158.656       100.00

 RUNOFF                                12.573        159739.250        37.31

 EVAPOTRANSPIRATION                    20.753        263661.500        61.58

 PERC./LEAKAGE THROUGH LAYER  1         1.263635      16054.487         3.75

 CHANGE IN WATER STORAGE               -0.889        -11296.795        -2.64

 SOIL WATER AT START OF YEAR            8.969        113952.523

 SOIL WATER AT END OF YEAR              9.192        116780.680

 SNOW WATER AT START OF YEAR            2.291         29108.672         6.80

 SNOW WATER AT END OF YEAR              1.179         14983.719         3.50

 ANNUAL WATER BUDGET BALANCE            0.0000            0.200         0.00

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                    ANNUAL TOTALS FOR YEAR    4
-------------------------------------------------------------------------------
                                      INCHES          CU. FEET        PERCENT
                                     --------        ----------       -------
 PRECIPITATION                         39.77         505277.656       100.00

 RUNOFF                                13.564        172335.922        34.11

 EVAPOTRANSPIRATION                    22.325        283641.125        56.14

 PERC./LEAKAGE THROUGH LAYER  1         3.458324      43938.012         8.70

 CHANGE IN WATER STORAGE                0.422          5362.568         1.06

 SOIL WATER AT START OF YEAR            9.192        116780.680

 SOIL WATER AT END OF YEAR              9.326        118483.984

 SNOW WATER AT START OF YEAR            1.179         14983.719         2.97

 SNOW WATER AT END OF YEAR              1.467         18642.982         3.69

 ANNUAL WATER BUDGET BALANCE            0.0000            0.042         0.00

*******************************************************************************
```

```
*******************************************************************************

                  ANNUAL TOTALS FOR YEAR    5
-------------------------------------------------------------------------------
                                      INCHES           CU. FEET      PERCENT
                                     --------         ----------     -------
  PRECIPITATION                        37.99          482662.969     100.00

  RUNOFF                               14.611         185632.797      38.46

  EVAPOTRANSPIRATION                   22.714         288576.281      59.79

  PERC./LEAKAGE THROUGH LAYER  1        2.124464       26991.309       5.59

  CHANGE IN WATER STORAGE              -1.459         -18537.617      -3.84

  SOIL WATER AT START OF YEAR           9.326         118483.984

  SOIL WATER AT END OF YEAR             9.246         117471.437

  SNOW WATER AT START OF YEAR           1.467          18642.982       3.86

  SNOW WATER AT END OF YEAR             0.088           1117.912       0.23

  ANNUAL WATER BUDGET BALANCE           0.0000             0.197       0.00

*******************************************************************************
```

```
*******************************************************************************

        AVERAGE MONTHLY VALUES IN INCHES FOR YEARS     1 THROUGH    5
-------------------------------------------------------------------------------

                           JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                           -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                   3.43     2.16     2.96     3.00     3.13     2.57
                             3.32     4.19     3.91     3.05     3.51     3.24

    STD. DEVIATIONS          1.02     1.02     1.20     1.32     0.99     1.09
                             0.91     2.45     1.69     1.29     2.18     0.79

  RUNOFF
  ------
    TOTALS                   1.308    1.104    4.284    3.287    0.311    0.156
                             0.250    0.311    0.337    0.400    0.831    0.778

    STD. DEVIATIONS          1.327    0.723    2.674    2.910    0.300    0.201
                             0.168    0.501    0.461    0.553    0.996    0.802

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                   0.412    0.494    0.466    1.178    3.292    3.056
                             3.922    3.600    2.570    1.623    1.230    0.549

    STD. DEVIATIONS          0.050    0.030    0.156    0.763    1.068    0.919
                             1.043    1.767    0.492    0.098    0.176    0.149

  PERCOLATION/LEAKAGE THROUGH LAYER  1
  ------------------------------------
    TOTALS                   0.0000   0.0000   0.0000   0.3899   0.3290   0.0280
                             0.0053   0.0069   0.0016   0.3568   1.0450   0.6102

    STD. DEVIATIONS          0.0000   0.0000   0.0000   0.3336   0.2572   0.0278
                             0.0022   0.0040   0.0015   0.4917   1.0725   0.3303
*******************************************************************************
```

```
******************************************************************************

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH    5
------------------------------------------------------------------------------
                                    INCHES             CU. FEET       PERCENT
                              -------------------   -------------   ---------
 PRECIPITATION                 38.47     (   3.225)   488735.9       100.00

 RUNOFF                        13.358    (  1.1756)   169707.11       34.724

 EVAPOTRANSPIRATION            22.392    (  0.9921)   284490.87       58.210

 PERCOLATION/LEAKAGE THROUGH    2.77288  (  1.76722)   35229.430       7.20827
   LAYER  1

 CHANGE IN WATER STORAGE       -0.054    (  1.2059)     -691.58       -0.142

******************************************************************************
```

```
********************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH    5
  ------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
     PRECIPITATION                               2.14         27188.701

     RUNOFF                                      2.783        35358.7852

     PERCOLATION/LEAKAGE THROUGH LAYER  1        0.232536      2954.37134

     SNOW WATER                                  7.57         96171.2344

     MAXIMUM VEG. SOIL WATER (VOL/VOL)                   0.4443

     MINIMUM VEG. SOIL WATER (VOL/VOL)                   0.2770

********************************************************************************
```

```
******************************************************************************

                FINAL WATER STORAGE AT END OF YEAR    5
      ----------------------------------------------------------------------
                 LAYER          (INCHES)        (VOL/VOL)
                 -----          --------        ---------
                   1             9.2461          0.4203

               SNOW WATER        0.088

******************************************************************************
******************************************************************************
```

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:     C:\HELP3\360CAP\DATA4.D4
TEMPERATURE DATA FILE:       C:\HELP3\360CAP\DATA7.D7
SOLAR RADIATION DATA FILE:   C:\HELP3\360CAP\DATA13.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3\360CAP\DATA11.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3\360CAP\360SOIL.D10
OUTPUT DATA FILE:            C:\HELP3\360CAP\OUT360.OUT


TIME:  14:50     DATE:   6/29/2004


******************************************************************************

     TITLE:  Peter Cooper Gowanda Site - 360 Cover System

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.
```

360 Equivalent

```
                         LAYER  1
                         --------

              TYPE 1 - VERTICAL PERCOLATION LAYER
                  MATERIAL TEXTURE NUMBER   6
   THICKNESS                  =      6.00   INCHES
   POROSITY                   =      0.4530 VOL/VOL
   FIELD CAPACITY             =      0.1900 VOL/VOL
   WILTING POINT              =      0.0850 VOL/VOL
   INITIAL SOIL WATER CONTENT =      0.4093 VOL/VOL
   EFFECTIVE SAT. HYD. COND.  =  0.720000011000E-03 CM/SEC
NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  3.00
         FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

Topsoil

```
                         LAYER  2
                         --------

                  TYPE 3 - BARRIER SOIL LINER
                  MATERIAL TEXTURE NUMBER  28
   THICKNESS                  =     24.00   INCHES
   POROSITY                   =      0.4520 VOL/VOL
   FIELD CAPACITY             =      0.4110 VOL/VOL
   WILTING POINT              =      0.3110 VOL/VOL
   INITIAL SOIL WATER CONTENT =      0.4520 VOL/VOL
   EFFECTIVE SAT. HYD. COND.  =  0.120000004000E-05 CM/SEC
```

Barrier

```
                         LAYER  3
                         --------

                TYPE 2 - LATERAL DRAINAGE LAYER
                  MATERIAL TEXTURE NUMBER  20
   THICKNESS                  =      0.20   INCHES
   POROSITY                   =      0.8500 VOL/VOL
   FIELD CAPACITY             =      0.0100 VOL/VOL
   WILTING POINT              =      0.0050 VOL/VOL
   INITIAL SOIL WATER CONTENT =      0.0100 VOL/VOL
   EFFECTIVE SAT. HYD. COND.  =    10.0000000000      CM/SEC
   SLOPE                      =      6.00   PERCENT
   DRAINAGE LENGTH            =    290.0    FEET
```

0.5cm

geocomposite

```
                         LAYER  4
                         --------

                TYPE 4 - FLEXIBLE MEMBRANE LINER
                  MATERIAL TEXTURE NUMBER  36
    THICKNESS                     =      0.04   INCHES
    POROSITY                      =      0.0000 VOL/VOL
    FIELD CAPACITY                =      0.0000 VOL/VOL
    WILTING POINT                 =      0.0000 VOL/VOL
    INITIAL SOIL WATER CONTENT    =      0.0000 VOL/VOL
    EFFECTIVE SAT. HYD. COND.     =  0.399999993000E-12 CM/SEC
    FML PINHOLE DENSITY           =      0.50   HOLES/ACRE
    FML INSTALLATION DEFECTS      =      1.00   HOLES/ACRE
    FML PLACEMENT QUALITY         =  3 - GOOD


            GENERAL DESIGN AND EVAPORATIVE ZONE DATA
            ----------------------------------------

  NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
           SOIL DATA BASE USING SOIL TEXTURE # 6 WITH AN
           EXCELLENT STAND OF GRASS, A SURFACE SLOPE OF  6.%
           AND A SLOPE LENGTH OF  290. FEET.

 SCS RUNOFF CURVE NUMBER                =     57.50
 FRACTION OF AREA ALLOWING RUNOFF       =    100.0    PERCENT
 AREA PROJECTED ON HORIZONTAL PLANE     =      5.000  ACRES
 EVAPORATIVE ZONE DEPTH                 =      6.0    INCHES
 INITIAL WATER IN EVAPORATIVE ZONE      =      2.456  INCHES
 UPPER LIMIT OF EVAPORATIVE STORAGE     =      2.718  INCHES
 LOWER LIMIT OF EVAPORATIVE STORAGE     =      0.510  INCHES
 INITIAL SNOW WATER                     =      0.000  INCHES
 INITIAL WATER IN LAYER MATERIALS       =     13.306  INCHES
 TOTAL INITIAL WATER                    =     13.306  INCHES
 TOTAL SUBSURFACE INFLOW                =      0.00   INCHES/YEAR


             EVAPOTRANSPIRATION AND WEATHER DATA
             -----------------------------------

  NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
           BUFFALO               NEW YORK

      STATION LATITUDE                        =  42.93 DEGREES
      MAXIMUM LEAF AREA INDEX                 =   2.00
      START OF GROWING SEASON (JULIAN DATE)   =   126
      END OF GROWING SEASON (JULIAN DATE)     =   285
      EVAPORATIVE ZONE DEPTH                  =   6.0  INCHES
      AVERAGE ANNUAL WIND SPEED               =  12.10 MPH
      AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  76.00 %
      AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  68.00 %
      AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  72.00 %
      AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %
```

LLDPE geomembrane

```
     NOTE:  PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
               COEFFICIENTS FOR    BUFFALO             NEW YORK

               NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL      FEB/AUG      MAR/SEP      APR/OCT      MAY/NOV      JUN/DEC
-------      -------      -------      -------      -------      -------
  3.02         2.40         2.97         3.06         2.89         2.72
  2.96         4.16         3.37         2.93         3.62         3.42


     NOTE:  TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
               COEFFICIENTS FOR    BUFFALO             NEW YORK

          NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL      FEB/AUG      MAR/SEP      APR/OCT      MAY/NOV      JUN/DEC
-------      -------      -------      -------      -------      -------
 23.50        24.50        33.00        45.40        56.10        66.00
 70.70        68.90        62.10        51.50        40.30        28.80


     NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
               COEFFICIENTS FOR    BUFFALO             NEW YORK
                AND STATION LATITUDE  =  42.93 DEGREES
```

```
*******************************************************************************

                    ANNUAL TOTALS FOR YEAR    1
-------------------------------------------------------------------------------
                                      INCHES         CU. FEET       PERCENT
                                     --------       ----------      -------
  PRECIPITATION                        42.58        772826.812      100.00

  RUNOFF                               13.720       249016.328       32.22

  EVAPOTRANSPIRATION                   22.109       401279.437       51.92

  PERC./LEAKAGE THROUGH LAYER  2        6.750800    122527.023       15.85

  AVG. HEAD ON TOP OF LAYER  2          1.1949

  DRAINAGE COLLECTED FROM LAYER  3      6.5720      119281.445       15.43

  PERC./LEAKAGE THROUGH LAYER  4        0.178820      3245.577        0.42

  AVG. HEAD ON TOP OF LAYER  4          0.0027

  CHANGE IN WATER STORAGE               0.000            4.154        0.00

  SOIL WATER AT START OF YEAR          13.308       241533.562

  SOIL WATER AT END OF YEAR            13.308       241537.719

  SNOW WATER AT START OF YEAR           0.000            0.000        0.00

  SNOW WATER AT END OF YEAR             0.000            0.000        0.00

  ANNUAL WATER BUDGET BALANCE           0.0000          -0.121        0.00

*******************************************************************************
```

```
*******************************************************************************

                       ANNUAL TOTALS FOR YEAR    2
-------------------------------------------------------------------------------
                                             INCHES         CU. FEET     PERCENT
                                            --------       ----------    -------
  PRECIPITATION                               38.30       695145.125     100.00

  RUNOFF                                       9.285      168530.047      24.24

  EVAPOTRANSPIRATION                          22.269      404184.687      58.14

  PERC./LEAKAGE THROUGH LAYER  2               5.454281    98995.195      14.24

  AVG. HEAD ON TOP OF LAYER  2                 0.5957

  DRAINAGE COLLECTED FROM LAYER  3             5.3040      96268.180      13.85

  PERC./LEAKAGE THROUGH LAYER  4               0.150249     2727.027       0.39

  AVG. HEAD ON TOP OF LAYER  4                 0.0022

  CHANGE IN WATER STORAGE                      1.291       23435.113       3.37

  SOIL WATER AT START OF YEAR                 13.308      241537.719

  SOIL WATER AT END OF YEAR                   12.308      223389.016

  SNOW WATER AT START OF YEAR                  0.000           0.000       0.00

  SNOW WATER AT END OF YEAR                    2.291       41583.816       5.98

  ANNUAL WATER BUDGET BALANCE                  0.0000          0.066       0.00

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```

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******************************************************************************

                        ANNUAL TOTALS FOR YEAR    3
------------------------------------------------------------------------------
                                         INCHES          CU. FEET     PERCENT
                                        --------        ----------    -------
  PRECIPITATION                          33.70          611655.250    100.00

  RUNOFF                                 10.466         189966.531     31.06

  EVAPOTRANSPIRATION                     19.963         362330.937     59.24

  PERC./LEAKAGE THROUGH LAYER  2          4.065335       73785.836     12.06

  AVG. HEAD ON TOP OF LAYER  2            0.3166

  DRAINAGE COLLECTED FROM LAYER  3        3.9516         71721.070     11.73

  PERC./LEAKAGE THROUGH LAYER  4          0.113761        2064.768      0.34

  AVG. HEAD ON TOP OF LAYER  4            0.0017

  CHANGE IN WATER STORAGE                -0.795         -14428.200     -2.36

  SOIL WATER AT START OF YEAR            12.308         223389.016

  SOIL WATER AT END OF YEAR              12.625         229139.312

  SNOW WATER AT START OF YEAR             2.291          41583.816      6.80

  SNOW WATER AT END OF YEAR               1.179          21405.312      3.50

  ANNUAL WATER BUDGET BALANCE             0.0000             0.123      0.00

******************************************************************************
```

```
*******************************************************************************

                       ANNUAL TOTALS FOR YEAR    4
-------------------------------------------------------------------------------
                                           INCHES           CU. FEET     PERCENT
                                          --------         ----------    -------
  PRECIPITATION                             39.77          721825.250    100.00

  RUNOFF                                    10.239         185831.609     25.74

  EVAPOTRANSPIRATION                        22.003         399363.156     55.33

  PERC./LEAKAGE THROUGH LAYER  2             6.557681      119021.914     16.49

  AVG. HEAD ON TOP OF LAYER  2               0.9413

  DRAINAGE COLLECTED FROM LAYER  3           6.3828        115848.453     16.05

  PERC./LEAKAGE THROUGH LAYER  4             0.174845        3173.444      0.44

  AVG. HEAD ON TOP OF LAYER  4               0.0027

  CHANGE IN WATER STORAGE                    0.970          17608.592      2.44

  SOIL WATER AT START OF YEAR               12.625         229139.312

  SOIL WATER AT END OF YEAR                 13.307         241520.391

  SNOW WATER AT START OF YEAR                1.179          21405.312      2.97

  SNOW WATER AT END OF YEAR                  1.467          26632.834      3.69

  ANNUAL WATER BUDGET BALANCE                0.0000            -0.010      0.00

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```

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*******************************************************************************

                         ANNUAL TOTALS FOR YEAR    5
-------------------------------------------------------------------------------
                                            INCHES         CU. FEET     PERCENT
                                           --------       ----------    -------
 PRECIPITATION                              37.99         689518.500    100.00

 RUNOFF                                     11.687        212116.578     30.76

 EVAPOTRANSPIRATION                         22.169        402371.812     58.36

 PERC./LEAKAGE THROUGH LAYER  2              6.494942     117883.195     17.10

 AVG. HEAD ON TOP OF LAYER  2                0.5966

 DRAINAGE COLLECTED FROM LAYER  3            6.3164       114641.906     16.63

 PERC./LEAKAGE THROUGH LAYER  4              0.178583       3241.285      0.47

 AVG. HEAD ON TOP OF LAYER  4                0.0026

 CHANGE IN WATER STORAGE                    -2.361        -42853.305     -6.21

 SOIL WATER AT START OF YEAR                13.307        241520.391

 SOIL WATER AT END OF YEAR                  12.325        223702.906

 SNOW WATER AT START OF YEAR                 1.467         26632.834      3.86

 SNOW WATER AT END OF YEAR                   0.088          1597.017      0.23

 ANNUAL WATER BUDGET BALANCE                 0.0000            0.237      0.00

*******************************************************************************
```

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*******************************************************************************

      AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH    5
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
 PRECIPITATION
 -------------
   TOTALS                   3.43     2.16     2.96     3.00     3.13     2.57
                            3.32     4.19     3.91     3.05     3.51     3.24

   STD. DEVIATIONS          1.02     1.02     1.20     1.32     0.99     1.09
                            0.91     2.45     1.69     1.29     2.18     0.79

 RUNOFF
 ------
   TOTALS                   1.147    0.933    4.032    3.018    0.144    0.000
                            0.000    0.058    0.000    0.253    0.914    0.582

   STD. DEVIATIONS          1.339    0.662    2.552    2.813    0.322    0.000
                            0.000    0.130    0.000    0.412    1.358    0.871

 EVAPOTRANSPIRATION
 ------------------
   TOTALS                   0.410    0.492    0.460    1.518    3.424    2.344
                            2.936    3.682    2.820    1.739    1.322    0.556

   STD. DEVIATIONS          0.052    0.032    0.159    1.037    1.356    1.001
                            0.810    1.834    0.545    0.207    0.143    0.153

 PERCOLATION/LEAKAGE THROUGH LAYER  2
 ------------------------------------
   TOTALS                   0.0981   0.1061   0.3066   0.6060   0.4130   0.2002
                            0.2833   0.4539   0.5741   0.7931   1.1389   0.8915

   STD. DEVIATIONS          0.1238   0.0965   0.1205   0.2236   0.2594   0.1847
                            0.2153   0.5769   0.5230   0.6090   0.3653   0.3964

 LATERAL DRAINAGE COLLECTED FROM LAYER  3
 ----------------------------------------
   TOTALS                   0.0948   0.1028   0.2972   0.5887   0.4016   0.1945
                            0.2757   0.4420   0.5590   0.7723   1.1092   0.8676

   STD. DEVIATIONS          0.1197   0.0935   0.1175   0.2175   0.2523   0.1801
                            0.2097   0.5624   0.5096   0.5941   0.3573   0.3867

 PERCOLATION/LEAKAGE THROUGH LAYER  4
 ------------------------------------
   TOTALS                   0.0032   0.0033   0.0094   0.0173   0.0113   0.0058
                            0.0077   0.0119   0.0151   0.0207   0.0297   0.0239

   STD. DEVIATIONS          0.0040   0.0030   0.0031   0.0062   0.0070   0.0046
                            0.0056   0.0144   0.0134   0.0149   0.0080   0.0097
```

```
-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


  DAILY AVERAGE HEAD ON TOP OF LAYER  2
  -------------------------------------
    AVERAGES                0.0017   0.0007   0.0032   0.5875   0.4884   0.2400
                            0.3492   0.8539   0.9319   1.6328   2.3076   1.3516

    STD. DEVIATIONS         0.0022   0.0007   0.0026   0.4422   0.3890   0.4548
                            0.3239   1.5117   1.3272   1.8774   2.0226   1.3141

  DAILY AVERAGE HEAD ON TOP OF LAYER  4
  -------------------------------------
    AVERAGES                0.0005   0.0006   0.0015   0.0030   0.0020   0.0010
                            0.0014   0.0022   0.0028   0.0038   0.0056   0.0043

    STD. DEVIATIONS         0.0006   0.0005   0.0006   0.0011   0.0012   0.0009
                            0.0010   0.0028   0.0026   0.0029   0.0018   0.0019

*******************************************************************************
```

Part 360 Cover System
5-acres

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*******************************************************************************

    AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH    5
-------------------------------------------------------------------------------
                                            INCHES            CU. FEET    PERCENT
                                      -------------------  -------------  ---------
 PRECIPITATION                         38.47     (   3.225)    698194.2    100.00

 RUNOFF                                11.079    (  1.7060)    201092.22    28.802

 EVAPOTRANSPIRATION                    21.703    (  0.9773)    393906.00    56.418

 PERCOLATION/LEAKAGE THROUGH            5.86461 (  1.12569)    106442.633   15.24542
   LAYER  2

 AVERAGE HEAD ON TOP                    0.729 (    0.342)
   OF LAYER  2

 LATERAL DRAINAGE COLLECTED             5.70536 (  1.09774)    103552.211  14.83144
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH            0.15925 (  0.02806)      2890.420    0.41399
   LAYER  4

 AVERAGE HEAD ON TOP                    0.002 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE               -0.179    (  1.4710)     -3246.73    -0.465
*******************************************************************************
```

```
***************************************************************************

              PEAK DAILY VALUES FOR YEARS    1 THROUGH    5
------------------------------------------------------------------------
                                                 (INCHES)      (CU. FT.)
                                                ----------    -----------
   PRECIPITATION                                   2.14        38841.000

   RUNOFF                                          2.743       49780.3750

   PERCOLATION/LEAKAGE THROUGH LAYER  2            0.050994      925.53223

   AVERAGE HEAD ON TOP OF LAYER  2                 5.983

   DRAINAGE COLLECTED FROM LAYER  3                0.04975       903.03308

   PERCOLATION/LEAKAGE THROUGH LAYER  4            0.001240       22.49911

   AVERAGE HEAD ON TOP OF LAYER  4                 0.008

   MAXIMUM HEAD ON TOP OF LAYER  4                 0.008

   LOCATION OF MAXIMUM HEAD IN LAYER  3
         (DISTANCE FROM DRAIN)                     0.0 FEET

   SNOW WATER                                      7.57       137387.4840


   MAXIMUM VEG. SOIL WATER (VOL/VOL)                       0.4530

   MINIMUM VEG. SOIL WATER (VOL/VOL)                       0.0850


        ***  Maximum heads are computed using McEnroe's equations.  ***

             Reference:  Maximum Saturated Depth over Landfill Liner
                         by Bruce M. McEnroe, University of Kansas
                         ASCE Journal of Environmental Engineering
                         Vol. 119, No. 2, March 1993, pp. 262-270.

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*******************************************************************************

                   FINAL WATER STORAGE AT END OF YEAR    5
    -----------------------------------------------------------------------
                    LAYER        (INCHES)       (VOL/VOL)
                    -----        ---------      ---------
                      1           1.4733          0.2456

                      2          10.8480          0.4520

                      3           0.0020          0.0100

                      4           0.0000          0.0000

                  SNOW WATER      0.088

*******************************************************************************
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APPENDIX H

POST REMEDIATION GROUNDWATER AND SURFACE WATER MONITORING PLAN

POST REMEDIAL GROUNDWATER AND SURFACE WATER MONITORING PLAN

PETER COOPER LANDFILL
NATIONAL PRIORITY LIST (NPL) SITE
GOWANDA, NY

February 2005 0021-001-400

PETER COOPER LANDFILL NPL GOWANDA SITE
POST REMEDIAL GROUNDWATER AND SURFACE WATER MONITORING PLAN
GOWANDA, NEW YORK

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PETER COOPER LANDFILL NPL GOWANDA SITE
POST REMEDIAL GROUNDWATER AND SURFACE WATER MONITORING PLAN
GOWANDA, NEW YORK

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APPENDICES

1.0 PURPOSE AND OBJECTIVES

The purpose of this Post-Remedial Groundwater and Surface Water Monitoring Plan is to identify and document the methods that will be employed at the Peter Cooper Gowanda NPL Site to monitor the effectiveness of the remedial measures in protecting against detrimental impacts to Cattaraugus Creek. Accordingly, this Plan identifies groundwater and surface water sampling locations, collection procedures, analytical parameters and methodology, and data reporting and interpretation requirements that will be implemented following construction of the recommended remedial measures.

This Plan contains eight sections:

- Section 2.0 identifies the post-remedial groundwater and surface water locations to be monitored.
- Section 3.0 identifies the monitoring parameters and frequency.
- Section 4.0 presents field sampling procedures to be employed at the site.
- Section 5.0 specifies analytical methods and quality control requirements.
- Section 6.0 presents corrective action measures to be taken in the event of changed field conditions or failure to meet quality assurance goals.
- Section 7.0 identifies data evaluation and reporting requirements
- Section 8.0 presents references cited in this report.

2.0 MONITORING NETWORK

The Remedial Investigation Report (Reference 1) identifies two primary groundwater zones at the site: groundwater in the overburden and bedrock groundwater. Generally, there is a horizontal groundwater flow component within the overburden and bedrock toward Cattaraugus Creek. Groundwater in the overburden and bedrock ultimately discharges to Cattaraugus Creek creating an upward gradient toward the Creek within the bedrock (Reference 1). Because of this upward gradient in the bedrock, downward migration of the Chemicals of Potential Concern (COPCs) (see Section 4.0 of this report) is not likely to occur; therefore, the overburden monitoring wells at the site are considered adequate to evaluate upgradient and downgradient groundwater quality. In addition, the receiving surface water body, the Cattaraugus Creek, will also be monitored. The monitoring network is presented in the following sections.

2.1 Groundwater Monitoring Locations

Groundwater monitoring will be performed at the following network locations (see Figure 1), where the S identifier indicates a shallow overburden monitoring well and the R identifier indicates a replacement monitoring well:

- Upgradient monitoring well MW-7S.
- Perimeter downgradient monitoring wells MW-2SR, MW-5S, MWFP-3S and MSFP-2SR.

In addition, the following locations will be monitored for water elevation information to facilitate preparation of overburden isopotential maps:

- Monitoring wells MW-6S, MW-8S, MW-1SR, and PZ-1.

Borehole logs for the groundwater monitoring wells identified in this section are included in Appendix A.

2.2 Surface Water Monitoring Locations

Surface water monitoring will be performed at three network locations presented on Figure 2. The three surface water locations are identified as: SW-1 (upstream), SW-2 (midstream), and SW-3 (downstream).

3.0 MONITORING PROGRAM

As described in Section 3.0, environmental monitoring will be conducted at specific monitoring wells and surface water locations at the Site. Details concerning the planned monitoring frequency, parameters and analytical methods are described below. A summary of the monitoring program requirements is presented in Table 1.

3.1 Groundwater Monitoring

Groundwater monitoring will include both water quality and water level monitoring. Water level monitoring is intended to detect seasonal changes in the groundwater flow direction and to illustrate hydraulic capture along the Inactive Landfill/Cattaraugus Creek area of the site by the groundwater collection system. Groundwater elevation monitoring will be performed at all monitoring well/piezometer locations identified on Table 1.

Groundwater samples will be collected at the well locations identified in Section 2.1 and summarized in Table 1. Procedures for well sampling are discussed in Section 5. Groundwater levels will be recorded prior to well purging. Groundwater samples will be collected on a semi-annual (spring and fall) basis for the first two years of monitoring, and may be reduced to annually thereafter if the data supports the reduction. Groundwater samples will be analyzed for the laboratory and field parameters identified in Table 1. Laboratory and field parameters will be evaluated for reduction following two years of monitoring.

3.2 Surface Water Monitoring

Surface water samples will be collected at the locations identified in Section 3.2 and summarized in Table 1. Procedures for surface water sampling are discussed in Section 5. As with the groundwater samples, surface water samples will be collected on a semi-annual (spring and fall) basis for the first two years of monitoring, and reduced to annually thereafter if the data supports the reduction. Surface water samples will be analyzed for the laboratory and field parameters identified in Table 1.

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TABLE 1

GROUNDWATER & SURFACE WATER MONITORING PROGRAM

Peter Cooper Landfill NPL Site
Gowanda, New York

Sample Location	Est. Number of Samples Per Event	Parameters	Frequency
Upgradient Monitoring Well			
MW-7S	1	TCL VOCsTotal Metals^2 Field Measurements^3 Water Quality Parameters^4	Semi-Annually
FMPA Monitoring Network Wells (water level and quality)			
MWFP-2S	1	TCL VOCs (chlorinated aliphatics only) Total Metals^2 Field Measurements^3	Semi-Annually
MWFP-3S	1		
ILA Monitoring Network Wells (water level and quality)			
MW-2SR	1	TCL VOCs Total Metals^2 Field Measurements^3 Water Quality Parameters^4	Semi-Annually
MW-5	1		
QA/QC Samples^1			
Trip Blank	1	TCL VOCs	Semi-Annually
Blind Duplicate	1	TCL VOCs Total Metals^2	Semi-Annually
Matrix Spike	1		
Matrix Spike Duplicate	1		
Monitoring Network Surface Water			
SW-1	1	TCL VOCs Total Metals^2 Water Quality^4 Field Measurements^3	Semi-Annually
SW-2	1		
SW-3	1		
Monitoring Network Wells (water level only)			
MW-6	--	--	Semi-Annually
MW-8S			
MW-1SR			
PZ-1			

Notes:

1. QA/QC samples will be collected at a frequency of 1 per 20 for each matrix.
2. Total metals include: arsenic, chromium, hexavalent chromium, manganese; if field measured turbidity is greater than 50 NTU, dissolved metals will also be collected.
3. Field measurements include: pH, temperature, specific conductance, turbidity, Eh
4. Water quality parameters include: ammonia, hardness, chloride, total sulfide

Acronyms:

FMPA = Former Manufacturing Plant Area of the Site
ILA = Inactive Landfill Area of the Site
TCL = Target Compound List
VOCs = Volatile Organic Compounds

4.0 FIELD SAMPLING PROCEDURES

This section describes the sampling procedures that will be implemented at the Peter Cooper Landfill NPL Gowanda Site during routine environmental monitoring events.

4.1 Pre-Sampling Preparation

Prior to a scheduled sampling event, the following steps will be taken by personnel responsible for sampling:

- Review the sampling procedures;
- Assemble and inspect all field equipment necessary for sample collection;
- Verify that equipment is clean and in proper working order;
- Field test equipment will be calibrated at the beginning of each sampling day, and will be checked and recalibrated according to manufacturer's specifications. Field instrumentation will be maintained and operated according to the applicable guidelines presented in Appendix B;
- Examine shuttles, bottles, labels and preservatives; contact laboratory immediately if any problems are discovered;
- Confirm sample delivery time and method of shipment with the laboratory;
- Establish a sampling team of at least two people; and
- Establish monitoring well evacuation and sampling schedule for the activities of each day.
- Establish surface water sampling schedule for the activities of each day.

4.2 Groundwater Sampling

Applicable guidelines to be employed for collecting representative groundwater samples from monitoring wells are provided in Appendix B. Applicable guidelines include:

- Groundwater Level Measurement
- Low Flow (Minimal Drawdown) Groundwater Purging Procedures
- Groundwater Sample Collection Procedures

Sample collection equipment will consist of a peristaltic pump and dedicated pump tubing following low-flow purge and sample collection procedures. Prior to sample collection, groundwater will be evacuated from each well at a low-flow rate (approximately 0.1 L/min) and field measurements for pH, Eh, specific conductance, temperature, turbidity, dissolved oxygen, visual and olfactory observations and water level will be periodically recorded and monitored for stabilization. Purging will be considered complete when pH, specific conductivity and temperature stabilize and when the turbidity is measured below 50 NTU, or stabilized above 50 NTU. Stability is defined as the variation between field measurements of 10 percent or less and no overall upward or downward trend in the measurements. Upon stabilization of field parameters, groundwater samples will be collected and analyzed for the parameters presented in Table 1.

Groundwater samples collected for volatile organic compound (VOC) analysis will not be sampled directly through the peristaltic pump due to potential degassing (i.e., loss of VOCs) of the groundwater sample. Instead, upon collection of the VOC samples, the pump will be turned off and the pressure on the flexible walled tubing within the pump head maintained in order to prevent water within the tubing from escaping. The tubing will then be removed from the well and coiled as to prevent any contact with the ground surface. Upon removal of the tubing, the pressure on the pump head will be slowly released allowing the trapped groundwater to flow into the VOC sample jars. Prior to and immediately following collection of groundwater samples, field measurements for pH, specific conductance, temperature, turbidity, Eh, dissolved oxygen, visual and olfactory observations and water level will be recorded.

4.3 Surface Water Sampling

Applicable guidelines to be employed for collecting representative surface water samples are provided in Appendix B. Sample collection equipment will consist of pre-cleaned, pre-preserved laboratory provided sample bottles. Surface water samples will be collected via direct grab starting with the furthest downstream sample location and proceeding upstream to minimize impacts on sample quality.

Each surface water sample will be collected from each designated location by slowly submerging each sample bottle with minimal surface disturbance. For pre-preserved bottles, completely submerging the bottle and overfilling will be avoided to prevent preservative loss. Pre-preserved VOC vials will be filled from a second, unpreserved, pre-cleaned glass container to facilitate zero headspace filling. Prior to and immediately following collection of surface water samples, field measurements for pH, specific conductance, temperature, turbidity, Eh, dissolved oxygen, visual and olfactory observations will be recorded.

4.4 Post-Sampling Handling

All collected groundwater and surface water samples will be placed in pre-cleaned, pre-preserved laboratory provided sample bottles, cooled to 4°C in the field, and transported under proper chain-of-custody command to a qualified testing laboratory for analysis within proper holding times (see Section 6.2). A chain-of-custody form will be completed for each bulk container (i.e., cooler) of collected samples. The chain-of-custody form will be signed and dated by the person who performed sample collection, the person the samples were relinquished to for transport to the laboratory (if applicable) and the laboratory sample custodian who receives the samples. The applicable guideline for sample labeling, storage and shipment is presented in Appendix B. The types and frequencies of field QA/QC samples to be collected are discussed in Section 6.0 of this report.

4.5 Field Equipment Cleaning

Non-dedicated purging equipment and water level monitoring probes will be cleaned before each use in accordance with the procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination presented in Appendix B. Peristaltic pump tubing will be dedicated to each monitoring well and will not require cleaning other than that provided by the manufacturer. Dedicated equipment must be maintained within the sealed original manufacturer's packaging prior to installation at each monitoring location.

4.6 Documentation of Field Activities

The results of all field measurements and associated calculations will be recorded on standard forms included with the guidelines presented in Appendix B. During all activities, the following general information will be recorded on appropriate data sheets:

- Date
- Field sampling crew members
- Meteorological conditions
- Brief description of field activities planned for date indicated
- Tailgate Health and Safety meeting topics

- Location where work is performed
- Problems encountered and corrective actions taken
- All field measurements or descriptions made
- Any modifications made to sampling procedures

In addition, the following information will be recorded by the Field Team Leader during the collection of all environmental samples:

- Sample Locations and summary of the samples collected
- Completeness of the sampling effort
- Sample descriptions
- Results of all field measurements
- Results of field instrument calibrations
- Sample preservation used (if applicable)
- Chain-of-custody information.

All original forms and field notebooks will be placed in a project record file maintained at an agreed upon location.

5.0 SAMPLE ANALYTICAL PROGRAM

5.1 Parameters for Physical/Chemical Analysis

The analytical parameters that will be analyzed in the monitoring programs discussed in this Plan are listed in Tables 1 and 2.

5.2 Analytical Methods/Protocols

The methods that will be used for chemical analysis of all samples collected during this monitoring program are presented in Table 2. The sampling holding times, preservation and container requirements are also presented.

5.3 Groundwater Monitoring Program Field Quality Control Samples

The following field quality control samples will be analyzed in support of the groundwater monitoring program at the Peter Cooper Gowanda Site:

- **Trip Blanks** - A sufficient number of trip blanks for volatile organic compound analysis will be prepared by the laboratory and delivered to the sampling team prior to a sampling event. One sealed blank will be carried into the field per day along with the sample containers for each day that volatile organic samples are collected. Trip blanks will be transported and handled in the same manner as the actual samples. The results of the trip blank analysis will be reviewed to evaluate if the potential for sample contamination during transportation and handling exists.

- **Blind Duplicate** - One blind duplicate will be collected and analyzed per 20 samples collected during each groundwater/surface water sampling event. The field sample containers will be returned to the laboratory identified only as the "blind duplicate". The well or sample location will be recorded in the Project Field Book and on the respective Water Sample Collection Log (see Appendix B) and the results will be compared to review analytical precision.

- **MS/MSD** – A sufficient volume of sample will be collected at one sampling location per sampling event for matrix spike/matrix spike duplicate (MS/MSD) analysis. The laboratory will report the results of the MS/MSD analysis, which will be reviewed for sampling and analysis precision and accuracy.

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TABLE 2

SAMPLE CONTAINER, VOLUME, PRESERVATION & HOLDING TIME REQUIREMENTS

Peter Cooper Landfill NPL Gowanda Site
Peter Cooper Corporation
Gowanda, New York

Matrix	Parameter	Method (Reference 1)	Container Type	Minimum Volume	Preservation (Cool to 4 °C for all samples)	Holding Time from Sample Date
Groundwater/ Surface Water	TCL VOCs	8260B	glass vial	2-40 ml	HCl to pH<2, Zero Headspace	14 days
	Total Metals [1]	6010B/7196A	plastic	600 ml	HNO_3 to pH<2	6 months
	Ammonia	350.2	plastic	500 ml	H_2SO_4 to pH<2	28 days
	Chloride	300	plastic	50 ml	Cool to 4 °C	28 days
	Hardness, Total	130.2	plastic	100 ml	H_2SO_4 to pH<2	6 months
	Sulfide, Total	376.2	plastic	50 ml	$C_4H_6O_4Zn+NaOH$	7 days

References:

1. Test Methods for Evaluating Solid Wastes, USEPA SW-846, Update III, 1991.

Notes:

1. Total metals include: arsenic, chromium, hexavalent chromium, manganese; if field measured turbidity is greater than 50 NTU, dissolved metals will also be collected.

Acronyms:

SVOC = Semi-Volatile Organic Compounds
TCL = Target Compound List
VOC = Volatile Organic Compounds

5.4 Laboratory Quality Control/Reporting Requirements

Laboratory quality control and reporting requirements will be as identified in the sections below.

5.4.1 General

- The laboratory will perform all standard in-house QA/QC necessary to control the introduction of contamination in the lab and to insure the accuracy and precision of the data.
- The laboratory will strictly adhere to the quality control requirements specified in the analytical method references presented in Table 2.
- All laboratories involved in the monitoring program must be certified in the New York State Department of Health (NYSDOH) National Environmental Laboratory Approval Program (NELAP) for the parameters being analyzed.

5.4.2 Laboratory Quality Control Analyses

The laboratory will analyze the following quality control samples in addition to the field quality control samples described above:

- **Method Blanks** – Method Blanks will be analyzed at least once per batch. If a particular reagent or piece of analytical equipment used is changed during preparation of a sample batch, additional testing will be required.
- **Surrogates** – For volatile organic analyses, surrogate standards are added to each sample and recoveries are calculated for method performance accuracy. Surrogate standard recoveries will be reported according to USEPA SW-846 reporting and deliverable requirements.

5.4.3 Reporting and Deliverable Requirements

The laboratory(ies) must adhere to USEPA SW-846 reporting and deliverable requirements unless otherwise directed. The laboratory will submit the analytical report within 30 business days of receipt of the last batch of samples. The analytical report will also include for each sample:

- Sample location/sample number
- Date collected
- Date extracted or digested
- Date analyzed

- Analytical methodology (including preparation methodology)
- Method detection limits
- Sample dilution factor (if applicable)
- Chain-of-Custody forms

The analytical report also must contain a case narrative that will describe all QA/QC problems encountered during sample analysis. For each sample for which QA/QC problems are encountered, the following specific information will be reported in the case narrative:

- Sample identification number
- Sample matrix
- Parameters analyzed
- Data acceptance criteria exceeded
- Specific analytical problems that occurred
- Corrective action taken or attempted to resolve the problem(s)

5.5 Custody Procedures

Sample custody is controlled and maintained throughout the sample collection and analysis process. These procedures track and control the possession of sample from their source, in the field, to their final disposition, the laboratory. Laboratory chain-of-custody procedures further track the custody of samples during their tenure at the laboratory. A sample is in custody if it is:

- In someone's physical possession;
- In someone's view after being in physical possession;
- In a designated secure area; or
- Placed in a locked container by an authorized individual.

This section discusses procedures to be used to adequately control and document sample custody.

5.5.1 Chain-of-Custody (COC) Forms

Chain-of-custody (COC) forms will be used to document the possession and transfer of custody of all samples. Typical information that will be supplied on the forms includes, but is not limited to:

- Field sample identification;
- Sample date and time of collection;

- Type of sample container;
- Sample location and depth (if applicable);
- Size and number of containers; and
- Analyses required.

The COC form will be initiated and signed by the field sampling team. The method of shipment, name of the courier and any other pertinent information should be entered in the "remarks" section. The original copy accompanies the sample shipment and a copy is retained by the Field Team Leader. The completed COC form will be placed in a resealable plastic bag and taped to the underside of the lid of the cooler containing the samples designated on the form. A copy of the carrier air-bill (if applicable) will be retained as part of the permanent COC documentation.

When relinquishing custody, the transferor and transferee must sign, date and time the COC form. Each person accepting custody of sample(s) will note their condition on the form. This record documents transfer of custody of samples from the sampler to another person, to the laboratory or to/from a secure storage area.

5.5.2 Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if the seals are disturbed. Custody seals should be placed on sample shipping containers as necessary to detect tampering. Seals must be signed and dated prior to using. Clear strapping tape should be placed over the seals to ensure that the seals are not accidentally broken during shipment, while maintaining an accurate assessment of the shipment integrity.

5.5.3 Field Custody Procedures

The sample packaging and shipment procedures summarized below will ensure that the samples will arrive at the laboratory with the COC intact. The procedures for sample numbering are included in the field operating procedures presented in Appendix B. The basic COC sequence is as follows:

1. Use laboratory supplied sample containers.

2. Collect and preserve sample (if not pre-preserved) and seal container.

3. Complete sample label and place on container.
4. Document the sampling procedures and related information in the Project Field Book and on a Water Sample Collection Log form.
5. Complete COC record form.
6. Custody transfers from field sampling personnel to anyone else documented with signatures, date and time on COC record form.
7. Pack sample containers for shipment with proper preservatives and custody forms into cooler.

The Field Team Leader is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. All bottles will be identified by the use of sample labels with unique sample numbers. The sample numbering system is presented in the FOP for sample labeling; storage and shipment (see Appendix B). The Field Team Leader is also responsible for the following:

- Ensuring only precleaned sample containers will be used and the coolers and/or boxes containing the empty sample containers are sealed with a custody tape seal during transportation to the field and while in storage prior to use. In the field, the precleaned sample containers will be stored in a secure location.
- Maintaining custody to so that as few individuals as possible handle the samples.
- Accurate recording and maintenance of all sample data in the Project Field Book and ensuring all appropriate forms are completed.
- Determine whether proper custody procedures were followed during the sampling event and decide if additional samples are required.
- Ensure proper completion of COC for each cooler in which samples are shipped. The samples must be shipped to the laboratory as soon as practical and must arrive within 24 hours of shipping.

5.5.4 Laboratory Custody Procedures

Laboratory custody procedures for sample receiving and log-in; sample storage and numbering; tracking during sample preparation and analysis; and storage of data will be performed in accordance with the analytical laboratory's quality assurance/quality control (QA/QC) procedures.

6.0 CORRECTIVE ACTION

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or performance that can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation (if applicable) and data assessment. All corrective action proposed and implemented will be documented on a Corrective Measures Report (see sample report in Appendix C). Corrective action should be implemented only after approval by the Project Manager, or his or her designee. If immediate corrective action is required, approvals should be secured by telephone from the Project Manager.

It shall be the responsibility of the project team, sampling team and laboratory staff to ensure that all measurement and sampling procedures are followed as specified and that measurement data meet the prescribed acceptance criteria. If problems are discovered, prompt corrective action will be taken.

6.1 Field Corrective Action

If errors in field procedures are found during the observation or review of field activities by project staff, corrective action will be initiated. Nonconformance to the QA/QC requirements of the field procedures will be identified immediately by project staff that know or suspect that a procedure is not being performed in accordance with the requirements. The Project Manager or his/her designee will be informed immediately upon discovery of all deficiencies. Timely action will be taken if corrective action is necessary.

Corrective actions in the field may be required when the sample network is changed or when sampling procedures and/or field analytical procedures require modification, due to unexpected conditions. In general, the Field Team Leader and Project Manager may identify the need for corrective action. The Project Manager will approve the corrective measure that will be that will be implemented by the field team and it will be the responsibility of the Project Manager to ensure that corrective action has been implemented.

Corrective actions will be documented in the Project Field Book and on a Corrective Measures Report (see sample report in Appendix C). No staff member will initiate corrective action without prior communication of findings to the Project Manager. If corrective actions are insufficient, work may be stopped by the Project Manager. Once a corrective action is implemented, the effectiveness of the action will be verified by the Project Manger.

6.2 Laboratory Corrective Action

Corrective actions may be initiated if the quality assurance goals of the project are not achieved. The initial step in a corrective action is to instruct the analytical laboratory to examine its procedures to assess whether analytical or computational errors caused the anomalous result. Sample collection and handling procedures will be concurrently reviewed to assess whether they could have contributed to the anomalous result. If no error in laboratory procedures or sample collection and handling procedures can be identified, then the laboratory Project Director will assess whether reanalysis or resampling is required, or whether any protocol should be modified for future sampling events.

6.3 Corrective Action During Data Assessment

The need for corrective action may be identified during the data assessment process. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples by the laboratory. These actions are dependent upon the ability to mobilize the field team, and whether the data to be collected is necessary to meet the QA objectives (e.g., the holding times for samples is not exceeded, etc.). All required corrective actions will be documented by the Project Manager and/or the laboratory.

7.0 DATA EVALUATION AND REPORTING

7.1 Groundwater Collection System

Groundwater monitoring data generated in support of the Peter Cooper Gowanda Site Monitoring program will be entered into a computer spreadsheet. The spreadsheet will be used for generating graphs showing the status and history of individual sampling points and compounds. The graphs and spreadsheets will also be used for historical trend analysis and to track environmental conditions within and offsite, as well as to assess performance of the remedial measures. A letter report will be prepared following the first semi-annual monitoring event. The letter reports will include:

- Sample collection date
- Groundwater elevation data
- Groundwater analytical results as compared to Class GA groundwater quality standards
- Surface water Analytical results as compared to Class 'D' Surface Water Quality Standards
- Upgradient well designation
- Sample location number
- QA/QC values
- Method detection limits
- Field sampling notes
- Chain-of-custody forms

An annual report will be prepared following the second semi-annual sampling event. In addition to the information described above, the annual report will include the following:

- A groundwater isopotential contour map for shallow overburden groundwater.

- A discussion of sample analytical results including elevations of parameters above background concentrations and historical trends evident from the data.

- A discussion of changes in water quality that has occurred from the previous year.

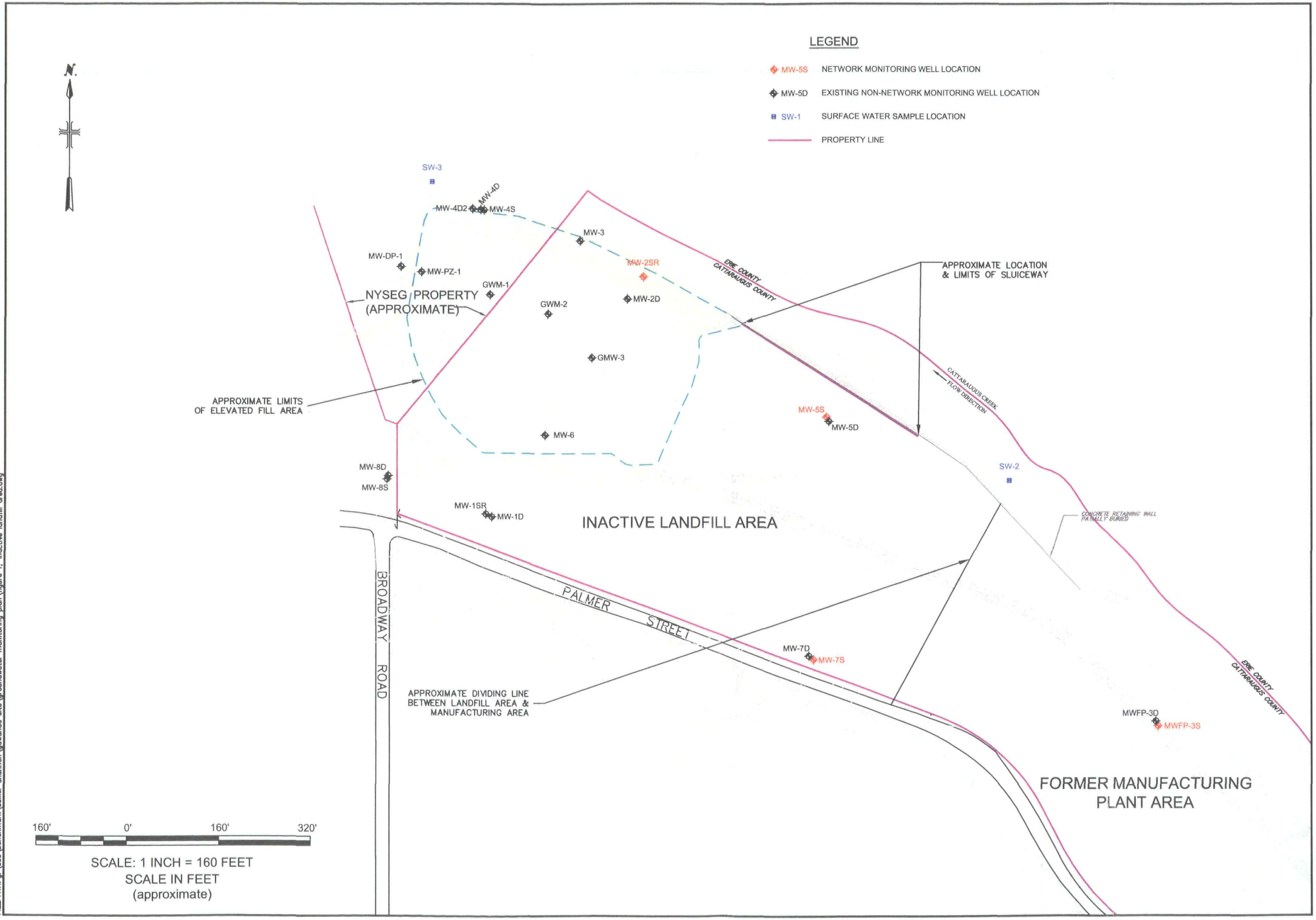
- A calculation and discussion of hydraulic loadings to the surface water body and corresponding potential for localized contravention of surface water quality standards, similar to the evaluation performed in the RI (Reference 1).

- A discussion of any proposed changes to the Peter Cooper Gowanda Site Monitoring Plan.

- A review of the data to either reduce the sampling frequency or reduce the parameter list, if warranted.

8.0 REFERENCES

1. Geomatrix Consultants, Inc. & Benchmark Environmental Engineering and Science, PLLC, Revised November 2003. *Remedial Investigation Report – Final, Peter Cooper Landfill Site, Gowanda, New York.*



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JOB NO.: 0021-001-400

INACTIVE LANDFILL AREA SITE PLAN

GROUNDWATER MONITORING PLAN

PETER COOPER - GOWANDA SITE
GOWANDA, NEW YORK

PREPARED FOR
PETER COOPER CORPORATION

FIGURE 1

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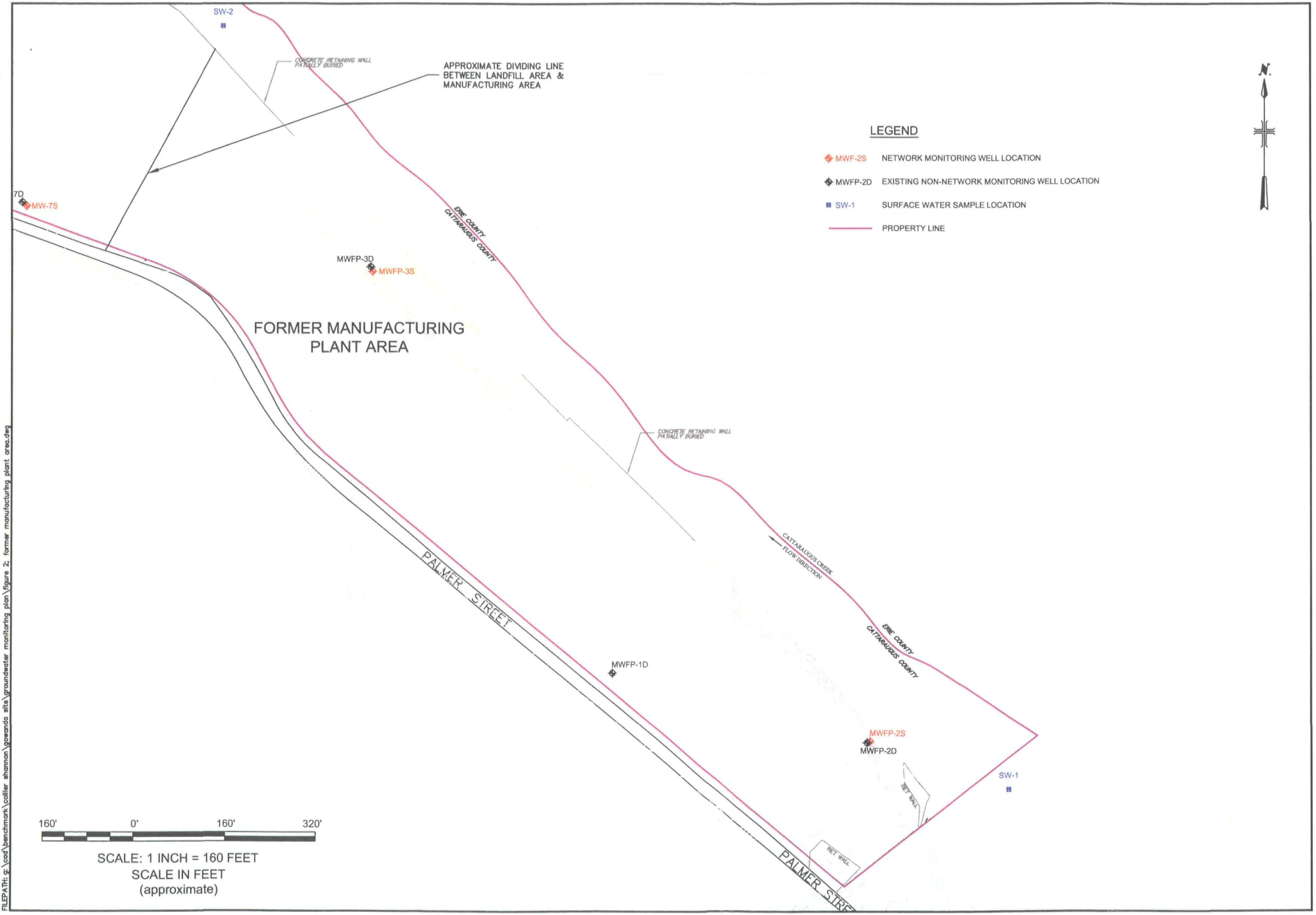

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FORMER MANUFACTURING PLANT AREA SITE PLAN

GROUNDWATER MONITORING PLAN

PETER COOPER - GOWANDA SITE
GOWANDA, NEW YORK

PREPARED FOR
PETER COOPER CORPORATION

FIGURE 2

Appendix A

Borehole Logs for Network Monitoring Wells

PROJECT: Peter Cooper RI/FS Gowanda, New York	**Log of Well No. MW-7S**

BORING LOCATION: See RI Figures for Boring Locations	TOP OF CASING ELEVATION 787.8	DATUM: fmsl
DRILLING CONTRACTOR: Nothnagle Drilling	DATE STARTED: 9/26/00	DATE FINISHED: 9/26/00
DRILLING METHOD: HSA (4 1/4" I.D.)	TOTAL DEPTH: 16.6 feet bgs	SCREEN INTERVAL: 4.0-16.5
DRILLING EQUIPMENT: CME-75	DEPTH TO WATER: FIRST | COMPL.	CASING: 2-inch PVC
SAMPLING METHOD: 2" dia. Stainless Steel Split Spoons	LOGGED BY: JV	
HAMMER WEIGHT: 140 lbs. DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ 6 inches	OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 786.1
					See log for MW-7D for soil description
1					
2					
3					
4					
5					
6					
7					
8					
9					
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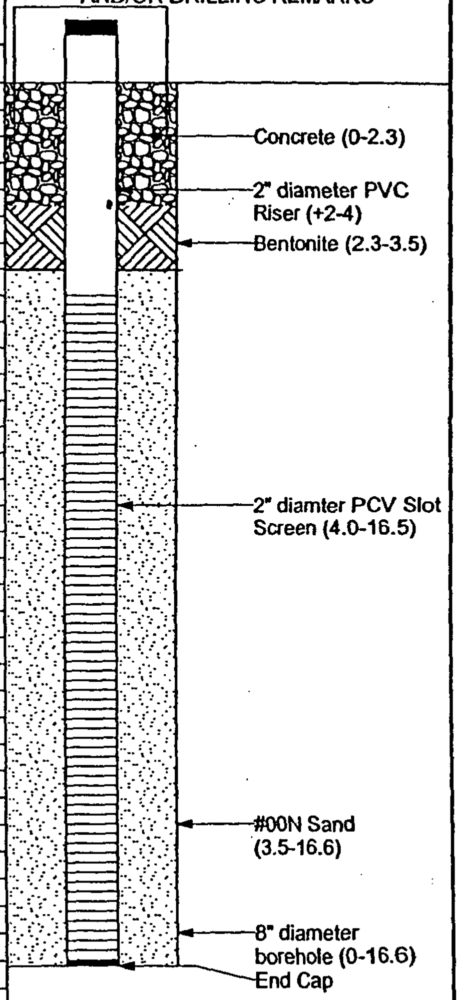
WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



WELL_OVM MW7S.GPJ (11/02)

Project No. 5771 | Geomatrix Consultants | Figure

PROJECT: Peter Cooper RI/FS
Gowanda, New York

Log of Well No. MWFP-2S

BORING LOCATION: See RI Figures for Boring Locations
DRILLING CONTRACTOR: Nothnagle Drilling
DRILLING METHOD: HSA (4 1/4" I.D.)
DRILLING EQUIPMENT: CME-75
SAMPLING METHOD: 2" dia. Stainless Steel Split Spoons
HAMMER WEIGHT: 140 lb
DROP: 30"

TOP OF CASING ELEVATION: 785.2
DATUM: fmsl
DATE STARTED: 10/3/00
DATE FINISHED: 10/3/00
TOTAL DEPTH: 12.0 feet bgs
SCREEN INTERVAL: 5-12
DEPTH TO WATER: FIRST | COMPL.
CASING: 2-inch PVC
LOGGED BY: JV
RESPONSIBLE PROFESSIONAL: Richard H. Frappa
REG. NO.

DEPTH (feet)	Sample No.	Blows/ 6 inches	OVM (ppm)
1	1	18	0
3	2	10	0
5	3	7	0
7	4	5	0
9	5	3	0
11	6	26	0

DESCRIPTION
NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.

Surface Elevation: 784.3

SILT AND FINE SAND (SM-ML): very dark greyish brown 10YR 3/2, dry, 40-50% fines, 40-50% fine sand, 5% gravel, 5% organic matter/roots, medium plasticity

SAND with GRAVEL (SW): very dark brown 10YR 2/2, dry to slightly moist, 80% sand, fine to medium grained, 15% gravel, 5% low plasticity fines, some coal pieces

SILTY SAND (SM): very dark brown 10YR 2/2, moist, 65% fine to medium grained sand, 20% low plasticity fines, 15% gravel, trace coal

WEATHERED BRICK: very pale brown 10YR 7/4, moist

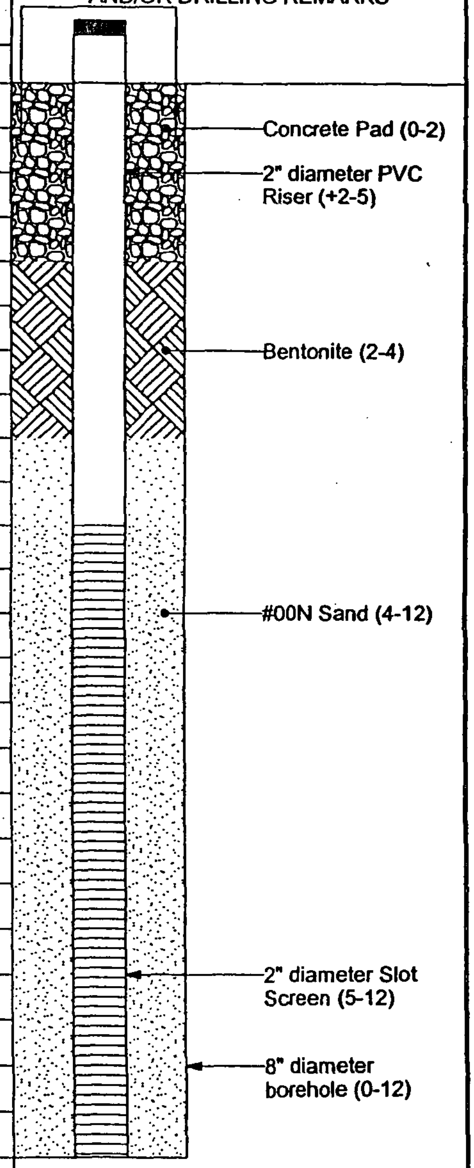
SILTY SAND (SM): very dark brown 10YR 2/2, moist, 65% fine to medium grained sand, 20% low plasticity fines, 15% gravel, trace coal
-more fines

SILT with GRAVEL (ML): dark reddish grey 5YR 3/2, moist to wet, 60% fines (peat-like decayed wood), 20% gravel, 10% fine sand, 10% wood pieces, medium plasticity, slight musty odor, fill

SILT with GRAVEL (ML): black 1 FOR GLEY 2.5/N, wet, 60% fines, 25% well graded angular gravel, 15% well graded sand, medium plasticity, trace wood pieces, slight coal-like odor, soft, fill

WEATHERED BEDROCK

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



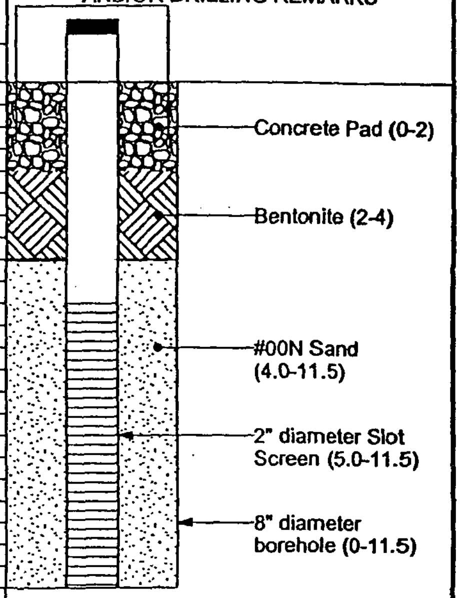
400423

PROJECT: Peter Cooper RI/FS
Gowanda, New York

Log of Well No. MWFP-3S

BORING LOCATION: See RI Figures for Boring Locations
TOP OF CASING ELEVATION: 780.7
DATUM: fmsl
DRILLING CONTRACTOR: Nothnagle Drilling
DATE STARTED: 10/3/00
DATE FINISHED: 10/3/00
DRILLING METHOD: HSA (4 1/4" I.D.)
TOTAL DEPTH: 11.5 feet bgs
SCREEN INTERVAL: 5-11.5
DRILLING EQUIPMENT: CME-75
DEPTH TO WATER: FIRST | COMPL.
CASING: 2-inch PVC
SAMPLING METHOD: 2" dia. Stainless Steel Split Spoons
LOGGED BY: JV
HAMMER WEIGHT: 140 lbs.
DROP: 30"
RESPONSIBLE PROFESSIONAL: Richard H. Frappa
REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ 6 Inches		Surface Elevation: 778.5	
					See log for well MWFP-3D for soil description.	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						



PROJECT: Peter Cooper RI/FS
Gowanda, New York

Log of Well No. MW-2S(R)

BORING LOCATION: 10 feet E. of MW-2S - Replacement Well for MW-2S		TOP OF CASING ELEVATION: 770.9	DATUM: fmsl
DRILLING CONTRACTOR: Nothnagle Drilling		DATE STARTED: 7/11/00	DATE FINISHED: 7/11/00
DRILLING METHOD: HSA (4 1/4" I.D.)		TOTAL DEPTH: 8.7 feet bgs	SCREEN INTERVAL: 4.5 to 8.5
DRILLING EQUIPMENT: CME-55 - ATV		DEPTH TO WATER: FIRST 5.5 feet | COMPL.	CASING: 2-inch PVC
SAMPLING METHOD: 2" dia. Stiainless Steel Split Spoon		LOGGED BY: CAL	
HAMMER WEIGHT: 140 lb.	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ 6 Inches	OVM (ppm)
1	1	☒	21	
3	2	☒	59	
5	3	☒		
7	4	☒	>158	
8	5	☒	>100	

DESCRIPTION
NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.

Surface Elevation: 768.2

TOPSOIL: dark brown, dry to moist, organic roots present

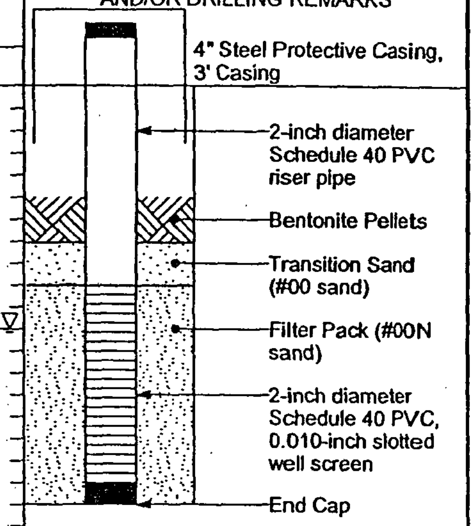
SILT with GRAVEL (ML); dark brown, dry, 75% fines, 10% coarse angular to subangular gravel, 5% fine subangular gravel, 10% fine sand, low plasticity [FILL]

POORLY GRADED SAND with SILT and GRAVEL; black, moist to wet, 50% fine to medium sand, 30% coarse angular to subangular gravel, 10% fine subangular to rounded gravel, 10% low plasticity fines. [FILL], strong septic type odor

No sample 2-4'; cobbles, rig chattered

BEDROCK; gray; very fissile; shale/shaley limestone

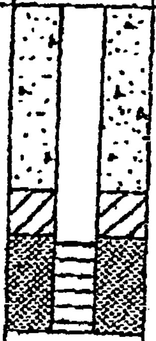
WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG File Name: PC004B.BL	Report of Boring No. MW-5 Sheet 1 of 1
Project Location: Gowanda, NY Client: Peter Cooper	SAMPLER Type: SPLIT SPOON Hammer: 140 lbs. Fall: 30"	Ground Water Depth 772.33 Date 12/15/86 Depth 771.60 Date 4/13/86 File No. 1171-005-130

Boring Co.: Parratt-Wolfe
Foreman: Mark Beck
OBG Geologist: Peter Bogardus

Boring Location: east of fill area
Ground Elevation: 778.98
Dates: Started:08/20/86 Ended:08/20/

	Sample							Field Testing			
Depth	"N" Value	Penetrn/ Recovery	Depth	Blows /6"	Sample Description	Stratum Change Depth	Equipment Installed	Sal. 0/00	Sp. Cond.	HNU	
0	--	12	0-2		Dry brown silt and gravel, root hairs (fill) 3'						
5	11	14	5-7	8-5 6-3	Black dry cinders, some silt pieces of wood 5'					.4	
10	18	14	10-12	10-8 11-6	Orange - red, fine to coarse sand and fine gravel, chunks of cement and wood wet at 8' - hard at 10' 10'					2	
15	50+	12	15-16	50/0	Wet sand and gravel, chunks of cement, iron oxide stain. 15'					.1	
—					Grey Weathered Shale 17'						
20					B.O.B.						
25											
30											
35											
40											
45											
50											
55											

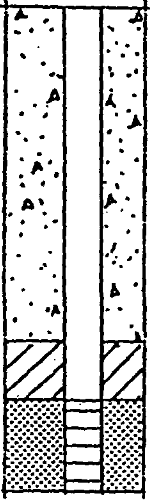
2" of screen installed from 15' to 13'
.5' of packed sand installed from 15' to 12.5'
.5' of bentonite pellets installed from 12.5' to 10'
.J' of bentonite grout cement installed from 10' to surface
4" protective guard pipe installed

400426

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG File Name: PC005B.BL	Report of Boring No. MW-6 Sheet 1 of 1
Project Location: Gowanda, NY Client: Peter Cooper	SAMPLER Type: SPLIT SPOON Hammer: 140 lbs. Fall: 30"	Ground Water Depth 773.4 Date 12/15/86 Depth 773.01 Date 4/13/87 File No. 1171-005-130

Boring Co.: Parratt-Wolfe
Foreman: Mark Beck
OBG Geologist: Peter Bogardus

Boring Location: edge of fill material
Ground Elevation: 781.38
Dates: Started:08/20/86 Ended:08/20/8

Depth	Sample				Sample Description	Stratum Change Depth	Equipment Installed	Field Testing			R m k. s
	"N" Value	Penetrn/ Recovery	Depth	Blows /6"				Sal. 0/00	Sp. Cond.	HNU	
0			0-2		Dry brown silt and fine sand, root hairs, medium sand and gravel 3'						
3-5	7	6"	3-5	3-5 2-5	Odor present, no return					.2	
5-6	1	12"	5-6	WOH 1-WOH	Grey-black silt same coarse gravel, trace of clay 7'					2.1	
8-10	9	12"	8-10	5-4 5-6	Wet black cinder fuel odor, sandy 10'					1.1	
10	8	12"	10-12	7-5 3-6	Same as above, piece of shale stuck in nose					1.1	
	1	8"	13-15	WOH WOH	Black gravel wet, odor, silt and clay in nose 15'					6.8	
15	2		15-17	WOH-1 1	Grey wet silt, and fine sand, trace clay,					1.3	
	45	12"	18-20	18-19 26-25	fire to medium sand 18'					1.2	
20					Grey Weathered Shale						
25											
30											
35											
40											
45											
50											
55											

of screen installed from 18' to 14'
3.8' of packed sand installed from 18' to 14.2'
2' of bentonite pellets installed from 14.2' to 12.2'
12.2' of bentonite grout cement installed from 12.2' to surface

PROJECT: Peter Cooper RI/FS
Gowanda, New York

Log of Well No. MW-8S

BORING LOCATION: See RI Figures for Boring Locations

TOP OF CASING ELEVATION: 777.4

DATUM: fmsl

DRILLING CONTRACTOR: Nothnagle Drilling

DATE STARTED: 9/28/00

DATE FINISHED: 9/28/00

DRILLING METHOD: HSA (4 1/4" I.D.)

TOTAL DEPTH: 16.0 feet bgs

SCREEN INTERVAL: 6-16

DRILLING EQUIPMENT: CME-75

DEPTH TO WATER: FIRST | COMPL.

CASING: 2-inch PVC

SAMPLING METHOD: 2" dia. Stainless Steel Split Spoons

LOGGED BY: JV

HAMMER WEIGHT: 140 lbs.

DROP: 30"

RESPONSIBLE PROFESSIONAL: Richard H. Frappa

REG. NO.

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ 6 inches	OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation: 778.1	
					See log for MW-8D for soil description	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
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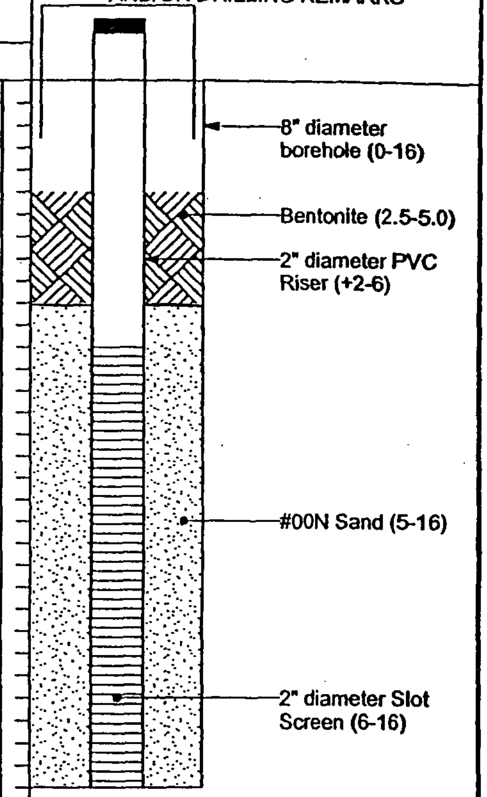


WELL_OVM MW8S.GPJ (11/02)

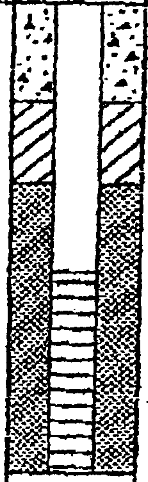
Project No. 5771

Geomatrix Consultants

Figure

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG [redacted]	REPORT OF BORING NO. MW-1R SHEET 1 OF
PROJECT LOCATION: Gowanda, N.Y. CLIENT: Peter Cooper	SAMPLER TYPE: Split Spoon HAMMER: 140 lbs. FALL: 30"	GROUND WATER DEPTH DATE 4/13/87 ELEV. 772.37 DEPTH DATE 5/14/87 ELEV. 771.37 FILE NO.: 1171.005.130

BORING CO.: Parratt-Wolff FOREMAN: Mark Beck OBG GEOLOGIST: Peter Bogardus	BORING LOCATION: Upgradient GROUND ELEVATION: 777.40 DATES: STARTED: 12/17/87 ENDED: 12/17/87

DEPTH	SAMPLE					SAMPLE DESCRIPTION	STRATUM CHANGE DEPTH	EQUIPMENT INSTALLED	FIELD TESTING			RMKS
	No.	DEPTH	BLOWS /6"	PENETRN/ RECOVERY	"N" VALUE				SAL. 0/00	SP. COND.	HNU	
0						Not Sampled (See 1D)						
5												
10												
15												

of screen installed from 10.4 - 5.4
of sand pack from 10.5 - 3.5
of Bentonite pellets from 3.5 - 1.5
.5 of cement/bentonite grout 1.5 - 0

PROJECT: Peter Cooper RI/FS
Gowanda, New York

Log of Well No. PZ-1

BORING LOCATION: See RI Figures for Boring Locations

TOP OF CASING ELEVATION: 772.3

DATUM: fmsl

DRILLING CONTRACTOR: Nothnagle Drilling

DATE STARTED: 10/10/00

DATE FINISHED: 10/10/00

DRILLING METHOD: HSA (4 1/4" I.D.)

TOTAL DEPTH: 14.0 feet bgs

SCREEN INTERVAL: 4-14

DRILLING EQUIPMENT: CME-75

DEPTH TO WATER: FIRST | COMPL.

CASING: 2-inch PVC

SAMPLING METHOD: 4' stainless steel barrel with acetate sleeve

LOGGED BY: JV

HAMMER WEIGHT: 140 lbs.

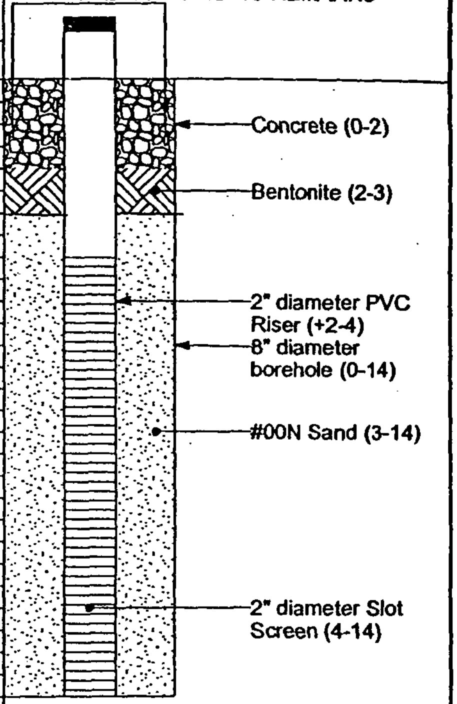
DROP: 30"

RESPONSIBLE PROFESSIONAL: Richard H. Frappa

REG. NO.

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ 6 inches	OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 770.0
1					**ORGANIC SILT (OL/OH):** dark greyish brown 2.5Y 4/2, 75% fines, 10% fine sand, 10% gravel, 5% organic matter, medium plasticity
2	1	☒		0	**WELL GRADED SAND with SILT and GRAVEL (SW-SM):** dark greyish brown 10YR 4/2, dry to slightly moist, 70% sand, 15% gravel, 15% low plasticity fines, fill
6	2	☒		0	
8					-wet to saturated **WELL GRADED SAND with SILT (SW-SM):** black 1 FOR GLEY 2.5/N, wet to saturated, 80-90% sand, 10-20% low plasticity fines
10	3	☒		0	
13	4			0	**SILT (ML):** black 1 FOR GLEY 2.5/N, wet to saturated, 80-90% fines, 0-10% fine sand, 0-10% gravel, high plasticity, [Sludge Fill]

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



WELL_OVM PZ1.GPJ (11/02)

Project No. 5771 | Geomatrix Consultants | Figure

Appendix B

Field Operating Procedures

FOP 008.0

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD pH/Eh METER

PURPOSE

This guideline describes a method for calibration of a portable pH/Eh meter. The pH/Eh meter measures the hydrogen ion concentration or acidity of a water sample (pH function), and the oxidation/reduction potential of a water sample (Eh function). Calibration is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the pH/Eh meter will be:

pH	± 0.2 pH unit, over the temperature range of ± 0.2 C.
Eh	± 0.2 millivolts (mV) over the range of ± 399.9 mV, otherwise ± 2 mV.

PROCEDURE

Note: Meters produced by different manufacturers may have different calibration procedures. These instructions will take precedence over the procedure provided herein. This procedure is intended to be used as a general guideline, or in the absence of available manufacturer's instructions.

1. Obtain and active the meter to be used. As stated above, initial calibrations will be performed at the beginning of each sampling day.

2. Immerse the sensing probe in a container of certified pH 7.0 buffer solution traceable to the National Bureau of Standards.

3. Measure the temperature of the buffer solution, and adjust the temperature setting accordingly.

4. Compare the meter reading to the known value of the buffer solution while stirring. If the reading obtained by the meter does not agree with the known value of the buffer solution, recalibrate the meter according to the manufacturer's instructions until the desired reading is obtained. This typically involves accessing and turning a dial or adjustment screw while measuring the pH of the buffer solution. The meter is adjusted until the output agrees with the known solution pH.

5. Repeat Steps 2 through 5 with a pH 4.0 and 10.0 buffer solution to provide a three-point calibration. Standards used to calibrate the pH meter will be of concentrations that bracket the expected values of the samples to be analyzed, especially for two-point calibrations (see note below).

Note: Some pH meters only allow two-point calibrations. Two-point calibrations should be within the suspected range of the groundwater to be analyzed. For example, if the groundwater pH is expected to be approximately 8, the two-point calibration should bracket that value. Buffer solutions of 7 and 10 should then be used for the two-point calibration.

6. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample). Information will include, at a minimum:

   - Time, date, and initials of the field team member performing the calibration
   - The unique identifier for the meter, including manufacturer, model, and serial number
   - The brand and expiration dates of buffer solutions
   - The instrument readings
   - The instrument settings (if applicable)

- Pass or fail designation in accordance with the accuracy specifications presented above
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate

MAINTENANCE

- When not in use, or between measurements, keep the pH/Eh probe immersed in or moist with buffer solutions.

- Check the meter batteries at the end of each day and recharge or replace as needed.

- Replace the pH/Eh probe any time that the meter response time becomes greater than two minutes or the meeting system consistently fails to retain its calibrated accuracy for a minimum of ten sample measurements.

- If a replacement of the pH/Eh probe fails to resolve instrument response time and stability problems, obtain a replacement instrument (rental instruments) and/or order necessary repairs/adjustment.

ATTACHMENTS

Equipment Calibration Log (sample)

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

EQUIPMENT CALIBRATION LOG

PROJECT INFORMATION:

Project Name:

Date:

Project No.:

Client:

Instrument Source: ☐ BM/TK ☐ Rental

METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTINGS
☐ pH meter	units					4.00		
						7.00		
						10.01		
☐ Turbidity meter	NTU					[illegible]		
						20		
						100		
						800		
☐ Sp. conductance meter	uS/mS					1413 μS @ 25 °C		
☐ PID	ppm					open air		
						100 ppm Iso. Gas		
☐ Particulate meter	mg/m^3					zero air		
☐ Oxygen	%					open air		
☐ Hydrogen sulfide	ppm					open air		
☐ Carbon monoxide	ppm					open air		
☐ LEL	%					open air		
☐ Radiation Meter	uR/H					background area		
☐								
☐								

ADDITIONAL REMARKS:

PREPARED BY:

DATE:

FOP 012.0

CALIBRATION AND MAINTENANCE OF PORTABLE SPECIFIC CONDUCTANCE METER

PURPOSE

This guideline describes a method for calibration of a portable specific conductance meter. This meter measures the ability of a water sample to conduct electricity, which is largely a function of the dissolved solids within the water. The instrument has been calibrated by the manufacturer according to factory specifications. This guideline presents a method for checking the factory calibration of a portable specific conductance meter. A calibration check is performed to verify instrument accuracy and function. All field test equipment will be checked at the beginning of each sampling day. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the specific conductance meter will be within ± 1 percent of full-scale, with repeatability of ± 1 percent. The built-in cell will be automatically temperature compensated from at least 32° to 160° F (0° to 71°C).

PROCEDURE

Note: The information included below is equipment manufacturer- and model-specific, however, accuracy, calibration, and maintenance procedures for this type of portable equipment are typically similar. The information below pertains to the Myron L Company Ultrameter Model 6P. The actual equipment to be used in the field will be equivalent or similar.

1. Calibrate all field test equipment at the beginning of each sampling day. Check and recalibrate the specific conductance meter according to the manufacture's specifications.

2. Use a calibration solution of known specific conductivity and salinity. For maximum accuracy, use a Standard Solution Value closest to the samples to be tested.

3. Rinse conductivity cell three times with proper standard.

4. Re-fill conductivity cell with same standard.

5. Press **COND** or **TDS**, then press **CAL/MCLR**. The "CAL" icon will appear on the display.

6. Press the **↑/MS** or **MR/↓** key to step the displayed value toward the standard's value or hold a key down to cause rapid scrolling of the reading.

7. Press CAL/MCLR once to confirm new value and end the calibration sequence for this particular solution type.

8. Repeat steps 1 through 7 with additional new solutions, as necessary.

9. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample), indicating the meter readings before and after the instrument has been adjusted. This is important, not only for data validation, but also to establish maintenance schedules and component replacement. Information will include, at a minimum:
    - Time, date and initials of the field team member performing the calibration
    - The unique identifier for the meter, including manufacturer, model, and serial number
    - The brand and expiration date of the calibration standards
    - The instrument readings: before and after calibration

- The instrument settings (if applicable)
- The overall adequacy of calibration including the Pass or fail designation in accordance with the accuracy specifications presented above.
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate.

MAINTENANCE

NOTE: Ultrameters should be rinsed with clean water after use. Solvents should be avoided. Shock damage from a fall may cause instrument failure.

Temperature Extremes

Solutions in excess of 160°F/71°C should not be placed in the cell cup area; this may cause damage. Care should be exercised not to exceed rated operating temperature. Leaving the Ultrameter in a vehicle or storage shed on a hot day can easily subject the instrument to over 150°F voiding the warranty.

Battery Replacement

Dry Instrument THOROUGHLY. Remove the four bottom screws. Open instrument carefully; it may be necessary to rock the bottom slightly side to side to release it from the RS-232 connector. Carefully detach battery from circuit board. Replace with 9-volt alkaline battery. Replace bottom, ensuring the sealing gasket is installed in the groove of the top half of case. Re-install screws, tighten evenly and securely.

NOTE: Because of nonvolatile EEPROM circuitry, all data stored in memory and all calibration settings are protected even during power loss or battery replacement.

Cleaning Sensors

The conductivity cell cup should be kept as clean as possible. Flushing with clean water following use will prevent buildup on electrodes. However, if very dirty samples — particularly scaling types — are allowed to dry in the cell cup, a film will form. This film reduces accuracy. When there are visible films of oil, dirt, or scale in the cell cup or on the electrodes, use a foaming non-abrasive household cleaner. Rinse out the cleaner and your Ultrameter is ready for accurate measurements.

NOTE: Maintain a log for each monitoring instrument. Record all maintenance performed on the instrument on this log with date and name of the organization performing the maintenance.

ATTACHMENTS

Equipment Calibration Log (sample)

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

EQUIPMENT CALIBRATION LOG

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ BM/TK ☐ Rental

METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL BY	STANDARD	READING	SETTINGS
☐ pH meter	units					4.00		
						[illegible]		
						[illegible]		
☐ Turbidity meter	NTU					[illegible]		
						20		
						100		
						800		
☐ Sp. conductance meter	uS/mS					1413 μS @ 25 °C		
☐ PID	ppm					open air		
						100 ppm Iso. Gas		
☐ Particulate meter	mg/m^3					zero air		
☐ Oxygen	%					open air		
☐ Hydrogen sulfide	ppm					open air		
☐ Carbon monoxide	ppm					open air		
☐ LEL	%					open air		
☐ Radiation Meter	uR/H					background area		
☐								
☐								

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

FOP 009.0

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD TURBIDITY METER

PURPOSE

This guideline describes the method for calibration of the HACH 2100P portable field turbidity meter. Turbidity is one water quality parameter measured during purging and development of wells. Turbidity is measured as a function of the samples ability to transmit light, expressed as Nephelometric Turbidity Units (NTUs). The turbidity meter is factory calibrated and must be checked daily prior to using the meter in the field. Calibration is performed to verify instrument accuracy and function. This procedure also documents critical maintenance activities for this meter.

ACCURACY

Accuracy shall be ± 2% of reading below 499 NTU or ± 3% of reading above 500 NTU with resolution to 0.01 NTU in the lowest range. The range key provides for automatic or manual range selection for ranges of 0.00 to 9.99, 0.0 to 99.9 and 0 to 1000 NTU. Another key provides for selecting automatic signal averaging. Pressing the key shall toggle signal averaging on or off.

PROCEDURE

Calibration of the 2100P Turbidimeter is based on formazin, the primary standard for turbidity. The instrument's electronic and optical design provides long-term stability and minimizes the need for frequent calibration. The two-detector ratioing system compensates for most fluctuations in lamp output. **A formazin recalibration should be performed at least once every three months,** more often if experience indicates the need. During calibration, use a primary standard such as StablCal™ Stabilized Standards or formazin standards.

Note: Meters produced by different manufacturers may have different calibration check procedures. These manufacturers' instructions will take precedence over the procedure provided here. This procedure is intended to be used as a general guideline, or in the absence of available manufacturer's instructions.

Note: Because the turbidity meter measures light transmission, it is critical that the meter and standards be cared for as precision optical instruments. Scratches, dirt, dust, etc. can all temporarily or permanently affect the accuracy of meter readings.

Preparing StablCal Stabilized Standards in Sealed Vials

Sealed vials that have been sitting undisturbed for longer than a month must be shaken to break the condensed suspension into its original particle size. Start at *step 1* for these standards. If the standards are used on at least a weekly interval, start at *step 3.*

Note: These instructions do not apply to < 0.1 NTU StablCal Standards; < 0.1 NTU StablCal Standards should not be shaken or inverted.

1. Shake the standard vigorously for 2-3 minutes to re-suspend any particles.
2. Allow the standard to stand undisturbed for 5 minutes.
3. Gently invert the vial of StablCal 5 to 7 times.
4. Prepare the vial for measurement using traditional preparation techniques. This usually consists of oiling the vial (see *Section 2.3.2 on page 11 of the manual*)

and marking the vial to maintain the same orientation in the sample cell compartment (see *Section 2.3.3 on page 12 of the manual*). This step will eliminate any optical variations in the sample vial.

5. Let the vial stand for one minute. The standard is now ready for use in the calibration procedure.

Calibration Procedure

1. Turn the meter on.

2. Shake pre-mixed formazin primary standards in accordance with the above procedure.

3. Wipe the outside of the < 0.1 NTU standard and insert the sample cell in the cell compartment by aligning the orientation mark on the cell with the mark on the front of the cell compartment.

4. Close the lid and press **I/O**.

5. Press the **CAL** button. The **CAL** and **S0** icons will be displayed and the 0 will flash. The four-digit display will show the value of the **S0** standard for the previous calibration. If the blank value was forced to 0.0, the display will be blank. Press the right arrow key (→) to get a numerical display.

6. Press **READ**. The instrument will count from 60 to 0, read the blank and use it to calculate a correction factor for the 20 NTU standard measurement. If the dilution water is ≥ 0.5 NTU, E 1 will appear when the calibration is calculated (*see Section 3.6.2.3 on page 31 of the manual*). The display will automatically increment to the next standard. Remove the sample cell from the cell compartment

Note: The turbidity of the dilution water can be "forced" to zero by pressing → rather than reading the dilution water. The display will show "S0 NTU" and the ↑ key must be pressed to continue with the next standard.

7. Repeat steps 1 through 7 for the 20, 100 and 800 standards.
8. Following the 800 NTU standard calibration, the display will increment back to the **S0** display. Remove the sample cell from the cell compartment.
9. Press **CAL** to accept the calibration. The instrument will return to measurement mode automatically.
10. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample). Information will include, at a minimum:
    - Time, date, and initials of the field team member performing the calibration
    - The unique identifier for the meter, including manufacturer, model, and serial number
    - The brand of calibration standards
    - The instrument readings
    - The instrument settings (if applicable)
    - Pass or fail designation in accordance with the accuracy specifications presented above
    - Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate.

Note: Pressing CAL completes the calculation of the calibration coefficients. If calibration errors occurred during calibration, error messages will appear after CAL is pressed. If E 1 or E 2 appear, check the standard preparation and review the calibration; repeat the calibration if necessary. If "CAL?" appears, an error may have

occurred during calibration. If "CAL?" is flashing, the instrument is using the default calibration.

NOTES

- If the **I/O** key is pressed during calibration, the new calibration data is lost and the old calibration will be used for measurements. Once in calibration mode, only the **READ, I/O, ↑** , and →keys function. Signal averaging and range mode must be selected before entering the calibration mode.

- If **E 1** or **E 2** are displayed, an error occurred during calibration. Check the standard preparation and review the calibration; repeat the calibration if necessary. Press **DIAG** to cancel the error message (**E 1** or **E 2**). To continue without repeating the calibration, press **I/O** twice to restore the previous calibration. If "**CAL?**" is displayed, an error may have occurred during calibration. The previous calibration may not be restored. Either recalibrate or use the calibration as is.

- To review a calibration, press **CAL** and then ↑ to view the calibration standard values. As long as **READ** is never pressed and **CAL** is not flashing, the calibration will not be updated. Press **CAL** again to return to the measurement mode.

MAINTENANCE

- **Cleaning**: Keep the turbidimeter and accessories as clean as possible and store the instrument in the carrying case when not in use. Avoid prolonged exposure to sunlight and ultraviolet light. Wipe spills up promptly. Wash sample cells with non-abrasive laboratory detergent, rinse with distilled or demineralized water, and air dry. Avoid scratching the cells and wipe all moisture and fingerprints off the cells before inserting them into the instrument. Failure to do so can give inaccurate readings. See *Section 2.3.1 on page 11of the manual* for more information about sample cell care.

- **Battery Replacement**: AA alkaline cells typically last for about 300 tests with the signal-averaging mode off, about 180 tests if signal averaging is used. The "battery" icon flashes when battery replacement is needed. Refer to *Section 1.4.2 on page 5 of the manual* for battery installation instructions. If the batteries are changed within 30 seconds, the instrument retains the latest range and signal average selections. If it takes more than 30 seconds, the instrument uses the default settings. If, after changing batteries, the instrument will not turn off or on and the batteries are good, remove the batteries and reinstall them. If the instrument still won't function, contact Hach Service or the nearest authorized dealer.

- **Lamp Replacement**: The procedure in *Section 4.0 on page 49 of the manual* explains lamp installation and electrical connections. Use a small screwdriver to remove and install the lamp leads in the terminal block. The instrument requires calibration after lamp replacement.

ATTACHMENTS

Equipment Calibration Log (sample)

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EQUIPMENT CALIBRATION LOG

PROJECT INFORMATION:

Project Name:

Date:

Project No.:

Client:

Instrument Source: ☐ BM/TK ☐ Rental

METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTINGS
☐ pH meter	units					4.00		
						7.00		
						10.00		
☐ Turbidity meter	NTU					[illegible]		
						20		
						100		
						800		
☐ Sp. conductance meter	uS/mS					1413 μS @ 25 °C		
☐ PID	ppm					open air		
						100 ppm Iso. Gas		
☐ Particulate meter	mg/m^3					zero air		
☐ Oxygen	%					open air		
☐ Hydrogen sulfide	ppm					open air		
☐ Carbon monoxide	ppm					open air		
☐ LEL	%					open air		
☐ Radiation Meter	uR/H					background area		
☐								
☐								

ADDITIONAL REMARKS:

PREPARED BY:

DATE:

FOP 007.0

CALIBRATION AND MAINTENANCE OF PORTABLE DISSOLVED OXYGEN METER

PURPOSE

This guideline describes a method for calibration of a portable dissolved oxygen meter. This meter measures the concentration of dissolved oxygen within a water sample. This parameter is of interest both as a general indicator of water quality, and because of its pertinence to fate and transport of organics and inorganics. This guideline presents a method for calibration of this meter, which is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the dissolved oxygen meter will be within ± 1% of full-scale over the temperature range of 23° to 113° F (-5° to +45° C).

PROCEDURE

1. Calibrate the dissolved oxygen meter to ambient air based on probe temperature and true local atmospheric pressure conditions (or feet above sea level). Because procedures vary with different brands and models of meters, refer to the manufacturer's recommended calibration procedures.

2. In the event of a failure to adequately calibrate, follow the corrective action directed by the manufacturer.
3. If calibration cannot be achieved or maintained, obtain a replacement instrument (rental instruments) and/or order necessary repairs/adjustment.

4. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample). Information will include, at a minimum:
    - Time, date, and initials of the field team member performing the calibration
    - The unique identifier for the meter, including manufacturer, model, and serial number
    - The brand and expiration dates of calibration solutions
    - The calibration readings
    - The instrument settings (if applicable)
    - The approximate response time
    - The overall adequacy of calibration including the Pass or fail designation in accordance with the accuracy specifications presented above
    - Corrective action taken (see Step 5 above) in the event of failure to adequately calibrate

MAINTENANCE

- When not in use or between measurements, the dissolved oxygen probe will be kept immersed in or moist with deionized water.

- The meter batteries will be checked prior to each meter's use and will be replaced when the meter cannot be redline adjusted.

- The meter response time and stability will be tracked to determine the need for instrument maintenance. When response time becomes greater than two minutes, probe service is indicated.

ATTACHMENTS

Equipment Calibration Log (sample)

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EQUIPMENT CALIBRATION LOG

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ BM/TK ☐ Rental

METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL BY	STANDARD	READING	SETTINGS
☐ pH meter	units					4.00		
						7.00		
						10.01		
☐ Turbidity meter	NTU					[illegible]		
						20		
						100		
						800		
☐ Sp. conductance meter	uS/mS					1413 μS @ 25 °C		
☐ PID	ppm					open air		
						100 ppm Iso. Gas		
☐ Particulate meter	mg/m^3					zero air		
☐ Oxygen	%					open air		
☐ Hydrogen sulfide	ppm					open air		
☐ Carbon monoxide	ppm					open air		
☐ LEL	%					open air		
☐ Radiation Meter	uR/H					background area		
☐								
☐								

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

FOP 022.0

GROUNDWATER LEVEL MEASUREMENT

PURPOSE

This procedure describes the methods used to obtain accurate and consistent water level measurements in monitoring wells, piezometers and well points. Water levels will be measured at monitoring wells and, if practicable, in supply wells to estimate purge volumes associated with sampling, and to develop a potentiometric surface of the groundwater in order to estimate the direction and velocity of flow in the aquifer. Water levels in monitoring wells will be measured using an electronic water level indicator (e-line) that has been checked for operation prior to mobilization.

PROCEDURE

1. Decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the Benchmark Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination. Store the e-line in a protected area until use. This may include wrapping the e-line in clean plastic until the time of use.

2. Unlock and remove the well protective cap or cover and place on clean plastic.

3. Lower the probe slowly into the monitoring well until the audible alarm sounds. This indicates the depth to water has been reached.

4. Move the cable up and down slowly to identify the depth at which the alarm just begins to sound. Measure this depth against the mark on the lip of the well riser used as a surveyed reference point (typically the north side of the riser).

5. Read depth from the graduated cable to the nearest 0.01 foot. Do not use inches. If the e-line is not graduated, use a rule or tape measure graduated in 0.01-foot increments to measure from the nearest reference mark on the e-line cable.

6. Record the water level on a Water Level Monitoring Record (sample attached).

7. Remove the probe from the well slowly, drying the cable and probe with a clean paper wipe. Be sure to repeat decontamination before use in another well.

8. Replace well plug and protective cap or cover. Lock in place as appropriate.

ATTACHMENTS

Water Level Monitoring Record (sample)

REFERENCES

Benchmark FOPs:
040 Non-Disposable and Non-Dedicated Sampling Equipment Decontamination

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WATER LEVEL MONITORING RECORD

Project Name: Client:
Project No.: Location:
Field Personnel: Date:
Weather:

Well No.	Time	Top of Riser Elevation (fmsl)	Static Depth to Water (fbTOR)	Groundwater Elevation (fmsl)	Total Depth (fbTOR)	Last Total Depth Measurement (fbTOR)

Comments/Remarks:

FOP 031.0

LOW FLOW (MINIMAL DRAWDOWN) GROUNDWATER PURGING & SAMPLING PROCEDURES

PURPOSE

This procedure describes the methods used for performing low flow (minimal drawdown) purging, also referred to as micro-purging, at a well prior to groundwater sampling to obtain a representative sample from the water-bearing zone. This method of purging is used to minimize the turbidity of the produced water. This may increase the representativeness of the groundwater samples by avoiding the necessity of filtering suspended solids in the field prior to preservation of the sample.

Well purging is typically performed immediately preceding groundwater sampling. The sample should be collected as soon as the parameters measured in the field (i.e., pH, specific conductance, dissolved oxygen, Eh, temperature, and turbidity) have stabilized.

PROCEDURE

1. Water samples should not be taken immediately following well development. Sufficient time should be allowed to stabilize the groundwater flow regime in the vicinity of the monitoring well. This lag time will depend on site conditions and methods of installation but may exceed one week.

2. Prepare the electronic water level indicator (e-line) in accordance with the procedures referenced in the Benchmark's Groundwater Level Measurement FOP and decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the Benchmark's Non-disposable and Non-dedicated Sampling Equipment Decontamination FOP. Store the e-line in a protected area until use. This may include wrapping the e-line in clean plastic until the time of use.

3. Calibrate all sampling devices and monitoring equipment in accordance with manufacturer's recommendations, the site Quality Assurance Project Plan (QAPP) and/or Field Sampling Plan (FSP). Calibration of field

instrumentation should be followed as specified in Benchmark's Calibration and Maintenance FOP for each individual meter.

4. Inspect the well/piezometer for signs of vandalism or damage and record condition on the Groundwater Well Purge & Sample Collection Log form (sample attached). Specifically, inspect the integrity of the following: concrete surface seal, lock, protective casing and well cover, well casing and J-plug/cap. Report any irregular findings to the Project Manager.

5. Unlock and remove the well protective cap or cover and place on clean plastic to avoid introducing foreign material into the well.

6. Monitor the well for organic vapors using a PID, as per the Work Plan. If a reading of greater than 5 ppm is recorded, the well should be allowed to vent until levels drop below 5 ppm before proceeding with purging.

7. Lower the e-line probe slowly into the monitoring well and record the initial water level in accordance with the procedures referenced in Benchmark's Groundwater Level Measurement FOP. Refer to the construction diagram for the well to identify the screened depth.

8. Decontaminate all non-dedicated pump and tubing equipment following the procedures referenced in the Benchmark's Non-disposable and Non-dedicated Sampling Equipment Decontamination FOP.

9. Lower the purge pump or tubing (i.e., low-flow electrical submersible, peristaltic, etc.) slowly into the well until the pump/tubing intake is approximately in the middle of the screened interval. Rapid insertion of the pump will increase the turbidity of well water, and can increase the required purge time. This step can be eliminated if dedicated tubing is already within the well.

   Placement of the pump close to the bottom of the well will cause increased entrainment of solids, which may have settled in the well over time. Low-flow purging has the advantage of minimizing mixing between the overlying stagnant casing water and water within the screened interval. The objective of low-flow purging is to maintain a purging rate, which minimizes stress (drawdown) of the water level in the well. Low-flow refers to the velocity with which water enters the pump intake and that is imparted to the formation pore water in the immediate vicinity of the well screen.

10. Lower the e-line back down the well as water levels will be frequently monitored during purge and sample activities.

11. Begin pumping to purge the well. The pumping rate should be between 100 and 500 milliliters (ml) per minute (0.03 to 0.13 gallons per minute) depending on site hydrogeology. Periodically check the well water level with the e-line adjusting the flow rate as necessary to stabilize drawdown within the well. If possible, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 feet or less). If the water level exceeds 2 feet below static and declining, slow the purge rate until the water level generally stabilizes. Record each pumping rate and water level during the event.

    The low flow rate determined during purging will be maintained during the collection of analytical samples. At some sites where geologic heterogeneities are sufficiently different within the screened interval, high conductivity zones may be preferentially sampled.

12. Measure and record field parameters (pH, specific conductance, Eh, dissolved oxygen (DO), temperature, and turbidity) during purging activities. In lieu of measuring all of the parameters, a minimum subset could be limited to pH, specific conductance, and turbidity or DO.

    Water quality indicator parameters should be used to determine purging needs prior to sample collection in each well. Stabilization of indicator parameters should be used to determine when formation water is first encountered during purging. In general, the order of stabilization is pH, temperature, and specific conductance, followed by Eh, DO and turbidity. Performance criteria for determination of stabilization should be based on water-level drawdown, pumping rate and equipment specifications for measuring indicator parameters. An in-line flow through cell to continuously measure the above parameters may be used. The in-line device should be disconnected or bypassed during sample collection.

13. Purging will continue until parameters of water quality have stabilized. Record measurements for field indicator parameters (including water levels) at regular intervals during purging. The stability of these parameters with time can be used to guide the decision to discontinue purging. Proper adjustments must be made to stabilize the flow rate as soon as possible.

14. Record well purging and sampling data in the Project Field Book or on the attached Groundwater Well Purge & Sample Collection Log (sample attached). Measurements should be taken approximately every three to five minutes, or as merited given the rapidity of change.

15. Purging is complete when field indicator parameters stabilize. Stabilization is achieved after all field parameters have stabilized for three successive readings. Three successive readings should be within ± 0.1 units for pH, ± 3% for specific conductance, ± 10 mV for Eh, and ± 10% for turbidity and dissolved oxygen. These stabilization guidelines are provided for rough estimates only, actual site-specific knowledge may be used to adjust these requirements higher or lower.

    An in-line water quality measurement device (e.g., flow-through cell) should be used to establish the stabilization time for several field parameters on a well-specific basis. Data on pumping rate, drawdown and volume required for parameter stabilization can be used as a guide for conducting subsequent sampling activities.

16. Collect all project-required samples except for volatile organic compounds (VOCs) from the discharge tubing at the flow rate established during purging in accordance with Benchmark's Groundwater Sample Collection Procedures FOP. Continue to maintain a constant flow rate such that the water level is not drawn down as described above. Fill sample containers with minimal

turbulence by allowing the ground water to flow from the tubing along the inside walls of the container.

17. If field filtration is recommended as a result of increased turbidity, an in-line filter equipped with a 0.45-micron filter should be utilized.

18. VOCs shall be collected using the following procedure.

    a. Once all other required sample containers have been filled, turn off the peristaltic pump. Groundwater remaining within the dedicated tubing assembly has not been altered by the negative pressure effects of the pump head and as such, this groundwater can be collected for VOC analysis.

    b. Remove the tubing from the well taking care to prevent the tubing from coming in contact with the ground surface and without allowing groundwater to escape or drain from the tubing intake.

    c. Once the tubing is carefully removed, reverse the pump direction so that the groundwater within the tubing will be "pushed" out of the intake end (i.e., positive displacement) and not "pulled" through the original discharge end (i.e., negative displacement). Groundwater pulled through the pump head assembly CANNOT be collected for VOC analysis.

    d. Turn pump on using the same flow rate during initial sample collection and allow groundwater within the tubing to fill the VOC vials slowly. VOC sample collection shall be conducted with as minimal disturbance as possible.

    e. Cap the VOC vials leaving no visible headspace (i.e., air-bubbles).

19. Replace the dedicated tubing down the well taking care to avoid contact with the ground surface.

20. Restore the well to its capped/covered and locked condition.

21. Upon purge and sample collection completion, slowly lower the e-line to the bottom of the well/piezometer. Record the total depth to the nearest 0.01-foot and compare to the previous total depth measurement. If a significant discrepancy exists, re-measure the total depth. Record observations of purge water to determine whether the well/piezometer had become silted due to inactivity or damaged (i.e., well sand within purge water). Upon confirmation of the new total depth and determination of the cause (i.e., siltation or damage), notify the Project Manager following project field activities.

ATTACHMENTS

Groundwater Well Purge & Sample Collection Log (sample)

REFERENCES

United States Environmental Protection Agency, 540/S-95/504, 1995. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures.*

<u>Benchmark FOPs:</u>

007	*Calibration and Maintenance of Portable Dissolved Oxygen Meter*
008	*Calibration and Maintenance of Portable Field pH/Eh Meter*
009	*Calibration and Maintenance of Portable Field Turbidity Meter*
011	*Calibration and Maintenance of Portable Photoionization Detector*
012	*Calibration and Maintenance of Portable Specific Conductance Meter*
022	*Groundwater Level Measurement*
024	*Groundwater Sample Collection Procedures*
040	*Non-Disposable and Non-Dedicated Sampling Equipment Decontamination*
046	*Sample Labeling, Storage and Shipment Procedures*

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LOW FLOW METHOD GROUNDWATER PURGE & SAMPLE COLLECTION LOG

Project Name:		WELL LOCATION:	
Project Number:		Sample Matrix:	groundwater
Client:		Weather:	

WELL DATA:

DATE:		TIME:		
Casing Diameter (inches):		Riser Material:		PVC
Screened interval (fbTOR):	-	Screen Material:		PVC
Static Water Level (fbTOR):		Bottom Depth (fbTOR):		
Elevation Top of Well Riser (fmsl):		Ground Surface Elevation (fmsl):		
Elevation Top of Screen (fmsl):	0.00	Stick-up (feet):		0.00
Standing volume in gallons: [(bottom depth - static water level) x vol calculation in table per well diameter]:				

Volume Calculation

Well Diameter	Volume gal/ft
1"	0.041
2"	0.163
3"	0.367
4"	0.653
5"	1.020
6"	1.469

PURGING DATA:

Pump Type:

Is equipment dedicated to location? yes no

Is tubing dedicated to location? yes no

Depth of Sample (i.e. Level of Intake) (fbTOR):

Approximate Purge Rate (gal/min):

Time	Water Level (fbTOR)	Accumulated Volume (gallons)	pH (units)	Temperature (degrees C)	Specific Conductance (uS/cm)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
	Initial								

SAMPLING DATA:

DATE:	START TIME:		END TIME:	
Method: low-flow with dedicated tubing	Was well sampled to dryness?	yes	no	
Initial Water Level (fbTOR):	Was well sampled below top of sand pack?	yes	no	
Final Water Level (fbTOR):	Field Personnel:			

PHYSICAL & CHEMICAL DATA:

Appearance:

Color:

Odor:

Sediment Present?

WATER QUALITY MEASUREMENTS

pH (units)	TEMP. (°C)	SC (uS)	TURB. (NTU)	DO (ppm)	ORP (mV)

REMARKS:

PREPARED BY:

FOP 064.0

SURFACE WATER SAMPLING PROCEDURES

PURPOSE

This procedure describes a method for collecting surface water samples. Sediment samples typically are collected in conjunction with surface water samples as dictated by the site-specific work plan. It should be noted, however, sediment sample collection procedures are not presented herein and Benchmark's sediment sampling FOPs 049 and 050 should be reviewed prior to sediment sample collection. This surface water sampling method incorporates the use of the laboratory provided sample bottle for collecting the sample, which eliminates the need for other equipment and hence, reduces the risk of introducing other variables into a sampling event.

PROCEDURE

1. Locate the surface water sample location.
2. Calibrate all field meters (i.e., pH/Eh, turbidity, specific conductance, dissolved oxygen, PID etc.) in accordance with the Benchmark Field Operating Procedure for Calibration and Maintenance of the specific field meter.
3. Wearing appropriate protective gear (i.e., latex gloves, safety glasses), as required in the Project Health and Safety Plan, prepare sample bottles for use.
4. If samples are to be collected from a stream, creek or other running water body, collect downstream samples first to minimize impacts on sample quality.
5. Surface water samples should be collected during a dry (non-precipitation) event to avoid any dilution effect from precipitation.
6. Pre-label all sample bottles in the field using a waterproof permanent marker in accordance with the Benchmark Sample Labeling, Storage and Shipment

FOP. The following information, at a minimum, should be included on the label:

- Project Number;
- Sample identification code (as per project specifications);
- Date of sample collection (mm, dd, yy);
- Time of sample collection (military time only) (hh:mm);
- Specify "grab" or "composite" sample type;
- Sampler initials;
- Preservative(s) (if applicable); and
- Analytes for analysis (if practicable).

7. Collect the surface water sample from the designated location by slowly submerging each sample bottle with minimal surface disturbance. If the sample location cannot be sampled in this manner due to shallow water conditions, a small depression can be created with a standard shovel to deepen the location to facilitate sample collection by direct grab. It should be noted, prior to disturbing sediment at any location for this purpose, all required sediment samples should be collected. All sediment cuttings will be removed from the area and the surface water allowed to flow through the depression for several minutes prior to collecting samples until clear (i.e., no visible sediment).

8. Collect samples from near shore. If water body is over three feet deep, check for stratification. Check each stratum for contamination using field measured water quality parameters. Collect samples from each stratum showing evidence of impact. If no stratum shows signs of impact, collect a composite sample having equal parts of water from each stratum.

9. Collect samples into pre-cleaned bottles provided by the analytical laboratory with the appropriate preservative(s) added based on the volatilization sensitivity or suite of analytical parameters required, as designated below:

   - Volatile Organic Compounds (VOCs)
   - Total Organic Halogens (TOX)

- Total Organic Carbon (TOC)
- Extractable Organic Compounds (i.e., BNAs, SVOCs, etc.)
- Total metals (Dissolved Metals)
- Total Phenolic Compounds
- Cyanide
- Sulfate and Chloride
- Turbidity
- Nitrate and Ammonia
- Radionuclides

10. For pre-preserved bottles, avoid completely submerging the bottle and overfilling to prevent preservative loss. Pre-preserved VOC vials should be filled from a second, unpreserved, pre-cleaned glass container. Never transfer samples from dissimilar bottle types (i.e., plastic to glass or glass to plastic).

11. Collect a separate sample of approximately 200 ml into an appropriate container prior to collecting the first and following the last surface water sample collected to measure the following field parameters:

Parameter	Units
Dissolved Oxygen	parts per million (ppm)
Specific Conductance	μmhos/cm or μS or mS
pH	pH units
Temperature	^{o}C or ^{o}F
Turbidity	NTU
Eh (*optional*)	mV
PID VOCs (*optional*)	ppm

Record all field measurements on a Surface Water Quality Field Collection Log form (sample attached).

12. Record available information for the pond, stream or other body of water that was sampled, such as its size, location and depth in the Project Field Book and

on the Surface Water Quality Field Collection Log form (sample attached). Approximate sampling points should be identified on a sketch of the water body.

13. Label, store and ship all samples in accordance with the Benchmark Field Operating Procedure for Sample Labeling, Storage and Shipment Procedures.

ATTACHMENTS

Surface Water Quality Field Collection Log (sample)

REFERENCES

<u>Benchmark FOPs:</u>

007	*Calibration and Maintenance of Portable Dissolved Oxygen Meter*
008	*Calibration and Maintenance of Portable Field pH/Eh Meter*
009	*Calibration and Maintenance of Portable Field Turbidity Meter*
012	*Calibration and Maintenance of Portable Specific Conductance Meter*
046	*Sample Labeling, Storage and Shipment Procedures*

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SURFACE WATER QUALITY FIELD COLLECTION LOG

PROJECT INFORMATION

Project Name:

Project No.:

Client:

SAMPLE DESCRIPTION

I.D.:

Matrix:

Location:

SAMPLE INFORMATION

Date Collected:

Time Collected:

Date Shipped to Lab:

Collected By:

Sample Collection Method:

LABORATORY ANALYSIS

SAMPLING INFORMATION

Weather:

Air Temperature:

Depth of Sample:

Parameter	First	Last	Units
pH			units
Temp.			°C
Cond.			µS
Turbidity			NTU
Eh			mV
D.O.			ppm
Odor			olfactory
Appearance			visual

LOCATION SKETCH

(not to scale, dimensions are approximate)

EXACT LOCATION (if applicable)

Northing (ft)	Easting (ft)	Surface Elevation (fmsl)

ADDITIONAL LABORATORY ANALYSIS

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

FOP 040.0

NON-DISPOSABLE AND NON-DEDICATED SAMPLING EQUIPMENT DECONTAMINATION

PURPOSE

This procedure is to be used for the decontamination of non-disposable and non-dedicated equipment used in the collection of environmental samples. The purpose of this procedure is to remove chemical constituents from previous samples from the sampling equipment. This prevents these constituents from being transferred to later samples, or being transported out of controlled areas.

HEALTH AND SAFETY

Nitric acid is a strong oxidizing agent as well as being extremely corrosive to the skin and eyes. Solvents such as acetone, methanol, hexane and isopropanol are flammable liquids. Limited contact with skin can cause irritation, while prolonged contact may result in dermatitis. Eye contact with the solvents may cause irritation or temporary corneal damage. Safety glasses with protective side shields, neoprene or nitrile gloves and long-sleeve protective clothing must be worn whenever acids and solvents are being used.

PROCEDURE

Bailers, split-spoons, steel or brass split-spoon liners, Shelby tubes, submersible pumps, soil sampling knives, and similar equipment will be decontaminated as described below.

1. Wash equipment thoroughly with non-phosphate detergent and potable-quality water, using a brush where possible to remove any particulate matter or surface film. If the sampler is visibly coated with tars or other phase-separated hydrocarbons, pre-wash with acetone or isopropanol, or by steam cleaning. Decontamination will adhere to the following procedure:

   a. Rinse with potable-quality water;
   b. Rinsed with 10% nitric acid (HNO_3) solution (see ***Note 1***);
   c. Rinse with potable-quality water;
   d. Rinse with pesticide grade acetone or methanol (see ***Note 2***);
   e. Rinse with pesticide grade hexane (see ***Note 2***);
   f. Rinse with deionized water demonstrated analyte-free, such as distilled water;
   g. Air dry; and
   h. Store in a clean area or wrap in aluminum foil (shiny side out) or new plastic sheeting as necessary to ensure cleanliness.

2. All non-dedicated well evacuation equipment, such as submersible pumps and bailers, which are put into the well, must be decontaminated following the procedures listed above. All evacuation tubing must be dedicated to individual wells (i.e., tubing cannot be reused). However, if submersible pump discharge tubing must be reused, the tubing and associated sample valves or flow-through cells used in well purging or pumping tests will be decontaminated as described below:

   a. Pump a mixture of potable water and a non-phosphate detergent through the tubing, sample valves and flow cells, using the submersible pump.
   b. Steam clean or detergent wash the exterior of the tubing, sample valves, flow cells and pump.
   c. Pump potable water through the tubing, sample valve, and flow cell until no indications of detergent (e.g. foaming) are observed.

d. Double rinse the exterior of the tubing with potable water.

e. Rinse the exterior of the tubing with distilled water.

f. Store in a clean area or wrap the pump and tubing assembly in new plastic sheeting as necessary to ensure cleanliness until ready for use.

3. All unused sample bottles and sampling equipment must be maintained in such a manner that there is no possibility of casual contamination.

4. Manage all waste materials generated during decontamination procedures as described in the Benchmark Field Operating Procedure for Management of Investigation Derived Waste.

ATTACHMENTS

none

REFERENCES

Benchmark FOPs:
032 Management of Investigation-Derived Waste

NOTES

(1) Omit this step if metals are not being analyzed. For carbon steel split spoon samplers, a 1% rather than 10% HNO_3 solution should be used.

(2) This solvent rinse can be omitted if organics are not being analyzed. Alternatively, if approval from the NYSDEC has been granted, use pesticide grade isopropanol as the cleaning solvent. Isopropanol is better suited as a cleaning solvent that acetone, methanol and hexane for the following reasons:

- Acetone is a parameter analyzed for on the Target Compound List (TCL); therefore the detection of acetone in samples collected using acetone rinsed equipment is suspect;

- Almost all grades of methanol contain 2-butanone (Methyl Ethyl Ketone, MEK) contamination. As for acetone, 2-butanone is a TCL compound. Thus, the detection of 2-butanone in samples collected using methanol rinsed equipment is suspect. In addition, methanol is much more hazardous than either isopropanol or acetone.

- Hexane is not miscible with water (hydrophobic) and therefore, is not an effective rinsing agent unless the sampling equipment is dry. Isopropanol is extremely miscible in water (amphoteric), making it an effective rinsing agent on either wet or dry equipment.

FOP 046.0

SAMPLE LABELING, STORAGE & SHIPMENT PROCEDURES

PURPOSE

The collection and analysis of samples of environmental media, including soils, groundwater, surface water, and sediment, are the central activities of the field investigation. These samples must be properly labeled to preserve its identity, and properly stored and shipped in a manner that preserves its integrity and chain of custody. This procedure presents methods for these activities.

SAMPLE LABELING PROCEDURE

1. Assign each sample retained for analysis a unique 9-digit alphanumeric identification code or as indicated in the Project Work Plan. Typically, this code will be formatted as follows:

Sample I.D. Example: GW051402047	
GW	**Sample matrix** GW = groundwater; SW = surface water; SUB = subsurface soil; SS = surface soil; SED = sediment; L = leachate; A = air
05	Month of sample collection
14	Day of sample collection
02	Year of sample collection
047	Consecutive sample number

2. Consecutive sample numbers will indicate the individual sample's sequence in the total set of samples collected during the investigation/sampling event. The sample number above, for example, would indicate the 47th sample retained for analysis during the field investigation, collected on May 14, 2002.

3. Affix a non-removable (when wet) label to each sample container. The following information will be written on the label with black or blue ink that will not smudge when wet:

   - Project number
   - Sample ID (see Step 1 above)
   - Date of sample collection
   - Time of sample collection (military time only)
   - Specify "grab" or "composite" sample with an "X"
   - Sampler initials
   - Preservative(s) (if applicable)
   - Analytes for analysis (if practicable)

4. Record all sample label information in the Project Field Book and on a Sample Summary Collection Log (see attached samples), keyed to the sample identification number. In addition, add information regarding the matrix, sample location, depth, etc. to provide a complete description of the sample.

SAMPLE STORAGE PROCEDURE

1. Immediately after collection, placement in the proper container, and labeling, place samples to be retained for chemical analysis into resealable plastic bags.

2. Place bagged samples into an ice chest filled approximately half-full of double bagged ice. Blue ice is not an acceptable substitute for ice.

3. Maintain samples in an ice chest or in an alternative location (e.g. sample refrigerator) as approved by the Benchmark Field Team Leader until time of shipment. Periodically drain melt-water off coolers and replenish ice as necessary.

4. Ship samples on a daily basis, unless otherwise directed by the Benchmark Field Team Leader.

5. Maintain appropriate custody procedures on coolers and other sample storage containers at all times. These procedures are discussed in detail in the Project Quality Assurance Project Plan, Monitoring Plan or Work Plan.

6. Samples shall be kept in a secure location locked and controlled (i.e., locked building or fenced area) so that only the Project Field Team Leader has access to the location or under the constant visual surveillance of the same.

SAMPLE SHIPPING PROCEDURE

1. Fill out the chain-of-custody form completely (see attached sample) with all relevant information. The white original goes with the samples and should be placed in a resealable plastic bag and taped inside the sample cooler lid; the sampler should retain the copy.

2. Place a layer of inert cushioning material such as bubble pack in the bottom of cooler.

3. Place each bottle in a bubble wrap sleeve or other protective wrap. To the extent practicable, then place each bottle in a resealable plastic bag.

4. Open a garbage bag (or similar) into a cooler and place sample bottles into the garbage bag (or similar) with volatile organic analysis (VOA) vials near the center of the cooler.

5. Pack bottles with ice in plastic bags. At packing completion, cooler should be at least 50 percent ice, by volume. Coolers should be completely filled, so that samples do not move excessively during shipping.

6. Duct tape (or similar) cooler drain closed and wrap cooler completely in two or more locations to secure lid, specifically covering the hinges of the cooler.

7. Place laboratory label address identifying cooler number (i.e., 1 of 4, 2 of 4 etc.) and overnight delivery waybill sleeves on cooler lid or handle sleeve (Federal Express).

8. Sign the custody seal tape with an indelible soft-tip marker and place over the duct tape across the front and back seam between the lid and cooler body.

9. Cover the signed custody seal tape with an additional wrap of transparent strapping tape.

10. Place "Fragile" and "This Side Up" labels on all four sides of the cooler. "This Side Up" labels are yellow labels with a black arrow with the arrowhead pointing toward the cooler lid.

11. For coolers shipped by overnight delivery, retain a copy of the shipping waybill, and attach to the chain-of-custody documentation.

ATTACHMENTS

Soil/Sediment Sample Summary Collection Log (sample)
Groundwater/Surface Water Sample Summary Collection Log (sample)
Wipe Sample Summary Collection Log (sample)
Air Sample Summary Collection Log (sample)
Chain-Of-Custody Form (sample)

REFERENCES

none

Benchmark Environmental Engineering & Science, PLLC
TurnKey Environmental Restoration, LLC

400473

GROUNDWATER/SURFACE WATER SAMPLE COLLECTION SUMMARY LOG

Field ID	Location	QC Type	Depth (feet)		Analytical Parameters	Containers	Date	Time	Sampler Initials	Comments (e.g. problems encountered, ref. to variance, location changes, depth changes, important matrix observations or description, gravel thickness, etc.)
			from	to						

<u>Equipment Rinsate Blanks</u> *- Pour clean deionized water over or through decontaminated sampling equipment into sample containers. Collect at a frequency of 1 per sampling method per day. Analyze for all those parameters analyzed for in the samples collected the same day. HSL Metals can be substituted by only the Metals analyzed for that day (except Hexavalent Chromium which needs a separate container). Match equipment used for constituents of concern to rinsate analyte. Note deionized water lot # or distilled water manufacturers info & date.*

<u>MS/MSD/MSB</u> *- Collect at a frequency of 1 per 20 samples of each matrix per day. Analyze for all those parameters analyzed for the samples collected the same day.*

<u>Field Blank</u> *- Pour clean deionized water (used as final decon rinse water) into sample containers while at the sampling site. Collect field blanks at a frequency of 1 per lot of deionized water. Note water lot number and dates in use for decon in 'Comments' section.*

<u>Investigation Derived Waste (IDW) Characterization samples</u> *- One composited sample from all drums of decon fluids and soil. Please note number of drums and labels on collection log.*

<u>Notes:</u>

1. See QAPP for sampling frequency and actual number of QC samples.
2. CWM - clear, wide-mouth glass jar with Teflon-lined cap.
3. HDPE - high density polyethylene bottle.
4. FD - Field Duplicate.
5. MS/MSD/MSB - Matrix Spike, Matrix Spike Duplicate, Matrix Spike Blank.
6. BD - Blind Duplicate.

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CHAIN OF CUSTODY RECORD

Project No.			Project Name			Number of Containers	VOCs	SVOCs	Metals						REMARKS
Samplers (Signature)															
No.	Date	Time	comp	grab	Sample Identification										

Possible Hazard Identification:
Non-haz Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal:
Return to Client ☐ Disposal by Lab ☐ Archive ____________(mos.)

Turnaround Time Required:
Normal ☐ Rush ☐

QC Level:
I. ☐ II. ☐ III. ☐ Project Specific (specify):__________________

Relinquished by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	REMARKS:
Relinquished by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	

Appendix C

Corrective Measures Report (sample form)

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DAILY LOG	DATE			
	REPORT NO.			
	PAGE	OF		

CORRECTIVE MEASURES REPORT

Date:

Project:

Job No:

Location:

CQA Monitor(s):

Client:

Contractor:

Contractor's Supervisor:

WEATHER CONDITIONS:

Ambient Air Temp. - A.M.:

Ambient Air Temp. - P.M.:

Wind Direction:

Wind Speed:

Precipitation:

Corrective Measures Undertaken (reference Problem Identification Report No.):

Retesing Location:

Suggested Method of Minimizing Re-Occurrence:

Approvals (initial):

CQA Engineer:

Project Manager:

Signed:

CQA Representative

APPENDIX I

PASSIVE VENT DAR-1 ANALYSIS

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TABLE 1

GAS VENT SYSTEM DAR-1 ANALYSIS

PETER COOPER LANDFILL NPL SITE
GOWANDA, NEW YORK

Parameter	Measured conc. (mg/m^3)^1	Measured conc. (lb/ft^3)	Gas Flow Rate (CFH)^2	Q_a (lbs/yr)	Q_b (lbs/hr)	h_s (ft)	h_b (ft)	h_e (ft)	Ca (ug/m^3)	AGC (ug/m^3)
Acetone	2.9	1.81E-07	702	1.113316	0.000127	20	N/A	20	0.007897	28000
Benzene	0.18	1.12E-08	702	0.069102	7.89E-06	20	N/A	20	0.00049	0.13
2-Butanone	1.1	6.87E-08	702	0.422292	4.82E-05	20	N/A	20	0.002995	5000
Carbon Disulfide	3.2	2E-07	702	1.228486	0.00014	20	N/A	20	0.008714	700
1,4,-Dichlorobenzene	0.048	3E-09	702	0.018427	2.1E-06	20	N/A	20	0.000131	0.09
Ethylbenzene	0.1	6.24E-09	702	0.03839	4.38E-06	20	N/A	20	0.000272	1000
2-Hexanone	0.007	4.37E-10	702	0.002687	3.07E-07	20	N/A	20	1.91E-05	48
4-Methyl-2-pentanone	0.37	2.31E-08	702	0.142044	1.62E-05	20	N/A	20	0.001008	3000
Styrene	0.02	1.25E-09	702	0.007678	8.76E-07	20	N/A	20	5.45E-05	1000
Toluene	2.6	1.62E-07	702	0.998145	0.000114	20	N/A	20	0.00708	400
Trichlorofluoromethane	0.0017	1.06E-10	702	0.000653	7.45E-08	20	N/A	20	4.63E-06	20000
Vinyl Acetate	0.014	8.74E-10	702	0.005375	6.14E-07	20	N/A	20	3.81E-05	200
Xylenes (o,m,p)	0.13	8.12E-09	702	0.049907	5.7E-06	20	N/A	20	0.000354	700
Hydrogen sulfide	1394	8.7E-05	351	267.5797	0.030546	20	N/A	20	1.897959	2

Notes:

1. Based on RI Samples.
2. Gas flow rate based on FS modeling.