APPENDIX A

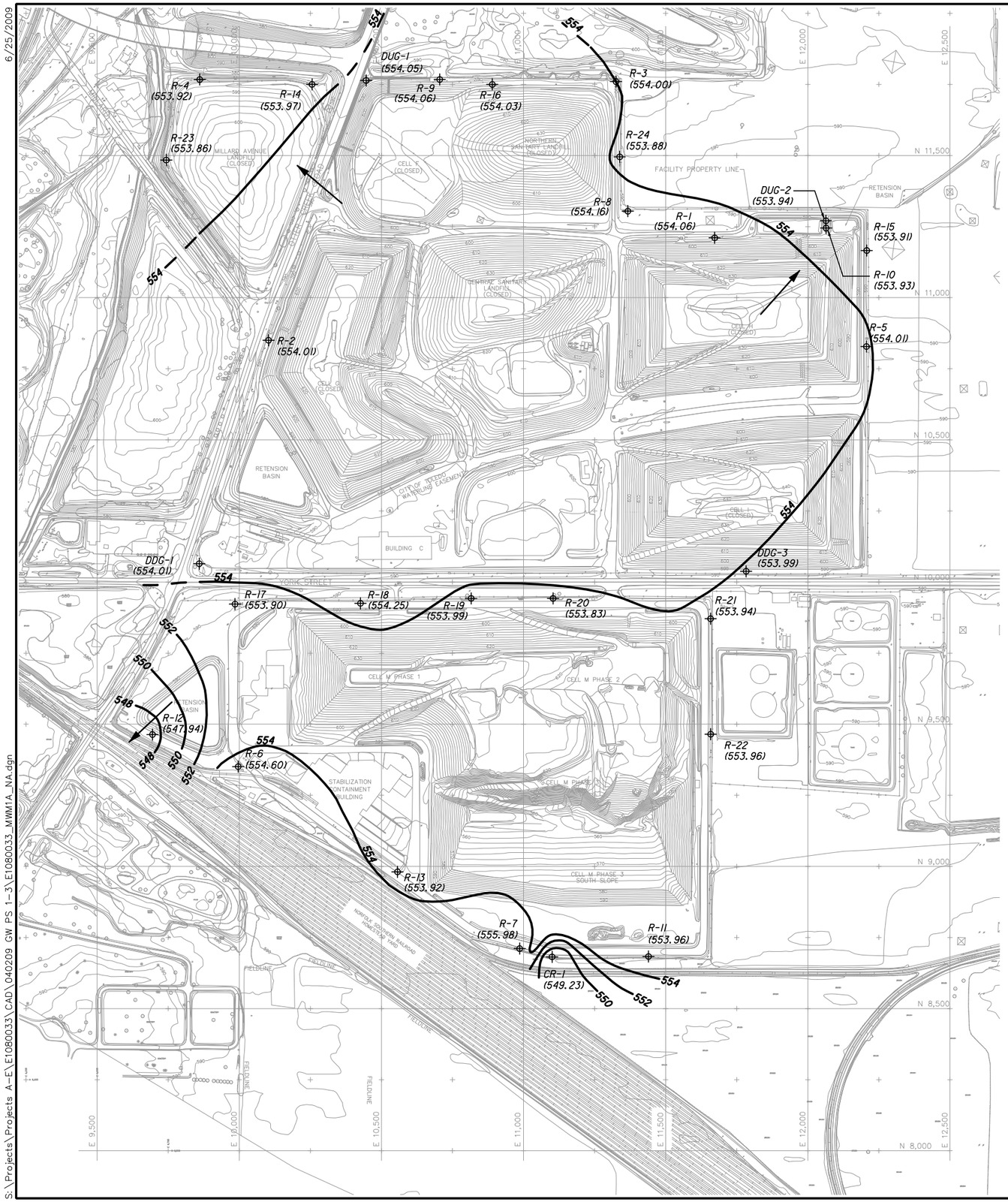
Supplemental Facility Monitoring Data

C O N T E N T S

Bedrock Groundwater Mapping
Surface Drainage Inspection
ENVIRON Inspection Report

Bedrock Groundwater Mapping

6/25/2009



GRAPHIC SCALE
0' 100' 200' 400'

BEDROCK MONITORING WELLS			
APRIL 2, 2009			
MONITORING WELL	TOP OF CASING (FEET MSL)	WATER LEVEL (FEET)	WATER LEVEL ELEVATION (FEET MSL)
CR-1	594.65	45.42	549.23
DDG-1	587.41	33.40	554.01
DDG-3	593.71	39.72	553.99
DUG-1	586.59	32.54	554.05
DUG-2	595.76	41.82	553.94
R-1	596.71	42.65	554.06
R-2	594.12	40.11	554.01
R-3	593.96	39.96	554.00
R-4	588.33	34.41	553.92
R-5	593.20	39.19	554.01
R-6	595.30	40.70	554.60
R-7	596.28	40.30	555.98
R-8	594.44	40.28	554.16
R-9	591.40	37.34	554.06
R-10	596.68	42.75	553.93
R-11	596.08	42.12	553.96
R-12	594.64	46.70	547.94
R-13	595.61	41.69	553.92
R-14	586.82	32.85	553.97
R-15	592.13	38.22	553.91
R-16	598.03	44.00	554.03
R-17	592.32	38.42	553.90
R-18	591.56	37.31	554.25
R-19	595.38	41.39	553.99
R-20	595.64	41.81	553.83
R-21	594.34	40.40	553.94
R-22	595.66	41.70	553.96
R-23	591.32	37.46	553.86
R-24	592.40	38.52	553.88

LEGEND

R-1 (544.06)	BEDROCK MONITORING WELL AND GROUNDWATER ELEVATION
554	POTENTIOMETRIC SURFACE CONTOUR
	DOMINANT FLOW DIRECTION

POTENTIOMETRIC CONTOUR INTERVAL = 2.0 FEET

TOPOGRAPHIC CONTOUR INTERVAL = 2.0 FEET

NOTES

1. TOPOGRAPHIC INFORMATION ON THIS DRAWING WAS OBTAINED FROM AN AERIAL SURVEY CONDUCTED ON OCTOBER 6, 2002 BY AEROCON PHOTOGRAMMETRIC SERVICES, INC.
2. GROUNDWATER ELEVATION DATA COLLECTED BY ESOI PERSONNEL ON APRIL 2, 2009.
3. THE GROUNDWATER SURFACE SHOWS LESS THAN ONE FOOT OF RELIEF ACROSS MOST OF THE SITE.

NO.	DATE	BY	DESCRIPTION
1			

The Mannik & Smith Group, Inc.
Civil Engineering, Surveying and Environmental Consulting

ENVIROSAFE SERVICES OF OHIO, INC.
ENVIROSAFE SERVICES OF OHIO, INC.
OREGON FACILITY

POTENTIOMETRIC SURFACE MAP FOR THE BEDROCK UNIT APRIL 2, 2009

1/3

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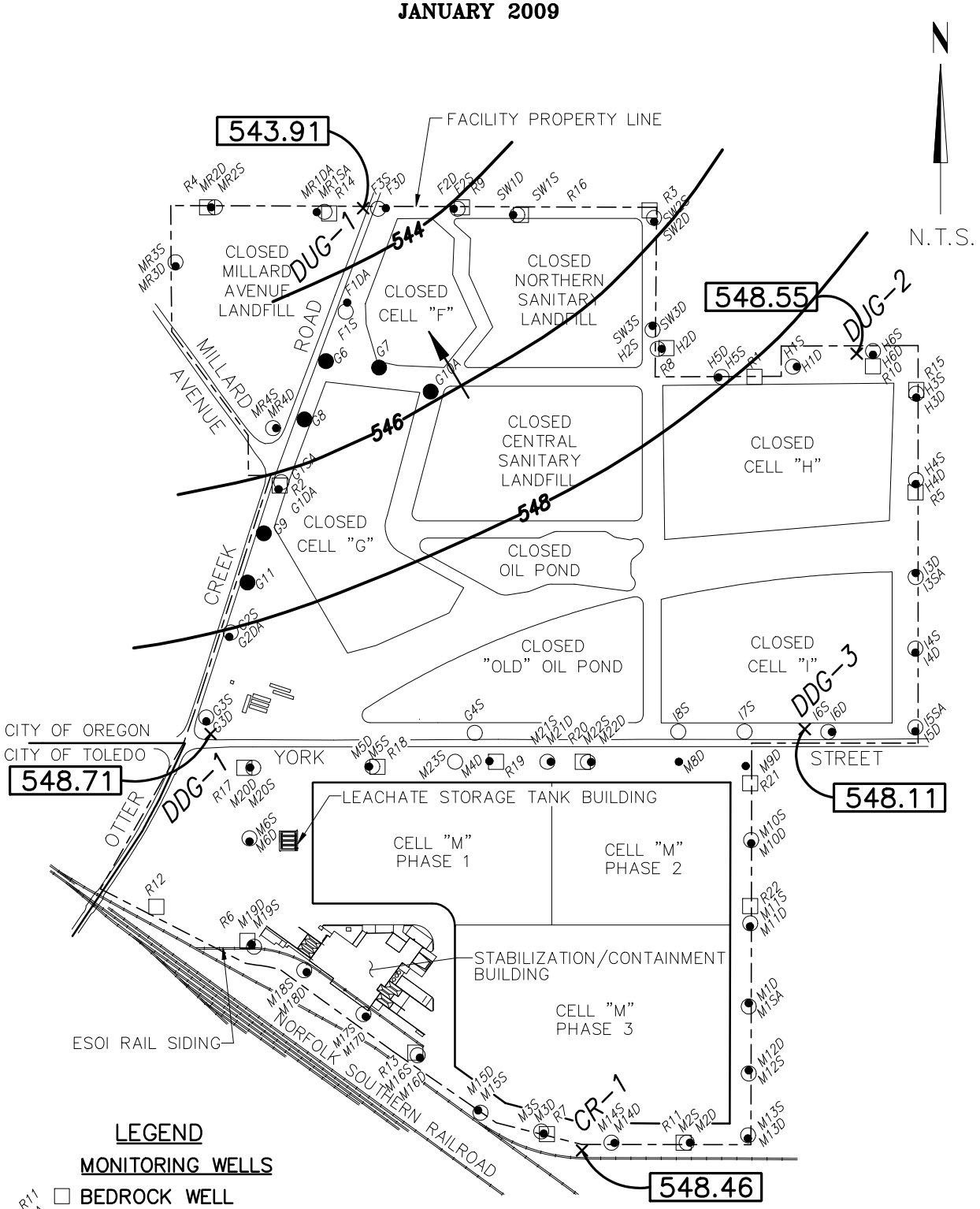
ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

JANUARY 2009



LEGEND

MONITORING WELLS

- R11 □ BEDROCK WELL
- G1DA ● DEEP WELL SAND
- M2D • DEEP WELL TILL
- M2S ○ SHALLOW WELL
- CR-1 × CHART RECORDER WELL
- 546 EQUIPOTENTIAL CONTOUR LINE
- GROUNDWATER FLOW DIRECTION
- CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

6/25/2009

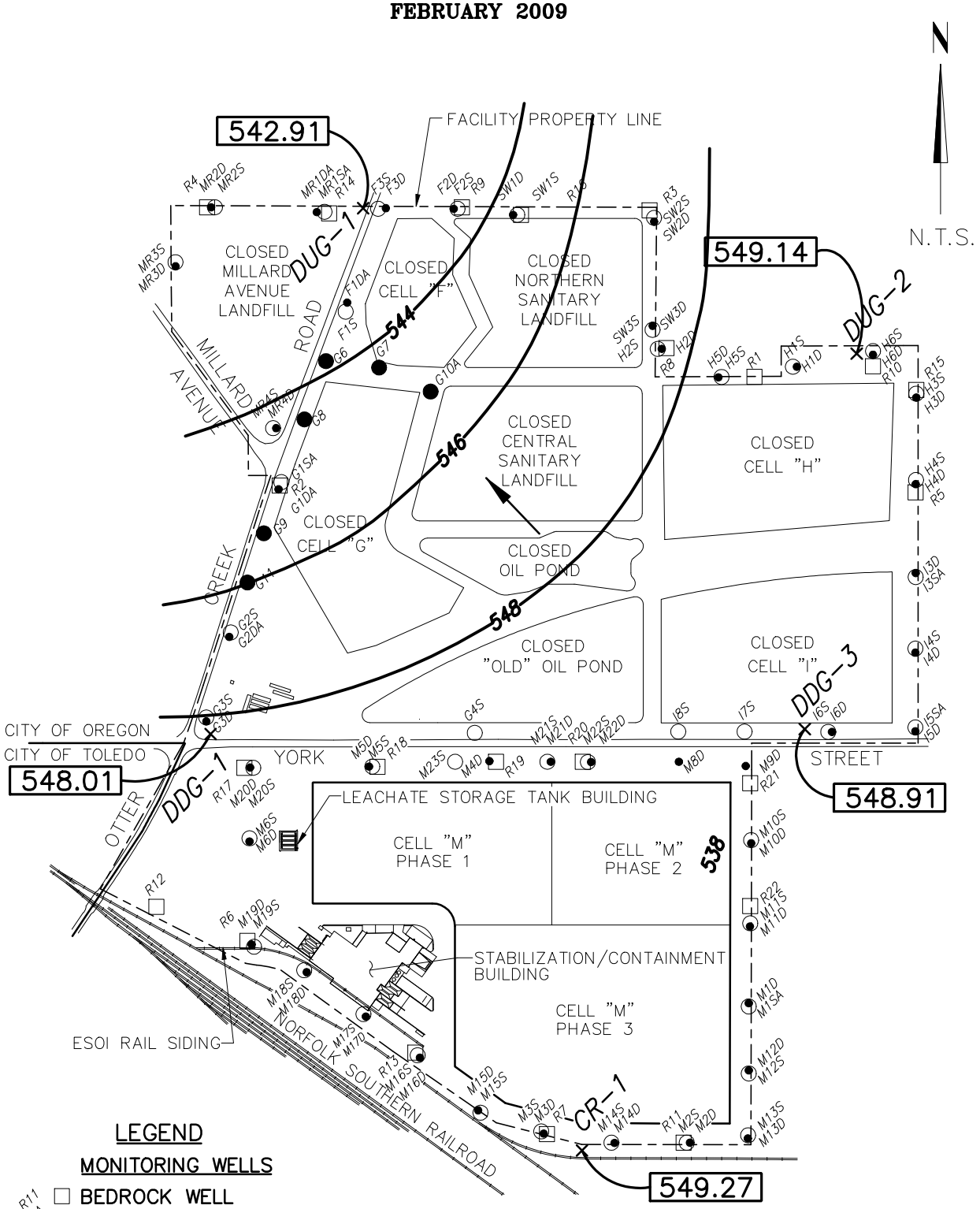
S:\Projects\Projects A-E\E1080033\CAD\FIGURES 1108-0309\E1080033_PSFIG_0109.dgn

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

FEBRUARY 2009



LEGEND

MONITORING WELLS

- R11 □ BEDROCK WELL
- G1DA ● DEEP WELL SAND
- M2D • DEEP WELL TILL
- M2S ○ SHALLOW WELL
- CR-1 × CHART RECORDER WELL
- 546 EQUIPOTENTIAL CONTOUR LINE
- GROUNDWATER FLOW DIRECTION
- CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

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6/25/2009

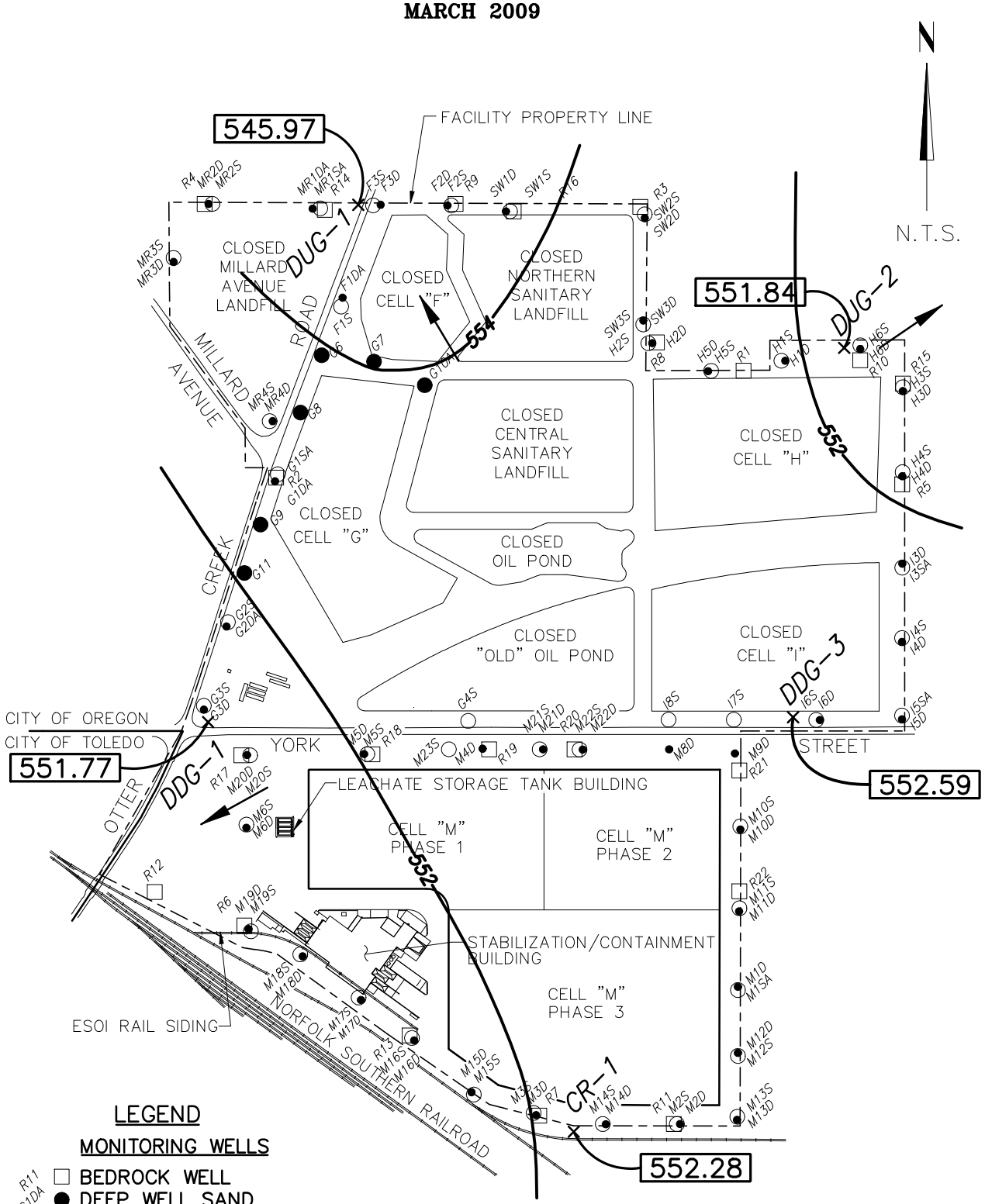
S:\Projects\Projects A-E\E1080033\CAD\FIGURES 1108-0309\E1080033_PSFIG_0209.dgn

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

MARCH 2009



LEGEND

MONITORING WELLS

- R11 □ BEDROCK WELL
- G1DA ● DEEP WELL SAND
- M2D • DEEP WELL TILL
- M2S ○ SHALLOW WELL
- CR-1 × CHART RECORDER WELL
- —552— EQUIPOTENTIAL CONTOUR LINE
- ◄— GROUNDWATER FLOW DIRECTION
  CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

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6/25/2009

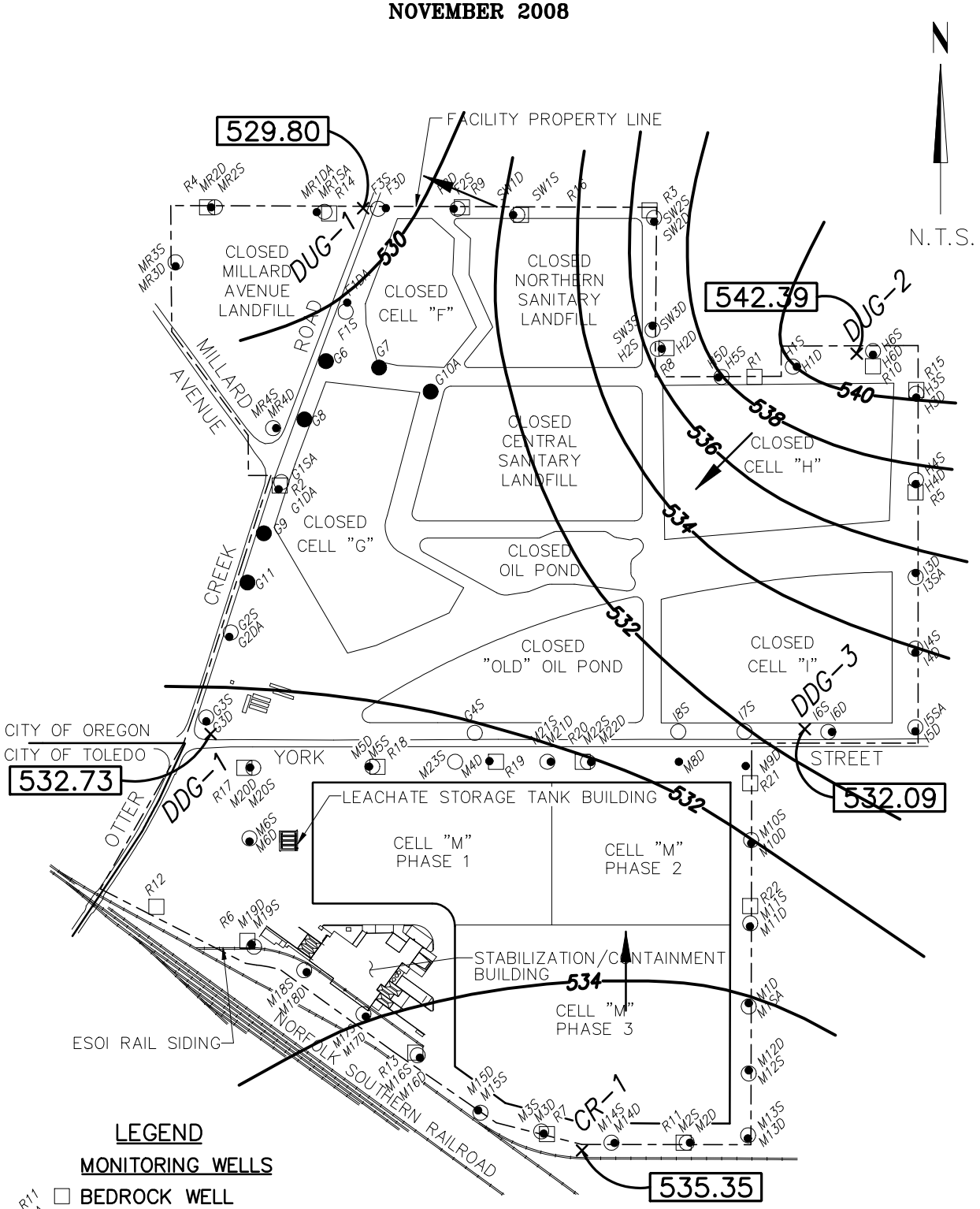
S:\Projects\Projects A-E\E1080033\CAD\FIGURES 1108-0309\E1080033_PSFIG_0309.dgn

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

NOVEMBER 2008



LEGEND

MONITORING WELLS

- R11 □ BEDROCK WELL
- G1DA ● DEEP WELL SAND
- M2D • DEEP WELL TILL
- M2S ○ SHALLOW WELL
- CR-1 × CHART RECORDER WELL
- —532— EQUIPOTENTIAL CONTOUR LINE
- ◄— GROUNDWATER FLOW DIRECTION
  CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

6/25/2009

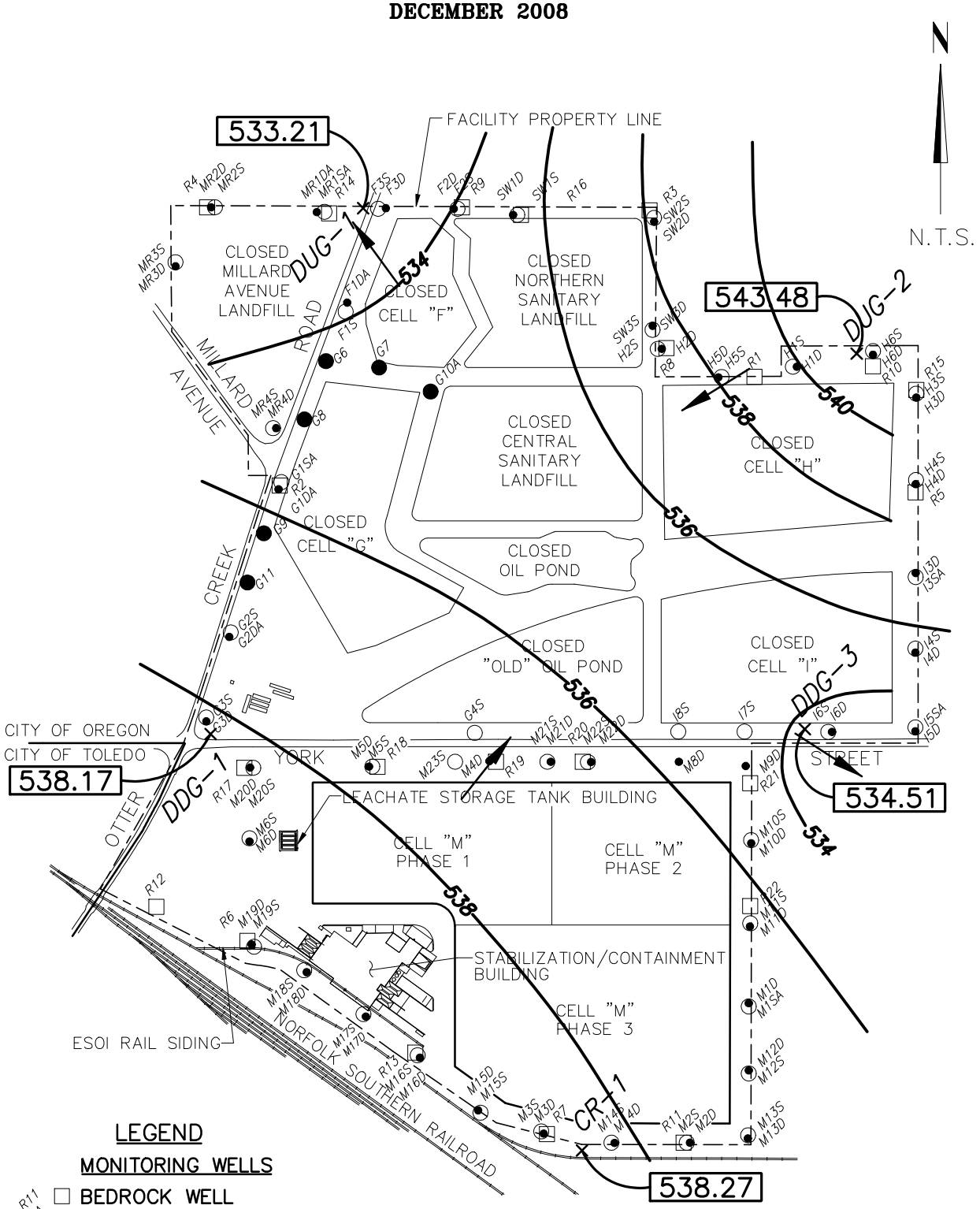
S:\Projects\Projects A-E\E1080033\CAD\FIGURES 1108-0309\E1080033_PSFIG_1108.dgn

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

DECEMBER 2008



LEGEND

MONITORING WELLS

- BEDROCK WELL
- DEEP WELL SAND
- DEEP WELL TILL
- SHALLOW WELL
- CHART RECORDER WELL
- EQUIPOTENTIAL CONTOUR LINE
- GROUNDWATER FLOW DIRECTION

CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

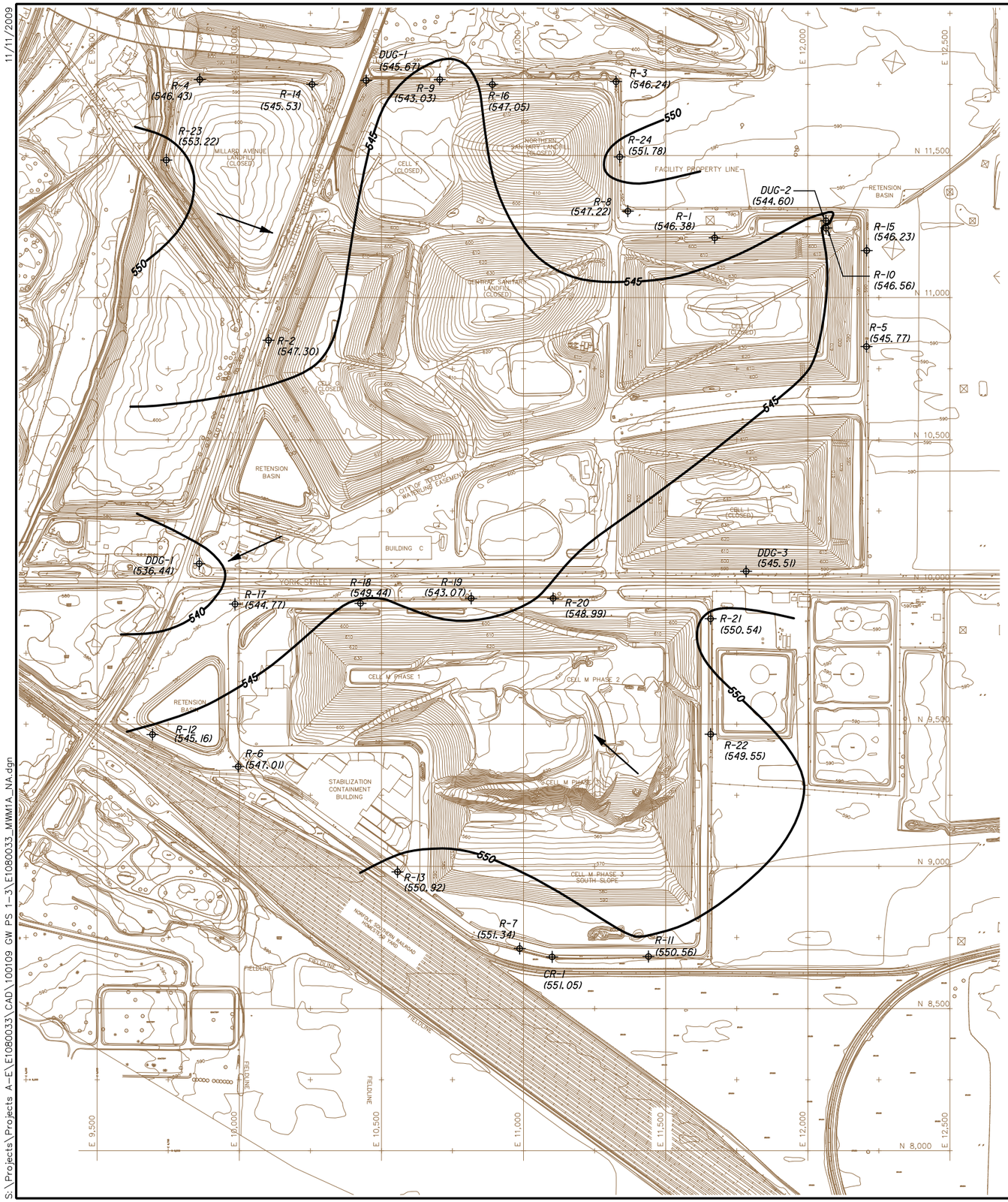
SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

6/25/2009

S:\Projects\Projects A-E\E1080033\CAD\FIGURES 1108-0309\E1080033_PSFIG_1208.dgn

11/11/2009



GRAPHIC SCALE
0' 100' 200' 400'

BEDROCK MONITORING WELLS			
OCTOBER 1, 2009			
MONITORING WELL	TOP OF CASING (FEET MSL)	WATER LEVEL (FEET)	WATER LEVEL ELEVATION (FEET MSL)
CR-1	594.65	43.60	551.05
DDG-1	587.41	50.97	536.44
DDG-3	593.71	48.20	545.51
DUG-1	586.59	40.92	545.67
DUG-2	595.76	51.16	544.60
R-1	596.71	50.33	546.38
R-2	594.12	46.82	547.30
R-3	593.96	47.72	546.24
R-4	588.33	41.90	546.43
R-5	593.20	47.43	545.77
R-6	595.30	48.29	547.01
R-7	596.28	44.94	551.34
R-8	594.44	47.22	547.22
R-9	591.40	48.37	543.03
R-10	596.68	50.12	546.56
R-11	596.08	45.52	550.56
R-12	594.64	49.48	545.16
R-13	595.61	44.69	550.92
R-14	586.82	41.29	545.53
R-15	592.13	45.90	546.23
R-16	598.03	50.98	547.05
R-17	592.32	47.55	544.77
R-18	591.56	42.12	549.44
R-19	595.38	52.31	543.07
R-20	595.64	46.65	548.99
R-21	594.34	43.80	550.54
R-22	595.66	46.11	549.55
R-23	591.32	38.10	553.22
R-24	592.40	40.62	551.78

LEGEND

R-1 (546.38)	BEDROCK MONITORING WELL AND GROUNDWATER ELEVATION
545	POTENTIOMETRIC SURFACE CONTOUR
	DOMINANT FLOW DIRECTION

POTENTIOMETRIC CONTOUR INTERVAL = 5.0 FEET

TOPOGRAPHIC CONTOUR INTERVAL = 2.0 FEET

NOTES

1. TOPOGRAPHIC INFORMATION ON THIS DRAWING WAS OBTAINED FROM AN AERIAL SURVEY CONDUCTED ON OCTOBER 6, 2002 BY AEROCON PHOTOGRAMMETRIC SERVICES, INC.
2. GROUNDWATER ELEVATION DATA COLLECTED BY ESOI PERSONNEL ON OCTOBER 1, 2009.

NO.	DATE	BY	DESCRIPTION
1			

The Mannik & Smith Group, Inc.
Civil Engineering, Surveying and Environmental Consulting

ENVIROSAFE
ENVIROSAFE SERVICES OF OHIO, INC.
ENVIROSAFE SERVICES OF OHIO, INC.
OREGON FACILITY

POTENTIOMETRIC SURFACE MAP FOR THE BEDROCK UNIT OCTOBER 1, 2009

1/3

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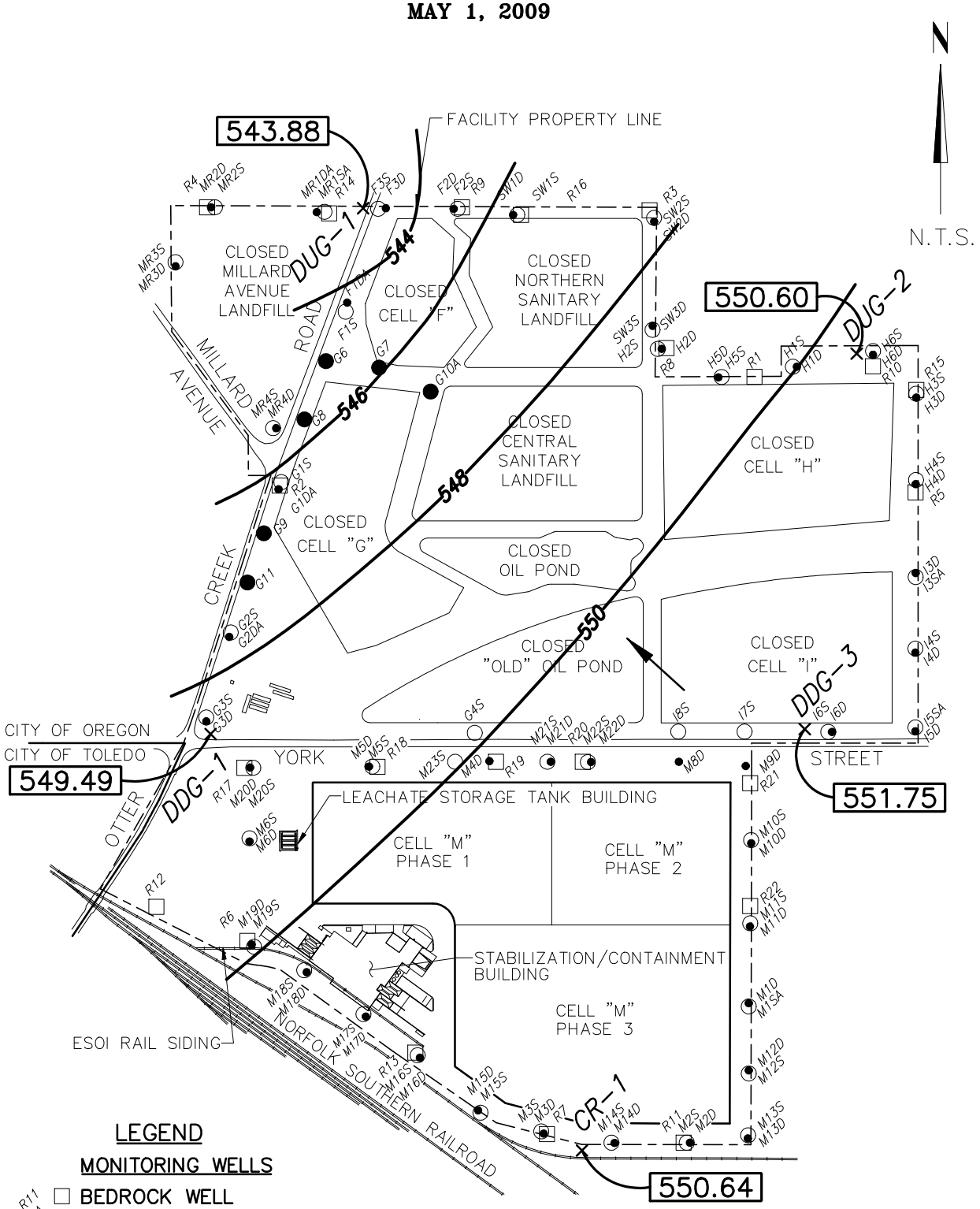
11/11/2009

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

MAY 1, 2009



LEGEND

MONITORING WELLS

- □ BEDROCK WELL
- ● DEEP WELL SAND
- • DEEP WELL TILL
- ○ SHALLOW WELL
- × CHART RECORDER WELL

548 – EQUIPOTENTIAL CONTOUR LINE

◄— GROUNDWATER FLOW DIRECTION

CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

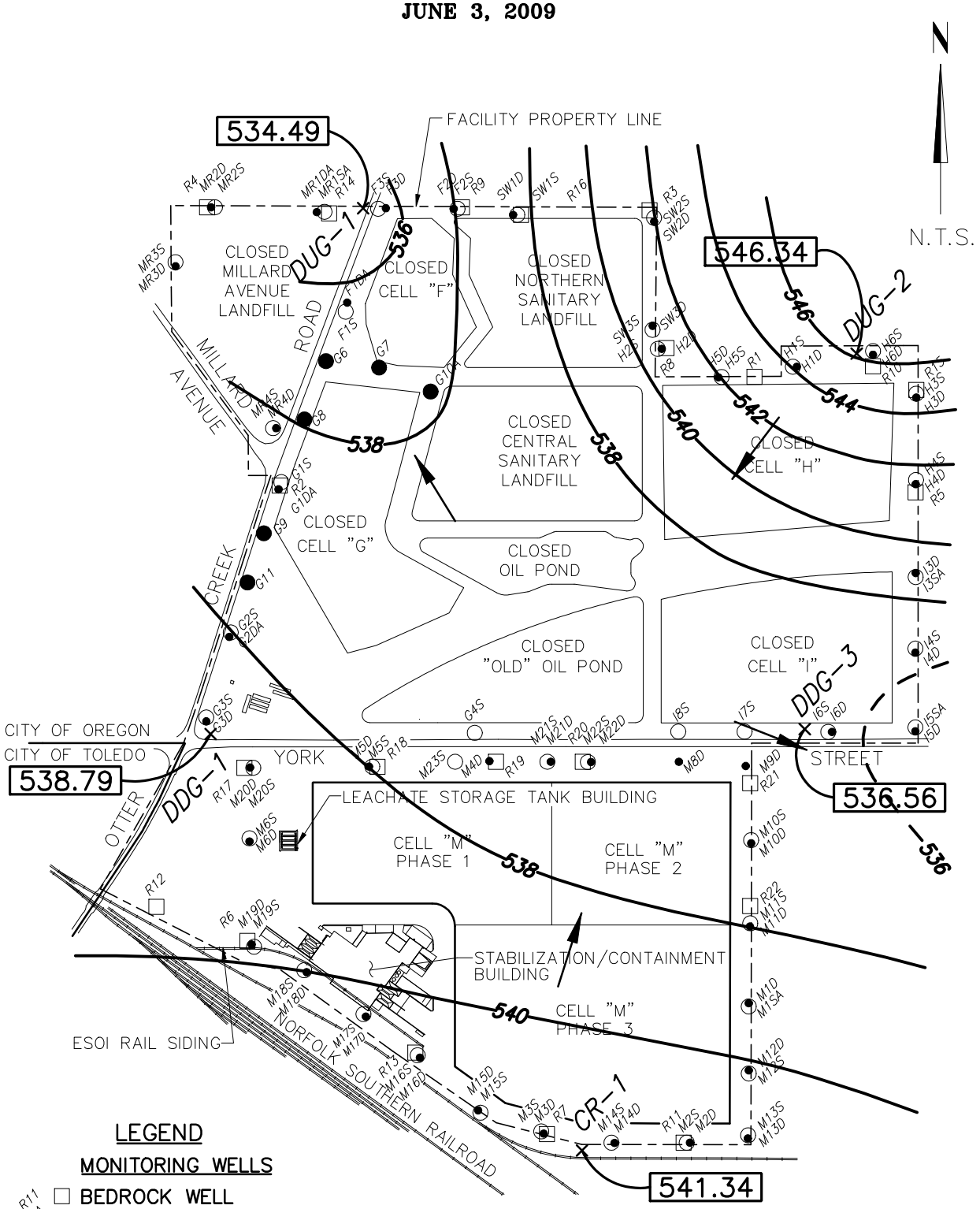
S:\Projects\Projects A-E\E1080033\CAD\FIGURES 0509-0909\E1080033_PSFIG_0509.dgn

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

JUNE 3, 2009



LEGEND

MONITORING WELLS

- BEDROCK WELL
- DEEP WELL SAND
- DEEP WELL TILL
- SHALLOW WELL
- CHART RECORDER WELL
- EQUIPOTENTIAL CONTOUR LINE
- GROUNDWATER FLOW DIRECTION

CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

11/11/2009

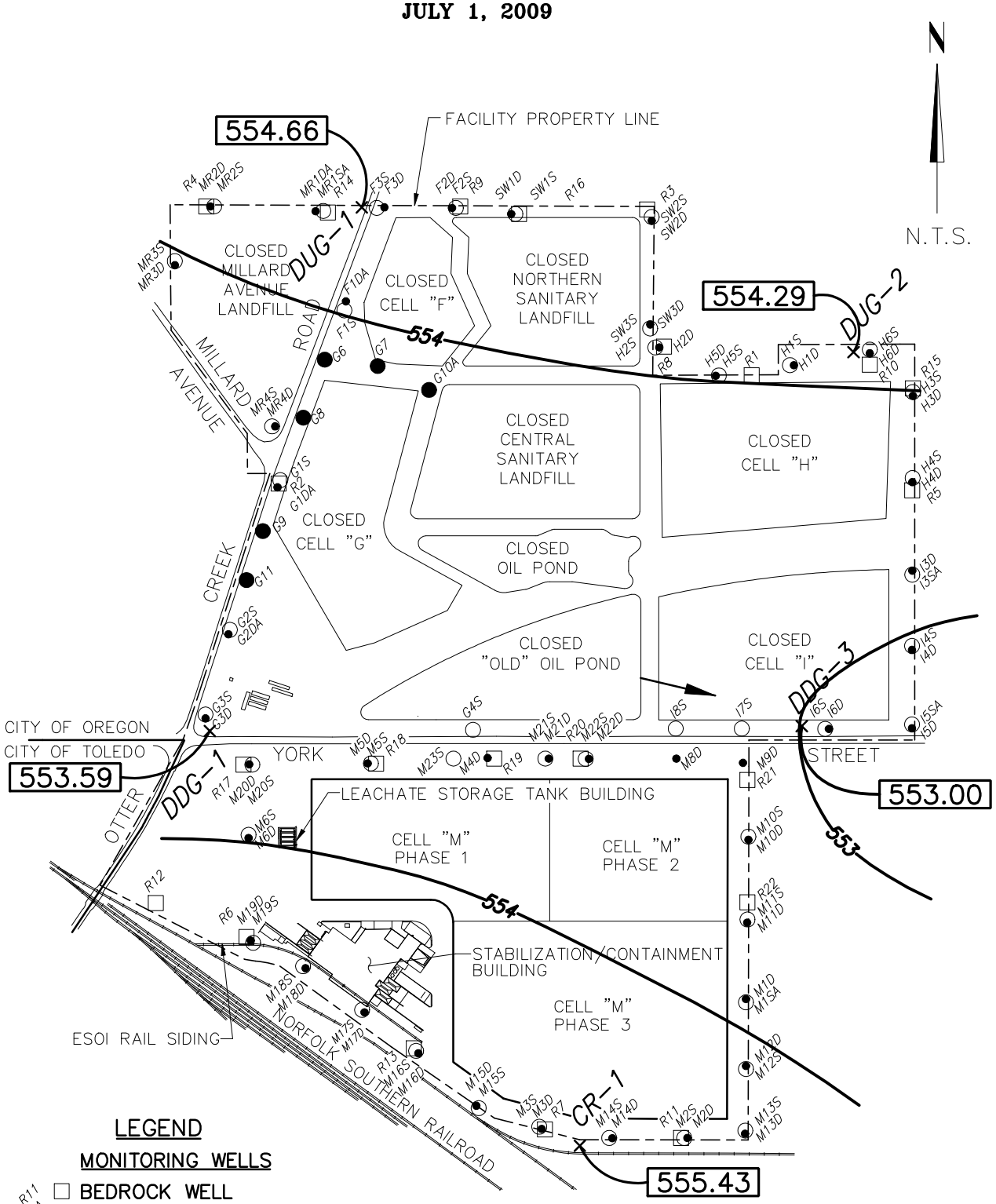
S:\Projects\Projects A-E\E1080033\CAD\FIGURES 0509-0909\E1080033_PSFIG_0609.dgn

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

JULY 1, 2009



LEGEND

MONITORING WELLS

- □ BEDROCK WELL
- ● DEEP WELL SAND
- • DEEP WELL TILL
- ○ SHALLOW WELL
- × CHART RECORDER WELL

554 — EQUIPOTENTIAL CONTOUR LINE

GROUNDWATER FLOW DIRECTION

CONTOUR INTERVAL 1 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

11/11/2009

S:\Projects\Projects A-E\E1080033\CAD\FIGURES 0509-0909\E1080033_PSFIG_0709.dgn

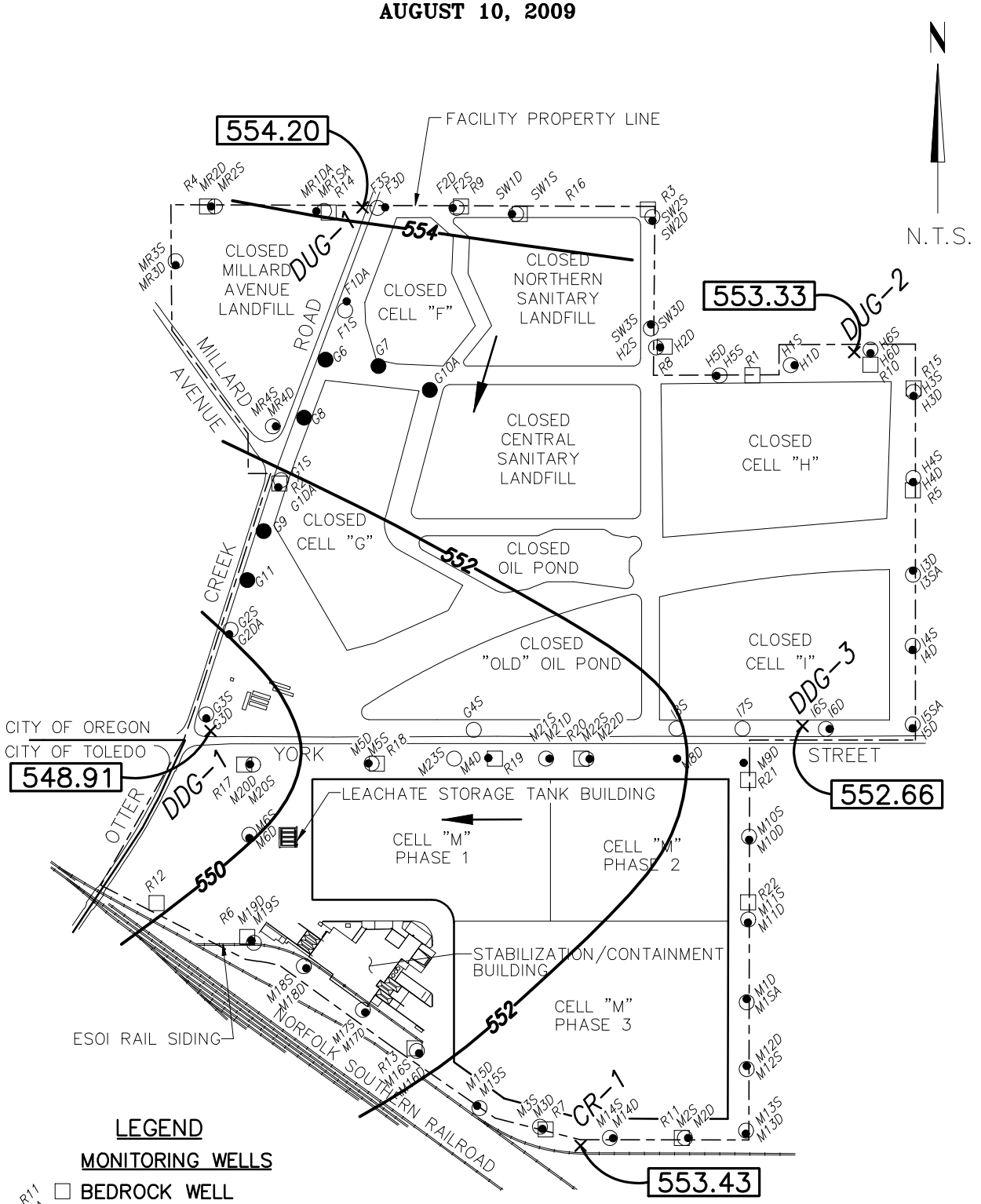
11/11/2009

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

AUGUST 10, 2009



LEGEND

MONITORING WELLS

- □ BEDROCK WELL
- ● DEEP WELL SAND
- • DEEP WELL TILL
- ○ SHALLOW WELL
- × CHART RECORDER WELL

—552— EQUIPOTENTIAL CONTOUR LINE

GROUNDWATER FLOW DIRECTION

CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

S:\Projects\Projects A-E\E1080033\CAD\FIGURES 0509-0909\E1080033_PSFIG_0809.dgn

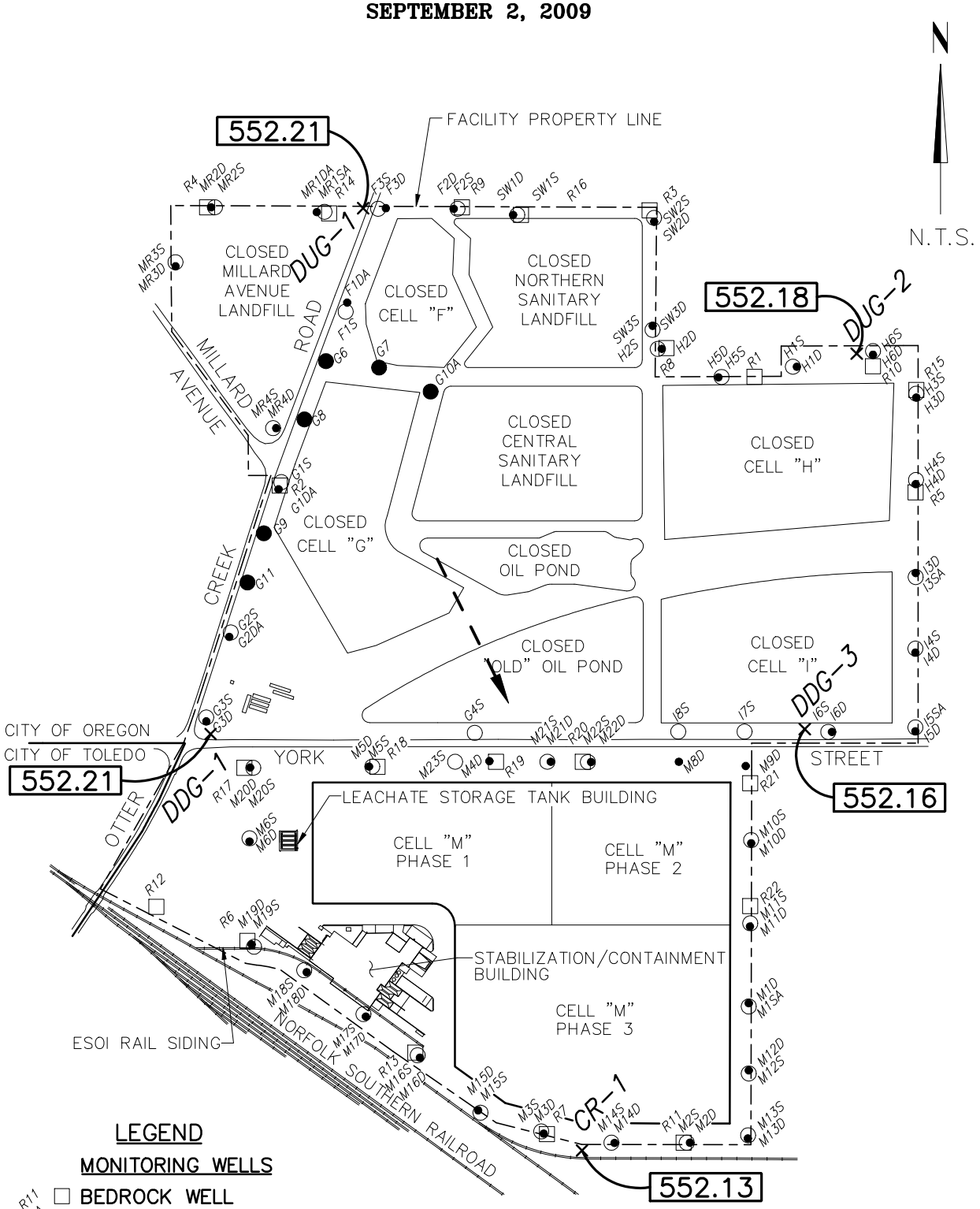
11/16/2009

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

SEPTEMBER 2, 2009



LEGEND

MONITORING WELLS

- R11 □ BEDROCK WELL
- G1DA ● DEEP WELL SAND
- M2D • DEEP WELL TILL
- M2S ○ SHALLOW WELL
- CR-1 × CHART RECORDER WELL
- —552— EQUIPOTENTIAL CONTOUR LINE
- ◄ — ESTIMATED FLOW DIRECTION. POTENTIOMETRIC SURFACE EXHIBITS VERY LITTLE RELIEF.

BOLD

INDICATES CHART RECORDER WELLS.

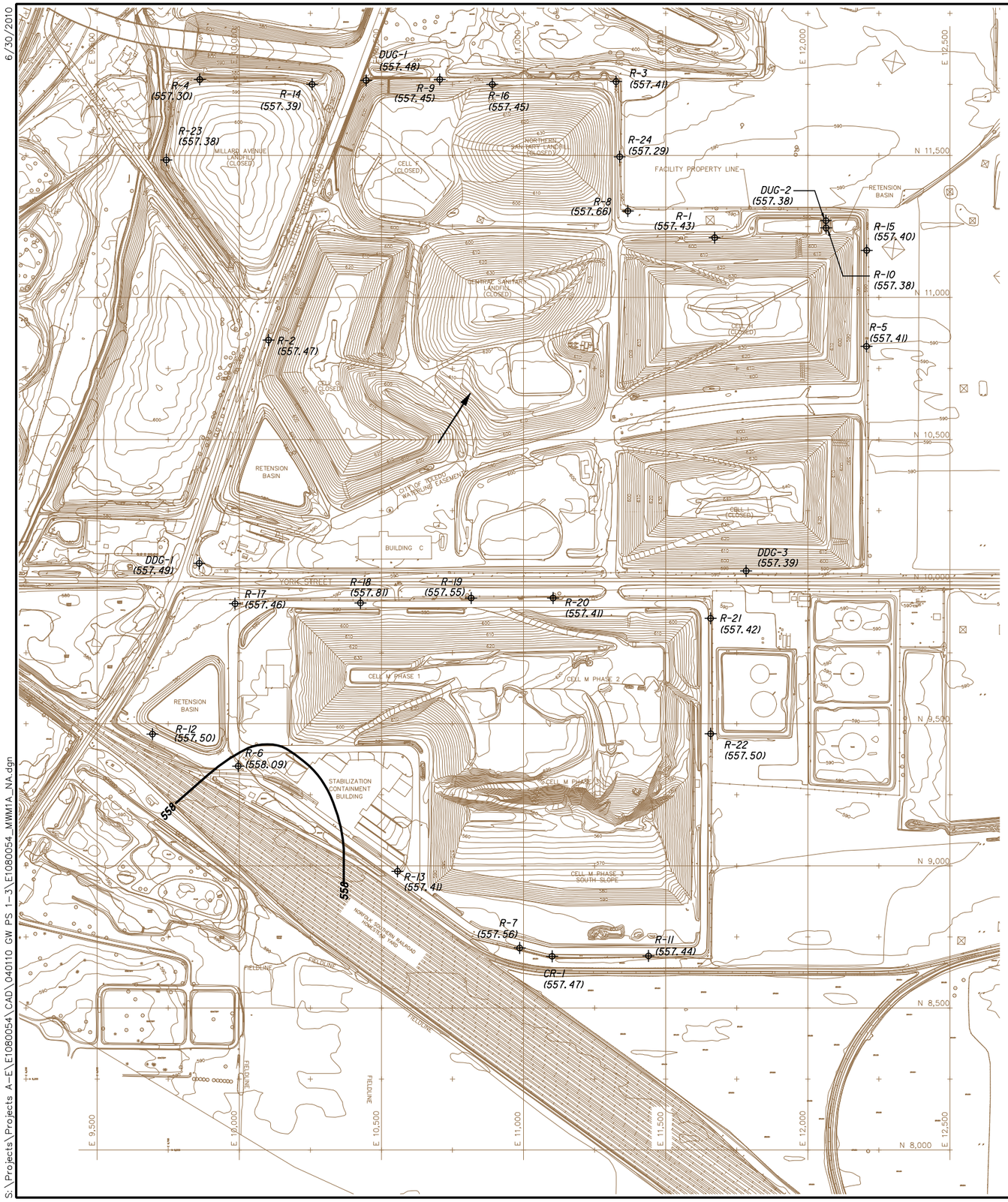
NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

S:\Projects\Projects A-E\E1080033\CAD\FIGURES 0509-0909\E1080033_PSFIG_0909.dgn

6/30/2010



GRAPHIC SCALE
0' 100' 200' 400'

BEDROCK MONITORING WELLS			
APRIL 1, 2010			
MONITORING WELL	TOP OF CASING (FEET MSL)	WATER LEVEL (FEET)	WATER LEVEL ELEVATION (FEET MSL)
CR-1	594.65	37.18	557.47
DDG-1	587.41	29.92	557.49
DDG-3	593.71	36.32	557.39
DUG-1	586.59	29.11	557.48
DUG-2	595.76	38.38	557.38
R-1	596.71	39.28	557.43
R-2	594.12	36.65	557.47
R-3	593.96	36.55	557.41
R-4	588.33	31.03	557.30
R-5	593.20	35.79	557.41
R-6	595.30	37.21	558.09
R-7	596.28	38.72	557.56
R-8	594.44	36.78	557.66
R-9	591.40	33.95	557.45
R-10	596.68	39.30	557.38
R-11	596.08	38.64	557.44
R-12	594.64	37.14	557.50
R-13	595.61	38.20	557.41
R-14	586.82	29.43	557.39
R-15	592.13	34.73	557.40
R-16	598.03	40.58	557.45
R-17	592.32	34.86	557.46
R-18	591.56	33.75	557.81
R-19	595.38	37.83	557.55
R-20	595.64	38.23	557.41
R-21	594.34	36.92	557.42
R-22	595.66	38.16	557.50
R-23	591.32	33.94	557.38
R-24	592.40	35.11	557.29

LEGEND

R-1 (557.43)	BEDROCK MONITORING WELL AND GROUNDWATER ELEVATION
558	POTENTIOMETRIC SURFACE CONTOUR
	DOMINANT FLOW DIRECTION

POTENTIOMETRIC CONTOUR INTERVAL = 1.0 FOOT

TOPOGRAPHIC CONTOUR INTERVAL = 2.0 FEET

NOTES

1. TOPOGRAPHIC INFORMATION ON THIS DRAWING WAS OBTAINED FROM AN AERIAL SURVEY CONDUCTED ON OCTOBER 6, 2002 BY AEROCON PHOTOGRAMMETRIC SERVICES, INC.
2. GROUNDWATER ELEVATION DATA COLLECTED BY ESOI PERSONNEL ON APRIL 1, 2010.
3. THE GROUNDWATER SURFACE SHOWS LESS THEN ONE FOOT OF RELIEF ACROSS MOST OF THE SITE.

NO.	DATE	BY	DESCRIPTION
1	. . .	. . .	. . .

The Mannik & Smith Group, Inc.
Civil Engineering, Surveying and Environmental Consulting

ENVIROSAFE SERVICES OF OHIO, INC.
ENVIROSAFE SERVICES OF OHIO, INC. OREGON FACILITY

POTENTIOMETRIC SURFACE MAP FOR THE BEDROCK UNIT APRIL 1, 2010

1/3

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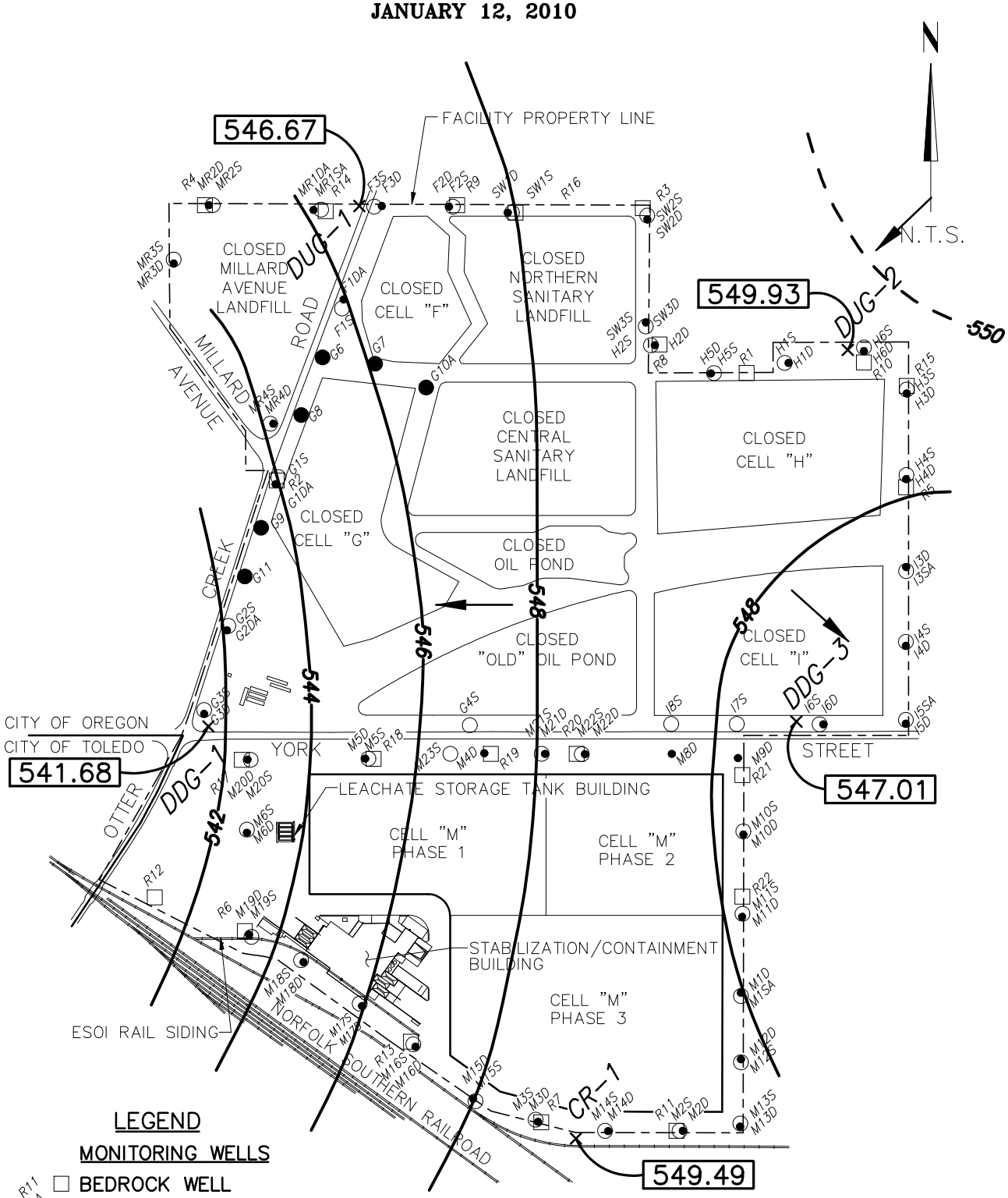
ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

JANUARY 12, 2010



LEGEND

MONITORING WELLS

- R11 □ BEDROCK WELL
- G1DA ● DEEP WELL SAND
- M2D • DEEP WELL TILL
- M2S ○ SHALLOW WELL
- CR-1 × CHART RECORDER WELL
- —548— EQUIPOTENTIAL CONTOUR LINE
- ◄— GROUNDWATER FLOW DIRECTION
  CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

6/30/2010

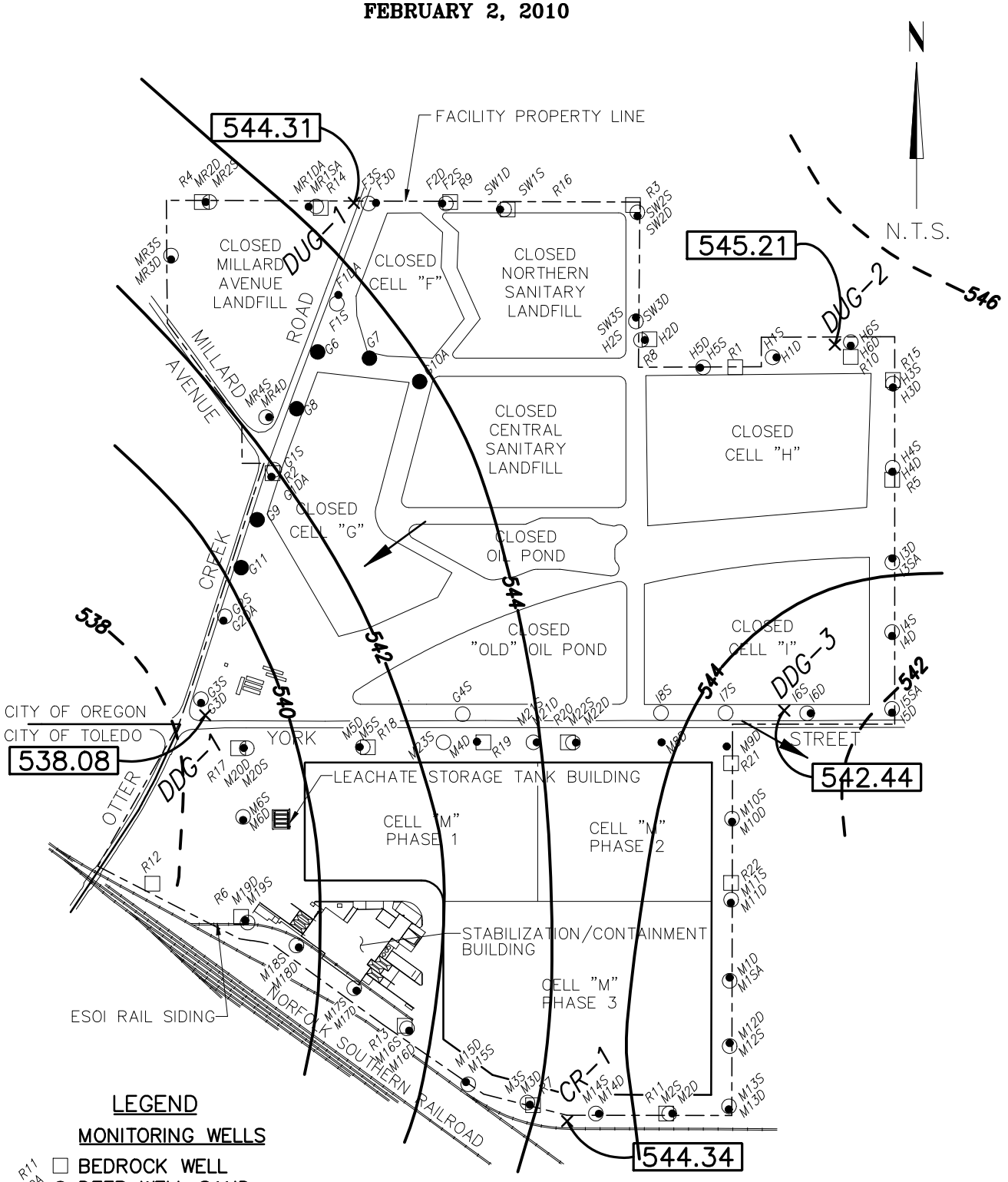
S:\Projects\Projects A-E\E1080054\CAD\FIGURES 1109-0310\E1080054_PSFIG_0110.dgn

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

FEBRUARY 2, 2010



LEGEND

MONITORING WELLS

- BEDROCK WELL (R11)
- DEEP WELL SAND (G1DA)
- DEEP WELL TILL (M2D)
- SHALLOW WELL (M2S)
- CHART RECORDER WELL (CR-1)
- EQUIPOTENTIAL CONTOUR LINE (544)
- GROUNDWATER FLOW DIRECTION
- CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

6/30/2010

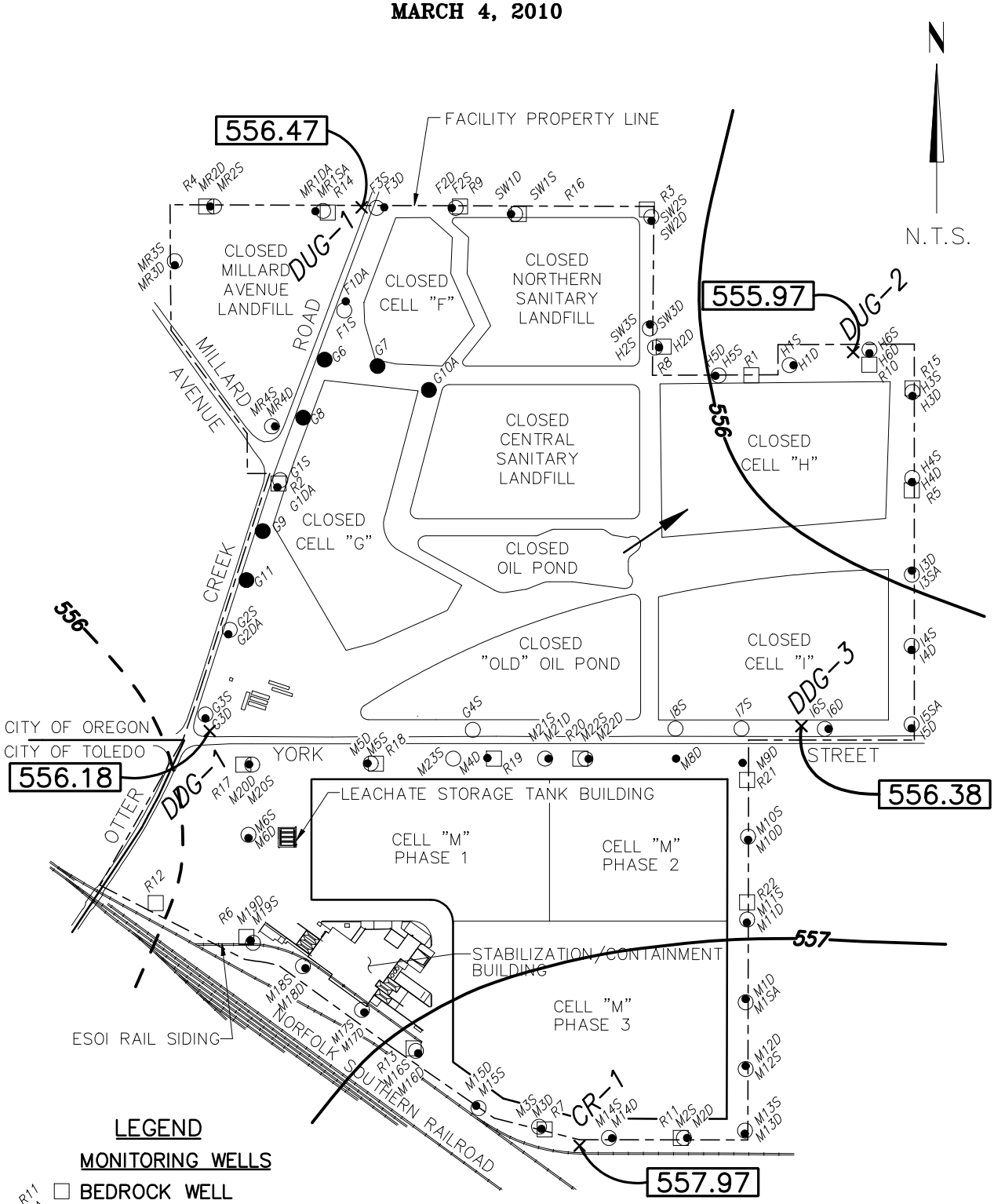
S:\Projects\Projects A-E\E1080054\CAD\FIGURES 1109-0310\E1080054_PSFIG_0210.dgn

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

MARCH 4, 2010



LEGEND

MONITORING WELLS

- BEDROCK WELL
- DEEP WELL SAND
- DEEP WELL TILL
- SHALLOW WELL
- CHART RECORDER WELL
- EQUIPOTENTIAL CONTOUR LINE
- GROUNDWATER FLOW DIRECTION

CONTOUR INTERVAL 1 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

6/30/2010

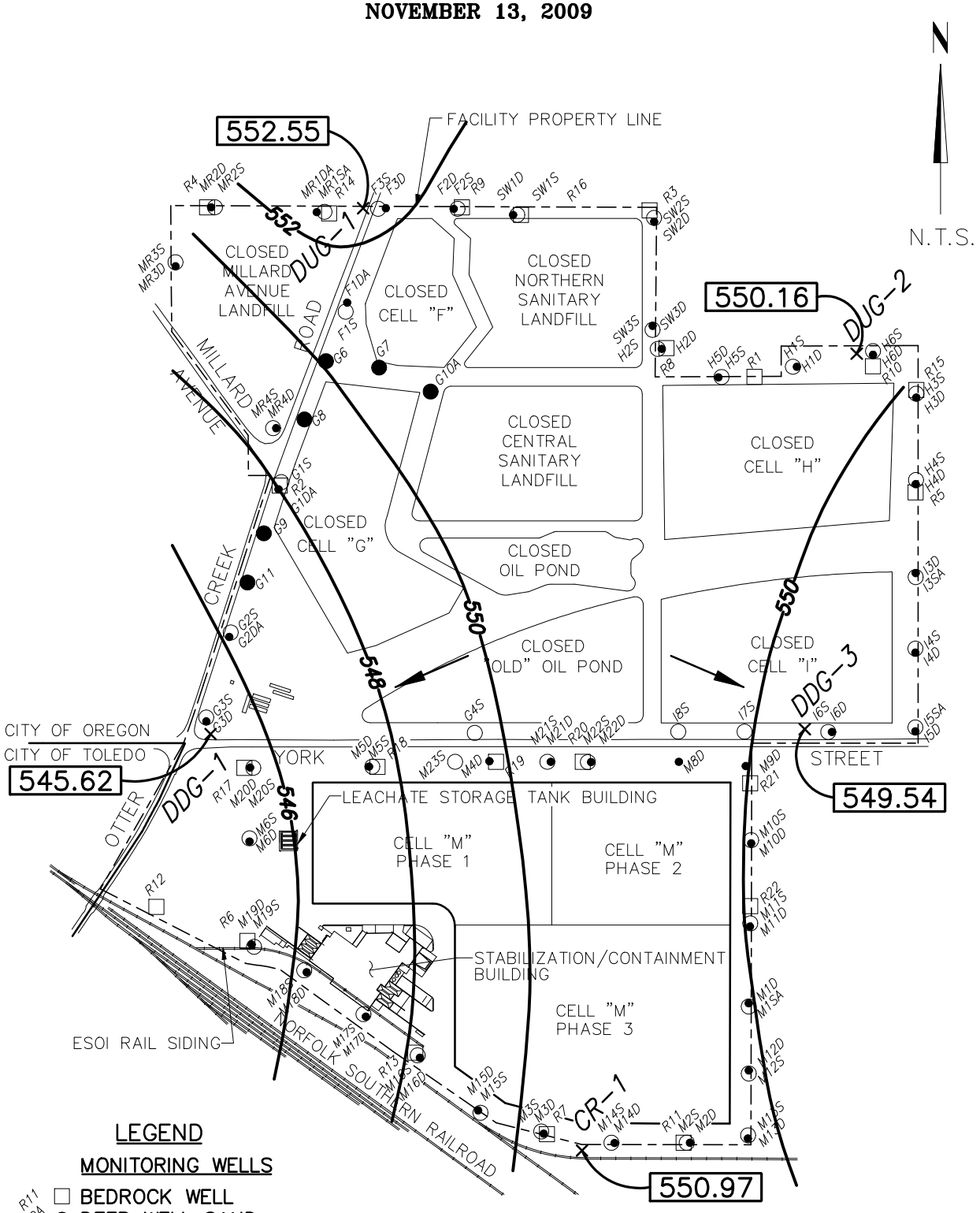
S:\Projects\Projects A-E\E1080054\CAD\FIGURES 1109-0310\E1080054_PSFIG_0310.dgn

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

NOVEMBER 13, 2009



LEGEND

MONITORING WELLS

- R11 □ BEDROCK WELL
- G1DA ● DEEP WELL SAND
- M2D • DEEP WELL TILL
- M2S ○ SHALLOW WELL
- CR-1 × CHART RECORDER WELL
- —550— EQUIPOTENTIAL CONTOUR LINE
- ◄— GROUNDWATER FLOW DIRECTION
  CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

6/30/2010

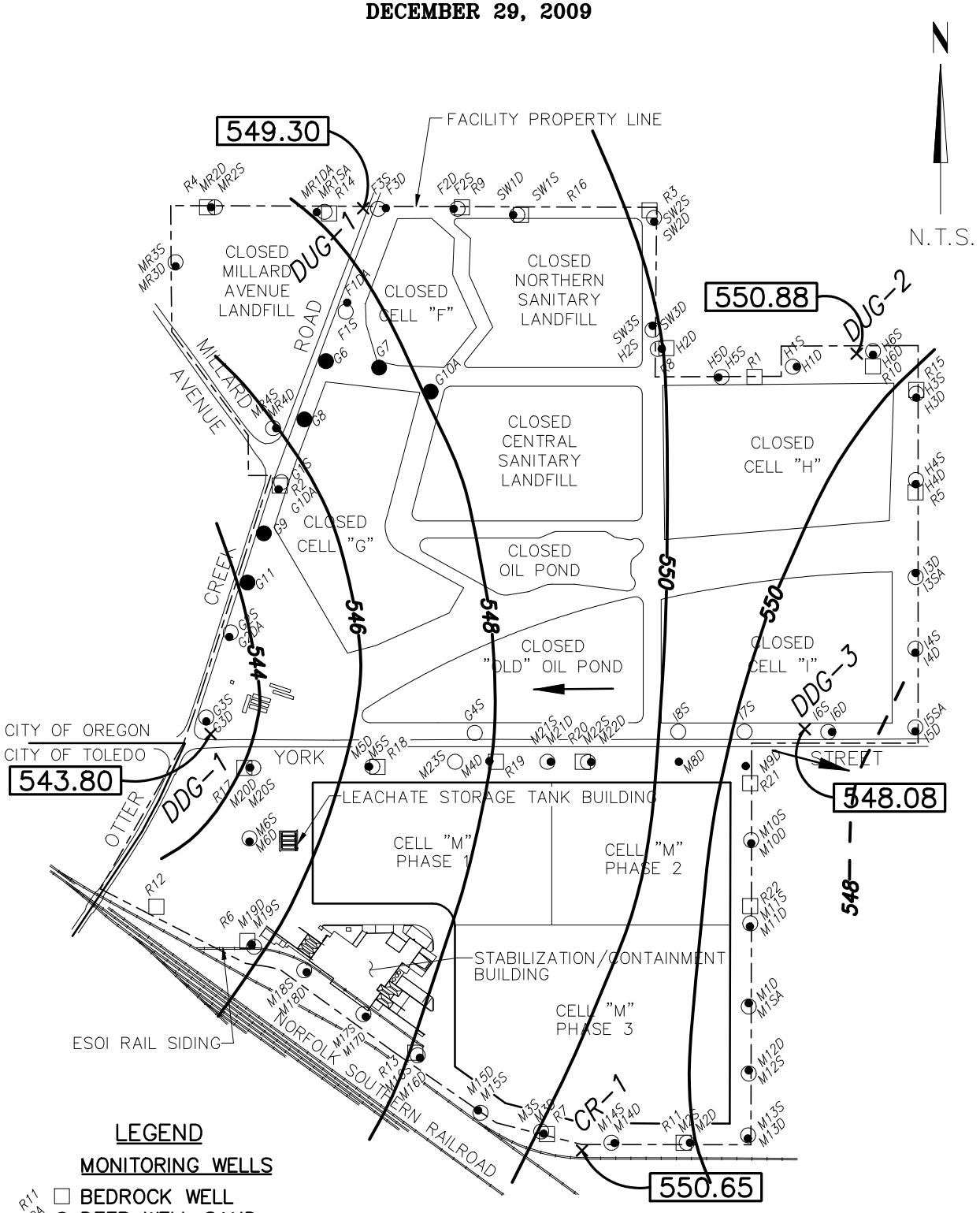
S:\Projects\Projects A-E\E1080054\CAD\FIGURES 1109-0310\E1080054_PSFIG_1109.dgn

ENVIROSAFE SERVICES OF OHIO, INC.

OTTER CREEK FACILITY

POTENTIOMETRIC SURFACE MAP

DECEMBER 29, 2009



LEGEND

MONITORING WELLS

- BEDROCK WELL
- DEEP WELL SAND
- DEEP WELL TILL
- SHALLOW WELL
- CHART RECORDER WELL
- EQUIPOTENTIAL CONTOUR LINE
- GROUNDWATER FLOW DIRECTION

CONTOUR INTERVAL 2 FOOT

BOLD

INDICATES CHART RECORDER WELLS.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

THE MANNIK & SMITH GROUP, INC.

6/30/2010

S:\Projects\Projects A-E\E1080054\CAD\FIGURES 1109-0310\E1080054_PSFIG_1209.dgn

Surface Drainage Inspection

ENVIROSAFE SERVICES OF OHIO, INC.

STORM WATER RUNOFF EVALUATION REPORT FOR SOLID WASTE MANAGEMENT UNITS 5, 6, AND 7

JULY 20, 2010

PREPARED FOR:
ENVIROSAFE SERVICES OF OHIO, INC.
876 OTTER CREEK ROAD
OREGON, OHIO 43616

USEPA IDENTIFICATION NO. OHD 045 243 706
OHIO EPA IDENTIFICATION NO. 03-48-0092

Table 1. Description of Storm Water Related Structures Pertinent to SWMUs 5, 6, and 7

Structure No.	Unit	Ground Survey Date	Initial Survey Point	Structure Description	Type	Location	Length	Width	Slope	Infiltration Risk	Comments and Recommendations
1	Cell H	5/18/10	10873	Outfall 004 Pipe	CMP w/valve	E end of pond	37'	12"	0.009	no	OK. Drains pond to ditch.
2	Cell H	5/18/10	10874	Cell H Pond	Pond	N of Cell H	350'	50'	NA	no	OK. Receives runoff from SWMUs 6 and 7 and Cell H.
3	Cell H	5/18/10	10881	Outfall 004 Ditch	Ditch	E end of pond				no	OK. Flows east from ESOI property.
4	Cell H	5/18/10	10889	Pond Inlet Pipe	CMP w/valve	NW corner of pond	72'	12"	0.010	no	OK. Receives flow from Structure 5 swale.
5	Cell H	5/18/10	10904	Pond Inlet Swale	Grass Swale	N of Cell H	423'		0.00096 to 0.0054	low	OK except for depression at outlet of SWMU 6 Culvert 4. Fill depression to culvert invert.
6	SWMU 6	5/18/10	10958	Culvert 4	CMP w/valve	SE of SWMU 6	41'	18"	0.021	medium	Inlet crushed. Repair inlet.
7	SWMU 6	5/18/10	10969	Ditch 5	Grass Swale	E side of SWMU 6 E road	480'		0.178	low	Ponding at point 10971 due to el 591.058 high point at point 10796. Cut 1.33' at point 10779 to el 589.724.
8	SWMU 6	5/18/10	10964	Ditch 4 N-S	Grass Swale	E toe of SWMU 6	460'		0.008 to S, 0.012 to N	high	Ponding at N end near inlet to Culvert 5. Fill to eliminate ponding.
9	SWMU 6	5/18/10	10994	Ditch 4 E-W	Grass Swale	N toe of SWMU 6	485		0.009	high	Ponding at several points along ditch. Gas vents in ditch provide recharge route. Remove vents & regrade ditch.
10	SWMU 6	5/18/10	11006	Outfall 12 Ditch	Riprap Ditch	NE of SWMU 6	42'	6'	0.009	low	Invert too high, hinders storm water sampling at Culvert 5 outlet. Cut invert 9" to facilitate sampling.
11	SWMU 6	5/18/10	11006	Culvert 5	CMP	NE of SWMU 6	20'	12"	0.028	high	Conveys flow from Ditch 4 to Outfall 6. Depressed areas at inlet. Repair inlet area. If necessary, install catch basin.
12	SWMU 6	5/18/10	11062	Ditch 1 N Riprap	Riprap Ditch	NW SWMU 6	69'	8'	0.093	no	OK. Feeds Ditch 4 E-W.
13	SWMU 6	5/18/10	11075	Ditch 1 N-S	Grass Swale	W SWMU 6	190'		0.030	no	OK. Feeds riprap N and S. Apex at point 11083.
14	SWMU 6	5/18/10	11086	Ditch 1 S Riprap	Riprap Ditch	SW SWMU 6	79'	8'	0.131	no	OK. Feeds Ditch 6.
15	SWMU 6	5/18/10	11099	Ditch 6	Grass Swale	SW SWMU 6	38'		0.037	no	OK. Tributary to Ditch 7.
16	SWMU 6	5/18/10	near 11109	Standpipe	PVC pipe	SW SWMU 6	13.49	6"	vertical	high	Grade el 591.0. Top el 596.49 (5.49' above grade). Bottom el 583.0. Water el 591.59 (4.90' depth to water). See Structure 17.
17	SWMU 6	5/18/10	11102	Ditch 7 W	Grass Swale	SW SWMU 6	232'		0.0076	high	Ponding in 80' segment W of E side of electrical tower. Fixes: Test standpipe water. Install underdrain, sump, & pump. Fill depressed areas. Kill phragmites.
18	SWMU 6	5/18/10	11103	Culvert 8	CMP	SW SWMU 6	127'	12"	0.021	no	OK. Fed by Ditch 7 W. Drains to junction box NE of Cell G. Outlet el 587.5 estimated.
19	SWMU 6	5/18/10	11104	Culvert 9 - SWMU 7 to SWMU 6	CMP	NW SWMU 7 to SW SWMU 6	99'	24"	0.025	high	Ponding at inlet. Fill depressed area, perhaps with concrete or grout.
20	SWMU 6	5/18/10	11150	Ditch 7 E	Grass Swale	S SWMU 6	366'		0.0023	high	Inadequate slope, ponding, & ruts. Fill point N11,265.65, E11,007.94 to el 593.28 and fill constant slopes in both directions to points 11123 and 11176. New length 291'. New slope 0.0058.
21	Cell G	5/18/10	NA	Junction Box	Concrete Chamber	NE of Cell G				no	OK. Receives flow from SWMU 6 Culvert 8 and discharges through Cell G Culvert 9 to Cell G NW Catch Basin.
22	Cell G	5/18/10	11227	Catch Basin	Catch Basin	N of Cell G	36"	36"		no	OK. Recives flow from Cell G Culvert 9.
23	Cell G	5/18/10	11228	Culvert 9 (Cell G)	CMP	N of Cell G	240'	24"	0.0255	no	OK. Receives flow from Cell G Junction Box and discharges to Catch Basin.
24	Cell G	5/18/10	11229	Culvert 10	CMP	N of Cell G	142'	24"	0.0068	no	OK. Receives flow from Catch Basin.
25	Cell F	5/18/10	11231	Culvert 11	CMP	SW Cell F	20'	12"	0.029	no	OK. Collects Cell F runoff and discharges to concrete trench.
26	Cell F	5/18/10	11232	Culvert 12	CMP	SW Cell F	20'	12"	flat	no	Inlet and outlet to Detention Area C from concrete trench.
27	Cell F	5/18/10	11234	Detention Area C	Dry Pond	SW Cell F	67"	30'	flat	no	Pond does not drain perfectly but is far enough from SWMUs 5, 6, and 7 to not produce significant recharge.
28	SWMU 7	5/18/10	11300	Standpipe	PVC pipe	NW SWMU 7	10'	6"	vertical	high	Adjacent to Structure 39. Grade el 600.251. Top el 601.751 (1.5' above grade). Bottom el 591.80. Liquid el 596.521 (5.23' depth to water), which is above the inlet invert (el 594.86) of Structure 19 and above the liquid levels in piezometer PZ-9 (el 593) and monitoring well T-8S (el 592). The standpipe may contain leachate. See report text for recommendations.
29	SWMU 7	5/18/10	11315	Central Letdown	Rock Letdown	E & Center SWMU 7	560'	10'	0.10	medium	55' main stem. 218' N branch. 287' S branch. Deeper than needed. May promote recharge. Discharges to Ditch 1.
30	SWMU 7	5/24/10	11406	Ditch 1	Grass Swale	E of SWMU 7	786'		0.005	high	Ponding near SE corner of SWMU 7. Regrade from point 11423 to point 11445.
31	SWMU 7	5/24/10	11445	Culvert 1	CMP	SE of SWMU 7	20'	12"	-0.013	high	Needs cleaning. May have reverse slope. Can't tell until it is clean. Discharges S to Structure 42.
32	SWMU 7	5/24/10	11447	Ditch 3 E	Grass Swale	E end S SWMU 7	40'		0.243	no	OK. Drains from riprap section of ditch to Ditch 1.
33	SWMU 7	5/24/10	11454	Ditch 3 Riprap	Riprap Ditch	E end S SWMU 7	182'	3'	0.11	no	OK. Drains east.
34	SWMU 7	5/24/10	11485	Ditch 3 Central	Grass Swale	Center S SWMU 7	213'		0.015	no	OK. Drains east.
35	SWMU 7	5/24/10	11508	Ditch 3 West	Grass Swale	West S SWMU 7	166'		0.084	no	OK. Drains west to outlet of Culvert 4.
36	SWMU 7	5/24/10	11539	Culvert 4 (Culvert 11)	CMP	SW SWMU 7	142'	18"	-0.002	high	Crushed and partially filled with sediment at N end. Needs repair and cleaning. Recheck slope when clean.
37	SWMU 7	5/24/10	11539	W Ditch	Grass Swale	SW SWMU 7	151'		0.006	high	Needs cleaning. Ponding at points 11550 and 11553. Receives flow from Culvert 4 and Ditch 3 West.
38	SWMU 7	5/24/10	11555	W Riprap Ditch	Riprap Ditch	W SWMU 7	210'	7' to 11'	0.037	high	Receives flow from W Ditch. Flows N. Ponds at N end due to obstruction at Culvert 6.
39	SWMU 7	5/24/10	11575	Culvert 6	PVC pipe	W SWMU 7	15'	12"	0.111	high	Culvert 6 is install too high, obstructs the flow from the W riprap ditch, and causes ponding. Remove and reinstall the culvert to eliminate the obstruction.
40	SWMU 7	5/24/10	11585	NW Riprap Ditch	Riprap Ditch	NW SWMU 7	54'	15'	0.231	high	Too deep at inlet to SWMU 6 Culvert 9. Fill depressed area, perhaps with concrete or grout.

Table 1. Description of Storm Water Related Structures Pertinent to SWMUs 5, 6, and 7

Structure No.	Unit	Ground Survey Date	Initial Survey Point	Structure Description	Type	Location	Length	Width	Slope	Infiltration Risk	Comments and Recommendations
41	Fishburn Tank Area			Fishburn Tank Diked Area	Diked Tank Area	S of SE Corner of SWMU 7	100'	100'		high	Storm water collects in the storage tank containment area and could possibly infiltrate to recharge SWMU 7. Pump out water as soon as possible when it accumulates.
42	New Oil Pond	5/24/10	11630	Ditch 4	Grass Swale	E New Oil Pond	216'		0.033	high	Drains south from Structure 31, SWMU 7 Culvert 1. Ponds at N end. Regrade the N 80' of the ditch invert.
43	New Oil Pond	5/24/10	11662	Culvert 8	CMP	E New Oil Pond	49'	24"	0.052	no	OK. Drains east from Ditch 4 to Cell H ditch.
44	New Oil Pond	5/24/10	11673	Culvert 10	PVC pipe	N Side New Oil Pond	40'	6"	0.022	no	Poorly defined inlet. Discharges SE to Ditch 7. Probably does not convery much water.
45	New Oil Pond	5/24/10	11674	Ditch 7	Grass Swale	Center New Oil Pond	108'		0.037	high	Flows SE to ponded area. Need to fill ponded area from point 11686 in Ditch 7 to point 11686.
46	New Oil Pond	5/24/10	11686	Ponded Area	Failed Ditch	E New Oil Pond	183'	5' to 22'	flat	high	Failed ditch flows S from Ditch 7 to Ditch 8. Need to fill ponded area from point 11686 in Ditch 7 to point 11686.
47	New Oil Pond	5/24/10	11705	Ditch 8 S	Grass Swale	S New Oil Pond	11'		0.0104	high	Receives flow from ponded area. Flows W to Riprap. Need to fill from Ditch 7 to Ditch 8 to eliminate pond.
48	New Oil Pond	5/24/10	11707	SE Riprap Ditch	Riprap Ditch	SE New Oil Pond	258'	3' to 5'	0.018	medium	Some ponding and infiltration may occur between the rocks. Reserve action for future evaluation.
49	New Oil Pond	5/24/10	11751	Ditch 8 W	Grass Swale	W New Oil Pond	147'		0.0044	high	Ponds due to sag near point 11756. Discharge hindered by SWMU 7 Culvert 4. Fill sag and fix Culvert 4.
50	SWMU 5	5/24/10	11873	Ditch 1	Grass Swale	Inside SWMU 5 Perimeter	1800'		varies	medium	Evidence of ponding in NE and SE portions of the ditch. Fill depressed areas.
51	SWMU 5	5/24/10	11873	Catch Basin 2	Catch Basin	S SWMU 5				no	OK. Surrounded & covered with rock. Drains southern portions of Ditch 1 to Ditch 2 through Culvert 2.
52	SWMU 5			Culvert 2	CMP	S SWMU 5	50'	18"		no	OK. Drains Catch Basin 2 to Ditch 2.
53	SWMU 5			Ditch 2	Roadside Ditch	N Side Old Millard Rd	468'			high	Ditch overgrown with phragmites and has standing water continuously. Ask City of Oregon to clean & regrade.
54	SWMU 5	5/24/10	11911	Catch Basin 1	Catch Basin	W SWMU 5				no	OK. Drains W and NW portions of Ditch 1.
55	SWMU 5	5/24/10	11913	Culvert 1	CMP	W SWMU 5		18"		no	OK. Drains Catch Basin 1 to Otter Creek.
56	SWMU 5	5/24/10	11943	Catch Basin 3	Catch Basin	N SWMU 5				no	OK. Drains N and E portions of Ditch 1.
57	SWMU 5	5/24/10	11944	Culvert 3	CMP	N SWMU 5		18"		no	OK. Drain Catch Basin 3 N to Ditch 3.
58	SWMU 5			Ditch 3	Roadside Ditch	S Side New Millard Rd	574'			no	OK. Perimeter monitoring wells are between ditch & SWMU 5.

ENVIRON Inspection Report

ENVIRON

October 27, 2010

via e-mail

Mr. Stephen J. DeLussa
Environmental Affairs Manager
Envirosource Technologies, Inc.
2300 Computer Ave., Suite L-61
Willow Grove, PA 19090

Re: Envirosafe Services of Ohio, Inc. – Otter Creek Road Facility
Summary of June 2010 Field Activities

As an initial task for the Corrective Measures Study (CMS) implementation, ENVIRON identified certain data requirements for the evaluation of corrective measures alternatives. These data requirements are summarized in the attached Table 1. The majority of the data required for evaluation in the CMS were collected as part of the RCRA Facility Investigation (RFI), presumptive corrective measures implementation, and ESOI's ongoing RCRA facility monitoring programs. However, a few potential data gaps were identified with respect to current conditions in comparison with observations recorded during the RFI, including but not limit to, conditions identified during the RFI that have been addressed by the implementation of presumptive corrective measures and/or facility maintenance activities. Based on the identified potential data gaps, additional field activities were performed on June 2, 2010 to obtain the additional data to assess current conditions and to support the evaluation of corrective measures alternatives in the CMS. Below is a summary of the additional field activities.

Landfill Gas Conditions (SWMU 8)

ENVIRON collected additional landfill gas measurements from each temporary leachate well (TLW-201 through TLW-207) associated with the RFI conducted at SWMU 8 (Old Oil Pond). Prior to collection of landfill gas each well was purged of stagnate air from the leachate well lines for at least 45 seconds. Following the purging activities, landfill gas parameters (including methane, carbon dioxide, and oxygen) were collected from each leachate well during two sampling intervals separated by approximately five minutes.

Elevated methane and gas pressure were evident at levels consistent with those detected during the RFI. A summary of the landfill gas data collected during the June sampling activities are provided on Table 2a. In addition, for reference, a summary of landfill gas data obtained during the RFI are summarized in Tables 2b and 2c.

Free-Phase Liquid/Groundwater Level Measurements (SWMU 5 and SWMU 8)
SMWU 5 (Millard Landfill)

ENVIRON collected measurements of free-phase liquid thickness and depth-to-groundwater at twelve temporary monitoring wells (T20S(1) through T20S(8), MR6S, T20W, T21S, and T45W) along the western boundary of SWMU 5 (Millard Landfill). Free-phase liquid/groundwater level measurements were collected using an electronic oil/interface (O/I) probe, which was decontaminated with an alconox and water solution after measuring each well.

Non-aqueous phase liquid (NAPL) was identified at three locations during the June gauging activities at SWMU 5: T20S(2), T20S(5), and T20S(6). The locations containing measurable NAPL during the June monitoring event are consistent with the observations identified during the RFI. Depth-to-NAPL and depth-to-water measurements collected in June 2010 are provided in Table 3a. For reference, similar measurements collected during the RFI are also provided in the same table.

Additionally, a confirmatory NAPL sample was collected from T20S(5) and analyzed for specific gravity and viscosity. This location was selected for a sample as the visible characteristics of the NAPL appeared different from those noted during the RFI. Sample results from T20S(5) are summarized on Table 4a. Viscosity results are similar between the two sampling events. For reference, similar measurements collected during the RFI are also provided Table 4b.

SMWU 8 (Old Oil Pond)

ENVIRON also collected free-phase liquid/leachate measurements from seven temporary leachate wells (TLW-201 through TLW-207) and three temporary monitoring wells (T33S, T-208, and T-209) located throughout SWMU 8 (Old Oil Pond).

NAPL was identified at five locations ranging in thickness from approximately 4.4 to 20 feet. These locations were the same as those identified has having NAPL present in the RFI. As detailed in the RFI, temporary monitoring wells T-208 and T-209 were installed in July 2006 to delineate free liquids found in well T33S; however, no measureable NAPL was noted in either T-208 or T-209 during the June 2010 field activities. NAPL/leachate measurements collected in June 2010 are provided in Table 3b. For reference, similar measurements collected during the RFI are also provided in the same table.

Inspection of Site-Wide Cap Conditions and Prior Seep Areas

ENVIRON performed a physical inspection of the seep areas at SWMU 6 (North Sanitary LF), SWMU 8 (Old Oil Pond), and SWMU 9 (New Oil Pond), and seepage at/around AOC 7 (Crock). Additionally, the cap conditions (i.e., assessment of evidence of subsidence, erosion, lack of vegetation, stormwater ponding) were also inspected at SWMU 5 (Millard Landfill), SWMU 6 (North Sanitary LF), SWMU 7 (Central Sanitary LF), SWMU 8 (Old Oil Pond), and SWMU 9 (New Oil Pond).

- Visual inspection of SWMU 5 determined the cap to be in good condition with well-developed vegetative cover.

- Visual inspection of SWMU 6 did not identify surface seepage or ponding along the northeast corner and the cap appeared in good condition with well-developed vegetative cover.

- Visual inspection of SWMU 7 indicated that the cap materials are in good condition with well-developed vegetative cover; however, it was noted that the stormwater flow from SWMU 7 to Outfall 4 is less than ideal and should be improved.

- Visual inspection of SWMU 8 identified surface seepage in the central portion of the Old Oil Pond, in the vicinity of TLW-205. Additionally, the cap on SWMU 8 appears to be subsiding in the area of Building C, which was also noted in the RFI.

- Visual inspection of AOC 7 (Butz Crock) did not identify evidence of seepage at or in the vicinity of Butz Crock.

- Visual inspection of SWMU 9 identified oily water seepage on the top of the unit and near certain vent pipes. Similar to prior observations, stormwater ponding was evident on the unit in the vicinity of the vent pipes.

The photographs taken during the visual inspection are attached for reference.

Please contact me if you have any questions regarding observations and data gathered during the June 2010 site inspection.

Sincerely,

J. Mark Nielsen, P.E.
Principal

Enclosures

Table 1 – Data Requirments for Evaluation of Corrective Measures Study Acitivies
Table 2a – SWMU 8 Landfill Gas Data June 2010
Table 2b – SWMU 8 Landfill Gas Data October 2006
Table 2c – SWMU 8 Landfill Gas Data August 2007
Table 3a – LNAPL Monitoring SWMU 5
Table 3b – LNAPL Monitoring SWMU 8
Table 4a – Summary of Physical Properties – T20S(5)
Table 4b – Summary of Physical Properties - 2006
Photo Log

cc: S. Song
F. Ramacciotti

Field_Report_20100812.doc

Table 1: Data Requirements for Evaluation of Corrective Measures Study Activities

ESOI Otter Creek Facility, Oregon, Ohio

Corrective Measure	SWMU	AOCs	Discharge Permit Limitations	Actual Recovery Flow Rate	Actual Leachate Concentrations[1]	Actual Leachate Levels[2]	Leachate Generation Projections[3]	Cell Construction Details[4]	Current Cap Condition[5]	Cap Test Results[6]	Topography[7]	Existing Stormwater Systems[8]	Actual LFG Data[9]	Actual Groundwater Quality	Groundwater Hydraulics[10]	Geological Profiles[11]	NAPL Properties[12]	NAPL Recovery[13]	Waste Mapping[14]	Seeps Mapping[15]	Waste Characterization	Building Information[16]	Tank Properties[17]	Unit Cost Data
Leachate Collection System Performance	1, 5, 6 , 7	1		X		X	X	X	X	X					X									X
Evaluate Options to Enhance Leachate Collection System	1, 5, 6 , 7, 8	1		X		X	X	X				X	X		X	X			X	X				X
Leachate/NAPL Seep Evaluation	6, 8 , 9	7, 12		X	X	X	X	X	X	X	X	X					X	X		X				X
Existing Cap Performance	1, 5, 6, 7, 8, 9			X		X	X	X	X	X	X		X						X	X				X
Perfomance of Existing Caps Outside Landfill Limit (Roadways)	6, 7, 9			X		X	X	X	X	X	X		X			X			X	X	X			X
Evaluation of Options for Cap Upgrades (if warranted)	1, 5, 6, 7, 8, 9			X		X	X	X	X	X	X		X			X			X	X				X
Stormwater Management System Evaluation	1, 5, 6, 7, 9	1					X	X	X	X	X	X								X				X
Evaluate Active LFG Recovery	1, 5, 6, 7, 8					X		X	X	X	X		X			X								X
Evaluate Need for Geotechnical Monitoring Program	1, 5, 6, 7, 8, 9							X	X	X	X		X			X			X					X
LNAPL Recovery/ Containment/ Removal	5, 8, 9	7						X		X	X			X	X	X	X	X		X	X			X
Targeted Waste Removal, Cap Expansion and/or Restoration	6, 8, 9	7, 12						X	X		X	X				X					X			X
Containment of Lacustrine/ Upper Fill Groundwater	5, 6, 8					X	X	X		X	X			X	X	X	X	X						X
Building Demolition	8										X								X		X	X	X	X
CAMU	8				X	X		X			X		X			X	X	X			X	X		X
Hydraulic Control Adjacent to Utilities	8	1			X	X	X	X			X			X	X	X	X	X		X	X			X
On-Site Pretreatment of Leachate	1, 5, 6, 7, 8, 9	1	X	X	X		X																	X
Groundwater Monitoring Program Evaluation	all	all			X	X		X						X	X	X								X
Tank Removal		6, 12																					X	X

Notes:
1. Minimum, Average, and Maximum influent (groundwater/leachate) concentrations for each parameter for the project life and the past five years. In addition, number of detections for each parameter.
2. Current leachate levels and historical leachate levels, leachate mounding rates, and leachate recovery rates (if currently being extracted).
3. Landfill cap design modeling results (e.g., leachate generation, stormwater infiltration).
4. Design records and as-built records of existing cap (bottom construction, cap thickness, slopes, tie-ins, etc).
5. Evaluation of current cap conditions as it relates to the integrity of the cap and the potential for infiltration (e.g., erosion, ruts, fissures/cracks, localized failures, booting of cap penetrations, etc.)
6. Cap permeability test results.
7. Current and historical topographical maps and analysis of topographical surface changes. Topographical maps should include site features and utilities.
8. Design records and as-built records of existing stormwater management system and assessment of current conditions.
9. Laboratory and field test results on LFG, including parameters analyzed, quality, flow and pressure data. Pore pressure measurements and vacuum test results.
10. Depth to groundwater, groundwater recovery records, groundwater flow and direction, and hydraulic conductivity data
11. Geological layers, physical properties of layers, layer thickness, layer permeabilities. Depth to confining layer.
12. NAPL physical characteristics, NAPL thickness, NAPL extent, and NAPL volume
13. Depth to NAPL, NAPL recovery study results, NAPL recovery records.
14. Vertical and horizontal extent of waste. Boring logs.
15. Seep observation records- when, where and ambient conditions prior to seep observations.
16. Building photographs, as-built drawings. Costs for building construction and immobile building equipment to be salvaged.
17. Tanks sizes and contents, location and depth to tanks, physical constraints in the vicinity of tanks (utilities, building, roads, etc), tank properties (materials of construction, cathodic protection, etc), and extent of soil impacts resulting from tanks.

TABLE 2a
Envirosafe Services of Ohio
Oregon, Ohio
RCRA Facility Investigation
SWMU 8 Landfill Gas Data
June 2010

	TLW-201		TLW-202		TLW-203		TLW-204		TLW-205		TLW-206		TLW-207	
	6/2/2010		6/2/2010		6/2/2010		6/2/2010		6/2/2010		6/2/2010		6/2/2010	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Pressure (PSI)	0	0	0	0	0	0	0	0	3.5	3.3	0	0	0	0
Time	1313	1316	1305	1307	1322	1325	1344	1347	1353	1357	1330	1333	1338	1339
CH4 (0 - 100%)	5.1	5.7	<<<	83.2	92.3	92.5	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<
CO2 (0 - 100%)	4.5	4.9	12.9	9.3	6.7	6.7	13.2	12.9	27.8	28.3	16.8	16.6	28.4	28.4
O2 (0 - 25%)	17.2	17.2	2.3	7.2	0.8	0.7	1.1	1.9	0.1	0.1	1.1	1.3	0.3	0.4
LEL (0 - 100%)	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<
H2S (0 - 200 ppm)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CO (0 - 2000 ppm)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Balance %	73.1	72.1	0	0	0	0	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<

Notes:

1 Landfill gas measurements collected using a GEM2000 Landfill Gas Meter

Abbreviations:

1 <<< -- Measured reading is out of range of the instruments capabilities (greater than range)

TABLE 2b
Envirosafe Services of Ohio
Oregon, Ohio
RCRA Facility Investigation
SWMU 8 Landfill Gas Data
October 2006

	LFG-201		LFG-202		LFG-203		LFG-204		LFG-205		LFG-206		LFG-207		LFG-208		LFG-209		LFG-210		LFG-211		LFG-212		LFG-213		LFG-214		LFG-215	
	10/27/2006		10/27/2006		10/27/2006		10/26/2006		10/27/2006		10/26/2006		10/26/2006		10/26/2006		10/26-27/2006		10/26/2006		10/26/2006		10/25/2006		10/25/2006		10/24/2006		10/25/2006	
Pressure (PSI)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Depth	*Shallow (~7.5' bgs)*		*Shallow (~7.5' bgs)*		*Shallow (~5.5' bgs)*		*Shallow (~5.5' bgs)*		*Shallow (~3.5' bgs)*		*Shallow (~7.5' bgs)*		*Shallow (~11.5' bgs)*		*Shallow (~7.5' bgs)*		*Shallow (~11.5' bgs)*		*Shallow (~13.5' bgs)*		*Shallow (~6.5' bgs)*		*Shallow (~14' bgs)*		*Shallow (~6.5' bgs)*		*Shallow (~6' bgs)*		*Shallow (~6.5' bgs)*	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Time	1455	1500	1135	1145	1005	1015	1410	1420	1455	1500	1335	1340	1045	1050	1455	1500	1630	1640	0905	0915	1540	1550	1515	1520	0900	NA	1350	1355	1055	1107
CH4 (0 - 100%)	0	0	51.1	42.2	0	0	47.5	49	98.7	100	68.1	52	29	3	39	25.1	72.5	67.2	76	65	67.4	68.9	100	2.4	0	NA	3	0	16.9	19.9
CO2 (0 - 60%)	0	0	17.5	14.4	0	0	9.5	9.4	14.9	15	29	26	4.7	0.9	14.5	10	42.3	35.3	29.4	26	32.9	33.6	13.7	0.9	0	NA	0.5	0	10.2	12.2
O2 (0 - 30%)	21	21	5.7	8.7	21.2	21.4	6.2	6	3	2.1	2.2	6.2	14.5	19.8	11.1	14.3	1.8	2	18.8	20.7	5.7	5.7	1.6	20.7	21.2	NA	20.8	21.2	17.5	15.5
LEL (0 - 100%)	0	0	49.2	40.5	0	0	47.4	47.7	99.3	*	*	49.5	4.9	1.8	21.7	15.8	72	62.3	55	--	55.9	53.5	0	0	0	NA	0	0	46	NA
H2S (0 -100 ppm)	0	0	0	0	0	0	7	4	0	0	406	406	0	0	1	0	1	0	0	0	49	49	0	0	0	NA	0	0	0	0
CO (0 - 50 ppm)	0	0	0	0	0	0	0	0	0	0	7	NA	0	0	9	0	6	7	1	1	5	5	0	21.5	0	NA	0	0	3	1
PID (0 - 10,000 ppm)	ND	ND	ND	ND	0.7	2.4	ND	ND	ND	ND	9.3	2.7	9.5	11	ND	1.3	2.3	1.6	4.2	5.3	4.1	3.9	ND	ND	ND	NA	8.3	ND	ND	ND
Depth	*Deep*		*Deep (~19.5' bgs)*		*Deep*		*Deep*		*Deep (~20' bgs)*		*Deep*		*Deep (~19.5' bgs)*		*Deep*		*Deep (~23.5' bgs)*		*Deep (~19.5' bgs)*		*Deep*		*Deep (25' bgs)*		*Deep (~11.5' bgs)*		*Deep*		*Deep (~11.5' bgs)*	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Time	NA	NA	1305	1310	NA	NA	NA	NA	1535	1545	NA	NA	1125	1130	NA	NA	0855	0905	0935	0940	NA	NA	1545	1550	0930	NA	NA	NA	1128	1140
CH4 (0 - 100%)	NA	NA	0.9	0	NA	NA	NA	NA	17.3	44.5	NA	NA	62	52	NA	NA	0	0.4	0	0	NA	NA	1.3	0.7	0	NA	NA	NA	0	0
CO2 (0 - 50%)	NA	NA	0	0	NA	NA	NA	NA	0	4	NA	NA	19.4	18	NA	NA	0.1	0	0.5	0.2	NA	NA	0	0	0	NA	NA	NA	0	0
O2 (0 - 25%)	NA	NA	20.4	20.4	NA	NA	NA	NA	17.5	12.4	NA	NA	5.5	5.5	NA	NA	21.4	21.4	18.9	20.5	NA	NA	21.1	21.2	21.2	NA	NA	NA	21.6	21.5
LEL (0 - 100%)	NA	NA	0	0	NA	NA	NA	NA	15.8	45.2	NA	NA	62.4	55	NA	NA	0	0.5	–	4	NA	NA	0	0	0	NA	NA	NA	0	0
H2S (0 -100 ppm)	NA	NA	0	0	NA	NA	NA	NA	0	0	NA	NA	0	0	NA	NA	0	0	0	0	NA	NA	0	0	0	NA	NA	NA	0	0
CO (0 - 50 ppm)	NA	NA	0	0	NA	NA	NA	NA	708	25	NA	NA	0	0	NA	NA	0	0	2	0	NA	NA	0	0	0	NA	NA	NA	0	0
PID (0 - 10,000 ppm)	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	1.3	0.9	NA	NA	ND	ND	24	30.3	NA	NA	ND	16.1	ND	NA	NA	NA	ND	ND

Notes:

1. Landfill gas measurements for methane, carbon dioxide, oxygen and LEL were collected using a Landtec GA 94 Landfill Gas Meter

2. Landfill gas measurements for hydrogen sulfide and carbon monoxide were collected using a QRAE Combustible Gas Meter

3. Photoionization detector (PID) readings were collected using a miniRAE 2000

Abbreviations:
NA -- Not Analyzed
ND - Not Detected
* - Peak the instruments capabilities to detect LEL

TABLE 2c
Envirosafe Services of Ohio
Oregon, Ohio
RCRA Facility Investigation
SWMU 8 Landfill Gas Data
August 2007

	TLW-201		TLW-202		TLW-203		TLW-204		TLW-205		TLW-206		TLW-207	
	8/29/2007		8/29/2007		8/29/2007		8/29/2007		8/29/2007		8/29/2007		8/29/2007	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Pressure (PSI)	0	0	0.7	0.8	0	0.8	0.7	0.5	4	4.6	0	0	0	0
Time	1357	1402	1348	1353	1340	1345	2001	2006	1159	1207	1326	1331	1314	1319
CH4 (0 - 100%)	26	3.7	0.2	4.6	69.7	8	<<<	<<<	0	<<<	27.2	5.4	1.5	3.2
CO2 (0 - 100%)	3.7	0.5	0	0.8	4.6	0.7	17	17.6	0	30.9	2.9	0.1	0.3	0.1
O2 (0 - 25%)	17	19.9	20.4	20.1	9.2	18.9	5.1	1.3	20.8	0	17.4	20.2	19.8	20.4
LEL (0 - 100%)	<<<	46	<<<	85	<<<	<<<	<<<	<<<	0	<<<	<<<	<<<	15	13
H2S (0 - 200 ppm)	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<	<<<
CO (0 - 2000 ppm)	116	115	125	121	117	126	19	75	2	96	96	111	36	28
Balance %	60.2	77	67.9	74.5	45.4	71.5	0	0	79.19	N/A	56.4	74.2	77.5	78.2

Notes:

1 Landfill gas measurements collected using a GEM2000 Plus Landfill Gas Meter

Abbreviations:

1 <<< -- Measured reading is out of range of the instruments capabilities (greater than range)

Table 3a
LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Millard Road Landfill SWMU 5

Date	Well	Depth to NAPL (ft)	Depth to Water (ft)	LNAPL Thickness (ft)	Comments
7/20/2006	T-20S (1)	--	4.97	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-20S (2)	13.97	14.00	0.03	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-20S (3)	--	6.17	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-20S (4)	--	10.19	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-20S (5)	6.55	7.53	0.98	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-20S (6)	--	13.99	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	MR-6S	--	12.88	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-21S	--	15.44	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	TLW-1	--	11.83	--	Wells were checked for DNAPL. No DNAPL was present
7/25/2006	T-20S (2)	14.24	14.28	0.04	
7/25/2006	T-20S (5)	6.7	7.71	1.01	Sampled on July 25, 2006, effectively removing the NAPL layer
7/26/2006	T-20S (1)	--	5.3	--	
7/26/2006	T-20S (2)	14.22	14.25	0.03	
7/26/2006	T-20S (3)	--	6.42	--	
7/26/2006	T-20S (4)	--	10.4	--	
7/26/2006	T-20S (5)	6.83	7.12	0.29	
7/26/2006	T-20S (6)	--	14.12	--	
7/27/2006	T-20S (5)	6.74	7.00	0.26	
7/28/2006	T-20S (5)	5.59	5.79	0.20	Heavy rain fell the previous night
8/1/2006	T-20S (1)	--	5.16	--	
8/1/2006	T-20S (2)	14.1	14.13	0.03	
8/1/2006	T-20S (3)	--	6.22	--	
8/1/2006	T-20S (4)	--	10.3	--	
8/1/2006	T-20S (5)	6.34	6.63	0.29	
8/1/2006	T-20S (6)	--	13.98	--	
8/1/2006	MR-6S	--	13.06	--	
8/1/2006	T-20W	--	8.54	--	
8/1/2006	T-21S	--	15.46	--	
8/1/2006	T-46W	--	10.31	--	
8/1/2006	T-47W	--	14.19	--	
8/1/2006	T-45W	--	11.11	--	
8/1/2006	TLW-1	--	12.25	--	
8/3/2006	T-20S (1)	--	5.14	--	
8/3/2006	T-20S (2)	14.08	14.09	0.01	
8/3/2006	T-20S (3)	--	6.21	--	
8/3/2006	T-20S (4)	--	10.31	--	
8/3/2006	T-20S (5)	6.53	6.71	0.18	Checked for DNAPL , but it was not present.
8/3/2006	T-20S (6)	--	14.03	--	
8/3/2006	MR-6S	--	13.06	--	
8/3/2006	T-20W	--	8.51	--	
8/3/2006	T-21S	--	15.51	--	
8/3/2006	T-46W	--	10.34	--	
8/3/2006	T-47W	--	14.14	--	
8/3/2006	T-45W	--	11.36	--	
8/3/2006	TLW-1	--	12.39	--	Checked for DNAPL , but it was not present.

Table 3a
LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Millard Road Landfill SWMU 5

8/8/2006	T-20S (1)	--	5.49	--	
8/8/2006	T-20S (2)	14.38	14.395	0.015	Checked for DNAPL , but it was not present.
8/8/2006	T-20S (3)	--	6.46	--	
8/8/2006	T-20S (4)	--	10.5	--	
8/8/2006	T-20S (5)	6.83	6.86	0.03	Checked for DNAPL , but it was not present.
8/8/2006	T-20S (6)	--	14.22	--	
8/8/2006	MR-6S	--	13.19	--	
8/8/2006	T-20W	--	8.83	--	
8/8/2006	T-21S	--	15.61	--	
8/8/2006	T-46W	--	10.53	--	
8/8/2006	T-47W	--	14.49	--	
8/8/2006	T-45W	--	11.97	--	
8/8/2006	TLW-1	--	12.91	--	
8/10/2006	T-20S (1)	--	5.38	--	
8/10/2006	T-20S (2)	14.31	14.32	0.01	Checked for DNAPL , but it was not present.
8/10/2006	T-20S (3)	--	6.44	--	
8/10/2006	T-20S (4)	--	10.43	--	
8/10/2006	T-20S (5)	6.87	6.89	0.02	Checked for DNAPL , but it was not present.
8/10/2006	T-20S (6)	--	14.19	--	
8/10/2006	MR-6S	--	13.24	--	
8/10/2006	T-20W	--	8.87	--	
8/10/2006	T-21S	--	15.6	--	
8/10/2006	T-46W	--	10.54	--	
8/10/2006	T-47W	--	14.41	--	
8/10/2006	T-45W	--	12.02	--	
8/10/2006	TLW-1	--	12.81	--	
10/24/2006	T-20S (1)	--	5.26	--	
10/24/2006	T-20S (2)	14.14	14.15	0.01	
10/24/2006	T-20S (3)	--	6.13	--	
10/24/2006	T-20S (4)	--	10.22	--	
10/24/2006	T-20S (5)	6.15	8.56	2.41	Bailed down NAPL
10/24/2006	T-20S (6)	--	14.02	--	
10/24/2006	MR-6S	--	13.17	--	
10/24/2006	T-20W	--	8.52	--	
10/24/2006	T-21S	--	15.08	--	
10/24/2006	T-46W	--	10.98	--	
10/24/2006	T-47W	--	14.1	--	
10/24/2006	T-45W	--	10.37	--	
10/24/2006	TLW-1	--	10.87	--	
10/26/2006	T-20S (1)	--	6.37	--	
10/26/2006	T-20S (2)	15.27	15.28	0.01	
10/26/2006	T-20S (3)	--	6.33	--	
10/26/2006	T-20S (4)	--	10.64	--	
10/26/2006	T-20S (5)	6.74	6.78	0.04	
10/26/2006	T-20S (6)	--	14.14	--	
10/26/2006	MR-6S	--	13.25	--	
10/26/2006	T-20W	--	8.51	--	
10/26/2006	T-21S	--	15.33	--	
10/26/2006	T-46W	--	10.76	--	

Table 3a
LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Millard Road Landfill SWMU 5

10/26/2006	T-47W	--	14.32	--	
10/26/2006	T-45W	--	10.37	--	
10/30/2006	T-20S (1)	--	5.54	--	
10/30/2006	T-20S (2)	14.4	14.41	0.01	
10/30/2006	T-20S (3)	--	6.05	--	
10/30/2006	T-20S (4)	--	10.15	--	
10/30/2006	T-20S (5)	6.27	6.28	0.01	
10/30/2006	T-20S (6)	--	13.78	--	
10/30/2006	T-20S (7)	--	7.4	--	DTB from TOC is 17.47'
10/30/2006	T-20S (8)	--	13.37	--	DTB from TOC is 20.33'
10/30/2006	MR-6S	--	13.19	--	
10/30/2006	T-20W	--	8.23	--	
10/30/2006	T-21S	--	14.8	--	
10/30/2006	T-46W	--	10.54	--	
10/30/2006	T-47W	--	13.19	--	
10/30/2006	T-45W	--	10.37	--	
10/30/2006	TLW-1	--	10.37	--	
11/1/2006	T-20S (1)	--	5.67	--	Time: 1301
11/1/2006	T-20S (2)	14.56	14.57	0.01	Time: 1312
11/1/2006	T-20S (3)	--	6.18	--	Time: 1259
11/1/2006	T-20S (4)	--	10.3	--	Time: 1255
11/1/2006	T-20S (5)	6.15	6.35	0.2	Time: 1308
11/1/2006	T-20S (6)	--	13.94	--	Time: 1253
11/1/2006	T-20S (7)	--	7.5	--	Time: 1306
11/1/2006	T-20S (8)	--	11.94	--	Time: 1303
8/27/2007	T-20S (1)	--	5.72	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (2)	15.39	15.45	0.06	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (3)	--	6.33	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (4)	--	10.41	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (5)	6.62	6.86	0.24	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (6)	14.94	14.95	0.01	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (7)	--	7.69	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (8)	--	10.26	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	MR-6S	14.72	14.73	0.01	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-21S	--	15.12	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	TLW-1	--	--	--	Well is missing, presumed destroyed.
SWMU 5 LNAPL Bail-down Test					
8/27/2007	MR-6S	14.72	14.73	0.01	Time: 1720 No FP or sheen noted on purged water, will not include in bail-down test.
8/27/2007	T-20S (2)	15.42	15.45	0.03	Time: 1725
8/27/2007	T-20S (5)	6.62	6.86	0.24	Time: 1748
8/27/2007	T-20S (6)	14.96	14.97	0.01	Time: 1740
8/27/2007	T-20S (2)	15.98	15.99	0.01	Time: 1800
8/27/2007	T-20S (5)	6.8	6.84	0.04	Time: 1752
8/27/2007	T-20S (6)	15.3	15.31	0.01	Time: 1807
8/27/2007	T-20S (2)	15.96	15.97	0.01	Time: 1830
8/27/2007	T-20S (5)	6.68	6.72	0.04	Time: 1812
8/27/2007	T-20S (6)	15.32	15.33	0.01	Time: 1821

Table 3a
LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Millard Road Landfill SWMU 5

11/28/2007	T-20S (1)	--	6.5	--	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (2)	14.92	15.30	0.38	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (3)	--	7.27	--	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (4)	--	11.10	--	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (5)	4.80	6.50	1.70	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (6)	15.80	16.20	0.40	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (7)	--	7.80	--	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (8)	--	11.90	--	Wells were checked for DNAPL. No DNAPL was present

Table 3a LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Millard Road Landfill - SWMU 5

Date	Well	Depth to NAPL (ft)	Depth to Water (ft)	LNAPL Thickness (ft)	Comments
	T-20S (1)	--	5.53	--	Wells were checked for DNAPL. No DNAPL was present
	T-20S (2)	15.5	15.83	0.33	
	T-20S (3)	--	5.95	--	Wells were checked for DNAPL. No DNAPL was present
	T-20S (4)	--	10.11	--	Wells were checked for DNAPL. No DNAPL was present
	T-20S (5)	6.06	6.79	0.73	
	T-20S (6)	14.93	15.09	0.16	
6/2/2010	T-20S (7)	--	7.46	--	Wells were checked for DNAPL. No DNAPL was present
	T-20S (8)	--	11.95	--	Wells were checked for DNAPL. No DNAPL was present
	MR-6S	--	14.76	--	
	T21S	--	15.36	--	Wells were checked for DNAPL. No DNAPL was present
	T20W	--	8.18	--	Well is missing, presumed destroyed.
	T45W	--	12.15	--	
	T46W				Unable to locate, presumed abandoned.

Table 3b
ESOI Otter Creek Facility
Oregon, Ohio
Old Oil Pond - SWMU 8

Date	Well	Depth to NAPL (ft)	Depth to Water (ft)	LNAPL Thickness	Comments
7/13/2006	T-33S	14.91	15.97	1.06	Sampled on July 14, 2006, effectively removing the NAPL layer
7/25/2006	T-33S	14.92	15.74	0.82	
7/26/2006	T-33S	15.92	18.14	2.22	
8/1/2006	T-33S	14.82	16.91	2.09	
8/1/2006	S8-206	2.08	2.97	0.89	
8/1/2006	S8-207	--	4.31	--	
8/1/2006	Butz Crock	--	1.69	--	Discontinous oil noted on water surface and coated the probe; no measurable product
8/3/2006	T-33S	14.71	16.39	1.68	
8/3/2006	S8-206	--	4.16	0.84	
8/3/2006	S8-207	1.65	2.49	--	
8/3/2006	Butz Crock	--	1.73	--	Discontinous oil noted on water surface and coated the probe tip; no measurable product.
8/8/2006	T-33S	15.28	16.58	1.3	Checked for DNAPL , but it was not present.
8/8/2006	S8-206	--	5.37	--	
8/8/2006	S8-207	3.79	4.94	1.15	
8/8/2006	Butz Crock	2.1	2.11	0.01	Checked for DNAPL , but it was not present.
8/10/2006	T-33S	15.03	16.28	1.25	Checked for DNAPL , but it was not present.
8/10/2006	S8-206	--	5.1	--	
8/10/2006	S8-207	4.36	5.69	1.33	
8/10/2006	Butz Crock	2.03	2.04	0.01	Checked for DNAPL , but it was not present.
10/24/2006	T-33S	14.48	14.69	0.21	
10/24/2006	TLW-201	6.68	7.8	1.12	
10/24/2006	TLW-202	6.11	14.14	8.03	
10/24/2006	Butz Crock	2.05	2.06	0.01	
10/26/2006	T-33S	14.99	15.32	0.33	
10/26/2006	TLW-201	6.66	--	--	
10/26/2006	TLW-202	5.79	12.54	6.75	
10/26/2006	Butz Crock	2.06	2.07	0.01	
10/30/2006	T-33S	14.53	14.86	0.33	
10/30/2006	TLW-201	6.69	6.7	0.01	
10/30/2006	TLW-202	5.59	12.1	6.51	
10/30/2006	Butz Crock	2.14	2.15	0.01	
10/30/2006	S8-205	--	26.67	--	DTB from TOC is 27.14'
10/30/2006	S8-204	--	25.18	--	DTB from TOC is 27.02'
10/30/2006	TLW-204	7.15	--	--	DTB is 21.0'
10/31/2006	TLW -204	7.14	7.15	0.01	
10/31/2006	TLW -205	7.44	17.1	9.66	
10/31/2006	TLW -206	8.74	22.64	13.9	
10/31/2006	TLW -207	6.54	12.93	6.39	
11/1/2006	TLW -204	7.29	7.31	0.02	Time: 0808
11/1/2006	TLW -205	7.67	17.91	10.24	Time: 0812
11/1/2006	TLW -206	7.7	to bottom	--	Time: 0827
11/1/2006	TLW -207	7.29	13.5	6.21	Time: 0817
11/1/2006	TLW -204	7.5	--	--	Time: 0855
11/1/2006	TLW -205	8.21	--	--	Time: 0902
11/1/2006	TLW -207	8.28	--	--	Time: 0907
11/1/2006	TLW -206	9.49	--	--	Time: 0919
11/1/2006	TLW -204	7.5	--	--	Time: 0923
11/1/2006	TLW -205	8.16	--	--	Time: 0927
11/1/2006	TLW -207	6.9	--	--	Time: 0930
11/1/2006	TLW -204	7.5	--	--	Time: 1211
11/1/2006	TLW -205	7.95	--	--	Time: 1213
11/1/2006	TLW -206	8.74	--	--	Time: 1225
11/1/2006	TLW -207	6.23	--	--	Time: 1220
11/1/2006	TLW -201	--	6.82	--	Time: 1231
11/1/2006	TLW -202	5.78	12.43	6.65	Time: 1235
11/1/2006	AOC7	2.85	2.86	0.01	Time: 1238
8/29/2007	TLW-201	5.27	--	--	No water level noted.
8/29/2007	TLW-202	3.8	11.35	7.55	
8/29/2007	TLW-203	--	10.59	--	
8/29/2007	TLW-204	5.2	--	--	No water level noted.
8/29/2007	TLW-205	--	--	--	Cannot access due to extreme pressure behind well cap.
8/29/2007	TLW-206	~0.5	--	--	DTP drops to ~0.8' below TOC after approximately 15 minutes. No water level noted.
8/29/2007	TLW-207	5.7	--	--	No water level noted.
6/2/2010	TLW-201	--	5.78	--	
6/2/2010	TLW-202	4.05	11.83	7.78	
6/2/2010	TLW-203	--	13.21	--	
6/2/2010	TLW-204	7.47	14.18	6.71	No water level noted.
6/2/2010	TLW-205	10.39	10.42	0.03	Access only after bleeding pressure with T-valve for approx. 20-minutes.
6/2/2010	TLW-206	2.02	22	19.98	Unable to obtain accurate measurement, O/I probe readings fluctuate at depth.
6/2/2010	TLW-207	8.47	12.88	4.41	
6/2/2010	T-33S	14.09	24.11	10.02	
6/2/2010	T-208	--	13.27	--	No free product noted.
6/2/2010	T-209	--	17.98	--	No free product noted.

Table 3b: LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Old Oil Pond - SWMU 8

Date	Well	Depth to NAPL (ft)	Depth to Water (ft)	LNAPL Thickness	Pressure (psi)	Comments
6/2/2010	TLW-201	--	5.78	--	0	
	TLW-202	4.05	11.83	7.78	0	
	TLW-203	--	13.21	--	0	
	TLW-204	7.47	14.18	6.71	0	No water level noted.
	TLW-205	10.39	10.42	0.03	3.5	Access only after bleeding pressure with T-valve for approx. 20-minutes.
	TLW-206	2.02	22	19.98	0	Unable to obtain accurate measurement, O/I probe readings fluctuate at depth.
	TLW-207	8.47	12.88	4.41	0	
6/2/2010	T-33S	14.09	24.11	10.02	N/A	
	T-208	--	13.27	--	N/A	No free product noted.
	T-209	--	17.98	--	N/A	No free product noted.

Table 4a
Summary of Physical Properties
T20S(5) Non-Aqueous Phase Liquid
ESOI Otter Creek Facility
Oregon, Ohio

LOCATION		**T-20S (5)**
ENVIRON Sample ID		**SWMU5-T20S5-NAPL**
Matrix		**NAPL**
Sample Date		**02-Jun-10**
Comments		
Physical Properties	Units	
Specific Gravity/Bulk Density	NONE	0.95
Viscosity @ 60F	CST	529.5
Viscosity @ 77F	CST	254.8
Viscosity @ 104F	CST	98.16
Viscosity @ 194F	CST	13.54
Viscosity @ 212F	CST	10.43

Abbreviations:
CST: Centistokes

Table 4b
Summary of Physical Properties
Non-Aqueous Phase Liquid
ESOI Otter Creek Facility
Oregon, Ohio

LOCATION		AOC 7	COMP_SWMU9	T-20S (5)	T-33S	TLW-202
ENVIRON Sample ID		AOC7-NAPL-060726	SWMU9-NAPL-061101-C	T20S5-NAPL-060726	T33S-NAPL-060714	TLW202-NAPL-060726
Matrix		NAPL	NAPL	NAPL	NAPL	NAPL
Sample Date		26-Jul-06	01-Nov-06	26-Jul-06	14-Jul-06	26-Jul-06
Comments						
Physical Properties	Units					
Specific Gravity/Bulk Density	NONE	0.99	0.93	0.97	0.93	0.98
Viscosity (Initial)	CST	5549.82 @60F	25.43 @60F	518.46 @60F	53.04 @15.6C	107.44 @60F
Viscosity (Secondary)	CST	2086.92 @77F	17.19 @77F	244.72 @77F	33.2 @25C	62.74 @77F
Viscosity (Initial)	SUS	25646.3 @60F	121 @60F	507.8 @60F	245.9 @15.6C	496.7 @60F
Viscosity (Secondary)	SUS	9653.9 @77F	86.1 @77F	1132.1 @77F	155.7 @25C	290.8 @77F

Abbreviations:
CST: Centistokes
SUS: Saybolt Universal Seconds

Photo 1: SWMU 5 – looking west to tree line at Otter Creek.

Photo 2: SWMU 5 – looking north, Millard Avenue Overpass in background.

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 3: SWMU 5 – looking north.

Photo 4: Standpipe – SWMU 7

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 5: Standpipe – SWMU 7

Photo 6: Drainage ditch – NW corner of SWMU 7

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 7: Drainage Ditch – SE corner of SWMU 6

Photo 8: Drainage Ditch – SE corner of SWMU 6

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 9: SWMU 1 – regraded cap area

Photo 10: SWMU 1 – regraded cap area

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 11: SWMU 1 – regraded cap area

Photo 12: SWMU 1 – regraded cap area

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 13: SWMU 1 – Leachate collection sump

Photo 14: SWMU 1 – w/Millard Avenue Overpass in background.

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 15: SWMU 1 – w/Millard Avenue Overpass in background.

Photo 16: SWMU 6 – northeast corner

Title:	Site Photographs	**Date: 10/27/2010**	
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**	
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON	

Photo 17: SWMU 6 – northeast corner

Photo 18: Northeast property boundary near SWMU 6

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 19: SWMU 9 – Building C in background.

Photo 20: SWMU 9 – looking southeast.

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 21: SWMU 9 looking east

Photo 22: SWMU 9 – stained vent pipe.

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 23: SWMU 9 – stained area and ponding.

Photo 24: SWMU 9 – stained vent pipe.

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 25: SWMU 9 – stained area.

Photo 26: SWMU 9 – standing water

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 27: SWMU 9 – weather station area

Photo 28: AOC 6 – Aboveground storage tank area.

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 29: SWMU 8 – TLW-205 location.

Photo 30: SWMU 8 – O/I probe tip after measurement at TLW-205.

Title:	Site Photographs	**Date: 10/27/2010**
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON

Photo 31: SWMU 8 – O/I probe tip after measurement at TLW-205.

Photo 32: NAPL sample collected from T20S(5).

Title:	Site Photographs	**Date: 10/27/2010**	
Site:	ESOI Otter Creek	**Project-No.: 02-6471M14B**	
Client:	Envirosafe Services of Ohio, Inc.	ENVIRON	

APPENDIX B

Amended Portions of Section F of Envirosafe's Part B Permit
Procedures to Prevent Hazards

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MF-17(c) (Wastewater Tank 403-404-LAB Daily Inspection Form)
MF-18(b) (F039 Leachate Tank Inventory Control Log)
Weekly: MF-04(a) (Leachate Storage Building Weekly Inspection)
F.8 Railcar Inspections
Daily*: MF-16(a) (Railcar Inbound Inspection)
MF-16(b) (Railcar Outbound Inspection)
Weekly: MF-16(c) (Rail Line Weekly Inspection)
* Days on which there is rail activity, only
F.9 Post-Closure Inspections

F-4c(7)(d) Waste Protection

Waste stored in storage areas will be removed and placed into the disposal/stabilization process as soon as possible in accordance with the Operations Schedule.

Unprotected wastes that are water reactive will be prohibited in storage areas located inside and outside of the Stabilization/Containment Building.

Dust generating waste within the area will be managed through the addition of water, admix or controlled misting to minimize the generation of dust. As required, waste within storage areas located inside and outside of the Stabilization/Containment Building will be covered with a compatible inert cover. (See Subsection F-4, "Prevention of Reaction of Ignitable, Reactive, and Incompatible Wastes")

F-4c(7)(e) Corrective Action Areas

The baseline human health risk assessment in the *Final RFI Report* for the ESOI Otter Creek Road Facility (ENVIRON International Corporation, Revised June 3, 2009) identified the need for corrective measures to address the following potential exposures in which the risk assessment conservatively assumed that workers do not use personal protective equipment, as shown on Figure 5-1 of the *Corrective Measures Study Work Plan* (Envirosource, ENVIRON, Revised December 31, 2009), which is included herein:

- *AOC 7*: potential exposure of on-site outdoor routine facility workers to *NAPL within Butz Crock*.
- *SWMU 5*: potential exposure of on-site outdoor routine facility workers to NAPL identified in subsurface soil.

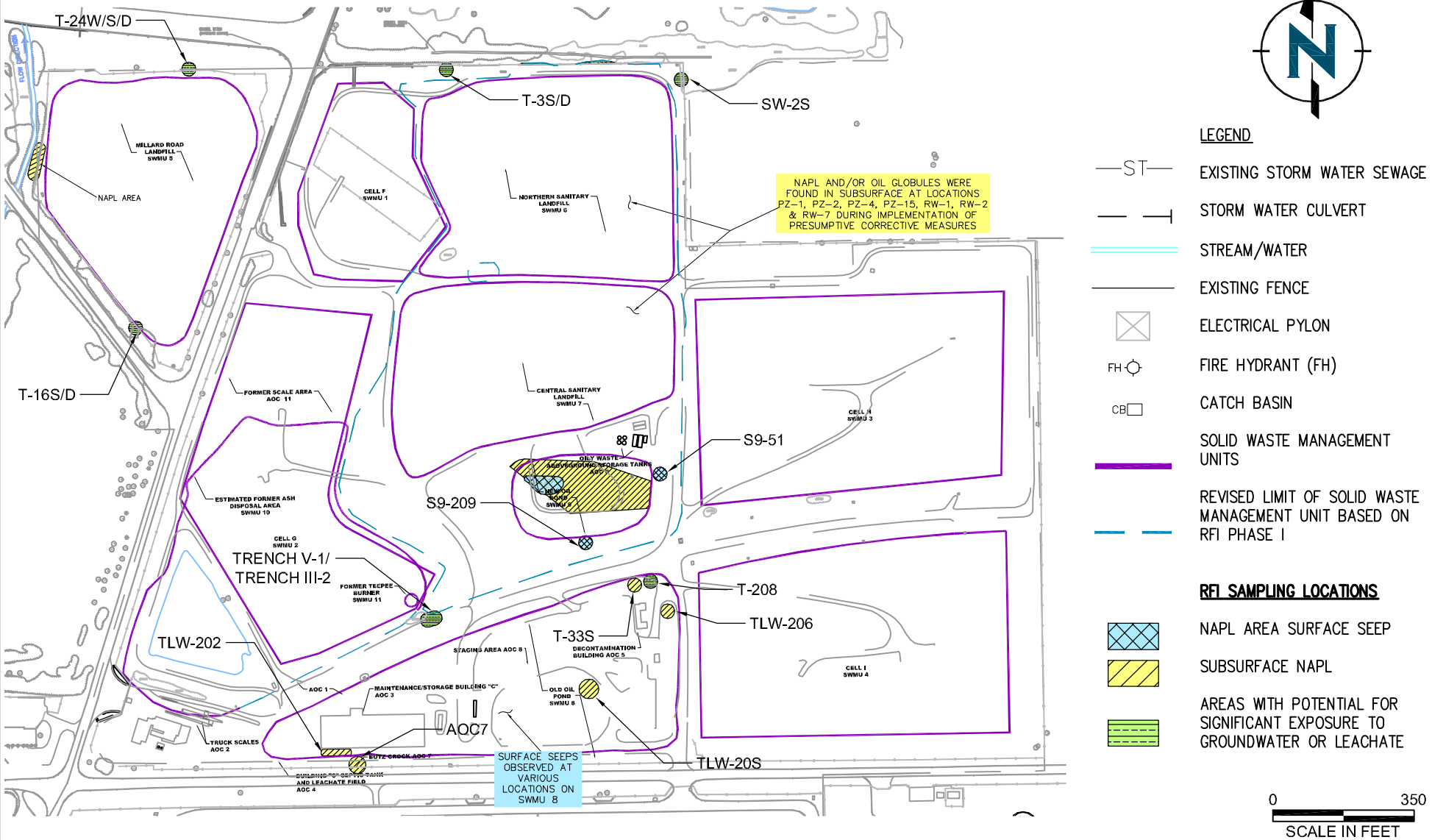
- *SWMUs 5 and 6*: potential exposures of on-site maintenance workers to *ground water*. .
- *SWMU 6*: potential exposures of on-site outdoor routine facility workers to *leachate seeps* at SWMU 6.
- *SWMU 8*: potential exposure of on-site outdoor routine facility workers and on-site maintenance workers to *NAPL seeps* and *shallow groundwater*..
- *SWMU 9*: potential exposure of on-site outdoor routine facility workers to *NAPL seeps*.

All of the areas listed above are being addressed as part of the Corrective Measures Proposal for the Facility. The implementation of corrective measures is intended to mitigate these potential exposures summarized above. While it is not believed that any individual will have actual exposures that are as high as those assumed in the risk assessment, personal protective equipment is required when work in these areas may result in exposure to the contaminated media, until it has been confirmed that the implemented corrective measures have mitigated the potential for these exposures. Personnel protective equipment requirements to prevent potential exposure to the media identified above are a modified Level D ensemble, as follows:

- long sleeve shirts and long pants,
- eye protection with side shields,
- safety shoes, and
- chemical resistant gloves.

F-4d Personnel Protective Equipment

Specific dress or personnel protective equipment is required for all disposal areas, storage areas, and process areas whenever there is a reasonable probability that an injury could be prevented by such equipment and as required by the area supervisor



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LAYOUT OF CORRECTIVE MEASURES ASSESSMENT AREAS

ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

FIGURE
F-6

026174M14B

TSP 12/29/10 [026174M13_C04]

APPENDIX C

Supporting Documentation for CM Analysis – Leachate Management

C O N T E N T S

Pre-Treatment Conceptual Design
Cost Estimates - Leachate Management Alternatives

Pre-Treatment Conceptual Design

Assessment of Leachate Pretreatment System for SWMUs 5, 6, and 7
ESOI Otter Creek Facility, Oregon, Ohio

Introduction

The existing leachate extraction system at ESOI consists of a network of nine recovery/ extraction wells at former landfills SWMU 5 (Milard Road Landfill), SWMU 6 (Northern Sanitary Landfill), and SWMU 7 (Central Sanitary Landfill). Leachate within the recovery wells is pumped using submersible pumps to on-site temporary storage tanks. The stored leachate is periodically trucked for off-site treatment at the City of Toledo's Publicly Owned Treatment Works (POTW).

This technical memorandum focuses on the feasibility of constructing an on-site plant for pretreatment of leachate extracted from SWMU's 5, 6, and 7. The treated leachate could either be discharged to the local sanitary sewer system for further treatment at the City of Toledo POTW.

Estimation of Leachate Loadings:

For the purpose of this evaluation, leachate generation rates were estimated based on the historical (i.e., July 2007 to May 2010) volume of leachate pumped from recovery wells in SWMUs 5, 6, and 7. Based on the available information and as summarized in Table 1, collectively the average annual leachate generated from all SWMUs is 0.65 million gallons (MG) and maximum annual leachate generated from all three SWMUs is 1.1 MG.

Table 1: Historical Leachate Generation from SWMUs 5, 6, & 7

	SWMU 5 (gal/ year)	SWMU 6 (gal/ year)	SWMU 7 (gal/ year)	Total Volume (million gallons)
2007	174,305	451,798	429,419	1.1
2008	203,802	281,357	347,931	0.8
2009	144,622	138,973	123,587	0.4
2010	59,886	118,747	67,376	0.2
Annual Average	**145,654**	**247,719**	**242,078**	**0.6**
Annual Maximum	**203,802**	**451,798**	**429,419**	**1.1**

Leachate Characterization:

The characteristics of leachate presented in the following table (Table 2) are based on the leachate sampling conducted in October 2008.

Table 2: Waste Characteristics of Leachate from SWMUs 5, 6, & 7

Parameters	Result (mg/L)
Volatile Organic Compounds	
Acetone	0.78
Acetonitrile	0.06
Benzene	0.013

Table 2: Waste Characteristics of Leachate from SWMUs 5, 6, & 7

Parameters	Result (mg/L)
2-Butanone	0.068
Chlorobenzene	0.014
1,4-Dioxane	8.5
Isobutyl alcohol	0.62
Methylene chloride	0.027
4-Methyl-2-pentanone	0.041
Tetrahydrofuran	0.045
Toluene	0.0052
Xylenes (total)	0.0066
n-Butyl alcohol	7.0
Semi Volatile organic compounds	
1,4-Dioxane	5.4
3-Methylphenol	0.13
4-Methylphenol	0.13
Phenol	0.86
Non halogenated Organics	
Methanol	0.032
Organochlorine Pesticides	
beta-BHC	0.0028
Chlordane (technical)	0.0067
4,4'-DDE	0.0015
Polychlorinated Biphenyl's (PCBs)	
PCBs	ND
Organophosphorous Compounds	
Organophosphorous Compounds	ND
Chlorinated Herbicide	
Chlorinated Herbicides	ND
Metals	
Arsenic	0.703
Lead	0.507
Antimony	0.152
Selenium	0.396
Mercury	0.0003
Silver	0.0022
Chromium	0.039.8
Nickel	0.615
Vanadium	0.269
Zinc	0.0533 J

Table 2: Waste Characteristics of Leachate from SWMUs 5, 6, & 7

Parameters	Result (mg/L)
General Chemistry	
Cyanide Amenable to	0.41
Cyanide, Total	3.1
Fluoride	15.1
Total Sulfide	4.0
pH	9
Phthalic Acids/ anhydrides	3.2
BOD	NA
COD	NA
Ammonia-Nitrogen	NA
Chloride	NA

Leachate from the SWMUs was composited and analyzed for organic compounds (VOCs and SVOCs, PCBs, organic phosphates, pesticides, and herbicides) and inorganics (heavy metals, cyanide, fluoride, and phthalates). As shown in Table 2, several VOCs, SVOCs and metals were detected in the leachate. Herbicide, pesticides, PCBs, organic phosphates were not detected. The pH of the leachate was 9 which is indicative of aged landfills (older than 5 to 10 years). In the absence of analytical data for other typical leachate parameters like BOD, COD, TDS, TSS, and alkalinity; and given that leachate is extracted from aged landfills, it was assumed that the extracted leachate have low biodegradability (ratio of BOD5 to COD < 0.5) value.

In accordance to Ohio EPA and 40 CFR Part 403, all indirect discharges to a POTW or any tributary sewer line of the POTW is to be pre-treated to meet pretreatment discharge limitations of the specific local wastewater treatment plant (WWTP). The pretreatment standards for City of Toledo's POTW are presented in Table 3.

Table 3: City of Toledo's Pretreatment Standards

Parameters	mg/L
Benzene	0.14
TTO	2.1
PCBs (total)	0.007
Arsenic	0.85
Cadmium	0.3
Chromium (total)	0.8
Copper	1.0
Cyanide (total)	4.2
Lead	1.5
Mercury	0.2
Nickel	2.9
Silver	0.2
Zinc	6.3

Table 3: City of Toledo's Pretreatment Standards

Parameters	mg/L
pH	5-12
TPH	0.25
Toluene	1.36
Ethyl benzene	1.59
Xylene	0.41

Based on the leachate characterization, concentrations of total toxic organics (TTOs), arsenic, and total cyanides exceed the POTW pretreatment discharge standards.

Most recent leachate characterization data available from April 2010 from ESOI's ongoing semi-annual monitoring, indicated that the concentrations of metals, cyanide, and TTOs from SWMUs 5, 6, and 7 meet the City of Toledo's pretreatment standards.

Proposed Pretreatment

To handle the current maximum annual leachate generation of 1.1 MG, and assuming standard work hour batch operation (5 days a week, 8 hours a day), the minimum capacity of the leachate pretreatment system should be 10 gpm. Considering potential future improvements to the collection system that would yield higher volumes and fluctuations inherent in leachate collection systems, the pretreatment system will be sized to treat a maximum of 20 gpm.

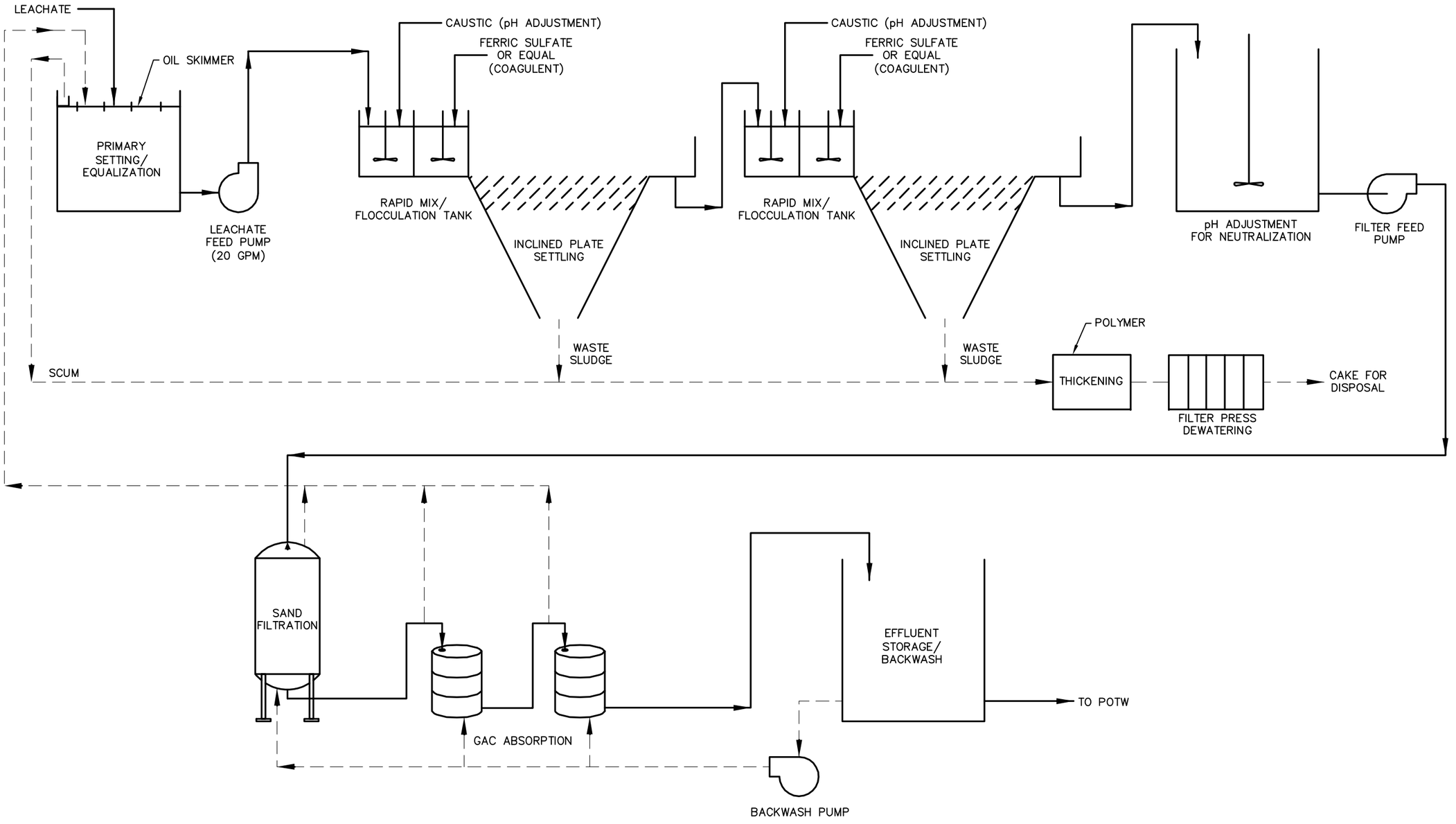
Based on the POTW treatment requirements and analytical data available, the primary treatment process for this leachate will be physico-chemical. In case of direct discharge of treated leachate into receiving waters, extensive onsite treatment is needed with respect to metals and organic constituents. In such cases, in addition to physical and chemical treatment, biological (aerobic/ anaerobic) treatment is required.

Conceptually the pretreatment process will consist of primary settling tanks, rapid mix tanks for flash mixing of chemicals for pH adjustment and coagulation of heavy metals and cyanide, flocculation tanks, primary and secondary inclined plate settling tanks, pH adjustment back to neutral, sand filtration for suspended solids control, GAC adsorption for removal of organics, and effluent storage. The pretreatment will also include chemical feed systems, oil skimmers, sludge removal, and filter press for dewatering of sludge.

The influent leachate will be conveyed to primary settling tanks, where heavier solids like grit sink and lighter substances like oil and grease float. Primary settling tanks will be equipped with oil skimmers to remove floating oil and scum. The primary settling tanks also provide leachate flow and load equalization. Influent from the primary tanks will then be pumped to a two stage rapid mix tank where caustic soda and ferric sulfate are added to the flow prior to settling tanks for pH adjustment and as a coagulant, respectively. Fine flocs formed in the flash mixers will agglomerate in the flocculation tanks and following flocculation, the heavier particles will be settled out on inclined settling plates. The settled particles will be stored in a hopper located directly underneath the settling plates. The clarified effluent will then flow to a collection tank where it will be neutralized and pumped to sand filters for removal of remaining unsettled fine suspended solids. Effluent from the sand filters will then enter the GAC vessels for adsorption of organics. The treated effluent will then be stored in effluent storage tanks from where it will be discharged to POTW sewer line or surface water.

The sand filter, GAC vessels will require periodic backwashing. The settled sludge from primary clarifiers, inclined plate hoppers will be periodically withdrawn and stored in sludge tanks where polymers will be added for further thickening of the sludge. The thickened sludge will then be dewatered through belt filter press and the cake staged in bins or boxes for disposal.

The pretreatment system would occupy an area of approximately 50 x 50 square-feet space. A process flow diagram of the conceptual treatment system is included as Figure 1.



ENVIRON

DRAFTED BY: PRM/BKLEIN | DATE: 10/12/10

CONCEPTUAL PROCESS FLOW DIAGRAM
LEACHATE PRETREATMENT SYSTEM
ENVIRONSAFE SERVICES OF OHIO
OREGON, OHIO

FIGURE
1

026174M14APFD01

F:\026174M14A

Cost Estimates - Leachate Management Alternatives

Cost Estimates for Leachate Pretreatment System

ESOI Otter Creek Facility, Oregon, Ohio

Current (Off-Site Transportation and Disposal): Leachate Disposal at POTW

Scope and Assumptions

Leachate Disposal at City of Toledo POTW via trucking: --

Assume average annual leachate collection from SWMUs 5,6, and 7: 0.7 MG

-- Leachate is trucked to a manhole on Berlin Ave (~ 1.5 miles from Site)

-- Net present costs are based on a discount rate of 2.7 % and 30 yrs of operation

-- No associated capital costs

Transportation and Disposal Cost

Item	Description	Quantity	Unit	Unit Cost	Total
1	Total Annual Transportation of Leachate	0.7	million gallons	$0.03	$23,800
2	Total Annual Disposal of Leachate	0.7	million gallons	$0.06	$44,660
3	Annual Sampling Cost	2	ea	$941	$2,000
			Annual Transportation and Disposal Cost		**$70,460**

CURRENT (OFF-SITE T&D), TOTAL COST **$2,114,000**

CURRENT (OFF-SITE T&D), NPV **$1,440,000**

Cost Estimates for Leachate Pretreatment System
ESOI Otter Creek Facility, Oregon, Ohio

Alternative 1: Leachate Disposal via Direct Connection to Sanitary Sewer

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

Leachate Disposal via Direct Connection to Sanitary Sewer:
-- Discharge to POTW via direct sewer connection (without pretreatment)
-- Possible sanitary sewer connection located within City of Toledo
-- Assume leachate pumping rate of 20 gpm
-- Assume two 3000 gallon leachate holding tanks
-- Operation costs include treated effluent monitoring and POTW's leachate disposal cost
-- Assume average annual leachate collection from SWMUs 5,6 and 7: 0.7 MG

Capital Costs

Item	Component	Quantity	Unit	Unit Cost	Total
1	Trench Excavation and Backfilling	556	CY	$33	$18,100
4	Compaction	556	CY	$11	$5,800
5	Grading	3,750	SF	$6	$23,000
6	4" HDPE pipe	2,500	LF	$9	$22,100
7	Centrifugal pump (20 gpm)	1	ea	$2,485	$2,500
8	Leachate Holding Tanks (3000 gallon)	2	ea	$4,890	$9,800
9	Sewer connection fee	1	ea	$5,500	$5,500
10	Manhole sewer connection at 30 feet bgs	1	ea	$40,000	$40,000
	Total Equipment Cost				**$127,000**

Engineering and Contingency

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering and Permitting (12%)	1	LS	$15,240	$15,240
2	Construction Quality Assurance (10%)	1	LS	$12,700	$12,700
3	Contingency (20%)	1	LS	$25,400	$25,400
	Subtotal				**$53,000**

TOTAL CAPITAL COSTS	**$180,000**

Operating, Monitoring and Maintenance Cost

Item	Description	Quantity	Unit	Unit Cost	Total
1	Sampling Costs (2 per annum)	2	ea	$945.70	$2,000
2	Annual Disposal of Leachate	0.7	million gallons	$0.06	$44,660
	Annual Operation and Maintenance Cost				$47,000

TOTAL OPERATION AND MAINTENANCE	**$1,410,000**
NPV OPERATION AND MAINTENANCE	**$957,995**

ALTERNATIVE 1, TOTAL COST	**$1,590,000**
ALTERNATIVE 1, NPV	**$1,138,000**

Cost Estimates for Leachate Pretreatment System
ESOI Otter Creek Facility, Oregon, Ohio

Alternative 2: Leachate Pretreatment System (SWMU 5, 6, and 7)

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Leachate Pretreatment System
-- Assume maximum annual leachate collection from SWMUs 5,6 and 7: 1.1 MG
-- Pretreatment system sized to treat 20 gpm
-- Assume standard work hour operation (5 days a week, 8 hours a day)
-- Pretreated leachate is discharged to POTW via sewer connection
-- POTW disposal costs for pretreated leachate assumes 25% reduction in current disposal costs.
-- Net present costs are based on a discount rate of 2.7% and 30 yrs of operation

Capital Costs

Item	Component	Quantity	Unit	Unit Cost	Total
1	Equilization/ Effluent tanks	2	3000 gallon	$4,900	$9,800
2	Inclined Plate Settlers	2	20 gpm	$106,200	$212,400
3	Sand Filtration	1	2-ft dia	$13,200	$13,200
3	Granular Activated Carbon (LGAC)	2	20 gpm	$3,700	$7,400
4	Neutralization System	1	20 gpm	$36,400	$36,400
5	Centrifugal Feed Pumps	2	20 gpm series	$2,500	$5,000
6	Transfer/Backwash Pumps	2	20 gpm series	$2,200	$4,400
7	Thickening and Dewatering	1	1 CF filter press	$30,800	$30,800
8	Chemical Feed Systems	1	ea	$20,000	$20,000
9	Yardpiping and Site Work	1	percentage	$152,730	$152,700
10	Direct Connection to Sanitary Sewer	1	project	$127,000	$127,000
	Total Equipment Cost				**$619,000**

Engineering and Contingency

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering and Permitting (12%)	1	LS	$74,280	$74,280
2	Construction Quality Assurance (10%)	1	LS	$61,900	$61,900
3	Contingency (20%)	1	LS	$123,800	$123,800
	Subtotal				**$260,000**

TOTAL CAPITAL COSTS	**$879,000**

Annual Operation and Maintenance

Item	Description	Quantity	Unit	Unit Cost	Total
1	Annual Operation and Maintenance	1	percentage	$87,900	$87,900
2	Annual Disposal of Leachate	0.7	million gallons	$0.05	$33,495
3	Sampling Costs (2 per annum)	2	ea	$946	$2,000
	Annual Operation and Maintenance Cost				$123,400
				TOTAL OPERATION AND MAINTENANCE	**$3,702,000**
				NPV OPERATION AND MAINTENANCE	**$2,515,246**

TOTAL PRETREATMENT SYSTEM COSTS	**$4,581,000**
TOTAL NET PRESENT PRETREATMENT SYSTEM COSTS	**$3,395,000**

APPENDIX D

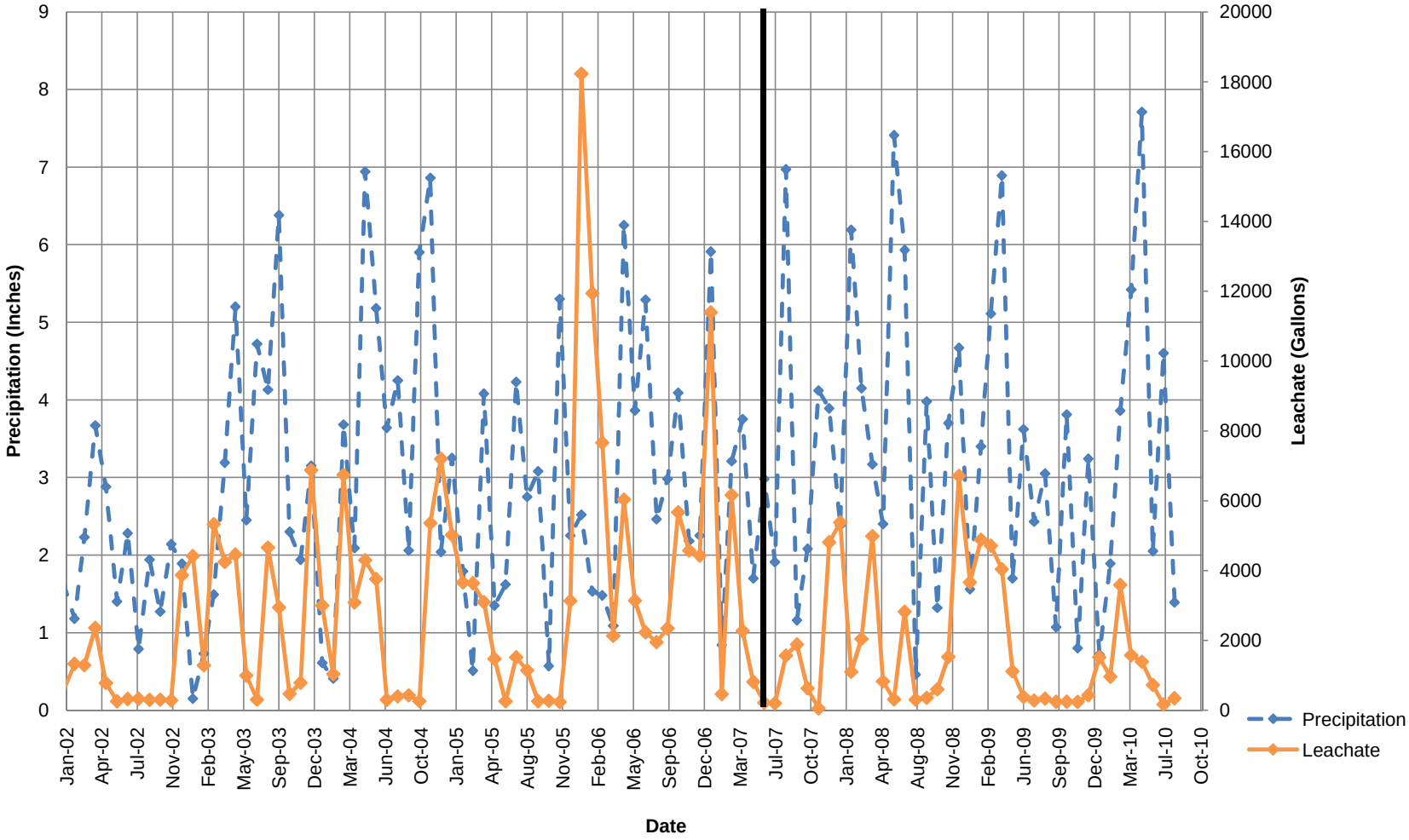
Supporting Documentation for CM Analysis - Landfills

C O N T E N T S

Leachate System Performance Data
Standpipe Data
Predicted Landfill Cap Performance
Off-site Waste
Cost Estimates - Landfill Covers

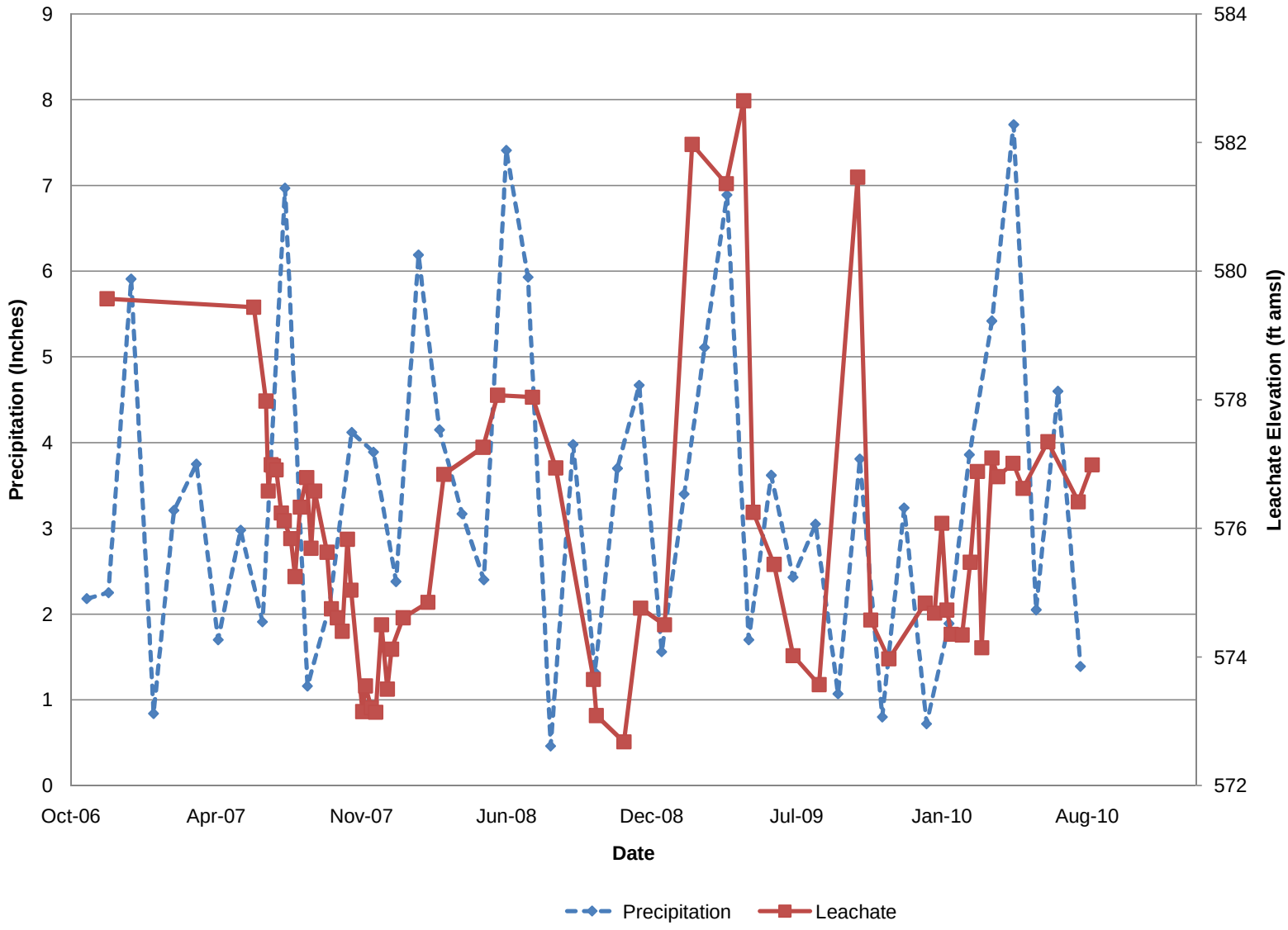
Leachate System Performance Data

Precipitation vs. Leachate Recovery at SWMU 1
ESOI Otter Creek Facility, Oregon, Ohio



Note: In 2006, torrential rain events and further subsidence caused excessive ponding and a significant water flow path around the leachate extraction manhole. It is believed that storm water directly entered the collection system through the manhole and is the reason for the skewed amount of leachate. The area was regraded and the manhole was repaired to prevent stormwater from entering the manhole., which is shown as a black vertical line in the graph.

Precipitation vs. Leachate Levels at SWMU 5 - Central ESOI Otter Creek Facility, Oregon, Ohio



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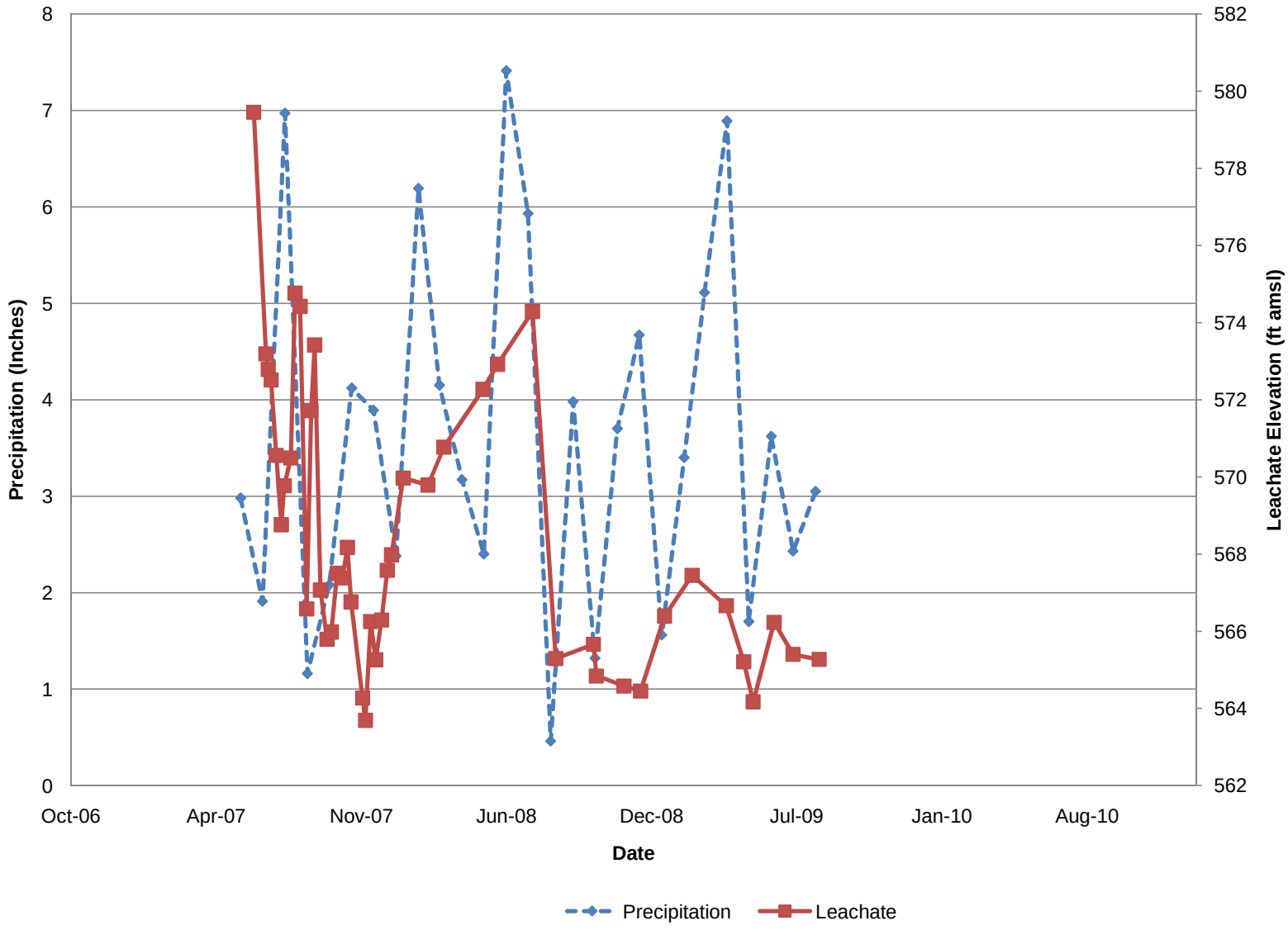
Precipitation vs. Leachate Level at SWMU 5 - West
ESOI Otter Creek Facility, Oregon, Ohio



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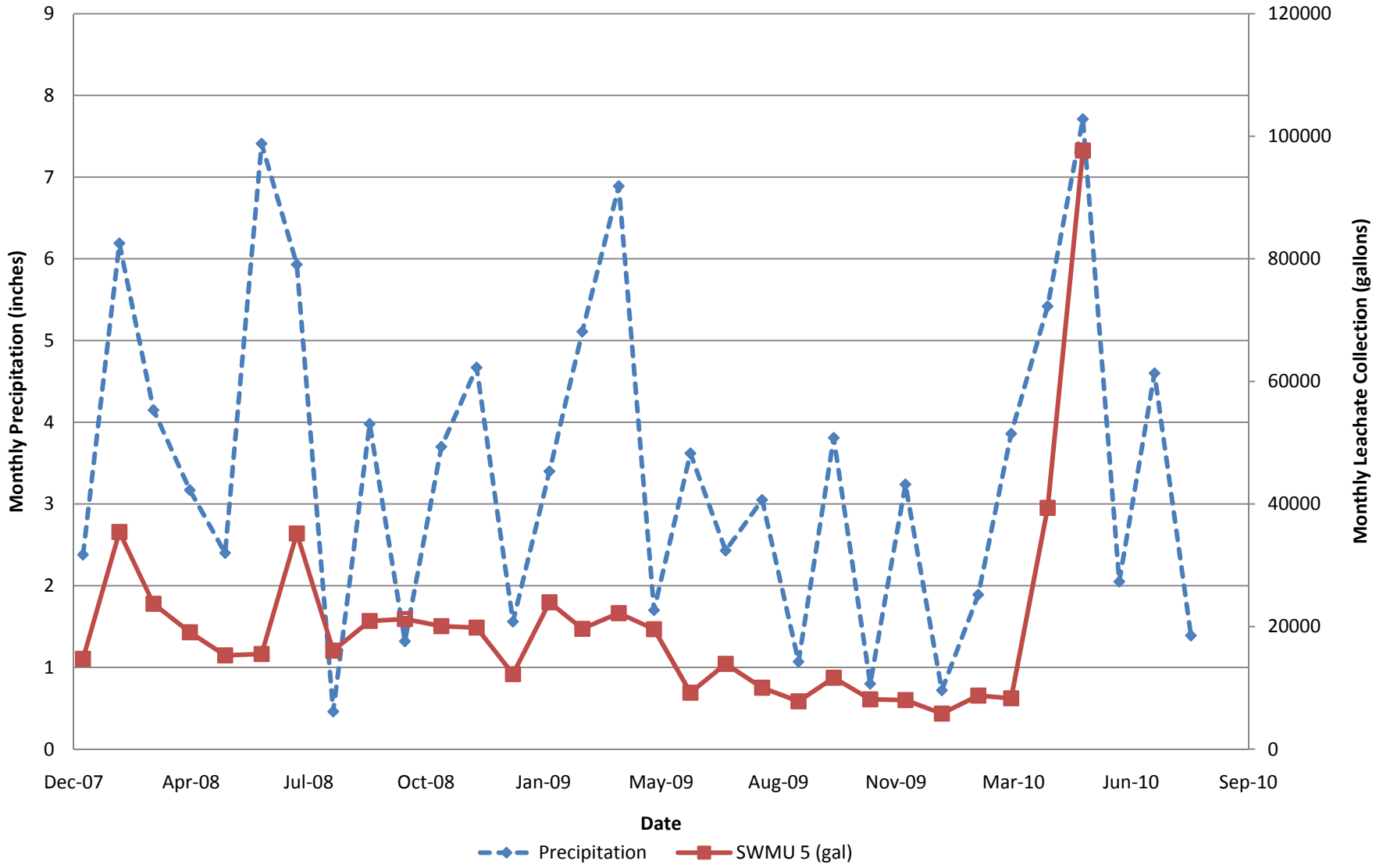
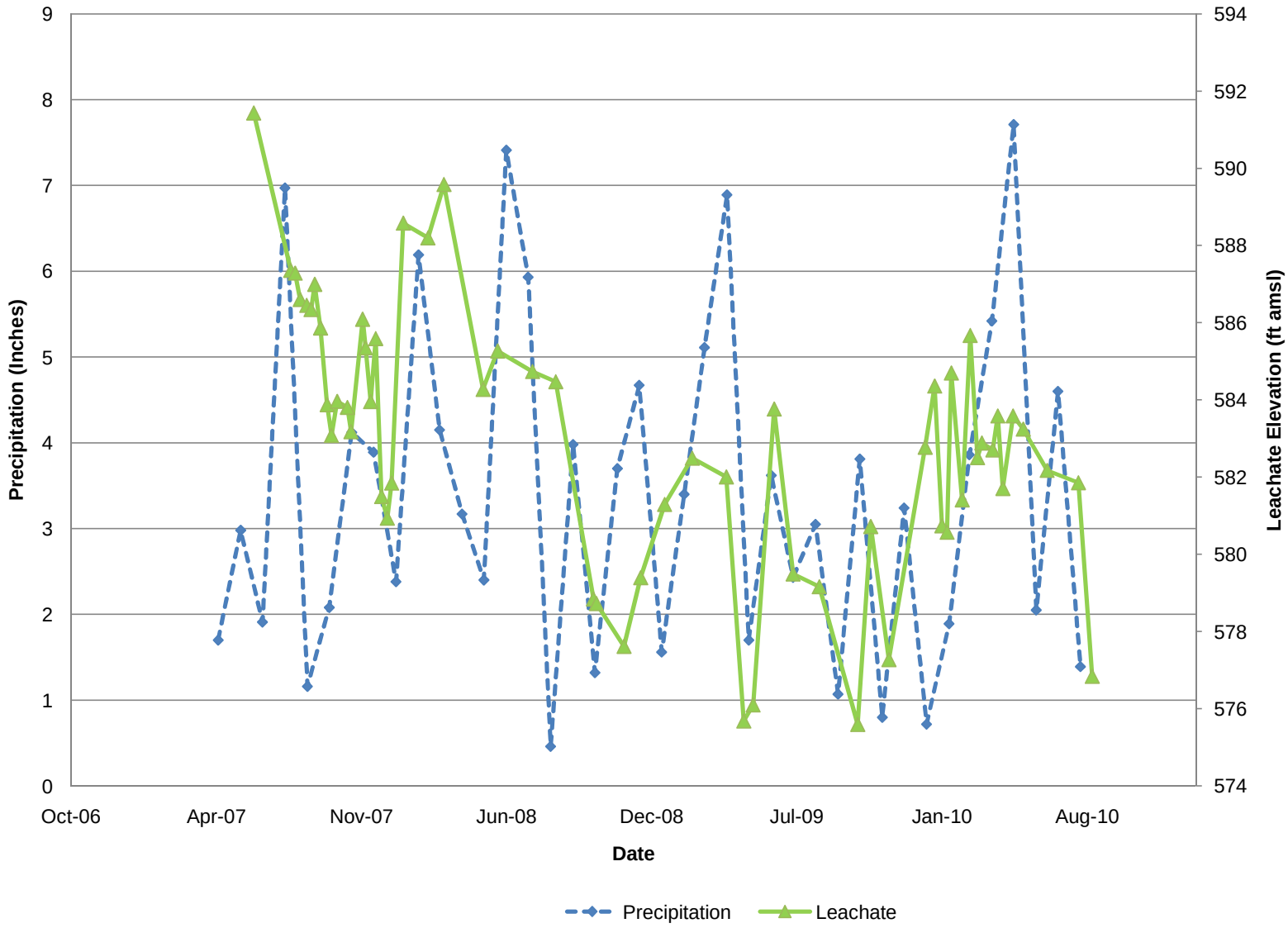
Precipitation vs. Leachate Recovery at SWMU 5
ESOI Otter Creek Facility, Oregon, Ohio



Note: Between January and April 2010, the maintenance program for the leachate recovery wells was modified to increase leachate recovery.

Precipitation vs. Leachate Level at SWMU 6
ESOI Otter Creek Facility, Oregon, Ohio



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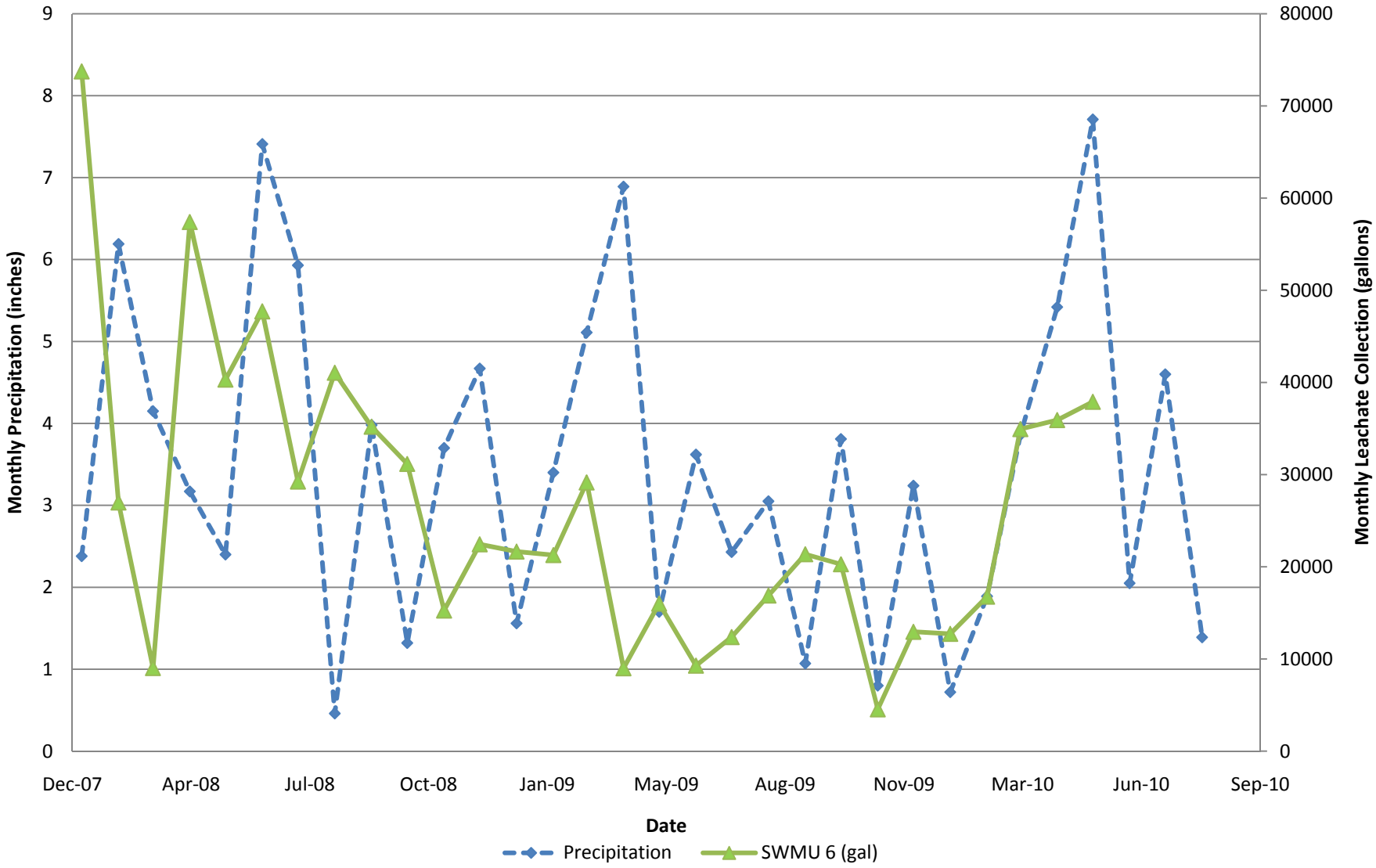
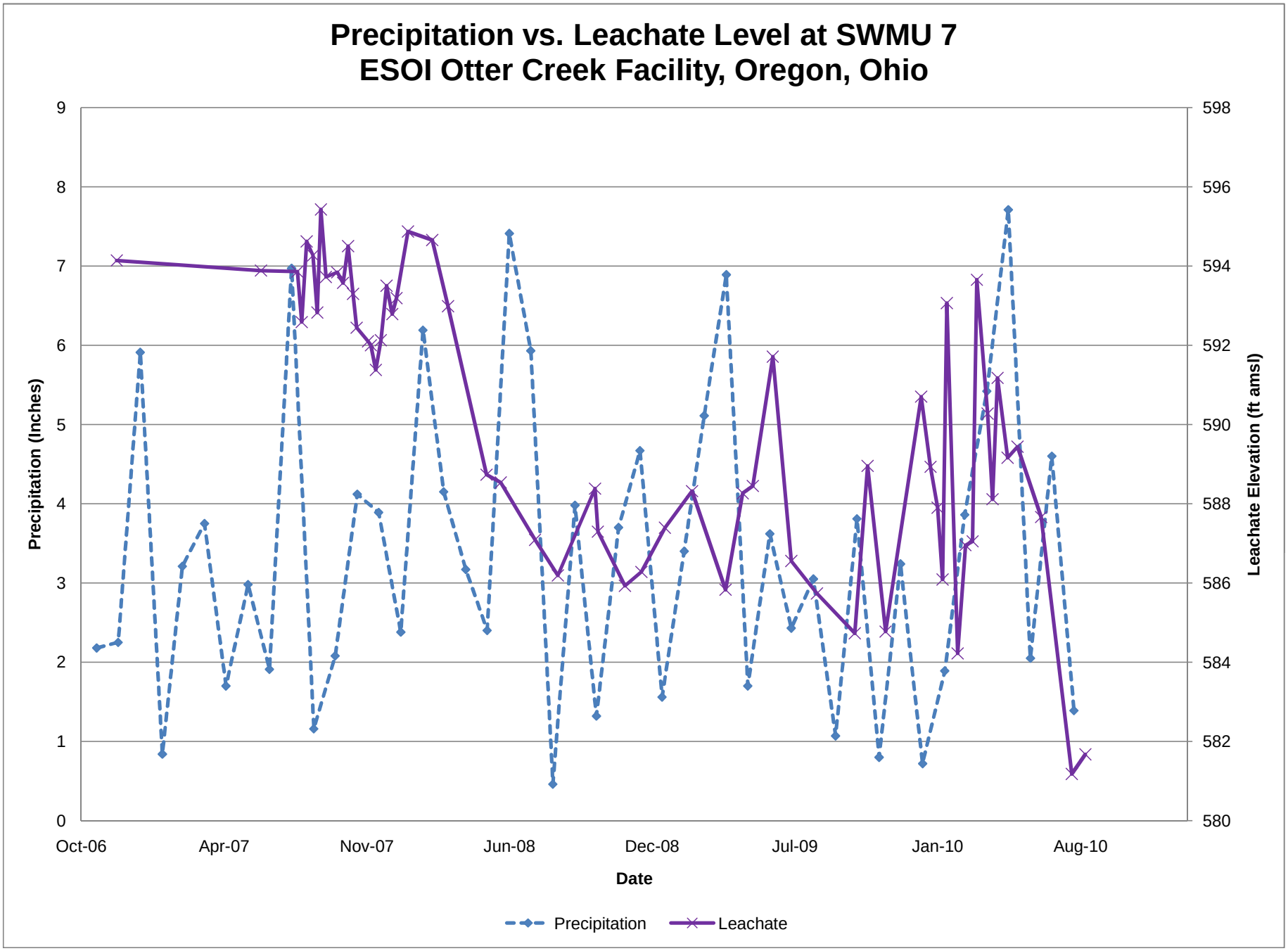
Precipitation vs. Leachate Recovery at SWMU 6
ESOI Otter Creek Facility, Oregon, Ohio

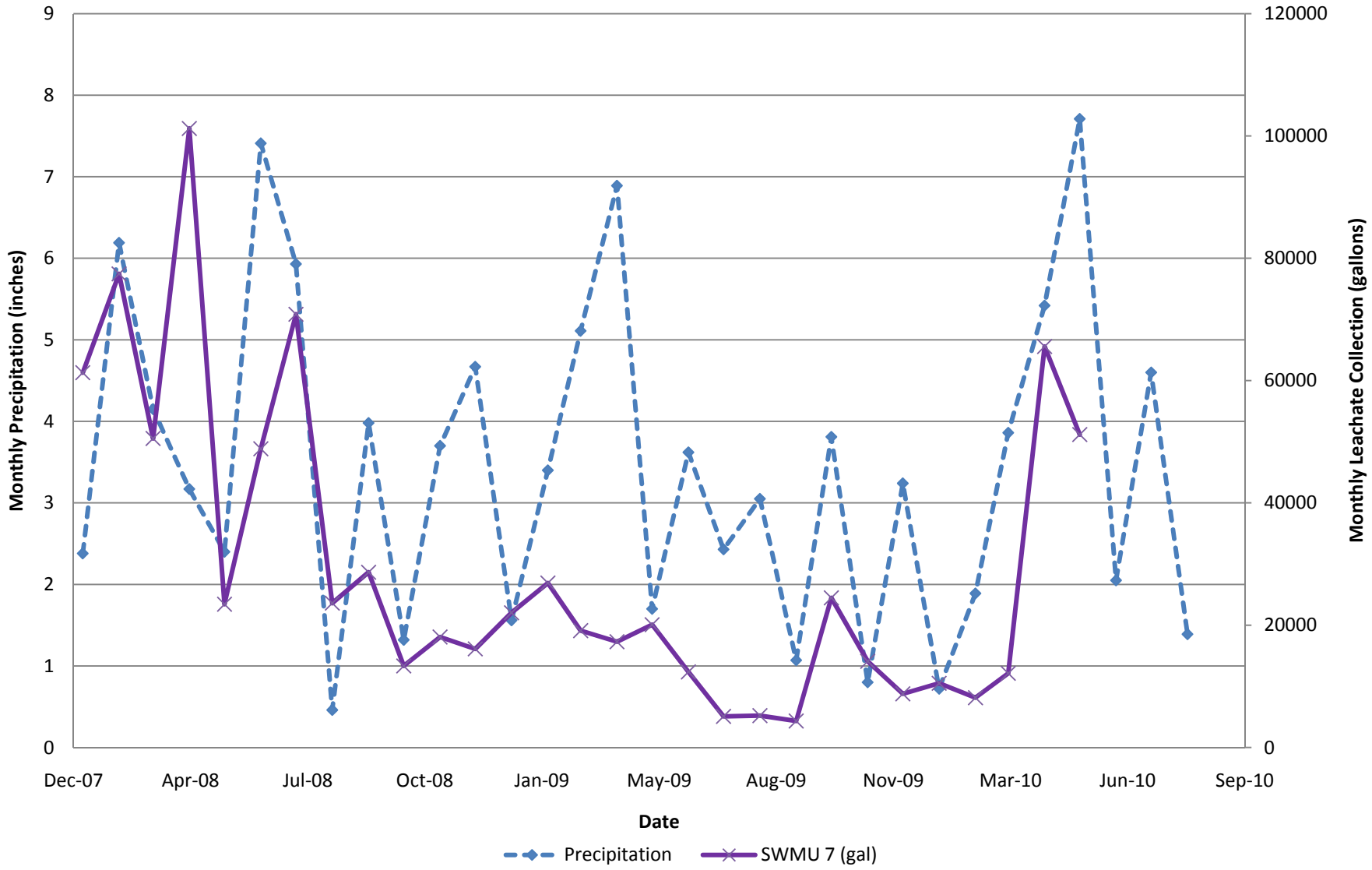


Note: Between January and April 2010, the maintenance program for the leachate recovery wells was modified to increase leachate recovery.


Precipitation vs. Leachate Level at SWMU 7
ESOI Otter Creek Facility, Oregon, Ohio
Precipitation (Inches)
Leachate Elevation (ft amsl)
0
1
2
3
4
5
6
7
8
9
580
582
584
586
588
590
592
594
596
598
Oct-06
Apr-07
Nov-07
Jun-08
Dec-08
Jul-09
Jan-10
Aug-10
Date
Precipitation
Leachate

ENVIRON

Precipitation vs. Leachate Recovery at SWMU 7
ESOI Otter Creek Facility, Oregon, Ohio



Note: Between January and April 2010, the maintenance program for the leachate recovery wells was modified to increase leachate recovery.

ENVIRON

Leachate Recovery Volumes				
Month	Rainfall (inches)	SWMU 5 (gal)	SWMU 6 (gal)	SWMU 7 (gal)
Jan-08	2.38	14743	73734	61299
Feb-08	6.19	35435	26981	77444
Mar-08	4.15	23717	9028	50528
Apr-08	3.17	19078	57397	101226
May-08	2.4	15298	40306	23436
Jun-08	7.41	15519	47712	48848
Jul-08	5.93	35187	29252	70843
Aug-08	0.46	16082	41051	23603
Sep-08	3.98	20915	35196	28660
Oct-08	1.32	21225	31159	13336
Nov-08	3.7	20068	15262	18073
Dec-08	4.67	19834	22442	16125
Jan-09	1.56	12236	21654	22038
Feb-09	3.4	23962	21278	26897
Mar-09	5.11	19634	29158	19114
Apr-09	6.89	22190	9001	17304
May-09	1.7	19572	16009	20083
Jun-09	3.62	9206	9283	12371
Jul-09	2.43	13915	12383	5090
Aug-09	3.05	10026	16887	5209
Sep-09	1.07	7801	21366	4345
Oct-09	3.81	11650	20279	24470
Nov-09	0.8	8123	4541	14098
Dec-09	3.24	8005	12952	8776
Jan-10	0.72	5812	12729	10503
Feb-10	1.89	8742	16759	8150
Mar-10	3.86	8299	34944	12131
Apr-10	5.42	39366	35918	65570
May-10	7.71	97666	37898	51175
Jun-10	2.05			
Jul-10	4.6			
Aug-10	1.39			
Sep-10				

Standpipe Data

ANALYTICAL REPORT

STANDPIPE INVESTIGATION

Lot #: A0J080623

Sue Richards

Envirosafe Services of Ohio In
876 Otter Creek Road
Oregon, OH 43616-3518

TESTAMERICA LABORATORIES, INC.

Approved for release.
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Project Manager
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October 28, 2010

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TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY - Detection Highlights

A0J080623

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
STANDPIPE SWALE 10/07/10 11:50 001				
Chloride	55.9	1.0	mg/L	MCAWW 300.0A
Chemical Oxygen Demand (COD)	15.9	10.0	mg/L	MCAWW 410.4
STANDPIPE SWMU7 10/07/10 12:00 002				
Tetrahydrofuran	80	5.0	ug/L	SW846 8260B
Benzene	32	2.5	ug/L	SW846 8260B
Chlorobenzene	2.5	2.5	ug/L	SW846 8260B
Chloride	208	10.0	mg/L	MCAWW 300.0A
Chemical Oxygen Demand (COD)	185	20.0	mg/L	MCAWW 410.4

Predicted Landfill Cap Performance

Leachate Modeling for SWMUs 1, 5, 6, and 7
ESOI Otter Creek Facility, Oregon, Ohio

The Hydrologic Evaluation of Landfill Performance (HELP) model (EPA 1994b) was used to estimate the potential volume of leachate that will be collected from SWMUs 1, 5, 6, and 7 for each corrective measures alternative. For each SWMU and alternative, the precipitation data was synthetically generated for Detroit, Michigan; temperature data was synthetically generated for Toledo, Ohio; and solar radiation data was synthetically generated for Detroit, Michigan but adjusted to the latitude of Toledo, Ohio. Each SWMU was modeled using three different scenarios for cover type and antecedent moisture content: the existing clay cap under steady state moisture conditions, the existing clay cap with an initial soil moisture value of 0.25 in the waste layer, and a composite clay/geomembrane cap with an initial soil moisture value of 0.25 in the waste layer. A complete listing of the HELP model inputs is included in the HELP Inputs Summary and Detailed HELP Inputs (also in this appendix).

The actual leachate collection data from SWMU 1 was compared to the estimated leachate generation rates from the HELP model, and the model was found to over-predict the annual leachate volume by an average factor of 3.7. Therefore, a conservative site-specific adjustment factor of 2.5 was applied to the modeled leachate volumes for SWMU 1 to estimate the cost of leachate treatment and disposal for this unit.

The actual leachate collection data for SWMU 1 was also compared to the leachate generation rates reported for Cells G, H, and I (i.e., the existing landfills having composite covers). This comparison indicated that the average leachate generation rate was approximately 40% lower for the composite cap landfills compared with the clay cap landfill.

HELP Inputs Summary ESOI Otter Creek Facility, Oregon, Ohio				
	SWMU 1	SWMU 5	SWMU 6	SWMU 7
Total size (acres)	3.00	8.03	6.43	6.89
Cover Soil (ft)	1	1	1	1
Recompacted Soil	3	3	2.5	3
General Fill	5	7		3
Waste Thickness (ft)	60	40	50	45
Waste Thickness (in)	720	480	600	540
K (cm2/sec)	1.00E-07	3.50E-08	7.66E-08	5.01E-06
Slope (%)	2	6.5	25	25
Length (ft)	320	250	175	170

Detailed HELP Inputs
ESOI Otter Creek Facility; Oregon, Ohio

SWMU 1 w/ clay cap									
Layer	Type	Texture #	Thickness (in)	Porosity	Field Capacity	Wilting Point	Initial Soil Water Content	K (cm/sec)	Description
1	1	11	12	0.464	0.31	0.187	0.4478	6.40E-05	Cover Soil
2	3	0	36	0.427	0.418	0.367	0.427	1.00E-07	Compacted Barrier Soil
3	1	12	60	0.471	0.342	0.21	0.342	4.20E-05	General Cover
4	1	0	720	0.541	0.187	0.047	0.2031	8.80E-05	Waste
SWMU 5 w/ clay cap									
Layer	Type	Texture #	Thickness (in)	Porosity	Field Capacity	Wilting Point	Initial Soil Water Content	K (cm/sec)	Description
1	1	15	12	0.475	0.378	0.265	0.4617	1.70E-05	Cover Soil
2	3	0	36	0.427	0.418	0.367	0.427	3.45E-08	Compacted Barrier Soil
3	1	28	84	0.452	0.411	0.311	0.411	1.20E-06	General Cover
4	1	0	480	0.541	0.187	0.047	0.187	8.90E-05	Waste
SWMU 6 w/ clay cap									
Layer	Type	Texture #	Thickness (in)	Porosity	Field Capacity	Wilting Point	Initial Soil Water Content	K (cm/sec)	Description
1	1	15	12	0.475	0.378	0.265	0.4606	1.70E-05	Cover Soil
2	3	0	30	0.427	0.418	0.367	0.427	7.66E-08	Compacted Barrier Soil
3	1	0	600	0.541	0.187	0.047	0.1945	8.90E-05	Waste
SWMU 7 w/ clay cap									
Layer	Type	Texture #	Thickness (in)	Porosity	Field Capacity	Wilting Point	Initial Soil Water Content	K (cm/sec)	Description
1	1	15	12	0.475	0.378	0.265	0.4397	1.70E-05	Cover Soil
2	3	0	36	0.427	0.418	0.367	0.427	6.15E-07	Compacted Barrier Soil
3	1	28	36	0.452	0.411	0.311	0.4443	1.20E-06	General Cover
4	1	0	540	0.541	0.187	0.047	0.2302	8.90E-05	Waste

Detailed HELP Inputs
ESOI Otter Creek Facility; Oregon, Ohio

SWMU 1 w/geomembrane liner in cap

Layer	Type	Texture #	Thickness (in)	Porosity	Field Capacity	Wilting Point	Initial Soil Water Content	K (cm/sec)	Description
1	1	11	36	0.464	0.31	0.187		6.40E-05	Cover Soil
2	2	20	0.2	0.85	0.01	0.005		10	Drainage Layer
3	4	35	0.04	0	0	0		2.00E-13	Geomembrane
4	3	0	12	0.427	0.418	0.367	0.427	1.00E-07	Compacted Barrier Soil
5	1	12	60	0.471	0.342	0.21	0.342	4.20E-05	General Cover
6	1	0	720	0.541	0.187	0.047	0.25	8.80E-05	Waste

SWMU 5 w/geomembrane liner in cap

Layer	Type	Texture #	Thickness (in)	Porosity	Field Capacity	Wilting Point	Initial Soil Water Content	K (cm/sec)	Description
1	1	11	36	0.464	0.31	0.187		6.40E-05	Cover Soil
2	2	20	0.2	0.85	0.01	0.005		10	Drainage Layer
3	4	35	0.04	0	0	0		2.00E-13	Geomembrane
4	3	0	12	0.427	0.418	0.367	0.427	3.45E-08	Compacted Barrier Soil
5	1	28	84	0.452	0.411	0.311	0.411	1.20E-06	General Cover
6	1	0	480	0.541	0.187	0.047	0.25	8.90E-05	Waste

SWMU 6 w/geomembrane liner in cap

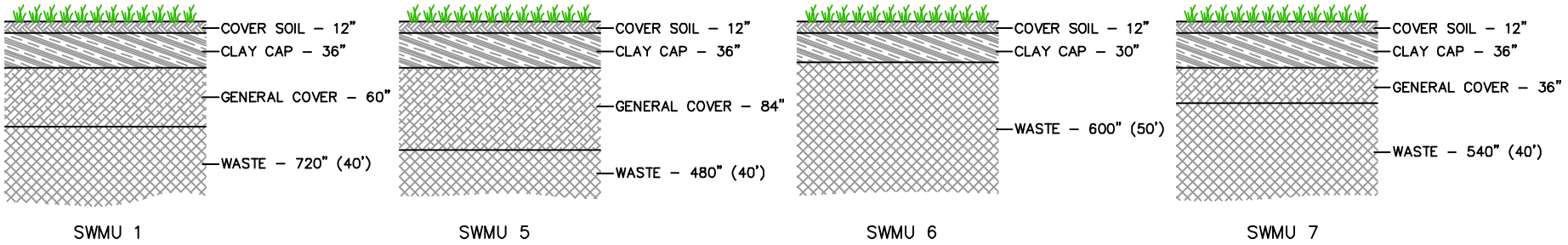
Layer	Type	Texture #	Thickness (in)	Porosity	Field Capacity	Wilting Point	Initial Soil Water Content	K (cm/sec)	Description
1	1	11	36	0.464	0.31	0.187		6.40E-05	Cover Soil
2	2	20	0.2	0.85	0.01	0.005		10	Drainage Layer
3	4	35	0.04	0	0	0		2.00E-13	Geomembrane
4	3	0	6	0.427	0.418	0.367	0.427	7.66E-08	Compacted Barrier Soil
5	1	0	600	0.541	0.187	0.047	0.25	8.90E-05	Waste

SWMU 7 w/geomembrane liner in cap

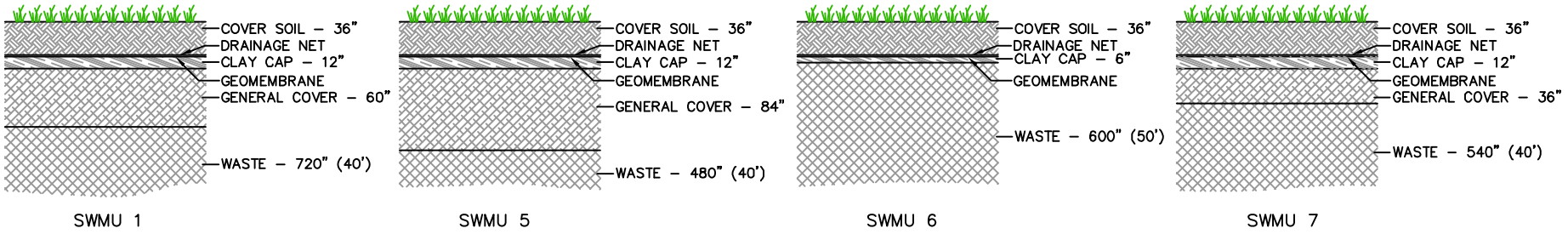
Layer	Type	Texture #	Thickness (in)	Porosity	Field Capacity	Wilting Point	Initial Soil Water Content	K (cm/sec)	Description
1	1	11	36	0.464	0.31	0.187	0.4397	6.40E-05	Cover Soil
2	2	20	0.2	0.85	0.01	0.005		10	Drainage Layer
3	4	35	0.04	0	0	0		2.00E-13	Geomembrane
4	3	0	12	0.427	0.418	0.367	0.427	6.15E-07	Compacted Barrier Soil
5	1	28	36	0.452	0.411	0.311	0.4443	1.20E-06	General Cover
6	1	0	540	0.541	0.187	0.047	0.25	8.90E-05	Waste

Geotextile inputs	
Pinhole density	1
Defect density	20
Installation Quality	Poor (4)
Transmissivity	2.032E-14

WITH CLAY CAP



WITH GEOMEMBRANE CAP



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CONCEPTUAL CAP DETAILS

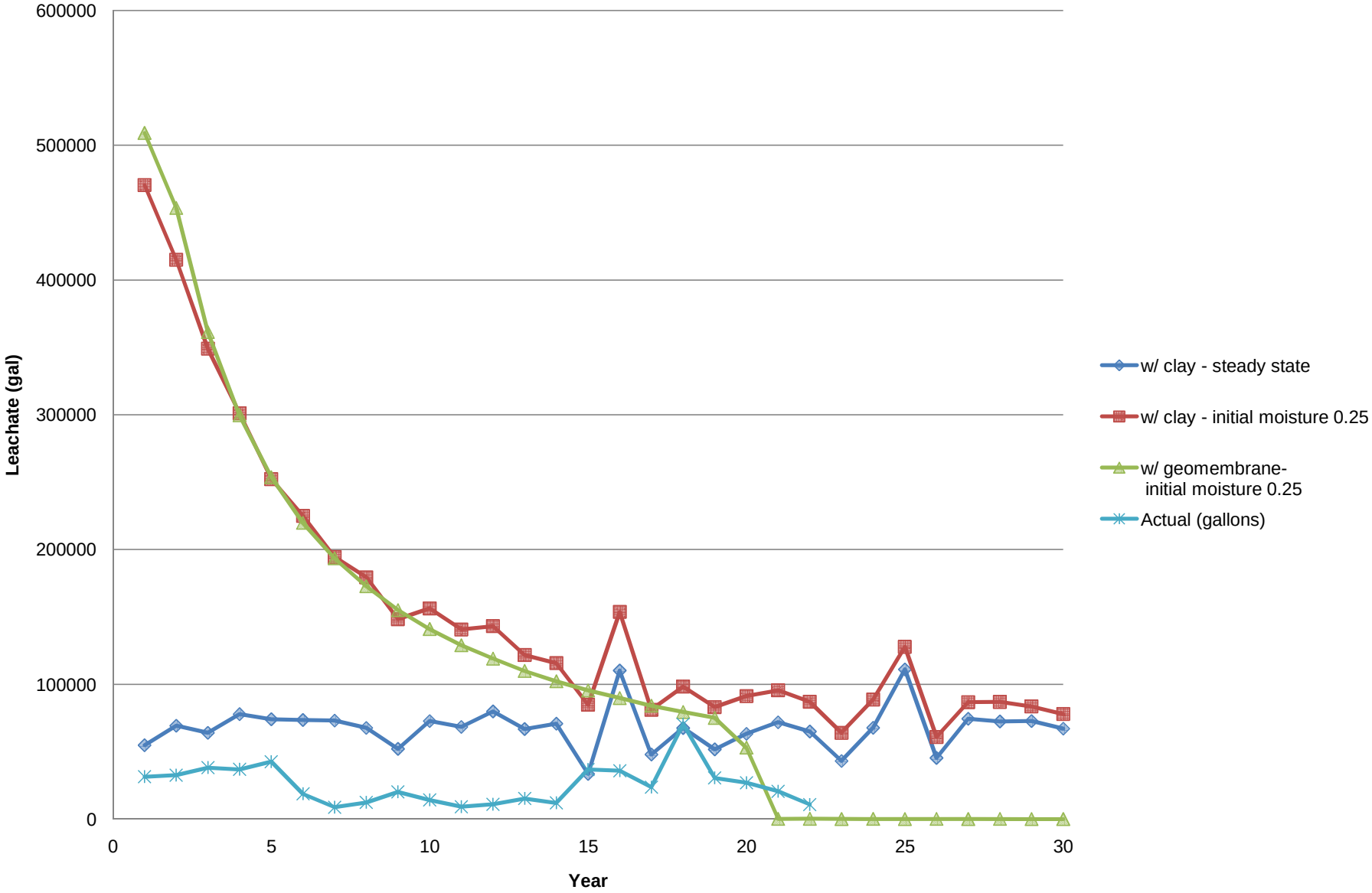
ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

FIGURE
1

026174M14B

BKLEIN 1/7/11 [026174M14B002]

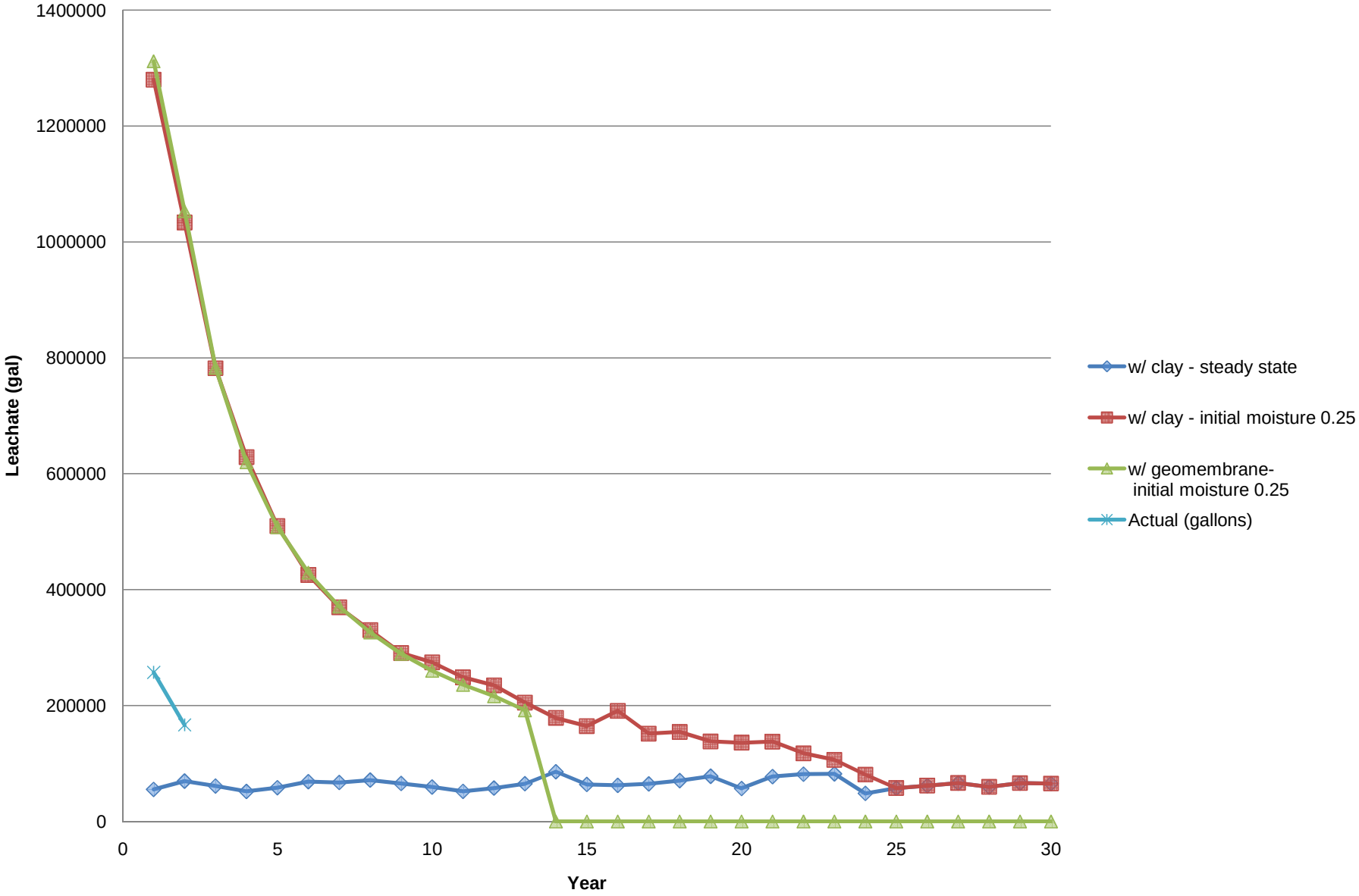
Modeled Leachate Generation - SWMU 1
ESOI Otter Creek Facility, Oregon, Ohio



Modeled Leachate Generation - SWMU 1
ESOI Otter Creek Facility, Oregon, Ohio

	Simulated Leachate Generation (gallons)			
Year	w/ clay - steady state	w/ clay - initial moisture 0.25	w/ geomembrane-initial moisture 0.25	Actual (gallons)
1	54884	470417	509114	31,369
2	69327	414995	453487	32,614
3	64060	349058	361393	38,109
4	77876	301176	299648	36,845
5	74138	252303	253698	42,603
6	73523	224994	219801	18,724
7	73146	194501	193440	8,753
8	67699	179421	172705	12,349
9	52155	148345	155013	20,162
10	72745	156295	141014	14,189
11	68395	140712	128969	9,104
12	79941	143169	119095	10,957
13	66821	121680	109931	15,232
14	70824	115738	102247	11,960
15	33513	84863	95439	36,771
16	110285	153736	89783	35,866
17	47932	81137	84074	23,702
18	67614	98274	79484	70,377
19	51726	83108	75081	30,466
20	63290	91245	53012	26,970
21	71832	95530	106	20,619
22	65022	86983	204	10,746
23	43150	64055	48	
24	67749	88651	93	
25	111077	127757	0	
26	45387	60914	131	
27	74497	86698	0	
28	72468	86938	96	
29	72724	83542	0	
30	67088	77910	0	
Average	**67,696**	**155,472**	**123,237**	
Size	3.00	3.00	3.00	
Per acre	22,565	51,824	41,079	
	Reduction w/liner:		**20.7%**	

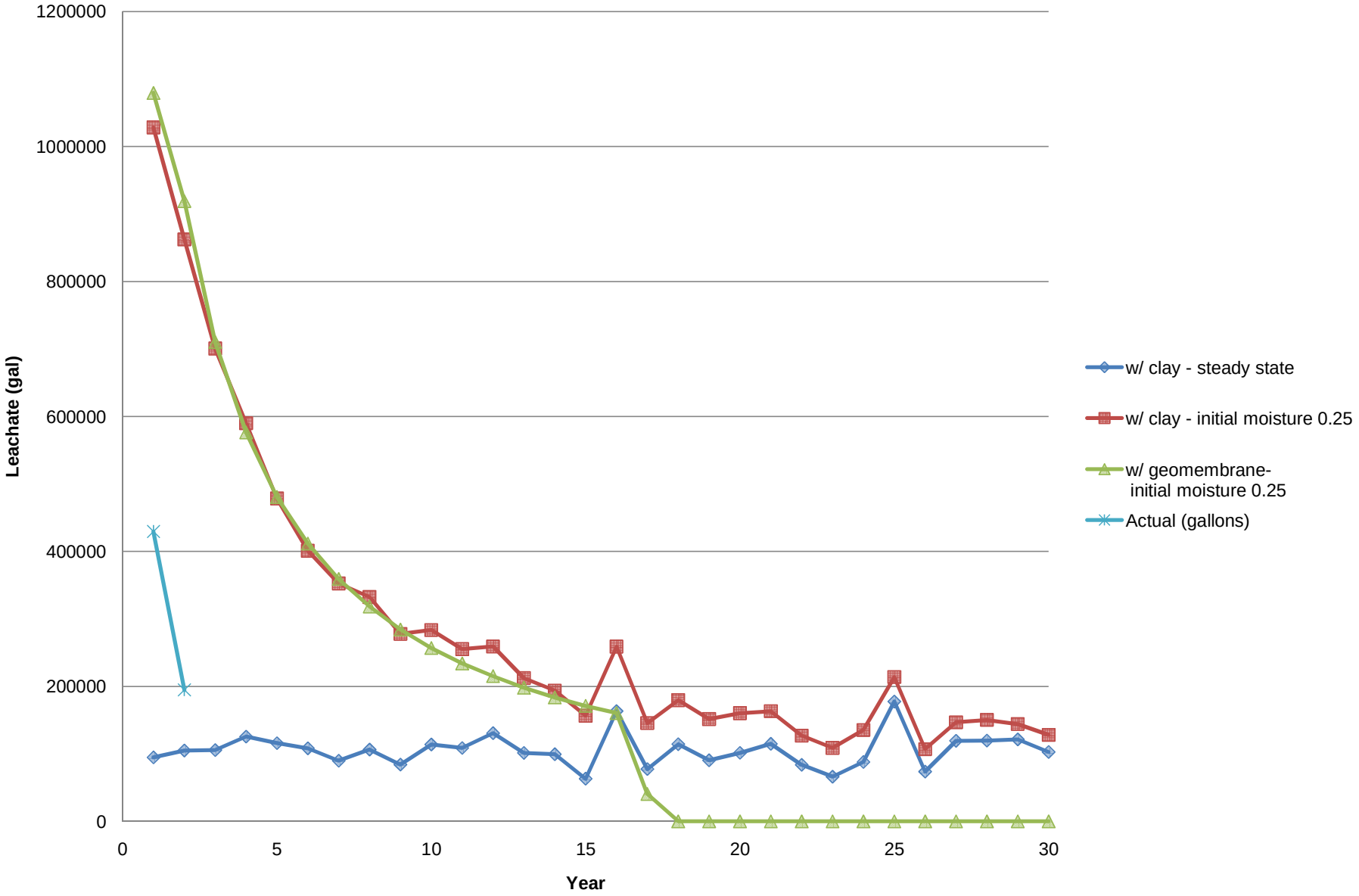
Modeled Leachate Generation - SWMU 5
ESOI Otter Creek Facility, Oregon, Ohio



Modeled Leachate Generation - SWMU 5
ESOI Otter Creek Facility, Oregon, Ohio

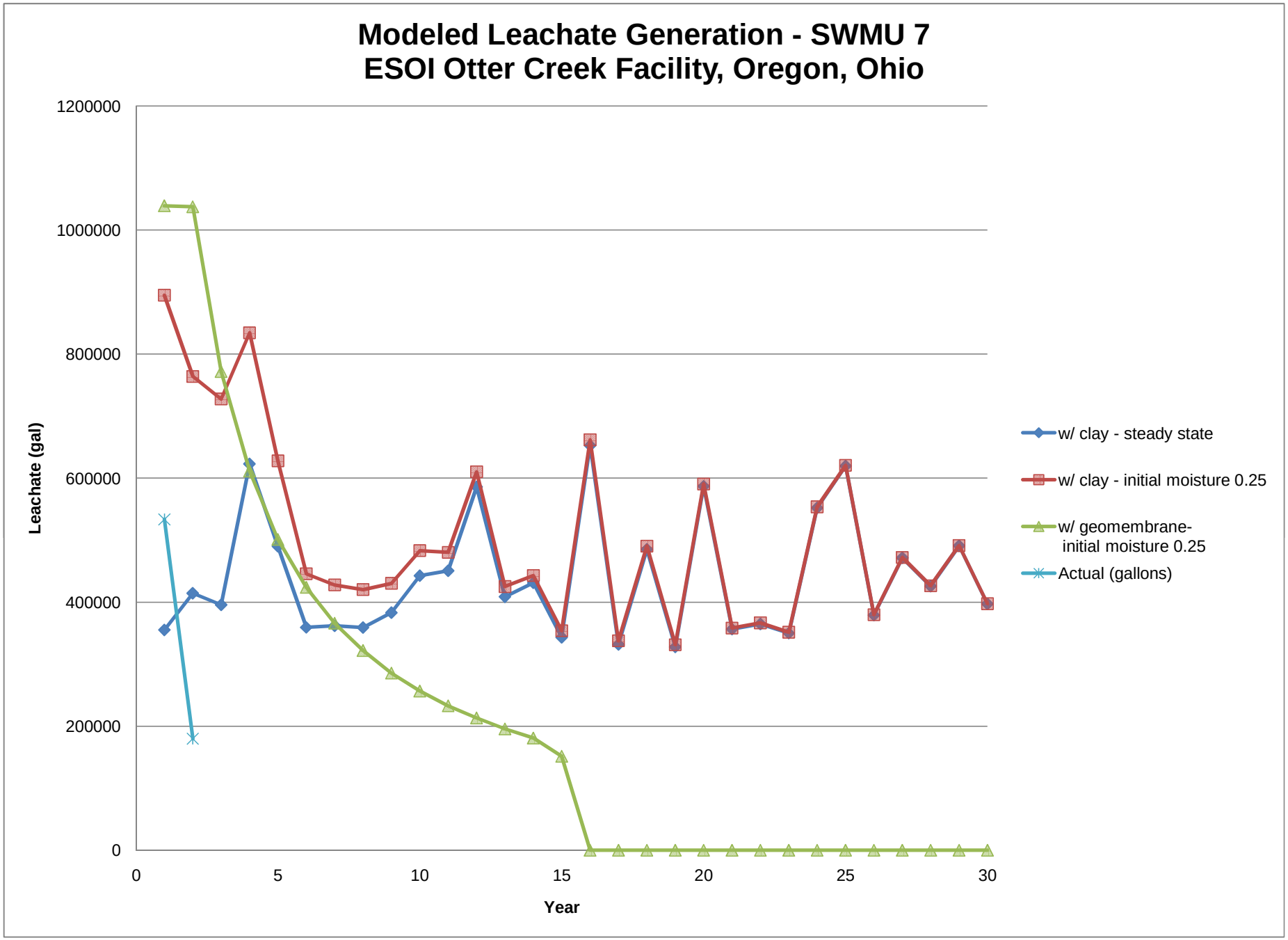
	Simulated Leachate Generation (gallons)			
Year	w/ clay - steady state	w/ clay - initial moisture 0.25	w/ geomembrane-initial moisture 0.25	Actual (gallons)
1	55252	1280061	1311660	257,102
2	69593	1033522	1053130	166,320
3	61050	782045	782863	
4	51719	628448	619749	
5	58217	509806	507796	
6	68609	425239	429291	
7	67168	369276	370665	
8	71373	330063	326167	
9	65488	290485	289210	
10	59343	274505	259951	
11	51841	248643	235741	
12	57535	234725	215966	
13	65075	205086	191743	
14	85836	178528	0	
15	63788	164372	0	
16	62288	190708	0	
17	64746	151475	0	
18	70409	154440	0	
19	77983	138066	0	
20	56772	135706	0	
21	77371	137538	0	
22	81573	117496	0	
23	82103	106243	0	
24	48354	80808	0	
25	57410	57410	0	
26	61659	61659	0	
27	66260	66260	0	
28	59561	59561	0	
29	66161	66161	0	
30	65338	65338	0	
Average	**64,996**	**284,789**	**219,798**	
Size	8.03	8.03	8.03	
Per acre	8,094	35,466	27,372	
Reduction w/liner:			0.228	

Modeled Leachate Generation - SWMU 6
ESOI Otter Creek Facility, Oregon, Ohio



Modeled Leachate Generation - SWMU 6
ESOI Otter Creek Facility, Oregon, Ohio

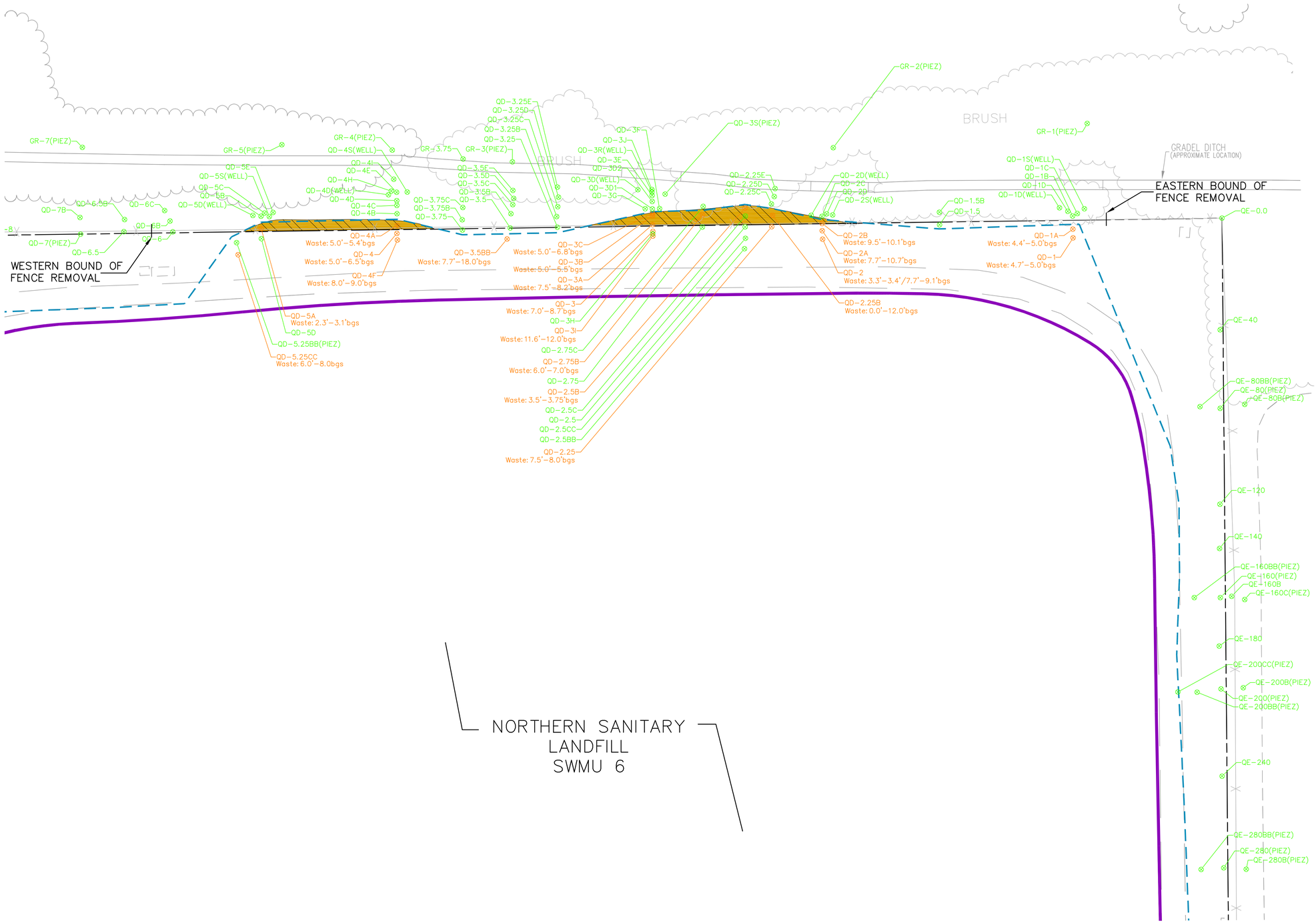
	Simulated Leachate Generation (gallons)			
Year	w/ clay - steady state	w/ clay - initial moisture 0.25	w/ geomembrane-initial moisture 0.25	Actual (gallons)
1	94779	1028278	1079460	429,520
2	105054	862286	919319	194,790
3	105607	700624	710269	
4	125594	589990	576529	
5	115915	478529	480752	
6	108294	401033	411743	
7	89804	352508	359092	
8	106381	332400	318513	
9	84135	277737	284262	
10	113931	283559	256881	
11	108743	255298	234016	
12	130713	259172	215220	
13	101494	212340	198024	
14	99439	193773	183668	
15	63140	156628	171128	
16	163511	258880	160511	
17	77445	145638	40687	
18	114438	179528	0	
19	90425	151554	0	
20	101547	160164	0	
21	114899	163192	0	
22	83707	127082	0	
23	66054	108795	0	
24	87956	135386	0	
25	177668	213825	0	
26	73681	106945	0	
27	119456	146816	0	
28	119755	150273	0	
29	121473	144244	0	
30	102862	128138	0	
Average	**105,597**	**290,154**	**220,003**	
Size	6.43	6.43	6.43	
Per acre	16,422	45,125	34,215	
	Reduction w/liner:		**24.2%**	


Modeled Leachate Generation - SWMU 7
ESOI Otter Creek Facility, Oregon, Ohio
Leachate (gal)
1200000
1000000
800000
600000
400000
200000
0
0
5
10
15
20
25
30
Year
w/ clay - steady state
w/ clay - initial moisture 0.25
w/ geomembrane-
initial moisture 0.25
Actual (gallons)

Modeled Leachate Generation - SWMU 7
ESOI Otter Creek Facility, Oregon, Ohio

	Simulated Leachate Generation (gallons)			
Year	w/ clay - steady state	w/ clay - initial moisture 0.25	w/ geomembrane-initial moisture 0.25	Actual (gallons)
1	355,300	894,759	1,039,013	533,418
2	414,363	763,803	1,037,493	179,796
3	395,702	727,435	771,875	
4	622,922	834,177	611,367	
5	490,113	627,633	501,108	
6	359,284	445,761	423,748	
7	362,023	427,789	365,952	
8	359,131	420,260	322,071	
9	383,028	430,291	285,614	
10	442,609	483,064	256,746	
11	450,714	480,260	232,855	
12	586,090	610,096	213,338	
13	408,794	425,136	195,648	
14	431,340	442,811	180,945	
15	343,317	353,882	151,531	
16	652,545	661,618	0	
17	331,818	337,623	0	
18	485,229	490,334	0	
19	327,766	331,290	0	
20	586,910	590,506	0	
21	356,462	358,221	0	
22	364,902	366,584	0	
23	350,038	351,613	0	
24	552,074	553,623	0	
25	619,615	620,503	0	
26	379,038	379,769	0	
27	471,487	472,030	0	
28	425,955	426,496	0	
29	490,785	491,154	0	
30	397,164	397,434	0	
Average	**439,884**	**506,532**	**219,644**	
Size	6.89	6.89	6.89	
Per acre	63,844	73,517	31,879	
	Reduction w/liner:		**56.6%**	

Off-Site Waste



VOLUME OF WASTE OUtSIDE FENCE

ESTIMATED 200 C.Y.

CAP VOLUME: ESTIMATED 110 C.Y.

FENCE REMOVAL = 400ft.

CONCEPTUAL NOT FOR DESIGN PURPOSES

5-2 FIGURE — SWMU 6 EXTENT OF WASTE	ENVIRON 214 CARNEGIE CENTER, PRINCETON, NJ 08540 www.environcorp.com
ENVIROSAFE SERVICES OF OHIO, INC. OTTER CREEK ROAD FACILITY OREGON, OHIO	8/21/09 DATE · AS SHOWN SCALE · 6174M13C30--WST01 CADD FILE · 1/7/11 PLOT DATE
	JP DESIGNED BY · PRM DRAFTED BY · FCR APPROVED BY

BKLEIN F:\020174M13\C30

Cost Estimates - Landfill Covers

Alternative 1: SWMU 1 - No Additional Cap Improvements

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions
-Cap to remain as constructed

TOTAL CAPITAL COSTS	**$0**

Long Term Leachate Disposal (30 years)

Item	Description	Quantity	Unit	Unit Cost	Total
1	Leachate Disposal	25,073	gallons	$0.12	$3,079
	Annual Operation and Maintenance Cost				$3,000

TOTAL OPERATION AND MAINTENANCE	**$90,000**
NPV OPERATION AND MAINTENANCE	**$61,149**

ALTERNATIVE 1, TOTAL COST	**$90,000**
ALTERNATIVE 1, NPV	**$62,000**

Note: NPV calculation using RoR of 2.7%

Alternative 2: SWMU 1 - Installation of a Composite Cover

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions
-Installation of a composite cover over the entire area of SWMU 1 (3 acres).
-Approximately 3-ft of current cover soils would be removed before installing the composite cover.
-Geotextile vent layer, covers 30% of the total area.

Cap and Vegetative Cover

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	14,520	1 yd^3	$5.02	$72,931
2	Recompacted Clay Liner Installation	0	1 yd^3	$7.26	$0
3	40 mil HDPE Liner Installation	130,680	1 ft^2	$0.56	$72,931
4	Geonet Drainage Layer Installation	130,680	1 ft^2	$0.33	$43,758
5	Geotextile Type 2 Installation	130,680	1 ft^2	$0.22	$29,172
6	Cover Soil Installation (36")	14,520	1 yd^3	$5.02	$72,931
7	Geotextile Vent Layer Type 1 Installation	39,204	1 ft^2	$0.33	$13,128
8	Anchor Trench	1,500	lf	$10.84	$16,260
9	Gas Collection System Installation	0	unit(s)	$41,298	$0
10	Vegetative Layer Establishment	3.0	acre	$1,339	$4,018
	Subtotal				**$325,000**

Storm Water Management and Access Roadways

Item	Description	Quantity	Unit	Unit Cost	Total
1	Aggregate Roadway Installation	395	tons	$20.37	$8,041
	Subtotal				**$8,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$333,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (12%)	1	LS	$39,960	$39,960
2	Construction Quality Assurance (10%)	1	LS	$33,300	$33,300
3	Contingency (20%)	1	LS	$66,600	$66,600
	Subtotal				**$140,000**

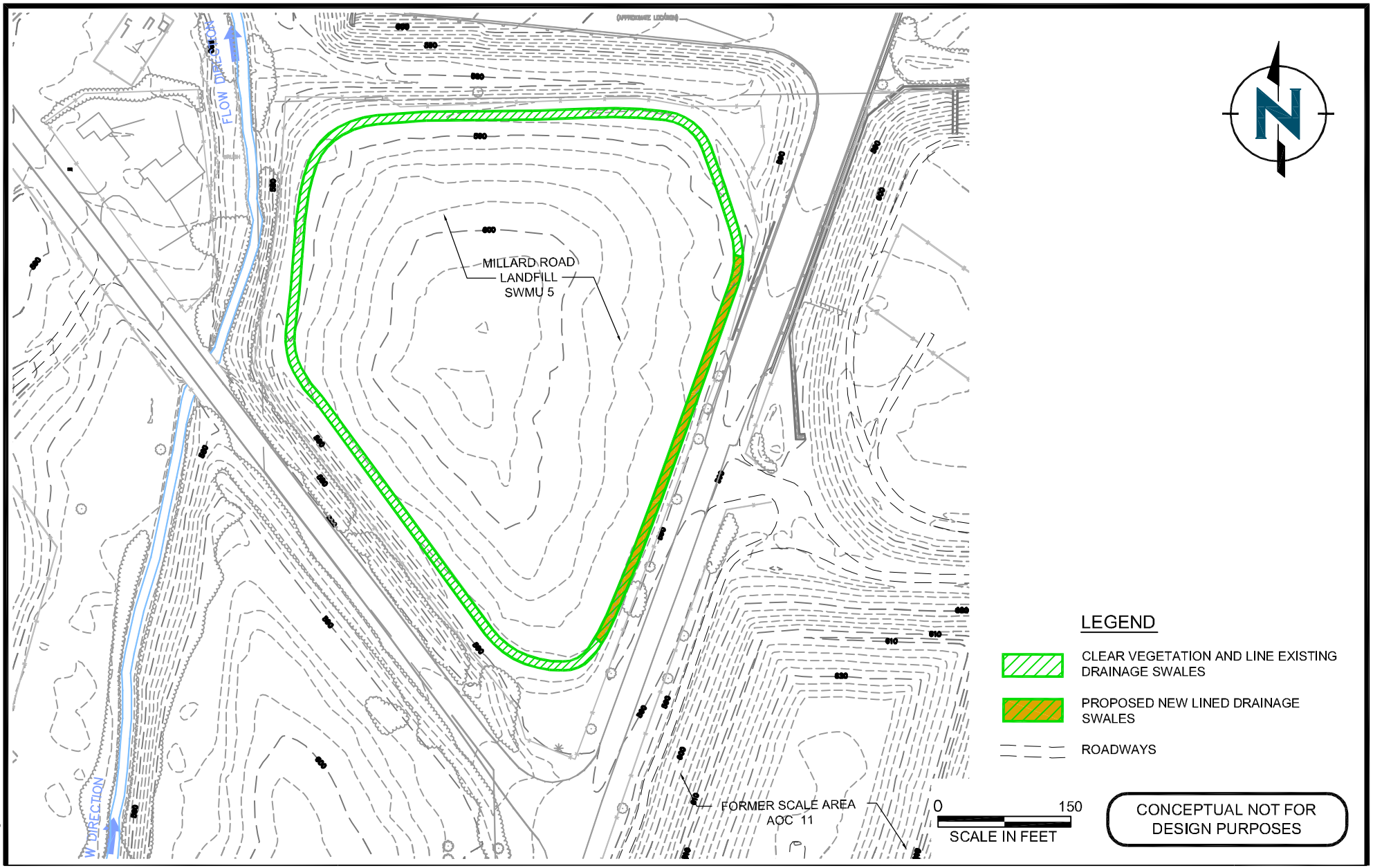
TOTAL CAPITAL COSTS	**$473,000**

Long Term Leachate Disposal (30 years)

Item	Description	Quantity	Unit	Unit Cost	Total
1	Leachate Disposal	1,254	gallons	$0.13	$168
	Annual Operation and Maintenance Cost				$200
				TOTAL OPERATION AND MAINTENANCE	**$6,000**
				NPV OPERATION AND MAINTENANCE	**$4,077**

ALTERNATIVE 2, TOTAL COST	**$479,000**
ALTERNATIVE 2, NPV	**$478,000**

Note: NPV calculation using RoR of 2.7%



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CONCEPTUAL STORMWATER IMPROVEMENTS - SWMU 5

ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

FIGURE
1

026174M14B

BKLEIN 1/7/11 [026174M13_B01]

Cap and Storm Water Cost Estimates
ESOI Otter Creek Facility, Oregon, Ohio

Alternative 1: SWMU 5 - Regrading Drainage Ditches

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

-Clear vegetation around entire perimeter, including areas identified by Mannik & Smith Group where ponding occurs, an estimated 1650 feet.
-Install a liner in these areas to prevent infiltration

Regrading Drainage Ditches

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	611	1 yd^3	$5.02	$3,069
2	Regrading	611	1 yd^3	$5.00	$3,056
3	40 mil HDPE Liner Installation	24,750	1 ft^2	$0.56	$13,813
	Total				**$20,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$20,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (12%)	1	LS	$2,400	$2,400
2	Construction Quality Assurance (10%)	1	LS	$2,000	$2,000
3	Contingency (20%)	1	LS	$4,000	$4,000
	Subtotal				**$8,000**

TOTAL CAPITAL COSTS	**$28,000**

Long Term Leachate Disposal (30 years)

Item	Description	Quantity	Unit	Unit Cost	Total
1	Leachate Disposal	64,996	gallons	$0.10	$6,357
	Annual Operation and Maintenance Cost				$6,000
				TOTAL OPERATION AND MAINTENANCE	**$180,000**
				NPV OPERATION AND MAINTENANCE	**$122,297**

ALTERNATIVE 1, TOTAL COST	**$208,000**
ALTERNATIVE 1, NPV	**$151,000**

Note: NPV calculation using RoR of 2.7%

Alternative 2: SWMU 5 - Installation of a Composite Cover

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

-Regrade areas identified by Mannik & Smith Group where ponding occurs, an estimated 3,500 square feet, and install a liner in these areas to prevent infiltration.
-Installation of a composite cover over the entire area of SWMU 5 (8 acres).
-Approximately 3-ft of current cover soils would be removed before installing the composite cover.
-Geotextile vent layer covers 30% of the total area.

Regrading Drainage Ditches

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	611	1 yd^3	$5.02	$3,069
2	Regrading	611	1 yd^3	$5.00	$3,056
3	40 mil HDPE Liner Installation	24,750	1 ft^2	$0.56	$13,813
	Total				**$17,000**

Cap and Vegetative Cover

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	38,720	1 yd^3	$5.02	$194,482
2	Recompacted Clay Liner Installation (Phs III)	0	1 yd^3	$7.26	$0
3	40 mil HDPE Liner Installation	348,480	1 ft^2	$0.56	$194,482
4	Geonet Drainage Layer Installation	348,480	1 ft^2	$0.33	$116,689
5	Geotextile Type 2 Installation	348,480	1 ft^2	$0.22	$77,793
6	Cover Soil Installation (36")	38,720	1 yd^3	$5.02	$194,482
7	Geotextile Vent Layer Type 1 Installation	104,544	1 ft^2	$0.33	$35,007
8	Anchor Trench	2,200	lf	$10.84	$23,848
9	Gas Collection System Installation	0	unit(s)	$41,298	$0
10	Vegetative Layer Establishment	8.0	acre	$1,339	$10,715
	Subtotal				**$847,000**

Storm Water Management and Access Roadways

Item	Description	Quantity	Unit	Unit Cost	Total
1	Aggregate Roadway Installation	1,053	tons	$20.37	$21,442
	Subtotal				**$21,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$885,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (15%)	1	LS	$132,750	$132,750
2	Construction Quality Assurance (10%)	1	LS	$88,500	$88,500
3	Contingency (20%)	1	LS	$177,000	$177,000
	Subtotal				**$398,000**

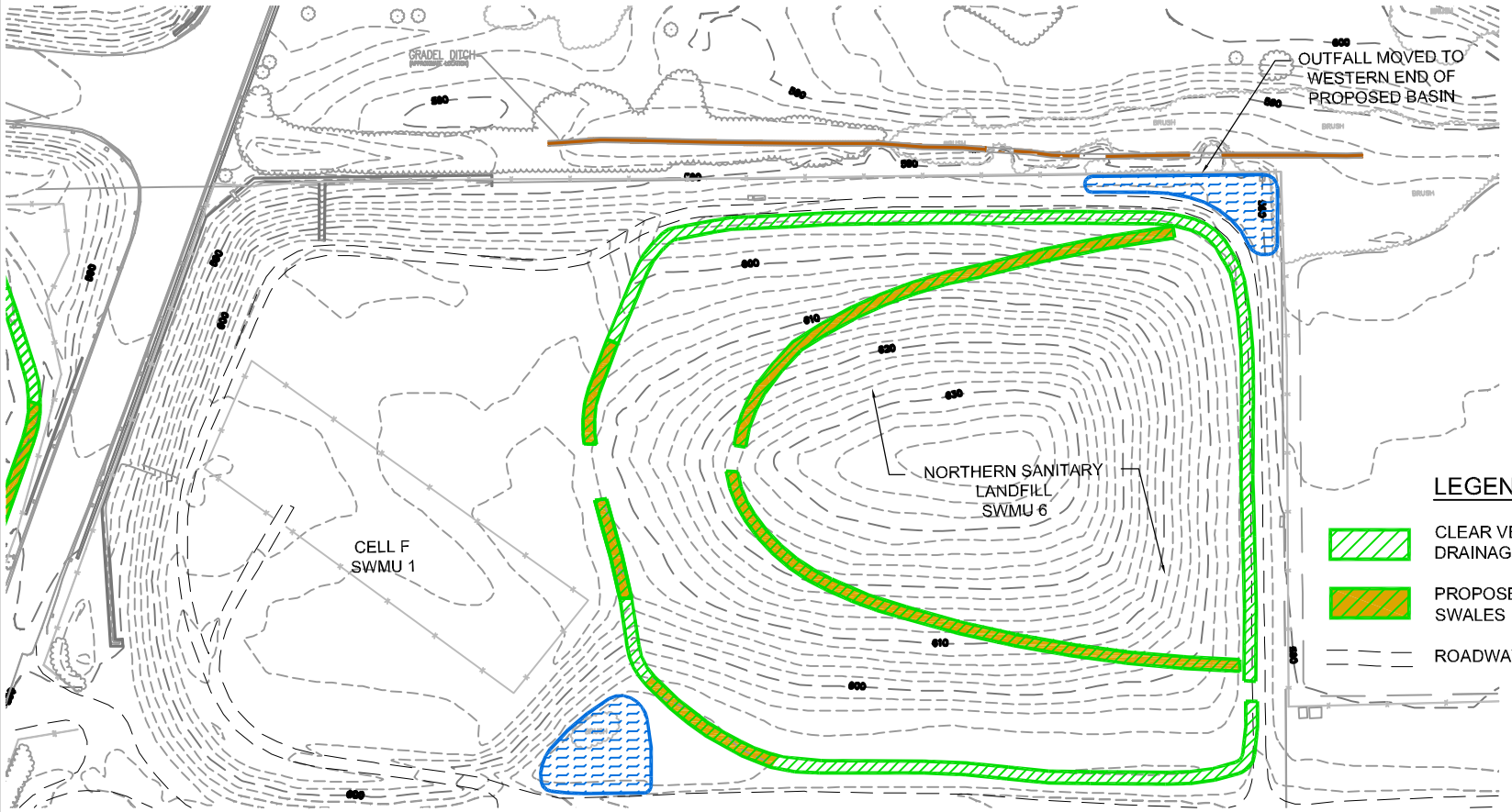
TOTAL CAPITAL COSTS	**$1,283,000**

Long Term Leachate Disposal (30 years)

Item	Description	Quantity	Unit	Unit Cost	Total
1	Leachate Disposal	3,250	gallons	$0.10	$318
	Annual Operation and Maintenance Cost				$300
				TOTAL OPERATION AND MAINTENANCE	**$9,000**
				NPV OPERATION AND MAINTENANCE	**$6,115**

ALTERNATIVE 2, TOTAL COST	**$1,292,000**
ALTERNATIVE 2, NPV	**$1,290,000**

Note: NPV calculation using RoR of 2.7%



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CONCEPTUAL STORMWATER IMPROVEMENTS - SWMU 6

ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

FIGURE
1

026174M14B

BKLEIN 1/7/11 [026174M13_B01]

Cap and Storm Water Cost Estimates
ESOI Otter Creek Facility, Oregon, Ohio

Alternative 1: SWMU 6 - Regrading Drainage Ditches

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

-Clear vegetation around perimeter, including areas identified by Mannik & Smith Group where ponding occurs, an estimated 19,500 square feet.
-Install a liner in perimeter ditches (1,950 ft) to prevent infiltration.
-Create intermediate drainage swales to channel water on the north and south sides of the unit, an estimated 9,000 square feet, and line swale.
-Install 2 retention basins: one in area of current ponding between SWMU 6 and SWMU 7, an estimated 6,000 square feet, and one in northeast corner, an estimated 4,500 square feet.
-Excavate waste outside of property line - an estimated 200 cubic yards - and dispose in Cell M.
-Off-site cover soil volume is estimated to be 110 cubic yards. Soil is assumed to be reusable. Outside of property line, soil cover ranges from 0 to 5 feet thick.
-A total off-site area of 980 square feet to be excavated (3 sections: 70' x 5', 40' x 7' and 35' x 10').
-Waste is assumed to weigh 1.5 tons/cubic yard.

Regrading Drainage Ditches and Intermediate Swales

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal (Clearing)	1,056	1 yd^3	$5.02	$5,302
2	Regrading Existing Eitches	1,056	1 yd^3	$5.00	$5,278
3	Create Intermediate Swales	333	1 yd^3	$5.00	$1,667
4	40 mil HDPE Liner Installation	42,750	1 ft^2	$0.56	$23,858
	Subtotal				**$36,000**

Retention Ponds for Storm Water Runoff in SW and NE corners

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	2,333	1 yd^3	$5.00	$11,667
2	Hauling Excavated Materials	2,333	1 yd^3	$5.00	$11,667
3	40 mil HDPE Liner Installation	10,500	1 ft^2	$0.56	$5,860
4	Geonet Drainage Layer Installation	10,500	1 ft^2	$0.33	$3,516
5	Geotextile Type 2 Installation	10,500	1 ft^2	$0.22	$2,344
6	Culvert Installation	500	linear ft	$12.23	$6,115
	Subtotal				**$41,000**

Cap and Waste Excavation for Off-site Waste

Item	Description	Quantity	Unit	Unit Cost	Total
1	Excavating and Hauling Waste and Cap	310	1 yd^3	$3.05	$946
2	Disposal in Cell M (Waste only)	300	ton	$56.90	$17,070
3	Backfilling and Regrading	310	1 yd^3	$5.00	$1,550
4	Vegetative Layer Establishment	0.02	acre	$1,339	$31
	Subtotal				**$20,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$97,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (12%)	1	LS	$11,640	$11,640
2	Construction Quality Assurance (10%)	1	LS	$9,700	$9,700
3	Contingency (20%)	1	LS	$19,400	$19,400
	Subtotal				**$41,000**

TOTAL CAPITAL COSTS	**$138,000**

Long Term Leachate Disposal (30 years)

Item	Description	Quantity	Unit	Unit Cost	Total
1	Leachate Disposal	105,597	gallons	$0.10	$10,327
	Annual Operation and Maintenance Cost				$10,300
				TOTAL OPERATION AND MAINTENANCE	**$309,000**
				NPV OPERATION AND MAINTENANCE	**$209,944**

ALTERNATIVE 1, TOTAL COST	**$447,000**
ALTERNATIVE 1, NPV	**$348,000**

Note: NPV calculation using RoR of 2.7%

Alternative 2: SWMU 6 - Installation of a Composite Cover

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

-Installation of a composite cover over the entire area of SWMU 6 (6.5 acres).
-Approximately 1 yard of current cover soils would be removed before installing the composite cover.
-Line Item 7, the Geotextile vent layer covers 30% of the total area.
-Clear vegetation around perimeter, including areas identified by Mannik & Smith Group where ponding occurs, an estimated 19,500 square feet.
-Install a liner in perimeter ditches (1,950 ft) to prevent infiltration.
-Create intermediate drainage swales to channel water on the north and south sides of the unit, an estimated 9,000 square feet, and line swale.
-Install 2 retention basins: one in area of current ponding between SWMU 6 and SWMU 7, an estimated 6,000 square feet, and one in northeast corner, an estimated 4,500 square feet.
-Excavate waste outside of property line - an estimated 200 cubic yards - and dispose in Cell M.
-Cap volume is estimated to be 110 cubic yards. Cap material is assumed to be reusable. Outside of property line, cap ranges from 0 to 5 feet thick.
-A total area of 980 square feet to be excavated (3 sections: 70' x 5', 40' x 7' and 35' x 10').
-Waste is assumed to weigh 1.5 tons/cubic yard.

Cap and Vegetative Cover

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	31,460	1 yd^3	$5.02	$158,017
2	Recompacted Clay Liner Installation (Phs III)	0	1 yd^3	$7.26	$0
3	40 mil HDPE Liner Installation	283,140	1 ft^2	$0.56	$158,017
4	Geonet Drainage Layer Installation	283,140	1 ft^2	$0.33	$94,810
5	Geotextile Type 2 Installation	283,140	1 ft^2	$0.22	$63,207
6	Cover Soil Installation (36")	31,460	1 yd^3	$5.02	$158,017
7	Geotextile Vent Layer Type 1 Installation	84,942	1 ft^2	$0.33	$28,443
8	Anchor Trench	2,000	lf	$10.84	$21,680
9	Gas Collection System Installation	0	unit(s)	$41,298	$0
10	Vegetative Layer Establishment	6.5	acre	$1,339	$8,706
	Subtotal				**$691,000**

Regrading Drainage Ditches and Intermediate Swales

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal (Clearing)	1,056	1 yd^3	$5.02	$5,302
2	Regrading Existing Ditches	1,056	1 yd^3	$5.00	$5,278
3	Create Intermediate Swales	333	1 yd^3	$5.00	$1,667
4	40 mil HDPE Liner Installation	42,750	1 ft^2	$0.56	$23,858
	Subtotal				**$36,000**

Retention Ponds for Storm Water Runoff in SW and NE corners

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	2,333	1 yd^3	$5.00	$11,667
2	Hauling Excavated Materials	2,333	1 yd^3	$5.00	$11,667
3	40 mil HDPE Liner Installation	10,500	1 ft^2	$0.56	$5,860
4	Geonet Drainage Layer Installation	10,500	1 ft^2	$0.33	$3,516
5	Geotextile Type 2 Installation	10,500	1 ft^2	$0.22	$2,344
6	Culvert Installation	500	linear ft	$12.23	$6,115
	Subtotal				**$41,000**

Storm Water Management and Access Roadways

Item	Description	Quantity	Unit	Unit Cost	Total
1	Aggregate Roadway Installation	855	tons	$20.37	$17,422
	Subtotal				**$17,000**

Cap and Waste Excavation for Off-site Waste

Item	Description	Quantity	Unit	Unit Cost	Total
1	Excavating and Hauling Waste and Cap	310	1 yd^3	$3.05	$946
2	Disposal in Cell M (Waste only)	300	ton	$56.90	$17,070
3	Backfilling and Regrading	310	1 yd^3	$5.00	$1,550
4	Vegetative Layer Establishment	0.02	acre	$1,339.41	$31
	Subtotal				**$20,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$805,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (15%)	1	LS	$120,750	$120,750
2	Construction Quality Assurance (10%)	1	LS	$80,500	$80,500
3	Contingency (20%)	1	LS	$161,000	$161,000
	Subtotal				**$362,000**

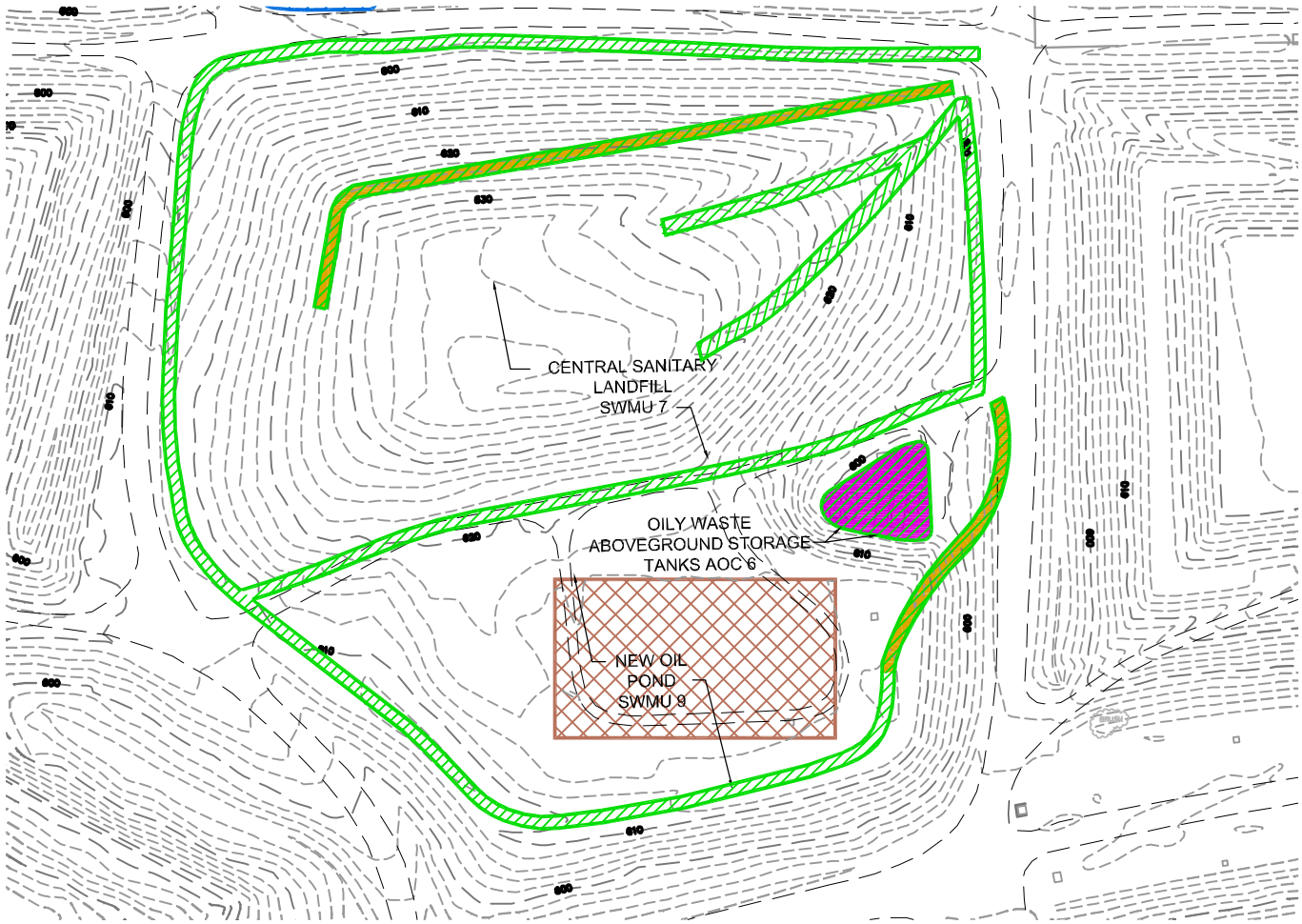
TOTAL CAPITAL COSTS	**$1,167,000**

Long Term Leachate Disposal (30 years)

Item	Description	Quantity	Unit	Unit Cost	Total
1	Leachate Disposal	5,280	gallons	$0.10	$516
	Annual Operation and Maintenance Cost				$500
				TOTAL OPERATION AND MAINTENANCE	**$15,000**
				NPV OPERATION AND MAINTENANCE	**$10,191**

ALTERNATIVE 2, TOTAL COST	**$1,182,000**
ALTERNATIVE 2, NPV	**$1,178,000**

Note: NPV calculation using RoR of 2.7%



LEGEND

- CLEAR VEGETATION AND LINE EXISTING DRAINAGE SWALES
- PROPOSED NEW LINED DRAINAGE SWALES
- ROADWAYS

0 150
SCALE IN FEET

CONCEPTUAL NOT FOR DESIGN PURPOSES

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CONCEPTUAL STORMWATER IMPROVEMENTS - SWMU 7 AND 9 AND AOC 6

ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

FIGURE
1

026174M14B

BKLEIN 1/7/11 [026174M13_B01]

Alternative 1: SWMU 7 - Regrade Drainage Ditches

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

-Regrade areas identified by Mannik & Smith Group where ponding occurs, an estimated 7,500 square feet, plus an additional 16,000 square feet for the remaining perimeter.
-Install a liner in swales to prevent infiltration.
-Create intermediate drainage swales to channel water on the north side of the unit, an estimated 6,000 square feet.

Regrading Drainage Ditches and Intermediate Swale

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal (Clearing)	1,093	1 yd^3	$5.02	$5,488
2	Regrade Existing Trenches	870	1 yd^3	$5.00	$4,352
3	Create Intermediate Swales	222	1 yd^3	$5.00	$1,111
4	40 mil HDPE Liner Installation	44,250	1 ft^2	$0.56	$24,695
	Subtotal				**$36,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$36,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (12%)	1	LS	$4,320	$4,320
2	Construction Quality Assurance (10%)	1	LS	$3,600	$3,600
3	Contingency (20%)	1	LS	$7,200	$7,200
	Subtotal				**$15,000**

TOTAL CAPITAL COSTS	**$51,000**

Long Term Leachate Disposal (30 years)

Item	Description	Quantity	Unit	Unit Cost	Total
1	Leachate Disposal	439,884	gallons	$0.10	$43,021
	Annual Operation and Maintenance Cost				$43,000

TOTAL OPERATION AND MAINTENANCE	**$1,290,000**
NPV OPERATION AND MAINTENANCE	**$876,463**

ALTERNATIVE 1, TOTAL COST	**$1,341,000**
ALTERNATIVE 1, NPV	**$928,000**

Note: NPV calculation using RoR of 2.7%

Alternative 2: SWMU 7 - Installation of a Composite Cover

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

-Installation of a composite cover over the entire area of SWMU 7 (7 acres).
-Approximately 1 yard of current cover soils would be removed before installing the composite cover.
-Geotextile vent layer covers 30% of the total area.
-Regrade areas identified by Mannik & Smith Group where ponding occurs, an estimated 7,500 square feet, plus an additional 13,500 square feet for the remaining perimeter.
-Install a liner around perimeter to prevent infiltration.
-Create intermediate drainage swales to channel water on the north side of the unit, an estimated 6,000 square feet.

Cap and Vegetative Cover

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	33,880	1 yd^3	$5.02	$170,172
2	Recompacted Clay Liner Installation (Phs III)	0	1 yd^3	$7.26	$0
3	40 mil HDPE Liner Installation	304,920	1 ft^2	$0.56	$170,172
4	Geonet Drainage Layer Installation	304,920	1 ft^2	$0.33	$102,103
5	Geotextile Type 2 Installation	304,920	1 ft^2	$0.22	$68,069
6	Cover Soil Installation (36")	33,880	1 yd^3	$5.02	$170,172
7	Geotextile Vent Layer Type 1 Installation	91,476	1 ft^2	$0.33	$30,631
8	Anchor Trench	2,100	lf	$10.84	$22,764
9	Gas Collection System Installation	0	unit(s)	$41,298	$0
10	Vegetative Layer Establishment	7.0	acre	$1,339	$9,376
	Subtotal				**$743,000**

Regrading Drainage Ditches and Intermediate Swale

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal (Clearing)	1,093	1 yd^3	$5.02	$5,488
2	Regrade Existing Trenches	870	1 yd^3	$5.00	$4,352
3	Create Intermediate Swales	222	1 yd^3	$5.00	$1,111
4	40 mil HDPE Liner Installation	44,250	1 ft^2	$0.56	$24,695
	Subtotal				**$36,000**

Storm Water Management and Access Roadways

Item	Description	Quantity	Unit	Unit Cost	Total
1	Aggregate Roadway Installation	921	tons	$20.37	$18,762
	Subtotal				**$19,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$798,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (15%)	1	LS	$114,300	$114,300
2	Construction Quality Assurance (10%)	1	LS	$76,200	$76,200
3	Contingency (20%)	1	LS	$15,960	$15,960
	Subtotal				**$206,000**

TOTAL CAPITAL COSTS	**$1,004,000**

Long Term Leachate Disposal (30 years)

Item	Description	Quantity	Unit	Unit Cost	Total
1	Leachate Disposal	21,994	gallons	$0.10	$2,151
	Annual Operation and Maintenance Cost				$2,200
				TOTAL OPERATION AND MAINTENANCE	**$66,000**
				NPV OPERATION AND MAINTENANCE	**$44,842**

ALTERNATIVE 2, TOTAL COST	**$1,070,000**
ALTERNATIVE 2, NPV	**$1,049,000**

Note: NPV calculation using RoR of 2.7%

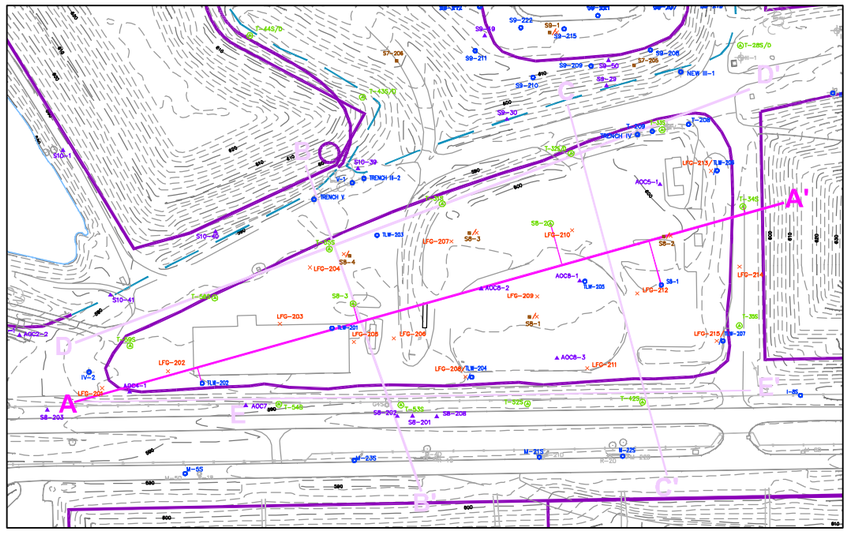
APPENDIX E

Supporting Documentation for CM Analysis – SWMU8

C O N T E N T S

Typical Cross-Sections
Cost Estimates – SWMU 8 Alternatives

Typical Cross-Sections



KEY MAP
1 INCH = 250 FEET

N

0 100
Scale In Feet

VERTICAL
EXAGGERATION IS
10X HORIZONTAL

LEGEND

- GRAVEL
- RECOMPACTED SILTY CLAY
- LACUSTRINE
- WASTE
- UPPER TILL
- STAINED LACUSTRINE
- SAND AND GRAVEL
- GROUND WATER/ LEACHATE ELEVATION
- NAPL

NOTES:

1. ALL SAMPLES SHOWN ON A–A' ARE PROJECTED AS SHOWN ON KEY MAP.
2. GROUNDWATER/LEACHATE LEVEL ELEVATIONS WERE MEASURED AUGUST 2007.

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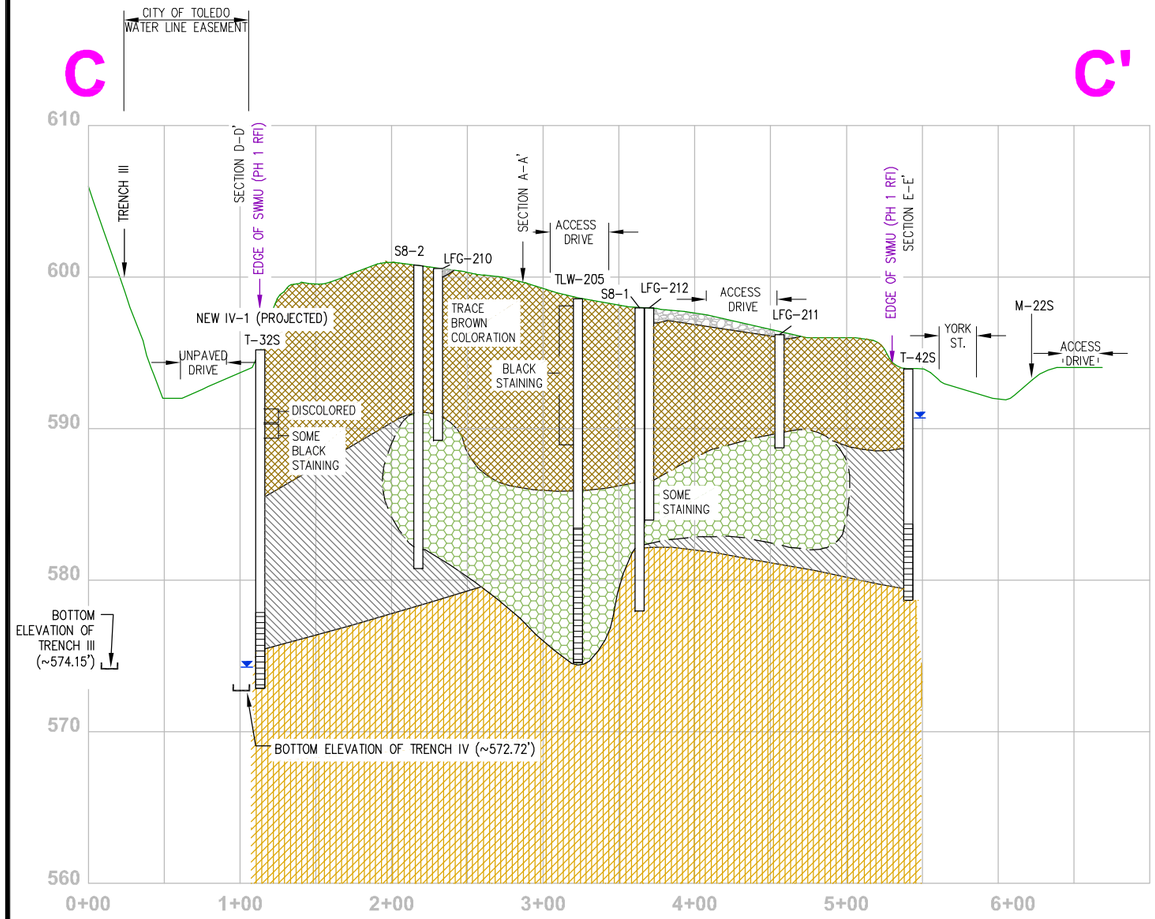
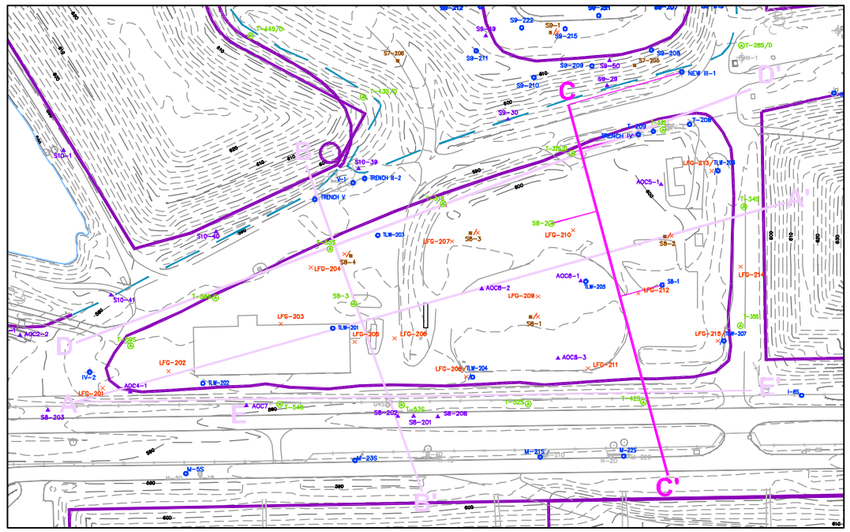
SWMU 8 – CROSS–SECTION A–A'

ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

Figure
4.2

6174M8X05





KEY MAP
1 INCH = 250 FEET

0 100
Scale In Feet

VERTICAL EXAGGERATION IS 10X HORIZONTAL

LEGEND

- GRAVEL
- RECOMPACTED SILTY CLAY
- LACUSTRINE
- WASTE
- UPPER TILL
- STAINED LACUSTRINE
- SAND AND GRAVEL
- GROUND WATER/ LEACHATE ELEVATION
- NAPL
- BOTTOM OF TRENCH'

NOTES:

1. ALL SAMPLES SHOWN ON C–C' ARE PROJECTED AS SHOWN ON KEY MAP.
2. GROUNDWATER/LEACHATE LEVEL ELEVATIONS WERE MEASURED AUGUST 2007.

' WATERLINE MONITORING TRENCH INFORMATION IS PROJECTED INTO THE CROSS–SECTION FOR REFERENCE. BOTTOM ELEVATIONS OF TRENCHES WERE FOUND USING SLOPE AND DISTANCES DERIVED FROM KNOWN SUMP ELEVATIONS. ELEVATIONS ARE APPROXIMATE.

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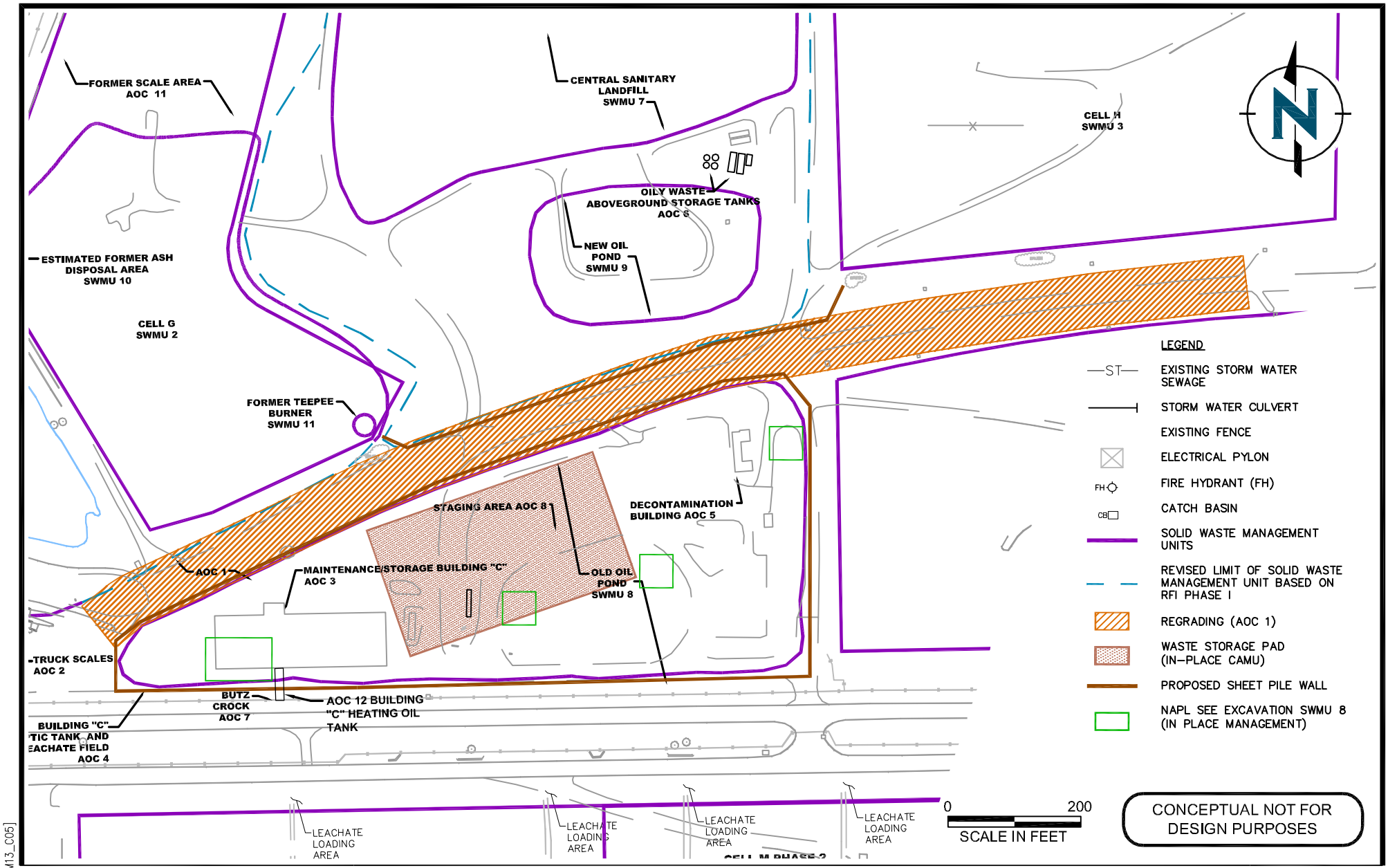
SWMU 8 – CROSS–SECTION C–C'

ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

Figure 4.2

6174M8X05

Cost Estimates – SWMU 8 Alternatives



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DRAFTED BY: BJK | DATE: 1/7/2011

CORRECTIVE MEASURES EVALUATION SWMU 8 & AOC 1

ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

FIGURE
1

026174M14B

BKLEIN 1/7/11 [026174M13_C05]

Alternative 1: SWMU 8 - In Place Management

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions
In Place management requires:
-Demolition of Building C - foot print of building estimated to be 260' x 80' and 12' high
-Excavation of AOC 7 - drain pipe and sump - an estimated 1,000 cubic yards (10' x 10' x 10')
-Repair cap in observed area of NAPL seepage - an estimated 26,500 square feet (almost 9,000 cubic yards) of cap,cap can be reused.
-Leachate collection wells - leachate is estimated to be an average of 5 feet thick at the base of the unit (estimated 6 acres) and 20% drainable porosity, yielding an estimated volume of 3.4 million gallons of leachate
-Installation of passive landfill gas vents
-Installation of a sheet pile barrier wall on the north and south perimeter - an estimated 2,700 linear feet

Building C

Item	Description	Quantity	Unit	Unit Cost	Total
1	Demolition of Structure	249,600	ft^3	$0.28	$69,649
2	Demolition of Slab	20,800	ft^2	$6.03	$125,369
3	Excavation of AOC 7	1,000	1 yd^3	$3.05	$3,050
4	Backfill of AOC 7	1,000	1 yd^3	$5.00	$5,000
5	Disposal of Structure	0	1 yd^3	$10.44	$0
6	Disposal of Slab	385	1 yd^3	$12.33	$4,751
7	Building Construction w/slab on grade	8,000	ft^2	$122.00	$976,000
	Subtotal				**$1,184,000**

Cap Repair

Item	Description	Quantity	Unit	Unit Cost	Total
1	Excavation of Cap in NAPL Seepage	8,833	1 yd^3	$3.05	$26,942
2	Backfilling and Repair Seep Areas	8,833	1 yd^3	$5.00	$44,167
3	Vegetative Layer Establishment	6.7	acre	$1,339	$8,974
	Subtotal				**$80,000**

Installation of Leachate Recovery Wells

Item	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization and Demobilization	1	LS	$1,500.00	$1,500
2	Subsistence	54	man/day	$100.00	$5,400
3	10" Sonic Drilling	400	feet	$55.00	$22,000
4	4" SS x HDPE Well Labor and Materials	400	ft	$69.00	$27,600
5	Restore site and waste management	10	hr	$350.00	$3,500
6	Decon Time (Rig and 3 man crew)	14	hr	$300.00	$4,200
7	Backhoe	4	week	$1,200.00	$4,800
8	Initial Leachate Recovery & Disposal (start-up)	1,955,360	gallons	$0.20	$391,072
	Subtotal				**$460,000**

Passive Landfill Gas Vent Installation Around Perimeter

Item	Description	Quantity	Unit	Unit Cost	Total
1	Moblization (included above)	1	LS	-	-
2	Labor and Equipment	5	Day	$1,350	$6,750
3	Installation of twelve, 4", 15 foot deep gas vents	180	ft	$193	$34,740
	Subtotal				**$41,000**

Containment Wall - SWMU 8 North and South Boundaries

Item	Description	Quantity	Unit	Unit Cost	Total
1	Sheet Pile Wall (35')	94,500	1 ft^2	$29	$2,742,437
	Subtotal				**$2,742,000**

Note: ESOI obtained quotes in 2005 for installing a shallow or deep slurry wall for groundwater containment. Prices are adjusted for inflation.

SUBTOTAL - CONSTRUCTION & STARTUP	**$4,507,000**

Engineering, Oversight, and Contingency

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering and Permitting (12%)	1	LS	$540,840	$540,840
2	Construction Quality Assurance (10%)	1	LS	$450,700	$450,700
3	Contingency (20%)	1	LS	$901,400	$901,400
	Subtotal				**$1,893,000**

TOTAL CAPITAL COSTS	**$ 6,400,000**

Long Term Monitoring

Item	Description	Quantity	Unit	Unit Cost	Total
1	Leachate Removal System Maintenance (30 years)	10	pump	$246	$2,456
2	Leachate Disposal (30 years)	232,000	gallons	$0.10	$22,690
3	Gas Probe Maintenance (30 years)	2	event	$123	$246
4	Weekly Monitoring of Gas Probes (5 years)	130	hour	$59.00	$7,670
5	Semi-Annual Monitoring of Gas Probes (25 years)	10	hour	$59.00	$590
	Annual Maintenance for the first 5 years				$33,100
	Annual Maintenance for 25 years (after the first 5)				$26,000
	TOTAL OPERATION AND MAINTENANCE				**$ 815,500**
	NPV OPERATION AND MAINTENANCE				**$563,591**

ALTERNATIVE 1, TOTAL COST	**$ 7,216,000**
ALTERNATIVE 1, NPV	**$ 6,964,000**

Notes: Gas Probe monitoring for newly installed points. The existing 4 points to the southwest of the unit are addressed in the landfill gas cost estimate sheet.
-ESOI estimated 1 hour a week for weekly monitoring of 5 points. 12 points need weekly monitoring (for 5 years) = 2.5 hours/week. ESOI estimated 16 hours for one semi annual monitoring of 41 points. 12 points need semi annual monitoring (for 10 years) = 5 hours/event = 10 hrs/yr
-Line items show the annual cost.
-Long term monitoring does not include vegetation maintenance (see facility wide cap cost estimates)

Alternative 2: SWMU 8 - In Place CAMU

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

In Place CAMU requires:
-Demolition of Building C - foot print of building estimated to be 260' x 80' and 12' high
-Excavation of AOC 7 - drain pipe and sump - an estimated 500 cubic yards (10' x 10' x 5')
-Installation of liner system below waste which includes a leachate collection system- a portion of the waste will be excavated and stored on the remaining unit while the liner is installed. The temporary storage pad is estimated to be 360' x 200'. Leachate will be collected from this stored waste and disposed. Leachate is estimated to be an average of 5' thick at the base of the unit (estimated 6 acres) and 20% porosity, yielding an estimated volume of 3.4 million gallons of leachate.
-Estimated waste volume of 100,000 cubic yards,cap volume of 65,000 cubic yards

Building C

Item	Description	Quantity	Unit	Unit Cost	Total
1	Demolition of Structure	249,600	ft^3	$0.28	$69,649
2	Demolition of Slab	20,800	ft^2	$6.03	$125,369
3	Excavation of AOC 7	1,000	1 yd^3	$3.05	$3,050
4	Backfill of AOC 7	1,000	1 yd^3	$5.00	$5,000
5	Disposal of Structure	0	CY	$10.44	$0
6	Disposal of Slab	385	CY	$12.33	$4,751
7	Building Construction	8,000	ft^2	$122.00	$976,000
	Subtotal				**$1,184,000**

Liner System

Item	Description	Quantity	Unit	Unit Cost	Total
1	Excavation of Waste and Cap	165,000	1 yd^3	$3.05	$503,250
2	12" gravel base for temporary storage pad	8,000	1 yd^2	$17.19	$137,513
3	40 mil HDPE liner for temporary storage pad	72,000	1 ft^2	$0.56	$40,182
4	6" gravel layer for temporary storage pad	8,000	1 yd^2	$8.99	$71,882
5	60 mil HDPE liner	291,852	1 ft^2	$0.53	$154,682
6	Geonet	291,852	1 ft^2	$0.23	$67,126
7	16 oz Geotextile	145,926	1 ft^2	$0.22	$32,104
8	Stone Aggregate	1,883	1 yd^3	$29.50	$55,535
9	Primary Clay	5,648	1 yd^3	$8.00	$45,181
10	80 mil HDPE	291,852	1 ft^2	$0.63	$183,867
11	Geonet	291,852	1 ft^2	$0.23	$67,126
12	16 oz Geotextile	323,956	1 ft^2	$0.22	$71,270
13	Stone Aggregate	1,883	1 yd^3	$29.50	$55,535
14	6 oz Geotextile	145,926	1 ft^2	$0.14	$20,430
15	Protective Cover	1,036	1 yd^3	$19.80	$20,514
16	HDPE Testing	145,926	1 ft^2	$0.04	$5,837
17	Stabilize Waste for Backfilling	100,000	yd^3	$10.00	$1,000,000
18	Backfill Waste	100,000	1 yd^3	$5.00	$500,000
	Subtotal				**$3,032,000**

Note: Liner installation cost based on ESOI estimates for Cell M

Construction of a Composite Cover

Item	Description	Quantity	Unit	Unit Cost	Total
1	40 mil HDPE Liner Installation	291,852	1 ft^2	$0.56	$162,879
2	Geonet Drainage Layer Installation	291,852	1 ft^2	$0.33	$97,727
3	Geotextile Type 2 Installation	291,852	1 ft^2	$0.22	$65,151
4	Cover Soil Installation (36")	22,547	1 yd^3	$5.02	$113,248
5	Vent pipe installation	4,800	feet	$15.00	$72,000
6	Geotextile Vent Layer Type 1 Installation	291,852	1 ft^2	$0.33	$97,727
7	Anchor Trench	2,700	lf	$10.84	$29,268
8	Vegetative Layer Establishment	6.7	acre	$1,339	$8,974
	Subtotal				**$647,000**

Leachate and LNAPL Recovery During Construction

Item	Description	Quantity	Unit	Unit Cost	Total
1	Initial Leachate Recovery & Disposal (start-up)	1,955,360	gallons	$0.20	$ 391,072
	Subtotal				**$391,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$5,254,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering and Permitting (15%)	1	LS	$788,100	$788,100
2	Construction Quality Assurance (10%)	1	LS	$525,400	$525,400
3	Contingency (20%)	1	LS	$1,050,800	$1,050,800
	Subtotal				**$2,364,000**

TOTAL CAPITAL COSTS	**$ 7,618,000**

Long Term Monitoring

Item	Description	Quantity	Unit	Unit Cost	Total
1	Leachate Removal System Maintenance (30 years)	10	pump	$246	$2,456
2	Leachate Disposal (30 years)	232,000	gallons	$0.10	$22,690
3	Gas Probe Maintenance (30 years)	2	event	$123	$246
4	Weekly Monitoring of Gas Vents (5 years)	130	hour	$59.00	$7,670
5	Semi-Annual Monitoring of Gas Vents (25 years)	10	hour	$59.00	$590
	Annual Maintenance for the first 5 years				$33,000
	Annual Maintenance for 25 years (after the first 5)				$26,000
	TOTAL OPERATION AND MAINTENANCE				**$815,000**
	NPV OPERATION AND MAINTENANCE				**$563,591**

ALTERNATIVE 2, TOTAL COST	**$8,433,000**
ALTERNATIVE 2, NPV	**$8,182,000**

Notes: Gas vent monitoring for newly installed vents. The existing 4 points to the southwest of the unit are addressed in the landfill gas cost estimate sheet.
-ESOI estimated 1 hour a week for weekly monitoring of 5 points. 12 points need weekly monitoring (for 5 years) = 2.5 hours/week. ESOI estimated 16 hours for one semi annual monitoring of 41 points. 12 points need semi annual monitoring (for 10 years) = 5 hours/event = 10 hrs/yr
-Line items show the annual cost.

Alternative 3: SWMU 8 - Active Cell M CAMU

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

Active Cell M CAMU requires:
-Demolition of Building C - foot print of building estimated to be 260' x 80' and 12' high
-Excavation of AOC 7 - drain pipe and sump - an estimated 500 cubic yards (10' x 10' x 5')
-Excavation and disposal of waste into Cell M
-Estimated waste volume of 100,000 cubic yards, cap volume of 65,000 cubic yards
-Waste is assumed to weigh 1.5 tops/cubic yard. Disposal costs provided by ESOI. Stabilization cost provided by ESOI for stability only.
-Cap is assumed to be reusable as backfill.

Building C

Item	Description	Quantity	Unit	Unit Cost	Total
1	Demolition of Structure	249,600	ft^3	$0.28	$69,649
2	Demolition of Slab	20,800	ft^2	$6.03	$125,369
3	Excavation of AOC 7	1,000	1 yd^3	$3.05	$3,050
4	Backfill of AOC 7	1,000	1 yd^3	$5.00	$5,000
5	Disposal of Structure	0	CY	$10.44	$0
6	Disposal of Slab	385	CY	$12.33	$4,751
7	Building Construction	8,000	ft^2	$ 122	$976,000
	Subtotal				**$1,184,000**

Leachate and LNAPL Recovery During Construction

Item	Description	Quantity	Unit	Unit Cost	Total
1	Initial Leachate Recovery & Disposal (start-up)	1,955,360	gallons	$0.20	$391,072
	Subtotal				**$391,000**

CAMU

Item	Description	Quantity	Unit	Unit Cost	Total
1	Excavation and Stockpiling of Cap	65,000	1 yd^3	$3.05	$198,250
2	Excavation and Hauling of Waste	100,000	1 yd^3	$3.05	$305,000
2	Disposal of Waste	150,000	ton	$57	$8,475,000
3	Stabilization of Waste for strength improvement	100,000	ton	$10	$1,000,000
4	Backfill of unit	165,000	1 yd^3	$5.00	$825,000
5	Vegetative Layer Establishment	6.7	acre	$1,339	$8,974
	Subtotal				**$10,812,000**

SUBTOTAL - CONSTRUCTION & STARTUP $ 12,387,000

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering and Permitting (15%)	1	LS	$1,858,050	$1,858,050
2	Construction Quality Assurance (10%)	1	LS	$1,238,700	$1,238,700
3	Contingency (20%)	1	LS	$2,477,400	$2,477,400
	Subtotal				**$5,574,000**

TOTAL CAPITAL COSTS $ 17,961,000

ALTERNATIVE 3, TOTAL COST $ 17,961,000

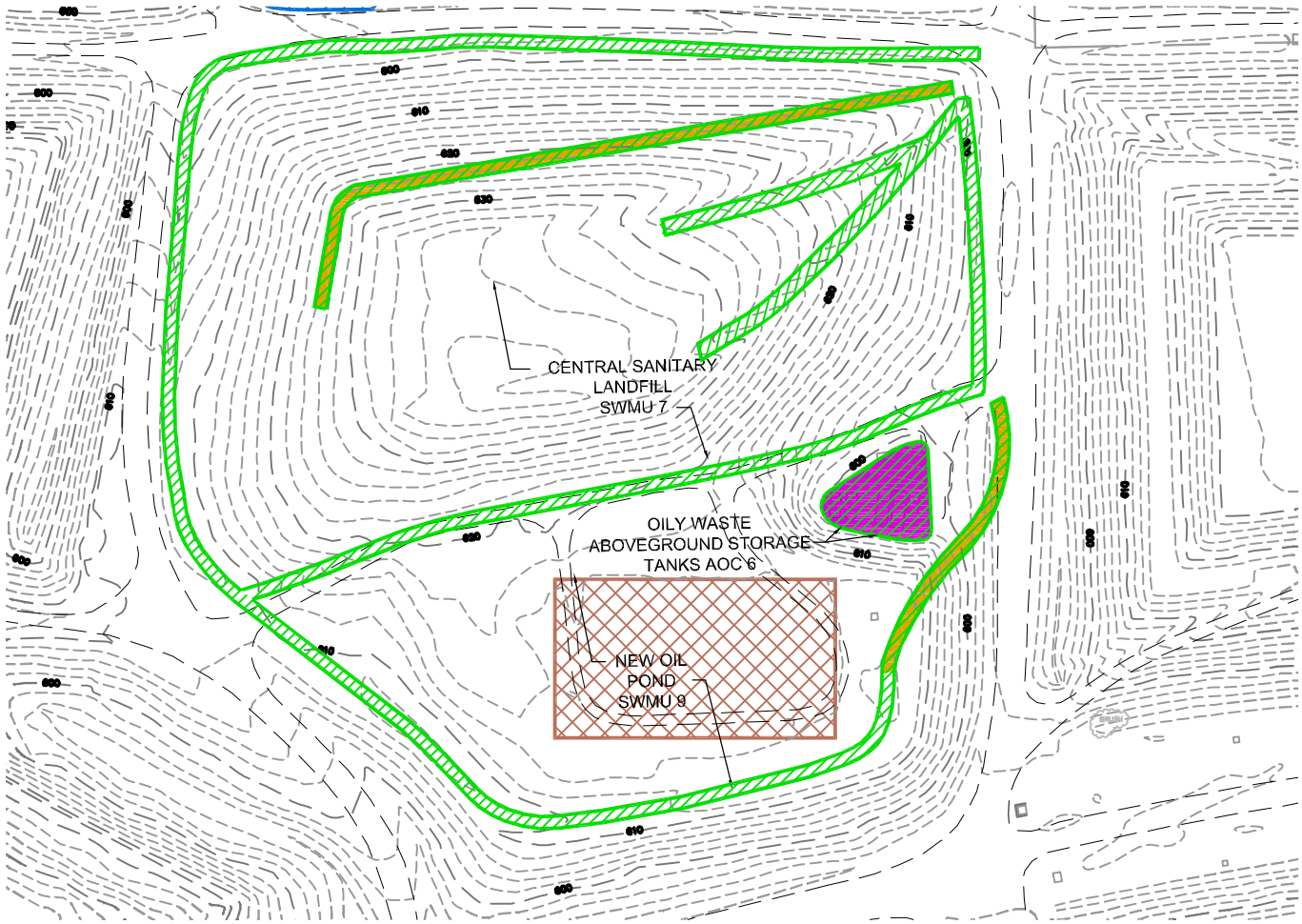
-Long term monitoring for vegetation maintenance is not included (see facility wide cap cost estimates)

APPENDIX F

Supporting Documentation for CM Analysis – SWMU 9

C O N T E N T S

Cost Estimates – SWMU 9 Alternatives



LEGEND

- CLEAR VEGETATION AND LINE EXISTING DRAINAGE SWALES
- PROPOSED NEW LINED DRAINAGE SWALES
- ROADWAYS

0 150
SCALE IN FEET

CONCEPTUAL NOT FOR DESIGN PURPOSES

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DRAFTED BY: BJK | DATE: 1/7/2011

CONCEPTUAL STORMWATER IMPROVEMENTS - SWMU 7 AND 9 AND AOC 6

ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

FIGURE
1

026174M14B

BKLEIN 1/7/11 [026174M13_B01]

Environsafe Services of Ohio, Inc.
Cap and Storm Water Cost Estimates

Alternative 1: SWMU 9 - Repair Cap and Regrade Drainage Ditches

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

-Regrade areas in drainage ditches identified by Mannik & Smith Group where ponding occurs, an estimated 850 LF, and install a liner.
-Repair cap in area of NAPL seepage - an estimated area of 40,000 square feet (160' x 250')
-Install leachate recovery wells to dewater unit during construction. Leachate has been measured to be approximately 2' thick over the 1.6 acres of the unit, and 20% drainable porosity/drainable leachate is assumed.
-Labor costs to remove leachate are assumed to be 8 hours per day over a 3 month period (60 working days)

Regrading Drainage Ditches and Installing Liner

Item	Description	Quantity	Unit	Unit Cost	Total
1	Remove accumulated material in ditches	315	1 yd^3	$5.02	$1,581
2	Regrading	315	1 yd^3	$5.00	$1,574
3	40 mil HDPE Liner Installation	12,750	1 ft^2	$0.56	$7,116
	Subtotal				**$10,000**

Repairing Cap in Areas of Seepage

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal for Repair	8,889	1 yd^3	$5.02	$44,647
2	Backfilling and Regrading	17,778	1 yd^3	$5.00	$88,889
3	Vegetative Layer Establishment	0.9	acre	$1,339	$1,230
	Subtotal				**$135,000**

Installation of Additional Dewatering Wells

Item	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization and Demobilization	1	LS	$1,500.00	$1,500
2	Subsistence	14	man/day	$100.00	$1,350
3	10" Sonic Drilling	125	feet	$55.00	$6,875
4	4" SS x HDPE Well Labor and Materials	125	ft	$69.00	$8,625
5	Restore site and waste management	5	hr	$350.00	$1,750
6	Decon Time (Rig and 3 man crew)	7	hr	$300.00	$2,100
7	Backhoe	1	week	$1,200.00	$1,200
8	Leachate Disposal	208,530	gallons	$0.10	$20,394
9	Leachate Disposal Labor	480	hours	$59.00	$28,320
	Subtotal				**$72,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$217,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering and Permitting (12%)	1	LS	$26,040	$26,040
2	Construction Quality Assurance (10%)	1	LS	$21,700	$21,700
3	Contingency (20%)	1	LS	$43,400	$43,400
	Subtotal				**$91,000**

TOTAL CAPITAL COSTS $	**308,000**

ALTERNATIVE 1, TOTAL COST **$308,000**

Alternative 2: SWMU 9 - Excavate Area of Seepage, Install Composite Cover, Regrade Ditches

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

-Top 6 feet of unit to be excavated - an estmated 40,000 square feet. 1 foot of cap to be disposed of in Cell M due to oily seepage - cap is estimated to weigh 1.5 tons/cubic yard.
-Composite cover installed over the area plus additional area - an estimated 55,000 square feet
-The estimated 9,000 cubic yards of cap is assumed to be reusable for backfilling
-Regrade areas in drainage ditches identified by Mannik & Smith Group where ponding occurs, an estimated 600 LF, and install a liner
-Install leachate recovery wells to dewater unit. Leachate has been measured to be approximately 2' thick over the 1.6 acres of the unit, and 20% porosity/drainable leachate is assumed.
-Labor costs to remove leachate are assumed to be 8 hours per day over a 3 month period (60 working days)

Excavation of Top of Unit and Installation of Composite Cover

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	8,889	1 yd^3	$5.02	$44,647
2	Backfilling and regrading	17,778	1 yd^3	$5.00	$88,889
3	Disposal of 1-ft of cover soils in Cell M	2,222	ton	$56.50	$125,556
4	40 mil HDPE Liner Installation	55,000	1 ft^2	$0.56	$30,695
5	Geonet Drainage Layer Installation	55,000	1 ft^2	$0.33	$18,417
6	Geotextile Type 2 Installation	55,000	1 ft^2	$0.22	$12,278
7	Cover Soil Installation (36")	6,111	1 yd^3	$5.02	$30,695
8	Anchor Trench	960	lf	$10.84	$10,406
9	Vegetative Layer Establishment	1.3	acre	$1,339	$1,691
	Subtotal				**$363,000**

Regrading Drainage Ditches and Installing Liner

Item	Description	Quantity	Unit	Unit Cost	Total
1	Remove accumulated material from ditches	315	1 yd^3	$5.02	$1,581
2	Regrading ditches	315	1 yd^3	$5.00	$1,574
3	40 mil HDPE Liner Installation	12,750	1 ft^2	$0.56	$7,116
	Subtotal				**$10,000**

Installation of Piezometers

Item	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization and Demobilization	1	LS	$1,500.00	$1,500
2	Subsistence	14	man/day	$100.00	$1,350
3	10" Sonic Drilling	125	feet	$55.00	$6,875
4	4" SS x HDPE Well Labor and Materials	125	ft	$69.00	$8,625
5	Restore site and waste management	5	hr	$350.00	$1,750
6	Decon Time (Rig and 3 man crew)	7	hr	$300.00	$2,100
7	Backhoe	1	week	$1,200.00	$1,200
8	Leachate Disposal	208,530	gallons	$0.10	$20,394
9	Leachate Disposal Labor	480	hours	$59.00	$28,320
	Subtotal				**$72,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$445,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering and Permitting (15%)	1	LS	$66,750	$66,750
2	Construction Quality Assurance (10%)	1	LS	$44,500	$44,500
3	Contingency (20%)	1	LS	$89,000	$89,000
	Subtotal				**$200,000**

TOTAL CAPITAL COSTS $	**645,000**

ALTERNATIVE 2, TOTAL COST **$645,000**

APPENDIX G

Supporting Documentation for CM Analysis SWMU 5 - LNAPL

C O N T E N T S

Characterization Data Tables
Cross-Section
Cost Estimates - SWMU 5 LNAPL Alternatives

Characterization Data Tables

Table 3a
LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Millard Road Landfill SWMU 5

Date	Well	Depth to NAPL (ft)	Depth to Water (ft)	LNAPL Thickness (ft)	Comments
7/20/2006	T-20S (1)	--	4.97	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-20S (2)	13.97	14.00	0.03	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-20S (3)	--	6.17	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-20S (4)	--	10.19	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-20S (5)	6.55	7.53	0.98	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-20S (6)	--	13.99	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	MR-6S	--	12.88	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	T-21S	--	15.44	--	Wells were checked for DNAPL. No DNAPL was present
7/20/2006	TLW-1	--	11.83	--	Wells were checked for DNAPL. No DNAPL was present
7/25/2006	T-20S (2)	14.24	14.28	0.04	
7/25/2006	T-20S (5)	6.7	7.71	1.01	Sampled on July 25, 2006, effectively removing the NAPL layer
7/26/2006	T-20S (1)	--	5.3	--	
7/26/2006	T-20S (2)	14.22	14.25	0.03	
7/26/2006	T-20S (3)	--	6.42	--	
7/26/2006	T-20S (4)	--	10.4	--	
7/26/2006	T-20S (5)	6.83	7.12	0.29	
7/26/2006	T-20S (6)	--	14.12	--	
7/27/2006	T-20S (5)	6.74	7.00	0.26	
7/28/2006	T-20S (5)	5.59	5.79	0.20	Heavy rain fell the previous night
8/1/2006	T-20S (1)	--	5.16	--	
8/1/2006	T-20S (2)	14.1	14.13	0.03	
8/1/2006	T-20S (3)	--	6.22	--	
8/1/2006	T-20S (4)	--	10.3	--	
8/1/2006	T-20S (5)	6.34	6.63	0.29	
8/1/2006	T-20S (6)	--	13.98	--	
8/1/2006	MR-6S	--	13.06	--	
8/1/2006	T-20W	--	8.54	--	
8/1/2006	T-21S	--	15.46	--	
8/1/2006	T-46W	--	10.31	--	
8/1/2006	T-47W	--	14.19	--	
8/1/2006	T-45W	--	11.11	--	
8/1/2006	TLW-1	--	12.25	--	
8/3/2006	T-20S (1)	--	5.14	--	
8/3/2006	T-20S (2)	14.08	14.09	0.01	
8/3/2006	T-20S (3)	--	6.21	--	
8/3/2006	T-20S (4)	--	10.31	--	
8/3/2006	T-20S (5)	6.53	6.71	0.18	Checked for DNAPL , but it was not present.
8/3/2006	T-20S (6)	--	14.03	--	
8/3/2006	MR-6S	--	13.06	--	
8/3/2006	T-20W	--	8.51	--	
8/3/2006	T-21S	--	15.51	--	
8/3/2006	T-46W	--	10.34	--	
8/3/2006	T-47W	--	14.14	--	
8/3/2006	T-45W	--	11.36	--	
8/3/2006	TLW-1	--	12.39	--	Checked for DNAPL , but it was not present.

Table 3a
LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Millard Road Landfill SWMU 5

8/8/2006	T-20S (1)	--	5.49	--	
8/8/2006	T-20S (2)	14.38	14.395	0.015	Checked for DNAPL , but it was not present.
8/8/2006	T-20S (3)	--	6.46	--	
8/8/2006	T-20S (4)	--	10.5	--	
8/8/2006	T-20S (5)	6.83	6.86	0.03	Checked for DNAPL , but it was not present.
8/8/2006	T-20S (6)	--	14.22	--	
8/8/2006	MR-6S	--	13.19	--	
8/8/2006	T-20W	--	8.83	--	
8/8/2006	T-21S	--	15.61	--	
8/8/2006	T-46W	--	10.53	--	
8/8/2006	T-47W	--	14.49	--	
8/8/2006	T-45W	--	11.97	--	
8/8/2006	TLW-1	--	12.91	--	
8/10/2006	T-20S (1)	--	5.38	--	
8/10/2006	T-20S (2)	14.31	14.32	0.01	Checked for DNAPL , but it was not present.
8/10/2006	T-20S (3)	--	6.44	--	
8/10/2006	T-20S (4)	--	10.43	--	
8/10/2006	T-20S (5)	6.87	6.89	0.02	Checked for DNAPL , but it was not present.
8/10/2006	T-20S (6)	--	14.19	--	
8/10/2006	MR-6S	--	13.24	--	
8/10/2006	T-20W	--	8.87	--	
8/10/2006	T-21S	--	15.6	--	
8/10/2006	T-46W	--	10.54	--	
8/10/2006	T-47W	--	14.41	--	
8/10/2006	T-45W	--	12.02	--	
8/10/2006	TLW-1	--	12.81	--	
10/24/2006	T-20S (1)	--	5.26	--	
10/24/2006	T-20S (2)	14.14	14.15	0.01	
10/24/2006	T-20S (3)	--	6.13	--	
10/24/2006	T-20S (4)	--	10.22	--	
10/24/2006	T-20S (5)	6.15	8.56	2.41	Bailed down NAPL
10/24/2006	T-20S (6)	--	14.02	--	
10/24/2006	MR-6S	--	13.17	--	
10/24/2006	T-20W	--	8.52	--	
10/24/2006	T-21S	--	15.08	--	
10/24/2006	T-46W	--	10.98	--	
10/24/2006	T-47W	--	14.1	--	
10/24/2006	T-45W	--	10.37	--	
10/24/2006	TLW-1	--	10.87	--	
10/26/2006	T-20S (1)	--	6.37	--	
10/26/2006	T-20S (2)	15.27	15.28	0.01	
10/26/2006	T-20S (3)	--	6.33	--	
10/26/2006	T-20S (4)	--	10.64	--	
10/26/2006	T-20S (5)	6.74	6.78	0.04	
10/26/2006	T-20S (6)	--	14.14	--	
10/26/2006	MR-6S	--	13.25	--	
10/26/2006	T-20W	--	8.51	--	
10/26/2006	T-21S	--	15.33	--	
10/26/2006	T-46W	--	10.76	--	

Table 3a
LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Millard Road Landfill SWMU 5

10/26/2006	T-47W	--	14.32	--	
10/26/2006	T-45W	--	10.37	--	
10/30/2006	T-20S (1)	--	5.54	--	
10/30/2006	T-20S (2)	14.4	14.41	0.01	
10/30/2006	T-20S (3)	--	6.05	--	
10/30/2006	T-20S (4)	--	10.15	--	
10/30/2006	T-20S (5)	6.27	6.28	0.01	
10/30/2006	T-20S (6)	--	13.78	--	
10/30/2006	T-20S (7)	--	7.4	--	DTB from TOC is 17.47'
10/30/2006	T-20S (8)	--	13.37	--	DTB from TOC is 20.33'
10/30/2006	MR-6S	--	13.19	--	
10/30/2006	T-20W	--	8.23	--	
10/30/2006	T-21S	--	14.8	--	
10/30/2006	T-46W	--	10.54	--	
10/30/2006	T-47W	--	13.19	--	
10/30/2006	T-45W	--	10.37	--	
10/30/2006	TLW-1	--	10.37	--	
11/1/2006	T-20S (1)	--	5.67	--	Time: 1301
11/1/2006	T-20S (2)	14.56	14.57	0.01	Time: 1312
11/1/2006	T-20S (3)	--	6.18	--	Time: 1259
11/1/2006	T-20S (4)	--	10.3	--	Time: 1255
11/1/2006	T-20S (5)	6.15	6.35	0.2	Time: 1308
11/1/2006	T-20S (6)	--	13.94	--	Time: 1253
11/1/2006	T-20S (7)	--	7.5	--	Time: 1306
11/1/2006	T-20S (8)	--	11.94	--	Time: 1303
8/27/2007	T-20S (1)	--	5.72	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (2)	15.39	15.45	0.06	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (3)	--	6.33	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (4)	--	10.41	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (5)	6.62	6.86	0.24	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (6)	14.94	14.95	0.01	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (7)	--	7.69	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-20S (8)	--	10.26	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	MR-6S	14.72	14.73	0.01	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	T-21S	--	15.12	--	Wells were checked for DNAPL. No DNAPL was present
8/27/2007	TLW-1	--	--	--	Well is missing, presumed destroyed.
SWMU 5 LNAPL Bail-down Test					
8/27/2007	MR-6S	14.72	14.73	0.01	Time: 1720 No FP or sheen noted on purged water, will not include in bail-down test.
8/27/2007	T-20S (2)	15.42	15.45	0.03	Time: 1725
8/27/2007	T-20S (5)	6.62	6.86	0.24	Time: 1748
8/27/2007	T-20S (6)	14.96	14.97	0.01	Time: 1740
8/27/2007	T-20S (2)	15.98	15.99	0.01	Time: 1800
8/27/2007	T-20S (5)	6.8	6.84	0.04	Time: 1752
8/27/2007	T-20S (6)	15.3	15.31	0.01	Time: 1807
8/27/2007	T-20S (2)	15.96	15.97	0.01	Time: 1830
8/27/2007	T-20S (5)	6.68	6.72	0.04	Time: 1812
8/27/2007	T-20S (6)	15.32	15.33	0.01	Time: 1821

Table 3a
LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Millard Road Landfill SWMU 5

11/28/2007	T-20S (1)	--	6.5	--	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (2)	14.92	15.30	0.38	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (3)	--	7.27	--	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (4)	--	11.10	--	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (5)	4.80	6.50	1.70	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (6)	15.80	16.20	0.40	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (7)	--	7.80	--	Wells were checked for DNAPL. No DNAPL was present
11/28/2007	T-20S (8)	--	11.90	--	Wells were checked for DNAPL. No DNAPL was present

Table 3a LNAPL Monitoring
ESOI Otter Creek Facility
Oregon, Ohio
Millard Road Landfill - SWMU 5

Date	Well	Depth to NAPL (ft)	Depth to Water (ft)	LNAPL Thickness (ft)	Comments
6/2/2010	T-20S (1)	--	5.53	--	Wells were checked for DNAPL. No DNAPL was present
	T-20S (2)	15.5	15.83	0.33	
	T-20S (3)	--	5.95	--	Wells were checked for DNAPL. No DNAPL was present
	T-20S (4)	--	10.11	--	Wells were checked for DNAPL. No DNAPL was present
	T-20S (5)	6.06	6.79	0.73	
	T-20S (6)	14.93	15.09	0.16	
	T-20S (7)	--	7.46	--	Wells were checked for DNAPL. No DNAPL was present
	T-20S (8)	--	11.95	--	Wells were checked for DNAPL. No DNAPL was present
	MR-6S	--	14.76	--	
	T21S	--	15.36	--	Wells were checked for DNAPL. No DNAPL was present
	T20W	--	8.18	--	Well is missing, presumed destroyed.
	T45W	--	12.15	--	
	T46W				Unable to locate, presumed abandoned.

Table 4a
Summary of Physical Properties
T20S(5) Non-Aqueous Phase Liquid
ESOI Otter Creek Facility
Oregon, Ohio

LOCATION		**T-20S (5)**
ENVIRON Sample ID		**SWMU5-T20S5-NAPL**
Matrix		**NAPL**
Sample Date		**02-Jun-10**
Comments		
Physical Properties	Units	
Specific Gravity/Bulk Density	NONE	0.95
Viscosity @ 60F	CST	529.5
Viscosity @ 77F	CST	254.8
Viscosity @ 104F	CST	98.16
Viscosity @ 194F	CST	13.54
Viscosity @ 212F	CST	10.43

Abbreviations:
CST: Centistokes

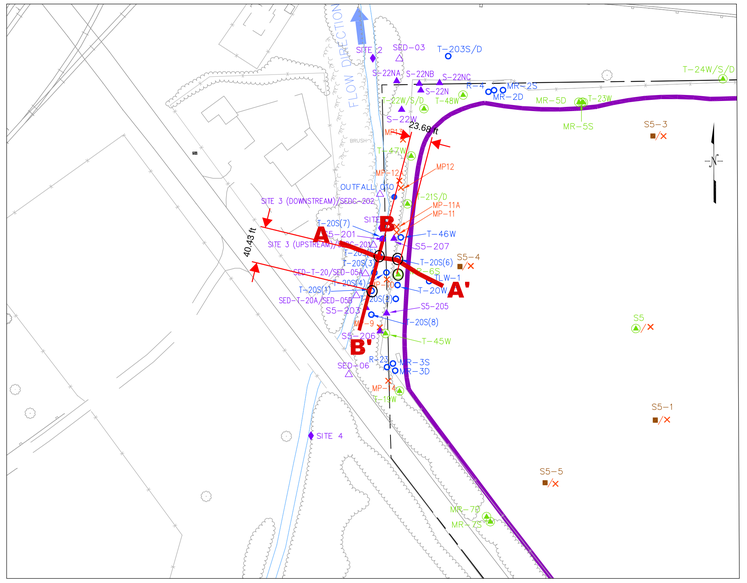
Table 4b
Summary of Physical Properties
Non-Aqueous Phase Liquid
ESOI Otter Creek Facility
Oregon, Ohio

LOCATION		AOC 7	COMP_SWMU9	T-20S (5)	T-33S	TLW-202
ENVIRON Sample ID		AOC7-NAPL-060726	SWMU9-NAPL-061101-C	T20S5-NAPL-060726	T33S-NAPL-060714	TLW202-NAPL-060726
Matrix		NAPL	NAPL	NAPL	NAPL	NAPL
Sample Date		26-Jul-06	01-Nov-06	26-Jul-06	14-Jul-06	26-Jul-06
Comments						
Physical Properties	Units					
Specific Gravity/Bulk Density	NONE	0.99	0.93	0.97	0.93	0.98
Viscosity (Initial)	CST	5549.82 @60F	25.43 @60F	518.46 @60F	53.04 @15.6C	107.44 @60F
Viscosity (Secondary)	CST	2086.92 @77F	17.19 @77F	244.72 @77F	33.2 @25C	62.74 @77F
Viscosity (Initial)	SUS	25646.3 @60F	121 @60F	507.8 @60F	245.9 @15.6C	496.7 @60F
Viscosity (Secondary)	SUS	9653.9 @77F	86.1 @77F	1132.1 @77F	155.7 @25C	290.8 @77F

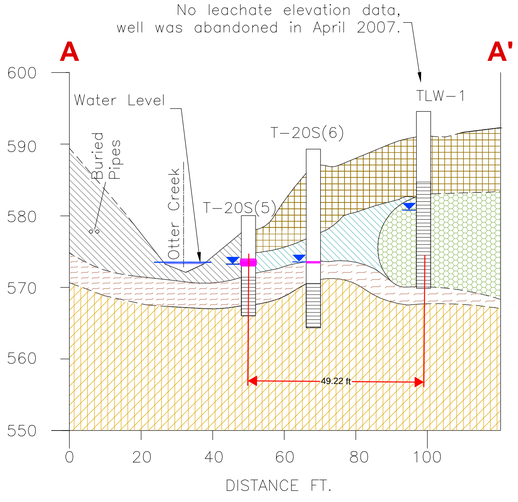
Abbreviations:
CST: Centistokes
SUS: Saybolt Universal Seconds

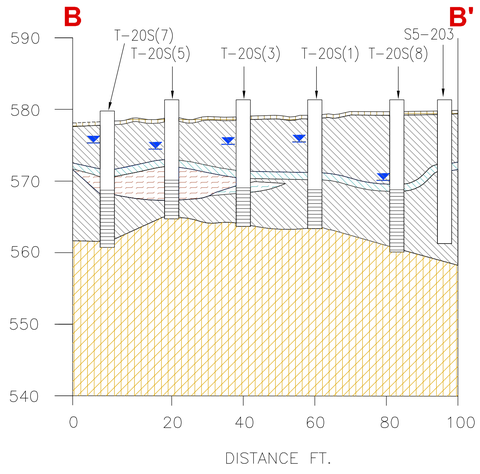
Cross-Section

Well	Oil in Voids/Staining	Interval (feet bgs)	Peat/Organic Layer/Staining	Peat/Organic layer depth (ft)	Well Screen Depth (ft)	NAPL in Well	Notes
TLW-1	No oil noted	--	Peat	21 -23	6 - 21	ND	*Soil description from 0 - 23 feet bgs based on drill cuttings and field observations.
T-19W	No oil noted	--	Peat	15 - 18	10 - 15	ND	
	Staining	18 - 22	Staining/Organics	6 - 9			
T-20W	No oil noted	--	--	--	9 - 14	ND	*Soil description taken from T-20S
T-20S	Staining	14 - 16	Peat	16 - 18	17 - 22	ND	
	Oil in voids/staining	18 - 19	--	--			
	Staining	19 - 22	--	--			
T-20S(1)	Staining/odor	6 - 7	Staining/Organics	6 - 7	9.5 - 14.5	ND	
	Staining	8 - 9.5, 10.3 - 10.5	--	--			
T-20S(2)	Staining	11.6 - 17	Peat	18 - 20	16 - 21	Yes	
	Oil in voids	14.2 - 14.5, 17 - 18	Staining/Organics	14 - 18			
	Odor	12 - 18, 19 - 20	--	--			
T-20S(3)	Oil in voids/odor	6.3 - 6.8	Peat-like material	3.8 - 4, 7.5 - 8	8.5 - 13.5	ND	
	Staining	10 - 10.5	--	--			
T-20S(4)	Staining	6 - 9.9, 14 - 16	Peat-like Material	5.8 - 6.1	13 - 18	ND	
	Oil in voids	9.5 - 9.9, 12 - 14	Peat	9.9 - 12			
	Odor	11.9 - 14	--	--			
T-20S(5)	Oil in voids	4 - 6.8	Peat	5.8 - 10	7 - 12	Yes	
	Odor	4 - 8	--	--			
T-20S(6)	Odor	10 - 12	Peat-like material	14 - 16	16 - 21	ND	
	Oil in voids	17 - 18, 19 - 19.6, 20.4 - 21.5	--	--			
	Staining	10.5 - 14, 17 - 18	--	--			
T-21S	No oil noted	--	Peat-like Material	16 - 20	17 - 22	ND	
	Staining	15 - 15.5	--	--			
T-21D	Odor	15 - 16.5, 18.75 - 20.75	Peat	16.5 - 17	63 - 68	ND	
T-22W	Staining	9.5 - 12	Peat-like material	9.5 - 12	7 - 12	ND	*Soil description taken from T-22S
	No oil noted	--	--	--			
T-22S	Staining	9.5 - 12	Peat-like material	9.5 - 12	16 - 21	ND	
	No oil noted	--	Peat	12 - 15.5			
T-22D	Odor	9 - 11	30% Peat	11 - 15	56 - 61	ND	
	No oil noted	--	Peat-like Material	15 - 16			
T-45W	No oil noted	--	--	--	8 - 13	ND	
	Staining	10 - 15	--	--			
T-46W	No oil noted	--	--	--	7 - 12	ND	
	Staining	7 - 8	--	--			
T-47W	No oil noted	--	Peat	8.5 - 9.5, 12 - 12.5, 14 - 16	11 - 16	ND	
	Staining	4.5 - 6.5, 9.5 - 12	--	--			
MR-3D	No oil noted	--	--	--	63 - 68	ND	



KEY MAP
1 INCH = 80 FEET





LEGEND:

- Recompacted Silty Clay
- Lacustrine
- Waste
- Ground Water/Leachate Elevation (October 2007)
- Upper Till
- Stained Lacustrine
- Peat
- NAPL

Note:
Strata to the west of T-20S(5) are estimated, as no borings were conducted west of this location.

DATE	DRWN	REVISIONS

CROSS SECTION A-A' AND B-B' (SWMU 5)

4.1
FIGURE

ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

ENVIRON
214 CARNEGIE CENTER, PRINCETON, NJ 08540
www.environcorp.com

2/14/08	AS SHOWN	6174M8X06	2/14/08
DATE	SCALE	CADD FILE	PLOT DATE
ENGINEER	BJK/KPM		MANAGER
DESIGNED BY	DRAFTED BY		APPROVED BY

F:\\026174m8

Cost Estimates – SWMU 5 LNAPL Alternatives

NAPL Recovery Estimates
ESOI Otter Creek Facility, Oregon, Ohio

Alternative 1: SWMU 5 - Passive Recovery

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions

-Four 4" wells will be drilled and a passive skimmer will be installed in each.
-875 gallons of recoverable NAPL.
-55 gallon drums will be used to collect NAPL.
-Weekly maintenance will be performed, including emptying skimmers (1 hour per event).
-When recovery rate decreases, absorbent socks will be used for ~1 year, changing sock monthly.

NAPL Recovery

Item	Description	Quantity	Unit	Unit Cost	Total
1	Passive Skimmer	4	EA	$955.00	$3,820
2	55 Gallon Drums	17	EA	$110.41	$1,877
3	Temporary Containment Area	1	EA	$192.92	$193
4	Installation	8	hour	$59.16	$473
5	Absorbent Socks	48	EA	$2.33	$112
	Subtotal				**$6,000**

Installation of Wells

Item	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization and Demobilization	1	LS	$1,500.00	$1,500
2	Subsistence	6	man/day	$100.00	$600
3	10" Sonic Drilling	80	feet	$55.00	$4,400
4	4" SS x HDPE Well Labor and Materials	80	ft	$69.00	$5,520
5	Restore Site and Waste Management	5	hr	$350.00	$1,750
6	Decon Time (Rig and 3 Man Crew)	5	hr	$300.00	$1,500
7	Backhoe	0.5	week	$1,200.00	$600
	Subtotal				**$16,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$22,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (12%)	1	LS	$2,640	$2,640
2	Construction Quality Assurance (10%)	1	LS	$2,200	$2,200
3	Contingency (20%)	1	LS	$4,400	$4,400
	Subtotal				**$9,000**

TOTAL CAPITAL COSTS	**$31,000**

Long Term Monitoring

Item	Description	Quantity	Unit	Unit Cost	Total
1	Remove Product, Skimmer Maintenance	208	hours	$59.16	$12,305
2	NAPL Disposal	0.5	drum	$250.00	$125
	Annual Operation and Maintenance Cost				$12,400
				TOTAL OPERATION AND MAINTENANCE	**$186,000**
				NPV OPERATION AND MAINTENANCE	**$151,294**

ALTERNATIVE 1, TOTAL COST	**$217,000**
ALTERNATIVE 1, NPV	**$183,000**

Note: NPV calculation using RoR of 2.7%

NAPL Recovery Estimates
ESOI Otter Creek Facility, Oregon, Ohio

Alternative 2: SWMU 5 - Active Recovery

Cumulative Cost Deflator, 2005 to 2010 -> 1.11617

Scope and Assumptions
-Two 4" wells will be drilled and a solar sipper (active skimmer) will be installed in each.
-875 gallons of recoverable NAPL.
-55 gallon drums will be used to collect NAPL and will be emptied 6 times per year (4 hours per event).
-Weekly maintenance will be performed (1 hour per event).
-When recovery rate decreases, absorbent socks will be used for ~1 year, changing sock monthly.

NAPL Recovery Equipment

Item	Description	Quantity	Unit	Unit Cost	Total
1	Solar Sipper System	2	EA	$6,355.00	$12,710
2	55 Gallon Drums	17	EA	$110.41	$1,877
3	Temporary Containment Area	2	EA	$192.92	$386
4	Installation	8	hour	$59.16	$473
5	Absorbent Socks	24	EA	$2.33	$56
	Subtotal				**$ 16,000**

Well Installation

Item	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization and Demobilization	1	LS	$1,500.00	$1,500
2	Subsistence	3	man/day	$100.00	$300
3	10" Sonic Drilling	40	feet	$55.00	$2,200
4	4" SS x HDPE Well Labor and Materials	40	ft	$69.00	$2,760
5	Restore Site and Waste Management	3	hr	$350.00	$1,050
6	Decon Time (Rig and 3 Man Crew)	3	hr	$300.00	$900
7	Backhoe	0.5	week	$1,200.00	$600
	Subtotal				**$9,000**

SUBTOTAL - CONSTRUCTION & STARTUP	**$25,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (12%)	1	LS	$3,000	$3,000
2	Construction Quality Assurance (10%)	1	LS	$2,500	$2,500
3	Contingency (20%)	1	LS	$5,000	$5,000
	Subtotal				**$11,000**

TOTAL CAPITAL COSTS	**$36,000**

Long Term Monitoring

Item	Description	Quantity	Unit	Unit Cost	Total
1	Remove Product, Maintenance	76	hours	$59.16	$4,496
2	NAPL Disposal	6	drums	$250.00	$1,500
	Annual Operation and Maintenance Cost				$6,000
				TOTAL OPERATION AND MAINTENANCE	**$18,000**
				NPV OPERATION AND MAINTENANCE	**$17,070**

ALTERNATIVE 2, TOTAL COST	**$54,000**
ALTERNATIVE 2, NPV	**$54,000**

Note: NPV calculation using RoR of 2.7%

Go To Geotech

Hydrocarbon Recovery System

Geotech Solar Sipper

The Geotech Solar Sipper is a solar powered remediation system, designed for remote applications where electrical power is either not available or not economically feasible to provide. The compact, easy to install features make this unit an industry favorite!

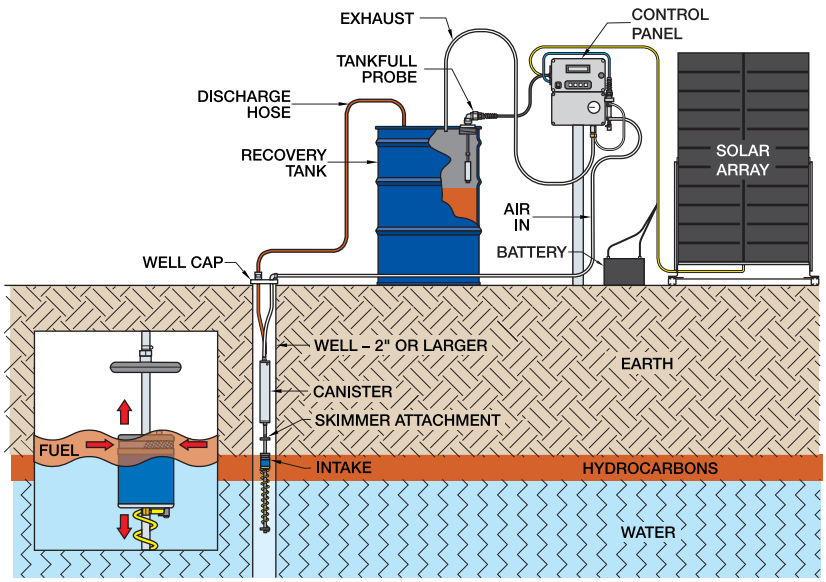
Unlike other solar powered pumping systems, which use a standard bladder pump operated by an air compressor, the Solar Sipper uses a unique vacuum/pressure canister pump to recover hydrocarbons through a floating oleophilic/hydrophobic intake filter. When the pump canister is filled, the pump reverses, pressurizes the system and pumps the recovered fluid to the surface and into a storage vessel.

The Geotech Solar Sipper can effectively extract fluids from depths to 180 feet below ground surface and recover viscous hydrocarbons such as 90 weight oil when a fixed intake is utilized.

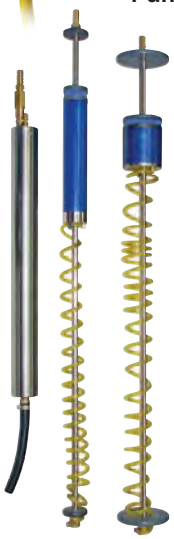
OPERATION

The Geotech Solar Sipper recovers floating hydrocarbons (LNAPL) from wells using a solar powered pump. The system utilizes a density float skimmer with a 60, or 100 mesh screen, or specific gravity float, depending on the application. The skimmer floats just above the oil/water interface to collect and remove hydrocarbons from the well into the optional above ground storage tank.

The Geotech Solar Sipper is also available for recovery of sinking product (DNAPL) from wells when using a fixed intake.



Control Panel and Pressure/Vacuum Pump



Collection Canister/Pump with 2" and 4" Skimmers

2" Skimmer with Optional Screen

CALL GEOTECH TODAY (800) 833-7958

Geotech Environmental Equipment, Inc.
2650 East 40th Avenue • Denver, Colorado 80205
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com

solar_sipper.qxp 03/30/10

Hydrocarbon Recovery System

Geotech Solar Sipper

CONFIGURATION

Control Panel with:

- NEMA 4 Enclosure
- 64 watt solar panel with adjustable mounting plate
- Tankfull Shut-Off Switch (2 inch NPT bung-fitting)
- Microprocessor Controller with alpha-numeric vacuum fluorescent display
- On/Off Switch
- Pressure/Vacuum Pump
- Pressure/Vacuum Gauge

Skimmer Assembly with:

- 2" or 4" Intake
- Downwell Collection Canister
- 2" or 4" Slip Fit Well Cap
- Air and Discharge Tubing, 100' of each

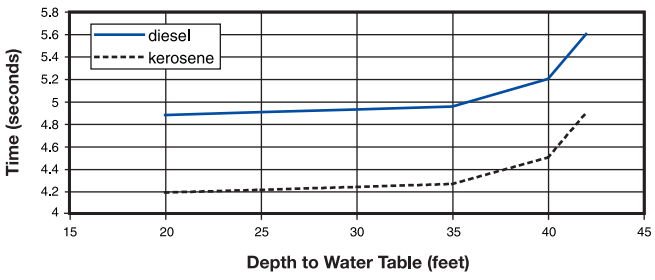
Options include:

- 55 Gallon Steel Product Drum
- Dual Containment Product Tank
- Additional Air and Discharge Tubing
- Power Cable Lead
- Screened Skimmer Assemblies
- Wall Mount Kit
- Pole Mount Kit
- AGM Solar Battery 104 AH, 12 Volt

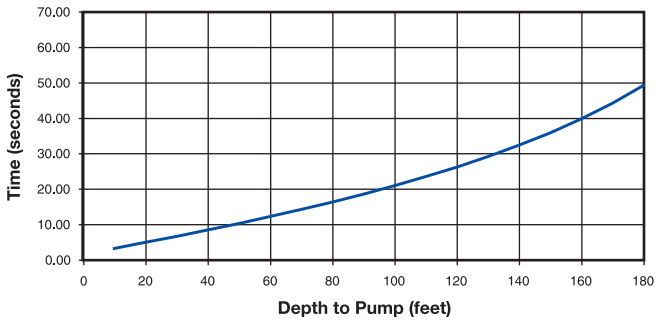
SPECIFICATIONS

Applications:	2" (5.8cm) or larger recovery wells	
Recovery Rate:	.2 gallons (.750 ml) per cycle	
Maximum Operating Depth:	180 feet (54.86m)	
Power Requirements:	12-15 Volts DC input @ 7.5 Amps 90-105 Watts usage	
Maximum Pressure:	100 psi	
Maximum Vacuum:	20" HgV @ MSL	
Oil/Water Separation:	Oleophilic/hydrophobic mesh screen	
Controller:		
Size	7" D x 17.4" L x 14" W (18cm D x 44.2cm L x 35.6cm W)	
Approximate Weight	18.4 lbs.	
Rating	NEMA 4	
Down Well Collection Canister:		
Size	23.5" L x 1.75" OD	
Weight	4.5 lbs.	
Materials	303 and 304 stainless steel, flexible tubing, PVC and brass	
Skimmer Assembly:	**2" Model**	**4" Model**
Effective Travel Range	12"	24"
Size	35.5" L x 1.75" OD	35.5" L x 3.75" OD
Weight	1.75 lbs.	2.25 lbs.
Operating Temperature	32° to 100°F	
Materials	304 Stainless Steel, Polyethylene, PVC, Polypropylene, Brass	
Tubing Sizes:		
Air	.17" ID x .25" OD (4.318mm ID x .35mm OD)	
Discharge	3/8" ID x 1/2" OD (9.525mm ID x 12.7mm OD)	
Solar Panel:		
Rated	Power 64 Watt	
Operating Voltage	16.5	
Operating Currant (Amps)	3.88	
Size	51.8" H x 59.0" W	
Approximate Weight	40.2 lbs.	

Solar Sipper Maximum Recommended Vacuum Times



Solar Sipper Time to Discharge (based on #2 Diesel)



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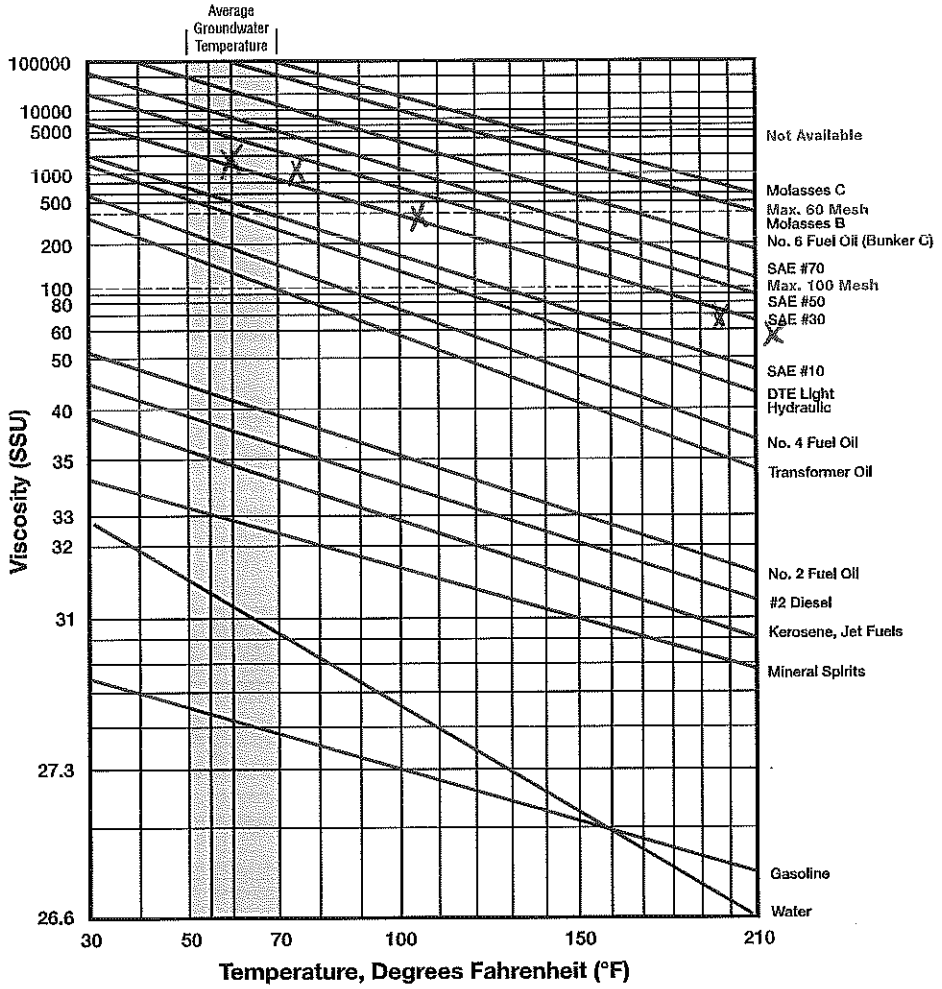
Average Viscosities of Miscellaneous Liquids



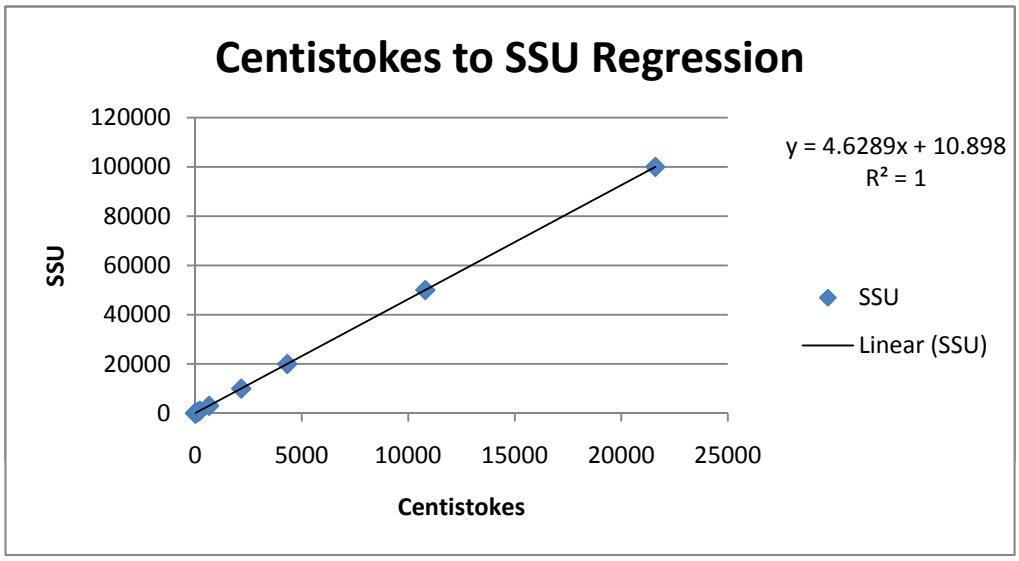
Application Graph for Geotech Oleophilic/Hydrophilic Screens

Saybolt Universal SSU	Stokes	Centistokes	Poises*	Centipoises	Degrees Engler	Redwood No. 1 Seconds	Typical Liquids at 65°F
27.7	0.006	0.600	0.005	0.480	NA	27.99	Gasoline
31	0.010	1.00	0.008	0.800	1	29	Water
33	0.020	2.00	0.016	1.60	1.11	31	Mineral Spirits
35	0.025	2.50	0.020	2.00	1.17	32	Kerosene/Jet Fuel
37	0.030	3.00	0.024	2.40	1.23	33	No. 2 Diesel
39	0.040	4.00	0.032	3.20	1.3	36	No. 2 Fuel Oil
100	0.202	20.2	0.162	16.2	3.02	86	Transformer Oil
170	0.363	36.3	0.290	29.0	4.88	145	No. 4 Fuel Oil
200	0.432	43.2	0.346	34.6	5.92	170	Hydraulic Oil
500	1.10	110	0.880	88	14.6	423	SAE 10 Oil
1,000	2.16	216	1.73	173	29.2	847	SAE 30 Oil
3,000	6.5	647	5.2	518	87.6	2,541	SAE 50 Oil
10,000	21.6	2,160	17.3	1,728	292.0	8,471	STE 70 Oil
20,000	43.2	4,320	34.6	3,456	584.0	16,941	No. 6 Fuel Oil (Bunker C)
50,000	108	10,800	86	8,640	1460.0	42,353	Molasses B
100,000	216	21,600	173	17,280	2920.0	84,706	Molasses C

*Poises and centipoises are given for oil of .8 specific gravity.
Releationship: Centistokes x Specific Gravity = Centipoise

Viscosity Unit Conversion Chart

Saybolt Universal SSU	Stokes	Centistokes	Poises	Centipoises	Degrees Engler	Redwood No. 1 Seconds	Typical Liquids at 65°F
27.7	0.006	0.6	0.005	0.48	NA	27.99	Gasoline
31	0.01	1	0.008	0.8	1	29	Water
33	0.02	2	0.016	1.6	1.11	31	Mineral Spirits
35	0.025	2.5	0.02	2	1.17	32	Kerosene/Jet Fuel
37	0.03	3	0.024	2.4	1.23	33	No. 2 Diesel
39	0.04	4	0.032	3.2	1.3	36	No. 2 Fuel Oil
100	0.202	20.2	0.162	16.2	3.02	86	Transformer Oil
170	0.363	36.3	0.29	29	4.88	145	No. 4 Fuel Oil
200	0.432	43.2	0.346	34.6	5.92	170	Hydraulic Oil
500	1.1	110	0.88	88	14.6	423	SAE 10 Oil
1,000	2.16	216	1.73	173	29.2	847	SAE 30 Oil
3,000	6.5	647	5.2	518	87.6	2,541	SAE 50 Oil
10,000	21.6	2,160	17.3	1,728	292	8,471	STE 70 Oil
20,000	43.2	4,320	34.6	3,456	584	16,941	No. 6 Fuel Oil (Bunker C)
50,000	108	10,800	86	8,640	1460	42,353	Molasses B
100,000	216	21,600	173	17,280	2920	84,706	Molasses C



6/2/2010 Data

Temp (°F)	CST	SSU
60	529.5	2461.90055
77	254.8	1190.34172
104	98.16	465.270824
194	13.54	73.573306
212	10.43	59.177427

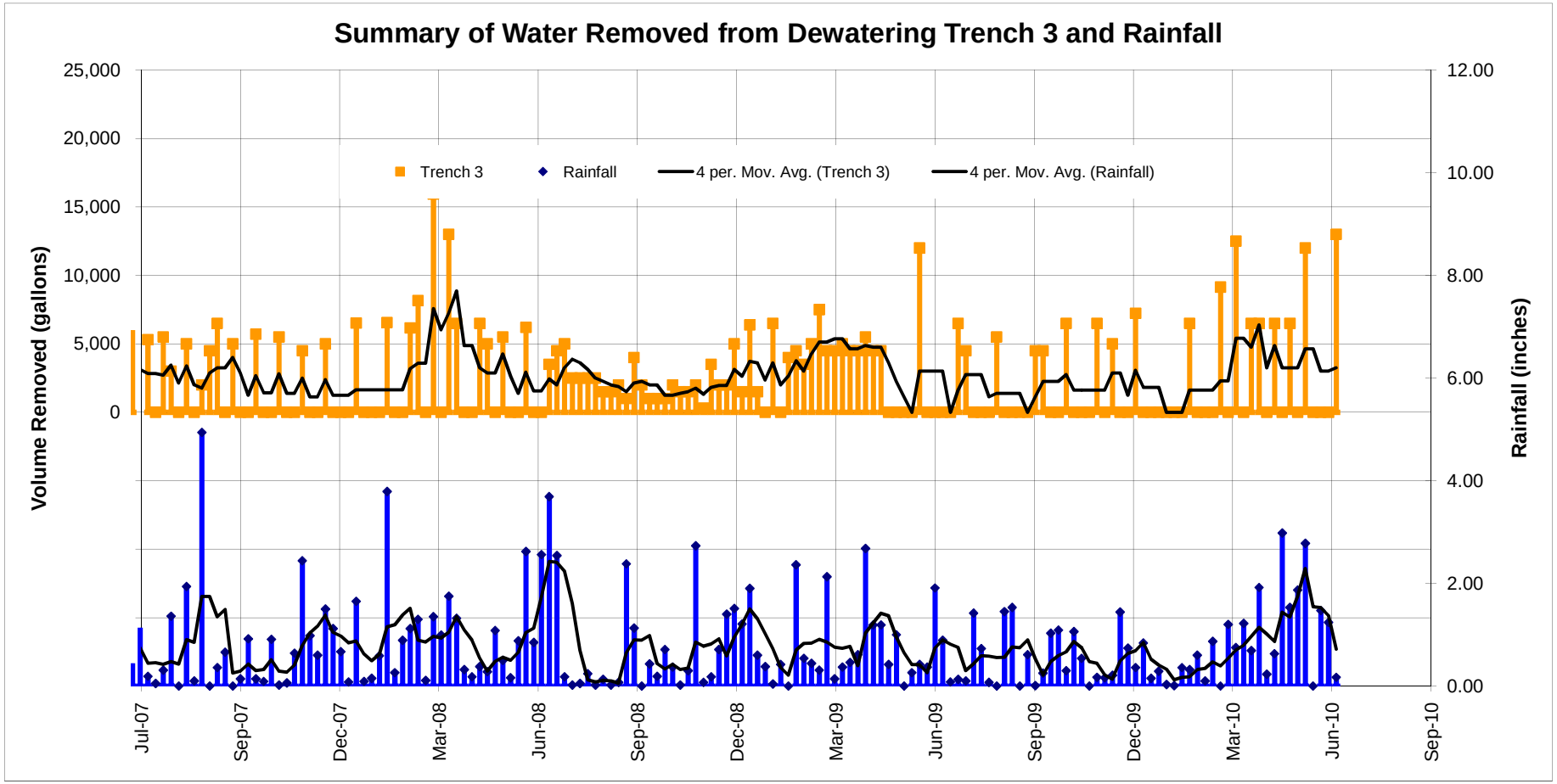
APPENDIX H

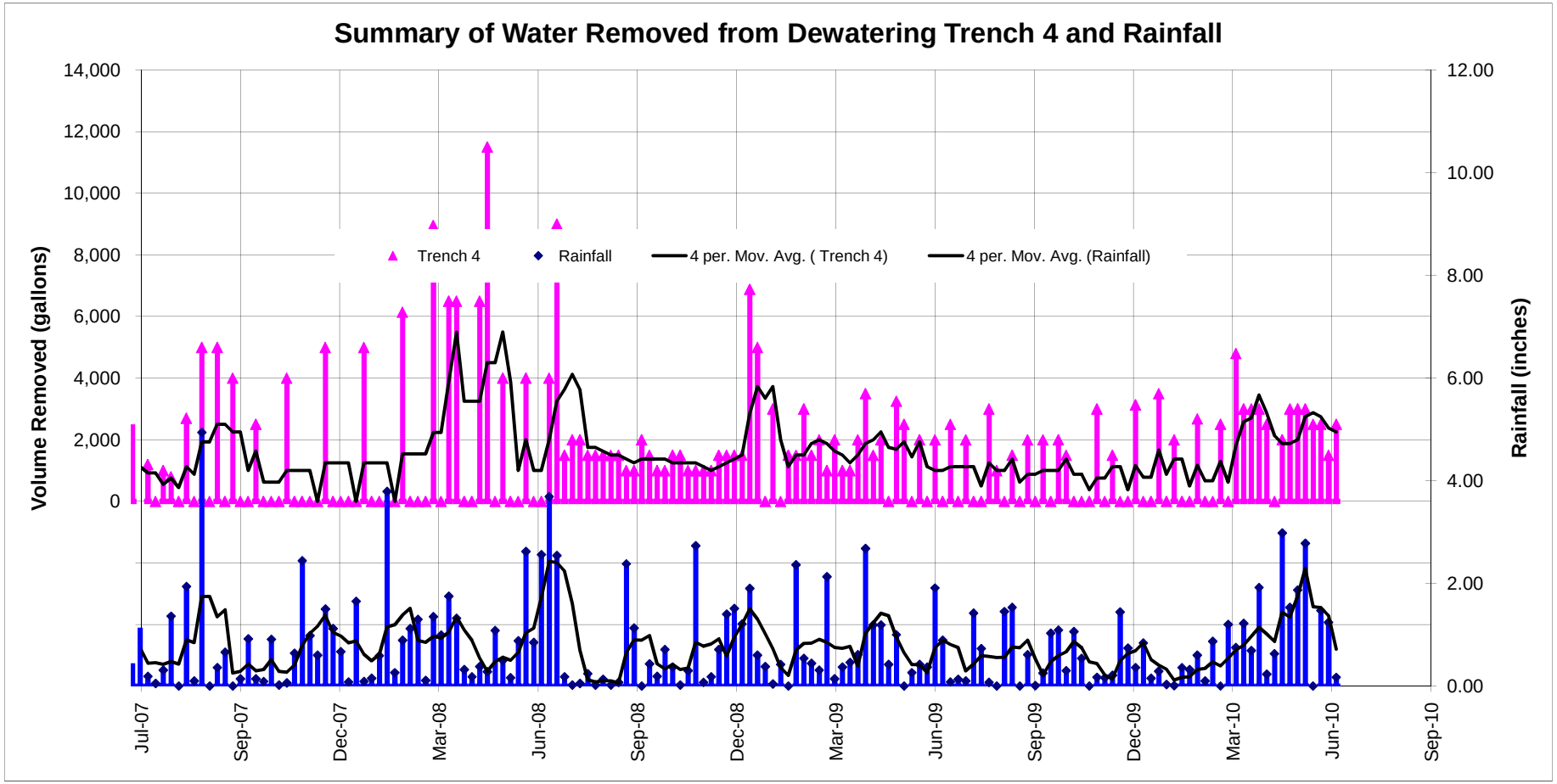
Supporting Documentation for CM Analysis – AOC 1

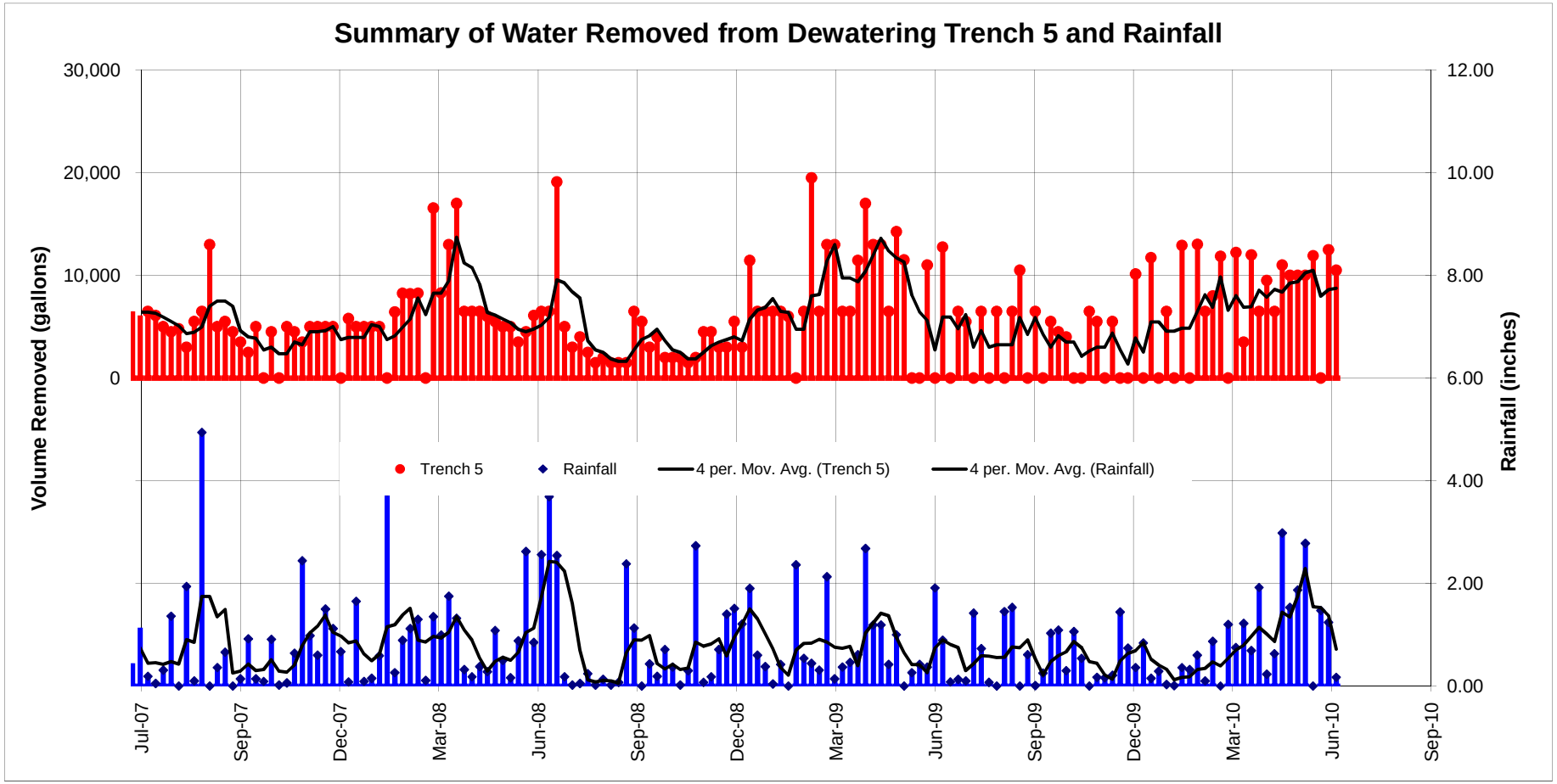
C O N T E N T S

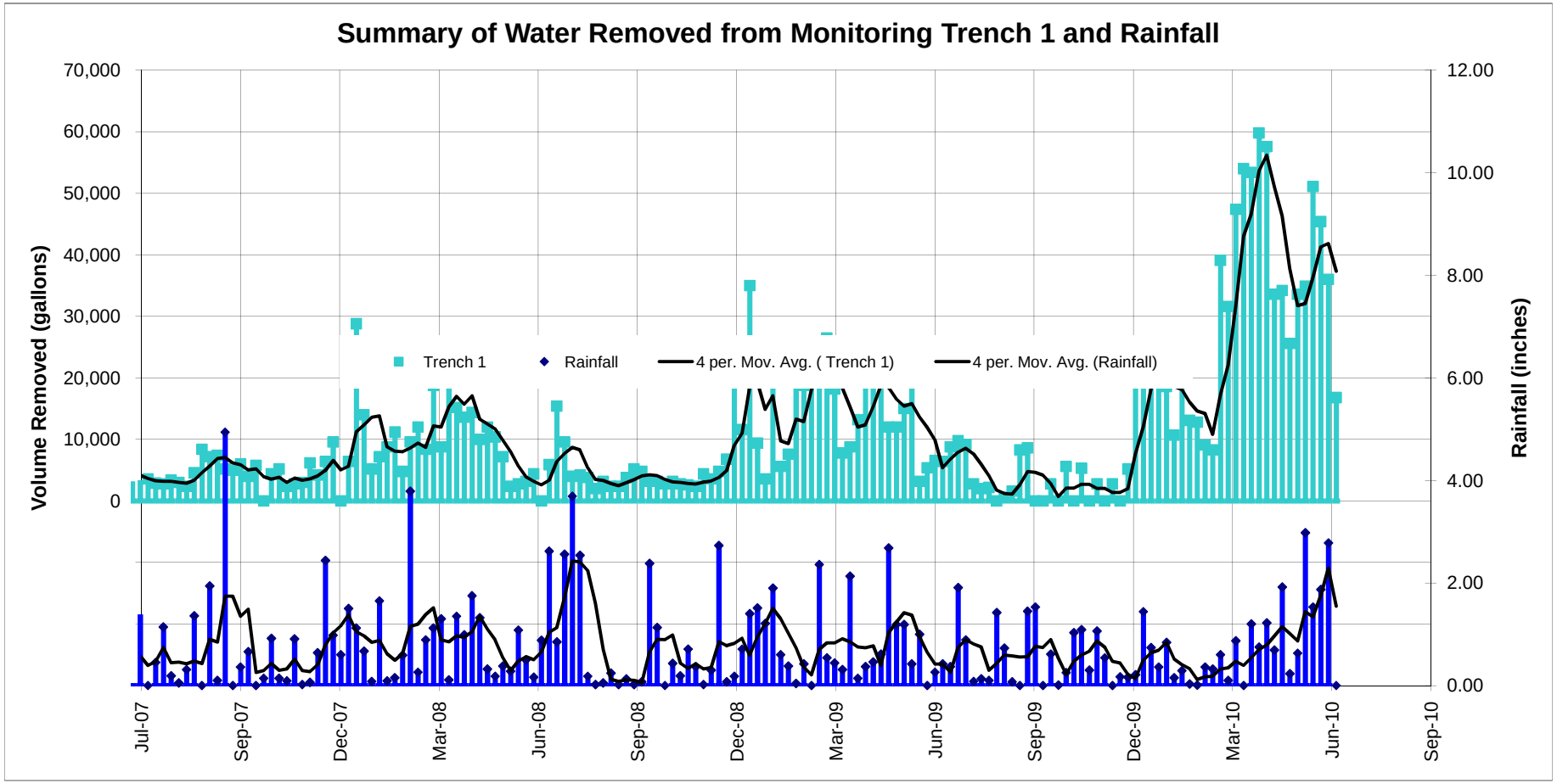
Water Recovery Graphs
Data Table
Cost Estimates – AOC 1 Alternatives

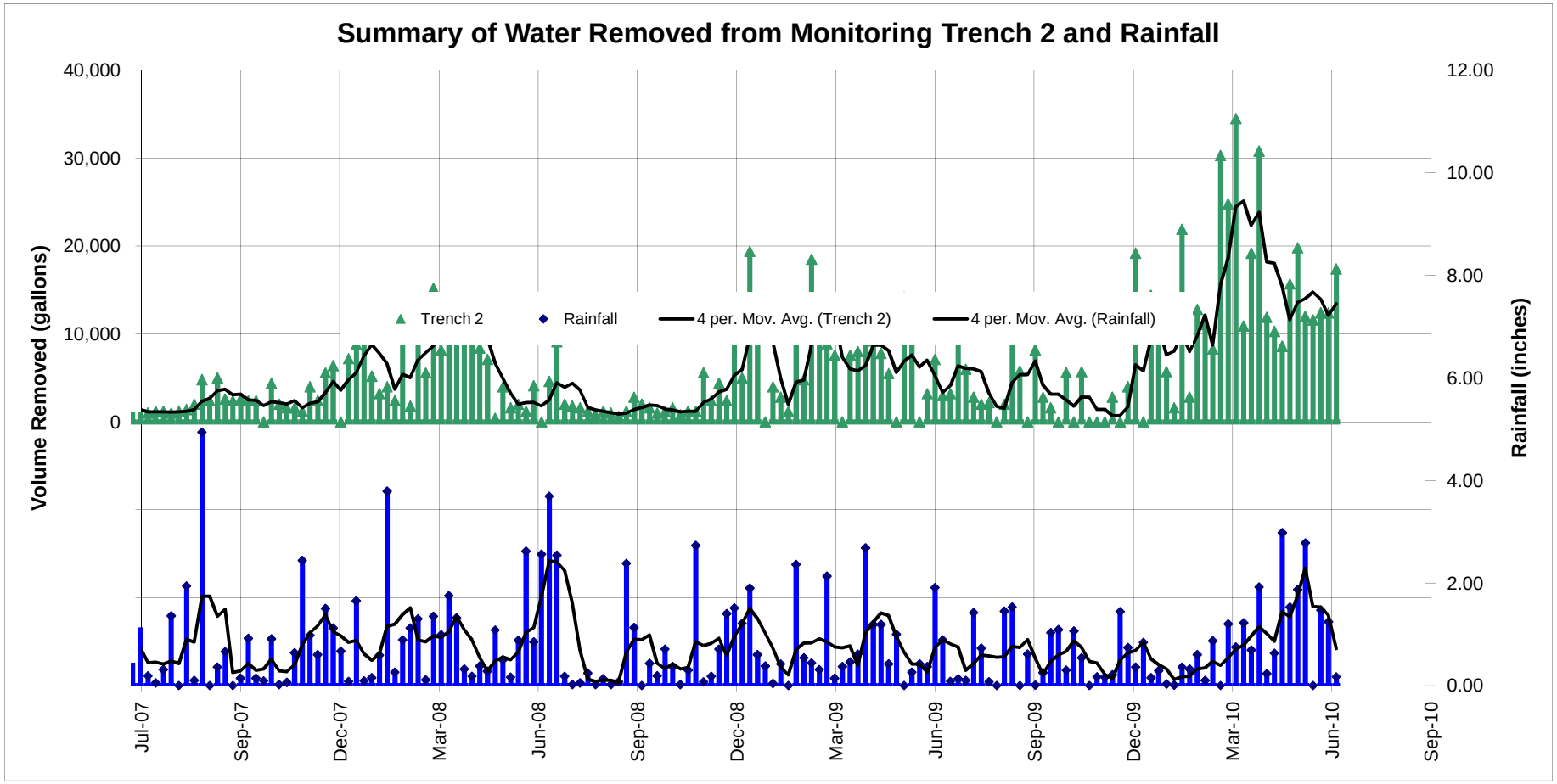
Water Recovery Graphs

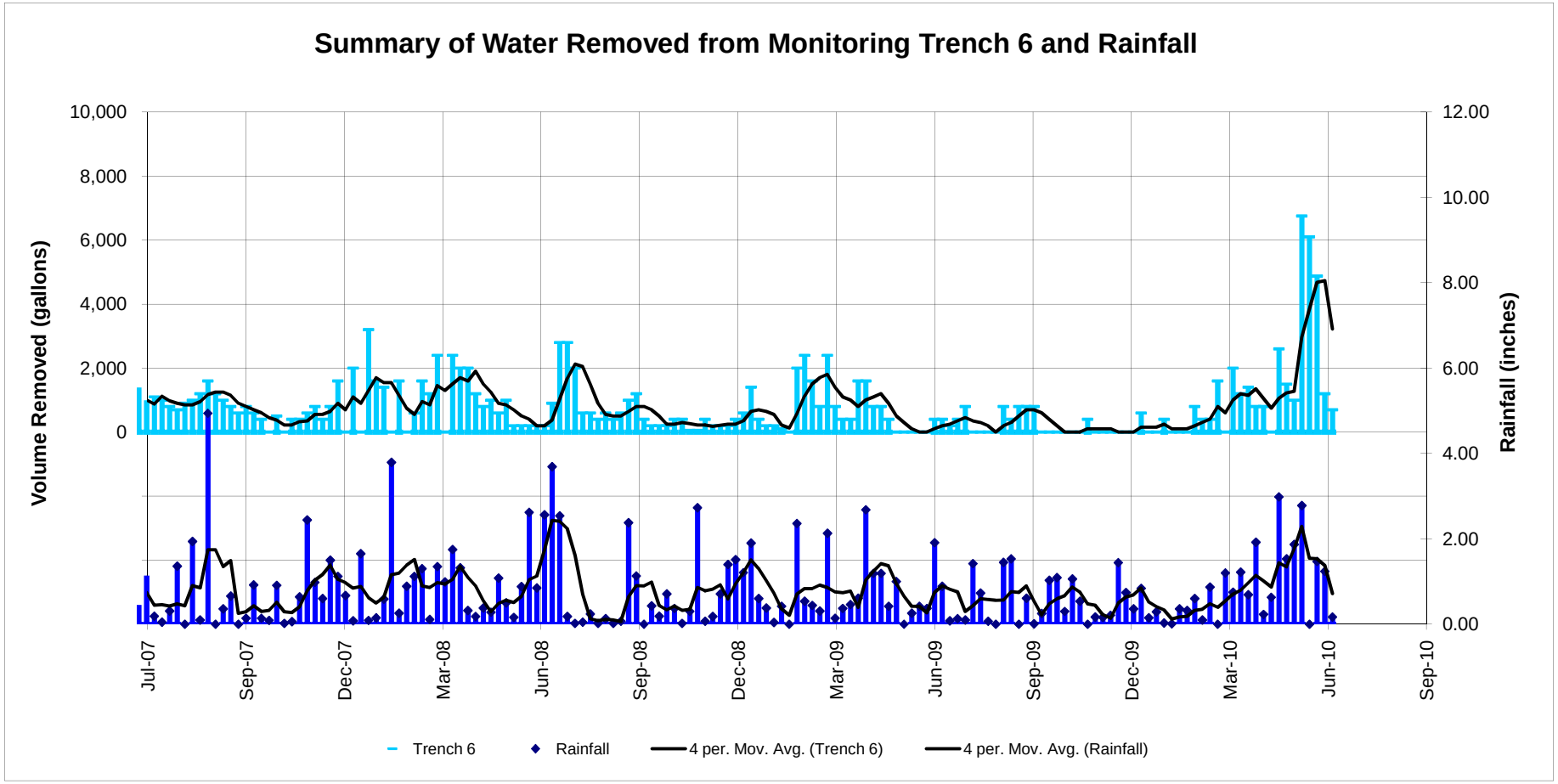

Summary of Water Removed from Dewatering Trench 3 and Rainfall
Volume Removed (gallons)
Rainfall (inches)
25,000
20,000
15,000
10,000
5,000
0
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Trench 3
Rainfall
4 per. Mov. Avg. (Trench 3)
4 per. Mov. Avg. (Rainfall)
Jul-07
Sep-07
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Mar-10
Jun-10
Sep-10


Summary of Water Removed from Dewatering Trench 4 and Rainfall
Volume Removed (gallons)
Rainfall (inches)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Trench 4
Rainfall
4 per. Mov. Avg. (Trench 4)
4 per. Mov. Avg. (Rainfall)
Jul-07
Sep-07
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Mar-10
Jun-10
Sep-10


Summary of Water Removed from Dewatering Trench 5 and Rainfall
Volume Removed (gallons)
Rainfall (inches)
30,000
20,000
10,000
0
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Trench 5
Rainfall
4 per. Mov. Avg. (Trench 5)
4 per. Mov. Avg. (Rainfall)
Jul-07
Sep-07
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Mar-10
Jun-10
Sep-10


Summary of Water Removed from Monitoring Trench 1 and Rainfall
Volume Removed (gallons)
Rainfall (inches)
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Trench 1
Rainfall
4 per. Mov. Avg. (Trench 1)
4 per. Mov. Avg. (Rainfall)
Jul-07
Sep-07
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Mar-10
Jun-10
Sep-10


Summary of Water Removed from Monitoring Trench 2 and Rainfall
Volume Removed (gallons)
Rainfall (inches)
40,000
30,000
20,000
10,000
0
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Trench 2
Rainfall
4 per. Mov. Avg. (Trench 2)
4 per. Mov. Avg. (Rainfall)
Jul-07
Sep-07
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Mar-10
Jun-10
Sep-10


Summary of Water Removed from Monitoring Trench 6 and Rainfall
Volume Removed (gallons)
Rainfall (inches)
10,000
8,000
6,000
4,000
2,000
0
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jul-07
Sep-07
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Mar-10
Jun-10
Sep-10
Trench 6
Rainfall
4 per. Mov. Avg. (Trench 6)
4 per. Mov. Avg. (Rainfall)

Data Table

Table 2
Analytical Results
May 2010 City of Toledo Water Line Trench
Envirosafe Services of Ohio, Inc.

Lab	Sump	Sample Date	Constituent	Result	Q	Unit	MDL	PQL	Dilution
DEWATERING TRENCHES									
General									
J & H	P-3W(5N)	5/5/2010	Conductivity	2980		umhos/cm		1	
J & H	P-3W(5N)	5/5/2010	pH	6.91		SU		1.00	
J & H	P-3W(5N)	5/5/2010	Chloride	341		mg/L		1	
J & H	P-3W(5N)	5/5/2010	Biological Oxygen Demand	32		mg/L		4	
J & H	P-3W(5N)	5/5/2010	Total Phenols	12		ug/L		5	
J & H	P-3W(5N)	5/5/2010	Sulfate	324		mg/L		5	
J & H	P-3W(5N)	5/5/2010	Total Suspeneded Solids	31		mg/L		5	
TA-NC	P-3W(5N)	5/5/2010	n-Hexane Extractable Material (O&G)	8.9		mg/L	0.77	5	1
TA-NC	P-3W(5N)	5/5/2010	Chemical Oxygen Demand (COD)	212		mg/L	20.4	40	4
Dissolved Metals									
TA-NC	P-3W(5N)	5/5/2010	Barium-DISS	676	B	ug/L	0.67	200	1
TA-NC	P-3W(5N)	5/5/2010	Chromium-DISS	3	J	ug/L	2.2	5	1
TA-NC	P-3W(5N)	5/5/2010	Iron-DISS	87.7	J	ug/L	81	100	1
TA-NC	P-3W(5N)	5/5/2010	Magnesium-DISS	95000	B	ug/L	34	5000	1
TA-NC	P-3W(5N)	5/5/2010	Sodium-DISS	235000		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
TA-NC	**P-3W(5N)**	**5/5/2010**	**PCB-1254**	**27**		**ug/L**	**0.8**	**5**	**5**
Volatile Organic Compounds (VOC)									
TA-NC	**P-3W(5N)**	**5/5/2010**	**Benzene**	**110**		**ug/L**	**2.2**	**17**	**16.67**
TA-NC	**P-3W(5N)**	**5/5/2010**	**Tetrahydrofuran**	**410**		**ug/L**	**7**	**83**	**16.67**
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	P-3W(5N)	5/5/2010	1,4-Dioxane	21	J	ug/L	2	40	4
TA-NC	P-3W(5N)	5/5/2010	Acenaphthene	2.5	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Anthracene	1.3	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Benzo(a)anthracene	1.5	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Benzo(a)pyrene	1.6	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Benzo(b)fluoranthene	1.4	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Benzo(ghi)perylene	1.6	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	bis(2-Ethylhexyl) phthalate	6.1	J	ug/L	3.2	40	4
TA-NC	P-3W(5N)	5/5/2010	Chrysene	1.8	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Dibenz(a,h)anthracene	1.8	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Fluoranthene	1.5	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Fluorene	2.9	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Indeno(1,2,3-cd)pyrene	1.1	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Naphthalene	2.6	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Phenanthrene	2.2	J	ug/L	0.4	40	4
TA-NC	P-3W(5N)	5/5/2010	Pyrene	2.1	J	ug/L	0.4	40	4
Total Organic Halogens (TOX)									
TA-NC	P-3W(5N)	5/5/2010	Total Organic Halogens	280		ug/L	95	150	5
TA-NC	P-3W(5N)	5/5/2010	Total Organic Halogens	361		ug/L	95	150	5
TA-NC	P-3W(5N)	5/5/2010	Total Organic Halogens	429		ug/L	95	150	5
TA-NC	P-3W(5N)	5/5/2010	Total Organic Halogens	361		ug/L	95	150	5
			Average TOX	**357.75**					
Total Organic Carbon (TOC)									
TA-NC	P-3W(5N)	5/5/2010	Total Organic Carbon	16.5		mg/L	0.24	1	1
TA-NC	P-3W(5N)	5/5/2010	Total Organic Carbon	15.8		mg/L	0.24	1	1
TA-NC	P-3W(5N)	5/5/2010	Total Organic Carbon	16.5		mg/L	0.24	1	1
TA-NC	P-3W(5N)	5/5/2010	Total Organic Carbon	17.5		mg/L	0.24	1	1
			Average TOC	16.6					
General									
J & H	P-4E(4S)	5/5/2010	Conductivity	1780		umhos/cm		1	
J & H	P-4E(4S)	5/5/2010	pH	6.55		SU		1.00	
J & H	P-4E(4S)	5/5/2010	Chloride	199		mg/L		1	
J & H	P-4E(4S)	5/5/2010	Biological Oxygen Demand	16		mg/L		4	
J & H	P-4E(4S)	5/5/2010	Sulfate	308		mg/L		5	
J & H	P-4E(4S)	5/5/2010	Total Suspeneded Solids	51		mg/L		5	

Table 2
Analytical Results
May 2010 City of Toledo Water Line Trench
Envirosafe Services of Ohio, Inc.

Lab	Sump	Sample Date	Constituent	Result	Q	Unit	MDL	PQL	Dilution
TA-NC	**P-4E(4S)**	**5/5/2010**	**n-Hexane Extractable Material (O&G)**	**10.3**		**mg/L**	**0.77**	**5**	**1**
TA-NC	P-4E(4S)	5/5/2010	Chemical Oxygen Demand (COD)	86.7		mg/L	5.1	10	1
Dissolved Metals									
TA-NC	P-4E(4S)	5/5/2010	Barium-DISS	179	B J	ug/L	0.67	200	1
TA-NC	P-4E(4S)	5/5/2010	Iron-DISS	429		ug/L	81	100	1
TA-NC	P-4E(4S)	5/5/2010	Magnesium-DISS	55500	B	ug/L	34	5000	1
TA-NC	P-4E(4S)	5/5/2010	Sodium-DISS	117000		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
TA-NC	**P-4E(4S)**	**5/5/2010**	**1,1-Dichloroethane**	**150**		**ug/L**	**0.75**	**5**	**5**
TA-NC	**P-4E(4S)**	**5/5/2010**	**1,2-Dichloroethene (total)**	**23**		**ug/L**	**1.7**	**10**	**5**
TA-NC	P-4E(4S)	5/5/2010	1,2-Dichloropropane	1.5	J	ug/L	0.9	5	5
TA-NC	P-4E(4S)	5/5/2010	Benzene	2.7	J	ug/L	0.65	5	5
TA-NC	**P-4E(4S)**	**5/5/2010**	**Chloroethane**	**170**		**ug/L**	**1.4**	**5**	**5**
TA-NC	**P-4E(4S)**	**5/5/2010**	**Ethylbenzene**	**170**		**ug/L**	**0.85**	**5**	**5**
TA-NC	**P-4E(4S)**	**5/5/2010**	**Tetrahydrofuran**	**35**		**ug/L**	**2.1**	**25**	**5**
TA-NC	**P-4E(4S)**	**5/5/2010**	**Toluene**	**41**		**ug/L**	**0.65**	**5**	**5**
TA-NC	P-4E(4S)	5/5/2010	Trichloroethene	1.9	J	ug/L	0.85	5	5
TA-NC	**P-4E(4S)**	**5/5/2010**	**Vinyl chloride**	**36**		**ug/L**	**1.1**	**5**	**5**
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	**P-4E(4S)**	**5/5/2010**	**1,4-Dioxane**	**30**		**ug/L**	**0.49**	**10**	**1**
TA-NC	P-4E(4S)	5/5/2010	2,4-Dimethylphenol	0.86	J	ug/L	0.8	10	1
TA-NC	P-4E(4S)	5/5/2010	Acenaphthene	0.27	J	ug/L	0.1	10	1
TA-NC	P-4E(4S)	5/5/2010	Benzo(b)fluoranthene	0.23	J	ug/L	0.1	10	1
TA-NC	P-4E(4S)	5/5/2010	bis(2-Ethylhexyl) phthalate	3.3	J	ug/L	0.8	10	1
TA-NC	P-4E(4S)	5/5/2010	Butyl benzyl phthalate	0.86	J	ug/L	0.8	10	1
TA-NC	P-4E(4S)	5/5/2010	Fluorene	0.28	J	ug/L	0.1	10	1
TA-NC	P-4E(4S)	5/5/2010	Pyrene	0.37	J	ug/L	0.1	10	1
Total Organic Halogens (TOX)									
TA-NC	P-4E(4S)	5/5/2010	Total Organic Halogens	224		ug/L	38	60	2
TA-NC	P-4E(4S)	5/5/2010	Total Organic Halogens	189		ug/L	38	60	2
TA-NC	P-4E(4S)	5/5/2010	Total Organic Halogens	174		ug/L	38	60	2
TA-NC	P-4E(4S)	5/5/2010	Total Organic Halogens	215		ug/L	38	60	2
			Average TOX	**200.5**					
Total Organic Carbon (TOC)									
TA-NC	P-4E(4S)	5/5/2010	Total Organic Carbon	16.5		mg/L	0.96	4	4
TA-NC	P-4E(4S)	5/5/2010	Total Organic Carbon	15.9		mg/L	0.96	4	4
TA-NC	P-4E(4S)	5/5/2010	Total Organic Carbon	16.3		mg/L	0.96	4	4
TA-NC	P-4E(4S)	5/5/2010	Total Organic Carbon	16.5		mg/L	0.96	4	4
			Average TOC	**16.3**					
General									
J & H	P-4W(5S)	5/5/2010	Conductivity	2490		umhos/cm		1	
J & H	P-4W(5S)	5/5/2010	pH	6.97		SU		1.00	
J & H	P-4W(5S)	5/5/2010	Chloride	262		mg/L		1	
J & H	P-4W(5S)	5/5/2010	Biological Oxygen Demand	7		mg/L		4	
J & H	P-4W(5S)	5/5/2010	Sulfate	329		mg/L		5	
J & H	P-4W(5S)	5/5/2010	Total Suspeneded Solids	14		mg/L		5	
TA-NC	P-4W(5S)	5/5/2010	n-Hexane Extractable Material (O&G)	3.8	J	mg/L	0.77	5	1
TA-NC	P-4W(5S)	5/5/2010	Chemical Oxygen Demand (COD)	42.9		mg/L	5.1	10	1
Dissolved Metals									
TA-NC	P-4W(5S)	5/5/2010	Barium-DISS	241	B	ug/L	0.67	200	1
TA-NC	P-4W(5S)	5/5/2010	Iron-DISS	1400		ug/L	81	100	1
TA-NC	P-4W(5S)	5/5/2010	Magnesium-DISS	163000	B	ug/L	34	5000	1
TA-NC	P-4W(5S)	5/5/2010	Sodium-DISS	132000		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
TA-NC	P-4W(5S)	5/5/2010	1,1-Dichloroethane	0.29	J	ug/L	0.15	1	1
TA-NC	P-4W(5S)	5/5/2010	Benzene	0.6	J	ug/L	0.13	1	1

Table 2
Analytical Results
May 2010 City of Toledo Water Line Trench
Envirosafe Services of Ohio, Inc.

Lab	Sump	Sample Date	Constituent	Result	Q	Unit	MDL	PQL	Dilution
TA-NC	**P-4W(5S)**	**5/5/2010**	**Chloroethane**	**7.2**		**ug/L**	**0.29**	**1**	**1**
TA-NC	P-4W(5S)	5/5/2010	Tetrahydrofuran	1.4	J	ug/L	0.42	5	1
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	**P-4W(5S)**	**5/5/2010**	**1,4-Dioxane**	**33**		**ug/L**	**0.49**	**10**	**1**
TA-NC	P-4W(5S)	5/5/2010	bis(2-Ethylhexyl) phthalate	1.5	J	ug/L	0.8	10	1
Total Organic Halogens (TOX)									
TA-NC	P-4W(5S)	5/5/2010	Total Organic Halogens	58.6		ug/L	19	30	1
TA-NC	P-4W(5S)	5/5/2010	Total Organic Halogens	65.8		ug/L	19	30	1
TA-NC	P-4W(5S)	5/5/2010	Total Organic Halogens	74.9		ug/L	19	30	1
TA-NC	P-4W(5S)	5/5/2010	Total Organic Halogens	40.9		ug/L	19	30	1
			Average TOX	**60.1**					
Total Organic Carbon (TOC)									
TA-NC	P-4W(5S)	5/5/2010	Total Organic Carbon	17.5		mg/L	0.24	1	1
TA-NC	P-4W(5S)	5/5/2010	Total Organic Carbon	16.9		mg/L	0.24	1	1
TA-NC	P-4W(5S)	5/5/2010	Total Organic Carbon	17.6		mg/L	0.24	1	1
TA-NC	P-4W(5S)	5/5/2010	Total Organic Carbon	17.1		mg/L	0.24	1	1
			Average TOC	**17.3**					
General									
J & H	P-5E(6N)	5/5/2010	Conductivity	4030		umhos/cm		1	
J & H	P-5E(6N)	5/5/2010	pH	6.95		SU		1.00	
J & H	P-5E(6N)	5/5/2010	Chloride	999		mg/L		1	
J & H	P-5E(6N)	5/5/2010	Biological Oxygen Demand	13		mg/L		4	
J & H	**P-5E(6N)**	**5/5/2010**	**Total Phenols**	**26**		**ug/L**		**5**	
J & H	P-5E(6N)	5/5/2010	Sulfate	13		mg/L		5	
J & H	P-5E(6N)	5/5/2010	Total Suspeneded Solids	11		mg/L		5	
TA-NC	P-5E(6N)	5/5/2010	n-Hexane Extractable Material (O&G)	4.6	J	mg/L	0.77	5	1
TA-NC	P-5E(6N)	5/5/2010	Chemical Oxygen Demand (COD)	87		mg/L	5.1	10	1
Dissolved Metals									
TA-NC	P-5E(6N)	5/5/2010	Barium-DISS	2050	B	ug/L	0.67	200	1
TA-NC	P-5E(6N)	5/5/2010	Iron-DISS	2480		ug/L	81	100	1
TA-NC	P-5E(6N)	5/5/2010	Magnesium-DISS	93100	B	ug/L	34	5000	1
TA-NC	P-5E(6N)	5/5/2010	Sodium-DISS	535000		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
TA-NC	**P-5E(6N)**	**5/5/2010**	**Benzene**	**66**		**ug/L**	**0.26**	**2**	**2**
TA-NC	**P-5E(6N)**	**5/5/2010**	**Chlorobenzene**	**5.7**		**ug/L**	**0.3**	**2**	**2**
TA-NC	P-5E(6N)	5/5/2010	Tetrahydrofuran	5.6	J	ug/L	0.84	10	2
TA-NC	P-5E(6N)	5/5/2010	Toluene	0.47	J	ug/L	0.26	2	2
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	P-5E(6N)	5/5/2010	1,4-Dichlorobenzene	0.52	J	ug/L	0.34	10	1
TA-NC	P-5E(6N)	5/5/2010	1,4-Dioxane	5	J	ug/L	0.49	10	1
TA-NC	**P-5E(6N)**	**5/5/2010**	**2,4-Dimethylphenol**	**27**		**ug/L**	**0.8**	**10**	**1**
TA-NC	P-5E(6N)	5/5/2010	Benzo(a)anthracene	0.53	J	ug/L	0.1	10	1
TA-NC	P-5E(6N)	5/5/2010	Benzo(ghi)perylene	0.27	J	ug/L	0.1	10	1
TA-NC	P-5E(6N)	5/5/2010	bis(2-Ethylhexyl) phthalate	1.8	J	ug/L	0.8	10	1
TA-NC	P-5E(6N)	5/5/2010	Chrysene	0.58	J	ug/L	0.1	10	1
TA-NC	P-5E(6N)	5/5/2010	Diethyl phthalate	1.8	J	ug/L	0.6	10	1
TA-NC	P-5E(6N)	5/5/2010	Di-n-butyl phthalate	1.5	J	ug/L	0.67	10	1
TA-NC	P-5E(6N)	5/5/2010	Phenol	1.2	J	ug/L	0.6	10	1
Total Organic Halogens (TOX)									
TA-NC	P-5E(6N)	5/5/2010	Total Organic Halogens	1080		ug/L	19	30	1
TA-NC	P-5E(6N)	5/5/2010	Total Organic Halogens	1110		ug/L	95	150	5
TA-NC	P-5E(6N)	5/5/2010	Total Organic Halogens	1250		ug/L	95	150	5
TA-NC	P-5E(6N)	5/5/2010	Total Organic Halogens	1140		ug/L	95	150	5
			Average TOX	**1145**					
Total Organic Carbon (TOC)									
TA-NC	P-5E(6N)	5/5/2010	Total Organic Carbon	26.2		mg/L	0.24	1	1
TA-NC	P-5E(6N)	5/5/2010	Total Organic Carbon	24.3		mg/L	0.24	1	1

Table 2
Analytical Results
May 2010 City of Toledo Water Line Trench
Envirosafe Services of Ohio, Inc.

Lab	Sump	Sample Date	Constituent	Result	Q	Unit	MDL	PQL	Dilution
TA-NC	P-5E(6N)	5/5/2010	Total Organic Carbon	24.7		mg/L	0.24	1	1
TA-NC	P-5E(6N)	5/5/2010	Total Organic Carbon	24.2		mg/L	0.24	1	1
			Average TOC	**24.9**					
General									
J & H	P-5W(7N)	5/5/2010	Conductivity	2460		umhos/cm		1	
J & H	P-5W(7N)	5/5/2010	pH	6.91		SU		1.00	
J & H	P-5W(7N)	5/5/2010	Chloride	373		mg/L		1	
J & H	P-5W(7N)	5/5/2010	Biological Oxygen Demand	20		mg/L		4	
J & H	P-5W(7N)	5/5/2010	Sulfate	296		mg/L		5	
TA-NC	P-5W(7N)	5/5/2010	n-Hexane Extractable Material (O&G)	2.1	J	mg/L	0.77	5	1
TA-NC	P-5W(7N)	5/5/2010	Chemical Oxygen Demand (COD)	89.4		mg/L	5.1	10	1
Dissolved Metals									
TA-NC	P-5W(7N)	5/5/2010	Barium-DISS	356	B	ug/L	0.67	200	1
TA-NC	P-5W(7N)	5/5/2010	Iron-DISS	761		ug/L	81	100	1
TA-NC	P-5W(7N)	5/5/2010	Magnesium-DISS	86600	B	ug/L	34	5000	1
TA-NC	P-5W(7N)	5/5/2010	Sodium-DISS	186000		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
TA-NC	P-5W(7N)	5/5/2010	1,2-Dichloroethene (total)	0.59	J	ug/L	0.34	2	1
TA-NC	P-5W(7N)	5/5/2010	1,4-Dioxane	22	J	ug/L	19	50	1
TA-NC	**P-5W(7N)**	**5/5/2010**	**Benzene**	**8.4**		**ug/L**	**0.13**	**1**	**1**
TA-NC	**P-5W(7N)**	**5/5/2010**	**Chlorobenzene**	**1.4**		**ug/L**	**0.15**	**1**	**1**
TA-NC	P-5W(7N)	5/5/2010	Ethylbenzene	0.69	J	ug/L	0.17	1	1
TA-NC	P-5W(7N)	5/5/2010	Tetrahydrofuran	1.2	J	ug/L	0.42	5	1
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	**P-5W(7N)**	**5/5/2010**	**1,4-Dioxane**	**19**		**ug/L**	**0.49**	**10**	**1**
TA-NC	P-5W(7N)	5/5/2010	Acenaphthene	0.2	J	ug/L	0.1	10	1
TA-NC	**P-5W(7N)**	**5/5/2010**	**bis(2-Ethylhexyl) phthalate**	**15**		**ug/L**	**0.8**	**10**	**1**
TA-NC	P-5W(7N)	5/5/2010	Diethyl phthalate	1.4	J	ug/L	0.6	10	1
Total Organic Halogens (TOX)									
TA-NC	P-5W(7N)	5/5/2010	Total Organic Halogens	220		ug/L	38	60	2
TA-NC	P-5W(7N)	5/5/2010	Total Organic Halogens	214		ug/L	38	60	2
TA-NC	P-5W(7N)	5/5/2010	Total Organic Halogens	270		ug/L	38	60	2
TA-NC	P-5W(7N)	5/5/2010	Total Organic Halogens	275		ug/L	38	60	2
			Average TOX	**245**					
Total Organic Carbon (TOC)									
TA-NC	P-5W(7N)	5/5/2010	Total Organic Carbon	23.6		mg/L	0.96	4	4
TA-NC	P-5W(7N)	5/5/2010	Total Organic Carbon	23.8		mg/L	0.96	4	4
TA-NC	P-5W(7N)	5/5/2010	Total Organic Carbon	23.2		mg/L	0.96	4	4
TA-NC	P-5W(7N)	5/5/2010	Total Organic Carbon	22.2		mg/L	0.96	4	4
			Average TOC	**23.2**					
MONITORING TRENCHES									
General									
J & H	T-1E(1N)	5/5/2010	Conductivity	1120		umhos/cm		1	
J & H	T-1E(1N)	5/5/2010	pH	7.20		SU		1.00	
J & H	T-1E(1N)	5/5/2010	Chloride	19.4		mg/L		1	
J & H	T-1E(1N)	5/5/2010	Sulfate	408		mg/L		5	
J & H	T-1E(1N)	5/5/2010	Total Suspeneded Solids	6		mg/L		5	
TA-NC	T-1E(1N)	5/5/2010	Chemical Oxygen Demand (COD)	13.3		mg/L	5.1	10	1
Dissolved Metals									
TA-NC	T-1E(1N)	5/5/2010	Barium-DISS	66.2	B J	ug/L	0.67	200	1
TA-NC	T-1E(1N)	5/5/2010	Magnesium-DISS	55100	B	ug/L	34	5000	1
TA-NC	T-1E(1N)	5/5/2010	Sodium-DISS	15700		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
TA-NC	T-1E(1N)	5/5/2010	1,1-Dichloroethane	0.3	J	ug/L	0.15	1	1
Semi-Volatile Organic Compounds (SVOC)									

Table 2
Analytical Results
May 2010 City of Toledo Water Line Trench
Envirosafe Services of Ohio, Inc.

Lab	Sump	Sample Date	Constituent	Result	Q	Unit	MDL	PQL	Dilution
TA-NC	T-1E(1N)	5/5/2010	bis(2-Ethylhexyl) phthalate	1.3	J	ug/L	0.8	10	1
TA-NC	T-1E(1N)	5/5/2010	Diethyl phthalate	1.1	J	ug/L	0.6	10	1
Total Organic Halogens (TOX)									
Total Organic Carbon (TOC)									
TA-NC	T-1E(1N)	5/5/2010	Total Organic Carbon	4.0		mg/L	0.24	1	1
TA-NC	T-1E(1N)	5/5/2010	Total Organic Carbon	3.9		mg/L	0.24	1	1
TA-NC	T-1E(1N)	5/5/2010	Total Organic Carbon	3.8		mg/L	0.24	1	1
TA-NC	T-1E(1N)	5/5/2010	Total Organic Carbon	3.6		mg/L	0.24	1	1
			Average TOC	**3.8**					
General									
J & H	T-1M(2N)	5/5/2010	Conductivity	1110		umhos/cm		1	
J & H	T-1M(2N)	5/5/2010	pH	7.03		SU		1.00	
J & H	T-1M(2N)	5/5/2010	Chloride	19.2		mg/L		1	
J & H	T-1M(2N)	5/5/2010	Sulfate	408		mg/L		5	
J & H	T-1M(2N)	5/5/2010	Total Suspeneded Solids	106		mg/L		5	
TA-NC	T-1M(2N)	5/5/2010	Chemical Oxygen Demand (COD)	13		mg/L	5.1	10	1
Dissolved Metals									
TA-NC	T-1M(2N)	5/5/2010	Barium-DISS	66.9	B J	ug/L	0.67	200	1
TA-NC	T-1M(2N)	5/5/2010	Magnesium-DISS	53500	B	ug/L	34	5000	1
TA-NC	T-1M(2N)	5/5/2010	Sodium-DISS	15200		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
TA-NC	T-1M(2N)	5/5/2010	1,1-Dichloroethane	0.46	J	ug/L	0.15	1	1
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	T-1M(2N)	5/5/2010	bis(2-Ethylhexyl) phthalate	1.7	J	ug/L	0.8	10	1
TA-NC	T-1M(2N)	5/5/2010	Diethyl phthalate	0.98	J	ug/L	0.6	10	1
TA-NC	T-1M(2N)	5/5/2010	Di-n-butyl phthalate	1.8	J	ug/L	0.67	10	1
Total Organic Halogens (TOX)									
Total Organic Carbon (TOC)									
TA-NC	T-1M(2N)	5/5/2010	Total Organic Carbon	4.0		mg/L	0.24	1	1
TA-NC	T-1M(2N)	5/5/2010	Total Organic Carbon	4.2		mg/L	0.24	1	1
TA-NC	T-1M(2N)	5/5/2010	Total Organic Carbon	4.0		mg/L	0.24	1	1
TA-NC	T-1M(2N)	5/5/2010	Total Organic Carbon	4.0		mg/L	0.24	1	1
			Average TOC	**4.1**					
General									
J & H	T-1W(3N)	5/5/2010	Conductivity	1220		umhos/cm		1	
J & H	T-1W(3N)	5/5/2010	pH	6.89		SU		1.00	
J & H	T-1W(3N)	5/5/2010	Chloride	23.3		mg/L		1	
J & H	T-1W(3N)	5/5/2010	Sulfate	403		mg/L		5	
TA-NC	T-1W(3N)	5/5/2010	Chemical Oxygen Demand (COD)	10.5		mg/L	5.1	10	1
Dissolved Metals									
TA-NC	T-1W(3N)	5/5/2010	Barium-DISS	64.5	B J	ug/L	0.67	200	1
TA-NC	T-1W(3N)	5/5/2010	Iron-DISS	233		ug/L	81	100	1
TA-NC	T-1W(3N)	5/5/2010	Magnesium-DISS	59000	B	ug/L	34	5000	1
TA-NC	T-1W(3N)	5/5/2010	Sodium-DISS	16300		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
TA-NC	T-1W(3N)	5/5/2010	1,1-Dichloroethane	0.45	J	ug/L	0.15	1	1
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	T-1W(3N)	5/5/2010	bis(2-Ethylhexyl) phthalate	1.4	J	ug/L	0.8	10	1
TA-NC	T-1W(3N)	5/5/2010	Di-n-butyl phthalate	1.6	J	ug/L	0.67	10	1
Total Organic Halogens (TOX)									
Total Organic Carbon (TOC)									
TA-NC	T-1W(3N)	5/5/2010	Total Organic Carbon	4.0		mg/L	0.24	1	1
TA-NC	T-1W(3N)	5/5/2010	Total Organic Carbon	3.8		mg/L	0.24	1	1
TA-NC	T-1W(3N)	5/5/2010	Total Organic Carbon	3.2		mg/L	0.24	1	1
TA-NC	T-1W(3N)	5/5/2010	Total Organic Carbon	3.1		mg/L	0.24	1	1

Table 2
Analytical Results
May 2010 City of Toledo Water Line Trench
Envirosafe Services of Ohio, Inc.

Lab	Sump	Sample Date	Constituent	Result	Q	Unit	MDL	PQL	Dilution
			Total TOC	**3.5**					
General									
J & H	T-2E(1S)	5/5/2010	Conductivity	1220		umhos/cm		1	
J & H	T-2E(1S)	5/5/2010	pH	7.27		SU		1.00	
J & H	T-2E(1S)	5/5/2010	Chloride	37.3		mg/L		1	
J & H	**T-2E(1S)**	**5/5/2010**	**Total Phenols**	**9**		**ug/L**	**2.5**	**5**	
J & H	T-2E(1S)	6/24/2010	Total Phenols	3	J	ug/L	1	5	
J & H	T-2E(1S)	5/5/2010	Sulfate	412		mg/L		5	
J & H	T-2E(1S)	5/5/2010	Total Suspeneded Solids	6		mg/L		5	
TA-NC	T-2E(1S)	5/5/2010	n-Hexane Extractable Material (O&G)	3.7	J	mg/L	0.77	5	1
TA-NC	T-2E(1S)	5/5/2010	Chemical Oxygen Demand (COD)	13.3		mg/L	5.1	10	1
Dissolved Metals									
TA-NC	T-2E(1S)	5/5/2010	Barium-DISS	63.1	B J	ug/L	0.67	200	1
TA-NC	T-2E(1S)	5/5/2010	Magnesium-DISS	56400	B	ug/L	34	5000	1
TA-NC	T-2E(1S)	5/5/2010	Sodium-DISS	21500		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	T-2E(1S)	5/5/2010	bis(2-Ethylhexyl) phthalate	2.5	J	ug/L	0.8	10	1
TA-NC	T-2E(1S)	5/5/2010	Di-n-butyl phthalate	1.6	J	ug/L	0.67	10	1
TA-NC	T-2E(1S)	5/5/2010	Di-n-octyl phthalate	3	J	ug/L	0.8	10	1
TA-NC	T-2E(1S)	5/5/2010	Naphthalene	0.78	J	ug/L	0.1	10	1
Total Organic Halogens (TOX)									
TA-NC	T-2E(1S)	5/5/2010	Total Organic Halogens	24.5	J	ug/L	19	30	1
TA-NC	T-2E(1S)	5/5/2010	Total Organic Halogens	19.7	J	ug/L	19	30	1
			Average TOX	**18.6**	J				
Total Organic Carbon (TOC)									
TA-NC	T-2E(1S)	5/5/2010	Total Organic Carbon	4.6		mg/L	0.24	1	1
TA-NC	T-2E(1S)	5/5/2010	Total Organic Carbon	4.4		mg/L	0.24	1	1
TA-NC	T-2E(1S)	5/5/2010	Total Organic Carbon	4.4		mg/L	0.24	1	1
TA-NC	T-2E(1S)	5/5/2010	Total Organic Carbon	4.4		mg/L	0.24	1	1
			Average TOC	**4.5**					
General									
J & H	T-2M(2S)	5/5/2010	Conductivity	1430		umhos/cm		1	
J & H	T-2M(2S)	5/5/2010	pH	7.07		SU		1.00	
J & H	T-2M(2S)	5/5/2010	Chloride	44.8		mg/L		1	
J & H	T-2M(2S)	5/5/2010	Sulfate	459		mg/L		5	
TA-NC	T-2M(2S)	5/5/2010	n-Hexane Extractable Material (O&G)	1.2	J	mg/L	0.77	5	1
TA-NC	T-2M(2S)	5/5/2010	Chemical Oxygen Demand (COD)	12.4		mg/L	5.1	10	1
Dissolved Metals									
TA-NC	T-2M(2S)	5/5/2010	Barium-DISS	56	B J	ug/L	0.67	200	1
TA-NC	T-2M(2S)	5/5/2010	Magnesium-DISS	65500	B	ug/L	34	5000	1
TA-NC	T-2M(2S)	5/5/2010	Sodium-DISS	22800		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	T-2M(2S)	5/5/2010	Diethyl phthalate	1.2	J	ug/L	0.6	10	1
Total Organic Halogens (TOX)									
Total Organic Carbon (TOC)									
TA-NC	T-2M(2S)	5/5/2010	Total Organic Carbon	4.0		mg/L	0.24	1	1
TA-NC	T-2M(2S)	5/5/2010	Total Organic Carbon	3.7		mg/L	0.24	1	1
TA-NC	T-2M(2S)	5/5/2010	Total Organic Carbon	3.5		mg/L	0.24	1	1
TA-NC	T-2M(2S)	5/5/2010	Total Organic Carbon	3.7		mg/L	0.24	1	1
			Average TOC	**3.7**					
General									
J & H	T-2W(3S)	5/5/2010	Conductivity	1260		umhos/cm		1	
J & H	T-2W(3S)	5/5/2010	pH	7.83		SU		1.00	

Table 2
Analytical Results
May 2010 City of Toledo Water Line Trench
Envirosafe Services of Ohio, Inc.

Lab	Sump	Sample Date	Constituent	Result	Q	Unit	MDL	PQL	Dilution
J & H	T-2W(3S)	5/5/2010	Chloride	57.0		mg/L		1	
J & H	T-2W(3S)	5/5/2010	Sulfate	408		mg/L		5	
J & H	T-2W(3S)	5/5/2010	Total Suspeneded Solids	509		mg/L		5	
TA-NC	T-2W(3S)	5/5/2010	n-Hexane Extractable Material (O&G)	1.2	J	mg/L	0.77	5	1
TA-NC	T-2W(3S)	5/5/2010	Chemical Oxygen Demand (COD)	21.6		mg/L	5.1	10	1
Dissolved Metals									
TA-NC	T-2W(3S)	5/5/2010	Barium-DISS	78.9	B J	ug/L	0.67	200	1
TA-NC	T-2W(3S)	5/5/2010	Magnesium-DISS	60000	B	ug/L	34	5000	1
TA-NC	T-2W(3S)	5/5/2010	Sodium-DISS	30200		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	T-2W(3S)	5/5/2010	Diethyl phthalate	1.1	J	ug/L	0.6	10	1
Total Organic Halogens (TOX)									
Total Organic Carbon (TOC)									
TA-NC	T-2W(3S)	5/5/2010	Total Organic Carbon	6.0		mg/L	0.24	1	1
TA-NC	T-2W(3S)	5/5/2010	Total Organic Carbon	5.8		mg/L	0.24	1	1
TA-NC	T-2W(3S)	5/5/2010	Total Organic Carbon	5.8		mg/L	0.24	1	1
TA-NC	T-2W(3S)	5/5/2010	Total Organic Carbon	5.8		mg/L	0.24	1	1
			Average TOC	**5.9**					
General									
J & H	TR-6(8N)	5/5/2010	Conductivity	954		umhos/cm		1	
J & H	TR-6(8N)	5/5/2010	pH	7.17		SU		1.00	
J & H	TR-6(8N)	5/5/2010	Chloride	10.8		mg/L		1	
J & H	TR-6(8N)	5/5/2010	Sulfate	286		mg/L		5	
TA-NC	TR-6(8N)	5/5/2010	n-Hexane Extractable Material (O&G)	1.4	J	mg/L	0.77	5	1
Dissolved Metals									
TA-NC	TR-6(8N)	5/5/2010	Barium-DISS	30.8	B J	ug/L	0.67	200	1
TA-NC	TR-6(8N)	5/5/2010	Magnesium-DISS	49900	B	ug/L	34	5000	1
TA-NC	TR-6(8N)	5/5/2010	Sodium-DISS	12500		ug/L	590	5000	1
Polychlorinated Biphynls (PCBs)									
Volatile Organic Compounds (VOC)									
TA-NC	TR-6(8N)	5/5/2010	Toluene	0.25	J	ug/L	0.13	1	1
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	TR-6(8N)	5/5/2010	bis(2-Ethylhexyl) phthalate	2.3	J	ug/L	0.8	10	1
Total Organic Halogens (TOX)									
Total Organic Carbon (TOC)									
TA-NC	TR-6(8N)	5/5/2010	Total Organic Carbon	2.9		mg/L	0.24	1	1
TA-NC	TR-6(8N)	5/5/2010	Total Organic Carbon	2.7		mg/L	0.24	1	1
TA-NC	TR-6(8N)	5/5/2010	Total Organic Carbon	2.7		mg/L	0.24	1	1
TA-NC	TR-6(8N)	5/5/2010	Total Organic Carbon	2.8		mg/L	0.24	1	1
			Average TOC	2.8					
WYNN ROAD TRENCHES									
General									
J & H	WT-1	5/5/2010	Conductivity	1790		umhos/cm		1	
J & H	WT-1	5/5/2010	pH	7.1		SU		1.00	
J & H	WT-1	5/5/2010	Chloride	25.8		mg/L		1	
J & H	WT-1	5/5/2010	Sulfate	864		mg/L		5	
J & H	WT-1	5/5/2010	Total Suspeneded Solids	13		mg/L		5	
TA-NC	WT-1	5/5/2010	Chemical Oxygen Demand (COD)	8	B	mg/L	5.1	10	1
Dissolved Metals									
TA-NC	WT-1	5/5/2010	Barium-DISS	11.4	J	ug/L	0.67	200	1
TA-NC	WT-1	5/5/2010	Magnesium-DISS	117000		ug/L	34	5000	1
TA-NC	WT-1	5/5/2010	Sodium-DISS	27700		ug/L	590	5000	1
Volatile Organic Compounds (VOC)									
Semi-Volatile Organic Compounds (SVOC)									

Table 2
Analytical Results
May 2010 City of Toledo Water Line Trench
Envirosafe Services of Ohio, Inc.

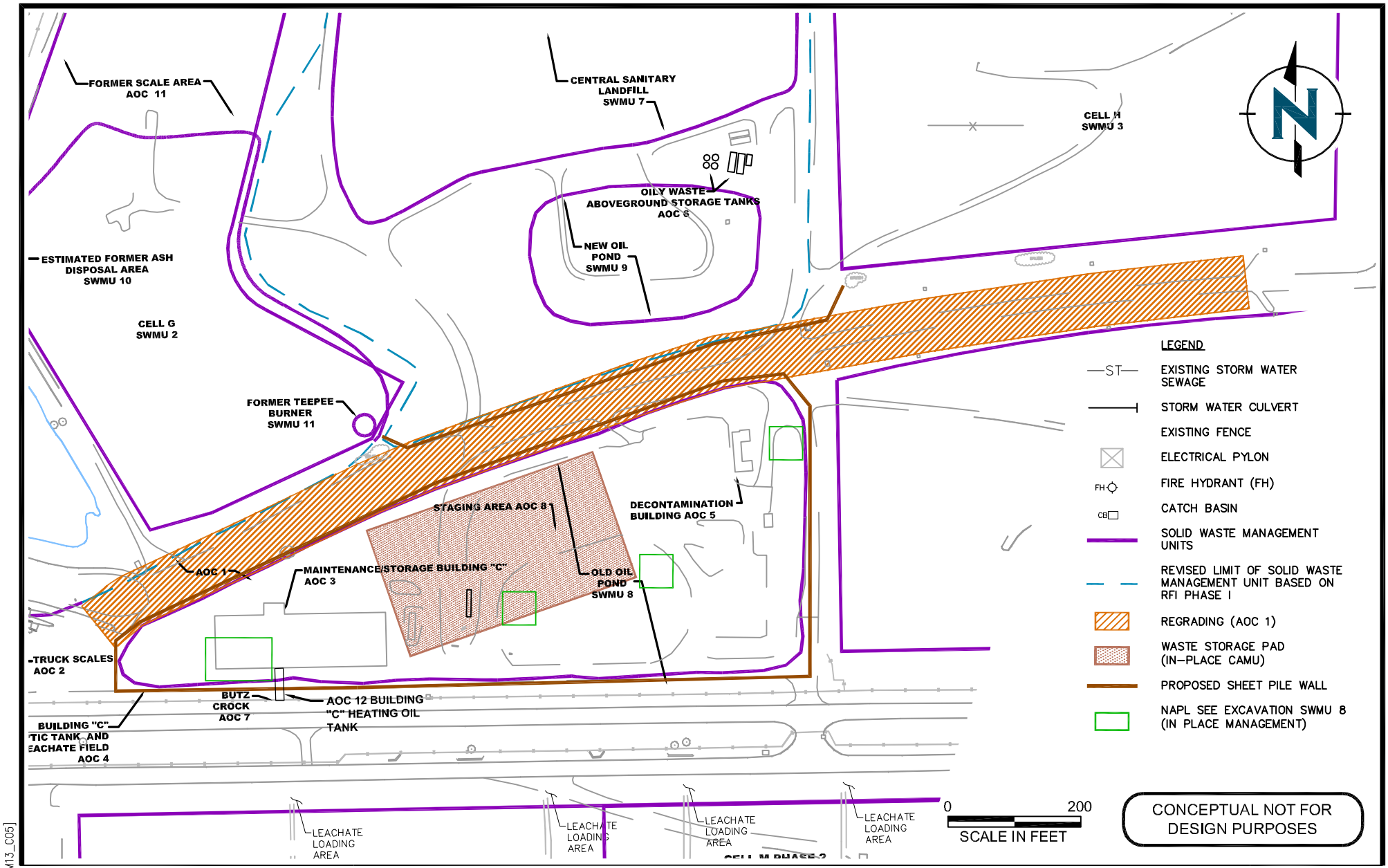
Lab	Sump	Sample Date	Constituent	Result	Q	Unit	MDL	PQL	Dilution
TA-NC	WT-1	5/5/2010	bis(2-Ethylhexyl) phthalate	8.5	J	ug/L	0.8	10	1
Total Organic Halogens (TOX)									
Total Organic Carbon (TOC)									
TA-NC	WT-1	5/5/2010	Total Organic Carbon	3.8		mg/L	0.24	1	1
TA-NC	WT-1	5/5/2010	Total Organic Carbon	3.6		mg/L	0.24	1	1
TA-NC	WT-1	5/5/2010	Total Organic Carbon	3.5		mg/L	0.24	1	1
TA-NC	WT-1	5/5/2010	Total Organic Carbon	3.6		mg/L	0.24	1	1
			Average TOC	3.6					
General									
J & H	WT-2	5/5/2010	Conductivity	2290		umhos/cm		1	
J & H	WT-2	5/5/2010	pH	7.94		SU		1.00	
J & H	WT-2	5/5/2010	Chloride	28.2		mg/L		1	
J & H	WT-2	5/5/2010	Sulfate	1300		mg/L		5	
TA-NC	WT-2	5/5/2010	n-Hexane Extractable Material (O&G)	0.78	J	mg/L	0.77	5	1
Dissolved Metals									
TA-NC	WT-2	5/5/2010	Barium-DISS	14.7	J	ug/L	0.67	200	1
TA-NC	WT-2	5/5/2010	Magnesium-DISS	140000		ug/L	34	5000	1
TA-NC	WT-2	5/5/2010	Sodium-DISS	47000		ug/L	590	5000	1
Volatile Organic Compounds (VOC)									
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	WT-2	5/5/2010	Diethyl phthalate	1.2	J	ug/L	0.6	10	1
General									
J & H	WT-3	5/5/2010	Conductivity	2770		umhos/cm		1	
J & H	WT-3	5/5/2010	pH	6.77		SU		1.00	
J & H	WT-3	5/5/2010	Chloride	34.3		mg/L		1	
J & H	WT-3	5/5/2010	Sulfate	1780		mg/L		5	
J & H	WT-3	5/5/2010	Total Suspeneded Solids	16		mg/L		5	
TA-NC	WT-3	5/5/2010	Chemical Oxygen Demand (COD)	6.2	B	mg/L	5.1	10	1
Dissolved Metals									
TA-NC	WT-3	5/5/2010	Barium-DISS	14.6	J	ug/L	0.67	200	1
TA-NC	WT-3	5/5/2010	Magnesium-DISS	201000		ug/L	34	5000	1
TA-NC	WT-3	5/5/2010	Sodium-DISS	49600		ug/L	590	5000	1
Volatile Organic Compounds (VOC)									
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	WT-3	5/5/2010	bis(2-Ethylhexyl) phthalate	0.94	J	ug/L	0.8	10	1
TA-NC	WT-3	5/5/2010	Diethyl phthalate	0.75	J	ug/L	0.6	10	1
Total Organic Halogens (TOX)									
Total Organic Carbon (TOC)									
TA-NC	WT-3	5/5/2010	Total Organic Carbon	2.9		mg/L	0.24	1	1
TA-NC	WT-3	5/5/2010	Total Organic Carbon	2.9		mg/L	0.24	1	1
TA-NC	WT-3	5/5/2010	Total Organic Carbon	2.6		mg/L	0.24	1	1
TA-NC	WT-3	5/5/2010	Total Organic Carbon	2.7		mg/L	0.24	1	1
			Average TOC	**2.8**					
General									
J & H	WT-4	5/5/2010	Conductivity	1870		umhos/cm		1	
J & H	WT-4	5/5/2010	pH	6.92		SU		1.00	
J & H	WT-4	5/5/2010	Chloride	22.6		mg/L		1	
J & H	WT-4	5/5/2010	Sulfate	1000		mg/L		5	
TA-NC	WT-4	5/5/2010	n-Hexane Extractable Material (O&G)	2.7	J	mg/L	0.77	5	1
TA-NC	WT-4	5/5/2010	Chemical Oxygen Demand (COD)	6.8	B	mg/L	5.1	10	1
Dissolved Metals									
TA-NC	WT-4	5/5/2010	Barium-DISS	16.2	J	ug/L	0.67	200	1
TA-NC	WT-4	5/5/2010	Magnesium-DISS	98300		ug/L	34	5000	1
TA-NC	WT-4	5/5/2010	Sodium-DISS	23500		ug/L	590	5000	1
Volatile Organic Compounds (VOC)									
Semi-Volatile Organic Compounds (SVOC)									
TA-NC	WT-4	5/5/2010	bis(2-Ethylhexyl) phthalate	3	J	ug/L	0.8	10	1

Table 2
Analytical Results
May 2010 City of Toledo Water Line Trench
Envirosafe Services of Ohio, Inc.

Lab	Sump	Sample Date	Constituent	Result	Q	Unit	MDL	PQL	Dilution
TA-NC	WT-4	5/5/2010	Diethyl phthalate	0.72	J	ug/L	0.6	10	1
Total Organic Halogens (TOX)									
Total Organic Carbon (TOC)									
TA-NC	WT-4	5/5/2010	Total Organic Carbon	2.4		mg/L	0.24	1	1
TA-NC	WT-4	5/5/2010	Total Organic Carbon	2.2		mg/L	0.24	1	1
TA-NC	WT-4	5/5/2010	Total Organic Carbon	2.0		mg/L	0.24	1	1
TA-NC	WT-4	5/5/2010	Total Organic Carbon	1.9		mg/L	0.24	1	1
			Average TOC	2.1					

MDL: Method Detection Limit
PQL: Practical Quantitation Limit
Q: Qualifier
U: Constituent not detected between the MDL and PQL
B: Constituent detected in Laboratory Blank
J: Constituent detected between the MDL and PQL - estimated value

Cost Estimates – AOC 1 Alternatives



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CORRECTIVE MEASURES EVALUATION SWMU 8 & AOC 1

ENVIROSAFE SERVICES OF OHIO, INC.
OTTER CREEK ROAD FACILITY
OREGON, OHIO

FIGURE
1

026174M14B

BKLEIN 1/7/11 [026174M13_C05]

Environsafe Services of Ohio, Inc.
Cap and Storm Water Cost Estimates

Alternative 2: AOC 1 - Recap Waterline Right-of-Way

Cumulative Cost Deflator, 2005 to (See Revision Date) -> 1.11160

Scope and Assumptions

-Regrade/recompact cover soil to promote drainage, 1,800' x 80' along Trench III and IV and 50% of Trench I and II, an area of 144,400 square feet

Regrading AOC 1

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	5,333	1 yd^3	$5.00	$26,679
2	Backfilling and Regrading	5,333	1 yd^3	$5.00	$26,667
3	Vegetative Layer Establishment	3.3	acre	$1,334	$4,410
	Subtotal				**$58,000**

TOTAL CAPITAL COSTS	**$**	**58,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (12%)	1	project	$6,960	$6,960
2	Construction Quality Assurance (10%)	1	project	$5,800	$5,800
3	Contingency (20%)	1	percentage	$11,600	$11,600
	Subtotal				**$24,000**

ALTERNATIVE 2, TOTAL COST $82,000

Alternative 3: AOC 1 - Installation of a Sheet Pile Wall

Cumulative Cost Deflator, 2005 to (See Revision Date) -> 1.11160

Scope and Assumptions

-Installation of a sheet pile wall on north side of unit from eastern corner of Cell G to eastern corner of SWMU 9 - estimated 660 feet - between limits of waste and sumps
-Wall is 35' deep.
-Regrade/recompact cover soil to promote drainage, 1,800' x 80' along Trench III and IV and 50% of Trench I and II

Installation of Boundary Wall

Item	Description	Quantity	Unit	Unit Cost	Total
1	Sheet Pile Wall (35')	23,100	1 ft^2	$29	$667,629
	Subtotal				**$668,000**

Regrading AOC 1

Item	Description	Quantity	Unit	Unit Cost	Total
1	Protective Cover Removal	5,333	1 yd^3	$5.00	$26,679
2	Backfilling and Regrading	5,333	1 yd^3	$5.00	$26,667
3	Vegetative Layer Establishment	3.3	acre	$1,334	$4,410
	Subtotal				**$58,000**

TOTAL CAPITAL COSTS	**$ 726,000**

Engineering

Item	Description	Quantity	Unit	Unit Cost	Total
1	Engineering (12%)	1	project	$87,120	$87,120
2	Construction Quality Assurance (10%)	1	project	$72,600	$72,600
3	Contingency (20%)	1	percentage	$145,200	$145,200
	Subtotal				**$305,000**

ALTERNATIVE 3, TOTAL COST $1,031,000

APPENDIX I

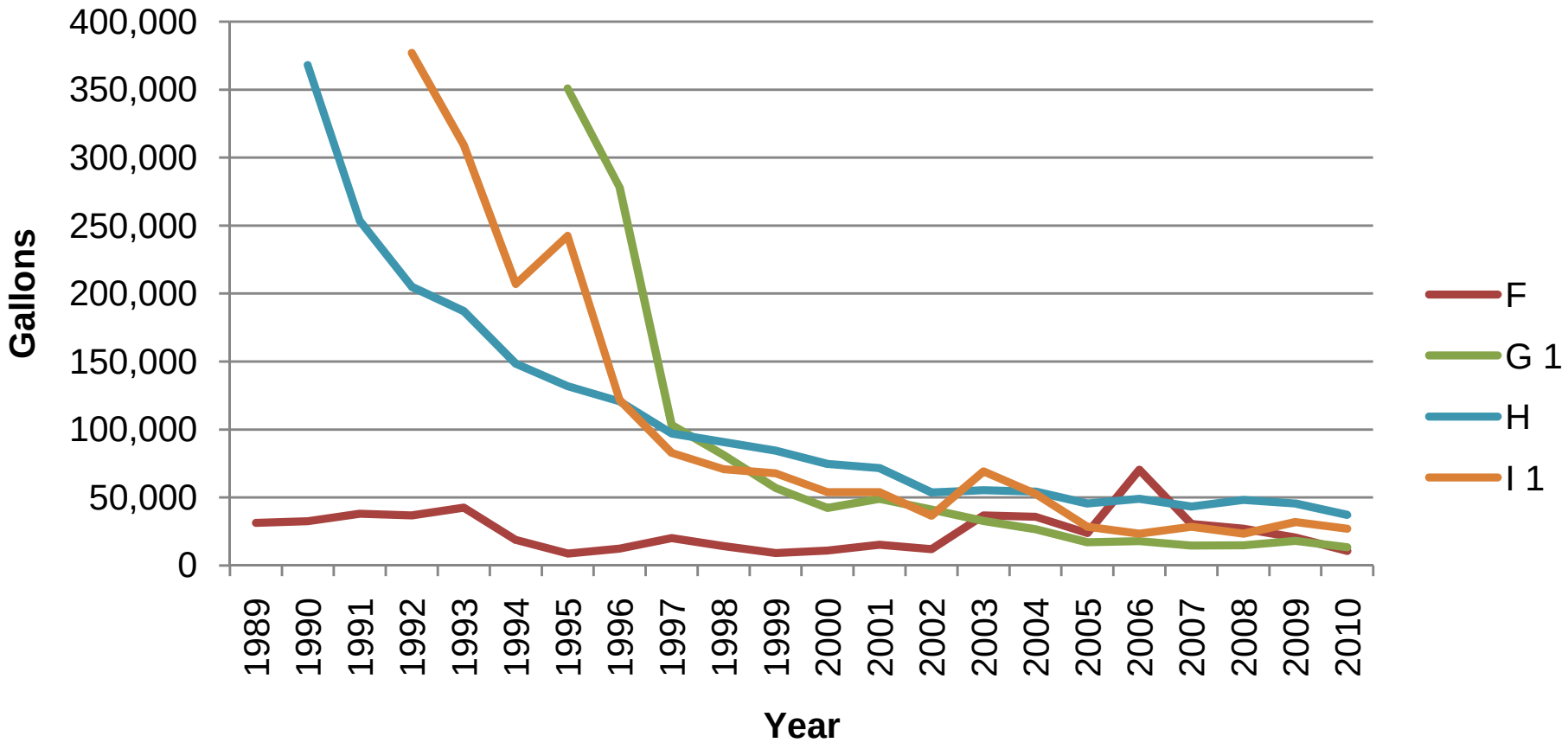
Groundwater Monitoring

C O N T E N T S

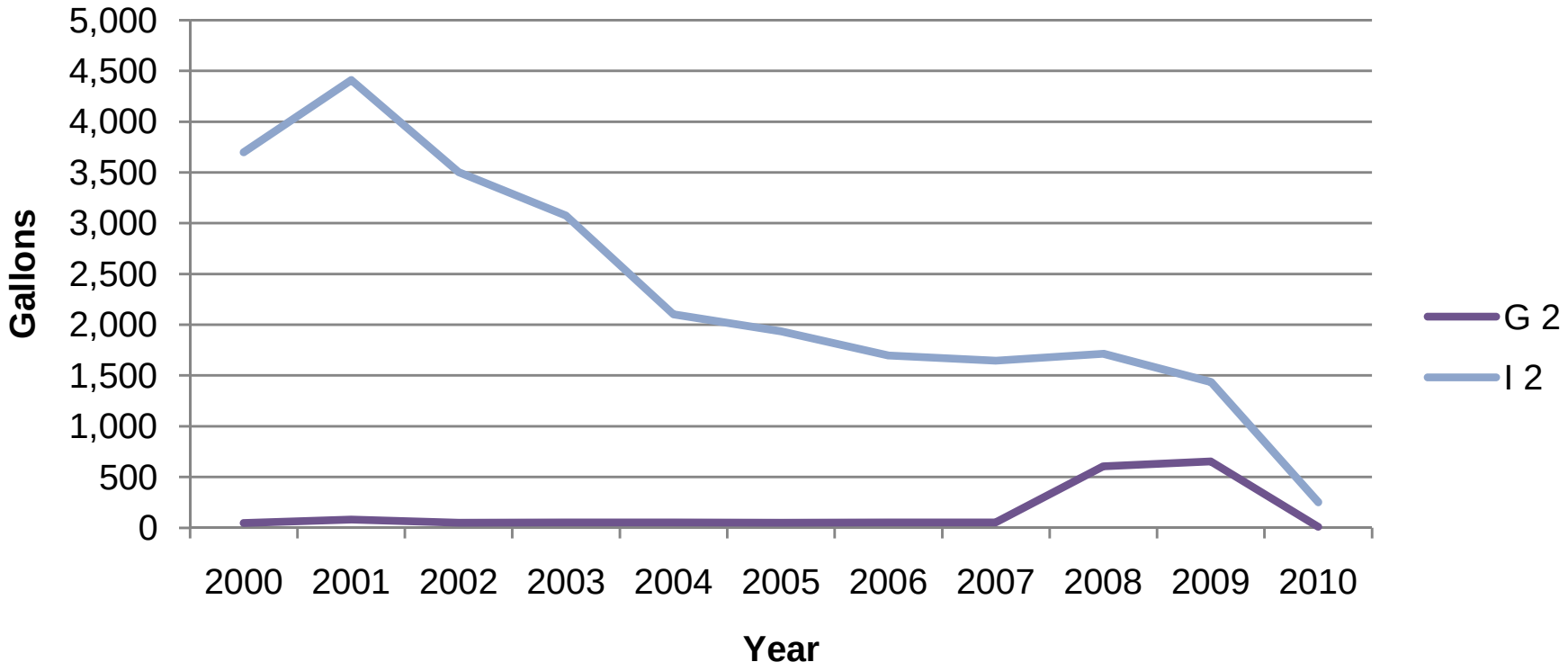
Leachate Recovery
Leachate Levels Relative to Shallow Well Screen Intervals
Pages from Permit Module K

Leachate Recovery

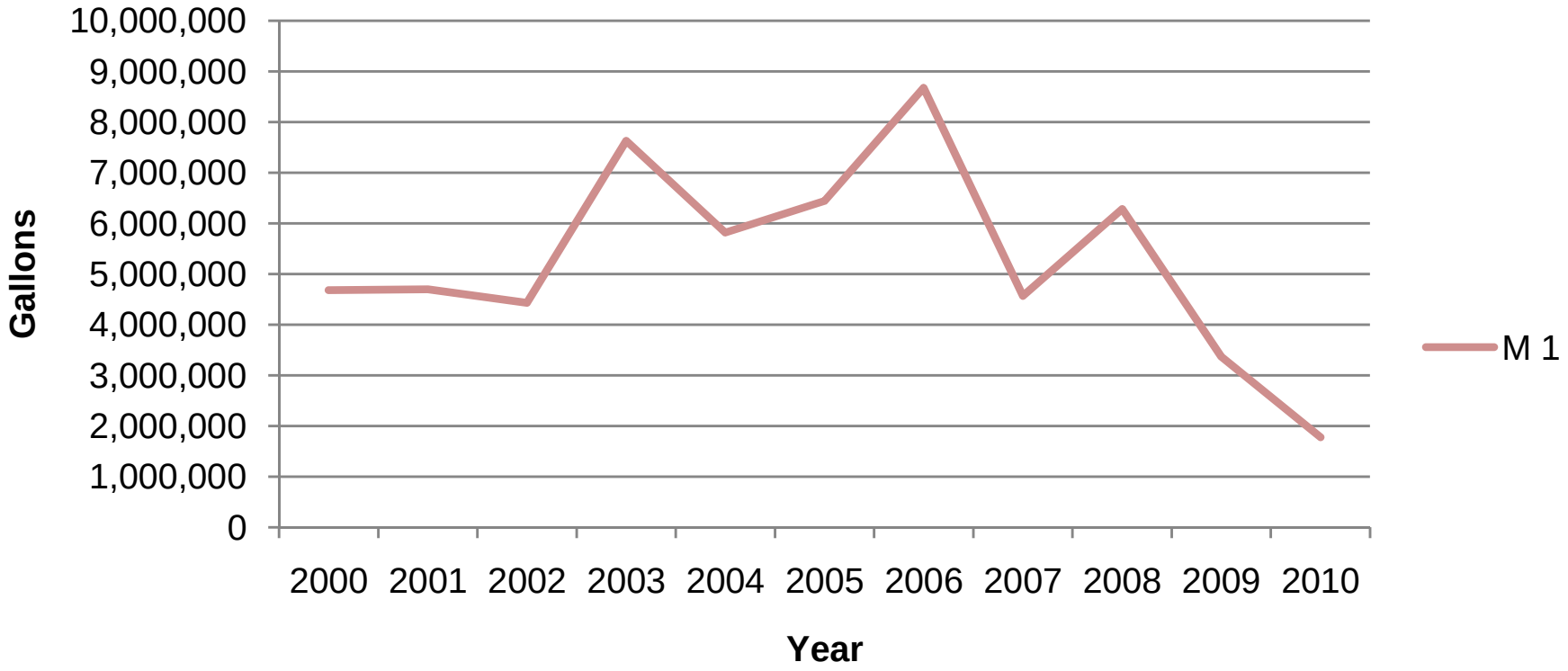
Leachate Recovery at Cell F, G, H, and I
ESOI Otter Creek Facility, Oregon, Ohio



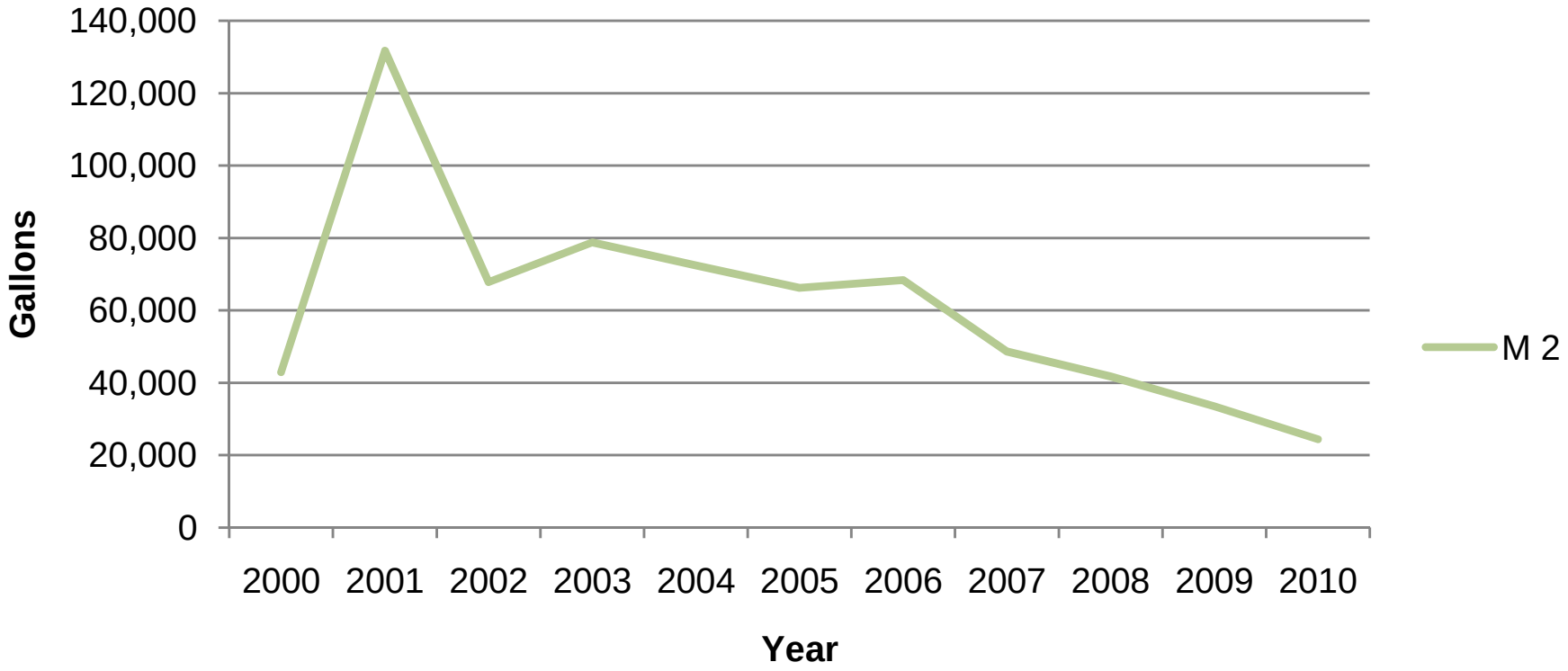
Leachate Recovery from Secondary Liner at Cell G and I ESOI Otter Creek Facility, Oregon, Ohio



Leachate Recovery from Primary Liner at Cell M
ESOI Otter Creek Facility, Oregon, Ohio



Leachate Recovery from Secondary Liner at Cell M
ESOI Otter Creek Facility, Oregon, Ohio



Leachate Levels Relative to Shallow Well Screen Intervals

Leachate Levels Relative to Shallow Well Screen Intervals
ESOI Otter Creek Facility, Oregon, Ohio

Associated Unit/Cell	Well ID	Well Zone	Top of Screen Elevation	Bottom of Screen Elevation	Target Leachate Elevation (ft)	Measured Leachate Elevation (ft)
5 - Central	F-1S	Shallow	576.5	571.5	557	577.5
5 - Central	G-1S	Shallow	577	572	557	577.5
5 - Central	MR-1SA	Shallow	571.1	566.1	557	577.5
5 - Central	MR-4S	Shallow	576.7	571.7	557	577.5
5 - Central	MR-5S	Shallow	572.9	567.9	557	577.5
5 - Central	MR-7S	Shallow	568.4	563.4	557	577.5
5 - West	MR-2S	Shallow	565.5	560.5	565	565.8
5 - West	MR-3S	Shallow	567	562	565	565.8
5 - West	MR-6S	Shallow	570.4	565.4	565	565.8
6	H-2S	Shallow	580.5	575.5	567	581.7
6	SW-1S	Shallow	571	566	567	581.7
6	SW-2S	Shallow	577.4	572.4	567	581.7
6	SW-3S	Shallow	577	572	567	581.7
6	T-8S	Shallow	576.3	571.3	567	581.7
7	T-5S	Shallow	580.3	575.3	571	583.03
7	T-8S	Shallow	576.3	571.3	571	583.03
7	T-15S	Shallow	581.5	576.5	571	583.03
7	T-43S	Shallow	576.7	571.7	571	583.03
F	F-1S	Shallow	576.5	571.5	538	<538
F	F-2S	Shallow	575	570	538	<538
F	F-3S	Shallow	573	568	538	<538
G	G-1S	Shallow	577	572	546	<546
G	G-2S	Shallow	574.3	569.3	546	<546
G	G-3S	Shallow	576	571	546	<546
G	G-4S	Shallow	579	574	546	<546
H	H-1S	Shallow	579.5	574.5	541	<541
H	H-2S	Shallow	580.5	575.5	541	<541
H	H-3S	Shallow	581	576	541	<541
H	H-4S	Shallow	581.5	576.5	541	<541
H	H-5S	Shallow	569.5	564.5	541	<541
H	H-6S	Shallow	582.5	577.5	541	<541
I	I-3SA	Shallow	579.5	574.5	543.5	<543.5
I	I-4S	Shallow	579.6	574.6	543.5	<543.5
I	I-5SA*	Shallow	578.5	573.5	543.5	<543.5
I	I-6S	Shallow	582.3	577.3	543.5	<543.5
I	I-7S	Shallow	584.1	579.1	543.5	<543.5
I	I-8S	Shallow	584.8	579.8	543.5	<543.5
M	M-2S	Shallow	584	579	550	<550
M	M-3S	Shallow	585.5	580.5	550	<550
M	M-5S	Shallow	583	578	550	<550
M	M-6S	Shallow	583.5	578.5	550	<550
M	M-10S	Shallow	584.1	579.1	550	<550
M	M-11S	Shallow	583.5	578.5	550	<550
M	M-12S	Shallow	581.7	576.7	550	<550
M	M-13S	Shallow	584.3	579.3	550	<550
M	M-14S	Shallow	585.6	580.6	550	<550
M	M-15S	Shallow	585.2	580.2	550	<550
M	M-16S	Shallow	582.4	577.4	550	<550
M	M-17S	Shallow	581.1	576.1	550	<550
M	M-18S	Shallow	579.1	574.1	550	<550
M	M-19S	Shallow	582.5	577.5	550	<550
M	M-1SA*	Shallow	583	578	550	<550
M	M-20S	Shallow	585.5	580.5	550	<550
M	M-21S	Shallow	583.9	578.9	550	<550
M	M-22S	Shallow	584.7	579.7	550	<550
M	M-23S	Shallow	582.6	577.6	550	<550
M	CR-1				550	
Notes:						
* Well screen elevation estimated from the screen interval from M-1S from the DOCC.						
Target leachate elevations for SWMUs 5, 6, and 7 are the target leachate levels established in the RCRA permit.						
Target leachate elevations for Cells F, G, H, I, and M are based on liner elevations, plus one foot.						
Measured leachate elevations for SWMUs 5, 6, 7 are the average of the levels inside the cell from January through August 2009.						
Measured leachate elevations for Cells F, G, H, I, and M are less than the permit required limits based on continued compliance with the required leachate levels at these units.						
Gray shaded cells indicate leachate levels within or above the screen interval.						

Pages from Permit Module K

must be considered elevated if its concentration is equal to or greater than the comparison standard in Permit Condition K.2(b)(i) or greater than a comparison standard determined in accordance with Permit Condition K.2(b)(ii) and an alternate source demonstration in accordance with Permit Condition K.6(i) has not been submitted.

(i) Table K-1. Constituents With Specified Comparison Standards

Constituent	Comparison Standard for Unaffected Wells (µg/L)
acetone	10
Benzene	1
chloroform	1
1,1-dichloroethane	1
1,2-dichloroethane	1
1,4-dioxane	50
ethylbenzene	1
methylene chloride	1
methyl ethyl ketone	10
total phenols	5
tetrahydrofuran	2
toluene	1
1,1,1-trichloroethane	1
trichloroethene	1
vinyl chloride	2
total xylenes	1
cadmium (dissolved)	1
chromium (dissolved)	25
dissolved lead	5
cyanide	10

(ii) Table K-2. Constituents With Comparison Standards listed in Appendix E.7 of the approved Part B permit application:

Constituent
Barium (dissolved)
Cyanide at R-6

(iii) For constituents without comparison standards listed in Appendix E.7 of the approved Part B permit application (e.g., new or replacement wells or Appendix to OAC Rule 3745-54-98 constituents where comparison standards are required as a result of a well being identified as affected), comparison standards must be developed in accordance with the following requirements and submitted as a permit modification to Appendix E.7 of the approved Part B permit application.

(a) The Permittee must evaluate currently available analytical results and determine, based on historical data at the site, regional data, geologic information and other relevant information, whether the constituent concentration at each well has been affected by past or current operations at the facility per Permit Condition K.6(c). The determination and justification supporting the determination must be submitted with the first semi-annual final data.

(b) In the case that the Permittee finds, in accordance with Permit Condition K.2(b)(iii)(a), that the concentration of a constituent at a well has been affected by past or current operations at the facility or the director does not concur with the Permittee's findings that it is not elevated, then that constituent at that well will be considered elevated until demonstrated, to the director's satisfaction, that it is not elevated due to past or current operations of the facility.

Table K-3. Ground Water Quality Parameters

Parameters
pH
specific conductance
temperature
turbidity

Note: The parameters in Table K-3 will be measured in the field in accordance with the Permittee's Standard Operating Procedures for the collection of ground water samples as described in Appendix E.9 of the Part B Permit Application. These parameters will be collected to demonstrate that the collected ground water samples are representative of formation water.

(c) Concentration Limits

In lieu of establishing individual concentration limits for elevated constituents determined in Permit Condition K.2(b)(i), (ii) and (iii), K.6(c), (d), (e)(iii) and (g), per OAC Rule 3745-54-94 for the affected wells and their constituents, the Permittee must apply the ACL Model in accordance with Appendix E-11 of the approved Part B permit application.

(d) Compliance Period

The Permittee must monitor for the constituents identified in Tables K-1, K-2 and K-3 in Permit Condition K.2(b) during the compliance period described in Permit Condition I.1(c).

K.3 Corrective Action Program
OAC Rules 3745-54-98, 3745-54-99, 3745-54-100 and 3745-54-101

When target risk levels, calculated in accordance with the ACL model in Appendix E-11 of the approved Part B permit application, are exceeded in the wells listed in Permit Condition K.2(a), the Permittee must:

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C1

ATTACHMENT K-1
Monitoring Wells in the Integrated Ground Water Monitoring Program
Permit Condition K.1.(a)

"S" Wells		"D" Wells		Bedrock Wells
F1S	M6S	F1DA	M4D	R-1
F2S	M10S	F2D	M5D	R-2
F3S	M11S	F3D	M6D	R-3
G1S	M12S	G1DA	M8D	R-4
G2S	M13S	G2DA	M9D	R-5
G3S	M14S	G3D	M10D	R-6
G4S	M15S	G6	M11D	R-7
H1S	M16S	G7	M12D	R-8
H2S	M17S	G8	M13D	R-9
H3S	M18S	G9	M14D	R-10
H4S	M19S	G10A	M15D	R-11
H5S	M20S	G11	M16D	R-12
H6S	M21S	H1D	M17D	R-13
I3SA	M22S	H2D	M18D	R-14
I4S	M23S	H3D	M19D	R-15
I5SA	MR1SA	H4D	M20D	R-16
I6S	MR2S	H5D	M21D	R-17
I7S	MR3S	H6D	M22D	R-18
I8S	MR4S	I3D	MR1DA	R-19
M1S	SW1S	I4D	MR2D	R-20
M2S	SW2S	I5D	MR3D	R-21
M3S	SW3S	I6D	MR4D	R-22
M5S		M1D	SW1D	R-23
		M2D	SW2D	R-24
		M3D	SW3D	CR-1*
				DDG-1*
				DDG-3*
				DUG-1*
				DUG-2*

*Bedrock Water Level Monitoring Wells. These wells are utilized for collecting water level measurements only.

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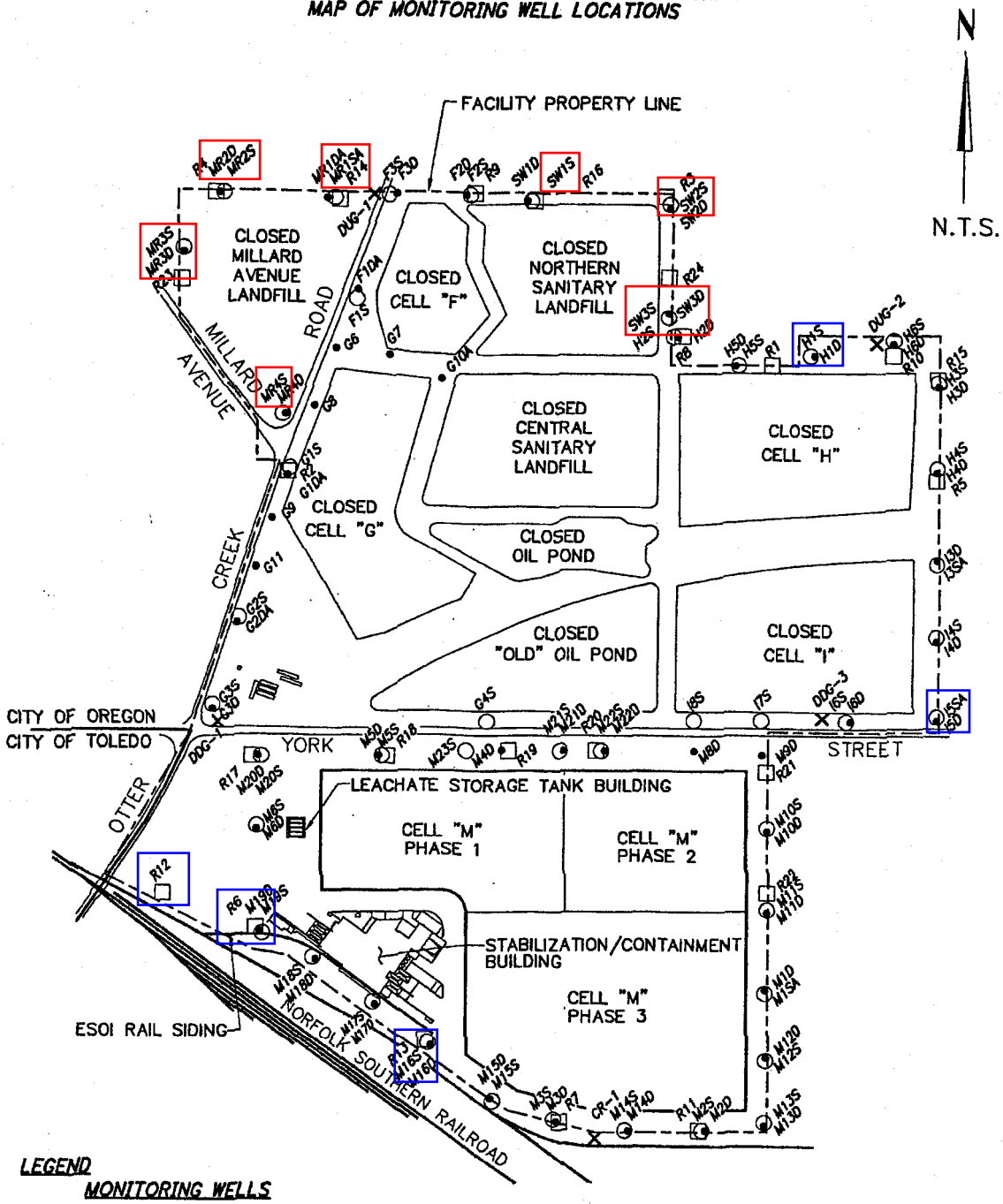
ATTACHMENT K-2
INTEGRATED GROUND WATER MONITORING PROGRAM
MAP OF MONITORING WELL LOCATIONS



LEGEND

MONITORING WELLS

- R11 ☐ BEDROCK WELL
- M20 • DEEP WELL TILL
- M25 ○ SHALLOW WELL
- CR-1 × CHART RECORDER WELL

THE MANNIK & SMITH GROUP, INC.

NOTE

SYMBOLS REPRESENT MONITOR WELL TYPE WITHIN EACH CLUSTER BUT DO NOT REFLECT EXACT LOCATION WITHIN THE CLUSTER.

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