February 29, 2012 Project No.: 023-6134

Josh Barber
USEPA Region III
Eastern PA Branch
1650 Arch Street, 3HS21
Philadelphia, PA 19103-2029

RE: INITIAL SCREENING RESULTS AND RECOMMENDATIONS
ADDITIONAL GROUNDWATER INVESTIGATIONS
FOLCROFT LANDFILL AND ANNEX REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Dear Mr. Barber:

On behalf of the Folcroft Landfill PRP Steering Committee, Golder Associates Inc. (Golder) is conducting additional groundwater investigations at the Folcroft Landfill and Annex Site (Site) located in Folcroft, Pennsylvania. The additional groundwater investigations are being performed in accordance with the scope of work that was approved by the United States Environmental Protection Agency (USEPA) on December 22, 2011.

The approved scope of work included a phased approach to the investigation. This report summarizes the results from the initial groundwater screening phase and presents, for USEPA approval, recommended next steps for completing the additional groundwater investigations. These next steps include the proposed location and depth of temporary monitoring wells across Thoroughfare Creek (creek).

1.0 SUMMARY OF INITIAL SCREENING RESULTS

Four new monitoring wells were installed between January 5 and January 10, 2012 as part of the initial screening phase. These new wells included MW-AS and MW-AD (the shallow and deep wells at location MW-A, respectively) and MW-BS and MW-BD (the shallow and deep wells at location MW-B, respectively). The locations of these wells are shown on enclosed Figure 1.

1.1 Soil Boring/Well Installation

1.1.1 Stratigraphy

During well construction, soil cores were collected to approximately 35 feet below ground surface (bgs) using direct push technology (DPT) methodologies at locations MW-A and MW-B. Each core was visually logged by a Golder geologist. Boring logs for each of the four new wells are presented in Attachment 1. The stratigraphy at locations MW-A and MW-B was similar, and generally consisted of the following:

- **Upper Soil Layer:** This layer consists of brown silt with trace amounts of sand and some organic materials (plant matter, roots, etc.). This layer was observed in the upper 4 to 5 feet of each boring.
- **Silt and Clay:** This layer consists of a brown to gray-black mottled clay and silt. It generally was present 4 to 8 feet bgs, and below the upper soil layer, with varying amounts of organic materials in the upper portion.

Golder Associates Inc.
200 Century Parkway, Suite C
Mt. Laurel, NJ 08054 USA
Tel: (856) 793-2005 Fax: (856) 793-2006 www.golder.com

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- **Silt and Clay:** This layer consists of a brown to gray-black mottled clay and silt. It generally was present 4 to 8 feet bgs, and below the upper soil layer, with varying amounts of organic materials in the upper portion.

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- **Sand and Gravel:** This layer consists of fine to coarse sand with varying amounts of fine to coarse gravel. This layer extended to the base of the borings. The sand and gravel layer is consistent with the overburden layer observed at the landfill and is the primary groundwater bearing unit.

1.1.2 Well Construction

Shallow and deep wells were installed within the sand and gravel layer. The deep wells were screened consistent with the zones currently monitored by existing wells MW-1 and MW-2. The screen for MW-AD was set 27-32 feet bgs and the screen for MW-BD was set at 30-35 bgs. The deep wells were constructed with a 5-foot, 0.75-inch pre-packed screen and a 0.75-inch polyvinyl chloride (PVC) riser pipe.

The screen for shallow well MW-AS was set at 9 to 14 feet bgs and the screen for shallow well MW-BS was set at 10 to 15 feet bgs. The shallow wells were constructed with a 5-foot, 1.5-inch pre-packed screen with a 1.5-inch PVC riser pipe.

All wells were completed with an approximate 3-foot stickup and locking outer well casing. Well construction logs also are shown in Attachment 1. A profile showing the screen intervals for the new wells in relation to landfill well MW-2 is provided on Figure 2. The alignment of the profile is shown on Figure 1.

1.3 Discrete Groundwater Sampling

In accordance with the approved scope of work and to provide a vertical profile, Hydropunch groundwater samples were collected on January 25, 2012 from two borings installed adjacent to each monitoring well pair location (MW-A and MW-B) at three depths intervals corresponding to the screen interval of the deep and shallow wells and an intermediate point. Field measurement of turbidity levels for the Hydropunch samples ranged from approximately 140 to 600 ntu.

The groundwater samples were submitted to CompuChem for analysis of Target Compound List (TCL) VOCs and TCL SVOCs, including 1,4-dioxane by the SVOC method. The laboratory results were checked for completeness and validated. Detections above Regional Screening Levels (RSLs) for tapwater were tabulated and compared to Pennsylvania Groundwater Medium-Specific Concentrations (MSCs). The results are shown in the attached Table 1 and on Figure 1. There were no detections above the Pennsylvania aquatic life surface water quality criteria.

1.4 Synoptic Water Level Event Results

Continuous water level measures were recorded in wells MW-AS, MW-AD, MW-BS, and MW-BD from January 10–16, 2012 using transducer/data loggers. Plots of these water levels are attached as Figures 3 and 4. In accordance with the approved scope of work, the wells were not surveyed for the screening evaluation. The water levels are based on an arbitrary datum selected for each well pair to allow an assessment of vertical gradients. The water level data generally show upward hydraulic gradients in each well pair.

2.0 CONCLUSIONS

The main conclusions of the initial screening evaluation are provided below:

- Both the shallow and deep wells are installed in the sand and gravel layer (the primary groundwater bearing unit). A four to five foot thick clay-silt layer resides above the sand and gravel layer.
- Higher concentrations of both VOCs and SVOCs were detected in the deeper Hydropunch samples at locations MW-A and MW-B.

- Concentrations of VOCs and SVOCs are considerably lower farther from the landfill at location MW-B. For example, 1,4-dioxane decreased from 330 ug/l at MW-A to 20 to 24 ug/l at MW-B. In addition, the VOC and SVOC concentrations were determined from turbid Hydropunch samples and are expected to decrease in samples that will be collected from developed wells at locations MW-A and MW-B.
- There are variable upward hydraulic gradients, indicating that there is some upward hydraulic pressure in the upper part of the water bearing zone.

Based on the above, and consistent with the December 21, 2011 scope of work, three additional monitoring wells are proposed across the creek to improve the understanding of the nature and extent of 1,4-dioxane migration and the relationship between groundwater and surface water.

3.0 RECOMMENDED NEXT STEPS

The following next steps are proposed to complete the implementation of the Additional Groundwater Investigations scope of work.

1. Install a total of three wells at locations MW-C (well pair) and MW-D (single well) across the creek as shown on Figure 1. The proposed well pair at MW-C will be similar to the well pairs installed at locations MW-A and MW-B and will consist of a shallow well (MW-CS) screened from approximately 10 to 15 feet bgs (5-foot screen) and a deeper well (MW-CD) screened from approximately 25 to 35 feet bgs (10-foot screen) as shown on Figure 2. In addition to providing chemistry information, the well pair at MW-C is designed to allow for the assessment of vertical gradients across the creek. Well MW-D is positioned across the creek from MW-1 where the USEPA, as part of its own sampling activities, detected the highest concentrations of 1,4-dioxane.

   Prior to conducting the screening investigation, Golder tentatively identified using tripod driven well points for well installation across the creek. However, drive points are not likely to achieve the greater well depths now proposed. Based on discussions with the driller, it is tentatively proposed to use a skid-mounted tripod rig and a cut and wash method that would involve advancing a borehole with a drive casing, flushing the casing with water, installing a 2-inch diameter PVC well casing and screen (ten-slot) inside the casing, placing a gravel pack, and grouting to the surface. The wash water would be run through a tub where the soil cuttings would be collected and the wash water would be recycled. Collected drill cuttings would be containerized in 55-gallon drums and staged on the landfill for future testing and disposal. The skid-mounted rig would be mobilized to the well locations using a barge.

2. Install additional staff gauges at the toe of the landfill (SG-04) and in the surface water impoundment at the wildlife refuge (SG-05) east of the creek (see Figure 1) to assist in assessing influences of the creek and pond on groundwater flow.
3. Survey all newly installed wells (MW-AS, MW-AD, MW-BS and MW-BD) as well as proposed wells (MW-CS, MW-CD, and MW-D) and new staff gauges. Place water level data loggers in the new wells, staff gauges, and select existing landfill wells (MW-1, MW-2, MW-3, MW-8, and MW-9) to provide a better understanding of groundwater flow and the hydraulic relationship between site groundwater and adjacent surface waters.
4. Perform two rounds of groundwater sampling for all of the new wells and existing Site wells MW-1, MW-2, MW-3, MW-8, and MW-9 as per the approved scope of work.

4.0 SCHEDULE

The following schedule is anticipated to complete the groundwater investigation:

- Finalize drilling procedures and methods – three weeks from USEPA approval

- Mobilize driller and install wells MW-CS, MW-CD, and MW-D – one week (assuming driller availability and acceptable weather and tide conditions)
- Install staff gauges and conduct surveying – one week after well installation
- Conduct first round of groundwater sampling– two weeks after well installation
- Conduct second round of groundwater sampling– one month after first round
- Complete laboratory analysis – four weeks after receipt of samples
- Complete analytical data review – two weeks after receipt of final round of groundwater sample analyses results
- Prepare letter report – four weeks after completion of analytical data review.

We look forward to USEPA's expedited approval of these recommended next steps and the completion of the additional groundwater investigations. If you have any questions, please call Steve Finn or Joe Gormley at 856-793-2005.

Very truly yours,

GOLDER ASSOCIATES INC.

Joseph B. Gormley, Jr., PE
Senior Consultant

Randolph S. White
Principal, Project Director

cc: Rob Allen, FWS
Ed Tokarski
Nancy Grosso

Attachments:
Attachment 1 – Soil Boring/Well Construction Logs
Table 1 – Initial Groundwater Screening Results – Hydropunch Samples
Figure 1 – Initial Screening Results & Proposed Well/Staff Gauge Locations
Figure 2 – Simplified Well Screen Interval Profile Including Screening Results
Figure 3 – Relative Water Elevations in MW-A Wells Over Time
Figure 4 – Relative Water Elevations in MW-B Wells Over Time

JBG/RSW/bjb

ATTACHMENT 1

SOIL BORING/WELL CONSTRUCTION LOGS

RECORD OF BOREHOLE MW-A (Shallow)

PROJECT: Folcroft Landfill
PROJECT NUMBER: 023-6134-007
DRILLED DEPTH: 14.0 ft
AZIMUTH: N/A
LOCATION: Folcroft Landfill

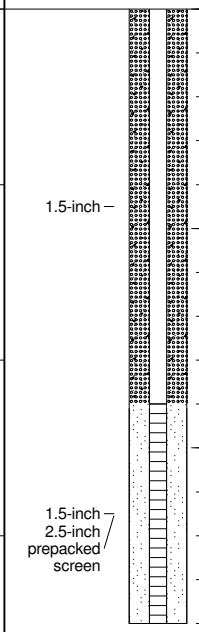
DRILL METHOD: Geoprobe
DRILL RIG: 6610DT
DATE STARTED: 1/5/12
DATE COMPLETED: 1/5/12
WEATHER: Cloudy

DATUM:
COORDS: not surveyed
GS ELEVATION:
TOC ELEVATION:
TEMPERATURE: 30's

INCLINATION: -90
DEPTH W.L.:
ELEVATION W.L.:
DATE W.L.:
TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC / ATT
0		0.0 - 4.0 TOP SOIL, SILT, brown, some organics, trace sand				Run 1	MC	0.5 / 4.0
		4.0 - 5.0 SILT, brown-black, trace organics, micaceous	ML		4.0			
5		5.0 - 8.5 CLAY, brown, mottled, firm, wet, (some silt bottom 2 inches)	CL		5.0	Run 2	MC	2.2 / 4.0
		8.5 - 13.0 SAND-GRAVEL, brown, F-C sand, F gravel, subangular-subrounded, trace silt, moist, loose	SW		8.5	Run 3	MC	3.0 / 4.0
10		13.0 - 14.0 SAND, light brown, F-C sand, trace silt, moist. loose	SW		13.0	Run 4	MC	2.8 / 4.0
		Boring completed at 14.0 ft						
15								
20								
25								
30								
35								

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES



WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0-9
Material: PVC
Diameter: 1.5-inch
Joint Type: Threaded

WELL SCREEN
Interval: 9-14
Material: PVC
Diameter: 1.5-inch
Slot Size: 0.010-inch
End Cap: Threaded

FILTER PACK
Interval: 9-14
Type: prepacked
Quantity: 5 feet

FILTER PACK SEAL
Interval: N/A
Type: N/A
Quantity: N/A

ANNULUS SEAL
Interval: 0-9
Type: Bentonite Grout
Quantity: 9 feet

LOG SCALE:
DRILLING COMPANY: Uni-Tech
DRILLER: Mike Sheppard

GA INSPECTOR: EJ
CHECKED BY: KM
DATE: 2/2/12

Golder Associates

RECORD OF BOREHOLE MW-A (Deep)

PROJECT: Folcroft Landfill
PROJECT NUMBER: 023-6134-007
DRILLED DEPTH: 35.0 ft
AZIMUTH: N/A
LOCATION: Folcroft Landfill

DRILL METHOD: Geoprobe
DRILL RIG: 6610DT
DATE STARTED: 1/5/12
DATE COMPLETED: 1/6/12
WEATHER: Cloudy

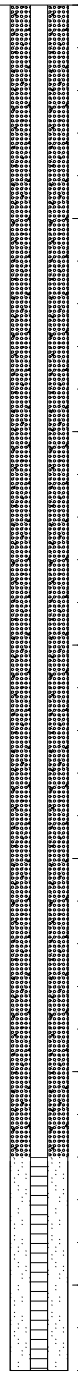
DATUM:
COORDS: not surveyed
GS ELEVATION:
TOC ELEVATION:
TEMPERATURE: 30's

INCLINATION: -90
DEPTH W.L.:
ELEVATION W.L.:
DATE W.L.:
TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC / ATT
0		0.0 - 4.0 TOP SOIL, SILT, brown, some organics, trace sand				Run 1	MC	0.3 / 4.0
		4.0 - 5.0 SILT, brown-black, trace organics, micaceous	ML		4.0			
5		5.0 - 8.5 CLAY, brown, mottled, firm, wet, (some silt bottom 2 inches)	CL		5.0	Run 2	MC	2.2 / 4.0
		8.5 - 13.0 SAND-GRAVEL, brown, F-C sand, F gravel, subangular-subrounded, trace silt, moist, loose	SW		8.5	Run 3	MC	3.0 / 4.0
10		13.0 - 18.5 SAND, light brown, F-C sand, trace silt, moist. loose	SW		13.0	Run 4	MC	2.8 / 4.0
15						Run 5	MC	2.6 / 4.0
		18.5 - 20.0 SAND, light brown, gravel interbeds, C gravel, C sand, moist, loose	SW		18.5			
20		20.0 - 21.0 SAND, brown, M-C sand, moist, loose	SW		20.0	Run 6	MC	2.6 / 4.0
		21.0 - 22.5 SAND, light brown, gravel interbeds	SW		21.0			
		22.5 - 25.5 SAND, light brown, F-C sand, moist, loose (sandy GRAVEL seam at 24.75 ft.)	SW		22.5			
25		25.5 - 33.0 SAND, light brown, gravel interbeds, F gravel, F-C sand, moist-wet, (silty SAND seam at 33 ft.)	SW		25.5	Run 7	MC	2.9 / 4.0
30						Run 8	MC	3.2 / 4.0
		33.0 - 34.5 sandy GRAVEL, light brown-brown, F-C gravel, F-C sand	GW		33.0	Run 9	MC	3.0 / 3.0
35		34.5 - 35.0 FRACTURED ROCK - Refusal at 35 ft.			34.5			

Boring completed at 35.0 ft

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES



WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0-27
Material: PVC
Diameter: 0.75
Joint Type: Threaded

WELL SCREEN
Interval: 27-32
Material: PVC
Diameter: 0.75
Slot Size: 0.010-inch
End Cap: Threaded

FILTER PACK
Interval: 27-32
Type: sand
Quantity: 5 feet

FILTER PACK SEAL
Interval: N/A
Type: N/A
Quantity: N/A

ANNULUS SEAL
Interval: 0-27
Type: Bentonite Grout
Quantity: 27 feet

LOG SCALE:
DRILLING COMPANY: Uni-Tech
DRILLER: Mike Sheppard

GA INSPECTOR: EJ
CHECKED BY: KM
DATE: 2/2/12

Golder Associates

RECORD OF BOREHOLE MW-B (Shallow)

PROJECT: Folcroft Landfill
PROJECT NUMBER: 023-6134-007
DRILLED DEPTH: 15.0 ft
AZIMUTH: N/A
LOCATION: Folcroft Landfill

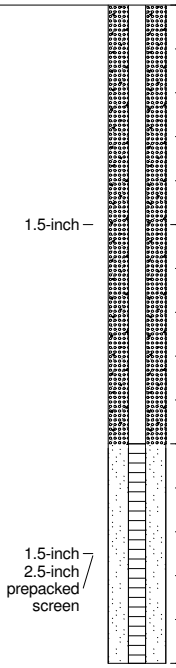
DRILL METHOD: Geoprobe
DRILL RIG: 6610DT
DATE STARTED: 1/6/12
DATE COMPLETED: 1/6/12
WEATHER: Sunny

DATUM:
COORDS: not surveyed
GS ELEVATION:
TOC ELEVATION:
TEMPERATURE: 40's

INCLINATION: -90
DEPTH W.L.:
ELEVATION W.L.:
DATE W.L.:
TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC / ATT
0		0.0 - 4.0 TOP SOIL, black, roots, trace sand and mica				Run 1	MC	1.2 / 4.0
5		4.0 - 9.0 silty CLAY, black-grey-brown, mottled, soft, med plasticity, moist, trace organics	CL-ML		4.0	Run 2	MC	3.7 / 4.0
10		9.0 - 13.8 SAND, brown, gravel interbeds, F-C sand, F gravel, wet, loose	SW		9.0	Run 3	MC	3.8 / 4.0
						Run 4	MC	3.0 / 3.0
		13.8 - 15.0 SAND, brown, F-M sand, trace gravel, wet, loose	SW		13.8			
15		Boring completed at 15.0 ft						
20								
25								
30								
35								

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES



WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0-10
Material: PVC
Diameter: 1.5-inch
Joint Type: Threaded

WELL SCREEN
Interval: 10-15
Material: PVC
Diameter: 1.5-inch
Slot Size: 0.010-inch
End Cap: Threaded

FILTER PACK
Interval: 10-15
Type: Sand
Quantity: 5-feet

FILTER PACK SEAL
Interval: N/A
Type: N/A
Quantity: N/A

ANNULUS SEAL
Interval: 0-10
Type: Bentonite Grout
Quantity: 10-feet

LOG SCALE:
DRILLING COMPANY: Uni-Tech
DRILLER: Mike Sheppard

GA INSPECTOR: EJ
CHECKED BY: KM
DATE: 2/2/12

Golder Associates

RECORD OF BOREHOLE MW-B (Deep)

PROJECT: Folcroft Landfill
PROJECT NUMBER: 023-6134-007
DRILLED DEPTH: 35.0 ft
AZIMUTH: N/A
LOCATION: Folcroft Landfill

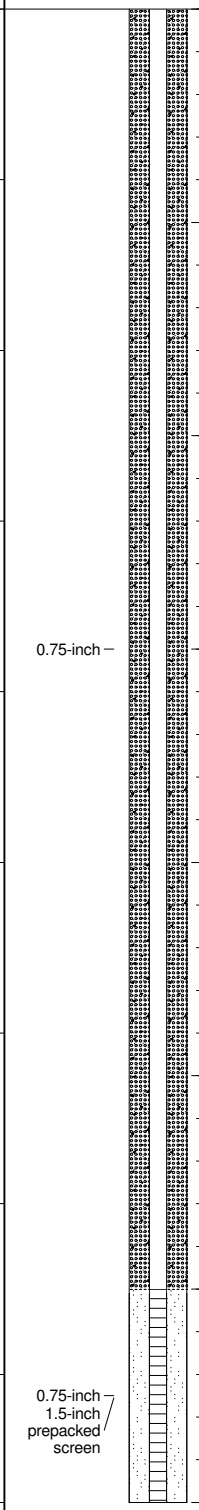
DRILL METHOD: Geoprobe
DRILL RIG: 6610DT
DATE STARTED: 1/6/12
DATE COMPLETED: 1/6/12
WEATHER: Sunny

DATUM:
COORDS: not surveyed
GS ELEVATION:
TOC ELEVATION:
TEMPERATURE: 40's

INCLINATION: -90
DEPTH W.L.:
ELEVATION W.L.:
DATE W.L.:
TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	REC / ATT
0		0.0 - 4.0 TOP SOIL, black, roots, trace sand and mica				Run 1	MC	1.2 / 4.0
5		4.0 - 9.0 silty CLAY, black-grey-brown, mottled, soft, med plasticity, moist, trace organics	CL-ML		4.0	Run 2	MC	3.7 / 4.0
10		9.0 - 13.8 SAND, brown, gravel interbeds, F-C sand, F gravel, wet, loose	SW		9.0	Run 3	MC	3.8 / 4.0
15		13.8 - 16.5 SAND, brown, F-M sand, trace gravel, wet, loose	SW		13.8	Run 4	MC	3.0 / 4.0
20		16.5 - 32.0 SAND, light brown-brown, gravel interbeds, FC sand, F gravel, trace silt, wet, loose	SW		16.5	Run 5	MC	2.9 / 4.0
25						Run 6	MC	2.7 / 4.0
30						Run 7	MC	3.3 / 4.0
35						Run 8	MC	3.2 / 4.0
		32.0 - 35.0 SAND, brown, F sand, wet, trace silt	SP		32.0	Run 9	MC	1.5 / 3.0
		Boring completed at 35.0 ft						

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES



WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0-30
Material: PVC
Diameter: 0.75-inch
Joint Type: Threaded

WELL SCREEN
Interval: 30-35
Material: PVC
Diameter: 0.75-inch
Slot Size: 0.010-inch
End Cap: Threaded

FILTER PACK
Interval: 30-35
Type: Sand
Quantity: 5-feet

FILTER PACK SEAL
Interval: N/A
Type: N/A
Quantity: N/A

ANNULUS SEAL
Interval: 0-30
Type: Bentonite Grout
Quantity: 30-feet

LOG SCALE:
DRILLING COMPANY: Uni-Tech
DRILLER: Mike Sheppard

GA INSPECTOR: EJ
CHECKED BY: KM
DATE: 2/2/12

Golder Associates

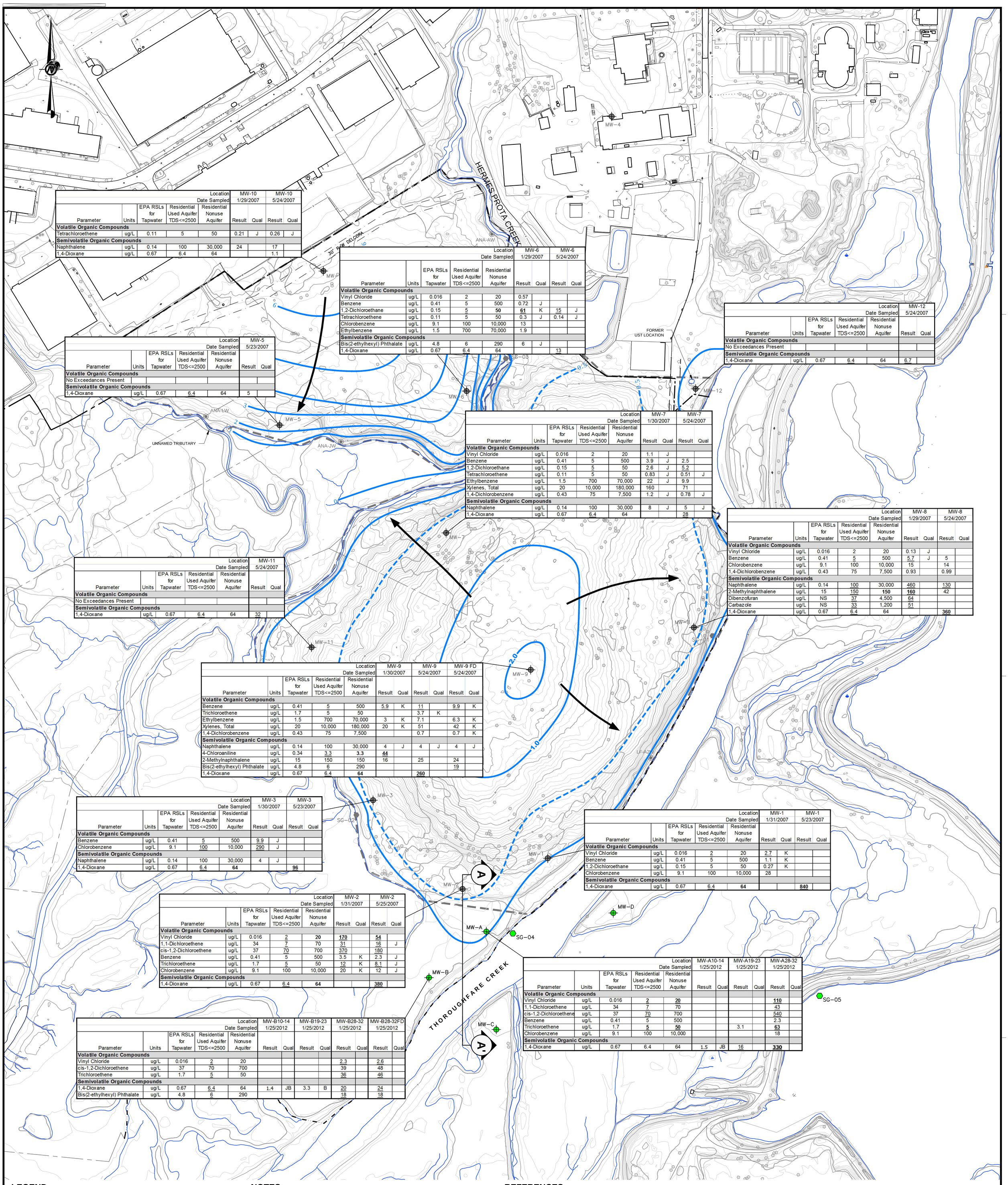
Table 1
Initial Groundwater Screening Results - Hydropunch Samples
Additional Groundwater Investigations
Remedial Investigation/Feasibility Study
Folcroft Landfill and Annex Site - Folcroft, PA

				Sample ID	MW-A			MW-A			MW-A			MW-B			MW-B			MW-B			MW-B		
				Sample Date	1/25/2012			1/25/2012			1/25/2012			1/25/2012			1/25/2012			1/25/2012			1/25/2012		
				N=Normal, FD=Field Duplicate	N			N			N			N			N			N			FD		
				Start Depth (ft)	10			19			28			10			19			28			28		
				End Depth (ft)	14			23			32			14			23			32			32		
Parameter	Unit	Regional Screening Level Table (RSL) Tapwater Criteria	Residential Used Aquifer TDS <=2500	Residential Nonuse Aquifer	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL
Volatile Organic Compounds																									
1,1-Dichloroethene	ug/L	34	**7**	70							**43**		**42**												
Benzene	ug/L	0.41	5	500							2.3		0.5												
Chlorobenzene	ug/L	9.1	100	10000							18		0.5												
cis-1,2-Dichloroethene	ug/L	37	**70**	700							**540**		**42**							39		2.5	48		2.5
Trichloroethene	ug/L	1.7	**5**	*50*				3.1		0.5	***63***		***42***							**36**		**2.5**	**46**		**2.5**
Vinyl Chloride	ug/L	0.016	**2**	*20*							***110***		***42***							**2.3**		**0.5**	**2.6**		**2.5**
Semivolatile Organic Compounds																									
1,4-Dioxane	ug/L	0.67	**6.4**	*64*	1.5	JB	2	**16**		**2**	***330***		***10***	1.4	JB	2	3.3	B	2	**20**		**2**	**24**		**2**
Bis(2-ethylhexyl) Phthalate	ug/L	4.8	**6**	290																**18**		**5**	**18**		**5**

Notes:
1) Only exceedances of the Tapwater Screening Levels are shown. Tapwater Screening Levels are from the United States Environmental Protection Agency (USEPA) Regional Screening Level (RSL) Summary Table, 2009.
2) Results above the Pennsylvania Residential Medium Specific Concentrations (MSCs) (Used Aquifers, TDS<=2500) are shown in **bold**.
3) Results above the Pennsylvania Residential MSCs (Nonuse Aquifers) are shown in *italics*.

Abbreviations:
ug/L = micrograms per liter
Qual = interpreted qualifier
RL = reporting limit
B = blank contamination
J = estimated result

Checked by: SLJ 2/24/2012



Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-10 1/29/2007 Result	Qual	MW-10 5/24/2007 Result	Qual
Volatile Organic Compounds								
Tetrachloroethene	ug/L	0.11	5	50	0.21	J	0.26	J
Semivolatile Organic Compounds								
Naphthalene	ug/L	0.14	100	30,000	24		17	
1,4-Dioxane	ug/L	0.67	6.4	64			1.1	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-6 1/29/2007 Result	Qual	MW-6 5/24/2007 Result	Qual
Volatile Organic Compounds								
Vinyl Chloride	ug/L	0.016	2	20	0.57			
Benzene	ug/L	0.41	5	500	0.72	J		
1,2-Dichloroethane	ug/L	0.15	5	**50**	**61**	K	15	J
Tetrachloroethene	ug/L	0.11	5	50	0.3	J	0.14	J
Chlorobenzene	ug/L	9.1	100	10,000	13			
Ethylbenzene	ug/L	1.5	700	70,000	1.9			
Semivolatile Organic Compounds								
Bis(2-ethylhexyl) Phthalate	ug/L	4.8	6	290	6	J		
1,4-Dioxane	ug/L	0.67	6.4	64			13	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-12 5/24/2007 Result	Qual
Volatile Organic Compounds						
No Exceedances Present						
Semivolatile Organic Compounds						
1,4-Dioxane	ug/L	0.67	6.4	64	6.7	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-5 5/23/2007 Result	Qual
Volatile Organic Compounds						
No Exceedances Present						
Semivolatile Organic Compounds						
1,4-Dioxane	ug/L	0.67	6.4	64	5	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-7 1/30/2007 Result	Qual	MW-7 5/24/2007 Result	Qual
Volatile Organic Compounds								
Vinyl Chloride	ug/L	0.016	2	20	1.1	J		
Benzene	ug/L	0.41	5	500	3.9	J	2.5	
1,2-Dichloroethane	ug/L	0.15	5	50	2.6	J	5.2	
Tetrachloroethene	ug/L	0.11	5	50	0.83	J	0.51	J
Ethylbenzene	ug/L	1.5	700	70,000	22	J	9.9	
Xylenes, Total	ug/L	20	10,000	180,000	160		71	
1,4-Dichlorobenzene	ug/L	0.43	75	7,500	1.2	J	0.78	J
Semivolatile Organic Compounds								
Naphthalene	ug/L	0.14	100	30,000	8	J	5	J
1,4-Dioxane	ug/L	0.67	6.4	64			28	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-8 1/29/2007 Result	Qual	MW-8 5/24/2007 Result	Qual
Volatile Organic Compounds								
Vinyl Chloride	ug/L	0.016	2	20	0.13	J		
Benzene	ug/L	0.41	5	500	5.7	J	5	
Chlorobenzene	ug/L	9.1	100	10,000	15		14	
1,4-Dichlorobenzene	ug/L	0.43	75	7,500	0.93		0.99	
Semivolatile Organic Compounds								
Naphthalene	ug/L	0.14	100	30,000	460		130	
2-Methylnaphthalene	ug/L	15	150	**150**	**160**		42	
Dibenzofuran	ug/L	NS	37	4,500	64			
Carbazole	ug/L	NS	33	1,200	51			
1,4-Dioxane	ug/L	0.67	6.4	64			**360**	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-11 5/24/2007 Result	Qual
Volatile Organic Compounds						
No Exceedances Present						
Semivolatile Organic Compounds						
1,4-Dioxane	ug/L	0.67	6.4	64	32	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-9 1/30/2007 Result	Qual	MW-9 5/24/2007 Result	Qual	MW-9 FD 5/24/2007 Result	Qual
Volatile Organic Compounds										
Benzene	ug/L	0.41	5	500	5.9	K	11		9.9	K
Trichloroethene	ug/L	1.7	5	50			3.7	K		
Ethylbenzene	ug/L	1.5	700	70,000	3	K	7.1		6.3	K
Xylenes, Total	ug/L	20	10,000	180,000	20	K	51		42	K
1,4-Dichlorobenzene	ug/L	0.43	75	7,500			0.7		0.7	K
Semivolatile Organic Compounds										
Naphthalene	ug/L	0.14	100	30,000	4	J	4	J	4	J
4-Chloroaniline	ug/L	0.34	3.3	**3.3**	**44**					
2-Methylnaphthalene	ug/L	15	150	150	16		25		24	
Bis(2-ethylhexyl) Phthalate	ug/L	4.8	6	290					19	
1,4-Dioxane	ug/L	0.67	6.4	**64**			**260**			

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-3 1/30/2007 Result	Qual	MW-3 5/23/2007 Result	Qual
Volatile Organic Compounds								
Benzene	ug/L	0.41	5	500	9.9	J		
Chlorobenzene	ug/L	9.1	100	10,000	290	J		
Semivolatile Organic Compounds								
Naphthalene	ug/L	0.14	100	30,000	4	J		
1,4-Dioxane	ug/L	0.67	6.4	**64**			**96**	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-1 1/31/2007 Result	Qual	MW-1 5/23/2007 Result	Qual
Volatile Organic Compounds								
Vinyl Chloride	ug/L	0.016	2	20	2.7	K		
Benzene	ug/L	0.41	5	500	1.1	K		
1,2-Dichloroethane	ug/L	0.15	5	50	0.27	K		
Chlorobenzene	ug/L	9.1	100	10,000	28			
Semivolatile Organic Compounds								
1,4-Dioxane	ug/L	0.67	6.4	**64**			**840**	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-2 1/31/2007 Result	Qual	MW-2 5/25/2007 Result	Qual
Volatile Organic Compounds								
Vinyl Chloride	ug/L	0.016	2	**20**	**170**		**54**	
1,1-Dichloroethene	ug/L	34	7	70	31		16	J
cis-1,2-Dichloroethene	ug/L	37	70	700	370		180	
Benzene	ug/L	0.41	5	500	3.5	K	2.3	J
Trichloroethene	ug/L	1.7	5	50	12	K	8.1	J
Chlorobenzene	ug/L	9.1	100	10,000	20	K	12	J
Semivolatile Organic Compounds								
1,4-Dioxane	ug/L	0.67	6.4	**64**			**380**	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-A10-14 1/25/2012 Result	Qual	MW-A19-23 1/25/2012 Result	Qual	MW-A28-32 1/25/2012 Result	Qual
Volatile Organic Compounds										
Vinyl Chloride	ug/L	0.016	2	20					**110**	
1,1-Dichloroethene	ug/L	34	7	70					43	
cis-1,2-Dichloroethene	ug/L	37	70	700					540	
Benzene	ug/L	0.41	5	500					2.3	
Trichloroethene	ug/L	1.7	5	50			3.1		63	
Chlorobenzene	ug/L	9.1	100	10,000					18	
Semivolatile Organic Compounds										
1,4-Dioxane	ug/L	0.67	6.4	64	1.5	JB	16		**330**	

Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	MW-B10-14 1/25/2012 Result	Qual	MW-B19-23 1/25/2012 Result	Qual	MW-B28-32 1/25/2012 Result	Qual	MW-B28-32FD 1/25/2012 Result	Qual
Volatile Organic Compounds												
Vinyl Chloride	ug/L	0.016	2	20					2.3		2.6	
cis-1,2-Dichloroethene	ug/L	37	70	700					39		48	
Trichloroethene	ug/L	1.7	5	50					36		46	
Semivolatile Organic Compounds												
1,4-Dioxane	ug/L	0.67	6.4	64	1.4	JB	3.3	B	20		24	
Bis(2-ethylhexyl) Phthalate	ug/L	4.8	6	290					18		18	

LEGEND

- PROPERTY LINE
- EASEMENT OR RIGHT-OF-WAY
- EDGE OF ROAD
- APPROXIMATE SITE BOUNDARIES
- MONITORING WELL (SEE NOTE 3)
- PROPOSED TEMPORARY MONITORING WELL (SEE NOTE 6)
- PROPOSED STAFF GAUGE
- STAFF GAUGE
- SEEP SAMPLING LOCATION
- 2 GROUNDWATER CONTOUR
- GROUNDWATER FLOW DIRECTION
- A A' ALIGNMENT OF WELL SCREEN INTERVAL PROFILE (SEE FIGURE 2)

NOTES

1.) ANALYTES TABULATED ARE THOSE WHICH EXCEED USEPA REGIONAL SCREENING LEVELS FOR TAP WATER DECEMBER 10, 2009 UPDATE.

2.) ANALYTES THAT EXCEED THE PADEP USED AQUIFER (TDS <=2500) RESIDENTIAL MEDIUM SPECIFIC CONCENTRATIONS FOR ORGANIC AND INORGANIC REGULATED SUBSTANCES IN GROUNDWATER, UPDATED NOVEMBER 24, 2001, ARE SHOWN UNDERLINED. ANALYTES THAT EXCEED THE PADEP NONUSE AQUIFER NON-RESIDENTIAL SPECIFIC CONCENTRATIONS FOR ORGANIC AND INORGANIC REGULATED SUBSTANCES IN GROUNDWATER, UPDATED NOVEMBER 24, 2001, ARE SHOWN IN BOLD.

3.) MONITORING WELLS MW-1 THROUGH MW-5 AND MW-12 (HISTORIC MONITORING WELLS) WERE INSTALLED BY OTHERS. ALL OTHER WERE INSTALLED BY GOLDER (NEW MONITORING WELLS).

4.) USEPA REGION III QUALIFIERS
- B= BLANK CONTAMINATION
- J= ESTIMATED RESULT
- K= BIASED HIGH
- L= BIASED LOW

5.) WATER LEVELS FROM DATALOGGER DATA FROM MARCH 21, 2007 AT 00:16.

6.) SHALLOW AND DEEP MONITORING WELLS WERE INSTALLED AT LOCATIONS MW-A AND MW-B IN JANUARY 2012. WELLS AT LOCATIONS MW-C AND MW-D ARE PROPOSED.

REFERENCES

1.) BASE MAP PROVIDED IN DIGITAL FORM BY USEPA, MARCH 2003.

2.) HORIZONTAL DATUM IS THE PENNSYLVANIA STATE PLANE COORDINATE SYSTEM OF 1983 (NAD 83).

3.) PROPERTY BOUNDARY, EASEMENTS AND R/W TAKEN FROM DIGITAL CAD FILE FOLCROFT.DWG, TITLED "FOLCROFT LANDFILL & ANNEX TRACTS 14D, 16, 16B, 27 & 27A," DATED JUNE 1, 2006, PROVIDED BY JAMES M. STEWART, INC.

4.) MONITORING WELLS MW-1 THROUGH MW-12 AND STAFF GAUGES SG-1 THROUGH SG-3 SURVEYED BY JAMES M. STEWART, MARCH 20, 2007.

120 0 120 240
SCALE FEET

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW

PROJECT
ADDITIONAL GROUNDWATER INVESTIGATIONS
FOLCROFT LANDFILL AND ANNEX SITE
FOLCROFT, PENNSYLVANIA

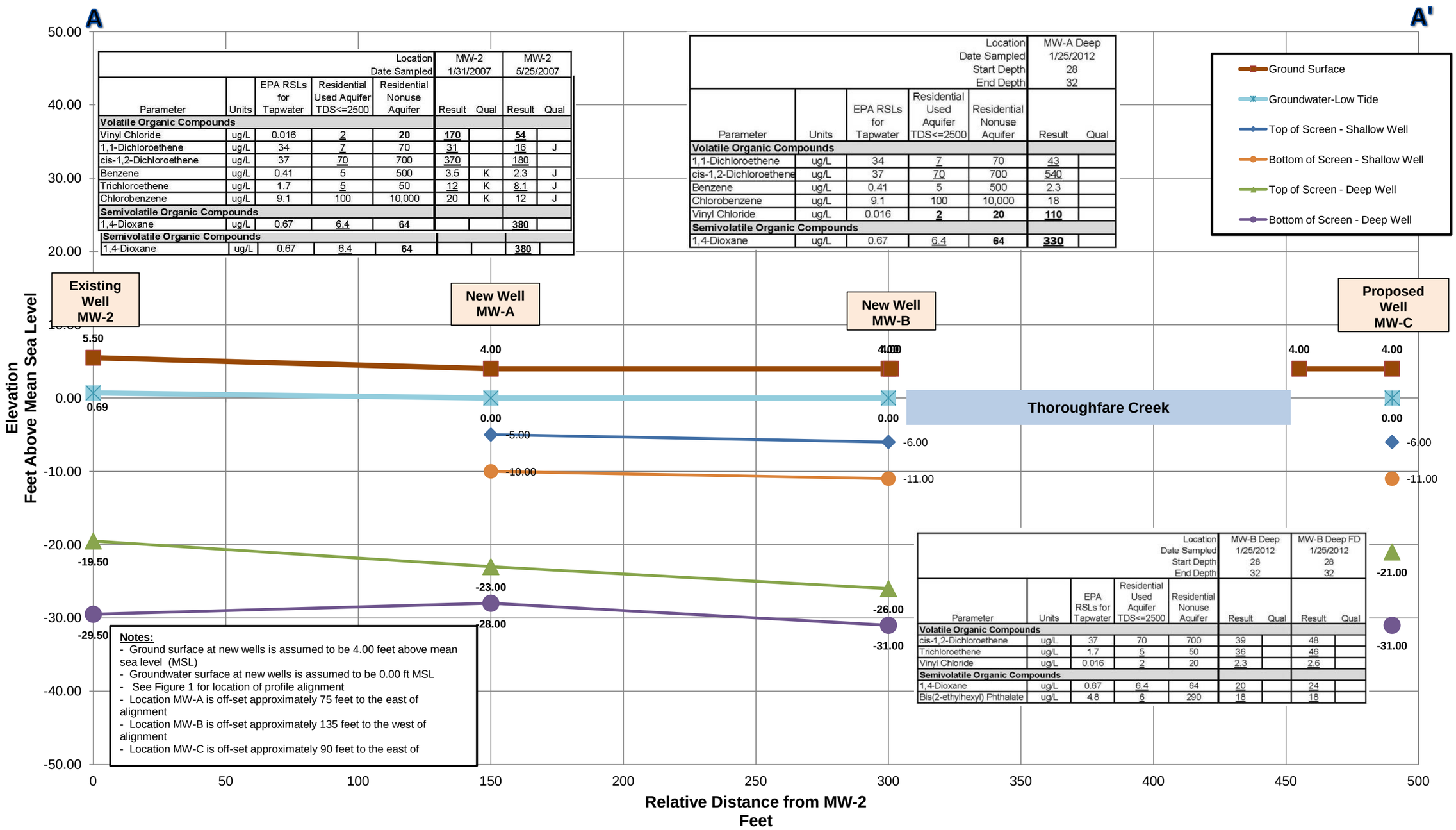
TITLE
INITIAL SCREENING RESULTS AND PROPOSED WELL / STAFF GAUGE LOCATIONS

Golder Associates
Mt. Laurel, New Jersey

PROJECT No.		023-6134	FILE No.	0236134H001
DESIGN	JBG	02/29/12	SCALE AS SHOWN	REV. 0
CADD	AM	02/29/12		
CHECK	JBG	02/29/12		
REVIEW	RSW	02/29/12		

FIGURE 1

Figure 2
Simplified Well Screen Interval Profile Including Screening Results
Additional Groundwater Investigations
Folcroft Landfill and Annex Site



				Location	MW-2		MW-2	
				Date Sampled	1/31/2007		5/25/2007	
Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	Result	Qual	Result	Qual
Volatile Organic Compounds								
Vinyl Chloride	ug/L	0.016	2	**20**	**170**		**54**	
1,1-Dichloroethene	ug/L	34	7	70	31		16	J
cis-1,2-Dichloroethene	ug/L	37	70	700	370		180	
Benzene	ug/L	0.41	5	500	3.5	K	2.3	J
Trichloroethene	ug/L	1.7	5	50	12	K	8.1	J
Chlorobenzene	ug/L	9.1	100	10,000	20	K	12	J
Semivolatile Organic Compounds								
1,4-Dioxane	ug/L	0.67	6.4	**64**			**380**	
Semivolatile Organic Compounds								
1,4-Dioxane	ug/L	0.67	6.4	**64**			**380**	

				Location	MW-A Deep	
				Date Sampled	1/25/2012	
				Start Depth	28	
				End Depth	32	
Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	Result	Qual
Volatile Organic Compounds						
1,1-Dichloroethene	ug/L	34	7	70	43	
cis-1,2-Dichloroethene	ug/L	37	70	700	540	
Benzene	ug/L	0.41	5	500	2.3	
Chlorobenzene	ug/L	9.1	100	10,000	18	
Vinyl Chloride	ug/L	0.016	**2**	**20**	**110**	
Semivolatile Organic Compounds						
1,4-Dioxane	ug/L	0.67	6.4	**64**	**330**	

				Location	MW-B Deep		MW-B Deep FD	
				Date Sampled	1/25/2012		1/25/2012	
				Start Depth	28		28	
				End Depth	32		32	
Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	Result	Qual	Result	Qual
Volatile Organic Compounds								
cis-1,2-Dichloroethene	ug/L	37	70	700	39		48	
Trichloroethene	ug/L	1.7	5	50	36		46	
Vinyl Chloride	ug/L	0.016	2	20	2.3		2.6	
Semivolatile Organic Compounds								
1,4-Dioxane	ug/L	0.67	6.4	64	20		24	
Bis(2-ethylhexyl) Phthalate	ug/L	4.8	6	290	18		18	

Notes:
- Ground surface at new wells is assumed to be 4.00 feet above mean sea level (MSL)
- Groundwater surface at new wells is assumed to be 0.00 ft MSL
- See Figure 1 for location of profile alignment
- Location MW-A is off-set approximately 75 feet to the east of alignment
- Location MW-B is off-set approximately 135 feet to the west of alignment
- Location MW-C is off-set approximately 90 feet to the east of

Golder Associates

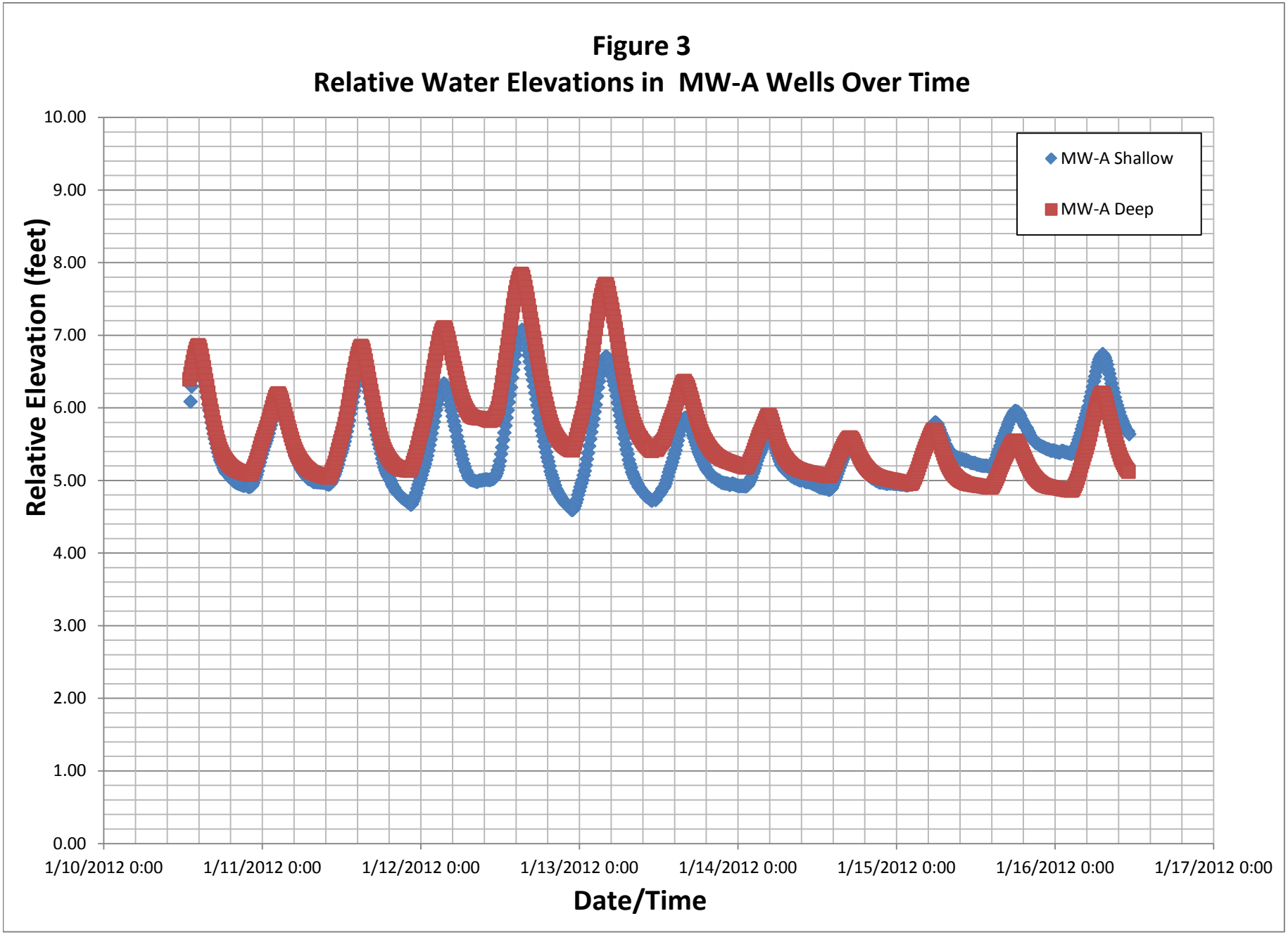


Figure 3
Relative Water Elevations in MW-A Wells Over Time
Relative Elevation (feet)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1/10/2012 0:00
1/11/2012 0:00
1/12/2012 0:00
1/13/2012 0:00
1/14/2012 0:00
1/15/2012 0:00
1/16/2012 0:00
1/17/2012 0:00
Date/Time
MW-A Shallow
MW-A Deep

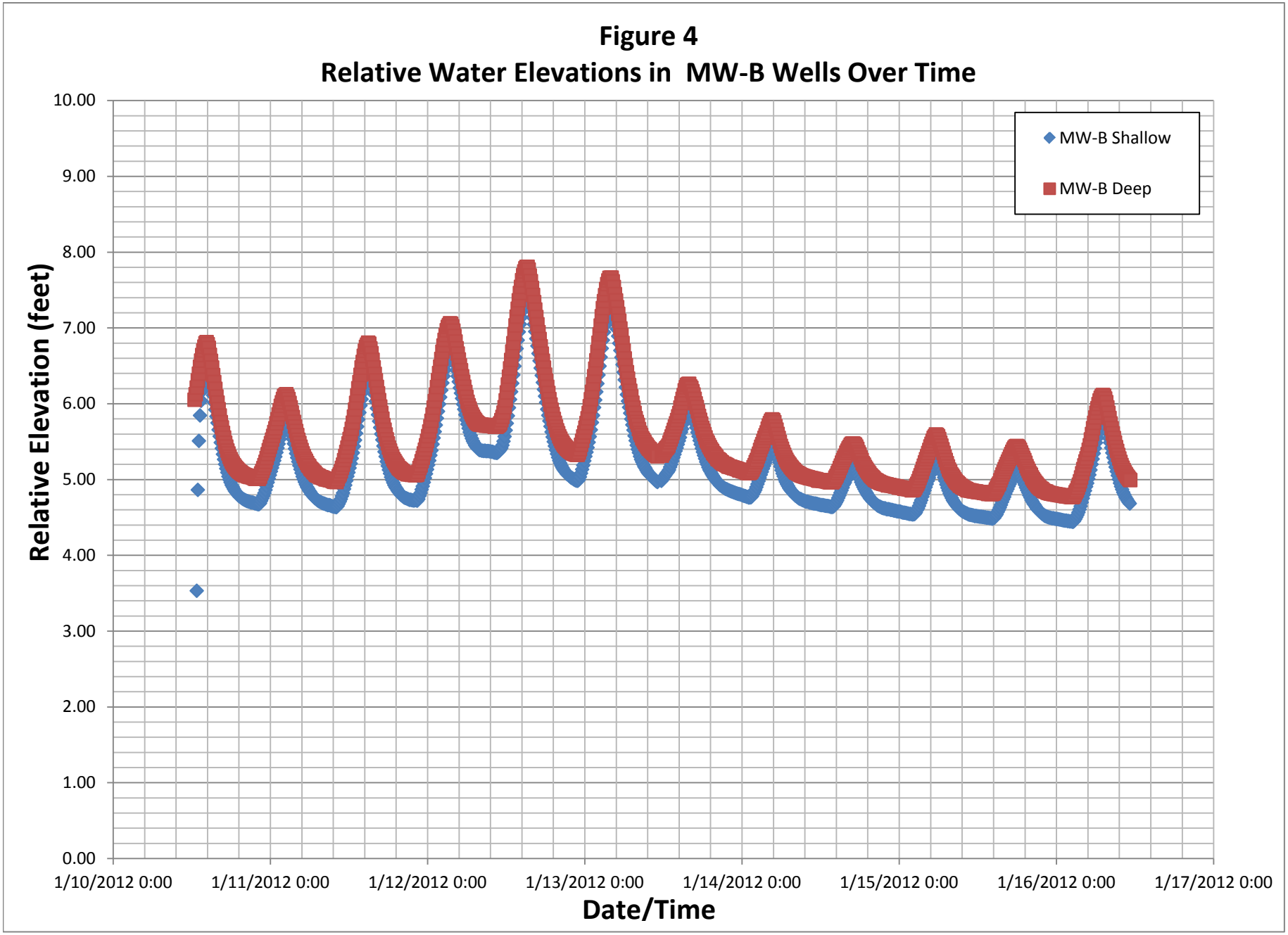


Figure 4
Relative Water Elevations in MW-B Wells Over Time
MW-B Shallow
MW-B Deep
Relative Elevation (feet)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1/10/2012 0:00
1/11/2012 0:00
1/12/2012 0:00
1/13/2012 0:00
1/14/2012 0:00
1/15/2012 0:00
1/16/2012 0:00
1/17/2012 0:00
Date/Time

- **Sand and Gravel:** This layer consists of fine to coarse sand with varying amounts of fine to coarse gravel. This layer extended to the base of the borings. The sand and gravel layer is consistent with the overburden layer observed at the landfill and is the primary groundwater bearing unit.

1.1.2 Well Construction

Shallow and deep wells were installed within the sand and gravel layer. The deep wells were screened consistent with the zones currently monitored by existing wells MW-1 and MW-2. The screen for MW-AD was set 27-32 feet bgs and the screen for MW-BD was set at 30-35 bgs. The deep wells were constructed with a 5-foot, 0.75-inch pre-packed screen and a 0.75-inch polyvinyl chloride (PVC) riser pipe.

The screen for shallow well MW-AS was set at 9 to 14 feet bgs and the screen for shallow well MW-BS was set at 10 to 15 feet bgs. The shallow wells were constructed with a 5-foot, 1.5-inch pre-packed screen with a 1.5-inch PVC riser pipe.

All wells were completed with an approximate 3-foot stickup and locking outer well casing. Well construction logs also are shown in Attachment 1. A profile showing the screen intervals for the new wells in relation to landfill well MW-2 is provided on Figure 2. The alignment of the profile is shown on Figure 1.

1.3 Discrete Groundwater Sampling

In accordance with the approved scope of work and to provide a vertical profile, Hydropunch groundwater samples were collected on January 25, 2012 from two borings installed adjacent to each monitoring well pair location (MW-A and MW-B) at three depths intervals corresponding to the screen interval of the deep and shallow wells and an intermediate point. Field measurement of turbidity levels for the Hydropunch samples ranged from approximately 140 to 600 ntu.

The groundwater samples were submitted to CompuChem for analysis of Target Compound List (TCL) VOCs and TCL SVOCs, including 1,4-dioxane by the SVOC method. The laboratory results were checked for completeness and validated. Detections above Regional Screening Levels (RSLs) for tapwater were tabulated and compared to Pennsylvania Groundwater Medium-Specific Concentrations (MSCs). The results are shown in the attached Table 1 and on Figure 1. There were no detections above the Pennsylvania aquatic life surface water quality criteria.

1.4 Synoptic Water Level Event Results

Continuous water level measures were recorded in wells MW-AS, MW-AD, MW-BS, and MW-BD from January 10–16, 2012 using transducer/data loggers. Plots of these water levels are attached as Figures 3 and 4. In accordance with the approved scope of work, the wells were not surveyed for the screening evaluation. The water levels are based on an arbitrary datum selected for each well pair to allow an assessment of vertical gradients. The water level data generally show upward hydraulic gradients in each well pair.

2.0 CONCLUSIONS

The main conclusions of the initial screening evaluation are provided below:

- Both the shallow and deep wells are installed in the sand and gravel layer (the primary groundwater bearing unit). A four to five foot thick clay-silt layer resides above the sand and gravel layer.
- Higher concentrations of both VOCs and SVOCs were detected in the deeper Hydropunch samples at locations MW-A and MW-B.

- Concentrations of VOCs and SVOCs are considerably lower farther from the landfill at location MW-B. For example, 1,4-dioxane decreased from 330 ug/l at MW-A to 20 to 24 ug/l at MW-B. In addition, the VOC and SVOC concentrations were determined from turbid Hydropunch samples and are expected to decrease in samples that will be collected from developed wells at locations MW-A and MW-B.
- There are variable upward hydraulic gradients, indicating that there is some upward hydraulic pressure in the upper part of the water bearing zone.

Based on the above, and consistent with the December 21, 2011 scope of work, three additional monitoring wells are proposed across the creek to improve the understanding of the nature and extent of 1,4-dioxane migration and the relationship between groundwater and surface water.

3.0 RECOMMENDED NEXT STEPS

The following next steps are proposed to complete the implementation of the Additional Groundwater Investigations scope of work.

1. Install a total of three wells at locations MW-C (well pair) and MW-D (single well) across the creek as shown on Figure 1. The proposed well pair at MW-C will be similar to the well pairs installed at locations MW-A and MW-B and will consist of a shallow well (MW-CS) screened from approximately 10 to 15 feet bgs (5-foot screen) and a deeper well (MW-CD) screened from approximately 25 to 35 feet bgs (10-foot screen) as shown on Figure 2. In addition to providing chemistry information, the well pair at MW-C is designed to allow for the assessment of vertical gradients across the creek. Well MW-D is positioned across the creek from MW-1 where the USEPA, as part of its own sampling activities, detected the highest concentrations of 1,4-dioxane.

   Prior to conducting the screening investigation, Golder tentatively identified using tripod driven well points for well installation across the creek. However, drive points are not likely to achieve the greater well depths now proposed. Based on discussions with the driller, it is tentatively proposed to use a skid-mounted tripod rig and a cut and wash method that would involve advancing a borehole with a drive casing, flushing the casing with water, installing a 2-inch diameter PVC well casing and screen (ten-slot) inside the casing, placing a gravel pack, and grouting to the surface. The wash water would be run through a tub where the soil cuttings would be collected and the wash water would be recycled. Collected drill cuttings would be containerized in 55-gallon drums and staged on the landfill for future testing and disposal. The skid-mounted rig would be mobilized to the well locations using a barge.

2. Install additional staff gauges at the toe of the landfill (SG-04) and in the surface water impoundment at the wildlife refuge (SG-05) east of the creek (see Figure 1) to assist in assessing influences of the creek and pond on groundwater flow.

3. Survey all newly installed wells (MW-AS, MW-AD, MW-BS and MW-BD) as well as proposed wells (MW-CS, MW-CD, and MW-D) and new staff gauges. Place water level data loggers in the new wells, staff gauges, and select existing landfill wells (MW-1, MW-2, MW-3, MW-8, and MW-9) to provide a better understanding of groundwater flow and the hydraulic relationship between site groundwater and adjacent surface waters.

4. Perform two rounds of groundwater sampling for all of the new wells and existing Site wells MW-1, MW-2, MW-3, MW-8, and MW-9 as per the approved scope of work.

4.0 SCHEDULE

The following schedule is anticipated to complete the groundwater investigation:

- Finalize drilling procedures and methods – three weeks from USEPA approval

- Mobilize driller and install wells MW-CS, MW-CD, and MW-D – one week (assuming driller availability and acceptable weather and tide conditions)
- Install staff gauges and conduct surveying – one week after well installation
- Conduct first round of groundwater sampling– two weeks after well installation
- Conduct second round of groundwater sampling– one month after first round
- Complete laboratory analysis – four weeks after receipt of samples
- Complete analytical data review – two weeks after receipt of final round of groundwater sample analyses results
- Prepare letter report – four weeks after completion of analytical data review.

We look forward to USEPA's expedited approval of these recommended next steps and the completion of the additional groundwater investigations. If you have any questions, please call Steve Finn or Joe Gormley at 856-793-2005.

Very truly yours,

GOLDER ASSOCIATES INC.

Joseph B. Gormley, Jr., PE
Senior Consultant

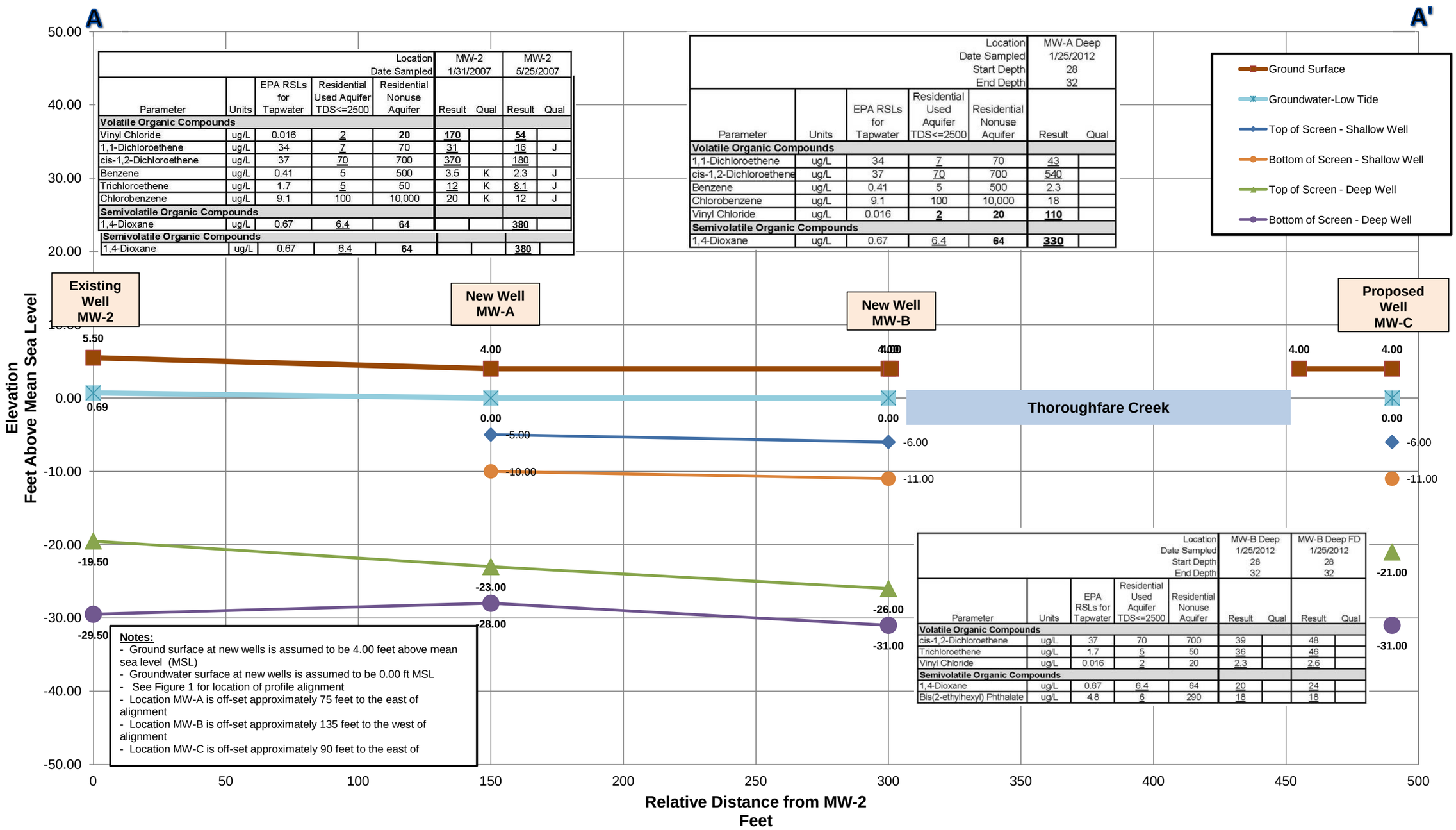
Randolph S. White
Principal, Project Director

cc: Rob Allen, FWS
Ed Tokarski
Nancy Grosso

Attachments:
Attachment 1 – Soil Boring/Well Construction Logs
Table 1 – Initial Groundwater Screening Results – Hydropunch Samples
Figure 1 – Initial Screening Results & Proposed Well/Staff Gauge Locations
Figure 2 – Simplified Well Screen Interval Profile Including Screening Results
Figure 3 – Relative Water Elevations in MW-A Wells Over Time
Figure 4 – Relative Water Elevations in MW-B Wells Over Time

JBG/RSW/bjb

Figure 2
Simplified Well Screen Interval Profile Including Screening Results
Additional Groundwater Investigations
Folcroft Landfill and Annex Site



				Location	MW-2		MW-2	
				Date Sampled	1/31/2007		5/25/2007	
Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	Result	Qual	Result	Qual
Volatile Organic Compounds								
Vinyl Chloride	ug/L	0.016	2	**20**	**170**		**54**	
1,1-Dichloroethene	ug/L	34	7	70	31		16	J
cis-1,2-Dichloroethene	ug/L	37	70	700	370		180	
Benzene	ug/L	0.41	5	500	3.5	K	2.3	J
Trichloroethene	ug/L	1.7	5	50	12	K	8.1	J
Chlorobenzene	ug/L	9.1	100	10,000	20	K	12	J
Semivolatile Organic Compounds								
1,4-Dioxane	ug/L	0.67	6.4	**64**			**380**	
Semivolatile Organic Compounds								
1,4-Dioxane	ug/L	0.67	6.4	**64**			**380**	

				Location	MW-A Deep	
				Date Sampled	1/25/2012	
				Start Depth	28	
				End Depth	32	
Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	Result	Qual
Volatile Organic Compounds						
1,1-Dichloroethene	ug/L	34	7	70	43	
cis-1,2-Dichloroethene	ug/L	37	70	700	540	
Benzene	ug/L	0.41	5	500	2.3	
Chlorobenzene	ug/L	9.1	100	10,000	18	
Vinyl Chloride	ug/L	0.016	**2**	**20**	**110**	
Semivolatile Organic Compounds						
1,4-Dioxane	ug/L	0.67	6.4	**64**	**330**	

				Location	MW-B Deep		MW-B Deep FD	
				Date Sampled	1/25/2012		1/25/2012	
				Start Depth	28		28	
				End Depth	32		32	
Parameter	Units	EPA RSLs for Tapwater	Residential Used Aquifer TDS<=2500	Residential Nonuse Aquifer	Result	Qual	Result	Qual
Volatile Organic Compounds								
cis-1,2-Dichloroethene	ug/L	37	70	700	39		48	
Trichloroethene	ug/L	1.7	5	50	36		46	
Vinyl Chloride	ug/L	0.016	2	20	2.3		2.6	
Semivolatile Organic Compounds								
1,4-Dioxane	ug/L	0.67	6.4	64	20		24	
Bis(2-ethylhexyl) Phthalate	ug/L	4.8	6	290	18		18	

Notes:
- Ground surface at new wells is assumed to be 4.00 feet above mean sea level (MSL)
- Groundwater surface at new wells is assumed to be 0.00 ft MSL
- See Figure 1 for location of profile alignment
- Location MW-A is off-set approximately 75 feet to the east of alignment
- Location MW-B is off-set approximately 135 feet to the west of alignment
- Location MW-C is off-set approximately 90 feet to the east of

Golder Associates