Seymour
Environmental Services, Inc.

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May 8, 2015

RECEIVED 5-11-15

Mr. Will Myers
Wisconsin Department of Natural Resources
3911 Fish Hatchery Road
Madison, Wisconsin 53711

Re: Request for Closure Consideration 02-13-256630
Former Superior Health Linen Property - 1509 Emil Street
Madison, Wisconsin

Dear Mr. Myers:

Seymour Environmental Services, Inc. (Seymour) previously presented the results of vapor intrusion sampling at the above referenced site and they are also included here. We feel that the site may be closed in its current condition.

Summary of Environmental Activities

Previous Investigation/Closure

Beginning in 2000, ~~an~~ environmental assessment work was performed by ARCADIS, Geraghty & Miller, prior to a real estate transaction. CVOCs were present in shallow soil near the southeast corner of the building. Groundwater with CVOC contamination was present in the shallow groundwater along the eastern side of the building. Tetrachloroethene (PCE) was present above the NR140 preventative action limit in water at MW-1 and MW-3, and above the enforcement standard in MW-2. The data was submitted to the WDNR and the site was closed to further environmental-related activities with a GIS Registry for residual soil and groundwater contamination (Figure 1).

Seymour Sampling Activities

Soil Sampling

On March 22, 2013 soil samples were collected at three locations beneath the building at the site. A single sample was collected at each location below the concrete floor. No analytes were detected in the two soil samples collected in the southern portion of the building (PIT, South). One analyte, PCE, was present in the soil sample collected at the remaining probe (north), which is located adjacent to a floor drain near the large metal shear. The PCE concentration in that point was 38 ug/kg. This concentration exceeds the groundwater protection standard of 2.3 ug/kg established by the USEPA and adopted by the WDNR. Soil analytical data is summarized in Table 1. The sampling locations are shown Figure 2.

1 on

On Jul 29, 2013, Seymour met On-Site Environmental to install borings in an attempt to collect groundwater samples. We installed two borings to refusal where a soil sample was collected (15 and 9 feet) in each boring shown on Figure 3. Neither soil sample had detectable levels of any VOCs.

Sub Slab/Indoor Air Vapor Sampling

On March 25, 2013 vapor sampling was conducted at the site. Samples of subslab vapors were collected from the three probes installed on March 22, 2013. A sample of the indoor air was collected near the southeast corner of the building. Vapor sampling results indicated that vapors beneath the building contain elevated levels of CVOCs. However, the indoor air sample showed that the vapor levels in the former boiler room are below the indoor air action levels. Subslab vapors contained CVOCs at each of the three sampling points. Subslab vapor samples contained three CVOCs: tetrachloroethene (PCE), trichloroethene (TCE), and trans 1,2 dichloroethene (trans 1,2 DCE). The highest vapor levels were PCE, which was present at each of the sampling points. The PCE level in the subslab samples ranged from 300 ppbv to 6100 ppbv. Both TCE and trans 1,2 DCE also were detected at the subslab sampling point near the southeast corner of the building (SS-1). The level of both compounds was less than 1 ppbv. The PCE levels in each of the subslab vapor samples exceed the WDNR action level for non-residential properties of 270 ppbv for non-residential properties. Vapor sampling analytical results are included in Table 2.

The information collected during 2013 was submitted to the WDNR. After review of the data the WDNR requested that additional assessment be conducted. In particular, they expressed concerns regarding the extent of hazardous vapor below your building and whether these vapors extend under adjacent structures. Since CVOC vapors are known to emanate from contaminated groundwater the WDNR suggested that further characterization of the groundwater contamination could aid in determining if neighboring properties may be at risk for vapor intrusion.

A second round of vapor sampling was conducted at the site in the summer of 2014. The objective of the sample was to evaluate the extent of hazardous vapors beneath the building slab. On June 4, 2014 vapor probes were installed at three locations in the building. Two sub-slab probes were installed near the western edge of the building (SS-4 and SS-5) and the third probe (SS-3A) was installed near a previous sampling location but slightly further from the sewer lines. Vapor sampling was conducted at the site on July 7-8, 2014. The vapor samples were collected using a 6-liter Summa canister provided by the Wisconsin State Lab of Hygiene. The sub-slab sampling canisters were equipped with a regulator so that the canister filled over a 30-minute period limiting the flow to approximately 200 ml/min. The canister used to collect the indoor air sample was equipped with a regulator so that it filled over a 24 hour period. The vapor sample was analyzed for CVOCs.

Vapor sampling results at the site indicate that CVOC vapors are widespread beneath the building. Only one analyte was detected in the sub-slab samples, tetrachloroethene (PCE). It should be noted, however, that the detection levels for other CVOCs were elevated significantly in the most highly contaminated sample (SS-3A). The PCE level in the vapors beneath the northeast portion of the building (SS-3A) was very high, 3,700 ppbv. This is slightly lower than the value measured at SS-3 which is located about 2 feet nearer to the sewer line. The PCE level in the vapors beneath the northwestern part of the building (SS-4) was also high (480 ppbv) and exceeded the WDNR sub-slab screening level for non-residential buildings of 270 vppb. The sub-slab vapor levels in the southwestern portion of the building were much lower (SS-5). Only PCE was detected in this area; the concentration was 8.2 vppb. Vapor sampling data is summarized in Table 2 and the sampling locations are shown on Figure 4.

Indoor samples show that CVOCs are present in the indoor air in the buildings at the subject parcel. The contaminant levels detected in the indoor air were below the health advisory standards for both non-residential and residential properties. The only CVOC detected in the indoor air samples was PCE. The PCE concentrations in the indoor air samples were approximately 0.3 ppbv. This concentration is below the acceptable indoor air quality standard. Results of the indoor air sampling are included on Table 2.

Passive Vapor Sampling

Passive vapor sampling was conducted to establish the distribution of CVOCs at the site near utility trenches as well as determining whether vapors may be present on the neighboring property to the south. This method was selected to characterize the CVOC distribution since bedrock prevented the collection of groundwater samples using a geoprobe. Seven points were placed around the building on June 4, 2014. Shallow boreholes were installed and a collector tube containing adsorptive media was placed in each of the boreholes. A foil seal was placed above the each collector tube and the surface was sealed with material similar to the adjacent surface (soil, asphalt). After 9 days the collector tubes were removed and the samples were submitted to Beacon Environmental Services for analysis. The passive vapor samples were analyzed for VOCs including the compounds associated with dry cleaning activities.

CVOCs were identified in 5 of the 7 samples. Significant levels of CVOCs were detected at two of the passive sampling points, PS-6 and PS-7. These locations are located along the sanitary sewer service exiting the northeast side of the building (PS-6), and the sanitary sewer beneath the building (PS-7). A number of CVOCs were detected in each of these points. The highest CVOC levels were tetrachloroethene. Tetrachloroethene (PCE) was present at 127 nanograms (PS-6) and 11,230 nanograms (PS-7) at these sampling points. Sample PS-7 was installed within the former subslab probe SS-3 where tetrachloroethene has been identified at 6,110 vppb in early 2013. The most widespread CVOC detected was trans 1, 2 dichloroethene which was present in 5 of the 7 samples. The trans 1, 2 dichloroethene level ranged from <10 to 27 nanograms. The samples where trans 1, 2 dichloroethene was detected are located beneath the building and immediately surrounding the building on the north, south and east sides. This is the general area where CVOCs were identified previously. Analytical data from the passive sampling are summarized in Table 3 and on Figure 5.

Discussion of Results

Data collected at the site confirms that CVOCs are present in the subsurface. Soil analytical data collected in 1999 and 2013 indicate that contaminants are present in the shallow soils. The historic groundwater data supports this since PCE was identified at levels exceeding the NR140 ES in the groundwater on the northern portion of the site.

Sub-slab vapor sampling confirms that PCE is present at levels exceeding the generic screening levels for non-residential properties beneath the north and east portions of the building. The highest sub slab and passive vapors have all been found along the drain/sewer trench exiting the building. The hazardous vapor levels do not appear to extend beneath the southwestern part of the building. The passive gas sampling indicates that the high levels of CVOCs in the shallow soil vapors are restricted to the immediate area of the building. No significant CVOCs were noted in passive sampling points located away from the building including the point immediately south of the building. Based on this, we believe that accumulation of hazardous vapor levels in nearby buildings is unlikely.

Information regarding the building construction and usage were evaluated to determine the appropriate sub-slab vapor to indoor air attenuation factor for the site. Both the WDNR and the U.S. EPA base their vapor attenuation factors primarily on observations at residential homes but recognize that alternative screening levels may be appropriate at larger commercial buildings. Because large commercial/industrial facilities are different from residential homes in several areas that affect vapor intrusion, the WDNR allows the vapor attenuation factor to be increased by a factor of 10, if certain criteria are met. Thus, the appropriate sub-slab vapor to indoor air attenuation factor would be 100 in this case. The criteria to apply the less stringent large commercial building attenuation factor at the site are discussed below.

- Building size. Commercial/industrial buildings typically have a significantly larger footprint than homes. The interior of the building should be open to air flow rather than subdivided into smaller offices or businesses.

  The building is over 18,000 square feet in area. Most of the building is used as a warehouse/manufacturing space with a small area used as offices.

- Foundation thickness and structural integrity. Commercial/industrial buildings are often slab-on-grade construction with thicker and more intact concrete slabs than residences.

  The concrete slab in the building was constructed to handle heavy traffic from forklifts and other material handling machinery. Based on drilling for the sub-slab sampling points it appears that the concrete at the site is over 14-inches thick. Additionally, visual inspection of the concrete indicates that it is in very good condition with no cracking and limited mechanical or structural perforations.

- Ceiling height. Ceilings are usually considerably higher in commercial/industrial facilities, increasing the air volume compared to residences.

  The ceilings in the area with the elevated sub slab and passive samples are 13 feet high which should prevent any vapors form accumulating in the breathing zone.

- Air exchange rate. Higher ventilation rates in commercial/industrial buildings should result in lower indoor air concentrations, if the rate of vapor intrusion from the subsurface is constant.

  The building is not tight and the overhead doors are opened throughout the day to load and unload trucks. On a daily basis including the winter the overhead doors are open in the mornings and late afternoons when the workers leave and return.

  The building is heated by overhead unit heaters. These are not sealed combustion units so they use air from the building during combustion. These types of units do not create significant pressure gradients which may result in increased migration of chemicals from below the slab.

  There are several exhaust fans in the building. These include small units in several bathrooms and a larger exhaust fan in the welding/soldering area. The exhaust fans increase the rate of air recycling within the building.

Based on the analysis of the building configuration we believe that a higher sub-slab to indoor air attenuation factor is appropriate for the site. Using the USEPA suggested attenuation factor of 100 for large, open commercial buildings the appropriate subslab screening level for PCE at the site would be 2700 ppbv (VAL times 100). The PCE level measured in the sub-slab vapor only exceeded this concentration in one area (SS-3/3A). In the remainder of the building subslab vapor levels were substantially below the screening level. This data is summarized on Table 4.

While the WDNR recommends looking at individual sampling points to evaluate the vapor intrusion risk at a site we believe that the considering the mean value may be more appropriate at the subject site. These points are located in a large open building so infiltrating vapors would readily mix in the indoor air. Additionally, the building foundation for the majority of the building is constructed using pilings with no internal footings so the vapors beneath the slab are not isolated and can move freely. Further, there is no reason that sub-slab vapor from the area where higher PCE levels were noted are more or less likely to migrate into the building. The subslab vapor data was averaged in two ways, the arithmetic mean and area-weighted average. The arithmetic mean of the PCE levels in the subslab vapors is 2205 vppb (data from SS-5 which was relatively clean was excluded from the calculation). The area-weighted average was determined by creating sub-areas connecting the individual sampling points as well as the building perimeter (again data from SS-5 was excluded). The average of the bounding sampling points was used to determine the mean PCE concentration in each sub area. The weighted average calculated using this method was 1956 vppb. The similarity between the two averages determined was expected since the original sampling points were spaced relatively equally across the slab area. Figure 6 shows the area averages used for the calculation.

The mean PCE level in the sub-slab vapor samples of 2205 vppb is less than the appropriate screening level for the site (2700 vppb). Similarly the weighted average PCE level in the subslab vapors, 1956 vppb, is below the screening level. Since the average PCE level in the sub-slab vapors is below the screening level we believe that hazardous vapor accumulation within the building is not likely.

Conclusions and Recommendations

We believe that the site may be closed without the requirement to treat the sub slab vapors for the following reasons:

Using the action levels for a large commercial/industrial building, we do not have any sub slab exceedances.

The indoor air samples, one which was collected from the office area, have never contained compounds above the standards.

The site should be closed with a continuing obligation that vapor intrusion potential will need to be re-evaluated if the building usage is changed or if modification to the structure such as installation of dividing walls is planned.

Please feel free to contact Mark Fryman or me at 608-838-9120 if you have any questions.

Sincerely,
Seymour Environmental Services, Inc.

Robyn Seymour

Robyn Seymour, P.G.
Hydrogeologist

Attachments
Tables (4)
Figures (6)

TABLE 1
SUMMARY OF SOIL ANALYTICAL DATA
Former Superior Health Linens
1509 Emil Street - Madison, Wisconsin

Sampling Date	Sample ID	Depth (ft)	Tetrachloroethene	Trichloroethene	cis 1,2 dichloroethene	trans 1,2 dichloroethene	Vinyl chloride
02/1999	GP-1	8-10	<31	<31	<31	<31	<31
	GP-2	2-4	**97**	<31	**190**	<31	<31
	GP-2	8-10	<31	<31	<31	<31	<31
	GP-3	0-2	**1280**	**140**	**2180**	<31	<31
	GP-3	8-10	<31	<31	<31	<31	<31
	GP-4	8-10	<31	<31	<31	<31	<31
	GP-5	6-8	<31	<31	<31	<31	<31
	GP-6	2-4	<31	<31	<31	<31	<31
03/22/13	PIT	1	<25.0	<25.0	<25.0	<25.0	<25.0
	South Drain	0.6	<25.0	<25.0	<25.0	<25.0	<25.0
	North Drain	0.7-1	**38.0**	<25.0	<25.0	<25.0	<25.0
07/29/13	B-1	15	<25.0	<25.0	<25.0	<25.0	<25.0
	B-2	9	<25.0	<25.0	<25.0	<25.0	<25.0
Groundwater Protection Standard			4.5	3.6	41.2	58.8	0.1
Direct Contact Hazard Level			30,700	644	156,000	211,000	67

- Results are reported in ug/kg
- ns = no standard established
- Bold Values exceed groundwate protection standard
- Standards from WDNR R&R Calculator (DAF = 2)

TABLE 2
SUMMARY OF VAPOR ANALYTICAL DATA
Former Superior Health Linens
1509 Emil Street - Madison, Wisconsin

Sampling Date	Sample ID	Tetrachloroethene	Trichloroethene	cis 1,2 dichloroethene	trans 1,2 dichloroethene	Vinyl chloride
SUBSLAB SAMPLING RESULTS						
3/25/2013	SS-1	**300**	0.340	<0.085	0.220	<0.085
	SS-2	**435**	<200	<200	<200	<200
	SS-3	**6110**	<1334	<1334	<1334	<1334
6/13/2014	SS-3A	**3700**	<130	<130	<130	<130
	SS-4	**480**	<6.4	<6.4	<6.4	<6.4
	SS-5	8.1	<2.1	<2.1	<2.1	<2.1
INDOOR AIR SAMPLING RESULTS						
3/25/2013	Loading Dock	0.28	<0.085	<0.085	<0.085	<0.085
6/13/2014	Office	0.33	<0.085	<0.085	<0.085	<0.085
Non-residential Properties						
Indoor Air Standard		27	1.6	ne	65	11
Subslab Screening Level (10x)		270	16	ne	650	110

- Results are reported in vapor part per billion (vppb)
- ne = no standard established
- Bold Values exceed indoor air quality standard
- Shaded values exceed subslab screening level

TABLE 3
SUMMARY OF PASSIVE VAPOR ANALYTICAL DATA
Former Superior Health Linens
1509 Emil Street - Madison, Wisconsin

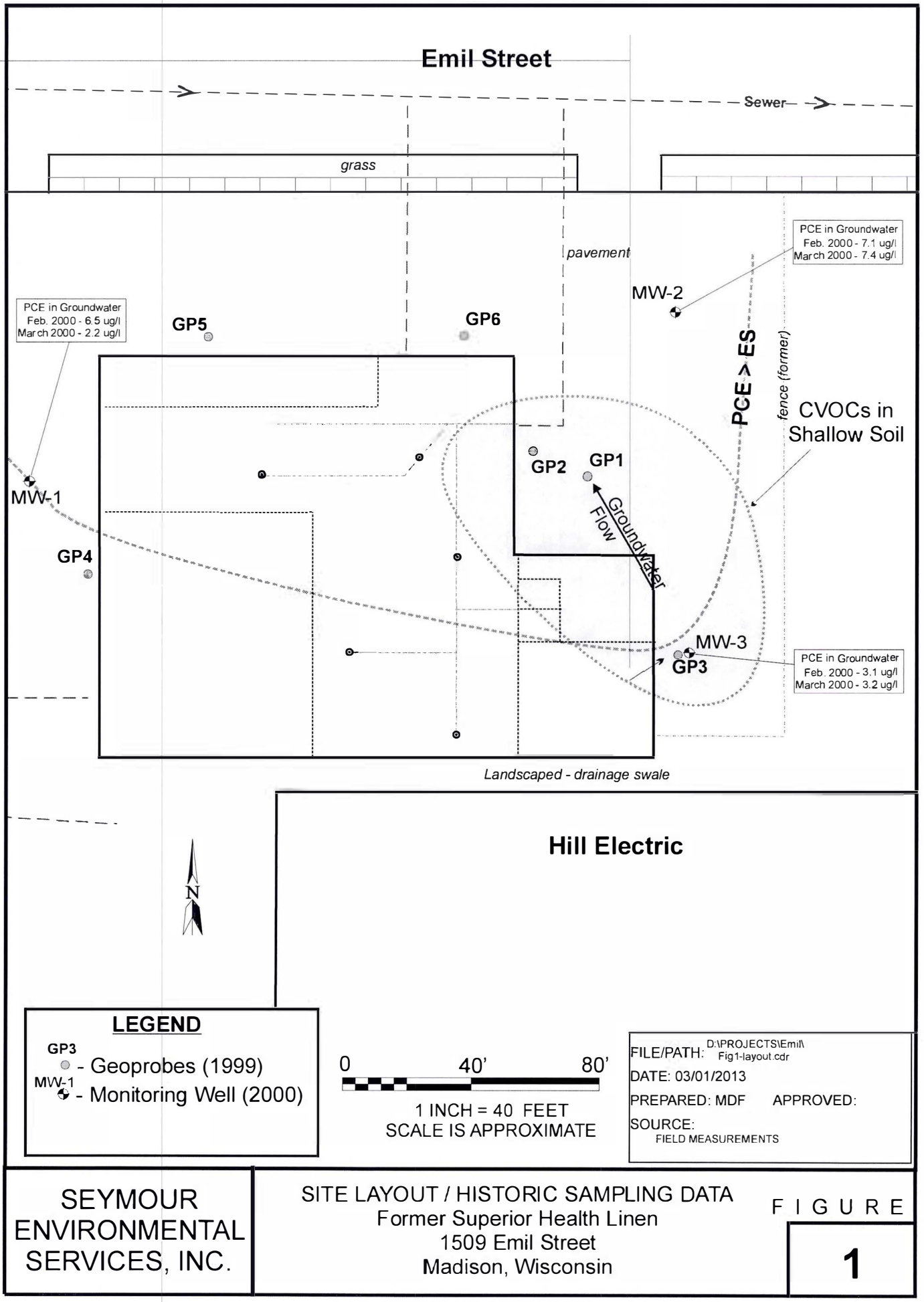
SAMPLE ID	PS-1	PS-2	PS-3	PS-4	PS-5	PS-6	PS-7
Tetrachloroethene	<10	<10	<10	<10	<10	**127**	**11230**
Trichloroethene	<10	<10	<10	<10	<10	**27**	**321**
cis 1,2 dichloroethene	<10	<10	<10	<10	<10	**32**	**34**
trans 1,2 dichloroethene	**11**	<10	**13**	<10	**18**	**27**	**21**
Vinyl chloride	<10	<10	<10	<10	<10	**95**	<10
Chloroform	<25	<25	<25	<25	<25	<25	**57**

- Analytical results listed in nanograms
- Detected values shown in bold

TABLE 4
SUMMARY OF VAPOR ANALYTICAL DATA
Former Superior Health Linens
1509 Emil Street - Madison, Wisconsin

SUBSLAB SAMPLING RESULTS						
Sampling Date	Sample ID	Tetrachloroethene	Trichloroethene	cis 1,2 dichloroethene	trans 1,2 dichloroethene	Vinyl chloride
3/25/2013	SS-1	**300**	0.340	<0.085	0.220	<0.085
	SS-2	**435**	<200	<200	<200	<200
	SS-3	**6110**	<1334	<1334	<1334	<1334
6/13/2014	SS-3A	**3700**	<130	<130	<130	<130
	SS-4	**480**	<6.4	<6.4	<6.4	<6.4
	SS-5	8.1	<2.1	<2.1	<2.1	<2.1
INDOOR AIR SAMPLING RESULTS						
3/25/2013	Loading Dock	0.28	<0.085	<0.085	<0.085	<0.085
6/13/2014	Office	0.33	<0.085	<0.085	<0.085	<0.085
Mean Subslab Concentration		**2205**	--	--	--	--
Areally-wighted avage subslab		**1956**	--	--	--	--
Non-residential Properties						
Indoor Air Standard (VAL)		27	1.6	ne	65	11
Default Subslab Level (10x)		270	16	ne	650	110
Commercial Subslab (100x)		2700	160	ne	6500	1100

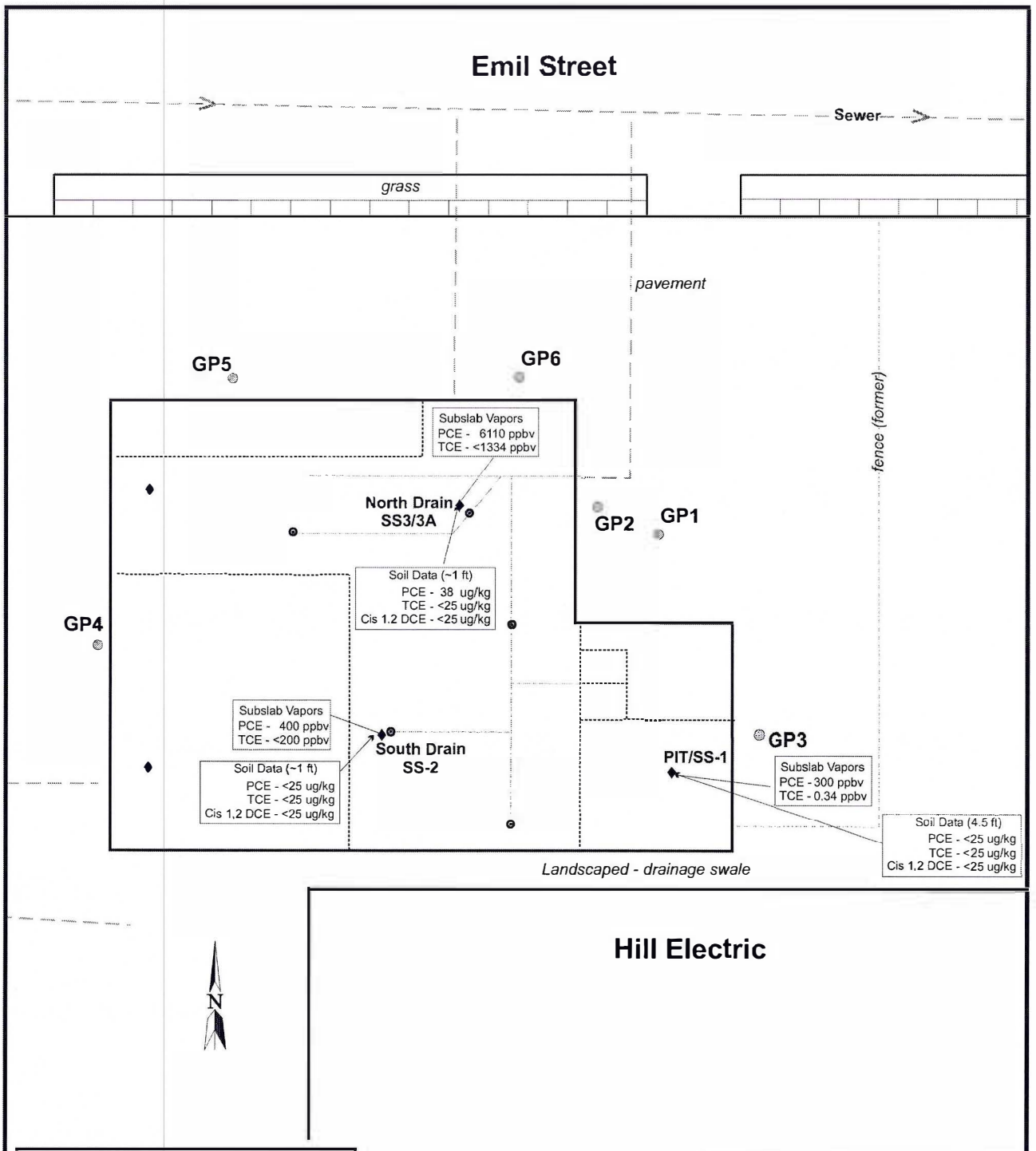
- Results are reported in vapor parts per billion (vppb)
- ne = no standard established
- Screening Levels from RR-800
- Bold Values exceed indoor air quality standard (VAL=Vapor action level)
- Underlined values exceed default subslab screening level with 0.1 slab attenuation factor
- Shaded values exceed commercial subslab screening level with 0.01 slab attenuation factor



SEYMOUR ENVIRONMENTAL SERVICES, INC.

SITE LAYOUT / HISTORIC SAMPLING DATA
Former Superior Health Linen
1509 Emil Street
Madison, Wisconsin

FIGURE
1



LEGEND

GP3 - Geoprobes (1999)

MW-1 - Monitoring Well (2000)

B5 - Seymour Sample

0 40' 80'

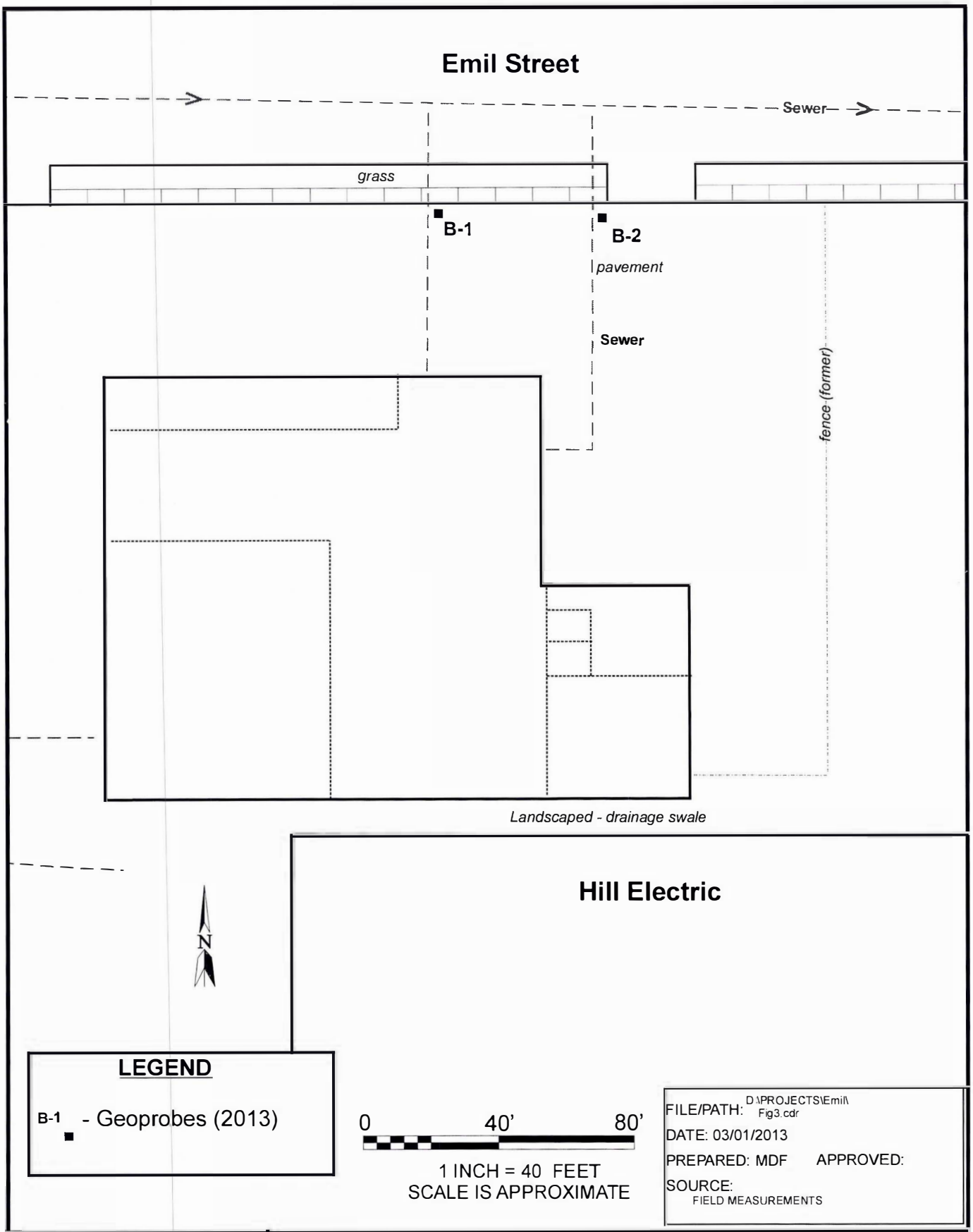
1 INCH = 40 FEET
SCALE IS APPROXIMATE

FILE/PATH: D:\PROJECTS\Emil\ Fig2.cdr
DATE: 03/01/2013
PREPARED: MDF APPROVED:
SOURCE: FIELD MEASUREMENTS

SEYMOUR ENVIRONMENTAL SERVICES, INC.

SAMPLING DATA - Early 2013
Former Superior Health Linen
1509 Emil Street
Madison, Wisconsin

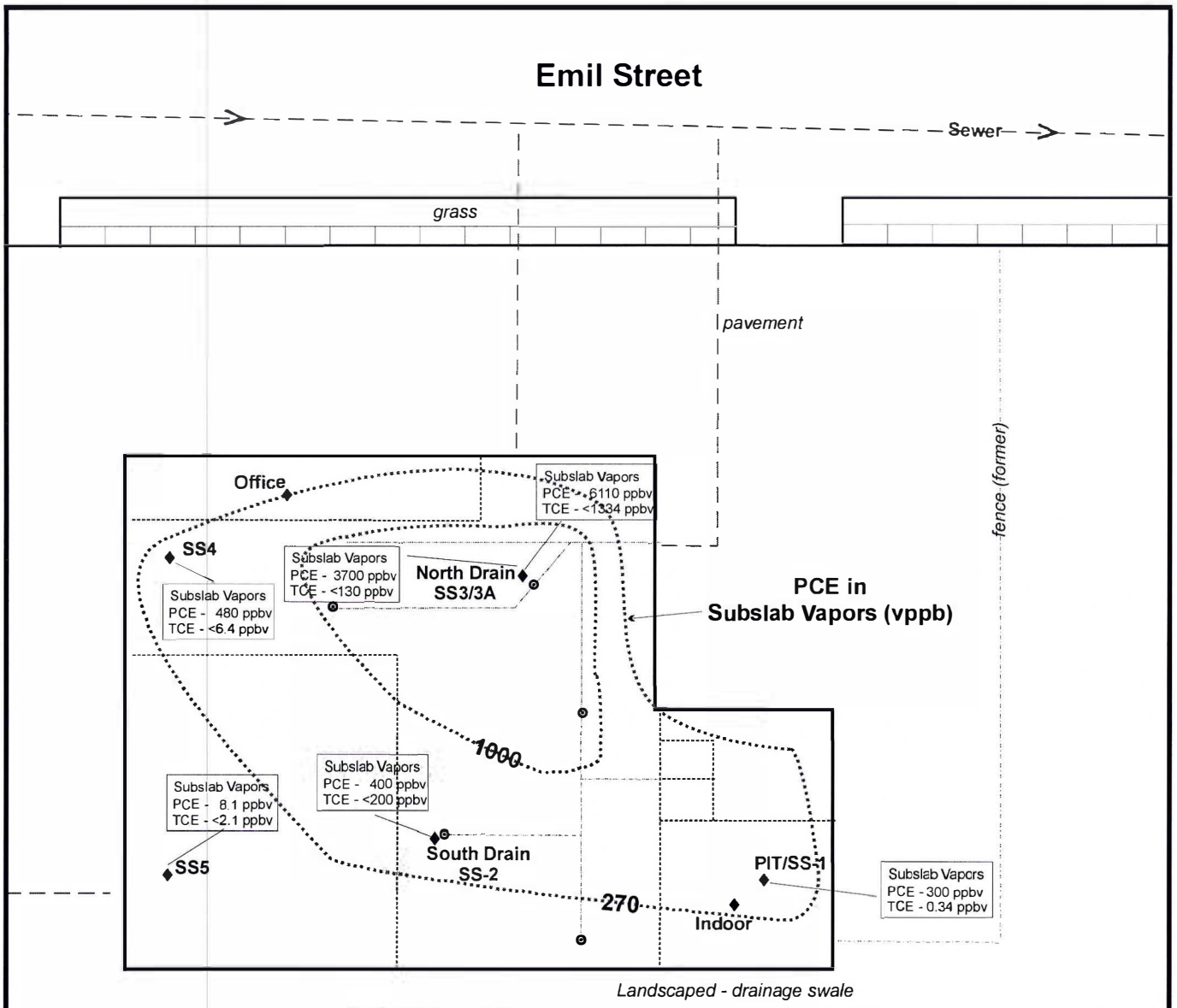
FIGURE 2



SEYMOUR ENVIRONMENTAL SERVICES, INC.

SOIL SAMPLING LOCATIONS (Sept. 2013)
Former Superior Health Linen
1509 Emil Street
Madison, Wisconsin

FIGURE
3



LEGEND

GP3 ○ - Geoprobes (1999)

MW-1 ◔ - Monitoring Well (2000)

B-1 ■ - Geoprobes (2013)

SS3 ♦ - Subslab Vapor Samples

0 40' 80'

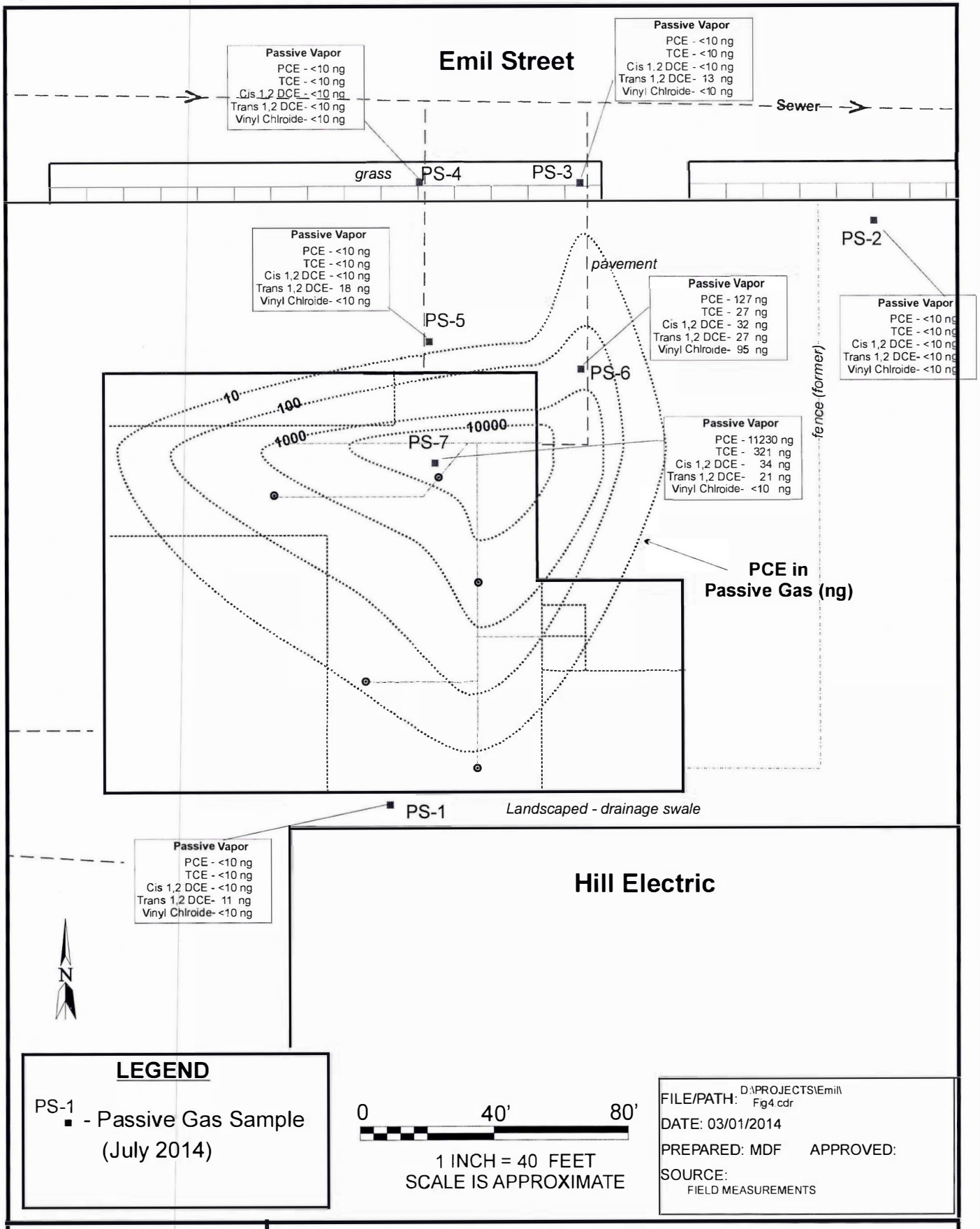
1 INCH = 40 FEET
SCALE IS APPROXIMATE

FILE/PATH: D:\PROJECTS\Emil\Fig5.cdr
DATE: 03/01/2013
PREPARED: MDF APPROVED:
SOURCE: FIELD MEASUREMENTS

SEYMOUR ENVIRONMENTAL SERVICES, INC.

SUBSLAB VAPOR SAMPLING DATA
Former Superior Health Linen
1509 Emil Street
Madison, Wisconsin

FIGURE 4



SEYMOUR ENVIRONMENTAL SERVICES, INC.

PASSIVE GAS SAMPLING DATA
Former Superior Health Linen
1509 Emil Street
Madison, Wisconsin

FIGURE
5