

TECHNICAL MEMORANDUM

TO: Mr. John Perine **DATE:** January 13, 2012

FROM: Mr. Thomas Cammarata

SUBJECT: Results from Indoor Ambient Air and Soil Gas Sampling
Perine Property, 812 and 820 South Adams Street in Seattle, Washington

SoundEarth Strategies, Inc. (SoundEarth), on behalf of Perine Property LLC, has prepared this Technical Memorandum to present the results from indoor ambient air and soil gas sampling conducted at the properties located at 812 and 820 South Adams Street in Seattle, Washington (the Property). The Property location is shown on Figure 1. Results from previous investigations conducted at the Property by SoundEarth in the summer of 2011 identified tetrachloroethylene (PCE) and trichloroethylene (TCE) in the indoor ambient air samples. The purpose the indoor ambient air and soil gas sampling performed in the course of the current investigation was to evaluate the nature and extent of PCE, TCE, cis-1,2-dichloroethylene (cis-1,2-DCE), trans-1,2-dichloroethylene (trans-1,2-DCE), and vinyl chloride in soil gas and indoor ambient air at the Property. This information will assist in the development of the design parameters for a sub-slab depressurization system to mitigate PCE and TCE vapors in the indoor ambient air.

SCOPE OF WORK

SoundEarth conducted indoor ambient air and soil gas sampling at the Property on November 15, 2011, and between November 16 and November 29, 2011, respectively. Indoor ambient air samples Summa 4 through 6 were collected in 6-liter Summa canisters over a period of 8 hours. Indoor ambient air samples Summa 1 through 3 were collected at the Property during a previous sampling event conducted by SoundEarth. Twenty-seven soil gas samples were collected using GORE-SORBER Modules (Gore modules). Indoor ambient air and Gore module sampling locations are shown on Figure 2. Sampling was conducted in accordance with the *Work Plan for Indoor Ambient Air and Soil Gas Sampling with Pilot Test for Sub-Slab Depressurization System Design, Perine Property, 812 and 820 South Adams Street, Seattle, Washington*, prepared by SoundEarth and dated November 10, 2011.

INDOOR AMBIENT AIR AND SOIL GAS RESULTS

A summary of analytical results for indoor ambient air and soil gas samples is presented below.

Indoor Ambient Air Sample Results

Analytical results of indoor ambient air samples are presented on Figure 3 and in Table 1. Figure 3 also includes analytical result for indoor ambient air samples Summa 1 through Summa 3, which were

collected by SoundEarth in June 2011. A summary of the analytical results for the indoor ambient air samples collected in November 15, 2011, is provided below:

- PCE and TCE were detected in the indoor ambient air sample Summa 4-20111115 at concentrations of 0.35 and 1.7 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), respectively. Concentrations of cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride were not detected above the laboratory reporting limit in sample Summa 4-20111115.
- PCE and TCE were detected in the indoor ambient air sample Summa 5-20111115 at concentrations of 0.31 and 1.7 $\mu\text{g}/\text{m}^3$, respectively. Concentrations of cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride were not detected above the laboratory reporting limit in sample Summa 5-20111115.
- PCE and TCE were each detected in the indoor ambient air sample Summa 6-20111115 at a concentration of 1.3 $\mu\text{g}/\text{m}^3$. Concentrations of cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride were not detected above the laboratory reporting limit in sample Summa 6-20111115.

The concentrations of PCE and/or TCE in indoor ambient air samples Summa 4-20111115 through Summa 6-20111115 exceed the applicable Method B cleanup levels for PCE and TCE as recognized in the Washington State Model Toxics Control Act (MTCA) Cleanup Regulation, as established in Chapter 340 of Title 173 of the Washington Administrative Code. These results are similar to indoor ambient air results from the June 2011 sampling event conducted by SouthEarth. A detailed discussion of indoor ambient air sampling results from the June 2011 sampling event is presented in the *Air Quality Evaluation, Perine Property, 820 South Adams Street Seattle, Washington*, prepared by SoundEarth and dated July 28, 2011 (Air Quality Report).

Soil Gas Sample Results

Analytical results of soil gas samples are presented on Figures 4 through 8 and in Table 2. A summary of the analytical results for the soil gas samples collected between November 16 and November 29, 2011, is provided below:

- PCE was detected in 18 of 25 Gore modules analyzed. The mass of PCE ranged from 0.05 to 58.42 μg .
- TCE was detected in 23 of 25 Gore modules analyzed. The mass of TCE ranged from 0.04 to 186.01 μg .
- cis-1,2-DCE was detected in 13 of 25 Gore modules analyzed. The mass of cis-1,2-DCE ranged from 0.03 to 44.63 μg .
- trans-1,2-DCE was detected in 11 of 25 Gore modules analyzed. The mass of trans-1,2-DCE ranged from 0.16 to 3.66 μg .
- Vinyl chloride was not detected in the Gore modules above laboratory reporting limits.

Figures 4 through 8 illustrate that the masses of PCE, TCE, cis-1,2-DCE, and trans-1,2-DCE (solvents) originate along the north wall of the Property, which adjoins the Northwest Plating facility, a known source for solvent contamination in soil, groundwater, and indoor ambient air. The largest masses of PCE, TCE, cis-1,2-DCE, and trans-1,2-DCE are located near the center of the north wall of the Property.

The masses of the analytes decrease with distance to the east, west, and south of the center of the north wall. Solvents were not detected in samples collected from the metal cutting room located at the Property.

A groundwater sample collected by SouthEarth from monitoring well MW05 in June 2011, which is located near the center of the north wall, contained concentrations of PCE and TCE. The concentration of TCE in the groundwater sample exceeded the Method A cleanup level for TCE as recognized in the MTCA cleanup regulation.

FINDINGS AND CONCLUSIONS

Soil gas results, in conjunction with soil and groundwater analytical results from previous sampling events conducted at the Property and north-adjointing property by SoundEarth and others, confirm that the adjacent Northwest Plating facility is the source of the solvents detected in indoor ambient air samples collected by SoundEarth at the Property. This conclusion is supported by the following findings:

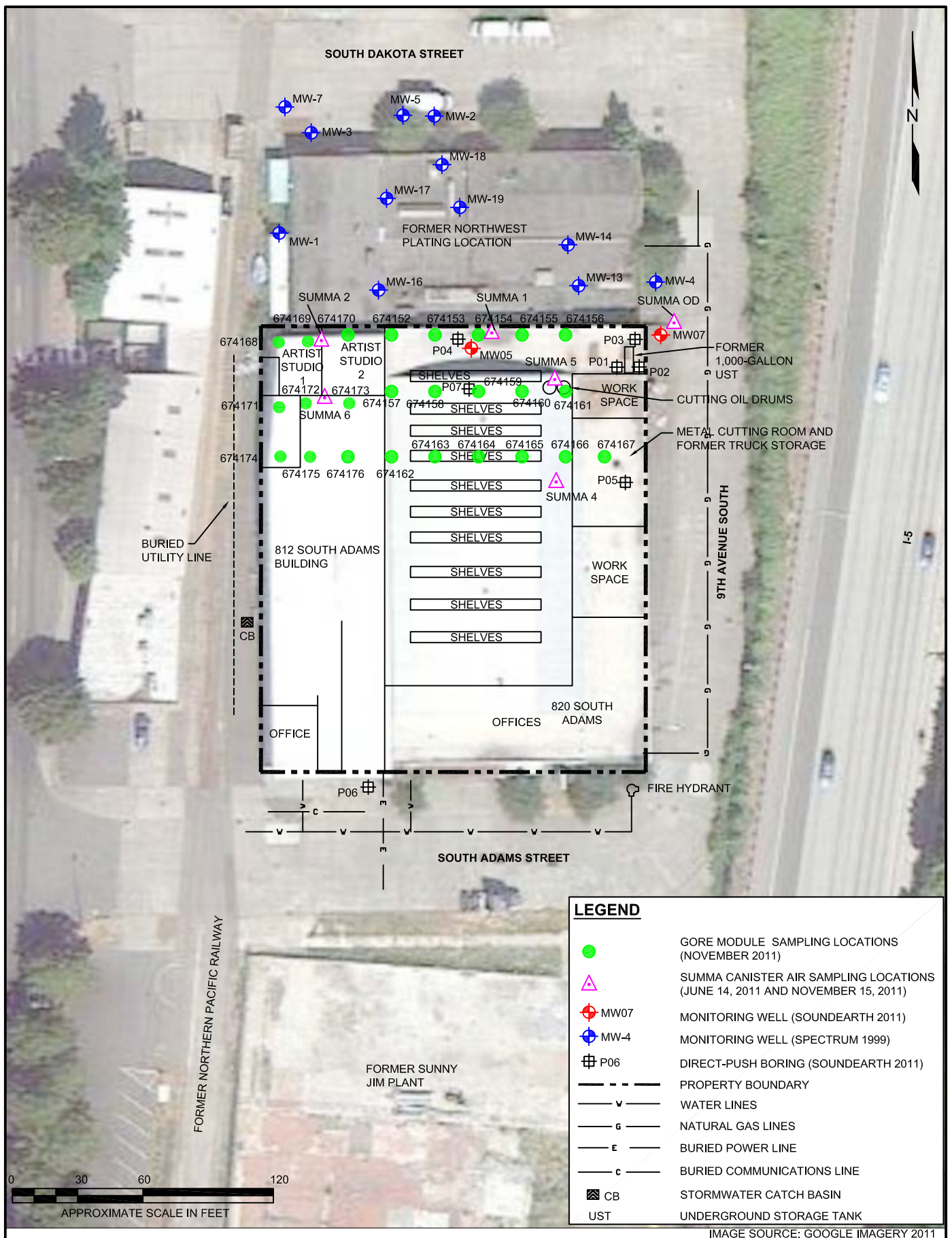
- There is no evidence that solvents have been used or released at the Property.
- Solvents were identified in soil, groundwater, and indoor air samples collected at the north-adjointing Northwest Plating facility by GeoEngineers, Inc., in 1989; Herrera Environmental Consultants in 1999; and Hart Crowser, Inc., in 2004.
- The types of solvents detected at the Property strongly resemble those associated with the release at the north-adjointing Northwest Plating facility.
- The concentrations and masses of solvents detected at the Property are highest along the north-central boundary of the Property, immediately adjacent to an area on the Northwest Plating facility where solvents are known to have been stored and released. The concentrations and masses of solvents dissipate with distance to the south, west, and east of this known source area.
- Solvents were not detected at levels above the laboratory's lower reporting limits in soil gas, soil, or reconnaissance groundwater samples collected by SoundEarth in the metal cutting room located at the Property, where impacts would likely have been encountered if solvents had historically been used or released at the Property.

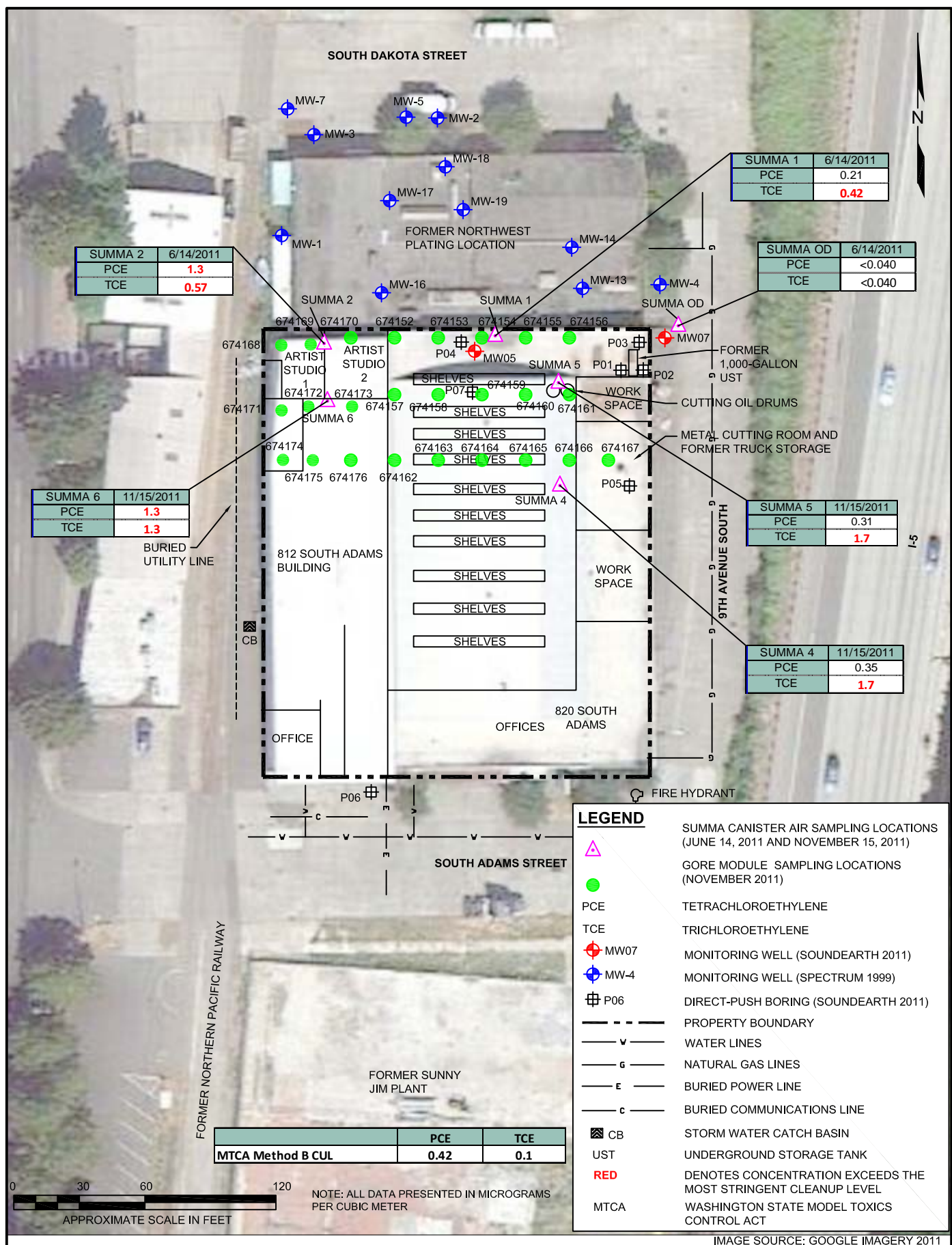
Attachments: Figure 1, Property Location Map
Figure 2, Sampling Location Map
Figure 3, Indoor Ambient Air Analytical Results
Figure 4, Mass Distribution of Trichloroethylene in Soil Gas
Figure 5, Mass Distribution of Tetrachloroethylene in Soil Gas
Figure 6, Mass Distribution of cis-1,2-Dichloroethylene in Soil Gas
Figure 7, Mass Distribution of trans-1,2-Dichloroethylene in Soil Gas
Figure 8, Mass Distribution of Vinyl Chloride in Soil Gas
Table 1, Summary of Indoor Ambient Air Analytical Results
Table 2, Summary of Analytical Results for Gore Modules

cc: William Joyce, Slater Joyce Ziker, PLLC

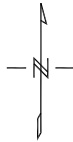
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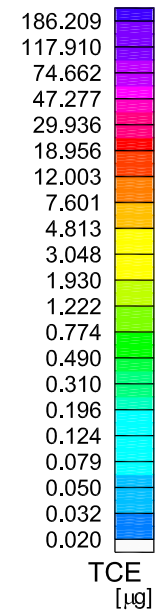
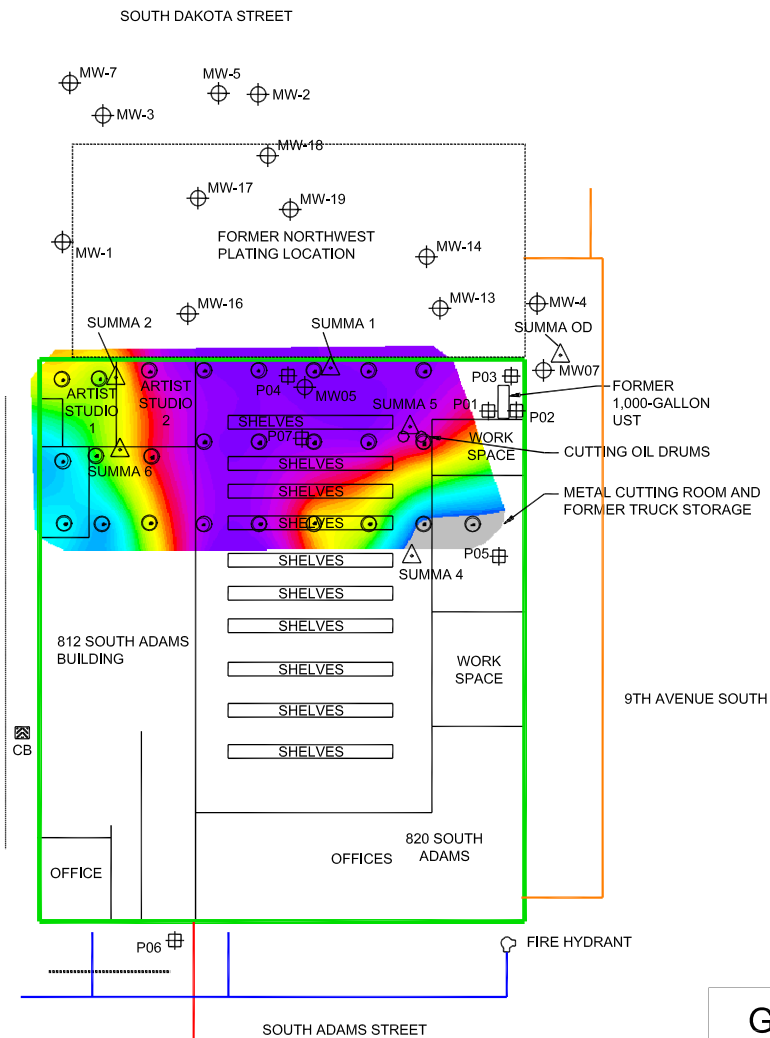
LEGEND

○	GORE MODULE SAMPLING LOCATIONS (NOVEMBER 2011)
△	SUMMA CANISTER AIR SAMPLING LOCATIONS (JUNE 14, 2011 AND NOVEMBER 15, 2011)
⊕ MW07	MONITORING WELL (SOUNDEARTH 2011)
⊕ MW-4	MONITORING WELL (SPECTRUM 1999)
⊕ P06	DIRECT-PUSH BORING (SOUNDEARTH 2011)
—	PROPERTY BOUNDARY
—	WATER LINES
—	NATURAL GAS LINES
—	BURIED POWER LINE
—	BURIED COMMUNICATIONS LINE
■ CB	STORM WATER CATCH BASIN
■ UST	UNDERGROUND STORAGE TANK

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AIRPORT WAY SOUTH

BURIED
UTILITY LINE

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SoundEarth Strategies, Inc., Seattle, WA
812 & 820 S. Adams Street, Seattle, WA
Trichloroethene

DATE DRAWN: 21DEC2011

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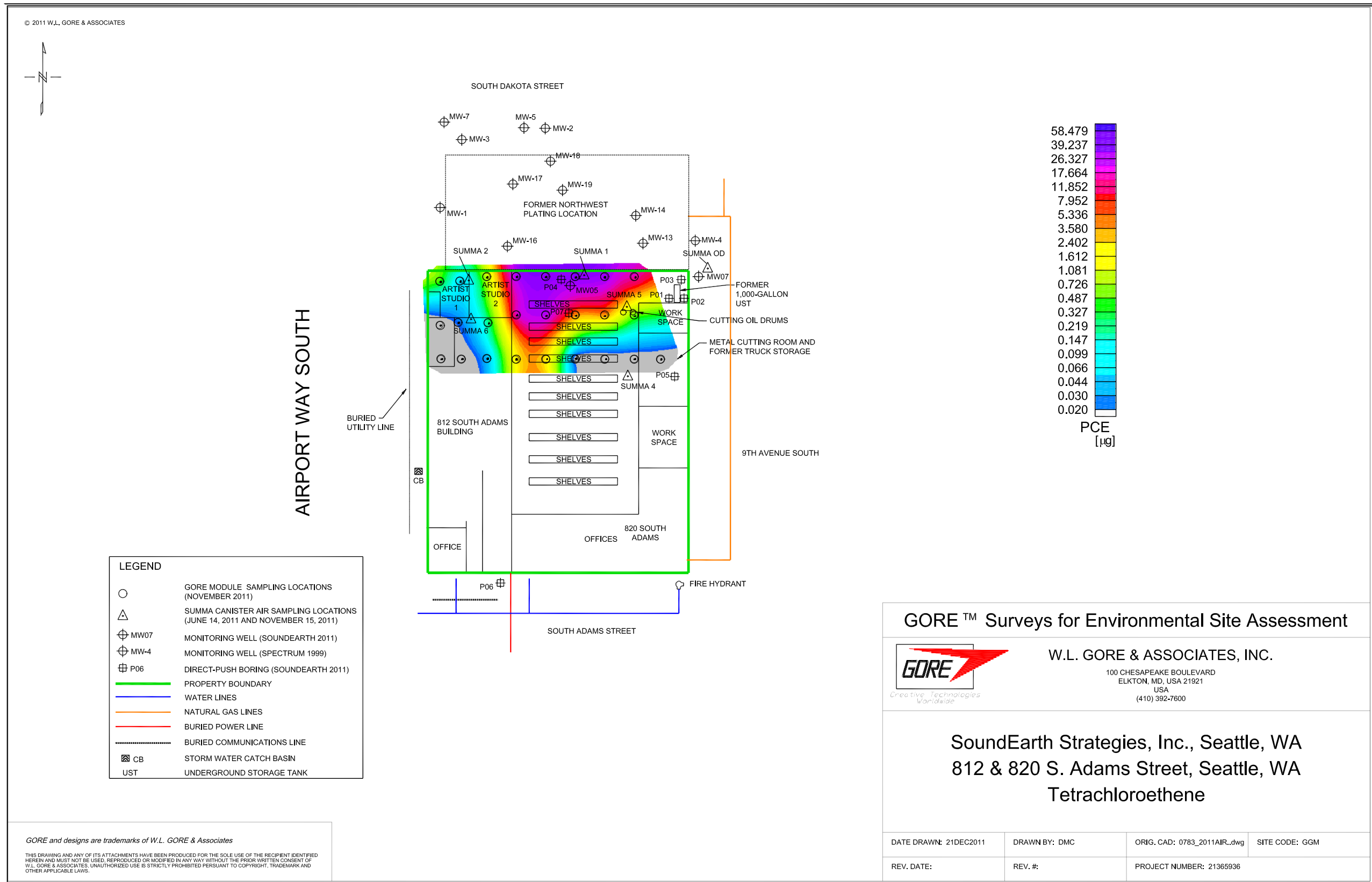
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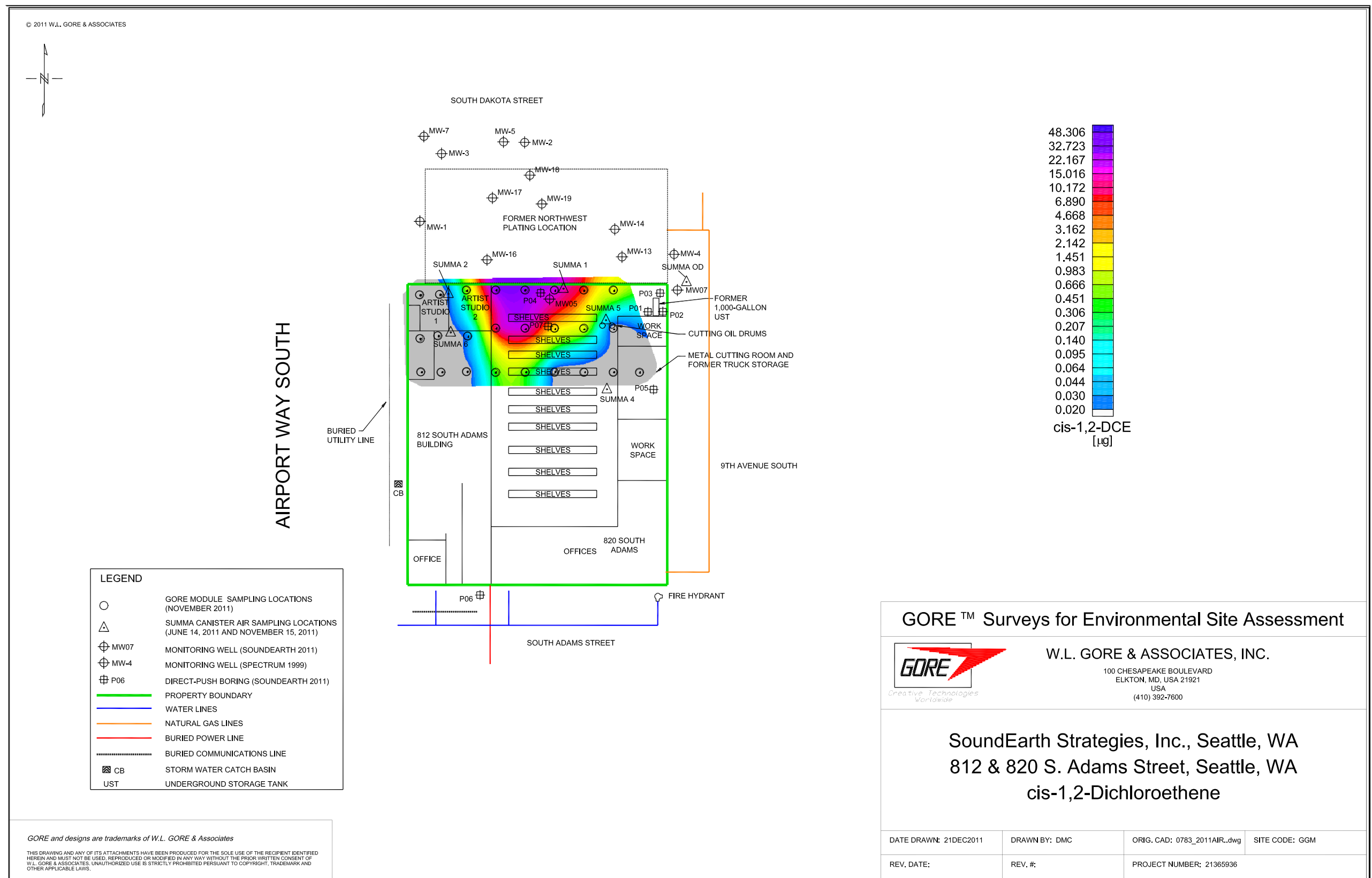
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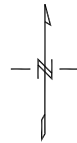
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AIRPORT WAY SOUTH

BURIED
UTILITY LINE

CB

SOUTH DAKOTA STREET

MW-7
MW-3MW-5
MW-2

MW-18

FORMER NORTHWEST
PLATING LOCATION

MW-1

MW-16

MW-19

MW-14

MW-13

SUMMA 2

SUMMA 1

SUMMA OD

ARTIST
STUDIO 1ARTIST
STUDIO 2

P04

MW05

SUMMA 5

P03

P01

P02

FORMER
1,000-GALLON
UST

CUTTING OIL DRUMS

WORK
SPACEMETAL CUTTING ROOM AND
FORMER TRUCK STORAGE

SUMMA 6

P07

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3.656
2.950
2.380
1.920
1.550
1.250
1.009
0.814
0.657
0.530
0.428
0.345
0.278
0.225
0.181
0.146
0.118
0.095
0.077
0.062
0.050

trans-1,2-DCE
[µg]

LEGEND

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- △ SUMMA CANISTER AIR SAMPLING LOCATIONS
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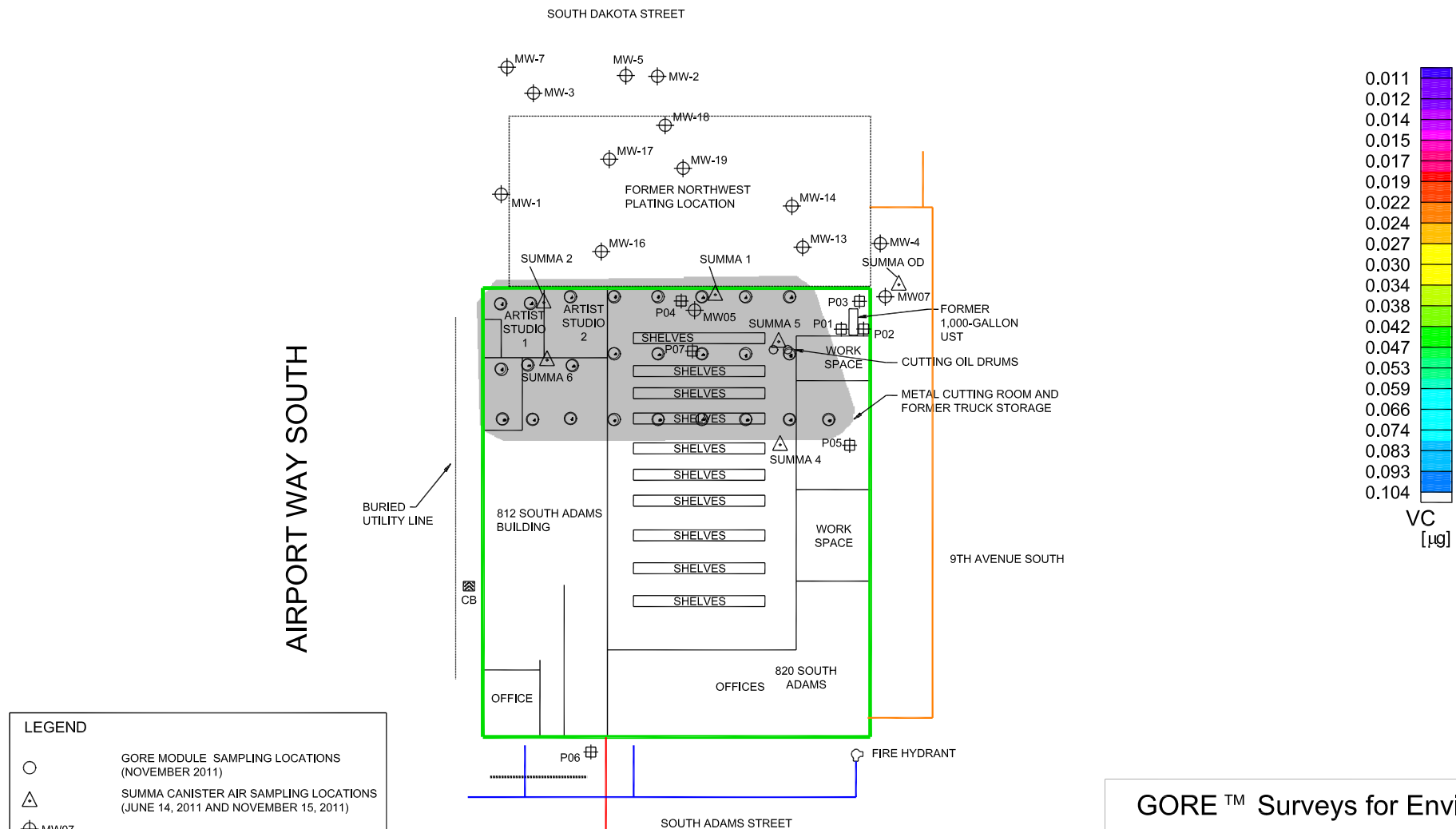
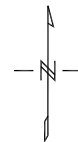
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LEGEND	
	GORE MODULE SAMPLING LOCATIONS (NOVEMBER 2011)
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SoundEarth Strategies, Inc., Seattle, WA
812 & 820 S. Adams Street, Seattle, WA
Vinyl Chloride

DATE DRAWN: 21DEC2011	DRAWN BY: DMC	ORIG. CAD: 0783_2011AIR.dwg	SITE CODE: GGM
REV. DATE:	REV. #:	PROJECT NUMBER: 21365936	



Table 1
Summary of Indoor Ambient Air Analytical Results
Perine Property
812 and 820 South Adams Street
Seattle, Washington

Sample ID	Date Sampled	Analytical Results ¹ (micrograms per cubic meter)				
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride
Summa 1-20110614	06/14/11	0.21	0.42	<0.034	<0.034	<0.034
Summa 2-20110614		1.3	0.57	<0.042	<0.042	<0.042
Summa OD-20110614		<0.040	<0.040	<0.040	<0.040	<0.040
Summa 4-20111115	11/15/11	0.35	1.7	<0.038	<0.038	<0.038
Summa 5-20111115		0.31	1.7	<0.035	<0.035	<0.035
Summa 6-20111115		1.3	1.3	<0.039	<0.039	<0.039
MTCA Method B Cleanup Levels for Indoor Air		0.42 ^a	0.1 ^a	16 ^b	32 ^b	0.28 ^a

NOTES:

Sample analyses performed by Columbia Analytical Services of Simi Valley, California.

Red indicates the reported concentration exceeds the most stringent CUL.

¹Analyzed by U.S. Environmental Protection Agency Method TO-15 - VOC SIM.

^aMTCA Method B Indoor Air Cleanup Levels, Table B-1, Indoor Air, Carcinogen, Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State, October 2009.

^bMTCA Method B Indoor Air Cleanup Levels, Table B-1, Indoor Air, Non-Carcinogen, Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State, October 2009.

< = not detected at concentration exceeding the laboratory reporting limit

cis-1,2-DCE = cis-1,2-dichloroethylene

CUL = cleanup level

MTCA = Washington State Model Toxics Control Act

PCE = tetrachloroethylene

TCE = trichloroethylene

trans-1,2-DCE = trans-1,2-dichloroethylene



Table 2
Summary of Analytical Results for Gore Modules
Perine Property
812 and 820 South Adams Street
Seattle, Washington

Date Sampled	Sample Name	Analytical Results ¹ in µg				
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride
11/16/11 - 11/29/11	674152	43.45	181.63	44.63	3.66	<0.10
11/16/11 - 11/29/11	674153	53.26	186.01	39.12	3.66	<0.10
11/16/11 - 11/29/11	674154	58.42	184.26	22.30	3.47	<0.10
11/16/11 - 11/29/11	674155	44.79	178.28	6.47	1.80	<0.10
11/16/11 - 11/29/11	674156	18.05	159.96	1.46	0.65	<0.10
11/16/11 - 11/29/11	674157	22.32	169.12	14.58	1.87	<0.10
11/16/11 - 11/29/11	674158	30.59	178.43	19.41	2.35	<0.10
11/16/11 - 11/29/11	674159	4.44	144.40	2.32	0.42	<0.10
11/16/11 - 11/29/11	674160	4.67	140.48	1.06	0.28	<0.10
11/16/11 - 11/29/11	674161	0.52	48.32	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674162	2.55	123.50	0.49	0.25	<0.10
11/16/11 - 11/29/11	674163	2.38	115.26	0.43	0.16	<0.10
11/16/11 - 11/29/11	674164	<0.02	3.91	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674165	<0.02	2.46	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674166	<0.02	<0.02	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674167	<0.02	<0.02	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674168	0.47	4.08	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674169	0.06	0.85	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674170	1.21	71.21	0.85	<0.05	<0.10
11/16/11 - 11/29/11	674171	<0.02	0.08	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674172	0.02	0.90	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674173	0.30	29.42	0.03	<0.05	<0.10
11/16/11 - 11/29/11	674174	<0.02	0.17	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674175	<0.02	0.04	<0.02	<0.05	<0.10
11/16/11 - 11/29/11	674176	0.05	4.62	<0.02	<0.05	<0.10

NOTES:

Sample analyses performed by Gore Survey Products Group, Elkton, Maryland.

¹Analyzed by U.S. Environmental Protection Agency Method Modified 8260.

< = not detected at concentration exceeding the laboratory reporting limit

µg = micrograms

cis-1,2-DCE = cis-1,2-dichloroethylene

PCE = tetrachloroethylene

TCE = trichloroethylene

trans-1,2-DCE = trans-1,2-dichloroethylene