PRELIMINARY EVALUATION
SOIL VAPOR INTRUSION INVESTIGATION
NWIRP BETHPAGE – HOME #3

Contract No. N62470-08-D-1001
Contract Task Order WE06

This preliminary evaluation presents a summary of the sampling activities and analytical results of the soil vapor intrusion investigation activities conducted at Home #3 in Bethpage, New York. Also included is an evaluation of the results with the New York State Department of Health (NYSDOH) guidance. Sampling activities consisted of indoor air (basement and living space), outdoor air, and sub-slab vapor sampling conducted at Home #3, including the February 2011 event.

Home #3 was initially sampled in January 2009. An Air Purifying Unit (APU) was installed in the basement as an interim mitigation measure and based on the indoor air results observed in the first floor living space, a second APU was also installed on the first floor. The NYSDOH matrix evaluation of the initial sampling results recommended mitigation for concentrations of trichloroethane (TCE), tetrachloroethene (PCE), and 1,1,1-trichloroethane (TCA). In May 2009, a Sub-Slab Depressurization (SSD) system was installed as a supplemental mitigation measure. In 2009, a Soil Vapor Extraction (SVE) Containment System was constructed along the Site 1 fenceline and began operation in January 2010. At the homeowner's request and with concurrence from the New York Department of Environmental Conservation, the APUs in the basement and living space of Home #3 were removed in July 2010.

Indoor air monitoring was conducted at Home #3 throughout 2009, 2010, and early 2011. Table 1 provides a summary of analytical results for these three compounds at Home #3. Figure 1 depicts the time trends for concentrations of TCE, PCE, and TCA in indoor air during this period and also identifies the implementation dates for the mitigation measures. SSD stack sampling was also conducted periodically throughout 2009 and 2010. Figure 2 depicts the time trends for TCE, PCE, and TCA concentrations observed in the sub-slab and SSD stack sampling through February 2011. Both of these graphs show a downward trend of VOC concentrations over time.

February 2011 activities are summarized as follows. To allow the sub-slab conditions to stabilize, the SSD system was turned off on February 3, 2011 prior to the sampling conducted on February 22, 2011 at Home #3. Indoor air samples were collected in the basement and first floor, along with the sub-slab vapor and associated outdoor air. Table 2 presents the analytical results for the samples collected at Home #3 during the initial sampling event, the November 2010 sampling event, and from the February 2011 sampling event. All indoor air concentrations detected at Home #3 in November 2010 and February 2011 were below NYSDOH indoor air guideline values. In addition, the sub-slab vapor sampling results

from February 2011 indicated concentrations of TCE at 0.37 µg/m^3, PCE at 0.24 µg/m^3, and TCA at 0.24 µg/m^3, which are 15,000 times less than the initial sampling in January 2009. The February 2011 analytical results were also evaluated against the NYSDOH decision matrices (Table 2) and based on the matrices; NFA was the recommended action for site-related VOCs in this home. The SSD system was turned back on after sampling and remains in operation.

During the February 2011 sampling event, to evaluate the capture zone and effectiveness of the SVE Containment System, vacuum readings were collected from the sub-slab at Home #3. Vacuum readings of 0.04 to 0.03 inches of water column were measured indicating a vacuum field is being created by SVE Containment System under the home.

Operation of the SVE Containment System is monitored continuously through an alarm and telemetry system and has a backup blower to provide dependable long-term operation. Local operators are able to respond to system alarms and conduct weekly inspections. Monitoring results for Home #3 and others in the neighborhood indicate the SVE Containment System has established a capture zone that encompasses the local area. The effectiveness of the SVE Containment System is also indicated by the decreasing VOC concentrations in the soil gas, sub-slab, and indoor air samples. It should be noted that the November 2010 and February 2011 sampling results were collected without the SSD system in operation.

TABLE 1
HISTORICAL SAMPLING SUMMARY (TCE/PCE/TCA)
HOME #3
SOIL VAPOR INVESTIGATION
NWIRP BETHPAGE, NEW YORK

Date Collected	Sample ID	Sample Type	Event Type	TCE ($\mu g/m^3$)	PCE ($\mu g/m^3$)	TCA ($\mu g/m^3$)
1/22/2009	BPS1-AR003-SSB	Subslab	IS	**13,000**	130	**10,000**
8/26/2009	BPS1-AR003-SSB2	Subslab	PSSD	**260**	3.7	38
7/28/2010 (2)	BPS1-AR003-SSB3 *	Subslab	PSVE only	14	0.96	2.3
11/9/2010(3)	BPS1-AR003-SSB4 *	Subslab	PSVE only	0.74	0.56	0.32 J
2/22/2011(3)	BPS1-AR003-SSB5 *	Subslab	PSVE only	0.37	0.24	0.24
6/22/2009	BPS1-AR003-ST01	SSD Stack	PSSD	7,700	92	3,600
8/25/2009	BPS1-AR003-ST02	SSD Stack	PSSD	10,000	170	4,200
11/16/2009	BPS1-AR003-ST03	SSD Stack	PSSD	6,200	64	2,900
11/16/2009	BPS1-AR003-ST03 DUP	SSD Stack	PSSD	5,400	61	2,200
3/2/2010	BPS1-AR003-ST04 *	SSD Stack	PSSD(1)/PSVE	3.8	0.82	0.98
8/24/2010	BPSI-AR003-ST05*	SSD Stack	PSSD/PSVE	4.3	2.4	2.4
1/22/2009	BPS1-AR003-IND	Basement	IS	**180**	4.3	95
1/22/2009	BPS1-AR003-IND DUP	Basement	IS	**180**	4.2	98
2/26/2009	BPS1-AR003-IND3	Basement	PUS	**34**	0.75	27
2/26/2009	BPS1-AR003-IND3 DUP	Basement	PUS	**31**	0.72	27
3/12/2009	BPS1-AR003-IND4	Basement	PUS	**32**	0.49 J	41
4/30/2009	BPS1-AR003-INDB	Basement	PUS	**52**	0.38 J	65
4/30/2009	BPS1-AR003-INDB DUP	Basement	PUS	**50**	0.54	64
6/23/2009	BPS1-AR003-INDB-01	Basement	PSSD	**79**	1.1	19
8/26/2009	BPS1-AR003-INDB-2	Basement	PSSD	**27**	1.3	4
11/17/2009	BPS1-AR003-INDB-3	Basement	PSSD	**5.1**	0.58	0.78
3/3/2010	BPS1-AR003-INDB-4 *	Basement	PSSD(1)/PSVE	0.46 U	0.58 U	0.47 U
7/28/2010 (2)	BPS1-AR003-INDB-5 *	Basement	PSVE only	0.27 J	0.28 J	1.9
11/9/2010(3)	BPS1-AR003-INDB-6 *	Basement	PSVE only	0.48 U	0.61 U	0.27 J
2/22/2011(3)	BPS1-AR003-INDB-7 *	Basement	PSVE only	0.17 U	0.16 J	0.23
2/18/2009	BPS1-AR003-IND2	Living Space	IS	**110**	3.1	74
3/12/2009	BPS1-AR003-IND5	Living Space	PUS	2.8	0.52 U	5.2
3/12/2009	BPS1-AR003-IND5 DUP	Living Space	PUS	3.0	0.56 U	5.5
6/23/2009	BPS1-AR003-INDL-01	Living Space	PSSD	**16**	2.4	30
8/26/2009	BPS1-AR003-INDL-2	Living Space	PSSD	**9.9**	0.43 J	5.2
11/17/2009	BPS1-AR003-INDL-3	Living Space	PSSD	1.1 J	0.56 UJ	5 J
3/3/2010	BPS1-AR003-INDL-4 *	Living Space	PSSD(1)/PSVE	0.6	0.66 U	3.7
7/28/2010 (2)	BPS1-AR003-INDL-5 *	Living Space	PSVE only	0.16 J	0.28 J	3.3
7/28/2010 (2)	BPS1-AR003-INDL-5 DUP *	Living Space	PSVE only	0.15 J	0.28 J	2.9
11/9/2010(3)	BPS1-AR003-INDL-6 *	Living Space	PSVE only	0.42 U	0.54 U	2.9
2/22/2011(3)	BPS1-AR003-INDL-7 *	Living Space	PSVE only	0.18 U	0.059 J	0.13 J

NOTES:

Bold values indicate exceedance of NYSDOH guideline values

IS = Initial Sampling

PUS = Post Unit Sampling (Air Purification Unit)

PSSD = Post SSD System Sampling

PSVE = Post Soil Vapor Extraction System Sampling

J = Estimated concentration

U = Compound not detected (reporting limit used as non-detect value, method detection limit approximately 5 times lower)

(1) SSD fan upgraded on system (after November 2009 sampling event)

(2) Sample collected with APUs removed from home and with SSD turned off

(3) APUs and SSD turned off prior to sample collection.

* Sample collected after SVE system began operation in January 2010

TABLE 2
NYSDOH HOME EVALUATION
HOME #3
SOIL VAPOR INVESTIGATION
NWIRP BETHPAGE, NEW YORK

VOCs (µg/m^3)	NYSDOH INDOOR AIR GUIDELINE VALUES	NYSDOH SUB-SLAB GUIDELINE VALUES	INITIAL SAMPLING (JANUARY 2009)				NOVEMBER 2010				FEBRUARY 2011 [3]			
			SUB-SLAB VAPOR	BASEMENT AIR	LIVING SPACE AIR	NYSDOH MATRIX EVALUATION	SUB-SLAB VAPOR	BASEMENT AIR	LIVING SPACE AIR	NYSDOH MATRIX EVALUATION	SUB-SLAB VAPOR	BASEMENT AIR	LIVING SPACE AIR	NYSDOH MATRIX EVALUATIO
1,1,1-Trichloroethane	100[2]	1,000[2]	**10,000**	**95**	**74**	MITIGATE	**0.32 J**	**0.27 J**	**2.9**	NFA	**0.24**	**0.23**	**0.13 J**	NFA
1,1-Dichloroethane	NE	NE	**99**	**0.80**	**0.6 J**	NA	0.6 U	0.72 U	0.64 U	NA	**0.01 J**	0.13 U	**0.012 J**	NA
1,1-Dichloroethene	NE	NE	**120**	**0.83**	**0.81 J**	NA	0.59 U	0.71 U	0.63 U	NA	0.064 U	0.064 U	0.065 U	NA
1,2-Dichloroethane	NE	NE	26 U	0.79 U	1.4 UJ	NA	**0.4 J**	**0.36 J**	**0.34 J**	NA	0.13 U	0.13 U	**0.12 J**	NA
cis-1,2-Dichloroethene	NE	NE	**15 J**	0.78 U	1.3 U	NA	0.59 U	0.71 U	0.63 U	NA	0.13 U	0.13 U	0.13 U	NA
Tetrachloroethene	100[1]	1,000[2]	**130**	**4.3**	**3.1**	MON/MIT	**0.56**	0.61 U	0.54 U	NFA	**0.24**	**0.16 J**	**0.059 J**	NFA
trans-1,2-Dichloroethene	NE	NE	26 U	0.78 U	1.3 U	NA	0.59 U	0.71 U	0.63 U	NA	0.64 U	0.64 U	0.65 U	NA
Trichloroethene	5[1]	250[2]	**13,000**	**180**	**110**	MITIGATE	**0.74**	0.48 U	0.42 U	NFA	**0.37**	0.17 U	0.18 U	NFA
Vinyl Chloride	NE	NE	17 U	0.5 U	0.86 U	NA	0.38 U	0.46 U	0.40 U	NA	0.041 U	0.041 U	0.042 U	NA

NOTES:

[1]= Value derived from NYSDOH guidance (2006), Table 3.1

[2] = Value derived from NYSDOH guidance (2006), Table 3.3 (Matrix 1 and 2)

[3] = The associated outdoor air sample detected concentrations of 1,1,1-trichloroethane at 0.036 J µg/m3 and tetrachloroethene at 0.079 J µg/m3

J = Estimated concentration

U = Compound not detected (reporting limit used as non-detect value, method detection limit approximately 5 times lower)

BOLD = Compound detected

SHADED = Exceedance of NYSDOH Guideline Value

MON/MIT = Monitor and/or Mitigate

NA = Not Applicable

NE = Not Established

NFA = No Further Action

NYSDOH = New York State Department of Health

µg/m^3 = Micrograms per Cubic Meter

FIGURE 1
HOME #3 TIME TREND
INDOOR AIR CONCENTRATIONS
NWIRP BETHPAGE, NEW YORK

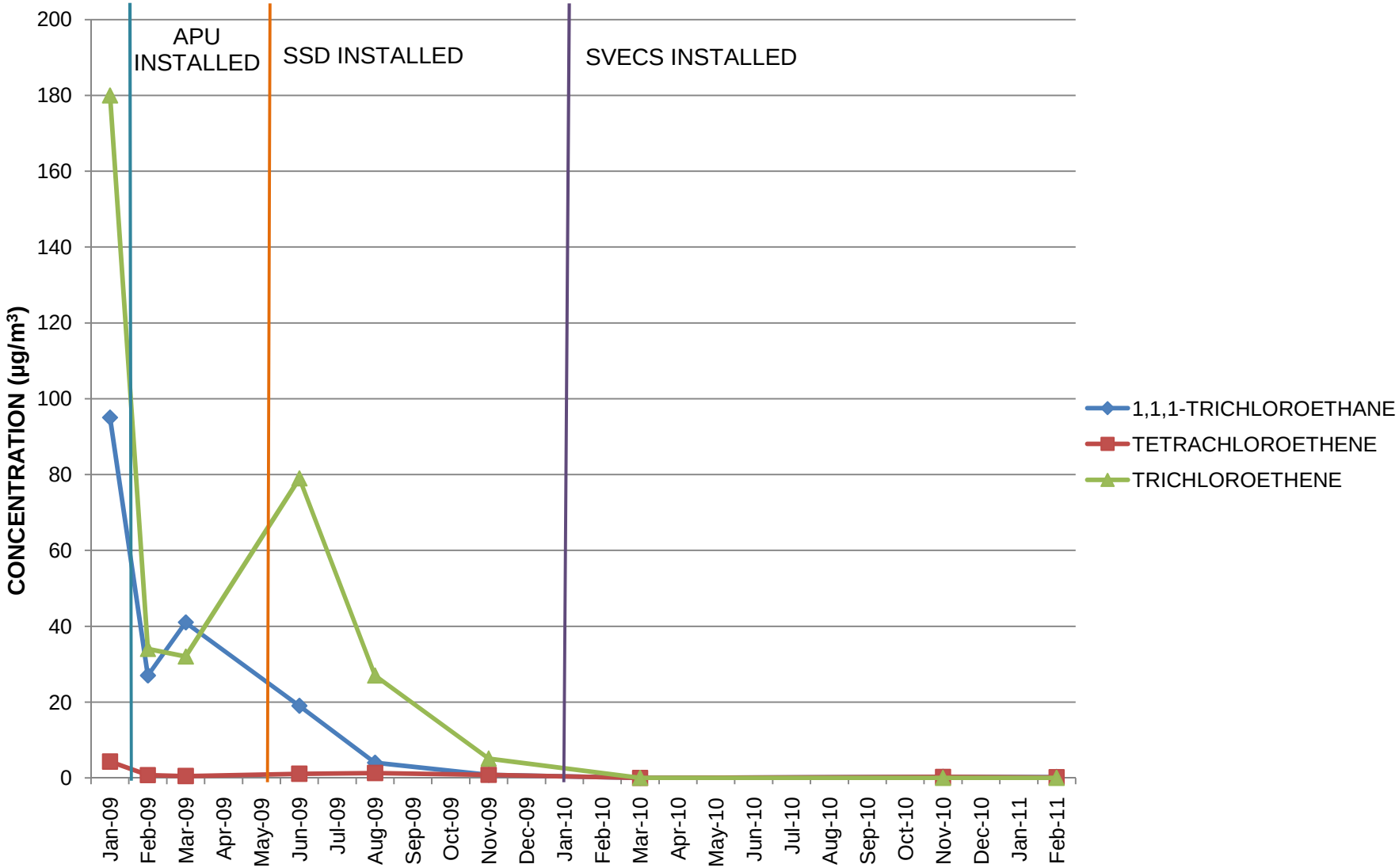

FIGURE 2
HOME #3 TIME TREND
SUB-SLAB AND SSD STACK CONCENTRATIONS
NWIRP BETHPAGE, NEW YORK