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NAS JACKSONVILLE
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DATA ANALYSIS FIELD EVENT 2 INVESTIGATION OF GEOLOGICAL AND HYDROGEOLOGICAL CHARACTERISTICS OF OPERABLE UNIT 3 (OU 3) NAS JACKSONVILLE FL

4/1/2011

ENVIRONMENTAL SECURITY TECHNOLOGY CERTIFICATION PROGRAM

Data Analysis Report
Field Event 2: NAS Jacksonville

Operable Unit 3, Building 106, PSC48
Naval Air Station Jacksonville (NAS JAX)
Jacksonville, Florida

ESTCP Project ER-0705:
Assessment of the Natural Attenuation of NAPL Source Zones and Post-Treatment NAPL Source Zones

April, 2011

Contents

Tables i
Figures ii
Acronyms and Abbreviations iii

1. Introduction 1
2. Field Investigation 1
3. References 5

Tables

Table 1 Depth-Discrete, Direct Push Sampling Locations and Analyses
Table 2 Monitoring Well Sampling Locations and Tests Performed
Table 3 Geologic Description of NAS Jacksonville Based on Continuous Direct-Push Soil Core: Event 1 - August 6-15, 2009
Table 4A Depth-to Water Measurements and Calculated Groundwater Elevations for Permanent Monitoring Wells: Event 1 – Aug 14, 2009
Table 4B Depth-to Water Measurements and Calculated Groundwater Elevations for Permanent Monitoring Wells: Event 2 – January 22, 2011
Table 5 Hydraulic Conductivity Estimates[1] for Depth-Discrete Aquifer Specific-Capacity Testing: Events 1 and 2
Table 6A Water Quality Data for Depth-Discrete, Direct Push Groundwater Samples: Event 1 – August 6-15, 2009
Table 6B Water Quality Data for Depth-Discrete, Direct Push Groundwater Samples: Event 2 – January 9-22, 2011
Table 7A Ion Concentration Data for Depth-Discrete, Direct Push Groundwater Samples: Event 1 – August 6-15, 2009
Table 7B Ion Concentration Data for Depth-Discrete, Direct Push Groundwater Samples: Event 2 – January 9-22, 2011
Table 8 DOC Concentration Data for Depth-Discrete, Direct Push Groundwater Samples: Events 1 and 2
Table 9 COD Data for Depth-Discrete, Direct Push Groundwater Samples: Events 1 and 2
Table 10 Alkalinity Data for Depth-Discrete Direct Push Groundwater Samples: Events 1 & 2
Table 11A VOC Concentration Data for Depth-Discrete Groundwater Samples: Event 1 – August 6-15, 2009
Table 11B VOC Concentration Data for Depth-Discrete Groundwater Samples: Event 2 – January 9-22, 2011

Table 12 VOC Soil Extractions: Event 2 – January 9-22, 2011
Table 13A Dehalococcoides Testing: Event 1 – August 6-15, 2009
Table 13B Dehalococcoides Testing: Event 2 – January 9-22, 2011
Table 14A Soil Gas Concentration Data: Event 1 – August 6-15, 2009
Table 14B Soil Gas Concentration Data: Event 2 – January 9-22, 2011
Table 15A Diffusion Coefficients: Event 1 – August 6-15, 2009
Table 15B Diffusion Coefficients: Event 2 – January 9-22, 2011
Table 16A Vapor Flux and Mass Loss Calculations: Event 1 – August 6-15, 2009
Table 16B Vapor Flux and Mass Loss Calculations: Event 2 – January 9-22, 2011

Figures

Figure 1 Site Map – Naval Air Station Jacksonville
Figure 2 Operable Unit 3, PSC 48 (Building 106) Site Map
Figure 3 Direct Push Water/Soil Sampling Locations: Event 1 – August 6-15, 2009
Figure 4A Groundwater Contour Map: Event 1 – August 14, 2009
Figure 4B Groundwater Contour Map: Event 2 – January 22, 2011
Figure 5A Vapor Sampling Locations: Event 1 – August 6-15, 2009
Figure 5B Vapor Sampling Locations: Event 2 – January 9-22, 2011
Figure 6A Groundwater Concentration Vertical Transect Contour Plot: Event 1 – August 6-15, 2009
Figure 6B Groundwater Concentration Vertical Transect Contour Plot: Event 2 – January 9-22, 2011
Figure 7 Mass Flux Calculation Example - Inputs
Figure 8 Mass Flux Calculation – Interpolated Concentration Profile Example
Figure 9 Hydraulic Conductivity Profile Example
Figure 10 Mass Flux Calculation – Output Example
Figure 11A Transect A-A' Flux Calculations – Event 1: August 6-15, 2009
Figure 11B Transect A-A' Calculations – Event 2: January 9-22, 2011
Figure 11C Upgradient Flux Input Calculations – Event 2: January 9-22,2011
Figure 12C Uncertainty Analysis – Example

Acronyms and Abbreviations

amsl	Above mean sea level
bgs	Below ground Surface
btoc	Below top of casing
CAH	Chlorinated aliphatic hydrocarbon
COD	Chemical oxygen demand
DCA	Dichloroethane
DCE	Dichloroethylene
DELCD	Dry electrolytic conductivity detector
Dhc	Dehalococcoides
DO	Dissolved oxygen
DOC	Dissolved organic carbon
DTW	Depth to water
EC	Electrical conductivity
ERH	Electrical resistance heating
ESTCP	Environmental Security Technology Certification Program
FID	Flame-ionization detector
ft	Feet
GC	Gas chromatography
kg	Kilogram
ND	Non-detect
NQ	Not quantified
NW	No water available for analysis
ORP	Oxidation reduction potential
PCE	Perchloroethylene
PCR	Polymerase chain reaction
sq ft	Square feet
TCA	Trichloroethane
TCE	Trichloroethylene
TOC	Top of casing
temp	Temperature
VC	Vinyl Chloride
VFA	Volatile fatty acid
VOA	Volatile organic analysis
y	Year

1. Introduction

The field investigation of Operable Unit 3, Building 106, PSC-48, Naval Air Station (NAS) Jacksonville, Jacksonville, Florida under the Environmental Security Technology Certification Program (ESTCP) project ER-0705, *Assessment of the Natural Attenuation of NAPL Source Zones and Post-Treatment NAPL Source Zones*, was performed January 69 through January 22, 2011. Figures 1 and 2 provide a site map that identifies the specific area of interest for this field investigation.

Consistent with the objectives set forth under the ER-0705 Demonstration Plan, the field investigation at this site included the following:

- Verification of the site geological/hydro-geological conceptual model;
- Collection of samples to determine groundwater concentrations down-gradient of the source zone, and soil gas concentrations above the source zone;
- Testing to determine aquifer properties and in situ effective diffusion coefficients;
- Collection of soil and groundwater samples for identification of dehalococcoides organisms.

2. Field Investigation

In accordance with the approved generic demonstration plan for this project, field investigations were performed to complete the objectives mentioned above. Tables 1 and 2 outline the types of sampling/testing performed, the locations for which are shown in Figure 3. Site activities are as follows:

2.1 Verification of the site hydro-geological conceptual model:

a. Basic Geologic Profile: A continuous soil core was collected for visual geologic evaluation and VOC analyses. Using a Geoprobe Macro Core sampler, soil core sections were collected to a total depth of 30 ft bgs at the locations shown in Figure 3. The basic geologic profile constructed from this soil core is presented in Table 3.

b. Depth-to-water: Depth-to-water (DTW) was measured in select permanent monitoring wells to determine groundwater elevation, flow direction, and hydraulic gradient. Table 4 contains DTW data for selected sampling locations. Based on data collected, the dominant groundwater flow direction is to the southeast with a gradient of 0.006 ft/ft. Figure 4 is a groundwater elevation map constructed from these data.

c. Hydraulic Conductivity Testing – Aquifer Specific-Capacity Tests: Depth-discrete, aquifer specific-capacity tests were conducted at direct push locations ASU-1 through ASU-7 (see Figure 3). Aquifer specific-capacity tests involve the measurement of the steady-state flowrate achieved under a fixed drawdown, and the hydraulic conductivity is estimated using those data and the Theim equation. Aquifer specific-capacity tests are described in further detail in the non-site-specific version of the Demonstration Plan. Hydraulic conductivity results from the aquifer specific-capacity testing are shown in Table 6.

2.2 Collection and analysis of groundwater samples to determine groundwater concentrations and the presence of dehalococcoides microorganisms:

a. Depth-Discrete Groundwater Sampling: Depth-discrete groundwater sampling was performed at direct push locations ASU-1 through ASU-7 shown in Figure 3. Groundwater samples were collected using a Geoprobe Screenpoint Sampler and a peristaltic pump. Groundwater samples were collected and preserved as outlined in the non-site-specific Demonstration Plan.

b. Depth Discrete Groundwater Sample Analysis: At the time of groundwater sample collection, field water quality parameters including pH, electrical conductivity (EC), temperature (T), dissolved oxygen (DO), and oxidation reduction potential (ORP) were measured. Field water quality data are shown in Table 7.

General water chemistry analyses including anions (Cl^-, NO_3^{2-}, SO_4^{2-}), cations (Fe^{2+}, Mn^{2+}) dissolved organic carbon (DOC), chemical oxygen demand (COD), and alkalinity were performed as possible on all direct push samples collected. General water chemistry analyses were performed as outlined in the non-site-specific Demonstration Plan. General water chemistry data are found in Tables 8, 9, and 10.

Volatile organic hydrocarbon (VOC) analyses were performed on-site by heated-headspace analysis and gas chromatography (GC) using a dry electrolytic conductivity detector (DELCD) and a flame-ionization detector (FID); the details of these analyses are provided in the non-site-specific demonstration plan. Data for VOC analyses are found in Table 11.

c. Dehalococcoides Analysis: Water Samples were collected to look for the presence of Dehalococcoides chlorinated hydrocarbon biodegrader populations. One-liter (1 L) samples were collected at the 9 depth-discrete, direct push locations shown in Table 1. Samples were extracted using a Mobio Water DNA Extraction Kit and amplified using nested PCR (polymerase chain reaction). Results for general bacterial and dehalococcoides testing are found in Table 12.

2.3 Collection of samples necessary to determine soil gas concentrations above the source zone:

a. Soil Gas Sampling and Analysis: Soil gas samples were collected from temporary soil gas sampling installations within the source zone area, as shown in Figure 5. Using a Geoprobe slide hammer, a 1-inch drive rod, and disposable stainless steel drive tips, 6" Geoprobe soil gas sampling implants were installed at 1.0 ft and 2.5 ft bgs. Soil gas sampling implants were installed with a sand-pack and bentonite seal to prevent surface leakage. Vapor samples were collected in tedlar bags using a lung sampler and were analyzed on-site at the time of collection by gas chromatography (GC) using a dry electrolytic conductivity detector (DELCD) and a flame-ionization detector (FID). Soil gas sampling results are summarized in Table 14.

   Note: soil gas sampling locations *Vapor 3B and 8B* were saturated at their installation depth of 2.5 ft bgs. No soil gas sampling or diffusion testing was performed at these locations.

b. Effective Soil Diffusion Coefficient Testing: In situ diffusion tests were performed at all soil gas sampling locations except gas sampling locations *Vapor 3B and 8B*. After installation of the sampling point and collection of a soil gas sample, 1 L of a mix of up to 10% v/v helium in soil gas was injected into the sample interval. After waiting a predetemined amount of time, 1 L of soil gas was withdrawn for helium analysis. The measured effective soil gas difficuion coefficients are presented in Table 15.

During the first field sampling event at NAS Jax the concrete slab and foundation from the demolished building 106 was still intact. Due to the stability of the slab it was not possible to sample directly beneath the slab. However prior to the most recent sampling event the slab was removed, the site graded and paved with asphalt. Slightly different construction methods were used on asphalt overlaying the now removed building. Under the new asphalt there was no underlayment and the asphalt is in direct contact with the soil; however under the older asphalt directly adjacent to the former building an underlayment of crushed shell was used. This difference may lead to significant variation between vapor flux in the new asphalt vs. the older. This difference will be investigated further in subsequent events.

Data reduction activities included first converting all dissolved and soil gas concentrations to "equivalent PCE" concentrations, as this is needed to account for the unmeasured constituents that are also part of the source zone mass loss (i.e., Cl^- ions lost when dechlorination occurs))when successive dechlorination steps occur. For NAS Jacksonville reporting, all CAH constituents were converted to PCE equivalents using adjustment factors based on the molar equivalence of each compound to PCE. Adjustment factors are shown as a secondary table under Table 17. Details concerning the use of PCE equivalents and calculation of adjustment factors are discussed in the updated source zone natural attenuation guidance being prepared under this ESTCP project.

Figure 6 shows a chemical concentration (PCE equivalents) contour plot along for the vertical transect A-A' shown in Figure 3, using dissolved CAH concentration data from direct push

locations ASU2 through ASU8. Transect A-A' is drawn roughly perpendicular to the dominant groundwater flow direction and data from the sampling locations are projected onto this transect.

Using the converted PCE equivalents groundwater concentration data, depth-discrete hydraulic conductivity measurements (see Table 6), and the site-specific hydraulic gradient of 0.006 ft/ft, a groundwater mass discharge calculation was performed using the Mass Flux Toolkit, Version 1.0. The Mass Flux Toolkit is a freeware program developed by Groundwater Services, Inc. and others under a contract funded by ESTCP. Figure 7 presents a snapshot of the input screen for the mass flux analysis. There are three interpolation schemes available for analysis within the Mass Flux Toolkit, and all possible combinations of interpolation schemes were tested in order to assess the sensitivity of the results to the interpolation scheme used. An example of the interpolated hydraulic conductivity and concentration profiles generated by various interpolation schemes are displayed in Figures 8 and 9. Figure 10 shows as an example the output of the linear interpolation scheme for the mass flux result for all chlorinated aliphatic hydrocarbons expressed consistently as PCE equivalents. During the second field event (Jan 2011) concentrations of chlorinated solvents were detected in upgradient wells (ASU1). To account for this flux input into the source zone, flux calculations were performed for the upgradient location. This resulting input flux was subtracted from the flux through transect A-A'. The input flux to the source zone can be found in Figure (12). ASU Mass flux results from nine possible interpolation combinations are summarized in Figure 11. The results are similar for all methods, with the difference between the lowest and highest value being only about a factor of two.

The Mass Flux Toolkit contains an uncertainty analysis that allows users to identify specific data points that most influence the calculated results. Use of this option with several interpolation options indicated that the calculated mass flux was most sensitive to changes in the hydraulic conductivity profile, especially in the vicinity of ASU5 (see results in Figure 12). Thus, these results suggest that uncertainty in the mass flux estimate might be decreased by increasing the sampling resolution near ASU5, as a large contribution to the overall mass flux comes through this section of the transect.

To accomplish this during future sampling events, additional samples may be collected on either side of ASU5 at depths vertically off-set from those at ASU5. This approach will be used rather than increased vertical resolution in a single borehole because it is felt that the additional horizontal resolution will provide additional bounds to the contour profile. This will also allow us to retain the same sampling point and depths at ASU5 for the benefit of data continuity, while adding more resolution and allowing us to better define the bounds of the highly conductive zone.

Using CAH soil gas concentration data (also converted to PCE equivalents), measured in situ effective diffusion coefficients, and an estimated source zone area footprint of 100-1000 m^2, the source zone mass loss rate associated with vapor transport was calculated. Vapor flux estimates for each well, and adjustment factors are located in Table 17. The vapor flux was estimated to be 9.5×10^{-4} kg/m^2-y as PCE which results in an equivalent PCE mass loss rate of 9.5×10^{-2} to 9.5 kg/y, for the range of estimated source zone footprints.

3. References

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Tables

Table 1

Depth-Discrete, Direct Push Sampling Locations and Analyses:

Location	Depth (ft bgs)	Aquifer Specific Capacity Test	Field Parameters[(a)]	Anions	Cations	Alkalinity	COD	DOC	CAH	Dhc	Ethene /Ethane
ASU1	10	x	x	---	x	x	---	x	x	---	x
	17	x	x	x	x	---	x	x	x	---	x
	25	x	x	x	x	x	x	---	x	---	x
	30	x	x	x	x	x	x	x	x	---	x
	35	x	x	x	x	x	x	x	x	---	x
	45	x	x	x	x	x	x	x	x	---	x
	60	x	x	x	x	x	x	---	x	---	---
ASU2	10	x	---	x	x	x	x	---	x	---	x
	17	x	x	x	x	x	x	x	x	---	x
	25	x	x	x	x	x	x	x	x	---	x
	30	x	x	x	x	x	x	x	x	---	x
	35	x	x	x	x	x	x	x	x	---	x
	45	x	x	x	x	---	x	x	x	x	x
	60	x	x	x	x	x	x	x	x	---	x
ASU2B	10	x	x	x	x	x	---	---	x	---	x
	17	x	---	---	x	x	---	x	x	---	x
	25	---	x	x	x	x	---	---	x	x	x
	30	x	x	x	x	x	x	---	x	---	x
	35	x	x	x	x	---	x	x	x	---	x
	45	---	---	---	---	---	---	---	---	---	---
	60	x	x	---	x	---	x	---	x	---	---
ASU3	10	x	x	x	x	x	x	---	x	---	x
	17	x	x	---	x	x	x	x	x	x	x
	25	x	x	x	x	---	---	x	x	x	x
	30	x	x	x	x	x	x	---	x	---	x
	35	x	x	---	x	---	---	---	x	---	x
	45	x	x	x	x	x	x	x	x	---	x
	60	x	x	x	x	x	x	---	x	---	x
ASU4	10	x	x	x	x	x	x	x	x	---	x
	17	x	---	x	x	x	x	---	x	---	x
	25	x	x	x	x	x	x	x	x	x	x
	30	x	x	x	x	x	---	x	x	---	x
	35	x	x	x	x	x	x	x	x	---	x
	45	x	x	x	x	x	x	x	x	---	x
	60	x	x	x	x	x	x	x	x	---	x
ASU5	10	x	x	x	x	x	---	---	x	---	x
	17	x	x	x	x	---	x	x	x	x	x
	25	x	x	x	x	x	x	---	x	x	x
	30	x	x	x	x	x	x	x	x	---	x
	35	x	x	x	x	---	---	x	x	x	x
	45	x	x	x	x	x	x	x	x	---	x
	60	x	x	x	x	x	x	x	x	---	x
ASU6	10	x	x	x	x	x	x	x	x	---	x
	17	x	x	x	x	x	x	x	x	---	x
	25	x	x	x	x	---	x	x	x	---	x
	30	x	x	x	x	x	x	x	x	---	x
	35	x	x	x	x	x	x	x	x	---	x
	45	x	x	x	x	---	x	x	x	---	x
	60	x	---	x	x	x	---	x	x	---	---

a) Field Parameters include: pH, electrical conductivity, temperature, dissolve oxygen, and oxidation reduction potential
--- Not enough water for test or location not identified for testing

Table 1 - Continued

Depth-Discrete, Direct Push Sampling Locations and Analyses:

Location	Depth (ft bgs)	Aquifer Specific Capacity Test	Field Parameters[(a)]	Anions	Cations	Alkalinity	COD	DOC	CAH	Dhc	Ethene /Ethane
ASU7	10	x	---	---	x	x	x	---	x	---	x
	17	x	x	---	x	---	---	---	x	---	x
	25	x	x	x	x	x	---	x	x	---	x
	30	x	x	x	x	x	x	---	x	---	x
	35	---	---		---	---	---	---	---	---	---
	45	x	x	x	x	x	x	x	x	---	x
	60	---	---	---	---	x	x	x	x	---	---
ASU8	10	x	x	x	x	x	x	x	x	---	---
	17	x	x	x	x	x	x	x	x	---	x
	25	x	x	x	x	x	---	x	x	---	x
	30	x	x	x	x	x		x	x	---	x
	35	x	x	---	---	x	x	x	x	---	x
	45	x	x	x	x	x	x	x	x	---	x
	60	x	x	x	x	---	x	x	x	---	x
ASU9	10	x	x	x	x	x	x	x	x	---	x
	17	x	x	x	x	x	x	x	x	---	x
	25	x	x	x	x	x	x	x	x	---	x
	30	x	x	x	x	x	x	x	x	---	x
	35	x	x	x	x	x	x	x	x	---	x
	45	x	x	x	x	x	x	x	x	---	x
	60	x	x	x	x	x	x	x	x	---	x
ASU10	10	x	x	x	x	x	x	x	x	---	x
	17	x	x	x	x	x	x	x	x	x	x
	25	x	x	x	x	x	x	x	x	---	x
	30	x	x	x	x	x	x	x	x	---	x
	35	x	x	x	x	---	x	x	x	---	x
	45	x	x	x	x	x	x	x	x	---	x
	60	x	x	x	x	x	x	x	x	---	x
ASU11	10	x	x	---	x	x	---	x	x	---	x
	17	x	x	x	x	x	x	x	x	---	x
	25	x	x	x	x	x	x	x	x	x	x
	30	x	x	x	x	x	x	---	x	---	x
	35	x	x	x	x	x	x	x	x	---	x
	45	---	---	---	---	---	---	x	x	---	x
	60	x	x	x	---	x	x	x	x	---	x

a) Field Parameters include: pH, electrical conductivity, temperature, dissolve oxygen, and oxidation reduction potential
--- Not enough water for test or location not identified for testing

Table 2

Monitoring Well Sampling Locations and Tests Performed

Well	DTW
PZ-1061	X
PZ-1062	X
PZ-1063	X
PZ-1064	X
PZ-1065	X
PZ-1066	X
PZ-1067	X
PZ-1068	
MW028	X

Table 3

Geologic Description of NAS Jacksonville Based on Continuous Direct-Push Soil Core:
Event 1 - August 6-15, 2009

Depth (ft bgs)	**Description**
0 – 0.5	Asphalt
0.5 – 1.5	Fine sand with gravel
1.5 – 5	Fine sand with silt/clay
5 – 6	Clay with trace sand and organic matter
6 – 7.5	Clay/silt with fine sand and organic matter
7.5 – 13	Fine sand/silt
13 – 16.5	Fine sand with silt/clay
16.5 – 18.5	Clay/silt with trace fine sand
18.5 – 20	Clay with 1” fine sand lens at ~18.75ft bgs
20 – 21.25	Clay with trace fine sand
21.25 – 25	Clay with 1” fine sand lens at ~23ft bgs
25 – 27.5	Fine sand with silt/clay
27.5 – 30	Fine sand with trace silt/clay

Table 4A

Depth-to Water Measurements and Calculated Groundwater
Elevations for Permanent Monitoring Wells: Event 1 – Aug 14, 2009

Location	**Elev TOC** (ft amsl)	**DTW** (m btoc)	**DTW** (ft btoc)	**Groundwater Elevation** (m amsl)	**Groundwater Elevation** (ft amsl)
PZ-1061	11.78	0.91	2.97	2.69	8.81
PZ-1062	11.73	0.91	2.99	2.66	8.74
PZ-1063	11.98	1.00	3.28	2.65	8.7
PZ-1064	11.41	1.05	3.43	2.43	7.98
PZ-1065	11.48	1.08	3.53	2.42	7.95
PZ-1066	11.78	1.18	3.88	2.41	7.9
PZ-1067	12.17	1.37	4.48	2.34	7.69
PZ-1068	11.48	1.17	3.85	2.33	7.63
MW028	Unknown	1.09	3.58	Unknown	Unknown

Table 4B

Depth-to Water Measurements and Calculated Groundwater
Elevations for Permanent Monitoring Wells: Event 2 – Jan 22, 2011

Location	**Elev TOC** (ft amsl)	**DTW** (m btoc)	**DTW** (ft btoc)	**Groundwater Elevation** (m amsl)	**Groundwater Elevation** (ft amsl)
PZ-1061	11.78	1.44	4.71	2.16	7.07
PZ-1062	11.73	1.43	4.68	2.15	7.05
PZ-1063	11.98	1.48	4.85	2.17	7.13
PZ-1064	11.41	Unknown	Unknown	Unknown	Unknown
PZ-1065	11.48	1.43	4.70	2.07	6.78
PZ-1066	11.78	1.54	5.05	2.05	6.73
PZ-1067	12.17	1.74	5.70	1.97	6.47
PZ-1068	11.48	Unknown	Unknown	Unknown	Unknown
MW028	Unknown	1.52	5.0	Unknown	Unknown

Table 5

Hydraulic Conductivity Estimates[1] for Depth-Discrete Aquifer Specific-Capacity Testing: Events 1 and 2

	K (cm/sec)																	
Depth (ft bgs)	ASU1			ASU2			ASU2B			ASU3			ASU4			ASU5		
	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3
10	7.7×10^{-3}	3.3×10^{-3}		5.4×10^{-5}	4.8×10^{-5}		X	7.7×10^{-4}		5.7×10^{-5}	3.7×10^{-3}		3.6×10^{-3}	4.5×10^{-3}		1.1×10^{-5}	1.3×10^{-3}	
15	---	X		2.5×10^{-4}	X		X	X		2.7×10^{-4}	X		5.0×10^{-4}	X		5.3×10^{-5}	X	
17	X	4.5×10^{-4}		X	1.5×10^{-4}		X	7.7×10^{-4}		X	3.6×10^{-4}		X	2.0×10^{-4}		X	3.4×10^{-4}	
22	---	X		5.7×10^{-4}	X		X	X		---	X		---	X		---	X	
25	X	2.9×10^{-4}		X	2.1×10^{-3}		X	---		X	5.1×10^{-3}		X	1.7×10^{-3}		X	7.7×10^{-3}	
30	8.3×10^{-5}	1.4×10^{-4}		2.8×10^{-3}	3.6×10^{-3}		X	1.3×10^{-3}		3.8×10^{-3}	4.9×10^{-3}		2.6×10^{-4}	1.7×10^{-3}		2.1×10^{-5}	1.4×10^{-3}	
35	1.0×10^{-4}	2.4×10^{-4}		---	1.1×10^{-4}		X	1.6×10^{-4}		2.3×10^{-3}	2.0×10^{-3}		1.4×10^{-4}	3.4×10^{-3}		1.7×10^{-4}	1.7×10^{-4}	
45	8.1×10^{-4}	3.1×10^{-3}		2.1×10^{-3}	2.0×10^{-3}		X	---		4.7×10^{-4}	8.9×10^{-4}		2.2×10^{-3}	1.6×10^{-3}		4.9×10^{-3}	5.1×10^{-3}	
60	---	2.7×10^{-4}		---	9.3×10^{-4}		X	3.7×10^{-4}		---	2.8×10^{-3}		---	8.2×10^{-3}		---	4.8×10^{-4}	

	K (cm/sec)																	
Depth (ft bgs)	ASU6			ASU7			ASU8			ASU9			ASU10			ASU11		
	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3
10	2.6×10^{-3}	8.8×10^{-3}		6.4×10^{-4}	2.6×10^{-3}		X	3.5×10^{-3}		X	6.9×10^{-3}		X	8.6×10^{-4}		X	6.9×10^{-4}	
15	3.5×10^{-4}			3.3×10^{-4}			X			X			X			X		
17	X	4.6×10^{-4}		X	1.9×10^{-3}		X	4.3×10^{-4}		X	2.0×10^{-4}		X	2.8×10^{-4}		X	4.6×10^{-4}	
22	---			---			X			X			X			X		
25	X	2.2×10^{-3}		X	2.2×10^{-3}		X	2.8×10^{-4}		X	2.1×10^{-3}		X	1.9×10^{-3}		X	2.0×10^{-3}	
30	3.6×10^{-3}	2.8×10^{-3}		2.7×10^{-4}	6.9×10^{-3}		X	2.0×10^{-3}		X	3.5×10^{-3}		X	2.0×10^{-4}		X	6.0×10^{-3}	
35	2.9×10^{-4}	1.7×10^{-3}		1.6×10^{-4}			X	3.7×10^{-4}		X	3.5×10^{-4}		X	4.1×10^{-4}		X	4.8×10^{-3}	
45	5.1×10^{-3}	9.5×10^{-4}		9.5×10^{-5}	1.2×10^{-4}		X	9.3×10^{-4}		X	9.5×10^{-5}		X	1.4×10^{-3}		X		
60	---	7.5×10^{-5}		---			X	1.3×10^{-3}		X	5.2×10^{-3}		X	4.1×10^{-3}		X	2.3×10^{-4}	

Evt – Event
X – No Sample available for analysis

Event 1: Aug 6-15, 2009
Event 2: Jan 9-22, 2011

Event 3: To be completed at a future date
1 – Theim method used for calculation

Table 6A

Water Quality Data for Depth-Discrete, Direct Push Groundwater Samples:
Event 1 – August 6-15, 2009

	Depth (ft bgs)	pH	EC (µS)	T (ºC)	DO (mg/L)	ORP (mV)
ASU1	10	6.3	243	28.8	<1	36.0
	15	---	---	---	---	---
	22	---	---	---	---	---
	30	5.8	160	28.5	<1	6.7
	35	5.7	158	28.8	,1	11.4
	45	6.1	302	31.1	<1	-50.9
	60	---	---	---	---	---
ASU2	10	---	---	---	---	---
	15	5.1	42710	27.9	<1	41.6
	22	5.5	12780	28.5	<1	41.0
	30	5.6	32120	29.0	<1	-7.5
	35	---	---	---	---	---
	45	6.4	2345	29.4	<1	-43.3
	60	---	---	---	---	---
ASU3	10	6.0	416	30.2	<1	-24.2
	15	5.2	25860	30.6	<1	86.7
	22	---	---	---	---	---
	30	5.4	13400	31.2	<1	47.0
	35	5.9	18100	28.7	<1	-60.6
	45	5.8	7711	28.4	<1	-17.4
	60	---	---	---	---	---
ASU4	10	5.8	1360	29.7	<1	5.9
	15	5.4	15510	32.1	<1	37.6
	22	---	---	---	---	---
	30	6.0	1382	27.9	<1	44.6
	35	6.2	1540	27.9	<1	-64.3
	45	5.8	9269	28.0	<1	-33.5
	60	6.2	381	27.5	<1	-58.9

	Depth (ft bgs)	pH	EC (µS)	T (ºC)	DO (mg/L)	ORP (mV)
ASU5	10	---	---	---	---	---
	15	5.6	7400	29.3	<1	18
	22	---	---	---	---	---
	30	---	---	---	---	---
	35	6.2	690	28.1	<1	165
	45	6.1	1140	30.6	1.78	-27.1
	60	---	---	---	---	---
ASU6	10	6.09	681	30.2	<1	37
	15	5.5	10310	31	<1	38.5
	22	---	---	---	---	---
	30	5.9	1128	30.3	<1	9.5
	35	6.0	502	30.01	<1	-17.8
	45	5.9	210	30.2	<1	6.5
	60	---	---	---	---	---
ASU7	10	5.9	946	31.1	<1	16.7
	15	5.5	10050	30.0	<1	36.5
	22	---	---	---	---	---
	30	5.8	394	27.0	<1	-42.8
	35	5.9	200	27.1	<1	-23.5
	45	6.1	284	27.8	<1	-47.8
	60	---	---	---	---	---

--- Not enough water available for analysis

<1- Dissolved oxygen values <1 mg/L are simply shown as <1

Table 6B

Water Quality Data for Depth-Discrete, Direct Push Groundwater Samples:
Event 2 – January 9-22, 2011

	Depth (ft bgs)	pH	EC (µS)	T (ºC)	DO (mg/L)	ORP (mV)
ASU1	10	6.2	246	20.9	1.9	58.5
	17	5.9	5482	22.8	<1	102.1
	25	5.9	4912	24.7	<1	2.9
	30	6.1	264	24.3	<1	-32.4
	35	5.7	152	23.7	<1	-16.6
	45	5.6	140	24.9	<1	8.1
	60	5.9	136	23.0	<1	-0.1
ASU2	10	---	---	---	---	---
	17	5.5	3350	18.1	---	41.7
	25	5.7	1814	20.4	<1	6.5
	30	5.7	2648	24.4	<1	-16
	35	5.9	1711	19.7	<1	-25.4
	45	6.4	3620	24.2	<1	-124
	60	6.9	387	23.4	<1	-198
ASU2B	10	8	1642	18.9	<1	-121.3
	17	---	---	---	---	---
	25	5.7	36230	23.1	<1	-37.8
	30	5.7	20190	22.2	<1	-39.1
	35	6.0	4839	19.7	1.0	-35.3
	45	---	---	---	---	---
	60	6.3	413	21.6	<1	-70
ASU3	10	6.4	5.4	22.3	<1	-48
	17	5.3	2010	23.2	<1	52
	25	5.7	4004	23.2	<1	-15.2
	30	5.8	4016	24	<1	-16
	35	6.0	1676	20.4	<1	-37
	45	5.9	6581	22.1	<1	-32
	60	6.3	484	22.84	<1	-103.3
ASU4	10	6.3	1377	22.736	<1	-30
	17	---	---	---	---	---
	25	6.0	2277	23.0	<1	-7
	30	6.0	2100	24.0	<1	-13.7
	35	6.2	2870	23.2	<1	-41
	45	5.9	1047	24.4	<1	-13.8
	60	6.5	408	24	<1	-85.1
ASU5	10	6.1	243	22.5	1.51	-16.5
	17	5.2	10880	19.9	<1	19.6
	25	5.9	1778	22.9	<1	-9.6
	30	6.1	1396	24.7	<1	-64.2
	25.0	0	27.5	23.0	<1	-59.6
	45	6.1	2574	22.2	<1	-56.2
	60	6.2	413	24.5	<1	-79.1

--- Not enough water available for analysis

	Depth (ft bgs)	pH	EC (µS)	T (ºC)	DO (mg/L)	ORP (mV)
ASU6	10	63	82	23.9	<1	16.5
	17	5.5	10530	24.7	<1	62
	25	6.1	1110	24.9	<1	-2
	30	5.9	1210	23.9	<1	-19.3
	35	5.8	503	23.9	<1	-35
	45	6.1	345	23.9	<1	-74.2
	60	---	---	---	---	---
ASU7	10	---	---	---	---	---
	17	5.6	9650	21.7	<1	-61
	25	6.2	777	24.4	<1	-9.6
	30	6.1	402	24.7	<1	-21.6
	35	---	---	---	---	---
	45	6.4	228	24.0	<1	-68
	60	---	---	---	---	---
ASU8	10	5.7	442	20.8	<1	13.8
	17	5.7	1979	19.4	<1	14.0
	25	5.8	367	20.7	<1	34.2
	30	5.9	334	23.6	<1	-20.9
	35	5.9	201	23.1	<1	-24.1
	45	6.0	238	23.3	<1	-52.8
	60	5.7	131	24.0	<1	15.7
ASU9	10	6.3	294	22.5	<1	-40.5
	17	5.9	15670	23.0	<1	1.2
	25	5.5	17250	21.9	<1	27.4
	30	5.6	19920	24.6	<1	12.9
	35	5.6	15030	23.5	<1	7.6
	45	6.2	5.35	20.4	<1	-30.8
	60	6.2	319	25.0	<1	-43.8
ASU10	10	6.2	268	23.2	<1	-1.6
	17	5.5	22450	23.5	<1	66.9
	25	5.9	1974	24.5	<1	3.0
	30	6.0	1726	21.33	<1	-15.9
	35	6.0	2139	25.0	<1	-22.5
	45	6.2	1378	22.3	<1	-24.7
	60	6.2	376	25.5	<1	-62.8
ASU11	10	6.3	226	22.5	<1	21.6
	17	5.5	11400	23.2	<1	71.8
	25	5.6	1674	23.0	<1	-11.5
	30	5.7	1315	25.2	<1	0.8
	35	5.5	260	25.0	<1	27.5
	45	---	---	---	---	---
	60	6.6	331	22.3	<1	-172.5

<1- Dissolved oxygen values <1 mg/L are simply shown as <1

Table 7A

Ion Concentration Data for Depth-Discrete, Direct Push Groundwater Samples:
Event 1 – August 6-15, 2009

	Depth (ft bgs)	(mg/L)				
		Cl^-	**NO_3^{-2}**	**SO_4^{-2}**	**Fe^{2+}**	**Mn^{2+}**
ASU 1	10	100	0	57	---	---
	15	---	---	---	---	---
	22	---	---	---	---	---
	30	76	1	21	20	ND
	35	130	1	3	15	ND
	45	35	0	53	15	ND
	60	---	---	---	---	---
ASU 2	10	---	---	---	---	---
	15	55	1	140	480	3
	22	62	0	100	300	3
	30	31	1	50	380	1
	35	---	---	---	42	1
	45	61	0	50	---	---
	60	---	---	---	---	---
ASU 3	10	62	0	130	---	---
	15	100	1	30	230	2
	22	---	---	---	---	---
	30	32	0	54	290	1
	35	57	1	99	77	1
	45	53	5	170	---	---
	60	---	---	---	---	---
ASU 4	10	490	0	100	---	---
	15	28	0	34	---	---
	22	---	---	---	---	---
	30	2100	0	33	66	1
	35	140	1	25	61	1
	45	25	0	96	190	1
	59	28	0	35	50	ND

	Depth (ft bgs)	(mg/L)				
		Cl^-	**NO_3^{-2}**	**SO_4^{-2}**	**Fe^{2+}**	**Mn^{2+}**
ASU 5	10	49	1	51	---	---
	15	---	---	---	97	1
	22	---	---	---	---	---
	30	52	5	170	---	---
	35	---	---	---	45	ND
	45	39	0	93	45	ND
	65	---	---	---	---	---
ASU 6	10	600	11	70	---	---
	15	100	0	17	180	2
	22	---	---	---	---	---
	30	34	1	98	97	ND
	35	530	0	16	46	ND
	45	170	0	130	25	ND
	59	---	---	---	---	---
ASU 7	10	470	1	39	5	ND
	15	40	0	53	200	3
	22	---	---	---	---	---
	30	62	0	96	32	ND
	35	2200	1	33	24	ND
	45	94	0	54	21	ND
	60	---	---	---	---	---

--- – No water available for analysis
ND – Non-detect
<1 – Indicates analyte was detected, but was below practical quantitation limit of 1 mg/L

Table 7B

Ion Concentration Data for Depth-Discrete, Direct Push Groundwater Samples:
Event 2 – January 9-22, 2011

	Depth (ft bgs)	(mg/L)				
		Cl^-	NO_3^{-2}	SO_4^{-2}	Fe^{2+}	Mn^{2+}
ASU1	10	4	ND	16	<1	ND
	17	2039	ND	62	17	ND
	25	ND	ND	19	200	1
	30	9	1	14	17	ND
	35	4	ND	12	17	ND
	45	6	ND	15	24	ND
	60	5	ND	9	14	ND
ASU2	10	---	---	---	2	ND
	17	2146	ND	129	660	3
	25	1144	ND	57	440	3
	30	895	ND	152	410	3
	35	997	ND	21	500	3
	45	996	ND	9	75	1
	60	37	ND	6	24	ND
ASU2B	10	257	ND	120	ND	ND
	17	---	---	---	74	ND
	25	2599		173	940	3
	30	569		38	880	2
	35	1356	ND	4	150	2
	45	---	---	---	---	---
	60	---	---	---	42	ND
ASU3	10	66	ND	23	1	ND
	17	---	---	---	440	3
	25	1289	ND	17	140	2
	30	1300	ND	15	170	1
	35	---	---	---	290	2
	45	2202	ND	9	93	ND
	60	66	ND	7	42	ND
ASU4	10	357	ND	24	7	ND
	17	505	ND	32	330	3
	25	680	ND	14	100	1
	30	623	ND	15	140	2
	35	841	ND	14	92	ND
	45	3521	ND	10	220	2
	60	64	ND	4	41	ND
ASU5	10	20	ND	7	10	ND
	17	1	ND	38	220	2
	25	487	ND	21	54	ND
	30	366	ND	19	120	1
	35	13	ND	10	39	ND
	45	665	ND	4	98	ND
	60	60	ND	12	46	ND

--- – No water available for analysis
ND – Non-detect

	Depth (ft bgs)	(mg/L)				
		Cl^-	NO_3^{-2}	SO_4^{-2}	Fe^{2+}	Mn^{2+}
ASU6	10	420	ND	63	6	ND
	17	3665	ND	53	260	3
	25	264	ND	11	34	ND
	30	329	ND	15	130	1
	35	111	ND	15	54	ND
	45	39	ND	10	20	ND
	60	19	ND	7	33	ND
ASU7	10	---	---	---	8	ND
	17	---	---	---	190	1
	25	176	ND	44	21	ND
	30	81	ND	14	42	ND
	35	3824	ND	ND	---	---
	45	6	ND	8	19	ND
	60	---	---	---	---	---
ASU8	10	31	ND	2	4	ND
	17	544	ND	31	62	ND
	25	70	ND	5	4	ND
	30	62	ND	14	12	ND
	35	7	ND	17	27	ND
	45	---	---	---	---	---
	60	39	ND	5	16	ND
ASU9	10	4	ND	14	5	ND
	17	511	ND	93	88	1
	25	1035	ND	48	460	3
	30	ND	ND	66	190	2
	35	682	ND	27	530	2
	45	85	ND	2	34	ND
	60	55	ND	4	23	ND
ASU10	10	14	ND	13	3	ND
	17	ND	ND	10	200	2
	25	532	ND	15	56	ND
	30	472	ND	17	66	ND
	35	592	ND	14	92	1
	45	362	ND	5	27	ND
	60	50	ND	3	43	ND
ASU11	10	---	---	---	1	ND
	17	ND	ND	76	160	2
	25	452	ND	13	50	ND
	30	364	ND	14	110	1
	35	47	ND	11	24	ND
	45	---	---	---	---	---
	60	17	ND	6	---	---

<1 – Indicates analyte was detected, but was below practical quantitation limit of 1 mg/L

Table 8

DOC Concentration Data for Depth-Discrete, Direct Push Groundwater Samples: Events 1 and 2

	DOC (mg/L)																	
Depth (ft bgs)	ASU1			ASU2			ASU2B			ASU3			ASU4			ASU5		
	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3
10	---	23		---	---		X	---		18	---		---	2		---	---	
15	---	X		13	X		X	X		7	X		8	X		7	X	
17	X	4		X	34		X	1		X	<1		X	---		X	8	
22	---	X		3	X		X	X		---	X		---	X		---	X	
25	X	---		X	14		X	---		X	1		X	10		X	---	
30	3	10		9	21		X	---		5	---		3	11		10	9	
35	7	30		2	<1		X	14		---	---		5	20		7	8	
45	4	4		---	19		X	---		5	3		6	4		4	15	
60	---	---		---	7		X	---		---	---		3	11		---	5	

	DOC (mg/L)																	
Depth (ft bgs)	ASU6			ASU7			ASU8			ASU9			ASU10			ASU11		
	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3
10	---	2		---	---		X	<1		X	21		X	---		X	19	
15	6	X		---	X		X	X		X	X		X	X		X	X	
17	X	<1		X	---		X	5		X	11		X	1		X	18	
22	---	X		---	X		X	X		X	X		X	X		X	X	
25	X	4		X	<1		X	2		X	9		X	4		X	5	
30	---	18		---	---		X	9		X	6		X	<1		X	---	
35	---	3		---	---		X	21		X	12		X	<1		X	8	
45	---	10		---	6		X	18		X	---		X	23		X	19	
60	---	14		---	32		X	6		X	15		X	27		X	24	

Evt – Event
X – No Sample available for analysis
<1 – Indicates analyte was detected below PQL

Event 1: Aug 6-15, 2009
Event 2: Jan 9-22, 2011

Event 3: is to be completed at a future date
--- – No water for analysis

Table 9

COD Data for Depth-Discrete, Direct Push Groundwater Samples: Events 1 and 2

	COD (mg/L)																	
Depth (ft bgs)	ASU1			ASU2			ASU2B			ASU3			ASU4			ASU5		
	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3
10	---	---		---	110		X	---		35	96		---	96		---	---	
15	---	X		34	X		X	X		41	X		150	X		290	X	
17	X	210		X	810		X	---		X	610		X	230		X	285	
22	---	X		14	X		X	X		---	X		---	X		---	X	
25	X	282		X	530		X	---		X	---		X	59		X	27	
30	3	39		52	920		X	450		30	147		42	---		130	36	
35	26	19		38	460		X	80		---	---		25	66		89	---	
45	17	8		---	69		X	---		47	145		130	220		58	84	
60	---	67		---	21		X	10		---	40		89	16		---	18	

	COD (mg/L)																	
Depth (ft bgs)	ASU6			ASU7			ASU8			ASU9			ASU10			ASU11		
	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3
10	---	34		---	27		X	6		X	15		X	110		X	---	
15	190	X		---	X		X	X		X	X		X	X		X	X	
17	X	160		X	---		X	45		X	610		X	390		X	117	
22	---	X		---	X		X	X		X	X		X	X		X	X	
25	X	32		X	---		X	---		X	667		X	40		X	51	
30	140	36		---	360		X	7		X	680		X	50		X	45	
35	122	36		---	---		X	24		X	220		X	39		X	17	
45	---	35		---	6		X	36		X	64		X	26		X	---	
60	---	---		---	24		X	42		X	12		X	11		X	34	

Evt – Event
X – No Sample available for analysis

Event 1: Aug 6-15, 2009
Event 2: Jan 9-22, 2011

Event 3: is to be completed at a future date
--- – No water for analysis

Table 10

Alkalinity Data for Depth-Discrete, Direct Push Groundwater Samples: Events 1 and 2

	Alkalinity (mg/L as CaCO3)																	
Depth (ft bgs)	ASU1			ASU2			ASU2B			ASU3			ASU4			ASU5		
	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3
10	---	80		---	120		X	240		80	120		100	80		---	40	
15	200	X		20	X		X	X		20	X		---	X		40	X	
17	X	---		X	20		X	60		X	20		X	40		X	---	
22	---	X		40	X		X	X		---	X		---	X		---	X	
25	X	20		X	60		X	20		X	---		X	40		X	40	
30	40	100		20	40		X	60		40	40		40	40		20	40	
35	60	60		---	40		X	---		20	---		60	40		20	---	
45	20	40		40	---		X	---		40	20		20	40		100	280	
60	---	40		---	60		X	---		---	80		20	40		---	40	

	Alkalinity (mg/L as CaCO3)																	
Depth (ft bgs)	ASU6			ASU7			ASU8			ASU9			ASU10			ASU11		
	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3	Evt 1	Evt 2	Evt 3
10	120	60		100	40		X	100		X	120		X	100		X	80	
15	60	X		40	X		X	X		X	X		X	X		X	X	
17	X	40		X	---		X	40		X	120		X	40		X	20	
22	---	X		---	X		X	X		X	X		X	X		X	X	
25	X	---		X	40		X	60		X	20		X	40		X	20	
30	20	40		40	20		X	40		X	40		X	60		X	20	
35	20	40		120	---		X	40		X	20		X	---		X	40	
45	40	---		100	40		X	40		X	60		X	60		X	---	
60	---	140		---	160		X	40		X	---		X	40		X	60	

Evt – Event
X – No Sample available for analysis

Event 1: Aug 6-15, 2009
Event 2: Jan 9-22, 2011

Event 3: is to be completed at a future date

Table 11A

VOC Concentration Data for Depth-Discrete Groundwater Samples:
Event 1 – August 6-15, 2009

Location	Depth (ft bgs)	VOC Concentrations (µg/L)								
		VC	**11 DCE**	**t - DCE**	**c-DCE**	**TCE**	**PCE**	**Ethene**	**Ethane**	**PCE Equivalents[1]**
ASU 1	10	-	-	-	-	-	-	<1	<1	0
	15	-	-	-	-	-	-	<1	2	9
	22	NW	NW	NW	NW	NW	NW	NW	NW	NW
	30	-	-	-	<1	<1	-	<1	<1	1
	35	-	-	-	-	-	-	<1	<1	-
	45	<1	<1	16	49	64	-	3	6	240
	60	-	-	-	-	-	-	-	-	-
ASU 2	10	210	-	45	100	-	-	2	<1	830
	15	74	2	<1	300	500	8000	<1	-	9300
	22	<1	7		34	210	10	-	-	350
	30	-	<1	<1	20	150	240	<1	<1	460
	35	-	-	-	-	-	3	-	-	3
	45	-	-	-	-	-	<1	<1	<1	-
	60	NW	NW	NW	NW	NW	NW	NW	NW	NW
ASU 3	10	1100	73	3500	16000	2400	-	10	-	39000
	15	1300	47	99	2700	550	9100	27	2	18000
	22	NW	NW	NW	NW	NW	NW	NW	NW	NW
	30	58	130	18	760	540	1300	<1	-	3700
	35	51	7	6	200	34	120	<1	<1	660
	45	<1	-	<1	6	<1	<1	<1	<1	10
	60	NW	NW	NW	NW	NW	NW	NW	NW	NW
ASU 4	10	1100	99	11000	18000	6000	9200	17	<1	71000
	15	630	50	2200	5300	7800	38000	5	<1	62000
	22	NW	NW	NW	NW	NW	NW	NW	NW	NW
	30	260	-	12	170	42	120	<1	<1	1200
	35	58	7	350	1100	1200	1800	<1	<1	6000
	45	3	7	3	690	200	64	<1	<1	1500
	59	-	-	2	14	2	14	-	-	45
ASU 5	10	490	19	650	2700	-	1	4	<1	7200
	15	2700	41	350	5600	150	750	470	-	21000
	22	NW	NW	NW	NW	NW	NW	NW	NW	NW
	30	6	3	13	470	20	130	2	2	1000
	35	<1	<1	3	28	7	9	<1	<1	75
	45	5	2	34	130	<1	<1	-	-	470
	65	<1	-	<1	3	<1	<1	6	12	100
ASU 6	10	310	19	110	6100	1600	750	<1	<1	14000
	15	120	24	75	1700	1900	19000	<1	<1	25000
	22	NW	NW	NW	NW	NW	NW	NW	NW	NW
	30	<1	<1	<1	9	140	460	-	-	650
	35	-	-	-	-	4	<1	<1	<1	6
	45	<1	4	17	120	520	11	<1	<1	900
	59	2	<1	15	58	5	14	-	-	150
ASU 7	10	340	30	88	6400	2500	1000	2	<1	16000
	15	65	2	72	520	290	8800	<1	-	10000
	22	NW	NW	NW	NW	NW	NW	NW	NW	NW
	30	-	-	-	-	5	-	<1	<1	6
	35	<1	<1	<1	<1	1	<1	<1	<1	3
	45	<1	2	12	110	65	<1	2	3	320
	60	NW	NW	NW	NW	NW	NW	NW	NW	NW

1) PCE equivalents based on adjustment factors in Table 16. Adjustment factors and their calculation will be detailed in a document to ESTCP at a later date.

NW - No water available for analysis

\- - Non-detect

<1 - Indicates analyte was detected, but below the practical quantitation limit of 1 ug/L

Table 11B

VOC Concentration Data for Depth-Discrete Groundwater Samples:
Event 2 – January 9-22, 2011

Location	Depth (ft bgs)	VOC Concentrations (µg/L)								
		VC	11 DCE	t - DCE	c-DCE	TCE	PCE	Ethene	Ethane	PCE Equivalents[1]
ASU 1	10	-	-	-	-	-	-	-	-	-
	17	-	-	-	-	-	-	<1	<1	-
	25	<1	<1	<1	23	61	<1	<1	<1	120
	30	-	-	-	-	4	-	<1	3	21
	35	-	-	-	<1	<1	<1	<1	2	13
	45	2	-	14	43	120	-	<1	<1	250
	60	3	-	29	140	580	-	NW	NW	1000
ASU 2	10	200	-	6	180	-	-	3	2	880
	17	20	-	-	250	690	10000	<1	<1	11000
	25	11	5	-	41	130	260	<1	<1	530
	30	3	4	-	140	200	260	-	<1	760
	35	-	-	-	3	2	2	-	<1	10
	45	1	<1	-	5	7	14	<1	<1	34
	60	-	2	10	71	2	<1	<1	<1	150
ASU 2B	10	10	-	-	-	-	-	<1	-	27
	17	270	21	160	1200	950	3900	2	<1	8200
	25	31	24	10	480	1400	2200	<1	<1	5000
	30	<1	<1	-	-	-	<1	-	<1	1
	35	2	-	<1	40	24	2	<1	<1	110
	45	NW	NW	NW	NW	NW	NW	NW	NW	NW
	60	<1	3	13	140	<1	<1	NW	NW	270
ASU 3	10	1700	110	2600	12000	-	-	18	<1	30000
	17	570	46	51	2000	1100	18000	15	<1	25000
	25	34	240	-	540	2800	30000	11	<1	35000
	30	40	220	18	480	2500	31000	6	<1	36000
	35	<1	1	2	180	46	1		<1	380
	45	1	<1	-	27	11	85	<1	<1	150
	60	<1	1	12	170	1	2	<1	<1	320
ASU 4	10	580	500	11000	26000	25000	39000	10	-	140000
	17	210	44	820	2500	4400	34000	25	<1	46000
	25	50	28	-	140	330	4600	4	<1	5500
	30	8	17	-	804	1000	2900	<1	<1	5600
	35	3	22	-	890	2000	5200	<1	<1	9300
	45	-	-	-	-	-	-	2	<1	935
	60	<1	<1	2	56	<1	1	<1	<1	100
ASU 5	10	1000	290	11000	20000	4600	1700	11	<1	62000
	17	2000	170	370	14000	2300	17000	460	-	53000
	25	86	22	23	890	370	700	19	<1	3100
	30	9	29	73	1800	76	23	2	<1	3400
	35	2	<1	9	100	21	-	<1	<1	220
	45	260	-	2	9	<1	<1	23	20	960
	60	<1	-	<1	<1	<1	<1	3	6	52
ASU 6	10	210	70	160	7000	2400	1000	3	3	17000
	17	34	27	51	950	2300	23000	<1	<1	28000
	25	-	33	-	18	380	2500	-	2	3100
	30	-	1	<1	6	230	7	<1	<1	320
	35	3	<1	<1	2	26	1	<1	<1	210
	45	12	40	22	170	1100	-	4	12	1800
	60	-	-	8	24	4	3	NW	NW	62

1) PCE equivalents based on adjustment factors in Table 16. Adjustment factors and their calculation will be detailed in a document to ESTCP at a later date.
NW - No water available for analysis
\- - Non-detect
<1 - Indicates analyte was detected, but below the practical quantitation limit of 1 ug/L

Table 11B - Continued

VOC Concentration Data for Depth-Discrete Groundwater Samples:
Event 2 – January 9-22, 2011

Location	Depth (ft bgs)	VOC Concentrations (µg/L)								
		VC	**11 DCE**	**t - DCE**	**c-DCE**	**TCE**	**PCE**	**Ethene**	**Ethane**	**PCE Equivalents[1]**
ASU 7	10	<1	-	3	310	<1	<1	<1	<1	530
	17	23	-	67	500	470	13000	<1	<1	15000
	25	-	<1	-	12	160	<1	-	<1	230
	30	-	<1	-	1	17	<1	<1	<1	25
	35	NW	NW	NW	NW	NW	NW	NW	NW	NW
	45	<1	<1	21	230	120	-	<1	2	570
	60	-	<1	41	110	100	<1	NW	NW	400
ASU 8	10	<1	-	-	<1	<1	<1	NW	NW	2
	17	<1	<1	<1	<1	<1	<1	<1	<1	4
	25	-	-	-	<1	<1	<1	<1	<1	18
	30	-	-	-	-	<1	<1	<1	3	49
	35	-	-	-	-	-	<1	2	7	27
	45	<1	<1	-	1	2	1	2	3	6
	60	-	-	<1	<1	5	-	<1	<1	8
ASU 9	10	64	<1	7	490	-	-	<1	<1	1100
	17	124	-	-	170	67	1400	3	7	2100
	25	<1	2	<1	21	68	13	-	<1	140
	30	<1	2	<1	28	59	17	-	<1	150
	35	-	-	-	<1	<1	-	<1	<1	50
	45	-	-	-	9	-	-	3	5	48
	60	-	<1	18	170	<1	<1	2	3	350
ASU 10	10	370	137	18000	14000	9400	7800	2	<1	75000
	17	300	82	1800	4000	6100	150000	3	<1	170000
	25	2	-	7	33	100	5300	<1	<1	5500
	30	<1	3	7	38	39	210	<1	<1	350
	35	-	16	-	75	160	4800	<1	<1	5100
	45	<1	14	4	96	51	150	<1	<1	410
	60	<1	4	12	160	4	42	<1	<1	350
ASU 11	10	25	26	23	2000	1400	180	<1	<1	5400
	17	49	25	19	1200	2500	44000	2	<1	50000
	25	-	15	-	23	200	1500	<1	<1	1800
	30	-	<1	-	4	48	<1	<1	<1	68
	35	-	-	-	1	6	44	-	<1	54
	45	<1	<1	<1	14	1	<1	<1	<1	38
	60	<1	-	3	310	<1	<1	2	5	26

1) PCE equivalents based on adjustment factors in Table 16. Adjustment factors and their calculation will be detailed in a document to ESTCP at a later date.

NW - No water available for analysis

\- - Non-detect

<1 - Indicates analyte was detected, but below the practical quantitation limit of 1 ug/L

Table 12

VOC Soil Extractions: Event 2 – January 9-22, 2011

Location	Depth (ft bgs)	VOC Concentrations (mg/kg)						
		VC	**11 DCE**	**t - DCE**	**c-DCE**	**TCE**	**PCE**	**PCE Equivalents[1]**
ASU 2B	16	NS	NS	NS	NS	NS	NS	NS
	17	NS	NS	NS	NS	NS	NS	NS
	19	NS	NS	NS	NS	NS	NS	NS
	21	-	-	-	-	-	7.2	7.2
	25	NS	NS	NS	NS	NS	NS	NS
ASU 10	16.5	NS	NS	NS	NS	NS	NS	NS
	18	NS	NS	NS	NS	NS	NS	NS
	19	NS	NS	NS	NS	NS	NS	NS
	21	NS	NS	NS	NS	NS	NS	NS
	24	NS	NS	NS	NS	NS	NS	NS
	25	-	-	-	-	-	2.1	2.1
	27	-	-	-	-	-	-	-

1) PCE equivalents based on adjustment factors in Table 16. Adjustment factors and their calculation will be detailed in a document to ESTCP at a later date.

\- - Non-detect

NS - No sample for analysis: Sample loss occurred during shipping

Table 13A

Dehalococcoides Testing: Event 1 – August 6-15, 2009

Location	Depth (ft bgs)	General Bacteria	Dehalococcoides
ASU 3	10	---	---
	15	---	---
	35	X	X
ASU 4	10	---	---
ASU 5	15	X	X
	35	---	---
	45	X	---
ASU 7	30	X	X
	45	---	---

X – Indicates positive
--- – indicates non-detect

Table 13B

Dehalococcoides Testing: Event 2 – January 9-22, 2011

Location	Depth (ft bgs)	General Bacteria	Dehalococcoides
ASU 2	45	X	--
ASU 2B	25	--	--
ASU 3	17	--	--
	25	X	X
ASU 4	25	--	--
ASU 5	17	X	X
	25	X	X
	35	X	--
ASU 10	17	--	--
ASU 11	25	--	--

Table 14A

Soil Gas Concentration Data: Event 1 – August 6-15, 2009

Vapor Point	Depth (cm bgs)	Soil Gas Concentration (µg/L)				
		t - DCE	c - DCE	TCE	PCE	PCE Equivalents
1A	30	-	-	5	120	130
1B	76	4	-	6	140	150
2A	30	1	-	7	190	200
2B	76	3	-	15	230	260
3A	30	6	-	23	260	300
3B	76	NS	NS	NS	NS	NS
4A	30	3	2	16	170	200
4B	76	4	-	15	210	240
5A	30	2	-	17	140	260
5B	76	1	-	16	140	170
6A	30	18	2	37	270	350
6B	76	20	2	31	300	370
7A	30	13	1	37	300	370
7B	76	13	1	47	340	430
8A	30	3	-	33	260	300
8B	76	NS	NS	NS	NS	NS

NS – No sample collected due to submerged sampling screen
- – Non-detect: Less than detection limit of 1ug/L

Table 14B

Soil Gas Concentration Data: Event 2 – January 9-22, 2011

Vapor Point	Depth (cm bgs)	Soil Gas Concentration (µg/L)				
		t - DCE	c - DCE	TCE	PCE	PCE Equivalents
10A	34	-	-	-	29	29
10B	81	-	-	-	20	20
11A	32		-		171	170
11B	80	<0.5	-	8	258	270
12A	30	-	-	-	65	65
12B	81	-	-	-	93	93
13A	30	-	-	<0.5	31	31
13B	65	-	-	-	30	30
14A	36	-	-	-	46	46
14B	81	<0.5	<0.5	<0.5	21	21
15A	34	72	15	20	97	270
15B	83	68	16	16	134	300
16A	38	-	-	7	81	89
16B	86	-	-	5	144	150
17A	19	2	10	5	39	66
17B	85	3	12	6	52	85
18A	38	<0.5	-	0.8	23	24
18B	83	-	-	0.5	21	22
19A	36	0.7	<0.5	3	40	44
19B	80	<0.5	<0.5	2	43	46
20A	37		-	5	80	86
20B	83	<0.5	-	7	65	74
21A	22	-	-	-	33	33
21B	84	-	-	-	34	34
22A	36	1	-	11	44	60
22B	80	2	-	9	39	54
23A	28	139	122	30	70	550
23B	81	143	122	27	52	540
24	33	-	-	0.8	6	7

<0.5 - Indicates analyte was detected, but below the practical quantitation limit of 0.5 ug/L
- – Non-detect:

Table 15A

Diffusion Coefficients: Event 1 – August 6-15, 2009

Location	**Depth** (cm)	**Effective Helium Diffusion Coefficient** (cm^2/s)	D_{He}^{eff} D_{He}^{Air} (cm^2/s)	**Location Overall Effective Diffusion Coefficient** (Dt) (cm^2/s)
1A	30	1.4×10^{-2}	2.1×10^{-2}	2.9×10^{-2}
1B	76	3.3×10^{-2}	4.9×10^{-2}	
2A	30	1.9×10^{-2}	2.8×10^{-2}	3.5×10^{-2}
2B	76	3.0×10^{-2}	4.5×10^{-2}	
3A	30	1.4×10^{-2}	2.1×10^{-2}	2.1×10^{-2}
3B	76	NS	NS	
4A	30	2.2×10^{-2}	3.2×10^{-2}	3.9×10^{-2}
4B	76	3.4×10^{-2}	5.0×10^{-2}	
5A	30	4.3×10^{-2}	6.4×10^{-2}	7.8×10^{-2}
5B	76	6.6×10^{-2}	9.9×10^{-2}	
6A	30	2.3×10^{-2}	3.4×10^{-2}	4.4×10^{-2}
6B	76	4.1×10^{-2}	6.2×10^{-2}	
7A	30	3.2×10^{-2}	4.8×10^{-2}	5.6×10^{-2}
7B	76	4.6×10^{-2}	6.9×10^{-2}	
8A	30	3.6×10^{-2}	5.4×10^{-2}	5.4×10^{-2}
8B	76	NS	NS	
Site Average	NA	3.2×10^{-2}	4.8×10^{-2}	4.4×10^{-2}

NS – No sample collected due to submerged sampling screen

$$D_t = \frac{L_t}{\frac{L_t}{2D_1} + \frac{L_t}{2D_2} + \dots + \frac{L_t}{2D_i}}$$

Where:

Lt = Total length between sampling locations (cm)

D_i = D_{eff}^{He} D_{He}^{air} $_i$ at sample location i (cm^2/s)

D_t = Overall effective diffusion coefficient for sampling interval (cm^2/s)

Table 15B

Diffusion Coefficients: Event 2 – January 9-22, 2011

Location	**Depth** (cm)	**Effective Helium Diffusion Coefficient** (cm^2/s)	D_{He}^{eff} D_{He}^{Air} (cm^2/s)	**Location Overall Effective Diffusion Coefficient** (Dt) (cm^2/s)
10A	34	1.4×10^{-2}	2.1×10^{-1}	1.4×10^{-1}
10B	81	6.8×10^{-2}	1.0×10^{-1}	
11A	32	5.6×10^{-2}	8.4×10^{-2}	1.0×10^{-1}
11B	80	8.5×10^{-2}	1.3×10^{-1}	
12A	30	3.2×10^{-2}	4.8×10^{-2}	6.2×10^{-2}
12B	81	5.9×10^{-2}	8.8×10^{-2}	
13A	30	6.5×10^{-2}	9.7×10^{-2}	9.8×10^{-2}
13B	65	6.7×10^{-2}	1.0×10^{-1}	
14A	36	6.0×10^{-2}	9.0×10^{-2}	7.8×10^{-2}
14B	81	4.7×10^{-2}	7.0×10^{-2}	
15A	34	5.6×10^{-2}	8.32×10^{-2}	8.0×10^{-2}
15B	83	5.2×10^{-2}	7.8×10^{-2}	
16A	38	5.5×10^{-2}	8.2×10^{-2}	1.1×10^{-1}
16B	86	9.8×10^{-2}	1.5×10^{-1}	
17A	19	3.2×10^{-2}	4.8×10^{-2}	6.0×10^{-2}
17B	85	5.3×10^{-2}	8.0×10^{-2}	
18A	38	4.0×10^{-2}	6.0×10^{-2}	6.4×10^{-2}
18B	83	4.6×10^{-2}	6.8×10^{-2}	
19A	36	2.2×10^{-2}	3.3×10^{-2}	4.7×10^{-2}
19B	80	5.5×10^{-2}	8.7×10^{-2}	
20A	37	3.1×10^{-2}	4.6×10^{-2}	5.8×10^{-2}
20B	83	5.4×10^{-2}	8.0×10^{-2}	
21A	22	4.8×10^{-2}	7.1×10^{-2}	7.1×10^{-2}
21B	84	4.7×10^{-2}	7.0×10^{-2}	
22A	36	2.1×10^{-2}	3.2×10^{-2}	5.0×10^{-2}
22B	80	2.2×10^{-2}	1.1×10^{-1}	
23A	28	7.4×10^{-2}	5.4×10^{-2}	9.3×10^{-2}
23B	81	3.6×10^{-2}	3.4×10^{-1}	
24	33	6.8×10^{-2}	1.0×10^{-1}	1.0×10^{-1}
Site Average	NA	6.2×10^{-2}	9.2×10^{-2}	8.0×10^{-2}

Dt: Calculation of Dt is explained beneath Table 15A

Table 16A

Vapor Flux and Mass Loss Calculations: Event 1 – August 6-15, 2009

Site Average Diffusion Coefficient (cm2/s)	**PCE Equivalents Flux** (kg/m^2-y)	**Estimated Source Zone Area Footprint** (m^2)	**Mass Loss of PCE Equivalents by Vapor Emission** (kg/y)
4.4×10^{-2}	6.4×10^{-4}	100	6.4×10^{-2}
4.4×10^{-2}	6.4×10^{-4}	200	1.3×10^{-1}
4.4×10^{-2}	6.4×10^{-4}	300	1.9×10^{-1}
4.4×10^{-2}	6.4×10^{-4}	400	2.6×10^{-1}
4.4×10^{-2}	6.4×10^{-4}	500	3.2×10^{-1}
4.4×10^{-2}	6.4×10^{-4}	1000	6.4×10^{-1}
4.4×10^{-2}	6.4×10^{-4}	10000	6.4

Note: Vapor Flux calculation is displayed on next page (26)

Table 16B

Vapor Flux and Mass Loss Calculations: Event 2 – January 9-22, 2011

Site Average Diffusion Coefficient (cm2/s)	**PCE Equivalents Flux** (kg/m^2-y)	**Estimated Source Zone Area Footprint** (m^2)	**Mass Loss of PCE Equivalents by Vapor Emission** (kg/y)
8.0×10^{-2}	9.5×10^{-4}	100	9.5×10^{-2}
8.0×10^{-2}	9.5×10^{-4}	200	1.9×10^{-1}
8.0×10^{-2}	9.5×10^{-4}	300	2.9×10^{-1}
8.0×10^{-2}	9.5×10^{-4}	400	3.8×10^{-1}
8.0×10^{-2}	9.5×10^{-4}	500	24.8×10^{-1}
8.0×10^{-2}	9.5×10^{-4}	1000	9.5×10^{-1}
8.0×10^{-2}	9.5×10^{-4}	10000	9.5

Note: Vapor Flux calculation is displayed on next page (26)

Vapor Flux Calculation

$$Flux_{Vapor} = \quad {}_{i} \quad D_i^{air} A_i \;\; D_t \quad \frac{\Delta C_{v,i}}{\Delta z} \;\; \psi_i^j$$

Where:

D_i^{air}	–	Diffusion coefficient of compound i in air (cm^2/s)
D_{He}^{eff}	–	Measured effective helium diffusion coefficient (cm^2/s)
D_{He}^{air}	–	Diffusion coefficient of helium in air (cm^2/s)
$C_{v,i}$	–	Concentration of compound i in vapor (µg/L)
Z	–	depth of sample (cm)
ψ_i^j	–	Adjustment Factor for measured chemical i in terms of chemical j
A_i	-	Impacted Area (cm^2)

Diffusion Coefficients in Air (cm2/s)

He	VC	11 DCE	t-DCE	11 DCA	c - DCE	TCE	PCE
6.71E-1	1.06E-01	9.00E-02	7.07E-02	7.42E-02	7.36E-02	7.90E-02	7.20E-02

Adjustment Factors (ψ_i^j)

		PCE Equivalent (adjustment factor)					
		PCA	**PCE**	TCA	**TCE**	DCA	**DCE**
Measured	PCA	1.000	0.700	0.564	0.555	0.418	0.409
	PCE	1.428	1.000	0.804	0.792	0.597	0.585
	TCA	1.775	1.243	1.000	0.985	0.742	0.727
	TCE	1.802	1.262	1.015	1.000	0.753	0.738
	DCA	2.392	1.676	1.348	1.328	1.000	0.980
	DCE	2.442	1.711	1.376	1.355	1.021	1.000
	Chloroethane	3.670	2.570	2.068	2.037	1.534	1.503
	VC	3.788	2.653	2.135	2.102	1.583	1.551
	Ethane	7.873	5.515	4.436	4.369	3.291	3.224
	Ethene	8.440	5.912	4.756	4.684	3.528	3.456

Adjustment factors calculated by ASU. Calculation will be detailed in a document to ESTCP at a later date.

Figures

Figure 1

Site Map – Naval Air Station Jacksonville

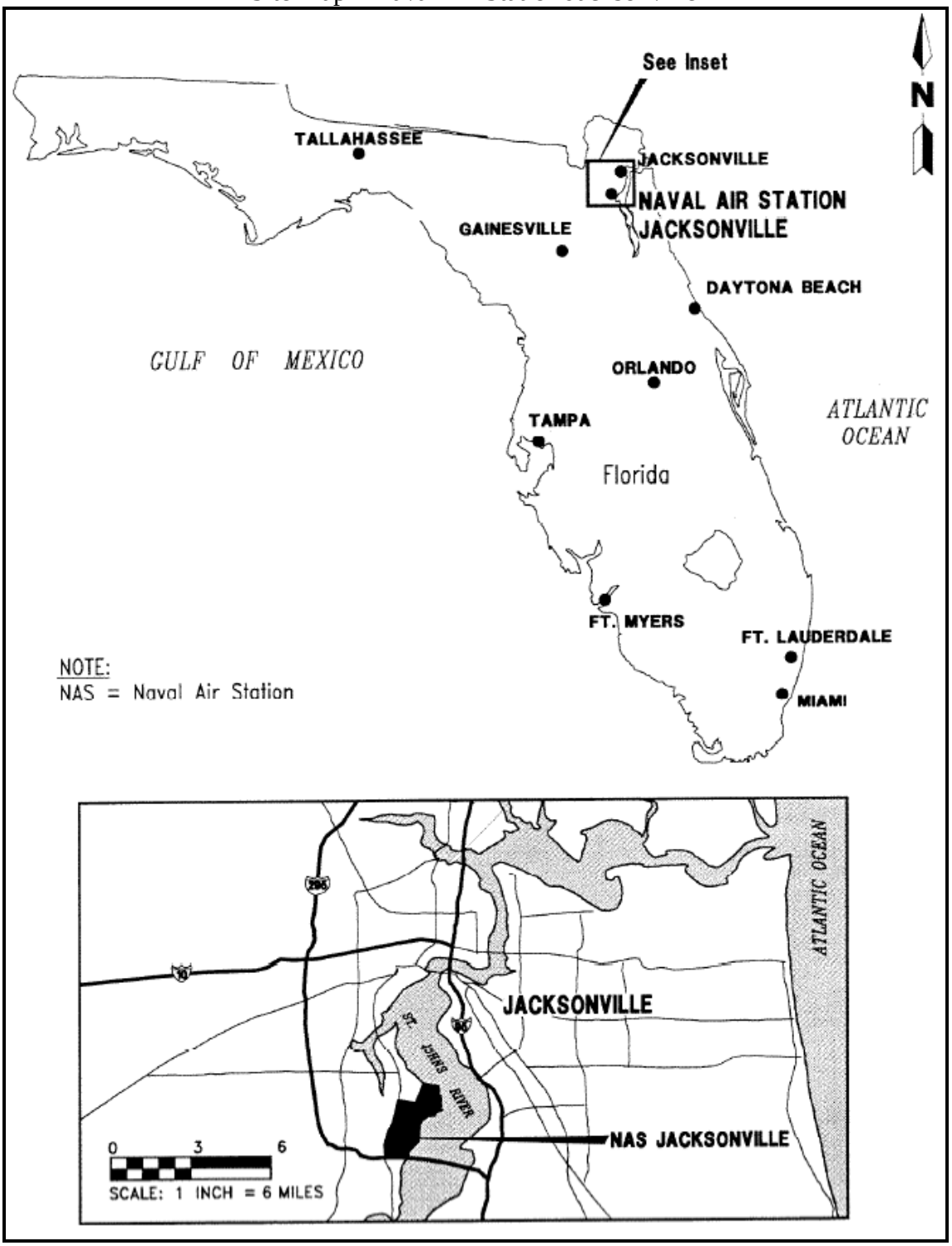
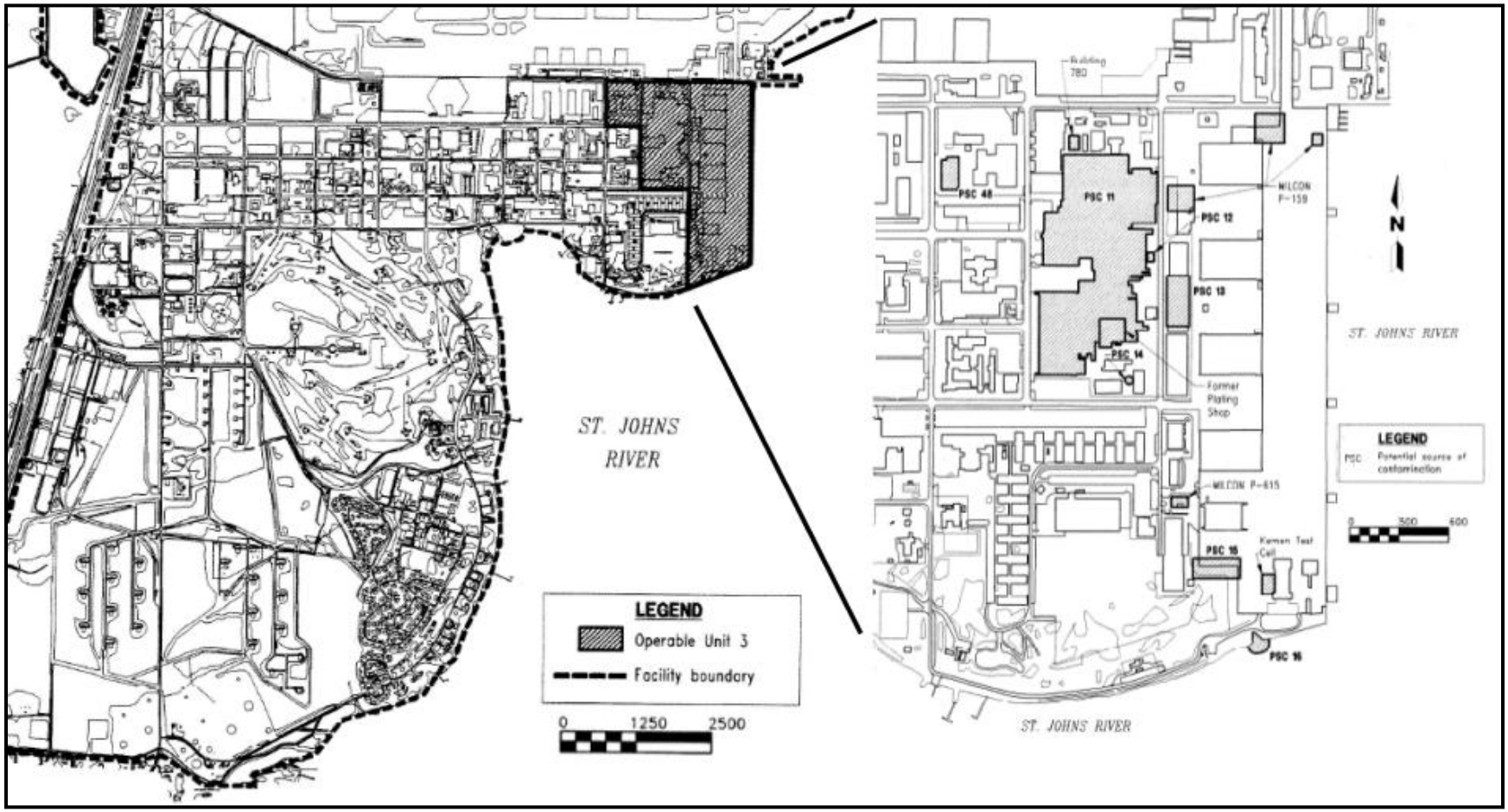


Figure 2

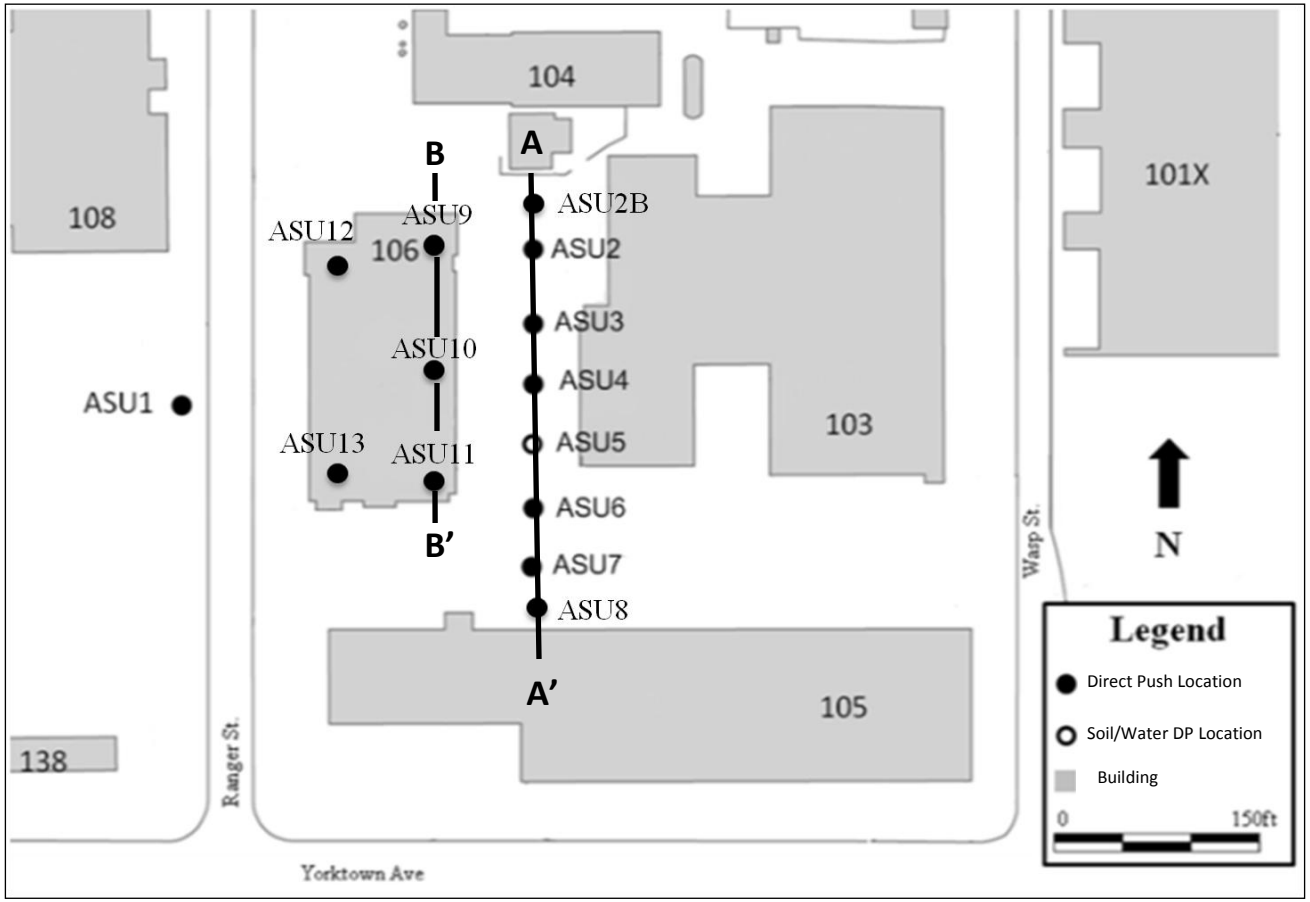
Operable Unit 3, PSC 48 (Building 106) Site Map



Source: OU3 RIFS April 2000

Figure 3

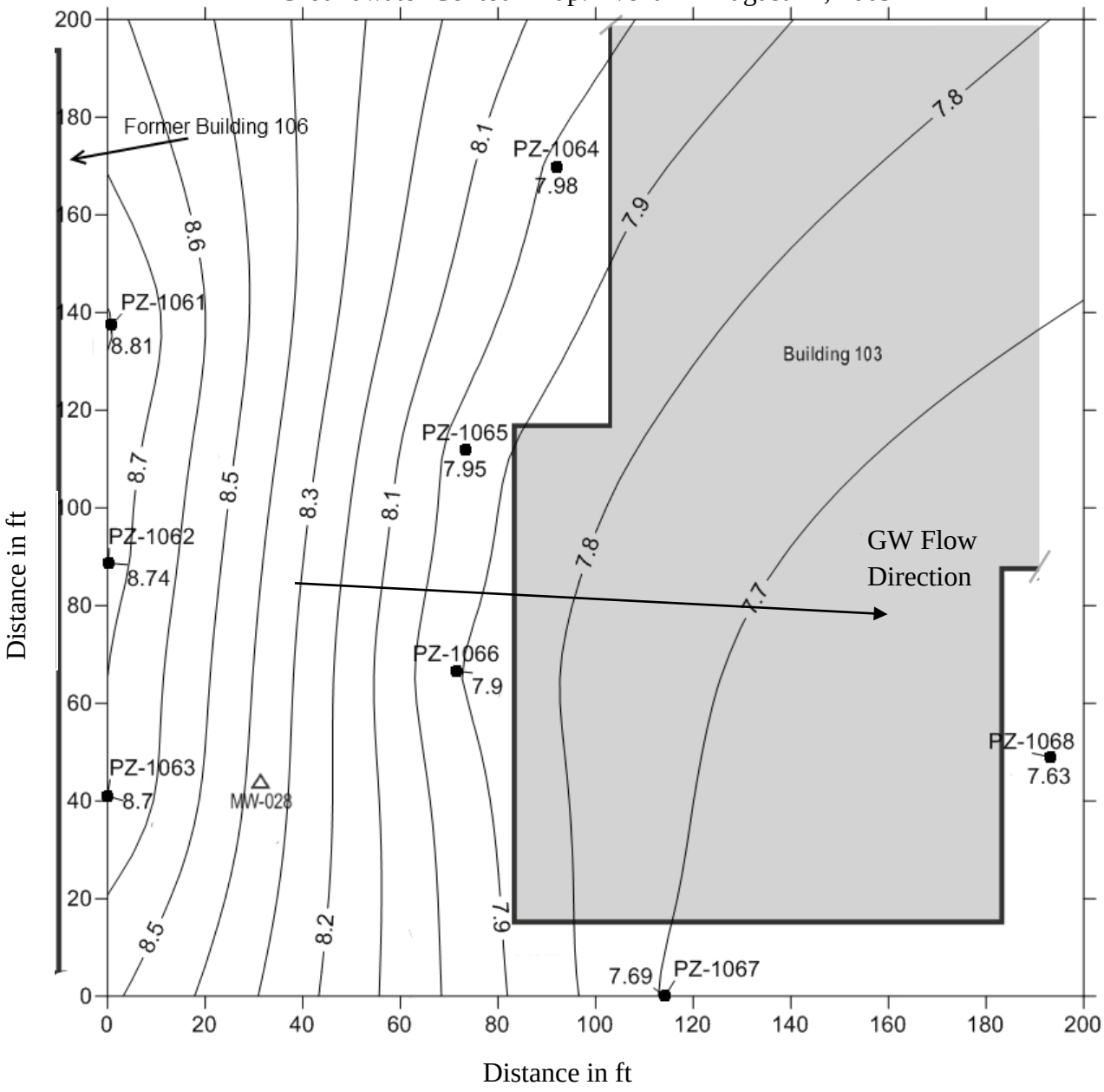
Direct Push Water/Soil Sampling Locations: Event 1 – August 6-15, 2009



Source: ER-0341 Demo Plan Final

Figure 4A

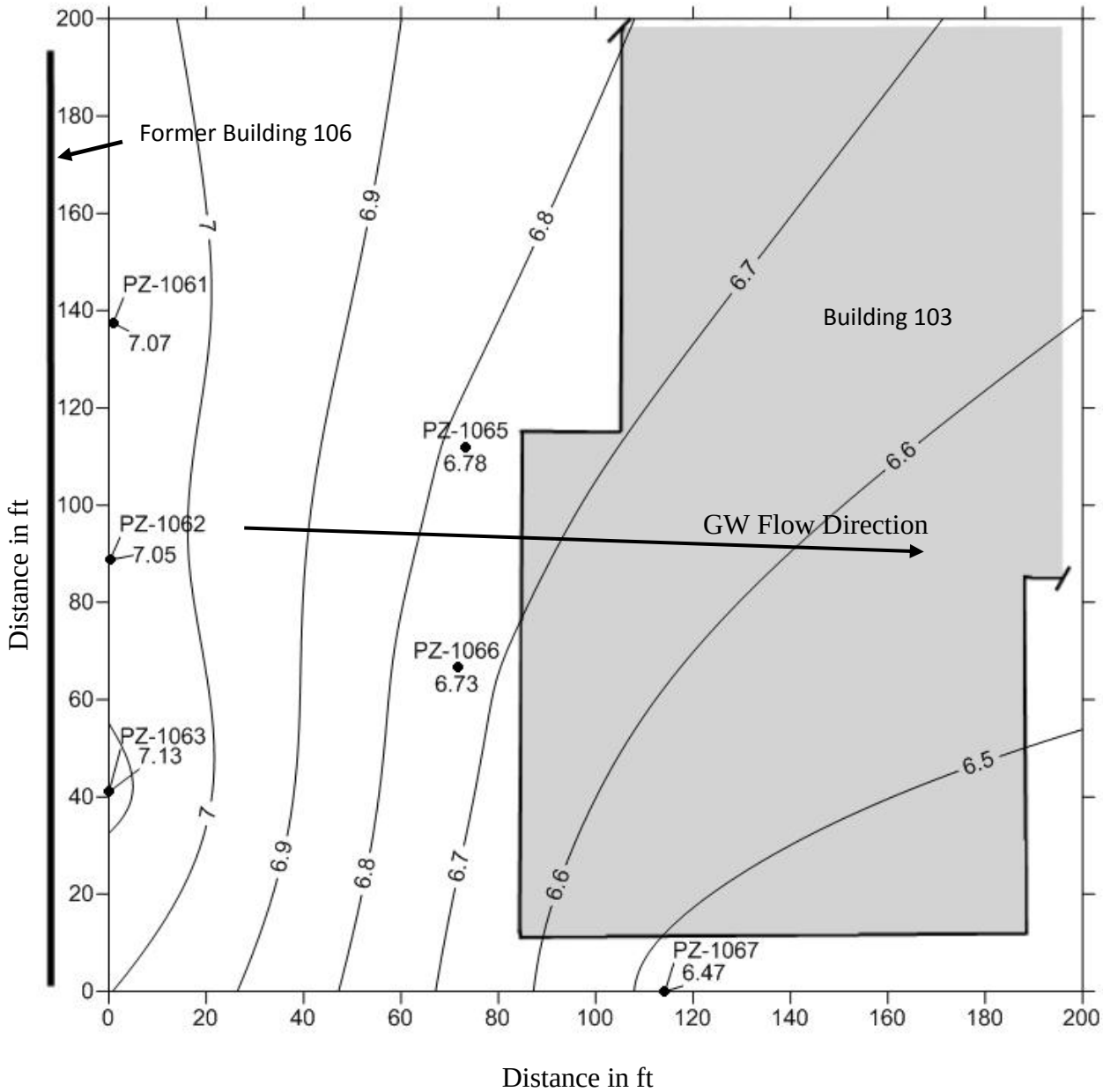
Groundwater Contour Map: Event 1 – August 14, 2009



Note: Contour elevations are listed in ft amsl

Figure 4B

Groundwater Contour Map: Event 2 – January 22, 2011



Note: Contour elevations are listed in ft amsl

Figure 5A

Vapor Sampling Locations: Event 1 – August 6-15, 2009

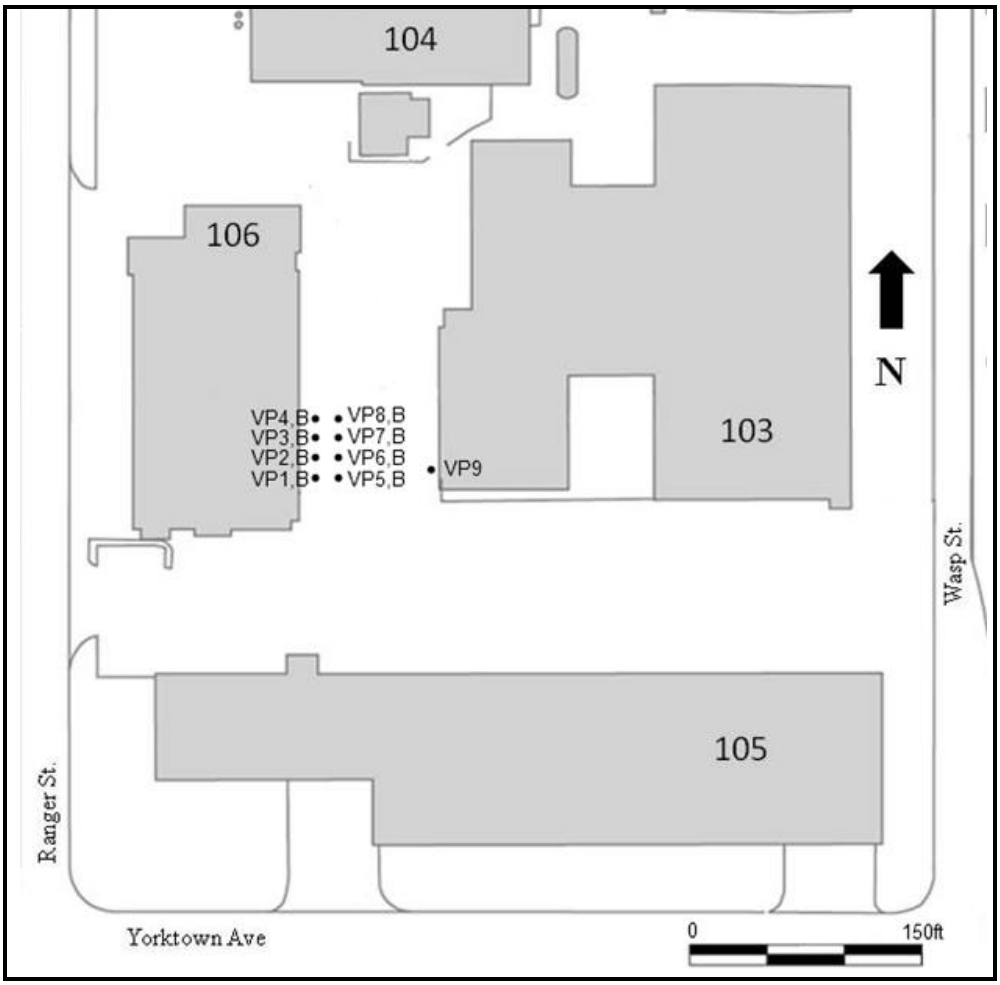


Figure 5B

Vapor Sampling Locations: Event 2 – January 9-22, 2011

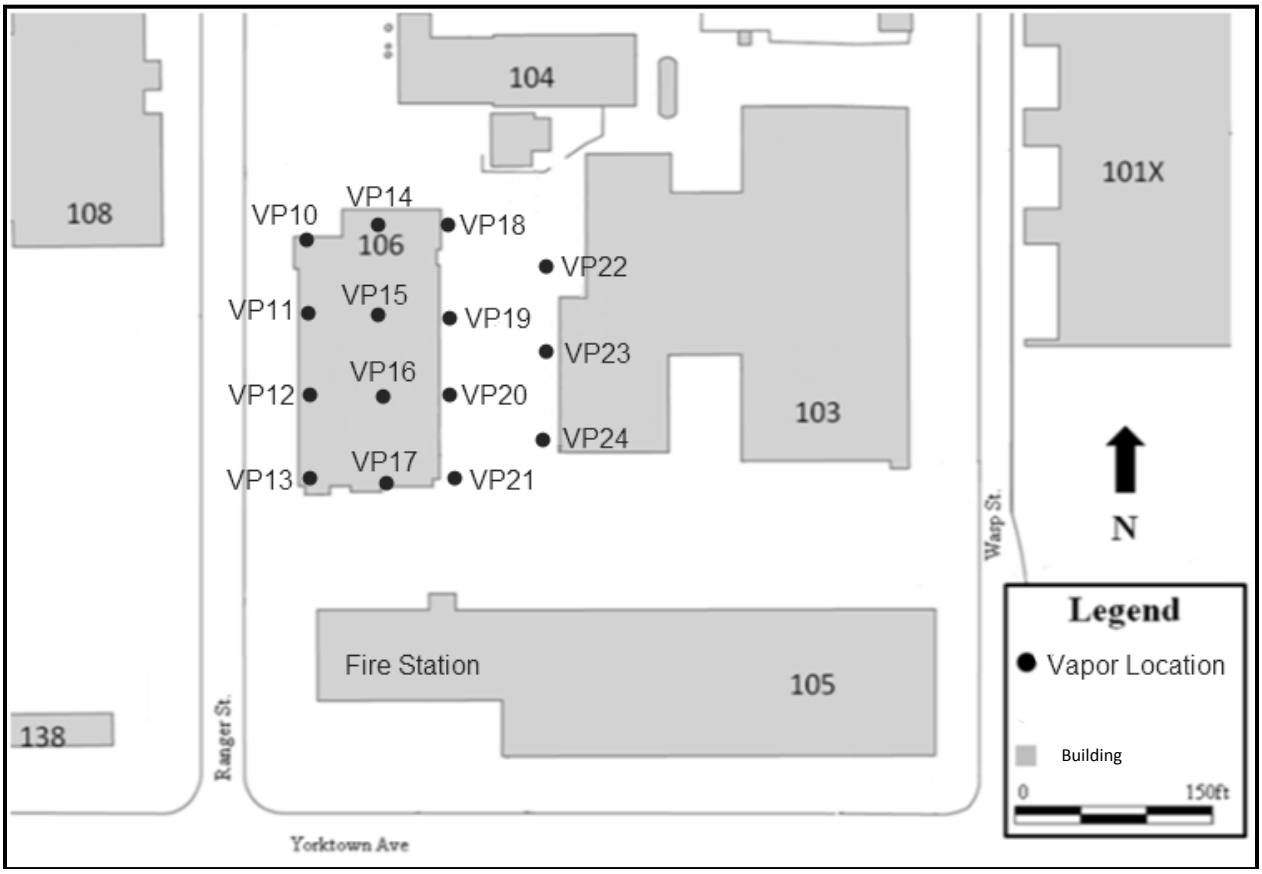
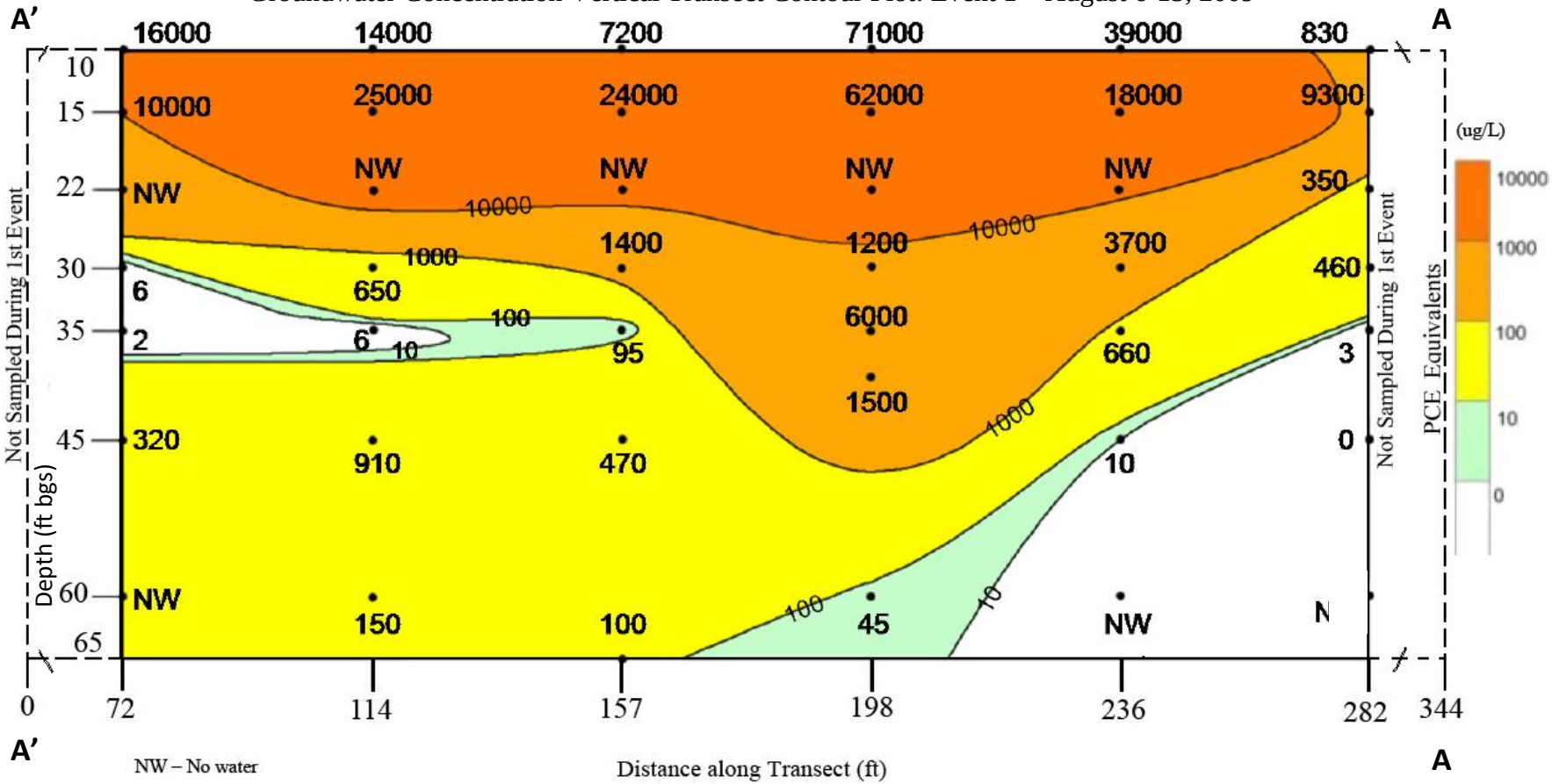


Figure 6A

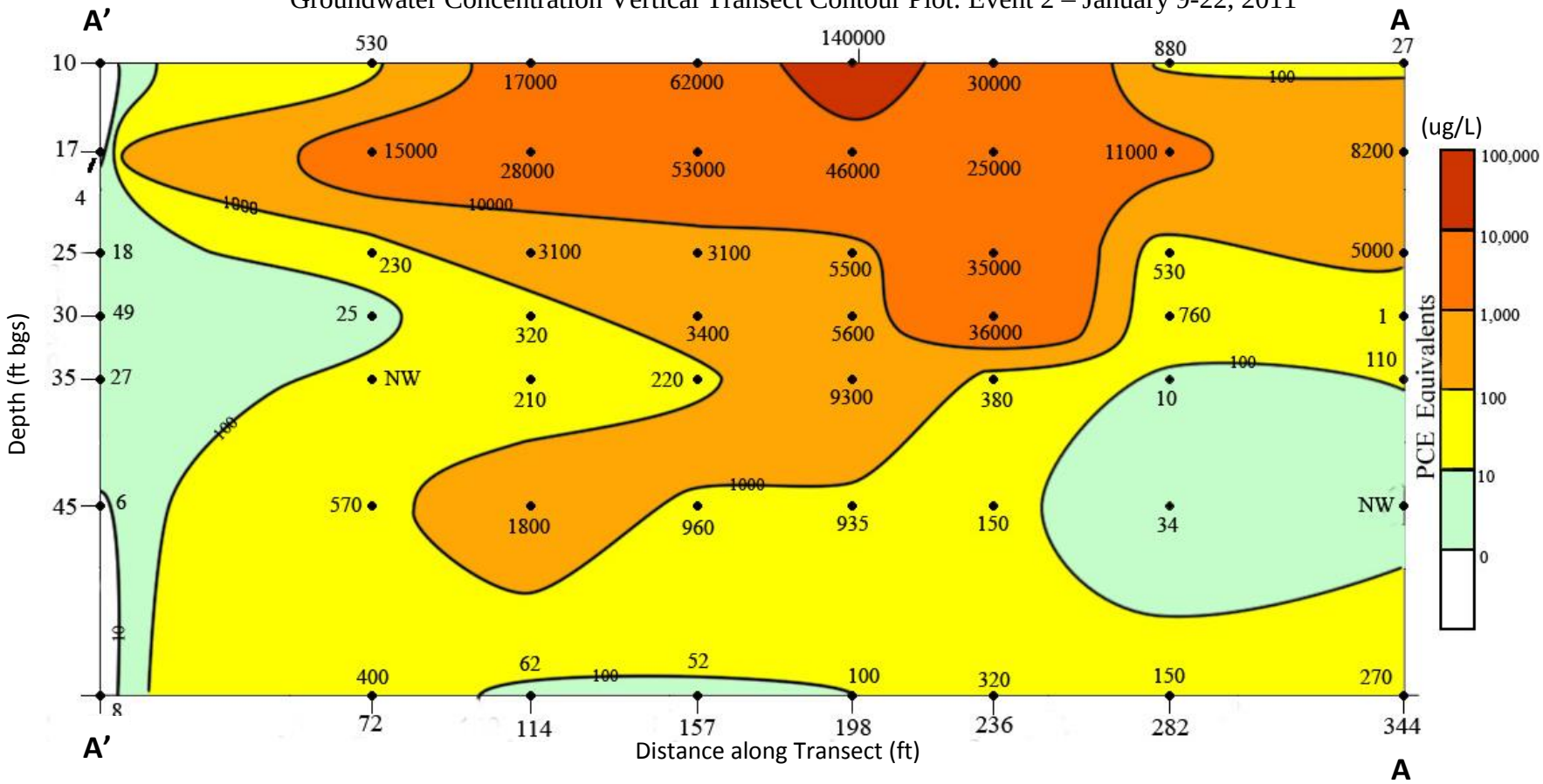
Groundwater Concentration Vertical Transect Contour Plot: Event 1 – August 6-15, 2009



Note: Transect as pictured depicts ASU sampling locations ASU7 to ASU2 from left to right.

Figure 6B

Groundwater Concentration Vertical Transect Contour Plot: Event 2 – January 9-22, 2011



Note: Transect as pictured depicts ASU sampling locations ASU8 to ASU2B from left to right.

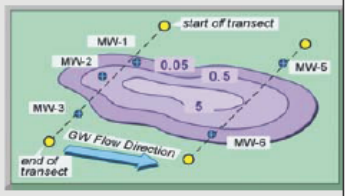
Figure 7

Mass Flux Calculation Example - Inputs

Input Data and Grid

Data Input Instructions
Enter value directly.
Value calculated by model
(Don't enter any data)

Site Location and I.D.: NAS Jacksonville
Description:



4. CHOOSE TRANSECT: Transect 1

5. CHOOSE TIME PERIOD: 1

6. ENTER TRANSECT DATA

6.1 Distance of Transect 1 from Source: 100 (ft)

6.2 ○ Darcy Velocity ◉ Hydraulic Conductivity

6.6 ○ Sampling Interval ◉ Mid Point of Sampling Interval

6.3 Hydraulic Conductivity Units: cm/sec

6.4 Uniform Hydraulic Conductivity?: No

6.5 Uniform Hydraulic Gradient?: Yes

Hydraulic Gradient: 6.67E-03 (cm/cm)

	Monitoring Point	Distance of Monitoring Point from Start of Transect (ft)	Mid Point of Sampling Interval (ft bgs)	Plume Top (ft bgs)	Plume Bottom (ft bgs)	Hydraulic Conductivity (cm/sec)	Concentration (ug/L) Constituent A PCE Equivalents	Concentration (ug/L) Constituent B
1	Start of Transect	0					0	0
2	End of Transect	212.5					0	0
3	2	211.5	10	10	65	5.35E-05	830	
4	2	211.5	15	10	65	2.53E-04	9300	
5	2	211.5	22	10	65	5.71E-04	350	
6	2	211.5	30	10	65	2.78E-03	460	
7	2	211.5	35	10	65	1.90E-05	3	
8	2	211.5	45	10	65	2.14E-03	0	
9	3	162	10	10	65	5.71E-05	39000	
10	3	162	15	10	65	2.72E-04	18000	
11	3	162	30	10	65	3.77E-03	3700	
12	3	162	35	10	65	2.28E-03	660	
13	3	162	45	10	65	4.71E-04	10	
14	4	123	10	10	65	3.64E-03	71000	
15	4	123	15	10	65	4.99E-04	62000	

7. CHOOSE GRID (OPTIONAL)

	Current Grid	Refine Grid By	Refined Grid
Number of rows	10	2	20
Number of columns	11	2	21

8. SELECT CONSTITUENT FOR CALCULATIONS

◉ PCE Equivalents ○ Constituent B

Next Step: Continue Data Input

Back to Transect Calculator Screen | Import MW Data | Export MW Data | See Conc/Flux Grids

Clear Screen | Paste Example | Restore Table Formatting | Print | HELP

Figure 8

Mass Flux Calculation – Interpolated Concentration Profile Example

Grid Completion: Concentration

Transect 1 Time Period 1. Vertical Interpolation: Linear Horizontal Interpolation: Linear

Step 10: Interpolate Conc Horizontally | Export Conc Grid | Import Conc Grid | Next Step: Interpolate Hydraulic Conductivity Grid

Back to Data Input | Back to Conc Grid | Back to K Grid | Print | HELP

Data Input Instructions

10.80 → Enter value directly. (Values in italics represent interpolated values.)

Top/Bottom of plume. (Don't enter any data).

PCE Equivalents Concentrations (ug/L)

Distance from Edge of Transect (ft)

Depth in ft-bgs	Start of Transect 0.0	0.5	7 1.0	21.0	6 41.0	63.5	5 86.0	104.5	4 123.0	142.5	3 162.0	186.8	2 211.5	212.0	End of Transect 212.5
10.0	0	8.00E+03	1.60E+04	1.50E+04	1.40E+04	1.06E+04	7.20E+03	3.91E+04	7.10E+04	5.50E+04	3.90E+04	1.99E+04	8.30E+02	4.15E+02	0
12.8	0	5.00E+03	1.00E+04	1.75E+04	2.50E+04	2.30E+04	2.10E+04	4.15E+04	6.20E+04	4.00E+04	1.80E+04	1.37E+04	9.30E+03	4.65E+03	0
15.5	0	4.17E+03	8.33E+03	1.46E+04	2.09E+04	1.93E+04	1.77E+04	3.48E+04	5.19E+04	3.37E+04	1.56E+04	1.10E+04	6.32E+03	3.16E+03	0
18.3	0	3.33E+03	6.67E+03	1.18E+04	1.69E+04	1.56E+04	1.43E+04	2.80E+04	4.17E+04	2.75E+04	1.32E+04	8.28E+03	3.33E+03	1.67E+03	0
21.0	0	2.50E+03	5.00E+03	8.91E+03	1.28E+04	1.19E+04	1.10E+04	2.13E+04	3.16E+04	2.12E+04	1.09E+04	5.60E+03	3.50E+02	1.75E+02	0
23.8	0	1.67E+03	3.34E+03	6.05E+03	8.77E+03	8.22E+03	7.67E+03	1.46E+04	2.15E+04	1.50E+04	8.47E+03	4.43E+03	3.87E+02	1.93E+02	0
26.5	0	8.36E+02	1.67E+03	3.19E+03	4.71E+03	4.52E+03	4.33E+03	7.83E+03	1.13E+04	8.71E+03	6.08E+03	3.25E+03	4.23E+02	2.12E+02	0
29.3	0	3.00E+00	6.00E+00	3.28E+02	6.50E+02	8.25E+02	1.00E+03	1.10E+03	1.20E+03	2.45E+03	3.70E+03	2.08E+03	4.60E+02	2.30E+02	0
32.0	0	2.25E+00	4.50E+00	1.66E+02	3.28E+02	4.33E+02	5.38E+02	2.07E+03	3.60E+03	2.89E+03	2.18E+03	1.21E+03	2.32E+02	1.16E+02	0
34.8	0	1.50E+00	3.00E+00	4.50E+00	6.00E+00	4.05E+01	7.50E+01	3.04E+03	6.00E+03	3.33E+03	6.60E+02	3.32E+02	3.00E+00	1.50E+00	0
37.5	0	5.43E+01	1.09E+02	2.06E+02	3.04E+02	2.55E+02	2.07E+02	2.35E+03	4.50E+03	2.47E+03	4.43E+02	2.23E+02	2.00E+00	1.00E+00	0
40.3	0	1.07E+02	2.14E+02	4.08E+02	6.02E+02	4.70E+02	3.38E+02	1.67E+03	3.00E+03	1.61E+03	2.27E+02	1.14E+02	1.00E+00	5.00E-01	0
43.0	0	1.60E+02	3.20E+02	6.10E+02	9.00E+02	6.85E+02	4.70E+02	9.85E+02	1.50E+03	7.55E+02	1.00E+01	5.00E+00	0.00E+00	0.00E+00	0
45.8	0	1.60E+02	3.20E+02	5.35E+02	7.50E+02	5.84E+02	4.17E+02	8.13E+02	1.21E+03	6.10E+02	1.00E+01	5.00E+00	0.00E+00	0.00E+00	0
48.5	0	1.60E+02	3.20E+02	4.60E+02	6.00E+02	4.82E+02	3.64E+02	6.41E+02	9.18E+02	4.64E+02	1.00E+01	5.00E+00	0.00E+00	0.00E+00	0
51.3	0	1.60E+02	3.20E+02	3.85E+02	4.50E+02	3.81E+02	3.11E+02	4.69E+02	6.27E+02	3.19E+02	1.00E+01	5.00E+00	0.00E+00	0.00E+00	0
54.0	0	1.60E+02	3.20E+02	3.10E+02	3.00E+02	2.79E+02	2.59E+02	2.97E+02	3.36E+02	1.73E+02	1.00E+01	5.00E+00	0.00E+00	0.00E+00	0
56.8	0	1.60E+02	3.20E+02	2.35E+02	1.50E+02	1.78E+02	2.06E+02	1.25E+02	4.50E+01	2.75E+01	1.00E+01	5.00E+00	0.00E+00	0.00E+00	0
59.5	0	1.60E+02	3.20E+02	2.35E+02	1.50E+02	1.51E+02	1.53E+02	9.89E+01	4.50E+01	2.75E+01	1.00E+01	5.00E+00	0.00E+00	0.00E+00	0
62.3	0	1.60E+02	3.20E+02	2.35E+02	1.50E+02	1.25E+02	1.00E+02	7.25E+01	4.50E+01	2.75E+01	1.00E+01	5.00E+00	0.00E+00	0.00E+00	0
65.0															

PCE Equivalents Concentrations (ug/L)

Distance from Edge of Transect (ft)

Figure 9

Hydraulic Conductivity Profile Example

Grid Completion: Hydraulic Conductivity

Transect 1 Time Period 1. Vertical Interpolation: Linear Horizontal Interpolation: Linear

Step 10: Interpolate K Horizontally | Export K Grid | Import K Grid | Next Step: View Hydraulic Gradient Grid

Back to Data Input | Back to Conc Grid | Back to K Grid | Print | HELP

Data Input Instructions

10.80 → Enter value directly. (Values in italics represent interpolated values.)

[redacted] → Top/Bottom of plume. (Don't enter any data).

Hydraulic Conductivity (cm/sec)

Distance from Edge of Transect (ft)

Start of Transect — End of Transect

Depth in ft-bgs	0.0	0.5	1.0	21.0	41.0	63.5	86.0	104.5	123.0	142.5	162.0	186.8	211.5	212.0	212.5
	7			6			5		4		3		2		
10.0	6.42E-04	6.42E-04	6.42E-04	1.61E-03	2.57E-03	1.31E-03	5.33E-05	1.85E-03	3.64E-03	1.85E-03	5.71E-05	5.53E-05	5.35E-05	1.10E-03	2.14E-03
12.8	6.42E-04	4.87E-04	3.33E-04	3.42E-04	3.50E-04	5.67E-04	7.84E-04	6.41E-04	4.99E-04	3.86E-04	2.72E-04	2.62E-04	2.53E-04	1.20E-03	2.14E-03
15.5	6.42E-04	4.82E-04	3.22E-04	6.10E-04	8.98E-04	7.77E-04	6.55E-04	5.57E-04	4.60E-04	6.57E-04	8.55E-04	6.07E-04	3.59E-04	1.25E-03	2.14E-03
18.3	6.42E-04	4.77E-04	3.11E-04	8.79E-04	1.45E-03	9.87E-04	5.26E-04	4.73E-04	4.20E-04	9.29E-04	1.44E-03	9.52E-04	4.65E-04	1.30E-03	2.14E-03
21.0	6.42E-04	4.71E-04	3.00E-04	1.15E-03	2.00E-03	1.20E-03	3.98E-04	3.89E-04	3.81E-04	1.20E-03	2.02E-03	1.30E-03	5.71E-04	1.36E-03	2.14E-03
23.8	6.42E-04	4.66E-04	2.90E-04	1.42E-03	2.54E-03	1.41E-03	2.69E-04	3.05E-04	3.42E-04	1.47E-03	2.60E-03	1.96E-03	1.31E-03	1.72E-03	2.14E-03
26.5	6.42E-04	4.60E-04	2.79E-04	1.69E-03	3.09E-03	1.62E-03	1.40E-04	2.21E-04	3.02E-04	1.74E-03	3.19E-03	2.62E-03	2.04E-03	2.09E-03	2.14E-03
29.3	6.42E-04	4.55E-04	2.68E-04	1.95E-03	3.64E-03	1.83E-03	1.14E-05	1.37E-04	2.63E-04	2.02E-03	3.77E-03	3.28E-03	2.78E-03	2.46E-03	2.14E-03
32.0	6.42E-04	4.29E-04	2.15E-04	1.09E-03	1.96E-03	1.03E-03	9.12E-05	1.45E-04	2.00E-04	1.61E-03	3.02E-03	2.21E-03	1.40E-03	1.77E-03	2.14E-03
34.8	6.42E-04	4.02E-04	1.63E-04	2.25E-04	2.88E-04	2.30E-04	1.71E-04	1.54E-04	1.36E-04	1.21E-03	2.28E-03	1.15E-03	1.90E-05	1.08E-03	2.14E-03
37.5	6.42E-04	3.91E-04	1.40E-04	1.02E-03	1.91E-03	1.82E-03	1.73E-03	1.28E-03	8.34E-04	1.26E-03	1.68E-03	1.20E-03	7.26E-04	1.43E-03	2.14E-03
40.3	6.42E-04	3.80E-04	1.18E-04	1.82E-03	3.52E-03	3.41E-03	3.29E-03	2.41E-03	1.53E-03	1.30E-03	1.07E-03	1.25E-03	1.43E-03	1.79E-03	2.14E-03
43.0	6.42E-04	3.69E-04	9.51E-05	2.62E-03	5.14E-03	5.00E-03	4.85E-03	3.54E-03	2.23E-03	1.35E-03	4.71E-04	1.31E-03	2.14E-03	2.14E-03	2.14E-03
45.8	6.42E-04	3.69E-04	9.51E-05	2.62E-03	5.14E-03	5.00E-03	4.85E-03	3.54E-03	2.23E-03	1.35E-03	4.71E-04	1.31E-03	2.14E-03	2.14E-03	2.14E-03
48.5	6.42E-04	3.69E-04	9.51E-05	2.62E-03	5.14E-03	5.00E-03	4.85E-03	3.54E-03	2.23E-03	1.35E-03	4.71E-04	1.31E-03	2.14E-03	2.14E-03	2.14E-03
51.3	6.42E-04	3.69E-04	9.51E-05	2.62E-03	5.14E-03	5.00E-03	4.85E-03	3.54E-03	2.23E-03	1.35E-03	4.71E-04	1.31E-03	2.14E-03	2.14E-03	2.14E-03
54.0	6.42E-04	3.69E-04	9.51E-05	2.62E-03	5.14E-03	5.00E-03	4.85E-03	3.54E-03	2.23E-03	1.35E-03	4.71E-04	1.31E-03	2.14E-03	2.14E-03	2.14E-03
56.8	6.42E-04	3.69E-04	9.51E-05	2.62E-03	5.14E-03	5.00E-03	4.85E-03	3.54E-03	2.23E-03	1.35E-03	4.71E-04	1.31E-03	2.14E-03	2.14E-03	2.14E-03
59.5	6.42E-04	3.69E-04	9.51E-05	2.62E-03	5.14E-03	5.00E-03	4.85E-03	3.54E-03	2.23E-03	1.35E-03	4.71E-04	1.31E-03	2.14E-03	2.14E-03	2.14E-03
62.3	6.42E-04	3.69E-04	9.51E-05	2.62E-03	5.14E-03	5.00E-03	4.85E-03	3.54E-03	2.23E-03	1.35E-03	4.71E-04	1.31E-03	2.14E-03	2.14E-03	2.14E-03
65.0															

Figure 10

Mass Flux Calculation – Output Example

Mass Flux Result

TOTAL MASS FLUX 1.11E+02 (g/day) 4.05E+01 (kg/yr)

Next Step: Mass Flux Summary | Run/View Uncertainty Analysis (Optional) | View Final Concentration Grid | Back to Data Grid | Print | HELP

Data Representation

1. Bold values represent calculations based on given values.
2. Values in italics represent calculations based on interpolation.
3. Black shaded cells represent the top and bottom of the plume.

SELECT TRANSECT TO VIEW: Transect 1

SELECT TIME PERIOD TO VIEW: 2

PCE Equiv Mass Flux (g/day)

Distance from Edge of Transect (ft)

PCE Equiv Mass Flux (g/day)

Distance from Edge of Transect (ft)

Depth in ft-bgs	Start of Transect 0.0	0.5	8 1.0	36.5	7 72.0	93.0	6 114.0	135.5	5 157.0	177.5	4 198.0	217.0	3 236.0	259.0	2 282.0	312.9	2B 343.8	343.9	344.0
10.0	0.00E+00	1.93E-06	1.39E-04	1.96E-02	4.29E-03	9.19E-01	3.50E+00	4.73E+00	1.87E+00	6.62E+00	1.37E+01	4.00E+00	2.08E-04	9.45E-03	1.25E-03	6.31E-03	3.55E-04	1.06E-06	0.00E+00
12.8	0.00E+00	2.26E-06	1.17E-04	1.66E-01	5.44E-02	8.50E-01	2.44E+00	2.58E+00	1.09E+00	2.69E+00	4.76E+00	1.60E+00	1.15E-01	5.91E-02	1.75E-02	7.43E-02	5.41E-02	1.61E-04	0.00E+00
15.5	0.00E+00	2.17E-06	3.41E-05	9.10E-02	8.87E-02	1.62E-01	3.02E-01	3.84E-01	4.17E-01	3.02E-01	2.00E-01	2.08E-01	2.08E-01	1.16E-01	4.90E-02	1.50E-01	1.08E-01	3.22E-04	0.00E+00
18.3	0.00E+00	4.63E-06	6.53E-05	1.22E-01	2.70E-01	3.27E-01	4.80E-01	1.27E+00	2.35E+00	1.36E+00	4.95E-01	8.41E-01	1.27E+00	6.22E-01	1.78E-01	2.09E-01	1.07E-01	3.06E-04	0.00E+00
21.0	0.00E+00	7.03E-06	8.73E-05	9.40E-02	2.45E-01	3.02E-01	4.32E-01	1.27E+00	2.40E+00	1.41E+00	4.96E-01	1.25E+00	2.58E+00	1.12E+00	1.73E-01	2.09E-01	1.02E-01	2.82E-04	0.00E+00
23.8	0.00E+00	9.37E-06	1.00E-04	6.01E-03	1.58E-02	8.48E-02	1.60E-01	3.64E-01	5.52E-01	4.57E-01	2.03E-01	1.44E+00	4.13E+00	1.62E+00	3.30E-02	1.50E-01	9.29E-02	2.51E-04	0.00E+00
26.5	0.00E+00	2.14E-05	7.57E-04	8.96E-03	1.81E-02	7.49E-02	1.00E-01	1.89E-01	2.95E-01	2.79E-01	2.05E-01	1.44E+00	4.11E+00	1.80E+00	5.46E-02	1.08E-01	5.10E-02	1.35E-04	0.00E+00
29.3	0.00E+00	3.71E-05	1.94E-03	6.44E-03	5.37E-03	1.94E-02	2.10E-02	6.48E-02	1.10E-02	9.35E-02	2.07E-01	1.44E+00	4.08E+00	1.98E+00	8.12E-02	3.17E-02	2.22E-05	5.75E-08	0.00E+00
32.0	0.00E+00	2.45E-05	8.93E-04	1.13E-02	2.31E-02	1.80E-02	1.40E-02	2.96E-02	6.49E-03	1.41E-01	4.13E-01	8.05E-01	1.45E+00	6.24E-01	2.12E-02	9.69E-03	6.92E-04	2.10E-06	0.00E+00
34.8	0.00E+00	1.44E-05	1.98E-04	1.20E-02	3.17E-02	1.54E-02	8.36E-03	4.76E-03	8.65E-04	1.92E-01	6.88E-01	2.74E-01	1.76E-02	5.21E-03	3.27E-05	2.76E-04	3.01E-04	2.01E-06	0.00E+00
37.5	0.00E+00	1.12E-05	2.21E-04	1.23E-02	3.10E-02	2.71E-02	2.51E-02	2.33E-02	1.96E-02	1.82E-01	3.97E-01	1.58E-01	1.14E-02	4.83E-03	3.95E-04	1.14E-03	4.00E-04	2.43E-06	0.00E+00
40.3	0.00E+00	7.60E-06	1.92E-04	1.03E-02	2.12E-02	2.68E-02	3.57E-02	5.47E-02	5.71E-02	1.42E-01	1.78E-01	7.15E-02	6.61E-03	4.21E-03	1.06E-03	2.30E-03	5.14E-04	2.89E-06	0.00E+00
43.0	0.00E+00	3.66E-06	1.11E-04	5.91E-03	2.13E-03	1.47E-02	4.00E-02	9.89E-02	1.13E-01	7.17E-02	3.26E-02	1.41E-02	3.09E-03	3.37E-03	2.02E-03	3.74E-03	6.42E-04	3.37E-06	0.00E+00
45.8	0.00E+00	3.92E-06	1.25E-04	5.96E-03	2.02E-03	1.10E-02	2.84E-02	7.05E-02	8.10E-02	6.37E-02	4.68E-02	1.99E-02	4.99E-03	4.45E-03	2.88E-03	4.14E-03	7.84E-04	3.89E-06	0.00E+00
48.5	0.00E+00	4.18E-06	1.39E-04	5.97E-03	1.92E-03	7.81E-03	1.88E-02	4.69E-02	5.42E-02	5.46E-02	5.43E-02	2.41E-02	7.30E-03	5.61E-03	3.54E-03	4.43E-03	9.40E-04	4.43E-06	0.00E+00
51.3	0.00E+00	4.45E-06	1.55E-04	5.94E-03	1.81E-03	5.18E-03	1.12E-02	2.81E-02	3.27E-02	4.44E-02	5.52E-02	2.66E-02	1.00E-02	6.86E-03	4.00E-03	4.63E-03	1.11E-03	5.00E-06	0.00E+00
54.0	0.00E+00	4.72E-06	1.71E-04	5.88E-03	1.71E-03	3.09E-03	5.51E-03	1.41E-02	1.66E-02	3.32E-02	4.94E-02	2.74E-02	1.32E-02	8.19E-03	4.25E-03	4.73E-03	1.29E-03	5.60E-06	0.00E+00
56.8	0.00E+00	5.00E-06	1.88E-04	5.79E-03	1.60E-03	1.54E-03	1.82E-03	4.83E-03	5.88E-03	2.09E-02	3.70E-02	2.66E-02	1.67E-02	9.61E-03	4.30E-03	4.74E-03	1.49E-03	6.22E-06	0.00E+00
59.5	0.00E+00	5.29E-06	2.06E-04	5.67E-03	1.49E-03	5.21E-04	1.09E-04	3.75E-04	5.78E-04	7.45E-03	1.78E-02	2.42E-02	2.07E-02	1.11E-02	4.14E-03	4.64E-03	1.71E-03	6.88E-06	0.00E+00
62.3	0.00E+00	5.29E-06	2.06E-04	5.67E-03	1.49E-03	5.21E-04	1.09E-04	3.75E-04	5.78E-04	7.45E-03	1.78E-02	2.42E-02	2.07E-02	1.11E-02	4.14E-03	4.64E-03	1.71E-03	6.88E-06	0.00E+00
65.0																			

Figure 11A

Transect A-A' Flux Calculations – Event 1: August 6-15, 2009

		Concentration			Mass Loss Rate PCE Equivalence (kg/y)
		Linear	Log	NN	
Conductivity	Linear	X			15.3
			X		10.8
				X	14.5
	Log	X			10.6
			X		8.0
				X	10.2
	NN	X			14.6
			X		10.4
				X	13.3
Site Average					12.0

Figure 11B

Transect A-A' Flux Calculations – Event 2: January 9-22, 2011

		Concentration			Mass Loss Rate PCE Equivalence (kg/y)
		Linear	Log	NN	
Conductivity	Linear	X			39.3
			X		30.6
				X	38.4
	Log	X			28.1
			X		22.5
				X	27.4
	NN	X			38.4
			X		29.9
				X	35.8
Site Average					32.3

Note: Transect from Event 2 is wider than Event 1

Figure 11C

Upgradient Flux Input Calculations – Event 2: January 9-22, 2011

		Concentration			Mass Loss Rate PCE Equivalence (kg/y)
		Linear	Log	NN	
Conductivity	Linear	X			1.4
			X		0.93
				X	1.4
	Log	X			1.1
			X		0.76
				X	1.1
	NN	X			1.4
			X		0.95
				X	1.5
Site Average					1.2

Figure 12

Uncertainty Analysis – Example

Interpolation Error Results

INSTRUCTIONS
1. The table below shows all concentration and, if applicable, non-uniform conductivity/Darcy velocity and gradient input data.
2. During the uncertainty analysis, each of the points in the table are removed one at a time and the mass flux calculated without that point using the interpolation scheme specified in the Data Input section (note that

Site Location and I.D.:
Description: [redacted]

Next Step: Mass Flux Summary | Back to Mass Flux Result | Print | Back to Data Input | HELP

SELECT TRANSECT TO VIEW: Transect 1
SELECT TIME PERIOD TO VIEW: 2

PCE Equiv Interpolation Methods

Hydraulic Conductivity: 1) Vertical: Linear 2) Horizontal: Linear
Concentration: 1) Vertical: Linear 2) Horizontal: Linear
Hydraulic Gradient: Uniform

Total Mass Flux Including All Points 1.11E+02 *(g/day)*

						RESULTS	
	End of Transect	Midpoint of Sampling Interval	Parameter Examined	Parameter Value Removed For Analysis	Parameter Units	Total Mass Flux Excluding Selected Point and Interpolating (g/day)	Contribution of Selected Point to Total Mass Flux (%)
1	Start of Transect		Conductivity	3.50E-03	cm/sec	1.11E+02	0.0
2	2B	10.0	Conductivity	3.50E-03	cm/sec	1.11E+02	0.1
3	2B	17.0	Conductivity	4.30E-04	cm/sec	1.11E+02	-0.4
4	2B	25.0	Conductivity	2.80E-04	cm/sec	1.11E+02	-0.1
5	2B	30.0	Conductivity	2.00E-03	cm/sec	1.11E+02	0.0
6	2B	35.0	Conductivity	3.70E-04	cm/sec	1.11E+02	0.0
7	2B	45.0	Conductivity	9.30E-04	cm/sec	1.11E+02	0.0
8	2B	60.0	Conductivity	1.30E-03	cm/sec	1.11E+02	0.0
9	2.00E+00	10.0	Conductivity	2.60E-04	cm/sec	1.11E+02	0.0
10	2.00E+00	17.0	Conductivity	1.90E-04	cm/sec	1.12E+02	-1.2
11	2.00E+00	25.0	Conductivity	2.20E-03	cm/sec	1.12E+02	-0.8
12	2.00E+00	30.0	Conductivity	6.90E-03	cm/sec	1.11E+02	0.2
13	2.00E+00	35.0	Conductivity		cm/sec	1.11E+02	0.0
14	2.00E+00	45.0	Conductivity	1.20E-04	cm/sec	1.13E+02	-1.6
15	2.00E+00	60.0	Conductivity		cm/sec	1.11E+02	0.0
16	3.00E+00	10.0	Conductivity	8.80E-03	cm/sec	9.80E+01	11.7
17	3.00E+00	17.0	Conductivity	4.60E-04	cm/sec	1.27E+02	-14.4
18	3.00E+00	25.0	Conductivity	2.20E-03	cm/sec	1.11E+02	0.3
19	3.00E+00	30.0	Conductivity	2.80E-03	cm/sec	1.11E+02	0.1
20	3.00E+00	35.0	Conductivity	1.70E-03	cm/sec	1.11E+02	0.0
21	3.00E+00	45.0	Conductivity	9.50E-04	cm/sec	1.11E+02	0.0
22	3.00E+00	60.0	Conductivity	7.50E-05	cm/sec	1.11E+02	-0.1
23	4.00E+00	10.0	Conductivity	1.30E-03	cm/sec	1.07E+02	3.8
24	4.00E+00	17.0	Conductivity	3.40E-04	cm/sec	1.28E+02	-15.6
25	4.00E+00	25.0	Conductivity	7.70E-03	cm/sec	1.01E+02	9.0
26	4.00E+00	30.0	Conductivity	1.40E-04	cm/sec	1.12E+02	-1.0
27	4.00E+00	35.0	Conductivity	1.70E-04	cm/sec	1.11E+02	-0.3
28	4	45	Conductivity	5.10E-03	cm/sec	1.10E+02	0.8
29	4	60	Conductivity	4.80E-04	cm/sec	1.11E+02	-0.2
30	5	10	Conductivity	4.50E-03	cm/sec	8.16E+01	26.5
31	5	17	Conductivity	2.00E-04	cm/sec	1.27E+02	-14.1
32	5	25	Conductivity	1.70E-03	cm/sec	1.10E+02	0.9
33	5	30	Conductivity	1.70E-03	cm/sec	1.12E+02	-0.6
34	5	35	Conductivity	3.40E-03	cm/sec	1.10E+02	1.0
35	5	45	Conductivity	1.60E-03	cm/sec	1.12E+02	-0.8
36	5	60	Conductivity	8.20E-03	cm/sec	1.11E+02	0.3
37	6	10	Conductivity	3.00E-07	cm/sec	1.12E+02	-0.8
38	6	17	Conductivity	3.60E-04	cm/sec	1.16E+02	-4.7
39	6	25	Conductivity	5.10E-03	cm/sec	1.05E+02	5.6
40	6	30	Conductivity	4.90E-03	cm/sec	1.08E+02	2.7
41	6	35	Conductivity	2.00E-03	cm/sec	1.11E+02	-0.5
42	6	45	Conductivity	8.90E-04	cm/sec	1.11E+02	-0.1
43	6	60	Conductivity	2.80E-03	cm/sec	1.11E+02	0.1
44	7	10	Conductivity	4.80E-05	cm/sec	1.11E+02	0.0
45	7	17	Conductivity	1.50E-04	cm/sec	1.12E+02	-1.0
46	7	25	Conductivity	2.10E-03	cm/sec	1.11E+02	-0.1
47	7	30	Conductivity	3.60E-03	cm/sec	1.10E+02	1.0
48	7	35	Conductivity	1.10E-04	cm/sec	1.11E+02	-0.2
49	7	45	Conductivity	2.00E-03	cm/sec	1.11E+02	0.0
50	7	60	Conductivity	9.30E-04	cm/sec	1.11E+02	0.0
51	8	10	Conductivity	7.70E-04	cm/sec	1.11E+02	0.0
52	8	17	Conductivity	7.70E-04	cm/sec	1.11E+02	-0.1
53	8	25	Conductivity		cm/sec	1.11E+02	0.0
54	8	30	Conductivity	1.30E-03	cm/sec	1.11E+02	0.2
55	8	35	Conductivity	1.60E-04	cm/sec	1.11E+02	0.0
56	8	45	Conductivity		cm/sec	1.11E+02	0.0
57	8	60	Conductivity	3.70E-04	cm/sec	1.11E+02	0.0
58	End of Transect		Conductivity	3.70E-04	cm/sec	1.11E+02	0.0