SITE HAZARD ASSESSMENT

WORKSHEET 1

Summary Score Sheet

SITE INFORMATION:

Gary Gilbert DDS
10115 SE Mill Plain Blvd.
Vancouver, Clark County, WA 98664
Section/Township/Range: Sec. 33/T2N/R2E
Latitude: 45.62075 Longitude: -122.56837
Ecology Facility Site ID No.: 20814

Site scored/ranked for the February 2015 update

SITE DESCRIPTION (management areas, substances of concern, and quantities):

The Gary Gilbert DDS site was placed on the Washington State Department of Ecology's (Ecology) database of Confirmed and Suspected Contaminated Sites on July 19th, 2012 as a result of the confirmed presence of high concentrations of mercury (Hg) and silver (Ag) in the onsite septic system (OSS). Sludge material in the OSS tank was designated as dangerous waste per WAC 173-303-070.

On March 29th, 2011, Clark County Public Health (CCPH) and Ecology conducted a site investigation to evaluate the OSS waste at the property owner's permission. The tank was evaluated due to concerns that hazardous materials may have been released to the OSS. The investigation confirmed, through direct observation and analytical results, that industrial waste was discharged into the OSS. One sample was collected from the septic tank sludge and analyzed for mercury and silver only. Test results of the septic tank sludge revealed high levels of mercury & silver causing the waste to designate as dangerous waste. See TABLE 1.

TABLE 1: Septic Tank Sludge Sampling Results (Metals)

Sample Name	Analyte	Analytical Result
001	Mercury	915 mg/kg
	Silver	1,010 mg/kg

Historical records show that the current building was built in 1951, and has been commercially zoned since 1989. The building is a house that was converted into a dental office. Therefore, it is estimated that the property has been operating as a dental office since at least 1989.

The Gary Gilbert DDS site is situated immediately North of a major municipal water source for City of Vancouver (The Ellsworth Wells). Therefore, any potential impact to the groundwater aquifer is a concern for City of Vancouver and its citizens. Due to the potential for groundwater impacts to affect the public's health, subsurface investigation was deemed a necessary component of this SHA.

On December 10, 2012, Ecology sent the property owners a letter notifying them that CCPH will be conducting a Site Hazard Assessment (SHA), on behalf of Ecology, in the near future. On January 30, 2013, CCPH and the property owners scheduled the site visits necessary for conducting the SHA.

On January 31, 2013, Clark County Public Health contracted GPR Data, Inc. to locate septic system components and their depth via ground penetrating radar technology. Ground penetrating radar was a necessary part of the SHA site work for determining ground boring and subsurface sample collection locations. The septic locating ground markings show the location of the 500 gallon (approx.) septic tank and two 62ft long (approx.) drainfield laterals that head towards the western direction. See FIGURE 3.

On February 20, 2013, subsurface soil sampling was conducted at the site. Cascade Drilling, L.P., was contracted by CCPH to install four borings, via direct-push boring, for subsurface sample collection near septic system components. The location of the ground borings were determined after considering guidance listed in the U.S. Environmental Protection Agency (EPA) "1992 Guidelines for Closure of Shallow Disposal Wells". See FIGURES 1 & 2.

FIGURE 1: EPA Guidance for OSS Soil Sample Locations (Plan View)

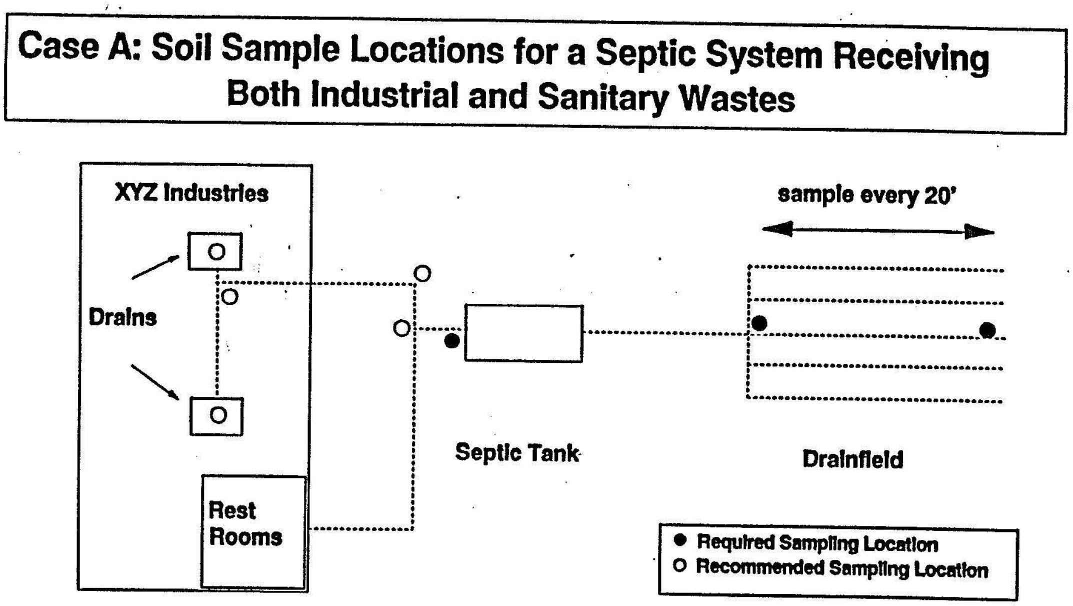

FIGURE 2: EPA Guidance for OSS Soil Sample Locations (Side View)

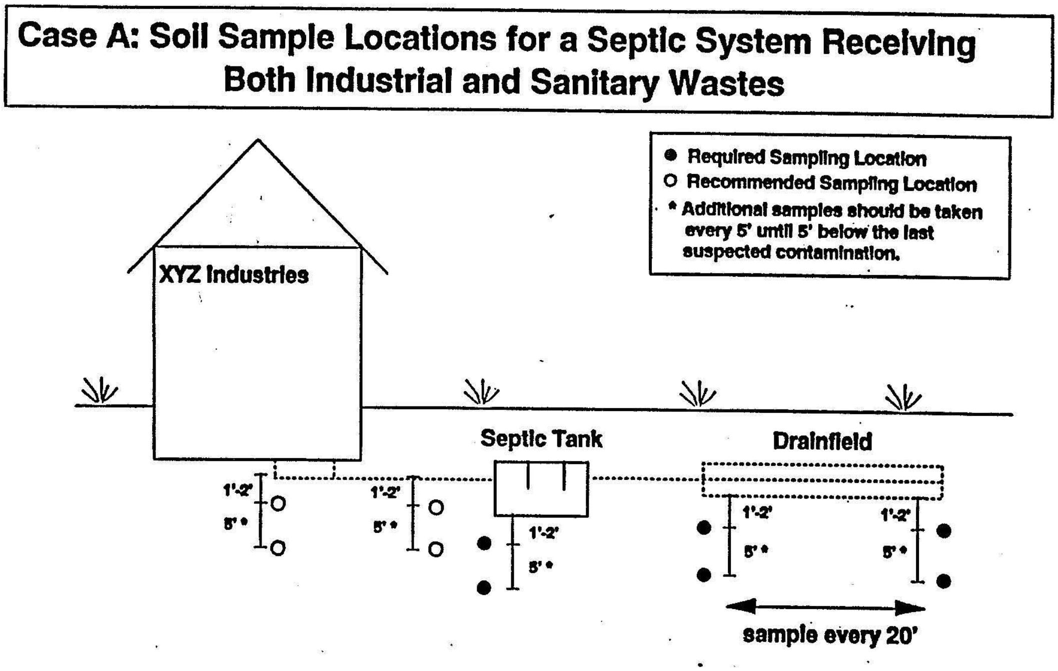

FIGURE 3 displays the approximate location of the septic tank and drainfield laterals (illustrated in red), and approximate location of ground borings B1-B4 (illustrated in green). See FIGURE 3 & TABLE 2 for ground boring location details.

FIGURE 3: OSS Layout & Boring Locations

TABLE 2: Ground Boring Log

	Boring Description	Total Depth (bgs)*	Soil Sample Name & Depth (bgs)*	Depth to Groundwater (bgs)*
B1	Located immediately outside the septic tank area, east side.	40’	B1-SS1 = 8.0’ B1-SS2 = 11.5’ B1-SS3 = 16.5’ B1-SS4 = 21.5’	B1-GWS1 = NA’
B2	Located approximately 2’ within the leachfield, between the drainfield laterals.	40’	B2-SS1 = 3.5’ B2-SS2 = 7.0’ B2-SS3 = 12.0’ B2-SS4 = 17.0’	B2-GWS1 = NA’
B3	Located approximately 22’ within the leachfield, between the drainfield laterals.	40’	B3-SS1 = 3.5’ B3-SS2 = 7.0’ B3-SS3 = 12.0’ B3-SS4 = 17.0’	B3-GWS1 = NA’
B4	Located approximately 45’ within the leachfield, between the drainfield laterals.	40’	B4-SS1 = 4.0’ B4-SS2 = 7.5’ B4-SS3 = 12.5’ B4-SS4 = 17.5’	B4-GWS1 = NA’

Note: Groundwater was not encountered within 40’ of the ground surface. Hard loose gravel and fine sand soils would not allow further drilling without possible damage to drill machinery.

* The abbreviation (bgs) refers to “below ground surface”.

All subsurface soil samples were collected and analyzed for Priority Pollutant Metals in accordance with appropriate EPA Methods. Soil cores were not favorable for sample collection and analysis, consisting of loose gravels and sands. Despite unfavorable soil characteristics, soil samples were collected at approximate interval depths of 18”, 5’, & 10’ below the bottom of the existing septic tank and/or drainfield lateral (totaling 4 soil samples per boring) at each ground boring location. Groundwater was not encountered within 40’ of the ground surface.

Arsenic (As), total chromium (Cr), and lead (Pb) were the metals consistently detected in subsurface soils. Other metals were found at low concentrations (such as mercury, silver & nickel), however As, Cr, and Pb were consistently detected in all soil samples. See TABLE 3 for soil sample results.

TABLE 3: Soil Sample Results

	Soil Sample Name & Depth (bgs)	Soil Description*	Analytical Results (mg/kg)	MTCA Method A Cleanup Level (mg/kg)
B1	B1-SS1 @ 8.0’	loose sand & gravel	Arsenic = 2.3	Arsenic = 20
			Chromium = 15	Chromium VI = 19
			Lead = 9.5	Lead = 250
	B1-SS2 @ 11.5’	loose sand & gravel	Arsenic = 1.7	Arsenic = 20
			Chromium = 12	Chromium VI = 19
			Lead = 5.6	Lead = 250
	B1-SS3 @ 16.5’	loose sand & gravel	Arsenic = 1.6	Arsenic = 20
			Chromium = 11	Chromium VI = 19
			Lead = 4.4	Lead = 250
	B1-SS4 @ 21.5’	loose sand & gravel	Arsenic = 1.5	Arsenic = 20
			Chromium = 13	Chromium VI = 19
			Lead = 4.2	Lead = 250
B2	B2-SS1 @ 3.5’	loose sand & gravel	Arsenic = 2.6	Arsenic = 20
			Chromium = 16	Chromium VI = 19
			Lead = 7.0	Lead = 250
	B2-SS2 @ 7.0’	loose sand & gravel	Arsenic = 2.2	Arsenic = 20
			Chromium = 13	Chromium VI = 19
			Lead = 5.5	Lead = 250
	B2-SS3 @ 12.0’	loose sand & gravel	Arsenic = 1.5	Arsenic = 20
			Chromium = 10	Chromium VI = 19
			Lead = 3.6	Lead = 250
	B2-SS4 @ 17.0’	loose sand & gravel	Arsenic = 1.7	Arsenic = 20
			Chromium = 11	Chromium VI = 19
			Lead = 3.4	Lead = 250
B3	B3-SS1 @ 3.5’	loose sand & gravel	Arsenic = 2.5	Arsenic = 20
			Chromium = 16	Chromium VI = 19
			Lead = 7.6	Lead = 250
	B3-SS2 @ 7.0’	loose sand & gravel	Arsenic = 1.4	Arsenic = 20
			Chromium = 9.1	Chromium VI = 19
			Lead = 4.8	Lead = 250
	B3-SS3 @ 12.0’	loose sand & gravel	Arsenic = 1.8	Arsenic = 20
			Chromium = 11	Chromium VI = 19
			Lead = 5.3	Lead = 250
	B3-SS4 @ 17.0’	loose sand & gravel	Arsenic = 1.7	Arsenic = 20
			Chromium = 11	Chromium VI = 19
			Lead = 3.5	Lead = 250
			Mercury = 1.3	Mercury = 2.0

B4	B4-SS1 @ 4.0’	loose sand & gravel	Arsenic = 2.1	Arsenic = 20
			Chromium = 13	Chromium VI = 19
			Lead = 6.1	Lead = 250
	B4-SS2 @ 7.5’	loose sand & gravel	Arsenic = 2.0	Arsenic = 20
			Chromium = 12	Chromium VI = 19
			Lead = 5.3	Lead = 250
	B4-SS3 @ 12.5’	loose sand & gravel	Arsenic = 2.6	Arsenic = 20
			Chromium = 12	Chromium VI = 19
			Lead = 5.5	Lead = 250
	B4-SS4 @ 17.5’	loose sand & gravel	Arsenic = 2.2	Arsenic = 20
			Chromium = 15	Chromium VI = 19
			Lead = 4.0	Lead = 250
			Mercury = 0.4	Mercury = 2.0

*Soil Description – subsurface soils were very poor for the collection and analysis of chemical contaminants. Soil cores & samples consisted solely of loose gravels and sands.

Groundwater was not reached within the 40’ limit of the subsurface soil assessment. Therefore, groundwater samples were not collected as part of this SHA. However, it is suspected that groundwater is also impacted by As, Cr, Pb, and Hg. Therefore, the groundwater route has been used in the scoring and ranking of this site.

As a result of this SHA, this site is scored and ranked due to the suspected presence of arsenic, chromium, lead, and mercury in groundwater. The extent of contamination was not determined as part of this SHA. However, further site characterization may be necessary.

SPECIAL CONSIDERATIONS (include limitations in site file data or data which cannot be accommodated in the model, but which are important in evaluating the risk associated with the site, or any other factor(s) over-riding a decision of no further action for the site):

At the completion of this SHA, the mercury and silver bearing waste was not yet removed from the OSS. The OSS was still being improperly used to collect industrial waste. An anaerobic environment, with a high organic content, and high microorganism population (i.e. septic tank) has the ability to increase the mobility of heavy metals, therefore impacting groundwater.

“Microorganisms can mobilize metals through autotrophic and heterotrophic leaching, chelation by microbial metabolites and siderophores, methylation, and redox transformations… There are various metal-mobilization techniques that can occur.”[10]

Therefore, due to the inability to achieve groundwater sampling during the subsurface investigation, and the ability of the OSS waste to impact groundwater, groundwater contamination is suspected rather than confirmed. Thus, only the groundwater route will be scored.

ROUTE SCORES:

Surface Water/Human Health:	**NS**	Surface Water/Environmental.:	**NS**
Air/Human Health:	**NS**	Air/Environmental:	**NS**
Groundwater/Human Health:	**65.6**		

OVERALL RANK: 2

WORKSHEET 2
Route Documentation

1. **SURFACE WATER ROUTE –** *Not Scored*
   a. List those substances to be considered for scoring: Source: __

   b. Explain basis for choice of substance(s) to be used in scoring.

   c. List those management units to be considered for scoring: Source: __

   d. Explain basis for choice of unit to be used in scoring:

2. **AIR ROUTE –** *Not Scored*
   a. List those substances to be considered for scoring:

      Source: __

   b. Explain basis for choice of substance(s) to be used in scoring:

   c. List those management units to be considered for scoring: Source: __

   d. Explain basis for choice of unit to be used in scoring:

3. **GROUNDWATER ROUTE**
   a. List those substances to be considered for scoring: Source: 1, 8, 9

      Arsenic, Chromium (total), lead, and mercury.

   b. Explain basis for choice of substance(s) to be used in scoring:

      These substances are suspected to be present in groundwater due to their elevated presence in the septic tank. These substances have been consistently detected in groundwater at dental office sites with septic systems.

   c. List those management units to be considered for scoring: Source: 1, 8, 9

      Groundwater.

   d. Explain basis for choice of unit to be used in scoring:

      These substances are suspected to be present in groundwater due to their elevated presence in the septic tank. These substances have been consistently detected in groundwater at dental office sites with septic systems.

WORKSHEET 6
Groundwater Route

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity											
Substance		Drinking Water Standard (μg/L)	Value	Acute Toxicity (mg/ kg-bw)	Value	Chronic Toxicity (mg/kg/day)	Value	Carcinogenicity		Value
								WOE	PF*	
1	Mercury	2	8	-	ND	0.0003	5	-	-	ND
2	Arsenic	50	6	763 (rat)	5	0.001	5	A	1.75	7
3	Lead	5	8	-	ND	-	ND	B2	-	ND
4	Chromium	100	6	-	ND	-	3	A	-	ND

** Potency Factor*

Source: 1, 2, 4, 8, 9
Highest Value: 8
(Max = 10)
Plus 2 Bonus Points? 2
Final Toxicity Value: 10
(Max = 12)

1.2 Mobility (use numbers to refer to above listed substances)	
Cations/Anions OR	**Solubility (mg/L)**
1= 3 + 1 (metals present in solution) = 4	**1=**
2 = 3 + 1 (metals present in solution) = 4	
3 = 2 + 1 (metals present in solution) = 3	
4= 1 + 1 (metals present in solution) = 2	**2=**

Source: 1, 2, 4, 8, 9
Value: 3
(Max = 3)

1.3 Substance Quantity:	
Explain basis: Quantity is calculated based on the once filled volume of the septic tank @ 501-1,000 gallons.	Source: 1, 2, 4 **Value: 3** (Max=10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment (explain basis):** Spill, discharge, and contaminated soil (i.e., drain field) = 10	1, 2, 5	**10** (Max = 10)
2.2	**Net precipitation:** 28.14” – 5.7” = 22.44”	5	**3** (Max = 5)
2.3	**Subsurface hydraulic conductivity:** sandy clayey loam	2, 4	**4** (Max = 4)
2.4	**Vertical depth to groundwater:** 50-100’	1, 4, 8	**4** (Max = 8)

3.0 TARGETS

		Source	Value
3.1	**Groundwater usage:** public supply, but alternate sources available with minimum hookup requirements	4, 6	**4** (Max = 10)
3.2	**Distance to nearest drinking water well:** >600 – 1,300	4, 6	**4** (Max = 5)
3.3	**Population served within 2 miles: √ pop.** = >10,000	4, 6	**100** (Max = 100)
3.4	**Area irrigated by (groundwater) wells within 2 miles:** 1,296 **(0.75)*√# acres** = 27.0	7	**27** (Max = 50)

4.0 RELEASE

	Source	Value
Explain basis for scoring a release to groundwater: (Direct discharge into the aquifer, i.e., down an injection well/OSS)	1, 4, 9	**5** (Max = 5)

SOURCES USED IN SCORING

1. Initial Investigation by Clark County Public Health, December 1, 2011.
2. Soil Survey of Clark County, Washington, November 1972.
3. Washington State Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992.
4. Washington State Department of Ecology, WARM Scoring Manual, April 1992.
5. Washington Climate – Net Rainfall Table.
6. Arial Photo, GIS Clark County MapsOnline.
7. Washington State Department of Ecology, Water Rights Application System (WRATS) printout for two-mile radius of site.
8. Analytical Report, by TestAmerica Laboratories, Inc., February 2013.
9. Cleanout required for a septic system at 10115 SE Mill Plain Blvd., Vancouver, WA 98664, by Department of Ecology, January 7, 2011.
10. Bioremediation of Arsenic, Chromium, Lead, and Mercury, August 2004 by U.S. EPA.