CSID 882

WORKSHEET 1
Summary Score Sheet

SITE INFORMATION:

Name: **Apple Valley Elementary School**
Address: **7 North 88th Avenue**
City: **Yakima**   County: **Yakima**   State: **WA**   Zip: **98908**
Section/Township/Range: **S19/ T13N/ R18E**
Latitude: **46° 35' 53" N**   Longitude: **120° 37' 27" W**
TCP ID #:   **3464749**

Site scored/ranked for the February 2006 update.

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

Apple Valley Elementary School is located on the western perimeter of Yakima. The nearly nine-acre property is set in a residentially zoned area. Historical aerial photographs do not indicate whether or not this site was used as orchard land prior to 1947.

This site was included in an area-wide lead and arsenic sampling program which involved collecting samples from schools suspected of having a history of past pesticide use. Prior to the mid-1940s, lead arsenate was the most widely used chemical used to control cottling moths on fruit trees. Lead (Pb) and arsenic (As) are known to be very stable in soil and tend to stay near the surface. Because of this historical background, it was suspected that the soil in the school playground might be contaminated with Pb and As. The Washington Department of Ecology (Ecology) obtained permission from West Valley School District to sample and test the soils for lead and arsenic from all of the Apple Valley school grounds.

The soils throughout the property were sampled by the Department of Ecology on March 3, 2005. Samples were taken from the top 6 inches using a core sampler. The samples were analyzed for lead and arsenic using X-Ray Fluorescence Spectroscopy.

Sampling results at Apple Valley Elementary School indicate that contaminant levels in soil exceed the Model Toxics Control Act Method A cleanup levels for lead (250ppm) and/or arsenic (20ppm) in 44 of 51 soil samples. The highest levels of arsenic and lead detected at the site were 124 ppm and 1083 ppm, respectively. These concentrations require the site be scored and ranked under the Washington Ranking Method (WARM).

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):

Due to the nature of metals in soil, it is assumed that lead and arsenic are likely not present at high concentrations at depths greater than four feet. This has been documented at several sites and seems

consistent for sites where lead arsenate pesticide was used. Samples were collected at a depth of six inches; however, for the purposes of this assessment, it is assumed that contamination extends to a depth of three feet.

Because of the presence of children at the school grounds, ingestion of contaminated soil is of concern and is considered the greatest risk to children. WARM scoring does not consider ingestion as an exposure route. However, the use of school grounds by children and their incidental ingestion of lead and arsenic contaminated soil are being addressed by Ecology through remediation efforts and by the State Department of Health through education.

ROUTE SCORES:

Surface Water/Human Health:	**7.7**	Surface Water/Environmental.:	**11.0**
Air/Human Health:	**8.9**	Air/Environmental:	**NS**
Groundwater/Human Health:	**62.7**		

OVERALL RANK: __3__

Route Documentation

1. **SURFACE WATER ROUTE**

    a. List those substances to be <u>considered</u> for scoring: Source: <u>1</u>

    Lead and arsenic

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

    Analytical results from soil sampling indicate the presence of these hazardous substances at levels which exceed our current Method A cleanup levels.

    c. List those management units to be <u>considered</u> for scoring: Source <u>1</u>

    Surface and subsurface soils

    d. Explain basis for choice of unit to be <u>used</u> in scoring:

    Spills/discharges caused soil contamination

2. **AIR ROUTE**

    a. List those substances to be <u>considered</u> for scoring: Source: <u>1</u>

    Lead and arsenic

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

    Analytical results from soil sampling indicate the presence of these hazardous substances at levels which exceed our current Method A cleanup levels.

    c. List those management units to be <u>considered</u> for scoring: Source: <u>1</u>

    Surface and subsurface soils

    d. Explain basis for choice of unit to be <u>used</u> in scoring:

    Spills/discharges caused soil contamination

3. **GROUNDWATER ROUTE**

    a. List those substances to be <u>considered</u> for scoring: Source: <u>1</u>

    Lead and arsenic

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

    Analytical results from soil sampling indicate the presence of these hazardous substances at levels which exceed our current Method A cleanup levels.

    c. List those management units to be <u>considered</u> for scoring: Source: <u>1</u>

    Surface and subsurface soils

    d. Explain basis for choice of unit to be <u>used</u> in scoring:

    Spills/discharges caused soil contamination

WORKSHEET 4
Surface Water 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 Lead	5	8	NA	ND	0.001	10	ND	ND	ND
2 Arsenic	10	8	763 (rat)	5	0.001	5	1.0	1.75	7

*Potency Factor

Source: 1, 2

Highest Value: 10
(Max = 10)

Plus 2 Bonus Points? 2
Final Toxicity Value: 12
(Max = 12)

1.2 Environmental Toxicity				
Substance	Acute Water Quality Criteria		Non-Human Mammalian Acute Toxicity	
	(µg/L)	Value	(mg/kg)	Value
1 Lead	82	6	ND	--
2 Arsenic	360	4	ND	--

Source: 1, 2

Highest Value: 6
(Max = 10)

1.3 Substance Quantity	
Explain Basis: One sample was collected from each randomly selected square in a 50' * 60'grid. Forty-four samples exceeded MTCA cleanup levels. Therefore, calculating 44 * 3000 sq. ft, 132000 sq. feet can be estimated as contaminated.	Source: 3, 7 **Value: 9** (Max = 10)

2.0   MIGRATION POTENTIAL

		Source	Value
2.1	**Containment:** Management unit scored as a spills/discharges/contaminated soil at the surface, with ineffectively maintained run-on/runoff controls (vegetated buffer). **Explain basis:** While a portion of the site is capped (parking lots, buildings, etc), soil samples were collected from only uncapped areas (i.e. in bare soil or beneath grass) at a depth of six inches.	1, 3	**4** (Max = 10)
2.2	**Surface Soil Permeability:** the site consists of silty and sandy loam	3, 8	**3** (Max = 7)
2.3	**Total Annual Precipitation:** average annual precipitation for Yakima WSO AP, WA = 8.15 in	9	**1** (Max = 5)
2.4	**Max 2yr/24hr Precipitation:** one inch	3	**1** (Max = 2)
2.5	**Flood Plain:** Not in flood plain	3, 10	**0** (Max = 2)
2.6	**Terrain Slope:** 2-5%	3, 6	**2** (Max = 5)

3.0   TARGETS

		Source	Value
3.1	**Distance to Surface Water:** ~1600 ft	3, 6	**7** (Max = 10)
3.2	**Population Served within 2 miles (see WARM Scoring Manual Regarding Direction):** no intakes found within 2 miles of site	3, 6	**0** (Max = 75)
3.3	**Area Irrigated by surface water within 2 miles :** $(0.75)*\sqrt{\#}$ **acres** = one intake is located in Section 20, assume ~5 acres irrigated $0.75 * \sqrt{5} = 1.7$	3, 6	**2** (Max = 30)
3.4	**Distance to Nearest Fishery Resource:** 6400 feet	3, 6	**3** (Max = 12)
3.5	**Distance to, and Name(s) of, Nearest Sensitive Environment(s):** 6400 feet	3, 6	**3** (Max = 12)

4.0   RELEASE

Explain Basis: Not documented	Source: <u>1, 3</u> **Value: <u>0</u>** (Max = 5)

WORKSHEET 5
Air Route

1.0   SUBSTANCE CHARACTERISTICS

1.1.   Introduction

1.2 Human Toxicity									
Substance	Air Standard ($\mu g/m^3$)	Value	Acute Toxicity (mg/m^3)	Value	Chronic Toxicity (mg/kg/day)	Value	Carcinogenicity WOE	PF*	Value
1 Lead	0.5	10	ND	--	0.001	10	B2	ND	--
2 Arsenic	0.00023	10	ND	--	0.001	5	A	50	9

Potency Factor   Source: <u>1, 2, 3</u>

Highest Value: <u>10</u>
(Max = 10)
Plus 2 Bonus Points? <u>2</u>
Final Toxicity Value: <u>12</u>
(Max = 12)

1.3 Mobility (Use numbers to refer to above listed substances)			
1.3.1 Gaseous Mobility	**1.3.2 Particulate Mobility**		
Vapor Pressure(s) (mmHg)	Soil Type	Erodibility	Climatic Factor
1	fine sandy and silty loam	47 - 86	10 - 30

                  Source: <u>NA</u>   Source: <u>3</u>

                  Value: <u>NS</u>   **Value: <u>1</u>**
                     (Max = 4)   (Max = 4)

1.4   Highest Human Health Toxicity/ Mobility Matrix Value (from Table A-7)

Final Matrix Value: <u>6</u>
(Max = 24)

1.5	Environmental Toxicity/Mobility					
	Substance	Non-human Mammalian Inhalation Toxicity (mg/m^3)	Acute Value	Mobility (mmHg)	Value	Matrix Value
1	Lead	ND	--	ND	--	--
2	Arsenic	ND	--	ND	--	--

Highest Environmental Toxicity/Mobility Matrix Value (from Table A-7) = **Final Matrix Value: <u>NS</u>**
(Max = 24)

1.6	Substance Quantity (Area)
Explain Basis: ~132000 sq ft (see Surface Water Route 1.3)	Source: <u>3, 8</u> **Value: <u>7</u>** (Max = 10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment:** Uncontaminated soil cover <2 feet thick	8	**5** (Max = 10)

3.0 TARGETS

		Source	Value
3.1	**Nearest Population:** <1000 feet to school	3, 7	**10** (Max = 10)
3.2	**Distance to [and name(s) of] nearest sensitive environment(s) [fisheries excluded]:** NA because not scoring environmental route		**NS** (Max = 7)
3.3	**Population served within 0.5 miles:** √ pop. = 289 homes * 3 = 867 pop √867 = 29.4	3, 6	**29** (Max = 75)

4.0 RELEASE

Explain Basis for scoring a release to air: Not documented	Source: <u>3, 7</u> **Value: <u>0</u>** (Max = 5)

WORKSHEET 6
Groundwater Route

1.0 SUBSTANCE CHARACTERISTICS

1.2 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 Lead	5	8	NA	ND	0.001	10	ND	ND	ND
2 Arsenic	10	8	763 (rat)	5	0.001	5	1.0	1.75	7

Potency Factor

Source: <u>1, 2</u>

Highest Value: <u>10</u>
(Max = 10)
Plus 2 Bonus Points? <u>2</u>
Final Toxicity Value: <u>12</u>
(Max = 12)

1.2 Mobility (use numbers to refer to above listed substances)	
Cations/Anions [Coefficient of Aqueous Migration (K)] OR	Solubility (mg/L)
1= K > 1.0 = 2	1=
2= K is 0.1 to 1.0 = 3	2=

Source: <u>3</u>
Value: <u>3</u>
(Max = 3)

1.3 Substance Quantity:	
Explain basis: (See Surface Water 1.3) Based on previous sampling sessions where lead/arsenic has been detected to depths up to 4', Ecology has determined that is likely that contaminated soil extends to a depth of 3' bgs. Therefore the estimated volume of contamination is calculated as follows. $$132000' * 3' = 396000 \text{ ft}^3 \text{ or } \sim 14677 \text{ yd}^3$$	Source: <u>1, 3</u> **Value: <u>5</u>** (Max=10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment (explain basis):** While a portion of the site is capped (parking lots, buildings, etc), soil samples were collected from only uncapped areas (i.e. in bare soil or beneath grass) at a depth of six inches.	3	**10** (Max = 10)

8

2.2	Net precipitation: 4.7" – 3" = 1.7"	2	1 (Max = 5)
2.3	Subsurface hydraulic conductivity: the site consists of very fine sandy and silty loam	3	3 (Max = 4)
2.4	Vertical depth to groundwater: water well reports nearby indicate groundwater is at a minimum 39 feet below ground surface	3, 5	6 (Max = 8)

3.0   TARGETS

		Source	Value
3.1	Groundwater usage: Public supply, but alternate sources available with minimum hookup requirements	3	4 (Max = 10)
3.2	Distance to nearest drinking water well: ~1850 feet	3, 5	3 (Max = 5)
3.3	Population served within 2 miles: $\sqrt{pop.} = \sqrt{23063} = 151.9$	3, 7	100 (Max = 100)
3.4	Area irrigated by (groundwater) wells within 2 miles: (0.75)*$\sqrt{\#}$ acres = $0.75 * \sqrt{1045} = 24.2$	3, 6	24 (Max = 50)

4.0   RELEASE

	Source	Value
Explain basis for scoring a release to groundwater: Not documented		0 (Max = 5)

SOURCES USED IN SCORING

1. Analytical results of soil sampling conducted on March 3, 2005 by the WA State Dept. of Ecology
2. Washington State Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992
3. Washington State Department of Ecology, WARM Scoring Manual, April 1992.
4. Washington Climate – Net Rainfall Table
5. Washington State Department of Ecology, Water Well Reports
6. Washington State Department of Ecology, Water Rights Application System (WRATS) printouts
7. Washington State Department of Health, Office of Drinking Water Sentry website printout for public water supplies
8. Apple Valley Elementary School file, WSDOE records at the Central Regional Office
9. Western Regional Climate Center's Historical Climate Information
10. Yakima County Land Information Portal website
11. National Resources Conservation Service Soil Survey of Yakima County Area, WA