

CSID 174

**WORKSHEET 1
SUMMARY SCORE SHEET**

Site Name/Location (Street, City, County, Section/Township/Range, TCP ID Number):

Olivine Corp. Hilton Ave.
Hilton Ave. & Roeder Ave.
Bellingham, Whatcom county, WA 98225

Sec 23/T38N/R2E
N-37-5046-000
Site scored/ranked for 2/17/98 update

Site Description (Include management areas, substances of concern, and quantities):

The Olivine Corporation Hilton Avenue site is a nearly level 2.283-acre portion of Port of Bellingham property situated along the southeastern boundary of the I & J Street Waterway. The site is bounded to the northwest by commercial property that fronts the Roeder Avenue corridor, to the southwest by Bornstein Seafoods, to the southeast by Hilton Avenue, and to the northwest by the I & J Street Waterway.

Historic uses of the site can be traced back to the late 1880's/early 1890's, as detailed thoroughly in the July 15, 1994 environmental assessment report by Landau Associates, Inc. A variety of industrial activities has occurred at the site since it was first developed for a sawmill and, later, lumber companies until the early 1960's. From 1964 until 1991, Olivine Corporation operated an olivine processing plant onsite, producing foundry sand and refractory materials for incinerators. In addition, an experimental incinerator operated onsite during 1981-1982. H & H Products leased the northern portion of the site during 1963-late 1960's/early 1970's. Olivine acquired the lease to this area in 1976. Preparation work at the site for these businesses included filling and grading and burning of scrap lumber, wood waste and other refuse.

Site reconnaissance during the 1994 assessment showed little evidence of past olivine processing operations due to the dismantling of the processing plant in 1992; however a considerable amount of olivine product remained onsite. Other items of interest observed included mounds of debris, concrete pads for former site buildings and structures, a water supply utility vault, and a former railroad spur track. The site was apparently filled over a number of years; the exact composition, origin, and quality of onsite fill material being unknown.

Of two subsurface soil samples collected onsite during the 1994 assessment, one showed concentrations of the polyaromatic hydrocarbons (PAHs) benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, and chrysene in excess of Model Toxics Control Act (MTCA) Method B cleanup levels for carcinogens. A composited surface sediment collected adjacent to the site from the I & J Waterway showed similar concentrations of the same PAHs, as well as total petroleum hydrocarbons (TPH), diesel range, which exceeded MTCA cleanup levels.

A follow-up environmental investigation, reported March 27, 1995 by Harding Lawson Associates, included additional soil sampling which again indicated PAH and heavy metal (arsenic, chromium and lead) at concentrations exceeding MTCA cleanup levels. In addition, monitoring well samples documented concentrations of chromium in excess of its MTCA Method A groundwater cleanup level.

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):

Although there is some degree of cover on the site from vegetation and olivine sands, both the surface water and air migration routes are believed to be applicable for evaluating the relative threat the site poses to human health and the environment, and both were scored. The maximum value of 10 was assigned for containment (lack of) for both the surface water and groundwater routes, due to documented sediment and groundwater contamination; while for the air route, a reduced value of 5 was used, per the WARM Scoring Manual, to reflect the presence of some degree of cover reducing the particulate migration route of exposure.

ROUTE SCORES:

Surface Water/Human Health: 26.9 Surface Water/Environ.: 48.3

Air/Human Health: 11.3 Air/Environmental: NS

Ground Water/Human Health: 39.0

OVERALL RANK: 3

WORKSHEET 2
ROUTE DOCUMENTATION

1. SURFACE WATER ROUTE

List those substances to be considered for scoring: Source: 1-3

Polyaromatic hydrocarbons (PAHs): benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, and chrysene. Heavy metals — arsenic, cadmium, chromium, lead, and mercury. TPH (diesel).

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

Will score contaminant toxicities for this route on all of the above, except cadmium and mercury, due to their documented occurrence in significant concentrations in soil, sediment or ground water samples.

List those management units to be considered for scoring: Source: 1-3

Landfilled areas; contaminated soil.

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

Contaminated soils used to evaluate containment due to documentation of contamination through soil samples.

2. AIR ROUTE

List those substances to be considered for scoring: Source: 1-3

Polyaromatic hydrocarbons (PAHs): benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, and chrysene. Heavy metals — arsenic, cadmium, chromium, lead, and mercury. TPH (diesel).

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

Will score contaminant toxicities for this route on all of the above, except cadmium and mercury, due to their documented occurrence in significant concentrations in soil, sediment or ground water samples.

List those management units to be considered for scoring: Source: 1-3

Landfilled areas; contaminated soil.

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

Contaminated soils used to evaluate containment due to documentation of contamination through soil samples, although at a lesser value than 10, due to presence of some degree of uncontaminated cover material.

WORKSHEET 2
ROUTE DOCUMENTATION (Cont.)

3. GROUND WATER ROUTE

List those substances to be considered for scoring: Source: 1-3

Polyaromatic hydrocarbons (PAHs): benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, and chrysene. Heavy metals - arsenic, cadmium, chromium, lead, and mercury. TPH (diesel).

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

Will score contaminant toxicities for this route on all of the above, except cadmium and mercury, due to their documented occurrence in significant concentrations in soil, sediment or ground water samples.

List those management units to be considered for scoring: Source: 1-3

Landfilled areas; contaminated soil.

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

Contaminated soils used to evaluate containment due to documentation of contamination through soil samples.

WORKSHEET 3 (If Required)
SUBSTANCE CHARACTERISTICS WORKSHEET
FOR MULTIPLE UNIT/SUBSTANCE SITES
Combination 1 Combination 2 Combination 3

Unit: **Section Not Applicable.**

1. SURFACE WATER ROUTE

Substance(s):
Human Toxicity Value:
Environ. Toxicity Value:
Containment Value:
Rationale:

Surface Water Human
Subscore: (+3)(+1)= (+3)(+1)= (+3)(+1)=
 () () = () () = () () =

Surface Water Environ.
Subscore: (+3)(+1)= (+3)(+1)= (+3)(+1)=
 () () = () () = () () =

2. AIR ROUTE

Substance(s):
Human Toxicity/Mobility
Value:
Environ. Toxicity/
Mobility Value:
Containment Value:
Rationale:

Air Human Subscore: (+3)(+1)= (+3)(+1)= (+3)(+1)=
 () () = () () = () () =

Air Environ. Subscore: (+3)(+1)= (+3)(+1)= (+3)(+1)=
 () () = () () = () () =

3. GROUND WATER ROUTE

Substance(s):
Human Toxicity Value:
Containment Value:
Rationale:

Ground Water Subscore: (+3)(+1)= (+3)(+1)= (+3)(+1)=
 () () = () () = () () =

Based on their respective highest scoring toxicity/containment combinations, the following management units will be used for route scoring:

Surface Water -
Air -
Ground Water -

WORKSHEET 4
SURFACE WATER ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drinking Water Standard		Acute Toxicity		Chronic Toxicity		Carcinogenicity		
	(ug/l)	Val.	(mg/kg-bw)	Val.	(mg/kg/day)	Val.	WOE	PF	Val.
1. Arsenic	50	6	763(rat)	5	0.001	5	A=1	1.75=7	7
2. Benzo(a)anthracene	0.2	10	ND	-	ND	-	B2=.8	11.5=9	7
3. Benzo(b)fluoranthene	0.2	10	ND	-	ND	-	B2=.8	11.5=9	7
4. Benzo(a)pyrene	0.2	10	50(rat)	10	ND	-	B2=.8	12=9	7
5. Chromium	100	6	ND	-	0.005	5	ND	-	-
6. Chrysene	0.2	10	ND	-	ND	-	B2=.8	11.5=9	7
7. Lead	5	8	ND	-	ND	-	ND	-	7
8. TPH-Diesel	20	6	490(rat)	5	0.004	5	ND	-	-

Potency Factor

Source: 1,2,4
Highest Value: 10
(Max.=10)

+2 Bonus Points? 2

Final Toxicity Value: 12
(Max.=12)

1.2 Environmental Toxicity

() Freshwater

(X) Marine

Substance	Acute Water Quality Criteria		Non-human Mammalian Acute Toxicity		Source: <u>1,2,4</u>	Value: <u>6</u> <small>(Max.=10)</small>
	(ug/l)	Value	(mg/kg)	Value		
1. Arsenic	69	6				
2. Benzo(a)anthracene	300	4				
3. Benzo(b)fluoranthene	300	4				
4. Benzo(a)pyrene	300	4				
5. Chromium	1100	2				
6. Chrysene	300	4				
7. Lead	140	4				
8. TPH-Diesel	140	4				

1.3 Substance Quantity: Unknown, use default = 1 Source: 1,2 Value: 1
Explain basis: _____

WORKSHEET 4 (CONTINUED)
SURFACE WATER ROUTE

2.0 MIGRATION POTENTIAL

2.1 Containment

Source: 1-3,5 Value: 10
(Max.=10)

Explain basis:

Management unit scored as contaminated soil; no
run-on/runoff control system; release to sediments documented.

2.2 Surface Soil Permeability: Silts/sands = medium Source: 1,2,5 Value: 3
(Max.=7)

2.3 Total Annual Precipitation: 33.6 inches Source: 6 Value: 3
(Max.=5)

2.4 Max. 2-Yr/24-hour Precipitation: 1.5 - 2 inches Source: 5 Value: 2
(Max.=2)

2.5 Flood Plain: Not in flood plain Source: 5 Value: 0
(Max.=2)

2.6 Terrain Slope: <2% Source: 1-3,5 Value: 1
(Max.=5)

3.0 TARGETS

3.1 Distance to Surface Water: Less than 1000' (adjac.) Source: 1-3 Value: 10
(Max.=10)

3.2 Population Served within 2 miles (See WARM Scoring
Manual Regarding Direction): $\sqrt{\text{pop.}} = \sqrt{0} = 0$ Source: 8 Value: 0
(Max.=75)

3.3 Area Irrigated within 2 miles $0.75\sqrt{\text{no. acres}} =$
(Refer to note in 3.2.): $0.75\sqrt{0} = 0$ Source: 8,9 Value: 0
(Max.=30)

3.4 Distance to Nearest Fishery Resource: Adjacent Source: 1-3,9 Value: 12
(Max.=12)

3.5 Distance to, and Name(s) of, Nearest Sensitive
Environment(s) Bellingham Bay - Fishery <1000 feet Source: 1-3,9 Value: 12
(Max.=12)

4.0 RELEASE

Explain basis for scoring a release to surface
water:

Source: 1,2 Value: 5
(Max.=5)

By analysis, documented sediment contamination
attributable to contaminants on-site.

WORKSHEET 5
AIR ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Introduction (WARM Scoring Manual) - Please review before scoring

1.2 Human Toxicity

Substance	Air Standard		Acute Toxicity		Chronic Toxicity		Carcinogenicity		
	(ug/m ³)	Val.	(mg/m ³)	Val.	(mg/kg/day)	Val.	WOE	PF	Val.
1. Arsenic	0.00023	10	ND	-	ND	-	A=1	50=9	9
2. Benzo(a)anthracene	ND	-	ND	-	ND	-	ND	ND	-
3. Benzo(b)fluoranthene	ND	-	ND	-	ND	-	ND	ND	-
4. Benzo(a)pyrene	0.0006	10	ND	-	ND	-	ND	ND	-
5. Chromium	8.3E-05	10	ND	-	5.7E-07	10	A=1	41=9	9
6. Chrysene	ND	-	ND	-	ND	-	ND	ND	-
7. Lead	0.5	10	ND	-	ND	-	ND	ND	-
8. TPH-Diesel	166.5	4	ND	-	ND	-	ND	ND	-

Potency Factor Source: 1,2,4
Highest Value: 10
(Max.=10)
+2 Bonus Points? 2
Final Toxicity Value: 12
(Max.=12)

1.3 Mobility (Use numbers to refer to above listed substances)

1.3.1 Gaseous Mobility
 Vapor Pressure(s) (mmHg): _____ Source: _____
 Value: _____
(Max.=4)

1.3.2 Particulate Mobility -
 Soil type: Silty sands Source: 1,2,4
 Erodibility: >30-80 Value: 1
 Climatic Factor: 1-10 (Max.=4)

1.4 Highest Human Health Toxicity/Mobility Matrix Value (from
 Table A-7) equals Final Matrix Value: 6
(Max.=24)

1.5 Environmental Toxicity/Mobility Source: 1,2,4

	Non-human Mammalian Acute	(Table A-7)
Substance	Inhal. Toxicity (mg/m ³) Value	Mobility (mmHg) Value Matrix Value
No data - pathway not scored (NS)		

Highest Environmental Toxicity/Mobility Matrix Value
 (From Table A-7) equals Final Matrix Value: ND
(Max.=24)

WORKSHEET 5 (CONTINUED)
AIR ROUTE

1.6 Substance Quantity: Unknown-use default value = 1 Source: 1-3,5 Value: 1
Explain basis: _____

2.0 MIGRATION POTENTIAL

2.1 Containment: Contaminated soil, uncontaminated Source: 1-3,5 Value: 5
soil cover < 2 feet thick (Max.=10)

3.0 TARGETS

3.1 Nearest Population: <1000 feet Source: 3,8 Value: 10
(Max.=10)

3.2 Distance to, and Name(s) of, Nearest Sensitive
Environment(s) Estuarine wetlands - <1000' Source: 3,8 Value: 7

_____ (Max.=7)

3.3 Population within 0.5 miles: $\sqrt{\text{pop.} = \sqrt{(.25)7886}} = 44$ Source: 8 Value: 44
(Note: am using one-quarter of the 0-1 mile population (Max.=75)
determined from the USEPA SITEINFO database

4.0 RELEASE

Explain basis for scoring a release to air: None Source: 1,2 Value: 0
documented. (Max.=5)

WORKSHEET 6
GROUND WATER ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drinking Water Standard		Acute Toxicity		Chronic Toxicity		Carcinogenicity		
	(ug/l)	Val.	(mg/kg-bw)	Val.	(mg/kg/day)	Val.	WOE	PF	Val.
1. Arsenic	50	6	763(rat)	5	0.001	5	A=1	1.75=7	7
2. Benzo(a)anthracene	0.2	10	ND	-	ND	-	B2=.8	11.5=9	7
3. Benzo(b)fluoranthene	0.2	10	ND	-	ND	-	B2=.8	11.5=9	7
4. Benzo(a)pyrene	0.2	10	50(rat)	10	ND	-	B2=.8	12=9	7
5. Cadmium	5	8	225(rat)	5	0.0005	5	ND	-	-
6. Chromium	100	6	ND	-	0.005	5	ND	-	-
7. Chrysene	0.2	10	ND	-	ND	-	B2=.8	11.5=9	7
8. Lead	5	8	ND	-	ND	-	ND	-	7

Potency Factor

Source: 1,2,4

Highest Value: 10
(Max.=10)

+2 Bonus Points? 2

Final Toxicity Value: 12
(Max.=12)

1.2 Mobility (Use numbers to refer to above listed substances)

Cations/Anions: 1 = 3; 5 = 3; 6 = 1; 8 = 2

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

OR

Solubility(mg/l): 2) 5.7E-03 = 0; 3) 1.4E-02 = 0;
4) 1.2E-03 = 0; 7) 1.8E-03 = 0

1.3 Substance Quantity: Unknown, use default value = 1
Explain basis: _____

Source: 1,2,4 Value: 1
(Max.=10)

2.0 MIGRATION POTENTIAL

2.1 Containment

Explain basis: Spills, discharge to soil=10

Source: 1,2,4 Value: 10
(Max.=10)

2.2 Net Precipitation: 16.7 inches

Source: 6 Value: 2
(Max.=5)

2.3 Subsurface Hydraulic Conductivity: Sands/silts

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

2.4 Vertical Depth to Ground Water: < 25 feet

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

WORKSHEET 6 (CONTINUED)
GROUND WATER ROUTE

3.0 TARGETS

- 3.1 Ground Water Usage: Usuable, not used Source: 1,2,8 Value: 2
(Max.=10)
- 3.2 Dist. to Nearest Drinking Water Well: > 2 miles Source: 1,2,8 Value: 0
(Max.=5)
- 3.3 Population Served within 2 Miles: $\sqrt{\text{pop.}} = \sqrt{0} = 0$ Source: 8 Value: 0
(Max.=100)
- 3.4 Area Irrigated by (Groundwater) Wells
within 2 miles: $0.75\sqrt{\text{no. acres}} =$ Source: 8,9 Value: 0
 $0.75\sqrt{0} = 0$ (Max.=50)

4.0 RELEASE

Explain basis for scoring a release to ground water: Documented by analytical data, contaminated groundwater by PAHs and metals Source: 1,2,4 Value: 5
(Max.=5)

SOURCES USED IN SCORING

1. Environmental Site Assessment: Proposed U.S.C.G. Search and Rescue Station, Bellingham, Washington, Landau Associates, Inc., July 15, 1994.
2. Soil, Sediment, and Groundwater Investigation, U.S. Coast Guard Olivine Site, Bellingham, Washington, Harding Lawson Associates, March 27, 1995.
3. Site drive-by/recon., December 4, 1997.
4. Washington Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992.
5. Washington Department of Ecology, WARM Scoring Manual, April 1992.
6. See attached table, identified as Reference 6.
7. Flood Insurance Rate Maps (FIRM).
8. U.S. EPA SITEINFO GIS Query for lat./long. of site, attached.
9. Ecology Water Rights Information System (WRIS).