WORKSHEET 1
SUMMARY SCORE SHEET

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

Roeder Avenue Landfill
W. of Roeder Ave. at F Street
Bellingham, WA 98225

Sec 23/T38N/R2E

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

The Roeder Avenue Landfill, aka the Old Bellingham Landfill, is a former tidal flat that was diked and filled to provide additional land for commercial and industrial development at the Bellingham Bay Waterfront. The property was purchased from the City of Bellingham by the Georgia-Pacific Corporation in the 1950's, then leased back to the City for use as a sanitary landfill from 1965-1975. During development of the landfill, a dike was constructed to contain the proposed disposal area; surface materials to a depth of approx. 20-25 feet were dredged from the area before filling of the site began. Although the dike was constructed of impervious clay, the landfill itself had no lining.

The site covers approx. 20 acres, being bordered by industrial property on the northwest and southeast (Bellingham Marine Industries), and by Geo-Pacific's bio-Treatment lagoon on the southwest. Between 1965 and 1975, approx. 17,000 tons of municipal wastes were landfilled at the site (no records exist of the exact quantities/types of waste), as well as the City of Bellingham disposed of materials including sludge from the city sewer plant, and Georgia-Pacific landfilled approx. 16,000-17,000 cubic yards per year of pulp tailings at the site.

A leachate discharge from a storm drain (identified by the U.S. Environmental Protection Agency (EPA) as the Hilton Avenue drain) from the landfill to Bellingham Bay was reported to the U.S. Coast Guard in 1980. Sample results showed chromium at 5,964 micrograms/liter. Apparently, this discharge was subsequently diverted into the City of Bellingham sewer treatment system, however there is no documentation of this. It came to further attention of regulatory authorities, initially the EPA, in the 1980's due to concerns regarding disposal of industrial waste from the Georgia-Pacific Corporation at the landfill, and its close proximity to the bay.

The June 1987 EPA Site Inspection Report concluded, since there was no written or verbal evidence that hazardous materials were deposited at the site between 1965-1975 and there was no current evidence of on-going contamination to the surrounding area, that no further action be taken under the EPA "Superfund" program and the site was referred to Ecology for further followup.

GeoEngineers conducted the third phase of an environmental site assessment of the property immediately adjacent to the landfill to the southeast (Bellingham Marine Industries) in 1992, installing monitoring wells and boreholes in the periphery of

the former landfill, inter alia. Samples taken from borehole B-3 and monitoring wells MW-12, MW-18, and MW-19, shown on the map (Figure 3) to fall within the toe of the former landfill, showed soil concentrations (in B-3) exceeding Model Toxics Control Act (MTCA) cleanup levels for the following heavy metals: arsenic, copper, mercury, and nickel, and groundwater concentrations exceeding MTCA levels for most of these same metals.

The site was scored on the basis these chemical constituents having been deposited on site through known landfilled substances over the history of the site's operation.

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 the presence of cover at the former landfill, the air route was not considered as an applicable route of potential/actual migration route from the site. The surface water route was evaluated, however at a reduced scoring value for containment, through the site's expected hydraulic continuity with Bellingham Bay (due to it being unlined and subject to tidal influence).

ROUTE SCORES:

Surface Water/Human Health:	13.7	Surface Water/Environ.:	33.3
Air/Human Health:	NS	Air/Environmental:	NS
Ground Water/Human Health:	25.9		

OVERALL RANK: 5

WORKSHEET 2
ROUTE DOCUMENTATION

1. SURFACE WATER ROUTE

List those substances to be considered for scoring: Source: 1,2

Heavy Metals: arsenic, copper, mercury, nickel.

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

All of the above will be used for scoring this route, as their respective concentrations in soil samples from monitor well borings associated with on-site soils exceed their respective Model Toxics Cleanup Act (MTCA) Cleanup Levels, and it is likely that substances containing any and all of these metals were deposited at the landfill.

List those management units to be considered for scoring: Source: 1,2

Landfill with unmaintained run-on/runoff control system or cover.

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

The above unit will be used for scoring this route, as heavy metals concentrations in soil samples from monitor well borings associated with on-site soils exceed their respective Model Toxics Cleanup Act (MTCA) Cleanup Levels, and it is likely that substances containing any and all of these metals were deposited at the landfill.

2. AIR ROUTE

List those substances to be considered for scoring: Source: 1,2

Not applicable for scoring.

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

List those management units to be considered for scoring: Source: N/A

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

WORKSHEET 2 (CONTINUED)
ROUTE DOCUMENTATION

3. GROUND WATER ROUTE

List those substances to be considered for scoring: Source: 1,2

Heavy Metals: arsenic, copper, mercury, nickel.

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

All of the above will be used for scoring this route, as their respective concentrations in soil samples from monitor well borings associated with on-site soils exceed their respective Model Toxics Cleanup Act (MTCA) Cleanup Levels, and it is likely that substances containing any and all of these metals were deposited at the landfill.

List those management units to be considered for scoring: Source: 1,2

Landfill with unmaintained run-on/runoff control system or cover.

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

The above unit will be used for scoring this route, as heavy metals concentrations in soil samples from monitor well borings associated with on-site soils exceed their respective Model Toxics Cleanup Act (MTCA) Cleanup Levels, and it is likely that substances containing any and all of these metals were deposited at the landfill.

WORKSHEET 4
SURFACE WATER ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drinking Water Standard (ug/l)	Val.	Acute Toxicity (mg/kg-bw)	Val.	Chronic Toxicity (mg/kg/day)	Val.	Carcino-genicity WOE	PF*	Val.
1. Arsenic	50	6	763	5	0.001	5	A=1	1.75=7	7
2. Copper	1300	2	ND	-	0.037	1	ND	-	-
3. Mercury	2	8	ND	-	0.0003	5	ND	-	-
4. Nickel	100	6	ND	-	0.02	1	ND	-	-

*Potency Factor

Source: 1,4
Highest Value: 8 (Max.=10)

+2 Bonus Points? 2
Final Toxicity Value 10 (Max.=12)

1.2 Environmental Toxicity

( ) Freshwater
(X) Marine

Substance	Acute Water Quality Criteria (ug/l)	Value
1. Arsenic	69	6
2. Copper	2.9	8
3. Mercury	2.1	8
4. Nickel	75	6
5.		
6.		

Non-human Mammalian Acute Toxicity (mg/kg) Value

Source: 1,4 **Value:** 8 (Max.=10)

1.3 Substance Quantity: Unknown - Use default = 1

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

Explain basis:

WORKSHEET 4 (CONTINUED)
SURFACE WATER ROUTE

2.0 MIGRATION POTENTIAL

2.1 Containment — Source: 1,3 — Value: 5 (Max.=10)
Explain basis:
Landfill - unmaintained run-off/runon control system or cover

2.2 Surface Soil Permeability: Silty sands — Source: 1,2 — Value: 5 (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.=5)

2.5 Flood Plain: Not in flood plain — Source: 3 — Value: 0 (Max.=2)

2.6 Terrain Slope: >8% — Source: 1,3 — Value: 5 (Max.=5)

3.0 TARGETS

3.1 Distance to Surface Water: <1000' - Hydraul. cont. — Source: 1,3 — Value: 10 (Max.=10)

3.2 Population Served within 2 miles (See WARM Scoring Manual Regarding Direction): √pop.=√0 = 0 — Source: 7 — Value: 0 (Max.=75)

3.3 Area Irrigated within 2 miles 0.75√no. acres= (Refer to note in 3.2.): 0.75√0 =0.75(0)= — Source: 8 — Value: 0 (Max.=30)

3.4 Distance to Nearest Fishery Resource: <1000' — Source: 1,3 — Value: 12 (Max.=12)

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

4.0 RELEASE

Explain basis for scoring a release to surface water: — Source: 1-3 — Value: 0 (Max.=5)
No analytical data available to show a release to surface water (currently) attributable to the landfill.

WORKSHEET 6
GROUND WATER ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drinking Water Standard (ug/l)	Val.	Acute Toxicity (mg/kg-bw)	Val.	Chronic Toxicity (mg/kg/day)	Val.	Carcinogenicity WOE	PF*	Val.
1. Arsenic	50	6	763	5	0.001	5	A=1	1.75=7	7
2. Copper	1300	2	ND	-	0.037	1	ND	-	-
3. Mercury	2	8	ND	-	0.0003	5	ND	-	-
4. Nickel	100	6	ND	-	0.02	1	ND	-	-

*Potency Factor

Source: 1,4
Highest Value: 8 (Max.=10)

+2 Bonus Points? 2
Final Toxicity Value: 10 (Max.=12)

1.2 Mobility (Use numbers to refer to above listed substances)
Cations/Anions: 1= ; 2= ; 3= ; 4= ; 5= ; 6= . Source: 5 **Value:** 3 (Max.=3)

OR
Solubility(mg/l): 1= 3; 2= 2; 3= 3; 4= 2;

1.3 Substance Quantity: Unknown - Use default = 1 Source: 1,5 **Value:** 1 (Max.=10)
Explain basis:

2.0 MIGRATION POTENTIAL

2.1 Containment Source: 1,3 **Value:** 7 (Max.=10)
Explain basis: No liner = 3; Compacted soil cover with unknown maint. = 1; No leachate collection collection system = 2; Possible free liquids = 1

2.2 Net Precipitation: 16.7 inches Source: 6 **Value:** 2 (Max.=5)

2.3 Subsurface Hydraulic Conductivity: Silty sands Source: 1,2 **Value:** 3 (Max.=4)

2.4 Vertical Depth to Ground Water: Less than 25 feet Source: 1,2 **Value:** 8 (Max.=8)

WORKSHEET 6 (CONTINUED)
GROUND WATER ROUTE

3.0 TARGETS

3.1 Ground Water Usage: Apparently - Irrigation only Source: 7 **Value:** 2 (Max.=10)

3.2 Distance to Nearest Drinking Water Well: N/A ft Source: 7 **Value:** 0 (Max.=5)

3.3 Population Served within 2 Miles: √pop.=√0 = Source: 7 **Value:** 0 (Max.=50)

3.4 Area Irrigated by (Groundwater) Wells within 2 miles: 0.75√no.acres= Source: 8 **Value:** 3 (Max.=100)
0.75√16 =0.75 (4) = 3

4.0 **RELEASE**

Explain basis for scoring a release to ground water: Confirmed by analytical data. Source: 2 **Value:** 5 (Max.=5)

SOURCES USED IN SCORING

1. Site Inspection Report for Old Bellingham Landfill, Bellingham, Washington. TDD F10-8704-13, Ecology and Environment, June, 1987.
2. Phase 3 Environmental Site Assessment - Bellingham Marine Industries, Bellingham, Washington, GeoEngineers, July, 1992.
3. Drive-by site reconnaissance, April 25, 1995.
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. DOH Public Water Supply System Listing.
8. Ecology Water Rights Information System (WRIS).