

SITE HAZARD ASSESSMENT  
WORKSHEET 1  
Summary Score Sheet

SITE INFORMATION:

Duwamish Marine Center  
6365 1<sup>st</sup> Ave S  
Seattle, King County, WA 98108

Section/Township/Range: 30/ 24N/ 04E  
Latitude: 47.54504  
Longitude: -122.33581  
Ecology Facility Site ID No: 21945598  
Ecology Cleanup Site ID No: 4146

*January 25, 2012*

**Site Description**

The Duwamish Marine Center site is located at 16 South Michigan Street on the east side of the Lower Duwamish Waterway Superfund site between Slip 2 and Slip 3. Samson Tug and Barge operates on the northern portion of the site and conducts shipping and associated activities such as equipment maintenance and painting. Duwamish Metal Fab operates on the southern portion of the property. The Duwamish Marine Center company is the leasing service for the Samson Tug and Barge tenant on the north portion of the site.

**Background**

In December 2000 the Washington Department of Ecology (Ecology) and the Environmental Protection Agency (EPA) signed an agreement with King County, the Port of Seattle, the City of Seattle and the Boeing Company to conduct a Remedial Investigation/Feasibility Study (RI/FS) to assess potential risks to human health and the environment related to the Lower Duwamish Waterway (LDW).

The EPA added the LDW to its National Priorities List on September 13, 2001. This is EPA's list of hazardous waste sites that warrant further investigation and cleanup under Superfund regulations. Ecology added the site to the Washington State Hazardous Sites List on February 26, 2002.

Historical operations at the site include a junk dealer, marine railway, and construction companies. Several docks are located along the LDW, and bank material includes metal waste deposited by a previous company operating at the site.

The Port of Seattle owns a narrow strip of shoreline along the Lower Duwamish Waterway where site operations have taken place and several docks are located. In addition, operations are conducted on unused street right of way as part of the site.

Several environmental investigations at the site showed contamination in the soil, groundwater, and sediment at the site. Soil contained metals, PAHs, PCBs, and petroleum hydrocarbons. Groundwater contained these contaminants and also mercury and pentachlorophenol.

The shoreline of the property has been filled and dredged extensively over the years. Dredge spoils, which may have contained contaminants such as polychlorinated biphenyls (PCBs), metals, and/or carcinogenic polynuclear aromatic hydrocarbons (cPAHs), may have been used as fill on the property and shoreline.

**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): N/A**

**ROUTE SCORES:**

Surface Water/Human Health: 30.1  
Air/Human Health: 30.2  
Groundwater/Human Health: 38.7

Surface Water/Environmental.: 61.7  
Air/Environmental: 29.5

**OVERALL RANK: 1**

WORKSHEET 2  
Route Documentation

1. **SURFACE WATER ROUTE**

- a. List those substances to be considered for scoring: Source:2  
**Arsenic, Cadmium, Chromium, Mercury, Lead, TPH-Dx,  
PCBs, cPAHs**
- b. Explain basis for choice of substance(s) to be used in scoring.  
**Analytical results from soil and groundwater sampling indicate the presence of these hazardous substances at levels which exceed our current Method A and B cleanup levels.**
- c. List those management units to be considered for scoring: Source 2  
**Surface and subsurface soils**
- d. Explain basis for choice of unit to be used in scoring:  
**Spills/discharges caused soil contamination**

2. **AIR ROUTE**

- a. List those substances to be considered for scoring: Source:2  
**Arsenic, Cadmium, Chromium, Mercury, Lead, TPH-Dx,  
PCBs, cPAHs**
- b. Explain basis for choice of substance(s) to be used in scoring:  
**Analytical results from soil and groundwater sampling indicate the presence of these hazardous substances at levels which exceed our current Method A and B cleanup levels.**
- c. List those management units to be considered for scoring: Source:2  
**Surface and subsurface soils**
- d. Explain basis for choice of unit to be used in scoring:  
**Spills/discharges caused soil contamination**

3. **GROUNDWATER ROUTE**

- a. List those substances to be considered for scoring: Source:2  
**Arsenic, Mercury, Lead, TPH-Dx, PCBs, cPAHs**
- b. Explain basis for choice of substance(s) to be used in scoring:

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

- c. List those management units to be considered for scoring: Source:2

**Surface and subsurface soils**

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

**Spills/discharges caused soil contamination**

WORKSHEET 3  
Surface Water Route

**1.0 SUBSTANCE CHARACTERISTICS**

| <b>1.2 Human Toxicity</b> |          |                                |       |                            |       |                              |       |                 |      |       |
|---------------------------|----------|--------------------------------|-------|----------------------------|-------|------------------------------|-------|-----------------|------|-------|
| Substance                 |          | Drinking Water Standard (µg/L) | Value | Acute Toxicity (mg/ kg-bw) | Value | Chronic Toxicity (mg/kg/day) | Value | Carcinogenicity |      | Value |
|                           |          |                                |       |                            |       |                              |       | WOE             | PF*  |       |
| 1                         | Arsenic  | 10                             | 8     | 763                        | 5     | 0.001                        | 5     | A               | 1.75 | 7     |
| 2                         | PCBs     | 0.5                            | 10    | 1315                       | 3     | ND                           | -     | B2              | 7.7  | 6     |
| 3                         | Lead     | 5                              | 8     | ND                         | -     | 0.001                        | 10    | ND              | -    | -     |
| 4                         | TPH-Dx   | 20.0                           | 6     | 490                        | 5     | 0.004                        | 3     | ND              | -    | -     |
| 5                         | Mercury  | 2.0                            | 8     | ND                         | -     | 0.0003                       | 5     | ND              | -    | -     |
| 6                         | Cadmium  | 5.0                            | 8     | 225                        | 5     | 0.0005                       | 5     | B1              | -    | -     |
| 7                         | Chromium | 100                            | 6     | ND                         | -     | 1.0                          | 1     | ND              | -    | -     |
| 8                         | cPAHs    | 0.2                            | 10    | 50                         | 10    | ND                           | -     | B2              | 12   | 7     |

\* Potency Factor

Source: 2

**Highest Value: 10**

(Max = 10)

**Plus 2 Bonus Points**

**Final Toxicity Value: 12**

(Max = 12)

| <b>1.2 Environmental Toxicity – Fresh Water</b> |          |                              |       |                                    |       |
|---|----------|------------------------------|-------|------------------------------------|-------|
| Substance                                       |          | Acute Water Quality Criteria |       | Non-Human Mammalian Acute Toxicity |       |
|   |          | (µg/L)                       | Value | (mg/kg)                            | Value |
| 1   | Arsenic  | 360                          | 4     |                                    |       |
| 2   | PCBs     | 2.0                          | 8     |                                    |       |
| 3   | Lead     | 82                           | 6     |                                    |       |
| 4   | TPH-Dx   | 2300                         | 2     |                                    |       |
| 5   | Mercury  | 2.4                          | 8     |                                    |       |
| 6   | Cadmium  | 3.9                          | 8     |                                    |       |
| 7   | Chromium | 1700                         | 2     |                                    |       |

|   |       |    |   |  |  |
|---|-------|----|---|--|--|
| 8 | cPAHs | ND | - |  |  |
|---|-------|----|---|--|--|

Source:1

**Highest Value: 8**  
(Max = 10)

| 1.3 Substance Quantity                         |   |
|--|---|
| Explain Basis: Unknown quantity, default to 1. | Source:2<br><b>Value: 1</b><br>(Max = 10) |

## 2.0 MIGRATION POTENTIAL

|     |  | Source | Value                   |
|-----|--|--------|-------------------------|
| 2.1 | <b>Containment:</b> Spill/discharge at surface<br><b>Explain basis:</b> No run-on/run-off controls | 2      | <b>10</b><br>(Max = 10) |
| 2.2 | <b>Surface Soil Permeability:</b> silt/sand/gravel   | 2      | <b>1</b><br>(Max = 7)   |
| 2.3 | <b>Total Annual Precipitation:</b> SeaTac = 35.0   | 5      | <b>3</b><br>(Max = 5)   |
| 2.4 | <b>Max 2yr/24hr Precipitation:</b> 1-2 inches  | 5      | <b>2</b><br>(Max = 2)   |
| 2.5 | <b>Flood Plain:</b> No 100-year flood plain  | 8      | <b>0</b><br>(Max = 2)   |
| 2.6 | <b>Terrain Slope:</b> Site adjacent to water body  | 2      | <b>5</b><br>(Max = 5)   |

## 3.0 TARGETS

|     |   | Source | Value                   |
|-----|---|--------|-------------------------|
| 3.1 | <b>Distance to Surface Water:</b> 0 feet  | 2      | <b>10</b><br>(Max = 10) |
| 3.2 | <b>Population Served within 2 miles (see WARM Scoring Manual Regarding Direction ): 0</b>     | 8      | <b>0</b><br>(Max = 75)  |
| 3.3 | <b>Area Irrigated by surface water within 2 miles : 0</b>                                     | 8      | <b>0</b><br>(Max = 30)  |
| 3.4 | <b>Distance to Nearest Fishery Resource:</b> Duwamish River 0 ft.                             | 2      | <b>12</b><br>(Max = 12) |
| 3.5 | <b>Distance to, and Name(s) of, Nearest Sensitive Environment(s):</b><br>Duwamish River 0 ft. | 2      | <b>12</b><br>(Max = 12) |

#### 4.0 RELEASE

**Explain Basis:** Documented release to catch basins and riverbank sediments.

Source:2

**Value: 5**  
(Max = 5)

**WORKSHEET 4**  
AIR ROUTE

**1.0 SUBSTANCE CHARACTERISTICS**

1.1. Introduction (WARM Scoring Manual) – Please review before scoring

| <b>1.2 Human Toxicity</b> |          |                                   |       |                                      |       |                              |       |                 |     |       |
|---------------------------|----------|-----------------------------------|-------|--------------------------------------|-------|------------------------------|-------|-----------------|-----|-------|
| Substance                 |          | Air Standard (µg/m <sup>3</sup> ) | Value | Acute Toxicity (mg/ m <sup>3</sup> ) | Value | Chronic Toxicity (mg/kg/day) | Value | Carcinogenicity |     | Value |
|                           |          |                                   |       |                                      |       |                              |       | WOE             | PF* |       |
| 1                         | Arsenic  | 0.00023                           | 10    | ND                                   | -     | ND                           | -     | A               | 50  | 9     |
| 2                         | PCBs     | ND                                | -     | ND                                   | -     | ND                           | -     | B2              | -   | -     |
| 3                         | Lead     | 0.5                               | 10    | ND                                   | -     | ND                           | -     | ND              | -   | -     |
| 4                         | TPH-Dx   | 166.5                             | 4     | ND                                   | -     | ND                           | -     | ND              | -   | -     |
| 5                         | Mercury  | 0.3                               | 10    | ND                                   | -     | 8.5E-05                      | 8     | ND              | -   | -     |
| 6                         | Cadmium  | 0.00056                           | 10    | 25                                   | 10    | ND                           | -     | B1              | 6.1 | 6     |
| 7                         | Chromium | 1.7                               | 9     | ND                                   | -     | 5.7E-07                      | 10    | ND              | -   | -     |
| 8                         | cPAHs    | 0.0006                            | 10    | ND                                   | -     | ND                           | -     | B2              | -   | -     |

\* Potency Factor

Source:2

**Highest Value: 10**

(Max = 10)

**Plus 2 Bonus Points +2**

**Final Toxicity Value: 12**

(Max = 12)

| <b>1.3 Mobility (Use numbers to refer to above listed substances)</b> |         |                                   |             |                 |
|---|---------|-----------------------------------|-------------|-----------------|
| <b>1.3.1 Gaseous Mobility</b>   |         | <b>1.3.2 Particulate Mobility</b> |             |                 |
| Vapor Pressure(s) (mmHg)  |         | Soil Type                         | Erodibility | Climatic Factor |
| 1-Arsenic   |         | Sandy Loam                        | 86          | 1-10            |
| 2-PCBs  |         |                                   |             |                 |
| 3-Lead  |         |                                   |             |                 |
| 4-TPH-Dx  | Value=3 |                                   |             |                 |
| 5-Mercury   |         |                                   |             |                 |
| 6-Cadmium   |         |                                   |             |                 |
| 7-Chromium  |         |                                   |             |                 |



|         |  |  |  |  |
|---------|--|--|--|--|
| 8-cPAHs |  |  |  |  |
|---------|--|--|--|--|

Source:1

**Value: 3**  
(Max = 4)

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

**Final Matrix Value: 18**  
(Max = 24)

| 1.5 Environmental Toxicity/Mobility |           |  |             |                 |       |              |
|-------------------------------------|-----------|--|-------------|-----------------|-------|--------------|
|                                     | Substance | Non-human Mammalian Inhalation Toxicity (mg/m <sup>3</sup> ) | Acute Value | Mobility (mmHg) | Value | Matrix Value |
| 1                                   | Arsenic   | ND   | -           |                 | -     |              |
| 2                                   | PCBs      | ND   | -           |                 | -     |              |
| 3                                   | Lead      | ND   | -           |                 | -     |              |
| 4                                   | TPH-Dx    | ND   | -           |                 | -     |              |
| 5                                   | Mercury   | ND   | -           |                 | -     |              |
| 6                                   | Cadmium   | 25 (rat)   | 10          | 0.0E+00         | 1     | 5            |
| 7                                   | Chromium  | ND   | -           |                 | -     |              |
| 8                                   | cPAHs     | ND   | -           |                 | -     |              |

Highest Environmental Toxicity/Mobility Matrix Value (from Table A-7) = **Final Matrix Value: 5**  
(Max = 24)

| 1.6 Substance Quantity                               |  |
|--|--|
| <b>Explain Basis:</b> Unknown, use default value = 1 | Source:2<br><b>Value: <u>1</u></b><br>(Max = 10) |

## 2.0 MIGRATION POTENTIAL

|     |  | Source | Value                   |
|-----|--|--------|-------------------------|
| 2.1 | <b>Containment:</b> Contaminated surface soil, with cover <2 ft. thick | 2      | <b>10</b><br>(Max = 10) |

### 3.0 TARGETS

|            |  | Source | Value                   |
|------------|--|--------|-------------------------|
| <b>3.1</b> | <b>Nearest Population:</b> 1404'   | 2      | <b>8</b><br>(Max = 10)  |
| <b>3.2</b> | <b>Distance to [and name(s) of] nearest sensitive environment(s):</b><br>Wetlands Park 825 ft. | 2      | <b>7</b><br>(Max = 7)   |
| <b>3.3</b> | <b>Population within 0.5 miles:</b> 894, sq rt 894=30  | 9      | <b>30</b><br>(Max = 75) |

### 4.0 RELEASE

|   |  |
|---|--|
| <b>Explain Basis:</b> No documented release to air. | Source:2<br><b>Value: 0</b><br>(Max = 5) |
|---|--|

WORKSHEET 5  
Groundwater Route

**2.0 SUBSTANCE CHARACTERISTICS**

| <b>1.2 Human Toxicity</b> |         |                                |       |                            |       |                              |       |                 |      |       |
|---------------------------|---------|--------------------------------|-------|----------------------------|-------|------------------------------|-------|-----------------|------|-------|
| Substance                 |         | Drinking Water Standard (µg/L) | Value | Acute Toxicity (mg/ kg-bw) | Value | Chronic Toxicity (mg/kg/day) | Value | Carcinogenicity |      | Value |
|                           |         |                                |       |                            |       |                              |       | WOE             | PF*  |       |
| 1                         | Arsenic | 10                             | 8     | 763                        | 5     | 0.001                        | 5     | A               | 1.75 | 7     |
| 2                         | PCBs    | 0.5                            | 10    | 1335                       | 3     | ND                           | -     | B2              | 7.7  | 6     |
| 3                         | Lead    | 5                              | 8     | ND                         | -     | 0.001                        | 10    | ND              | -    | -     |
| 4                         | TPH-Dx  | 20.0                           | 6     | 490                        | 5     | 0.004                        | 3     | ND              | -    | -     |
| 5                         | Mercury | 2.0                            | 8     | ND                         | -     | 0.0003                       | 5     | ND              | -    | -     |
| 6                         | cPAHs   | 0.2                            | 10    | 50                         | 10    | ND                           | -     | B2              | 12   | 7     |

\* Potency Factor

Source:2

**Highest Value: 10**  
(Max = 10)  
**Plus 2 Bonus Points? +2**  
**Final Toxicity Value: 12**  
(Max = 12)

| <b>1.2 Mobility (use numbers to refer to above listed substances)</b> |                      |
|---|----------------------|
| Cations/Anions [Coefficient of Aqueous Migration (K)]                 | OR Solubility (mg/L) |
| 1= Value=3  | 1=                   |
| 2=  | 2=                   |
| 3=  | 3=                   |
| 4=  | 4=                   |
| 5= Value=3  | 5=                   |
| 6=  | 6=                   |

Source 1  
**Value: 3**  
(Max = 3)

|  |  |
|--|--|
| <b>1.3 Substance Quantity (volume):</b>              |  |
| <b>Explain basis:</b> Unknown quantity, default to 1 | <b>Source:2</b><br><b>Value: 1</b><br>(Max=10) |

### 3.0 MIGRATION POTENTIAL

|            |   | <b>Source</b> | <b>Value</b>            |
|------------|---|---------------|-------------------------|
| <b>2.1</b> | <b>Containment (explain basis):</b> Spill/discharge to soil | 2             | <b>10</b><br>(Max = 10) |
| <b>2.2</b> | <b>Net precipitation:</b> 24.5"-5.2" = 19.2"                | 5             | <b>2</b><br>(Max = 5)   |
| <b>2.3</b> | <b>Subsurface hydraulic conductivity:</b> sandy silt        | 2             | <b>3</b><br>(Max = 4)   |
| <b>2.4</b> | <b>Vertical depth to groundwater:</b> 5 feet                | 2             | <b>8</b><br>(Max = 8)   |

### 4.0 TARGETS

|            |  | <b>Source</b> | <b>Value</b>            |
|------------|--|---------------|-------------------------|
| <b>3.1</b> | <b>Groundwater usage:</b> Not usable   | 8             | <b>1</b><br>(Max = 10)  |
| <b>3.2</b> | <b>Distance to nearest drinking water well:</b> >10,000 feet   | 8             | <b>0</b><br>(Max = 5)   |
| <b>3.3</b> | <b>Population served within 2 miles:</b> $\sqrt{\text{pop.}} = \sqrt{0} = 0$   | 9             | <b>0</b><br>(Max = 100) |
| <b>3.4</b> | <b>Area irrigated by (groundwater) wells within 2 miles:</b><br>$(0.75) * \sqrt{\# \text{ acres}} = 0.75 * \sqrt{0} = 0$ | 6             | <b>0</b><br>(Max = 50)  |

### 5.0 RELEASE

|  |  | <b>Source</b> | <b>Value</b>          |
|--|--|---------------|-----------------------|
|  | <b>Explain basis for scoring a release to groundwater:</b> Documented release to groundwater | 2             | <b>5</b><br>(Max = 5) |

## SOURCES USED IN SCORING

1. Washington ranking Method Toxicological Data-Base
2. Remedial Investigation Report: Gilmur/Hale Family Trust, 6365 First Ave. S., Seattle, WA. Pacific Crest Environmental, LLC, May 11, 2009.
3. Site Hazard Assessment, PHSKC, 12/10
4. National Weather Service Data
5. Washington State Department of Health Public Water Supply Listing
6. Washington State Water Use Data
7. King County GIS Center Data
8. 2000 Census Data, King County GIS Center
9. Washington Department of Ecology, Warm Scoring Manual