CSID 183

WORKSHEET 1
Summary Score Sheet

**SITE INFORMATION:**

Name: **Blaine Shipyard**
Address: **9088 Shipyard Lane**
City: **Blaine** County: **Whatcom County** State: **WA** Zip: **98230**
Section/Township/Range: **S07/ T40N/ R01E**
Latitude: **48° 58' 20.3" N** Longitude: **122° 43' 56.8" W**

Facility Site ID #: **1579941**

*Site scored/ranked for the August 2006 update.*

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

This site was entered in the ISIS database on 2/2/2004 and is awaiting SHA. Blaine Shipyard is located at 9088 Shipyard Lane, Blaine, WA 98230. Tax Parcel No. 400107 397291.

Blaine Shipyard began operating in the early 1900's as a ship builder for WW 1. Ship repair occurred at the site for many years following. The site was referred to as the Drayton Harbor Shipyard Co. in 1986. The current owner Linda Dadey has owned the site for 10 years. She can be contacted at 8376 110th Street, Delta, BC, Canada V4C 4J6.

The site is located on the waterfront at the mouth of Dakota Creek where the creek enters Drayton Harbor in Blaine, WA. The historical boat building, repair and painting activities at the site would indicate a high likelihood of soil and/or sediment contamination by heavy metals.

A Washington Department of Ecology (Ecology) Memorandum, dated December 4, 1986, from Will Kendra to Dave Nunnallee documents previous environmental investigations in the vicinity of the subject property. In August of 1986, Ecology WQ Investigations Section conducted an investigation of Dakota Creek for Cadmium contamination. Water and sediment sampling occurred at the mouth of Dakota Creek, near the subject property. A grab sample of water was collected from the creek surface for cadmium and hardness. The water sample results indicated a cadmium concentration of 12.1 ug/L in the creek. The memorandum also referenced a grab water sample collected from the same site the previous winter. The result of that sample was cadmium at a concentration of 25 ug/L. These results apparently exceeded the EPA (1986) standard criteria for cadmium.

A mid-intertidal sediment sample was collected by Ecology from a 6-point composite of the upper 2 cm of the exposed tideflat. The intertidal sediment sample had a total cadmium content of 400 ug/Kg dry weight. This concentration is below the MTCA Method A clean up standard for soil.

Mindy Miller of the Whatcom County Health Department (WCHD) conducted an initial investigation (II) at the site on November 16, 2003, in response to ERTS 537096. The ERTS was initiated by Mary O'Herron of the Ecology Bellingham Field Office in response to information

about a planned demolition of condemned buildings on the site, and the awareness of the potential contamination of the site.

During the II, WCHD observed potentially contaminated soils that were exposed under the building slated for demolition. Mindy indicated that the soils appeared to contain sandblast grit. A restriction placed on the demolition project included covering approximately 2700 square feet of exposed soil with impermeable material immediately following the demolition. Photos and documents from the II visit did not indicate that the buildings on site contained hazardous chemicals.

On May 9, 2006 Bill Angel of WCHD conducted a site inspection and observed that the area of exposed soil located where the building, on the western portion of the property, had been removed was partially covered with plastic sheeting. The soil beneath the plastic appeared normal, though the cover material prevented adequate observation under natural light. Areas where the ship conveyance rail tracks are located appeared to contain discolored soil/sediment. The marine/creek sediment in the tideflat area was dark grey at a depth of approximately 6 cm, likely due to regular anaerobic condition in the intertidal zone.

An exposed basement area supported the remaining building on the southern portion of the site, 150 feet away from the shoreline. The basement/storage area was filled with an estimated 1500 pounds of various hazardous wastes common to the boat repair/painting industry. Some of the containers were leaking their contents onto the floor of the room. The chemicals included paints containing cooper, Muriatic acids, petroleum based sealants and others.

On May 25, 2006, Bill Angel of WCHD and Michael Spencer of Ecology HQ TCP performed a sampling event at the Blaine Shipyard site. Cadmium was detected in three soil samples at concentrations above the 2 mg/kg MTCA Method A clean up standard for industrial properties. Lead was detected in a shallow groundwater sample at a concentration above the 15 ug/l MTCA Method A ground water clean up standard for lead. Arsenic was detected in the shallow groundwater sample at a concentration above the 5 ug/l MTCA Method A ground water clean up standard for arsenic. The tables below describe the results and locations of samples.

**Table 1: Soil Samples**

| Sample | Matrix | Type | Location | Priority pollutant metals | | Semi-volatile organic Compounds |
|---|---|---|---|---|---|---|
| | | | | Cadmium (2.0 mg/kg) | Lead (250 mg/kg) | |
| BS-1 | Soil | 5-point Composite | West side soil covered with plastic sheeting | **3.13** | 64.9 | No exceedence (NE) |
| BS-2 | Soil | 4-point composite | West side grass covered soil nearer to creek | **2.66** | 128 | NE |
| BS-3 | Soil | 4-point composite | Soil from a ship dry docking rail track | 1.75 | 47.5 | NE |
| BS-5 | Soil | Grab | Soil from the surface water drain outfall | **5.95** | 102 | Not analyzed |

Note: Source, 12

**Table 2: Water Sample**

| Sample | Matrix | Type | Location | Priority pollutant metals | | | Semi-volatile organic Compounds |
|---|---|---|---|---|---|---|---|
| | | | | Cadmium (5 ug/L) | Lead (15 ug/L) | Arsenic (5 ug/L) | |
| BS-6 | Ground Water | Grab | Ground water seep in to soil sampling hole in the ship dry dock rail track area | 0.0034 mg/L 3.4 ug/L | 0.135 mg/L **135 ug/L** | 0.020 mg/L **20 ug/L** | Not analyzed |

Note: Source, 12

**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):**

The investigation did not include sampling for tri-butyl tin. The investigation did not analyze for both Chromium VI and Chromium III. Future remediate investigation/feasibility study activities should include testing for these contaminants.

While the population served by drinking water wells within 2 miles of the site is 11554, the site poses no threat to the water quality in those wells, since they are upgradient of the site.

**ROUTE SCORES:**

Surface Water/Human Health: **10.3**
Air/Human Health: **5.9**
Groundwater/Human Health: **46.0**
Surface Water/Environmental: **23.4**
Air/Environmental: **16.2**

**OVERALL RANK: 3**

## WORKSHEET 2
Route Documentation

1. **SURFACE WATER ROUTE**

   a. List those substances to be considered for scoring: Source: 1

   **Cadmium**

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

   **Analytical results from soil sampling indicate the presence of this hazardous substance at levels, which exceed the current Method A cleanup levels.**

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

   **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: 1

   **Cadmium**

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

   **Analytical results from soil sampling indicate the presence of this hazardous substance at levels, which exceed the current Method A cleanup levels.**

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

   **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: 1

   **Cadmium, lead and arsenic**

   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 the current Method A cleanup levels.**

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

**Surface and subsurface soils, groundwater, surface water**

c. Explain basis for choice of unit to be used 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 | Cadmium | 5 | 8 | 225 (rat) | 5 | 0.0005 | 5 | ND | ND | ND |
| 2 | | | | | | | | | | |

***Potency Factor*

Source: 1, 2

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

**Plus 2 Bonus Points? 0**

**Final Toxicity Value: 8**
(Max = 12)

### 1.2 Environmental Toxicity ( ) Fresh water (X) Marine

| | Substance | Acute Water Quality Criteria | | Non-Human Mammalian Acute Toxicity | |
|---|---|---|---|---|---|
| | | (µg/L) | Value | (mg/kg) | Value |
| 1 | Cadmium | 43 | 6 | -- | -- |
| 2 | | | | | |

Source: 1, 2

**Highest Value: 6**
(Max = 10)

### 1.3 Substance Quantity (areal extent)

**Explain Basis:** Unknown, use default value of 1

Source: 3, 8

**Value: 1**
(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).<br><br>**Explain basis:** A portion of the site is covered with weathered and torn plastic sheeting. Water entering the covered soil area and the uncovered areas from above and from surface run on could flow to surface water. 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 silt loam, and concrete drained to surface water | 3, 10 | **3** (Max = 7) |
| **2.3** | **Total Annual Precipitation:** average annual precipitation for Blaine, WA = 40.69 in | 9 | **3** (Max = 5) |
| **2.4** | **Max 2yr/24hr Precipitation:** 2.5 inches | 3 | **3** (Max = 6) |
| **2.5** | **Flood Plain:** in 100 year flood plain WC PDS CAO MAP | 10 | **2** (Max = 2) |
| **2.6** | **Terrain Slope:** 10% | 3, 11 | **5** (Max = 5) |

## 3.0 TARGETS

| | | Source | Value |
|---|---|---|---|
| **3.1** | **Distance to Surface Water:** 0 ft | 6 | **10** (Max = 10) |
| **3.2** | **Population Served within 2 miles (see WARM Scoring Manual Regarding Direction ):** $\sqrt{0} = 0$ | 3, 6 | **0** (Max = 75) |
| **3.3** | **Area Irrigated by surface water within 2 miles : (0.75)*$\sqrt{}$ # acres =** $0.75 * \sqrt{0} = 0$ | 3, 6 | **0** (Max = 30) |
| **3.4** | **Distance to Nearest Fishery Resource:** 0 feet | 3, 6 | **12** (Max = 12) |
| **3.5** | **Distance to, and Name(s) of, Nearest Sensitive Environment(s):** 0 feet | 3, 6 | **12** (Max = 12) |

## 4.0 RELEASE

| | |
|---|---|
| **Explain Basis:** Not documented | Source: 1, 3<br>**Value: 0**<br>(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 | | Value |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | WOE | PF* | |
| 1 | Cadmium | 0.00056 | 10 | 25 (LC50 rat) | 10 | ND | -- | B1 | 6.1 | 6 |
| 2 | | | | | | | | | | |

* *Potency Factor*

Source: 1, 2, 3

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

**Plus 2 Bonus Points? 0**

**Final Toxicity Value: 10**
(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 | Cadmium | 1 | Silt loam | 47 | 1-10 |

Source: NA

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

Source: 3, 11

**Value: 1**
(Max = 4)

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

**Final Matrix Value: 5**
(Max = 24)

**1.5 Environmental Toxicity/Mobility**

| | Substance | Non-human Mammalian Inhalation Toxicity ($mg/m^3$) | Acute Value | Mobility (particulate) | Value | Matrix Value |
|---|---|---|---|---|---|---|
| 1 | Cadmium | 25 | 10 | 1 | 1 | 5 |
| 2 | | | | | | |

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

| 1.6 Substance Quantity (areal extent) | |
|---|---|
| **Explain Basis:** ~ Unknown, use default value of 1 | Source: 3, 8<br>**Value: 1**<br>(Max = 10) |

## 2.0 MIGRATION POTENTIAL

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

## 3.0 TARGETS

| | | Source | Value |
|---|---|---|---|
| 3.1 | **Nearest Population:** <1000 feet to residence | 3, 8 | **10**<br>(Max = 10) |
| 3.2 | **Distance to [and name(s) of] nearest sensitive environment(s) [fisheries excluded]:** estuaries/ wetlands | 13 | **7**<br>(Max = 7) |
| 3.3 | **Population served within 0.5 miles: √ pop.** = 150 homes * 3 = 450 pop<br>√216 = 21.2 | 3, 6 | **21**<br>(Max = 75) |

## 4.0 RELEASE

| | |
|---|---|
| **Explain Basis for scoring a release to air:** Not documented | Source: 3, 7<br>**Value: 0**<br>(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 | Cadmium | 5 | 8 | 225 (LD50 rat) | 5 | 0.0005 | 5 | ND | ND | ND |
| 2 | Lead | 5 | 8 | ND | -- | 0.001 | 5 | ND | ND | ND |
| 3 | Arsenic | 10 | 8 | 763 (LD50 rat) | 5 | 0.001 | 5 | A | 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 Mobility (use numbers to refer to above listed substances)**

| Cations/Anions [Coefficient of Aqueous Migration (K)] OR | Solubility (mg/L) |
|---|---|
| 1= Cadmium, K > 1.0 = 3 | 1= |
| 2= Lead, K0.1 to 1.0 = 2 | 2= |
| 3= Arsenic, K > 1.0 = 3) | 3 = |

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

**1.3 Substance Quantity (volume):**

| | |
|---|---|
| **Explain basis:** Unknown, use default value of 1 | Source: 1, 3<br>**Value: 1**<br>(Max=10) |

## 2.0 MIGRATION POTENTIAL

| | | Source | Value |
|---|---|---|---|
| 2.1 | **Containment (explain basis):** While a portion of the site is capped (boat ramps, buildings, etc), soil samples were collected from only uncapped areas (i.e. in bare soil or beneath grass) at a depth of zero to six inches. | 3 | **10** (Max = 10) |
| 2.2 | **Net precipitation:** 40.69" – 13" = 27.69" | 9 | **3** (Max = 5) |
| 2.3 | **Subsurface hydraulic conductivity:** the site consists of silty loam | 10 | **3** (Max = 4) |
| 2.4 | **Vertical depth to groundwater:** water well reports nearby indicate groundwater is likely between less than 25 feet below ground surface | 3, 5 | **8** (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:** ~6,676 **feet** | 3, 5 | **1** (Max = 5) |
| 3.3 | **Population served within 2 miles: √ pop. =** >18, **√18=4.24** | 3, 10 | **4** (Max = 100) |
| 3.4 | **Area irrigated by (groundwater) wells within 2 miles: (0.75)*√# acres =** 0.75 * √138 = 8.8 | 3, 6 | **9** (Max = 50) |

## 4.0 RELEASE

| | Source | Value |
|---|---|---|
| **Explain basis for scoring a release to groundwater:** Documented in the sampling results, lead and arsenic observed above MTCA clean up standards. | 1, 3, 8 | **5** (Max = 5) |

## SOURCES USED IN SCORING


1. Analytical results of soil sampling conducted on May 25, 2006 by the Whatcom County Health Department
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)
7. Washington State Department of Health, Office of Drinking Water Sentry website printout for public water supplies
8. Blaine Shipyard Site Hazard Assessment file, Whatcom County Health Department records
9. Western Regional Climate Center's Historical Climate Information

10. Goldin, Alan. PhD. Soil Survey of Whatcom County Area, Washington. United States Department of Agriculture, Soil Conservation Service, 1985.
11. Washington State Department of Health, Office of Drinking Water, Sentry Internet Home Page, http://www4.doh.wa.gov/sentryinternet/Intro.aspx
12. Whatcom County Planning & Development, CAO (Frequently Flooded Areas) 2/2006.
13. Whatcom County Planning & Development, CAO (Wetland Areas) 2/2006.
14. Wildflower Productions, TOPO! Interactive Maps On CD-Rom, San Francisco, CA, 1998.
15. Private Water Well Information Layer, ArcExplorer Mapping Application, Whatcom County Health Department, updated June 2005.