

# SITE HAZARD ASSESSMENT

## Worksheet 1

### Summary Score Sheet

**SITE INFORMATION:**

South Park Marina  
 8604 Dallas Avenue S  
 Seattle, King County, WA 98108

Cleanup Site ID: 2858  
 Facility/Site ID: 44653368

Section:	33	Latitude:	47.52689
Township:	24N	Longitude:	-122.31228
Range:	4E	Tax/Parcel ID:	0001600001

*Site Scored/ranked for the February 2015 Hazardous Sites List Publication*

**SITE DESCRIPTION:**

The South Park Marina site (Site) is a former A&B Barrel Company located in Seattle, King County, Washington. The 1.96-acre property is located adjacent to the Duwamish River, and zoned for industrial (I) use.

Adjacent properties include single family residences to the south, the Duwamish River to the north, and a Port of Seattle property and warehouse to the southeast (Malarkey Asphalt/Terminal 117, Cleanup Site ID (CSID) 1385). To the west, across Dallas Avenue South, is a property used for boat storage. The South Park Marina is composed of several adjacent tax parcels, including parcels 2185600070, 2185600025, and 0001600001. Parcel 0001600001 is the parcel associated with CSID 2858.

The Site is currently operated as a marina by South Park Marina, LTD Partner.

Current activities conducted at the Site include moorage, washing and maintenance of boats. The facility has a National Pollutant Discharge Elimination System (NPDES) Boatyard General Permit (permit number WAG 030045), allowing treated discharge with general prohibitions (e.g. oil and grease) and limitations on pH and concentrations of copper, zinc, and lead.

The Site is located on the north side of Dallas Avenue South, between 16th Avenue South to the west and 17th Avenue South to the east. The Site is located along the west bank of the Duwamish River. Two other state cleanup sites, Basin Oil Dallas Ave (CSID 1844) and Basin Oil Drum Storage 17th Ave S (CSID 4789), are located approximately one block south of the Site.

**SITE BACKGROUND:**

A summary of prior operations/tenants at the subject property is presented below.

<u>From</u>	<u>To</u>	<u>Operator/Tenant</u>	<u>Activity</u>
1946	1961	A&B Barrel Company	Reconditioning and painting of used barrels and drums
1980	1981	North Star Trading Company (tenant)	
1985	1999	Evergreen Boat Transport (tenant)	
1995	1999	Dekker Engineering (tenant)	
1970	2014	South Park Marina	Boat marina and maintenance facility

**SITE CONTAMINATION:**

In 2007 the South Park Marina site was reported to Washington State Department of Ecology (Ecology) and placed on the Confirmed and Suspected Contaminated Sites (CSCSL) list with ID number 2858.

The Site was identified during Lower Duwamish Waterway (LDW) source control investigation activities as part of

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the Early Action Area 5 focus area.

A&B Barrel company occupied the Site until the mid-1950's. During this time, waste liquid containing oil, grease, and sodium hydroxide was reportedly discharged to a small pond located onsite. The pond reportedly discharged to the Duwamish River. Barrels were also stored onsite in the vicinity of the pond. Analysis of pond waste in 1955 reportedly identified sodium hydroxide at a concentration of 940 ppm. Based on historic aerial imagery, the pond likely operated between the mid-1950's and 1961.

One steel underground storage tank (UST) of unknown size and location (UST ID 853) was reportedly removed from the Site in 1996. It was originally installed in 1964.

Terminal 117, located adjacent to southeast property line of the South Park Marina, is a former asphalt manufacturing site. Until 1993, site activities at Terminal 117 included the use of polychlorinated biphenyl (PCB) containing oils. Terminal 117 is currently undergoing remediation.

Soil samples collected along the Terminal 117 and South Park Marina property line in 2004 and 2006 contained detectable concentrations of PCBs. In 2004, sample SB-13, collected at a depth of 0 to 1.5 feet along the Terminal 117/South Park Marina boundary, contained total PCBs at a concentration of 5.0 milligrams per kilogram (mg/kg). In 2006, soil samples from the southeastern corner of the Site contained concentrations of PCBs ranging from 0.082 to 3.2 mg/kg at a sampling depth of 0 to 1 foot, and PCBs at a concentration of 0.59 mg/kg between 2.5 and 4 feet below ground surface (bgs).

Visual evidence of oil spills on concrete was identified during a 2005 stormwater compliance inspection conducted by Ecology. Four catch basins are located in the boatyard, and discharge to the storm drain. One catch basin is located in close proximity to a wash pad, and the potential for improper discharge of wash water to the storm drain was noted in the inspection report. During 2007, discharge monitoring reports reported concentrations of copper above benchmark values for stormwater discharge. Oil and grease concentrations were also reportedly above benchmark values during April and May 2006.

#### **PAST REMEDIATION ACTIVITIES:**

A&B Barrel Company vacated the Site in 1961. The A&B Barrel Company building was removed, the area was regraded, and the discharge pond was filled. No information is available about the fill material used.

As part of the source control for the Lower Duwamish Waterway, Science Applications International Corporation (SAIC) performed additional site characterization activities during 2007 and 2008. Sixteen soil borings were advanced to depths between 2.5 and 20 feet below ground surface (bgs). Soil samples were collected and analyzed for semi-volatile organic compounds (SVOCs), PCBs, hydrocarbons, chlorinated pesticides, and eight metals. Three of the soil borings were completed as groundwater monitoring wells. SAIC also conducted groundwater sampling, riverbank soil and sediment sampling, and a tidal study.

Soil samples collected in 2007 and 2008 from the former pond area (1.5 feet bgs to 7.5 feet bgs) contained concentrations of cadmium, chromium, lead, mercury, total PCBs, dichlorodiphenyltrichloroethane (DDT), gasoline, diesel, residual range organics, benzene, ethylbenzene, methylene chloride, tetrachloroethene (PCE), toluene, trichloroethene (TCE), and xylenes above Model Toxics Control Act (MTCA) Method A cleanup levels. Soils from the former pond area also contained concentrations of arsenic, aldrin, dieldrin, PCBs, and vinyl chloride above MTCA Method B cleanup levels. In the pond area, the majority of analytes present at concentrations above MTCA cleanup levels were detected in the top 6 inches of soil. One deeper sample from the pond area, at 7.5 feet bgs, contained arsenic, chromium, PCBs, gasoline, oil, residual-range organics, and aldrin at concentrations above MTCA Method A cleanup levels. Soil samples from other areas on the property had concentrations of total PCBs and residual range organics above MTCA Method A cleanup levels. Most soil samples, including riverbank samples, contained concentrations of arsenic above the MTCA Method B cleanup level (carcinogenic), but below the MTCA Method A cleanup level.

Three monitoring wells were located at the site in 2007. MW-1 is the northernmost of the three wells, and is the farthest from the former pond area. MW-3 is the closest monitoring well to the former pond. Groundwater samples collected during 2007 and 2008 contained concentrations of arsenic above MTCA Method A cleanup levels in all three monitoring wells. Dieldrin was reported at concentrations above the MTCA Method B cleanup level in groundwater samples collected from MW-3, and PCE was reported at concentrations above MTCA

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Method B (but not above MTCA Method A) in groundwater samples from MW-2 and MW-3.

In 2009, SAIC produced a sediment recontamination assessment, which modeled potential contaminant leaching and solute transport for the South Park Marina. The report concluded that although PCBs in sediments at the South Park Marina were reported at concentrations above MTCA Method A cleanup levels, the contaminants may not have been sourced from the South Park Marina, and contaminants from the South Park Marina are not expected to cause additional future sediment contamination.

#### CURRENT SITE CONDITIONS:

As of 2007, impacted groundwater and soils were present at the Site, particularly in the area of the former discharge pond. In soil samples collected elsewhere at the Site, PCBs and residual range organics have been reported at concentrations above MTCA Method A cleanup levels. Reports by SAIC suggest that while contaminated soils and groundwater are present at the Site, current site activities are unlikely to contribute further to the magnitude or extent of contamination. The Site is predominantly paved. No soil excavation has been reported to have occurred at the Site.

A tidal study conducted by SAIC concluded that groundwater elevations at the Site are influenced by tidal fluctuations in the LDW, indicating interaction between Site groundwater and surface water in the LDW. No seeps were identified along the property bank, however one seep was noted south of the Site along the bank of Terminal 117.

Cadmium, chromium, lead, mercury, total PCBs, DDT, gasoline, diesel, residual range organics, benzene, ethylbenzene, methylene chloride, PCE, toluene, TCE, and xylenes have been detected in soils at the Site at concentrations above MTCA Method A cleanup levels. Impacted soils appear to be confined to the upper 7.5 feet of soil. Arsenic has been detected in groundwater at the Site at concentrations exceeding the MTCA Method A cleanup level, and dieldrin and PCE have been detected in Site groundwater above the MTCA Method B cleanup levels.

The approximate depth to groundwater is 10.5 to 12 feet below ground surface, with groundwater flowing to the north, towards the Duwamish River (from groundwater studies by SAIC). Subsurface soils are sand and silty sand (based on soil borings).

#### SPECIAL CONSIDERATIONS:

Checked boxes indicate routes applicable for Washington Ranking Method (WARM) scoring

**Surface Water**

Site contamination is primarily present in shallow subsurface soil. The Site is paved, however due to the interaction of groundwater with the LDW, groundwater at the Site is expected to affect the surface water pathway. The Site is covered by a stormwater permit, though information is available for parameters beyond what is covered by the Site's stormwater permit.

**Air**

Volatile compounds have been identified at concentrations above MTCA Method A cleanup levels in shallow soils.

**Groundwater**

In 2007, arsenic, dieldrin, and PCE were detected in groundwater at concentrations above the respective MTCA Method A or B cleanup levels.

Other potential contaminants of concern are present in shallow subsurface soils at the Site, and may be available for transport via these pathways. However, other substances that may be present and were not individually listed would not result in a change to the Human Health or Environmental Toxicity values on worksheets 4 through 6.

#### ROUTE SCORES:

Surface Water/ Human Health:	28.0	Surface Water/ Environment:	72.4
Air/ Human Health:	31.9	Air/ Environment:	1.5

**SITE HAZARD ASSESSMENT**  
**Worksheet 1**  
**Summary Score Sheet**

Groundwater/ Human Health: 43.3

**Overall Rank: 2**

**REFERENCES:**

- 1 Ecology Water Resources Explorer, accessed February 2014.  
<https://fortress.wa.gov/ecy/waterresources/map/WaterResourcesExplorer.aspx>
  - 2 King County GIS Center iMAP application, Property Information, Groundwater Program, and Sensitive Areas mapsets. Accessed February 2014.  
<http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx>
  - 3 Missouri Census Data Center, Circular Area Profiles - 2010 census data around a point location. <http://mcdc.missouri.edu/websas/caps10c.html>. Accessed February 2014.
  - 4 National Climatic Data Center 2011 Local Climatological Data for Seattle, Seattle Tacoma Airport. <http://www1.ncdc.noaa.gov/pub/orders/IPS-90B1F39F-6CFA-4A6B-AA82-5ED1FF897CCC.pdf>
  - 5 Science Applications International Corporation, 2007, Lower Duwamish Waterway South Park Marina, Site Reconnaissance Plan. June 2007.
  - 6 Science Applications International Corporation, 2007, Lower Duwamish Waterway South Park Marina, Summary of Existing Information and Identification of Data Gaps . June 2007.
  - 7 Science Applications International Corporation, 2008, Final Technical Memorandum: Transmittal of Low-Level Mercury Results, July 2008 Groundwater Sampling Round, South Park Marina Site, Seattle, Washington. December 31, 2008.
  - 8 Science Applications International Corporation, 2008, South Park Marina, Seattle, Washington, Additional Site Characterization Activities Data Report. June 2008.
  - 9 Science Applications International Corporation, 2009, Final Technical Memorandum: Lower Duwamish Waterway, South Park Marina, Sediment Recontamination Assessment. June 22, 2009.
  - 10 State of Washington Department of Ecology, 2005, Stormwater Compliance Inspection Report. June 7, 2005.
  - 11 WARM Scoring Manual
  - 12 WARM Toxicological Database
  - 13 Washington Department of Transportation 24-hour Isopluvial Maps, January 2006 update. <http://www.wsdot.wa.gov/publications/fulltext/Hydraulics/Wa24hrIspluvials.pdf>
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# SITE HAZARD ASSESSMENT

## Worksheet 2

### Route Documentation

Cleanup Site ID: 2858

South Park Marina

Facility/Site ID: 44653368

#### 1. SURFACE WATER ROUTE

**List those substances to be considered for scoring:**

Arsenic, dieldrin, PCE, PCBs, gasoline, and diesel

**Explain the basis for choice of substances to be used in scoring:**

Prior detection of arsenic, dieldrin, and PCE in groundwater above the MTCA Method A or B cleanup level; presence of PCBs, gasoline and diesel in soils (confirmed from 1.5 to 7.5 feet bgs); potential for groundwater discharge to surface water. Other potential contaminants of concern are present in shallow subsurface soils at concentrations above their respective MTCA Method A or B cleanup levels. Other substances that may be present but are not listed individually would not result in a change to the Human Health or Environmental Toxicity values.

**List those management units to be considered for scoring:**

Surface water

**Explain basis for choice of unit to be used in scoring:**

The Site is covered by a surface water permit, however groundwater is expected to discharge to surface water, and data are available for parameters beyond what is covered under the Site's stormwater permit.

#### 2. AIR ROUTE

**List those substances to be considered for scoring:**

Mercury, gasoline (benzene), ethylbenzene, methylene chloride, PCE, toluene, TCE, and xylenes

**Explain the basis for choice of substances to be used in scoring:**

Prior detections in soils above MTCA Method A cleanup levels; potential for vapor transport. Other potential contaminants of concern are present in shallow subsurface soils at concentrations above their respective MTCA Method A or B cleanup levels. Other substances that may be present but are not listed individually would not result in a change to the Human Health or Environmental Toxicity values.

**List those management units to be considered for scoring:**

Soil vapor

**Explain basis for choice of unit to be used in scoring:**

Potential for vapor transport

#### 3. GROUNDWATER ROUTE

**List those substances to be considered for scoring:**

Arsenic, dieldrin, PCE, PCBs, gasoline, and diesel

**Explain the basis for choice of substances to be used in scoring:**

Prior detection of arsenic, dieldrin, and PCE in groundwater above the MTCA Method A or B cleanup level; presence of PCBs, gasoline and diesel in soils (confirmed from 1.5 to 7.5 feet bgs). Other potential contaminants of concern are present in shallow subsurface soils at concentrations above their respective MTCA Method A or B cleanup levels. Other substances that may be present but are not listed individually would not result in a change to the Human Health or Environmental Toxicity values.

**List those management units to be considered for scoring:**

**SITE HAZARD ASSESSMENT**  
**Worksheet 2**  
**Route Documentation**

Groundwater

**Explain basis for choice of unit to be used in scoring:**

Presence in groundwater at concentrations exceeding MTCA Method A cleanup levels; potential for transport to groundwater

**Worksheet 4**  
**Surface Water Route**

CSID: 2585

Site Name: South Park Marina

**1.0 Substance Characteristics**

**1.1 Human Toxicity**

Substance	Drinking Water Standard Value	Acute Toxicity Value	Chronic Toxicity Value	Carcinogenicity Value
Arsenic	8	5	5	7
Dieldrin	X	10	8	7
PCE	8	5	3	4
Gasoline	8	3	X	5
Diesel	4	5	3	X

Highest Value 10  
 Bonus Points? 2  
 Human Health Toxicity Value

**1.2 Environmental Toxicity**

Substance	Acute Water Quality Criteria		Non-human Mammalian Acute Toxicity	
	ug/L	Value	mg/kg	Value
Arsenic	69	6	763	5
Dieldrin	0.71	10	38.3	10
PCE	10200	2	800	5
Gasoline	5100	2	3306	3
Diesel	2350	2	490	5

Environmental Toxicity Value

**1.3 Substance Quantity**

Amount: 750 square feet

Basis: Estimated extent of contaminated soils  
 from the former disposal pond

Substance Quantity Value

**2.0 Migration Potential**

**2.1 Containment**

Containment Value

Explain Basis: Groundwater is expected to impact surface water  
 (Lower Duwamish Waterway)

**2.2 Surface Soil Permeability**

Soil Permeability Value

sand and silty sand

**2.3 Total Annual Precipitation**

Total Precipitation Value

37 inches

**2.4 Max 2-yr/24-hour Precipitation**

2YR/24HR Precipitation Value

2.4 inches

**2.5 Floodplain**

Floodplain Value

Within the 100 year floodplain

**2.6 Terrain Slope**

Slope Value

Greater than 8% slope

**Worksheet 4**  
**Surface Water Route**

CSID: 2585

Site Name: South Park Marina

**3.0 Targets**

**3.1 Distance to Surface Water**

Surface Water Distance Value

Site is located along the Lower Duwamish Waterway

**3.2 Population Served within 2 miles**

Population Value

people

**3.3 Area Irrigated within 2 miles**

Irrigation Value

acres

**3.4 Distance to Nearest Fishery Resource**

Fishery Value

Site is located along the Lower Duwamish Waterway

**3.5 Distance to and Name of Nearest Sensitive Environment**

Sensitive Environment Value

Site is located along the Lower Duwamish Waterway

**4.0 Release**

Release to Surface Water Value

Explain basis for scoring a release to surface water

No confirmed release to surface water

**Pathway Scoring - Surface Water Route, Human Health Pathway**

$$SW_H = (SUB_{SH} * 40/175) * [(MIG_S * 25/24) + REL_S + (TAR_{SH} * 30/115)] / 24$$

Where:

$SUB_{SH}$  = (Human Toxicity Value + 3) \* (Containment + 1) + Substance Quantity

$MIG_S$  = Soil Permeability + Annual Precip + Rainfall Frequency + Floodplain + Slope

$REL_S$  = Release to Surface Water

$TAR_{SH}$  = Distance to Surface Water + Population Served by Surface Water + Area Irrigated

$SUB_{SH}$	171
$MIG_S$	14
$REL_S$	0
$TAR_{SH}$	10.0
$SW_H$	28.0

**Pathway Scoring - Surface Water Route, Environmental Pathway**

$$SW_E = (SUB_{SE} * 40/153) * [(MIG_S * 25/24) + REL_S + (TAR_{SE} * 30/34)] / 24$$

Where:

$SUB_{SE}$  = (Env Tox Value + 3) \* (Containment + 1) + Substance Qty

$MIG_S$  = Soil Permeability + Annual Precip + Rainfall Frequency + Floodplain + Slope

$REL_S$  = Release to Surface Water

$TAR_{SE}$  = Distance to Surface Water + Distance to Fishery + Distance to Sensitive Environment

$SUB_{SE}$	149
$MIG_S$	14
$REL_S$	0
$TAR_{SE}$	34.0
$SW_E$	72.4



**Worksheet 5**

**Air Route**

**CSID: 2858**

**Site Name: South Park Marina**

**1.0 Substance Characteristics**

**1.1 Introduction (WARM Scoring Manual) - Please Review before scoring**

**1.2 Human Toxicity**

Substance	Ambient Air Standard Value	Acute Toxicity Value	Chronic Toxicity Value	Carcinogenicity Value
Mercury	10	X	8	X
Gasoline (benzene)	10	3	X	5
Ethylbenzene	1	X	X	X
Methylene chloride	9	3	1	4
Tetrachloroethylene (PCE)	9	5	X	X
Toluene	1	X	1	X
Trichloroethylene (TCE)	10	3	X	4
Xylenes	1	3	1	X

Highest Value 10  
 Bonus Points? 2  
 Toxicity Value

**1.3 Mobility**

Gaseous Mobility	Max Value:	4
Particulate Mobility	Soil Type:	
	Erodibility:	
	Climatic Factor:	

Mobility Value

**1.4 Final Human Health Toxicity/Mobility Matrix Value**

**HH Final Matrix Value**

**1.5 Environmental Toxicity/Mobility**

Substance	Non-human Mammalian Inhalation Toxicity (mg/m3)	Acute Value	Mobility Value	Table A-7 Matrix Value
Mercury	X	X	3	X
Gasoline (benzene)	31947	3	4	6
Ethylbenzene	X	X	3	X
Methylene chloride	88000	3	4	6
Tetrachloroethylene (PCE)	4000	5	4	10
Toluene	X	X	4	X
Trichloroethylene (TCE)	15583	3	4	6
Xylenes	21714	3	3	5

Env. Final Matrix Value

**1.6 Substance Quantity**

Amount: 750 square feet

Basis: Estimated extent of contaminated soils from the former disposal pond

Substance Quantity Value

**Worksheet 5**

**Air Route**

**CSID:** 2858

**Site Name:** South Park Marina

**2.0 Migration Potential**

**2.1 Containment**

Containment Value

Explain Basis: Cover greater than 2 feet thick, but no vapor collection system present

**3.0 Targets**

**3.1 Nearest Population**

Population Distance Value

200 feet to nearest dwelling

**3.2 Distance to and name of nearest sensitive environments**

Sensitive Environment Value

2,200 feet to Duwamish Waterway Park, a municipal park

**3.3 Population within 0.5 miles**

Population Value

2,241 population

**4.0 Release**

Release to Air Value

Explain basis for scoring a release to air:

No confirmed release to air

**Pathway Scoring - Air Route, Human Health Pathway**

$$AIR_H = (SUB_{AH} * 60 / 329) * [REL_A + (TAR_{AH} * 35 / 85)] / 24$$

Where:

$$SUB_{AH} = (\text{Human toxicity} + 5) * (\text{Containment} + 1) + \text{Substance Qty}$$

REL<sub>A</sub> = Release to Air

$$TAR_{AH} = \text{Nearest Population} + \text{Population within 1/2 mile}$$

SUB <sub>AH</sub>	178
REL <sub>A</sub>	0
TAR <sub>AH</sub>	57
<b>AIR<sub>H</sub></b>	<b>31.9</b>

**Pathway Scoring - Air Route, Environmental Pathway**

$$AIR_E = (SUB_{AE} * 60 / 329) * [REL_A + (TAR_{AE} * 35 / 85)] / 24$$

Where:

$$SUB_{AE} = (\text{Environmental Toxicity Value} + 5) * (\text{Containment} + 1) + \text{Substance Qty}$$

REL<sub>A</sub> = Release to Air

$$TAR_{AE} = \text{Nearest Sensitive Environment}$$

SUB <sub>AE</sub>	94
REL <sub>A</sub>	0
TAR <sub>AE</sub>	5
<b>AIR<sub>E</sub></b>	<b>1.5</b>

**Worksheet 6**  
**Groundwater Route**

CSID: 2858

Site Name: South Park Marina

**1.0 Substance Characteristics**

**1.1 Human Toxicity**

Substance	Drinking Water Standard Value	Acute Toxicity Value	Chronic Toxicity Value	Carcinogenicity Value
Arsenic	8	5	5	7
Dieldrin	X	10	8	7
PCE	8	5	3	4
Gasoline	8	3	X	5
Diesel	4	5	3	X

Highest Value 10  
 Bonus Points? 2  
 Toxicity Value

**1.2 Mobility**

Cations/Anions Max Value:  
 Solubility Max Value: 3  
 Mobility Value

**1.3 Substance Quantity**

Amount: 83 cubic yards  
 Basis: Estimated extent of soil contamination based on former pond area (3 foot depth assumed)  
 Substance Quantity Value

**2.0 Migration Potential**

**2.1 Containment** Containment Value   
 Explain Basis: Contaminated soil

**2.2 Net Precipitation** >10 to 20 inches Net Precipitation Value

**2.3 Subsurface Hydraulic Conductivity** Conductivity Value   
 Sand and sandy silt

**2.4 Vertical Depth to Groundwater** 0 to 25 feet  
 Confirmed release: Yes Depth to Aquifer Value

**3.0 Targets**

**3.1 Groundwater Usage** Aquifer Use Value   
 Private supply, but alternate sources are available with minimum hookup requirements

**3.2 Distance to Nearest Drinking Water Well** >5,000 to 10,000 feet  
 Well Distance Value

**3.3 Population Served within 2 Miles** Population Served Value   
 9 people

**Worksheet 6**  
**Groundwater Route**

CSID: 2858

Site Name: South Park Marina

**3.4 Area Irrigated by GW Wells within 2 miles**

Area Irrigated Value

0 acres

**4.0 Release**

Release to Groundwater Value

Explain basis for scoring a release to groundwater:

Confirmed release to groundwater

**Pathway Scoring - Groundwater Route, Human Health Pathway**

$$GW_H = (SUB_{GH} * 40 / 208) * [(MIG_G * 25 / 17) + REL_G + (TAR_{GH} * 30 / 165)] / 24$$

Where:

$$SUB_{GH} = (\text{Human toxicity} + \text{mobility} + 3) * (\text{Containment} + 1) + \text{Substance Qty}$$

$$MIG_G = \text{Depth to Aquifer} + \text{Net Precip} + \text{Hydraulic Conductivity}$$

$$REL_G = \text{Release to Groundwater}$$

$$TAR_{GH} = \text{Aquifer Use} + \text{Well Distance} + \text{Population Served} + \text{Area Irrigated}$$

SUB <sub>GH</sub>	200
MIG <sub>G</sub>	14
REL <sub>G</sub>	5
TAR <sub>GH</sub>	8
<b>GW<sub>H</sub></b>	<b>43.3</b>

## Washington Ranking Method

### Route Scores Summary and Ranking Calculation Sheet

**Site Name:** South Park Marina

**CSID:** 2858

**Site Address:** 8604 Dallas Avenue South

**FSID:** 44653368

#### HUMAN HEALTH ROUTE SCORES

Enter Human Health Route Scores for all Applicable Routes:

Pathway	Route Score	Quintile Group
Surface Water	28.0	4
Air	31.9	4
Groundwater	43.3	4

H=	4
M=	4
L=	4

$$\frac{H^2 + 2M + L}{8} = \frac{16 + 8 + 4}{8} = 4$$

**Human Health  
Priority Bin Score:**  
**4**  
rounded up to next  
whole number

#### ENVIRONMENT ROUTE SCORES

Enter Environment Route Scores for all Applicable Routes:

Pathway	Route Score	Quintile Group
Surface Water	72.4	5
Air	1.5	1

H=	5
L=	1

$$\frac{H^2 + 2L}{7} = \frac{25 + 2}{7} = 4$$

**Environment  
Priority Bin Score:**  
**4**  
rounded up to next  
whole number

**Comments/Notes:**

**FINAL MATRIX  
RANKING**

**2**

#### FOR REFERENCE:

##### Final WARM Bin Ranking Matrix

Human Health Priority	Environment Priority					
	5	4	3	2	1	N/A
5	1	1	1	1	1	1
4	1	2	2	2	3	2
3	1	2	3	4	4	3
2	2	3	4	4	5	3
1	2	3	4	5	5	5
N/A	3	4	5	5	5	NFA






##### Quintile Values for Route Scores - August 2014 Values

Quintile	Human Health			Environment	
	Surface Water	Air	Ground Water	Surface Water	Air
5	>= 30.7	>= 37.3	>= 51.9	>= 49.8	>= 30.3
4	>= 22.5	>= 23.0	>= 41.0	>= 30.9	>= 23.0
3	>= 13.0	>= 14.5	>= 33.1	>= 23.2	>= 14.1
2	>= 6.8	>= 8.1	>= 23.5	>= 10.7	>= 1.6
1	<= 6.7	< 8.1	<= 23.4	<= 10.6	<= 1.5

Quintile value associated with each route score entered above



**Legend:**

-  Property location (approximate)
-  Remaining soil contamination (former discharge pond area) (approximate)
-  Former building location (approximate)
-  Monitoring well (approximate)
-  Soil sample (approximate)

**Notes:**

1. All locations are approximate, and not to scale.



**South Park Marina**  
8604 Dallas Avenue South  
Seattle, WA 98108

**Site Overview Map**

**CSID 2858**  
CSID2858.vsd