

SITE HAZARD ASSESSMENT

Worksheet 1

Summary Score Sheet

SITE INFORMATION:

Marine Lumber Service S. Monroe R-O-W
525 S. Chicago St
Seattle, King County, WA 98108

Cleanup Site ID: 12151

Facility/Site ID: 38921541

Section:	29	Latitude:	47.53133
Township:	24N	Longitude:	-122.32786
Range:	4E	Tax/Parcel ID:	7327902920, 7327902900, 7327902850, 7327902895, 7327901925

Site scored/ranked for the Hazardous Sites List Publication: August 2015

SITE DESCRIPTION:

The Marine Lumber Service S. Monroe R-O-W site (Site) is a former and current roadway and easement located in Seattle, King County, Washington. The 0.5-acre property is located approximately 1,500 feet from the Lower Duwamish Waterway (LDW), and zoned for industrial (IG2 U/65) use.

Adjacent properties are the Marine Lumber Service South Yard to the north, a warehouse building across South Monroe Street, an Alaska Logistics storage lot and office building to the west, a warehouse to the southwest and a vacant lot to the east. The South Yard is also a cleanup site identified as CSID 8993, and another cleanup site, Marine Lumber Service Plant Yard is located to the northeast (CSID 10349).

The Site is currently operated as a roadway and managed by Seattle Department of Transportation.

South Monroe Street is located to the south of the Marine Lumber Service South Yard. The roadway has a porous gravel surface and was recently disturbed in 2012 by Seattle Public Utilities (SPU) during underground utility corridor work.

The Site is located in the right-of-way, nearest the northeast corner of the intersection of 5th Avenue South and South Monroe Street in the South Park neighborhood of Seattle.

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>
	2014	Seattle Department of Transportation	South Monroe Street right-of-way

SITE CONTAMINATION:

In 2009 the Marine Lumber Service S. Monroe R-O-W site was reported to Washington State Department of Ecology (Ecology) and placed on the Confirmed and Suspected Contaminated Sites (CSCSL) list with ID number 12151.

Soil samples were collected during source control investigation activities conducted by SPU after wood preservative staining was observed on pavement on the Marine Lumber Service property at 7915 5th Ave South (the South Yard, CSID 8993) and was suspected to have run off the South Yard and onto the Site. Concentrations of arsenic in soil were present above the MTCA Method A cleanup level in the city-owned right-of-way adjacent to the Marine Lumber Service Property.

Shallow soil was sampled at multiple depths from locations adjacent to the storage yard along the shoulder on the north side of South Monroe Street. Arsenic, copper, lead, mercury, zinc, hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), phthalates, polychlorinated biphenyls (PCBs) and semi-volatile organic compounds (SVOCs) were detected at concentrations above laboratory reporting limits. Arsenic and copper concentrations in

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soil were detected up to 950 milligrams per kilogram (mg/kg) and 8,370 mg/kg, respectively.

PAST REMEDIATION ACTIVITIES:

Administrative Order DE8862 was issued in November 2011 by Ecology requiring Marine Lumber Service to address contaminated surface soils and accumulated solids on the north side of South Monroe Street. A remedial action work plan was developed in coordination with Seattle Department of Transportation. Site operational practices at the South Yard were amended prior to development of the June 2012 work plan, with treated lumber no longer stored at the South Yard, and the affected source area (CSID 8993) was pressure washed and resealed to minimize potential recontamination of the South Monroe Street right-of-way area.

Remediation activities were conducted in the South Monroe Street right-of-way in September 2012 by SPU. Soils were excavated from an approximate area of 10 feet by 100 feet to a depth up to 3 feet below ground surface (bgs), as described in the remedial action work plan prepared by Environmental Partners. Analytical results from confirmation soil samples indicate that the extent of soils impacted by arsenic and/or copper has not been fully characterized. Concentrations of arsenic and/or copper above source control evaluation screening levels or MTCA Method A or B cleanup levels extends beyond the area excavated. A remediation construction report was not available for review, however a map of pre- and post- excavation sampling locations and analytical results was emailed to Rick Thomas at Ecology by Beth Schmoyer of SPU. Reportedly, sampling location ML6 corresponds with observed oil-staining of surface materials. Near-surface soil samples collected from location ML1, adjacent to the fenceline separating this Site from the Marine Lumber Service South Yard (CSID 8993), contained concentrations of arsenic up to 980 mg/kg, copper up to 3,680 mg/kg, and zinc up to 1,770 mg/kg. The suite of analyses of post-excavation soil samples was generally limited to arsenic, copper and zinc.

CURRENT SITE CONDITIONS:

The adjacent Marine Lumber Services South Yard property (CSID 8993) appears to be a possible source of metals present in accumulated solids and shallow soils along the South Monroe Street right-of-way. Groundwater conditions near the right-of-way have not been characterized. In 2008 and 2009, SPU conducted sampling at nearby catch basins which receive runoff that may be conveyed to the LDW. SPU's findings identified concentrations of arsenic, copper, zinc, diesel and oil above source control screening levels.

Analytical results from soil sampling confirm that concentrations of arsenic and copper are present above corresponding MTCA Method A or B cleanup levels.

The approximate depth to groundwater is 10 feet below ground surface, with groundwater flowing to the northeast (assumed based on location of LDW). Subsurface soils are gravel, sand and silt (as expected based on surface conditions).

SPECIAL CONSIDERATIONS:

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

☒ **Surface Water**

Arsenic, copper and zinc may be available for transport to surface water, based on pre-remediation samples collected from nearby stormwater catch basins.

☒ **Air**

Arsenic and copper may be available for transport as airborne particulate, however dust mitigation practices and the gravel-covered surface are expected to minimize availability to the air route.

☒ **Groundwater**

Concentrations of arsenic and copper in soils are above MTCA Method A and/or B cleanup levels. Groundwater conditions have not been characterized at the site.

The source of metals appears to be located on the adjacent South Yard property (CSID 8993) and associated with leaching of ammoniacal copper zinc arsenate (ACZA) from treated lumber products and stormwater runoff. Berms, infiltration trenches and other engineering controls have been implemented in an attempt to address the conveyance of metals by surface runoff.

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ROUTE SCORES:

Surface Water/ Human Health: 10.8

Surface Water/ Environment: 28.8

Air/ Human Health: 13.1

Air/ Environment:

Groundwater/ Human Health: 26.2

Overall Rank: 4

REFERENCES:

- 1 Ecology Water Resources Explorer, accessed May 2015.
<https://fortress.wa.gov/ecy/waterresources/map/WaterResourcesExplorer.aspx>
 - 2 Environmental Partners, Inc., 2012, Remedial Action Work Plan - Marine Lumber Service South Yard. City of Seattle Right-of-Way, Northeast Corner of 5th Ave S. and S. Monroe St., Seattle, Washington 98108. 29 June. Prepared for Marine Lumber Service, Inc.
 - 3 King County GIS Center iMAP application, Property Information, Groundwater Program, and Sensitive Areas mapsets. Accessed October 2014.
<http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx>
 - 4 Missouri Census Data Center, Circular Area Profiles - 2010 census data around a point location. <http://mcdc.missouri.edu/websas/caps10c.html>. Accessed October 2014.
 - 5 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>
 - 6 SAIC, 2012, Lower Duwamish Waterway RM 2.2 to 3.4 West Riverside Drive Summary of Existing Information and Identification of Data Gaps. April.
 - 7 Seattle Department of Transportation, 2012, Letter to Donna Musa, Ecology, regarding the identification of contaminant concentrations above MTCA in the South Monroe Street Right of Way. 21 August.
 - 8 Seattle Public Utilities, 2014, Email from Beth Schmoyer (SPU) to Richard Thomas and Rachel McCrae (Ecology) regarding partial cleanup at Marine Lumber/S Monroe St Site. 15 December.
 - 9 WARM Scoring Manual
 - 10 WARM Toxicological Database
 - 11 Washington Department of Ecology, 2011, Amendment to Immediate Action Order No. 7247. 15 November.
 - 12 Washington Department of Transportation 24-hour Isopluvial Maps, January 2006 update.
<http://www.wsdot.wa.gov/publications/fulltext/Hydraulics/Wa24hrIsopluvials.pdf>
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SITE HAZARD ASSESSMENT

Worksheet 2

Route Documentation

Cleanup Site ID: 12151

Marine Lumber Service S. Monroe R-O-W

Facility/Site ID: 38921541

1. SURFACE WATER ROUTE

List those substances to be considered for scoring:

Arsenic, copper, zinc, diesel and oil

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

Substances are confirmed to be present in catch basin solids and/or surface soil samples at concentrations exceeding source control screening level concentrations.

List those management units to be considered for scoring:

Surface water runoff/stormwater

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

A confirmed release to surface soils and catch basins has occurred.

2. AIR ROUTE

List those substances to be considered for scoring:

Arsenic and copper

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

Substances are confirmed present in surface soils.

List those management units to be considered for scoring:

Particulate/dust transport

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

Substances may be available for transport as airborne particulate.

3. GROUNDWATER ROUTE

List those substances to be considered for scoring:

Arsenic and copper

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

Substances are confirmed present in shallow soils at concentrations above MTCA Method A or B cleanup levels.

List those management units to be considered for scoring:

Shallow groundwater

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

A release to groundwater by infiltration is suspected.

Worksheet 4
Surface Water Route

CSID: 12151

Site Name: Marine Lumber Service S Monroe R-O-W

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
copper	2	X	1	X
zinc	2	X	1	X
diesel and oil	X	5	X	X

Highest Value 8
 Bonus Points? +2
 Human Health Toxicity Value **10**

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
copper	2.9	8	X	X
zinc	95	6	X	X
diesel and oil	X	X	490	5

Assumes marine water quality criteria

Environmental Toxicity Value **8**

1.3 Substance Quantity

Amount: Approximately 1,000 square feet

Basis: Estimated based on extent of remediated area. Full extent of surface impacts
 has not been characterized.

Substance Quantity Value **6**

2.0 Migration Potential

2.1 Containment

Containment Value **4**

Explain Basis: Release to surface with some partially effective runoff control

2.2 Surface Soil Permeability

Soil Permeability Value **1**

gravel

2.3 Total Annual Precipitation

Total Precipitation Value **3**

37 inches

2.4 Max 2-yr/24-hour Precipitation

2YR/24HR Precipitation Value **3**

2.4 inches

2.5 Floodplain

Floodplain Value **0**

Not in floodplain

2.6 Terrain Slope

Slope Value **1**

<2% grade

Worksheet 4
Surface Water Route

CSID: 12151

Site Name: Marine Lumber Service S Monroe R-O-W

3.0 Targets

3.1 Distance to Surface Water

Surface Water Distance Value

1,600 feet to LDW, but less than 200 feet to Combined Sewer Outfall manhole

3.2 Population Served within 2 miles

Population Value

0 people

3.3 Area Irrigated within 2 miles

Irrigation Value

0 acres

3.4 Distance to Nearest Fishery Resource

Fishery Value

200 feet to LDW

3.5 Distance to and Name of Nearest Sensitive Environment

Sensitive Environment Value

200 feet to LDW

4.0 Release

Release to Surface Water Value

Explain basis for scoring a release to surface water

Confirmed release (based on catch basin solids results)

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}	71
MIG_S	8
REL_S	5
TAR_{SH}	10.0
SW_H	10.8

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}	61
MIG_S	8
REL_S	5
TAR_{SE}	34.0
SW_E	28.8

Worksheet 5**Air Route**

CSID: 12151

Site Name: Marine Lumber Service S Monroe R-O-W

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
arsenic	10	X	X	9
copper	9	X	X	X
zinc	X	X	X	X

Highest Value 10

Bonus Points? +2

Toxicity Value **12****1.3 Mobility**

Gaseous Mobility	Max Value:
Particulate Mobility	Soil Type: gravelly sand
	Erodibility: 22
	Climatic Factor: 1-10

Mobility Value **0****1.4 Final Human Health Toxicity/Mobility Matrix Value**HH Final Matrix Value **3****1.5 Environmental Toxicity/Mobility**

Substance	Non-human Mammalian Inhalation Toxicity (mg/m3)	Acute Value	Mobility Value	Table A-7 Matrix Value
arsenic	X	X	X	X
copper	X	X	X	X
zinc	X	X	X	X

Env. Final Matrix Value **not scored****1.6 Substance Quantity**

Amount: Approximately 1,000 square feet of affected surface/near surface soil

Basis: Estimated based on known area remediated; extent has not been characterized

Substance Quantity Value **4**

Worksheet 5**Air Route**

CSID: 12151

Site Name: Marine Lumber Service S Monroe R-O-W

2.0 Migration Potential**2.1 Containment**Containment Value

Explain Basis: No cover, discharge occurred directly to surface

3.0 Targets**3.1 Nearest Population**Population Distance Value

<800 feet to nearest residential properties

3.2 Distance to and name of nearest sensitive environmentsSensitive Environment Value

1,900 feet to Duwamish Waterway Park

3.3 Population within 0.5 milesPopulation Value

1259 population

4.0 ReleaseRelease to Air Value

Explain basis for scoring a release to air:

No confirmed release

Pathway Scoring - Air Route, Human Health Pathway

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

Where:

 $SUB_{AH} = (\text{Human toxicity} + 5) * (\text{Containment} + 1) + \text{Substance Qty}$ $REL_A = \text{Release to Air}$ $TAR_{AH} = \text{Nearest Population} + \text{Population within 1/2 mile}$

SUB_{AH}	92
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REL_A	0
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TAR_{AH}	45.5
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AIR_H	13.1
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Pathway Scoring - Air Route, Environmental Pathway

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

Where:

 $SUB_{AE} = (\text{Environmental Toxicity Value} + 5) * (\text{Containment} + 1) + \text{Substance Qty}$ $REL_A = \text{Release to Air}$ $TAR_{AE} = \text{Nearest Sensitive Environment}$

SUB_{AE}	#VALUE!
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REL_A	0
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TAR_{AE}	6.0
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AIR_E	Not Scored
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Worksheet 6
Groundwater Route

CSID: 12151

Site Name: Marine Lumber Service S Monroe R-O-W

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
copper	2	X	1	X
zinc	X	X	1	X

Highest Value 8

Bonus Points? 0

Toxicity Value

1.2 Mobility

Cations/Anions Max Value:

Solubility Max Value: 3

Mobility Value

1.3 Substance Quantity

Amount: Up to 100 cubic yards

Basis: Estimated volume of impacted soils remaining

Substance Quantity Value

2.0 Migration Potential

2.1 Containment

Containment Value

Explain Basis: Contaminated soil

2.2 Net Precipitation >10 - 20 inches

Net Precipitation Value

2.3 Subsurface Hydraulic Conductivity

Silty sand with gravel

Conductivity Value

2.4 Vertical Depth to Groundwater feet

Confirmed release: No

Depth to Aquifer Value

3.0 Targets

3.1 Groundwater Usage

Groundwater not used, but usable

Aquifer Use Value

3.2 Distance to Nearest Drinking Water Well feet

Well Distance Value

3.3 Population Served within 2 Miles

0 people

Population Served Value

Worksheet 6
Groundwater Route

CSID: 12151

Site Name: Marine Lumber Service S Monroe R-O-W

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:

Groundwater not characterized - confirmed impacts to shallow soil

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} = (Human toxicity + mobility + 3) * (Containment + 1) + Substance Qty

MIG_G = Depth to Aquifer + Net Precip + Hydraulic Conductivity

REL_G = Release to Groundwater

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

SUB_{GH}	156
MIG_G	14
REL_G	0
TAR_{GH}	2.0
GW_H	26.2

Washington Ranking Method

Route Scores Summary and Ranking Calculation Sheet

Site Name: Marine Lumber Service S. Monroe R-O-W

CSID: 12151

Site Address: 525 S. Chicago St

FSID: 38921541

HUMAN HEALTH ROUTE SCORES

Enter Human Health Route Scores for all Applicable Routes:

Pathway	Route Score	Quintile Group
Surface Water	10.8	2
Air	13.1	2
Groundwater	26.2	2

H=	2
M=	2
L=	2

$$\begin{array}{c} H^2 \\ 4 \end{array} + \begin{array}{c} 2M \\ 4 \end{array} + \begin{array}{c} L \\ 2 \end{array} = \frac{10}{8}$$

**Human Health
Priority Bin Score:**
2
rounded up to next
whole number

ENVIRONMENT ROUTE SCORES

Enter Environment Route Scores for all Applicable Routes:

Pathway	Route Score	Quintile Group
Surface Water	28.8	3
Air	ns	0

H=	3
L=	0

$$\begin{array}{c} H^2 \\ 9 \end{array} + \begin{array}{c} 2L \\ 0 \end{array} = \frac{9}{7}$$

**Environment
Priority Bin Score:**
2
rounded up to next
whole number

Comments/Notes:

**FINAL MATRIX
RANKING**

4

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 - February 2015 Values

Quintile	Human Health			Environment	
	Surface Water	Air	Ground Water	Surface Water	Air
5	>= 30.7	>= 37.6	>= 51.6	>= 50.9	>= 29.9
4	>= 23.1	>= 23.8	>= 40.9	>= 31.2	>= 22.5
3	>= 14.1	>= 15.5	>= 33.2	>= 23.6	>= 14.0
2	>= 7.0	>= 8.5	>= 23.5	>= 11.0	>= 1.6
1	<= 6.9	<= 8.4	<= 23.4	<= 10.9	<= 1.5

Quintile value associated with each route score entered above



Legend:

- Property location (approximate)
- Excavation area (approximate)
- Pre-excitation soil/solids sample (approximate)
- Post-excitation soil sample (approximate)

Notes:

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



**Marine Lumber Service
S Monroe R-O-W
525 South Chicago Street
Seattle, WA 98108**

Site Overview Map

CSID 12151
CSID12151.vsd