

SITE HAZARD ASSESSMENT

Worksheet 1

Summary Score Sheet

SITE INFORMATION:

King County Metro Transit S Annex
11911 East Marginal Way S
Seattle, King County, WA 98168

Cleanup Site ID: 7790

Facility/Site ID: 8422289

Section:	10	Latitude:	47.49588
Township:	23N	Longitude:	-122.28676
Range:	4E	Tax/Parcel ID:	1023049066

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

SITE DESCRIPTION:

The King County Metro Transit S Annex site (Site) is a former Metro bus parking, fueling, and maintenance garage facility located in Seattle, King County, Washington. The 16.15-acre property is located approximately 1,350 feet from the Lower Duwamish Waterway (LDW), and zoned for Manufacturing Industrial Center/Heavy Industrial (MIC/H) use.

Two streams that discharge to the LDW are located near the area where hazardous substances were released (see the Site Overview Map), including a Class 3 stream located approximately 50 feet west of the Site, and a Class 2 stream located under the Site (presumably in a culvert).

Adjacent properties include: The main Metro South Base site to the southeast [Site Identification (CSID) 7077] across East Marginal Way; general manufacturing/industrial and warehouse facilities to the north and south (properties to the north are located on the opposite side of Highway 599 from the Site); and greenbelt space and highway interchange to the west.

The Site is currently operated as a Metro bus parking, fueling, and maintenance facility by King County Transit.

Current activities performed at the property generally include: Bus parking, fueling, and maintenance; facilities maintenance; general materials storage and vehicle parking; and administration.

Parking and storage areas are generally located in the central and northern portions of the property, administrative offices are located in the southeastern portion of the property, and maintenance facilities are located in the western portion of the property.

The property area where hazardous substances associated with CSID 7790 were released (i.e., the "Site"; discussed in the following sections) is located near the southwestern portion of the maintenance building in the western portion of the property, as shown on the attached Site Overview Map.

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>
1994	2015	King County Transit	Metro maintenance and administration

SITE CONTAMINATION:

In 1995 the King County Metro Transit S Annex site was reported to Washington State Department of Ecology (Ecology) and placed on the Leaking Underground Storage Tank (LUST) list.

Four soil borings (SB-1 through SB-4) were advanced, and soil samples collected, in the vicinity of three underground storage tanks (USTs) in October 1994 (Woodward Clyde, 1995). The three USTs included one 550-gallon engine oil UST, one 10,000-gallon unleaded gasoline UST, and one 10,000-gallon UST (partitioned for gasoline and diesel), and were located south of the southwestern portion of the facility stores and

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maintenance building. AGI Technologies (1997) indicated that the USTs were installed in 1986 and were constructed of fiberglass. Groundwater samples were collected in October 1994 from four existing de-watering wells located in the UST cavity (reportedly installed at the same time as the USTs).

Soil samples from three borings (SB-1, -3, and -4) were submitted for laboratory analysis of gasoline-range total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylenes (BTEX), and lead (SB-1 only). The soil sample from boring SB-2 was submitted for analysis of undifferentiated TPH. Four dewatering well samples were submitted for analysis of diesel- and oil-range TPH, and total lead.

Undifferentiated TPH was detected in SB-2 (soil) at a concentration 8,710 mg/kg, above the MTCA Method A soil cleanup level for diesel- and oil- range petroleum hydrocarbons. No other analytes were detected in the October 1994 soil or groundwater samples at concentrations above the laboratory reporting limits.

Four additional soil borings (SB-5 through SB-8) were advanced in December 1994 (Note: SB-8 is located northeast of the facility Sotres and Maintenance Building). Three of the borings (SB-5, -7, and -8) were reportedly completed as groundwater monitoring wells (Woodward Clyde, 1995); however, the maps provided in the report show the locations as soil borings only and it is unclear if these were temporary or permanent wells. Soil and groundwater samples collected from each of the borings, and were analyzed for diesel- and oil-range TPH.

Diesel-range TPH was detected in soil samples from SB-5 and SB-8 at a maximum concentration of 54.7 mg/kg, below the MTCA Method A soil cleanup level. Oil-range TPH was detected in three groundwater samples at concentrations above the laboratory reporting limit [maximum concentration of 723 micrograms per liter (ug/L) at SB-7], and diesel-range TPH in two samples (maximum concentration of 550 ug/L at SB-7). The diesel- and oil-range TPH concentrations detected in groundwater sample SB-7 were above the MTCA Method A groundwater cleanup level.

PAST REMEDIATION ACTIVITIES:

The three USTs described in the previous section were removed from the Site in April 1997 (AGI Technologies, 1997). Soil samples were collected from the excavation area margins following UST removal and were analyzed for gasoline-, diesel-, and oil-range TPH and BTEX constituents. Ten soil samples were collected from the vicinity of the former 10,000-gallon diesel and gasoline USTs, and three from the vicinity of the former 550-gallon oil UST. No analytes were detected in soil samples at concentrations above the laboratory reporting limits except toluene at a concentration of 0.15 mg/kg, and total xylenes at a concentration of 0.71 mg/kg, both below the MTCA Method A soil cleanup level.

One groundwater sample was collected from dewatering well DW-4 and contained toluene (2.3 ug/L) and benzene (9.5 ug/L) at concentrations above the laboratory reporting limits. The detected benzene concentration was above the MTCA Method A groundwater cleanup level.

No additional information regarding subsequent soil sampling or groundwater monitoring was available in Ecology's Site file.

Following removal of the three USTs in 1997, one new unleaded gasoline UST was installed at the same approximate location as the previous 10,000-gallon USTs, and is listed in Ecology's UST database as "operational" with a capacity of 5,000-9,999 gallons.

CURRENT SITE CONDITIONS:

The most recent sampling data available is for the UST removal performed in April 1997. Confirmational soil samples collected following UST removal contained concentrations of toluene and xylenes above the laboratory reporting limits, but below the MTCA Method A soil cleanup levels. However, a groundwater sample collected down-gradient from the UST area in 1997 contained benzene at a concentration above the MTCA Method A groundwater cleanup level. In addition, groundwater samples collected from borings SB-6, -7, and -8 contained TPH at concentrations above the laboratory reporting limits, including diesel- and oil-range concentrations above the MTCA Method A groundwater cleanup level at SB-7.

Based on the available information, soil with TPH concentrations above MTCA Method A soil cleanup levels was excavated from the immediate vicinity of the USTs during removal, but analytical results for previous samples

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collected outside the excavation margins suggest that residual impacts to soil and groundwater remain at the Site.

The King County GIS website depicts two streams in the vicinity of the UST area at the Site. Both are generally oriented north-south and drain to the LDW either directly or via a drainage ditch located north of the site across Highway 599. A stream listed as Class 3 (most likely seasonal or intermittent) is shown adjacent to the western property margin and identified as part of the Duwamish River basin. Sections of the streambed are visible on recent aerial photographs, but it is mostly obscured by vegetation. The Class 3 stream is located down-gradient and within approximately 50 feet of the former UST area, indicating a potential for migration of soil and groundwater contaminants to surface water.

The second stream, located east of the UST area, is listed as a Class 2 Salmonid stream (unnamed) by King County and identified as an SAO (Sensitive Areas Ordinance) stream. This stream is located approximately 150 feet east and northeast of the UST area, but is not visible on recent aerial photographs and is presumably located in a culvert beneath the Site (the areas where the stream is shown are either paved or have a graded gravel surface). The Class 2 stream appears to be located up-gradient from the UST area; however, its proximity to impacted soil and groundwater indicates a potential for migration of soil and groundwater contaminants to surface water, although to a lesser degree than the Class 3 stream west of the Site.

Listings for both of these streams are provided in the Priority Habitats and Species (PHS) database maintained by the Washington Department of Fish and Wildlife. The Class 3 stream located west of the former UST area (i.e., down-gradient) is listed as a priority area for the occurrence and migration of coho and coastal cutthroat salmon, and the Class 2 stream located east of the former UST area (i.e., up-gradient) is listed as a priority area for the occurrence of coho salmon. Both streams are also listed as a priority area for the occurrence of the western pond turtle, which is also listed by the State as an endangered species.

Site contaminants include diesel- and oil-range TPH in soil and groundwater, and benzene in groundwater.

The approximate depth to groundwater is 7 feet below ground surface, with groundwater flowing to the west-northwest (based on map included in Woodward Clyde, 1995). Subsurface soils are sand, silty sand, and silt (based on boring logs and excavations).

SPECIAL CONSIDERATIONS:

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

☒ **Surface Water**

A Class 3 stream adjacent to the western property margin discharges to the LDW. The stream is located approximately 50 feet down-gradient of the former UST area, indicating a potential for contaminant transport via the surface water pathway.

☒ **Air**

Volatile compound (benzene) detected in groundwater at a concentration above the MTCA Method A cleanup level indicates a potential for contaminant transport via the air pathway.

☒ **Groundwater**

Concentrations of diesel-range TPH, oil-range TPH, and benzene were detected in groundwater samples above MTCA Method A groundwater cleanup levels.

ROUTE SCORES:

Surface Water/ Human Health: 19.5

Surface Water/ Environment: 26.4

Air/ Human Health: 23.5

Air/ Environment: 1.5

Groundwater/ Human Health: 55.2

Overall Rank: 1

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REFERENCES:

- 1 AGI Technologies, 1997, Underground Storage Tank Closure Assessment Report, Facilities Maintenance South UST Project, June 18th 1997.
 - 2 Ecology Water Resources Explorer, accessed June 2015.
<https://fortress.wa.gov/ecy/waterresources/map/WaterResourcesExplorer.aspx>
 - 3 King County GIS Center iMAP application, Property Information, Groundwater Program, and Sensitive Areas mapsets. Accessed June 2015.
<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 June 2015.
 - 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 WARM Scoring Manual
 - 7 WARM Toxicological Database
 - 8 Washington Department of Fish and Wildlife, online Priority Habitats and Species database. Accessed June 2015. <http://wdfw.wa.gov/mapping/phs/disclaimer.html>
 - 9 Washington Department of Transportation 24-hour Isopluvial Maps, January 2006 update. <http://www.wsdot.wa.gov/publications/fulltext/Hydraulics/Wa24hrIsopluvials.pdf>
 - 10 Woodward-Clyde, 1995, Pre-Construction Site Assessment Report, South Operating Base Facility Annex, January 1995.
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SITE HAZARD ASSESSMENT

Worksheet 2

Route Documentation

Cleanup Site ID: 7790

King County Metro Transit S Annex

Facility/Site ID: 8422289

1. SURFACE WATER ROUTE

List those substances to be considered for scoring:

Benzene, diesel (oil not scored as toxicity data is not available in WARM)

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

Confirmed releases to soil and groundwater based on analytical tests; close proximity to surface water (stream draining to LDW down-gradient of former UST area).

List those management units to be considered for scoring:

Surface water

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

Potential for transport of contaminants in soil and groundwater to surface water

2. AIR ROUTE

List those substances to be considered for scoring:

Benzene

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

Confirmed release of volatile compound to groundwater based on analytical tests; potential for transport via the air pathway

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:

Benzene, diesel (oil not scored as toxicity data is not available in WARM)

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

Confirmed release to groundwater based on analytical tests

List those management units to be considered for scoring:

Groundwater

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

Prior detection of contaminants at concentrations above MTCA cleanup levels

Worksheet 4
Surface Water Route

CSID: 7790

Site Name: King County Metro Transit S Annex

1.0 Substance Characteristics

1.1 Human Toxicity

Substance	Drinking Water Standard Value	Acute Toxicity Value	Chronic Toxicity Value	Carcinogenicity Value
benzene	8	3	X	5
TPH (as diesel)	4	5	3	X

Highest Value 8
Bonus Points? 0
Human Health Toxicity Value

1.2 Environmental Toxicity

Substance	Acute Water Quality Criteria		Non-human Mammalian Acute Toxicity	
	ug/L	Value	mg/kg	Value
benzene	5,300	2	3,306	3
TPH (as diesel)	2,300	2	490	5

Environmental Toxicity Value

1.3 Substance Quantity

Amount: approximately 600 square feet

Basis: estimated aerial extent of soil and groundwater

impacts described in available reports

Substance Quantity Value

2.0 Migration Potential

2.1 Containment

Containment Value

Explain Basis: potential for impacted groundwater discharge to surface water

2.2 Surface Soil Permeability

Soil Permeability Value

medium permeability; sand, silty sand, and silt

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

not in 100-year or 500-year flood plain

2.6 Terrain Slope

Slope Value

less than 2%

Worksheet 4
Surface Water Route

CSID: 7790

Site Name: King County Metro Transit S Annex

3.0 Targets

3.1 Distance to Surface Water <50 feet
distance to stream located west of the release area

Surface Water Distance Value

3.2 Population Served within 2 miles
3 people

Population Value

3.3 Area Irrigated within 2 miles
200 acres

Irrigation Value

3.4 Distance to Nearest Fishery Resource <50 feet
stream located along western property margin

Fishery Value

3.5 Distance to and Name of Nearest Sensitive Environment
<50 feet
stream located along western property margin

Sensitive Environment Value

4.0 Release

Release to Surface Water Value

Explain basis for scoring a release to surface water

No confirmed release to surface water; potential for groundwater to discharge 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}	126
MIG_S	10
REL_S	0
TAR_{SH}	22.3
SW_H	19.5

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}	60
MIG_S	10
REL_S	0
TAR_{SE}	34.0
SW_E	26.4

Worksheet 5**Air Route**

CSID: 7790

Site Name: King County Metro Transit S Annex

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
benzene	10	3	X	5

Highest Value 10

Bonus Points? 0

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
benzene	31,947	3	4	6

Env. Final Matrix Value **1.6 Substance Quantity**

Amount: approximately 600 square feet

Basis: Footprint of estimated area of soil impacts from reports

Substance Quantity Value

Worksheet 5**Air Route**

CSID: 7790

Site Name: King County Metro Transit S Annex

2.0 Migration Potential**2.1 Containment**Containment Value

Explain Basis: Spill/discharge to subsurface only with
no vapor collection system

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

300 feet Workers at adjoining property

3.2 Distance to and name of nearest sensitive environmentsSensitive Environment Value

<50 feet habitat for State Endangered species (western pond turtle)

3.3 Population within 0.5 milesPopulation Value

1498 population

4.0 ReleaseRelease 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_A = Release to Air

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

SUB _{AH}	154
REL _A	0
TAR _{AH}	48.7
AIR _H	23.5

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 = Release to Air

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

SUB _{AE}	70
REL _A	0
TAR _{AE}	7.0
AIR _E	1.5

Worksheet 6
Groundwater Route

CSID: 7790

Site Name: King County Metro Transit S Annex

1.0 Substance Characteristics

1.1 Human Toxicity

Substance	Drinking Water Standard Value	Acute Toxicity Value	Chronic Toxicity Value	Carcinogenicity Value
benzene	8	3	X	5
TPH (as diesel)	4	5	3	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: >10-100 cubic yards

Basis: Residual impacted soil quantity based on site reports

Substance Quantity Value

2.0 Migration Potential

2.1 Containment

Containment Value

Explain Basis: Contaminated soil present

2.2 Net Precipitation

>10-20 inches

Net Precipitation Value

2.3 Subsurface Hydraulic Conductivity

Primarily sand and silt

Conductivity Value

2.4 Vertical Depth to Groundwater

7 feet

Confirmed release: Yes

Depth to Aquifer Value

3.0 Targets

3.1 Groundwater Usage

Private supply with alternate sources

Aquifer Use Value

3.2 Distance to Nearest Drinking Water Well

4,200 feet

City of Seattle municipal well

Well Distance Value

3.3 Population Served within 2 Miles

10,000 people

Population Served Value

Worksheet 6
Groundwater Route

CSID: 7790

Site Name: King County Metro Transit S Annex

3.4 Area Irrigated by GW Wells within 2 miles

Area Irrigated Value 4

35 acres

4.0 Release

Release to Groundwater Value 5

Explain basis for scoring a release to groundwater:

Release confirmed by analytical results for groundwater samples

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	13
REL_G	5
TAR_{GH}	110.4
GW_H	55.2

Washington Ranking Method

Route Scores Summary and Ranking Calculation Sheet

Site Name: King County Metro Transit S Annex

CSID: 7790

Site Address: 11911 East Marginal Way S, Seattle, WA 98168

FSID: 8422289

HUMAN HEALTH ROUTE SCORES

Enter Human Health Route Scores for all Applicable Routes:

Pathway	Route Score	Quintile Group
Surface Water	19.5	3
Air	23.5	3
Groundwater	55.2	5

H=	5
M=	3
L=	3

$$\begin{array}{c} H^2 \\ 25 \end{array} + \begin{array}{c} 2M \\ 6 \end{array} + \begin{array}{c} L \\ 3 \end{array} = \frac{\quad}{8}$$

**Human Health
Priority Bin Score:**
5
rounded up to next
whole number

ENVIRONMENT ROUTE SCORES

Enter Environment Route Scores for all Applicable Routes:

Pathway	Route Score	Quintile Group
Surface Water	26.4	3
Air	1.5	1

H=	3
L=	1

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

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

Comments/Notes:

**FINAL MATRIX
RANKING**

1

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	N/A

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)
- Former underground storage tank (UST) location
- Soil boring location (approximate) for soil and groundwater samples
- UST removal excavation area soil sample location (approximate)
- ⊕ Dewatering well location (approximate)
- Sample with soil or groundwater concentrations above MTCA
- Approximate estimated area of impacted soil (Woodward-Clyde, 1995)

Notes:

1. All locations are approximate. Scale is approximate.



KC Metro Transit S Annex
11911 E Marginal Way S
Seattle, WA 98168

Site Overview Map

CSID 7790

CSID7790.vsd