SITE HAZARD ASSESSMENT
Worksheet 1
Summary Score Sheet

SITE INFORMATION:

Cleanup Site ID: 2116

Chevron 97451

Facility/Site ID: 53482918

2626 Bellevue Way NE

Bellevue, King County, WA 98004

Section:	20	Latitude:	47.63430
Township:	25N	Longitude:	-122.20124
Range:	5E	Tax/Parcel ID:	2025059143

Site scored/ranked for the Hazardous Sites List Publication: August 2018

SITE DESCRIPTION:

The Chevron 97451 site (Site) is a an operating gasoline station located in Bellevue, King County, Washington. The 0.37-acre property is located approximately 1,200 feet from an unnamed tributary of Yarrow Creek, and zoned for neighborhood business (NB) use.

The Site is located on the east side of Bellevue Way Northeast. It is bounded on the north, south, and west by parking lots for the adjacent Northtowne Shopping Center. Across Bellevue Way to the west is vacant wooded land. Across the parking lot are Northtowne Park to the north, retail stores to the east and northeast, and single family housing to the south. The Fire Dog Pizza Company food truck operates in the parking lot to the south of the Site.

The Site is currently operated as a gasoline station by Chevron Texaco.

The service building is located on the east side of the Site. The current dispenser island is located in the north central portion of the Site. The underground storage tanks (USTs) are located to the south of the dispenser island. Historically, USTs on the Site have contained multiple grades of gasoline, used oil, and heating oil. USTs were most recently replaced in 1991. Currently, three 12,000 gallon gasoline tanks are located at the Site.

SITE BACKGROUND:

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

From	To	Operator/Tenant	Activity
1930	1956	Unknown	Gas station
1956	2018	Chevron	Gas station

SITE CONTAMINATION:

In 1991 the Chevron 97451 site was reported to Washington State Department of Ecology (Ecology) and placed on the Confirmed and Suspected Contaminated Sites List (CSCSL).

During removal and replacement of USTs in 1991, soil and groundwater samples were taken. Both media were contaminated with gasoline range petroleum hydrocarbons (TPH-G), benzene, toluene, ethylbenzene, and xylenes (BTEX) above applicable MTCA Method A cleanup levels. Contamination was attributed to the USTs, and resulted in Ecology assigning a LUST ID for the site (LUST 2199). Remedial activities were conducted at this time to address petroleum contaminated soil.

Groundwater monitoring has been conducted at the Site routinely between 1991-1996 and 2000-present. Separate phase hydrocarbons (AKA light non-aqueous phase liquids, LNAPL) have been observed in MW-2, located just to the north of the dispenser island, since 2000. Recent sampling of MW-3, located north of MW-2, indicates contamination of groundwater with TPH-G and benzene above MTCA Method A cleanup levels.

Sampling from this well prior to 2005 also indicated contamination with toluene, ethylbenzene, and xylene above Method A cleanup levels. Sampling of MW-4, located to the northeast of MW-2, historically indicated contamination with MTBE. Concentrations of MTBE have been below MTCA Method A cleanup levels since 2005.

Investigation of soil across the Site was most recently done in 2005. Nine borings were advanced and soil and groundwater were sampled. Soil from one boring, collected 10 feet below ground surface (bgs) in the north central portion of the dispenser island, contained TPH-G above MTCA Method A cleanup levels. Groundwater collected from six borings within the dispenser island and UST areas indicated contamination with TPH-G, benzene, ethylbenzene, xylene, and MTBE above Method A cleanup levels. Groundwater in the borings was encountered between 7.7 and 13.7 feet bgs at this time.

Historically, some automotive service activities were conducted at the site in addition to retail gas sales. The used waste oil UST located in the southeast corner of the site was removed in 2012. Samples collected from the excavation pit and removed soil stockpile did not contain petroleum hydrocarbons above MTCA Method A cleanup levels.

REMEDIATION ACTIVITIES:

Multiple remedial actions were implemented at the time of station remodeling in 1991. This remodel included the removal of old USTs, pump islands, and fuel lines prior to the installation of new USTs. Five monitoring wells were installed (MW-1 through -5), and groundwater and soil were sampled from each. Groundwater contained concentrations of TPH-G and BTEX above MTCA Method A cleanup levels. MW-3 through -5 were decommissioned during the remodeling process. Groundwater was encountered between 8 and 11 feet bgs at this time, and was observed to be mounded near the location of the USTs. Soil samples were collected from excavation pits and from stockpiles of excavated soil from the areas of the gasoline tanks, pump islands, heating oil tank, used oil tank, and an electrical conduit encountered during excavation. Soils from the pump island (excavation pit and stockpile) and the gasoline tanks (stockpile) contained concentrations of TPH-G and BTEX above MTCA Method A cleanup levels. A sample from the electrical conduit excavation contained oil range petroleum hydrocarbons above the MTCA Method A cleanup level at the time (200 mg/kg), but below the current Method A cleanup level (2,000 mg/kg). A total of approximately 955 cubic yards of petroleum contaminated soil was disposed of with Woodworth and Company in Tacoma for incorporation into asphalt.

A vapor extraction system was installed at the Site to address remaining petroleum contaminated soil. Soil samples collected from one of six installation borings (VE-5) contained TPH-G and BTEX at concentrations greater than MTCA Method A cleanup levels. The vapor extraction system ran from July 1991 until 1993. Analysis of system emissions during the first 13 months of operation estimated 626 pounds of petroleum hydrocarbon vapors had been removed from the soil.

Groundwater monitoring has been conducted at least semi-annually during 1991-1996 and 2000-present. Monitoring sites include the original MW-1 and MW-2, installed in 1991, as well as a second set of wells named MW-3 and MW-4, installed in 2000. These wells are in different locations than the original MW-3 and -4. LNAPL has been observed in MW-2 since 2000. In an attempt to decrease the amount of LNAPL present, a subsurface injection of surfactant was utilized in December 2012. LNAPL has remained present in MW-2 following the surfactant injection, though LNAPL thickness has been decreasing over time.

CURRENT SITE CONDITIONS:

The Site is fully paved with the exception of small landscaped areas along the western property boundary. The closest structure is the Northtowne Shopping Center located 40 feet to the east. The Northtowne Shopping Center is on Ecology's Confirmed and Suspected Contaminated Sites List (CSID: 14464) due to halogenated solvent contamination of soil, air, and groundwater. No additional Ecology cleanup sites are located within a half mile of the Site. The Northtowne Neighborhood Park is located approximately 225 feet to the north. The park is 0.77 acres in size and includes a play area. A tributary to Yarrow Creek is the closest surface water, and is located 1,200 feet to the northeast. Yarrow Creek is part of the Lake Washington watershed. The Site is not located within a wellhead protection, sole source aquifer, or critical aquifer recharge area. One active drinking water well is located 3,432 feet to the northwest, with one connection that serves ten people.

SITE HAZARD ASSESSMENT
Worksheet 1
Summary Score Sheet

The approximate depth to groundwater is 8 - 17 (range from all groundwater monitoring data) feet below ground surface, with groundwater flowing to the northeast across the site, with observed groundwater mounding affecting flow direction near the UST basin. Subsurface soils are silty sands under a shallow (< 2 feet) layer of gravel fill.

SPECIAL CONSIDERATIONS:

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

☐ **Surface Water**

Not evaluated due to subsurface release of chemicals.

☑ **Air**

Volatile chemicals are present in groundwater on Site.

☑ **Groundwater**

TPH and associated chemicals have been detected in groundwater on Site.

No historical release locations are available for the Site, and previous soil sampling has not identified a clear source area for the TPH in groundwater. Since the groundwater is better characterized than the soil, a conservative estimate of LNAPL in groundwater was made using 2017 groundwater monitoring data. This estimate was used as the contaminant volume for scoring.

ROUTE SCORES:

Surface Water/ Human Health:		Surface Water/ Environment:	
Air/ Human Health:	35.5	Air/ Environment:	1.5
Groundwater/ Human Health:	46.9		

Overall Rank: 4

REFERENCES:

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16 WA Dept. of Ecology. Accessed 2018. Well Report Viewer. https://fortress.wa.gov/ecy/waterresources/map/WCLSWebMap/default.aspx

17 WA Dept. of Health Office of Drinking Water. Accessed 2018. Find Water System. https://fortress.wa.gov/doh/eh/portal/odw/si/FindWaterSystem.aspx

SITE HAZARD ASSESSMENT
Worksheet 2
Route Documentation

Cleanup Site ID: 2116 Chevron 97451

Facility/Site ID: 53482918

1. SURFACE WATER ROUTE

List those substances to be considered for scoring:

Not evaluated

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

List those management units to be considered for scoring:

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

2. AIR ROUTE

List those substances to be considered for scoring:

Gasoline range hydrocarbons (benzene), toluene, ethylbenzene, and xylenes

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

Volatile chemicals documented in the subsurfce. Including MTBE in scoring would not have affected scoring.

List those management units to be considered for scoring:

Groundwater

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

Documented presence of volatile chemicals in groundwater on Site

3. GROUNDWATER ROUTE

List those substances to be considered for scoring:

Gasoline range hydrocarbons (benzene), toluene, ethylbenzene, and xylenes

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

Chemicals documented in groundwater on Site. Including MTBE in scoring would not have affected scoring.

List those management units to be considered for scoring:

Groundwater

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

Chemicals documented in groundwater on Site

Maximum contaminant concentrations detected on site in soil.

CHEMICAL[a]	SOIL CONCENTRATION (mg/kg)		BORING ID	DEPTH (feet bgs)
	Maximum	MTCA Method A cleanup level		
TPH-G	166	100	BA-5	10
toluene	710	7	BA-5	10
ethylbenzene	450	6	BA-5	10
xylenes	2,800	9	BA-5	10
lead	1.94	250	BA-5	10

Maximum contaminant concentrations detected on site in groundwater.

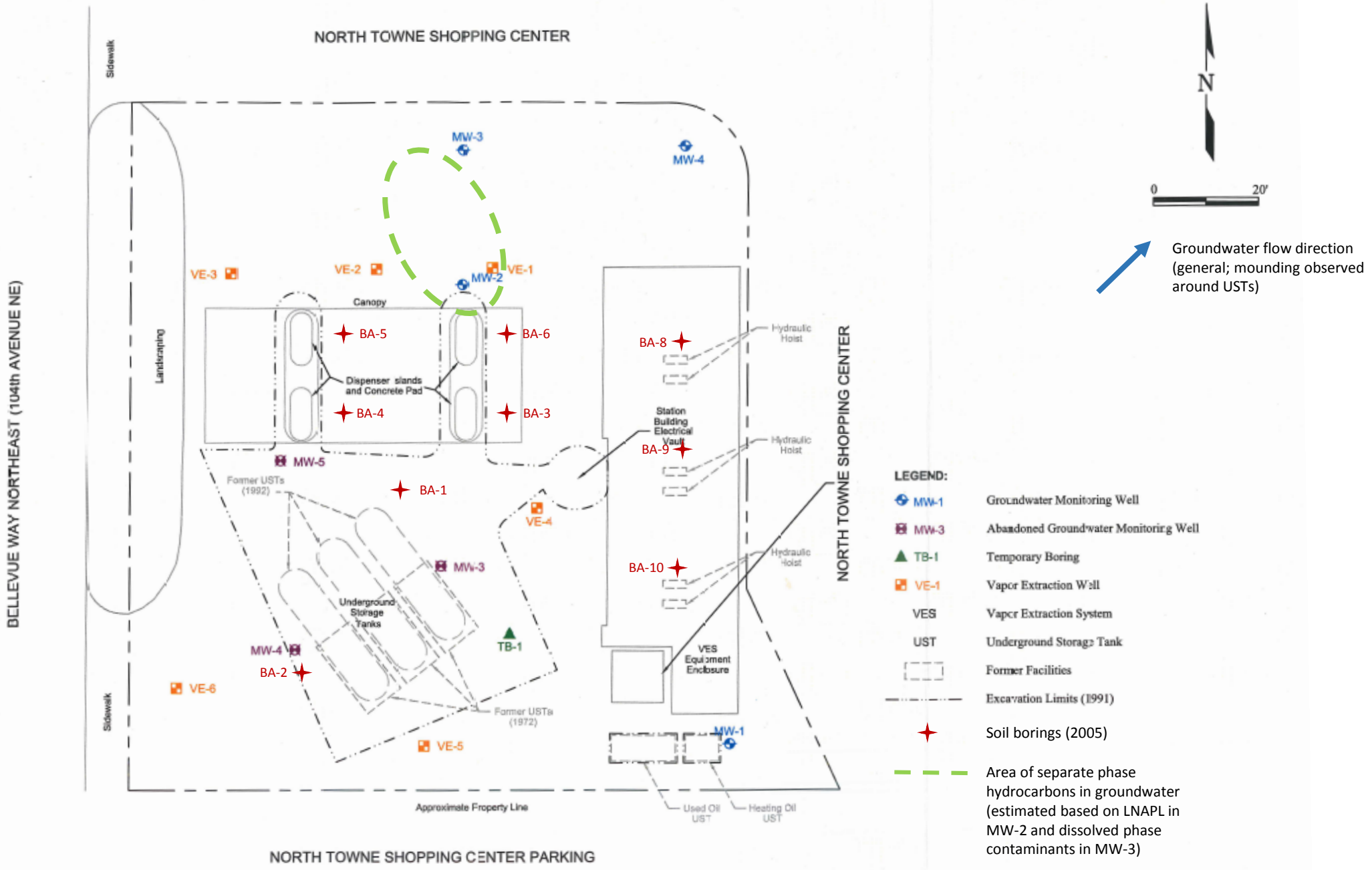
CHEMICAL[a]	GROUNDWATER CONCENTRATION (µg/L)		WELL ID	SAMPLE YEAR
	Maximum	MTCA Method A cleanup level		
TPH-G	420,000	800	MW-2	2016
benzene	7,620	5	MW-2	1996
toluene	7,430	1,000	MW-2	1996
ethylbenzene	2,110	700	MW-2	1996
xylenes	15,000	1,000	MW-2	2016
MTBE	747	20	MW-3	2001
lead	520	15	VE-1	1993

Groundwater concentrations from 2017 semi-annual sampling events.

CHEMICAL[a]	GROUNDWATER CONCENTRATION (µg/L)		WELL ID[b]
	Maximum	MTCA Method A cleanup level	
TPH-G	2,000	800	MW-3
benzene	13	5	MW-3
ethylbenzene	0.6	700	MW-3
xylenes	3.5	1,000	MW-3

a - Chemicals are only listed if they were present above laboratory reporting limits in at least one sample. Groundwater was not analyzed for lead in 2017.

b - MW-2 had separate phase hydrocarbons present during both 2017 sampling events, so no groundwater samples were analyzed from this well.


NORTH TOWNE SHOPPING CENTER
BELLEVUE WAY NORTHEAST (104th AVENUE NE)
NORTH TOWNE SHOPPING CENTER PARKING
Sidewalk
Landscaping
Approximate Property Line
MW-3
MW-4
MW-2
VE-1
VE-2
VE-3
VE-4
VE-5
VE-6
Canopy
Dispenser Islands and Concrete Pad
BA-1
BA-2
BA-3
BA-4
BA-5
BA-6
BA-8
BA-9
BA-10
MW-5
MW-3
MW-4
TB-1
MW-1
Former USTs (1992)
Former USTs (1972)
Underground Storage Tanks
Station Building Electrical Vault
Hydraulic Hoist
VES Equipment Enclosure
Used Oil UST
Heating Oil UST
N
0
20'
Groundwater flow direction (general; mounding observed around USTs)
LEGEND:
MW-1 Groundwater Monitoring Well
MW-3 Abandoned Groundwater Monitoring Well
TB-1 Temporary Boring
VE-1 Vapor Extraction Well
VES Vapor Extraction System
UST Underground Storage Tank
Former Facilities
Excavation Limits (1991)
Soil borings (2005)
Area of separate phase hydrocarbons in groundwater (estimated based on LNAPL in MW-2 and dissolved phase contaminants in MW-3)

Worksheet 4
Surface Water Route

CSID: 2116

Site: Chevron 97451

Not scored.

Worksheet 5
Air Route

CSID: 2116

Site: Chevron 97451

1.0 SUBSTANCE CHARACTERISTICS

1.1 Introduction

No scoring in Section 1.1.

1.2 Human Toxicity

Substance	Amb. Air Stnd. Value (ug/m^3)	Score	Acute Toxicity Value (mg/m^3)	Score	Chronic Toxicity Value (mg/kg/day)	Score	Carcinogenicity Adj. CPFi (risk/mg/kg-day)	Score
Gasoline (benzene)	3.45E-02	10	3.19E+04	3	8.57E-03	8	2.73E-02	5
Toluene	5.00E+03	1	--	X	1.43E+00	3	--	X
Ethylbenzene	4.00E-01	10	--	X	2.86E-01	3	--	X
Xylenes	--	X	2.17E+04	3	2.86E-02	5	--	X

Maximum score: 10

Bonus points: 2

Human Toxicity Score: 12

Source: WARM Toxicity Database

Range: 1-12

1.3 Mobility

Gaseous Mobility

Substance	Vapor Pressure Value (mm Hg)	Score	Henry's Law Value (atm-m3/ mol)	Score
Gasoline (benzene)			5.56E-03	4
Toluene			6.63E-03	4
Ethylbenzene			7.88E-03	4
Xylenes			6.80E-03	4

Maximum score: 4

Source: WARM Toxicity Database

Particulate Mobility

Soil type:

Erodibility factor:

Climatic factor:

Mobility value:

Mobility Score: 4

Source:

Range: 0-4

1.4 Human Toxicity/Mobility

Source: WARM Scoring Manual

Human Tox/Mobil Score: 24

Range: 1-24

1.5 Environmental Toxicity/Mobility

Substance	Acute Value (mg/m^3)	Score
Gasoline (benzene)	3.19E+04	3
Toluene	--	X
Ethylbenzene	--	X
Xylenes	2.17E+04	3
Maximum score	3	

Source: WARM Toxicity Database

Environmental Toxicity Score: 3

Range: 1-10

Environmental Tox/Mobil Score: 6

Range: 1-24

1.6 Substance Quantity

Quantity: 1,700 gallons

Basis: calculated from estimated possible area of free product (1,500 sq ft) and mean of last 4 measured LNAPL thicknesses (0.15 ft) in MW-2

Source: GW monitoring data

Substance Quantity Score: 4

Range: 1-10

2.1 Containment

Description: subsurface contamination, cover > 2 ft thick, no vapor collection system

Basis: site reports

Containment Score: 5

Range: 0-10

SUBSTANCE PARAMETER CALCULATIONS

Human Health Pathway

SUBh (Human Tox/Mobil + 5) x (Containment +1) + Substance Quantity: 178.0

Environmental Pathway

SUBe (Environ. Tox/Mobil + 5) x (Containment +1) + Substance Quantity: 70.0

3.0 TARGETS

3.1 Nearest Population

Description: Northtowne Shopping Center

Distance (ft): 40

Source: King County iMap

Nearest Population Score: 10

Range: 0-10

3.2 Nearest Sensitive Environment

Description:	Northtowne Neighborhood Park		
Distance (ft):	225	Nearest Sensitive Environment Score:	7
Source:	King County iMap	Range:	0-7

3.3 Population within One-Half Mile

Number:	2,897	Population within Half Mile Score:	53.8
Source:	Missouri Census Data Center	Range:	0-75

TARGET PARAMETER CALCULATIONS

Human Health Pathway

TARh: Nearest Population + Population within Half Mile **63.8**

Environmental Pathway

TARe Nearest Sensitive Environment **7.0**

4.0 RELEASE

Evid. of release?	no air sampling data		
Source:	site reports	Release Score (REL):	0.0
		Range:	0 or 5

AIR ROUTE CALCULATIONS

Human Health Pathway

AIRh = (SUBh x 60/329) x {REL + (TARh x 35/85} / 24 **35.5**

Environmental Pathway

AIRe = (SUBe x 60/329) x {REL + (TARe x 35/85} / 24 **1.5**

Range: 0-100

Worksheet 6
Groundwater Route

CSID: 2116

Site: Chevron 97451

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human toxicity

	Drink. Wat. Stnd		Acute Toxicity		Chronic Toxicity		Carcinogenicity	
Substance	Value (ug/L)	Score	Value (mg/kg)	Score	Value (mg/kg/day)	Score	Adj. CPFo (risk/mg/kg-day)	Score
Gasoline (benzene)	5.00E+00	8	3.31E+03	3	4.00E-03	3	5.50E-02	5
Toluene	1.00E+03	4	5.00E+03	3	8.00E-02	1	--	X
Ethylbenzene	7.00E+02	4	3.50E+03	3	1.00E-01	1	--	X
Xylenes	1.00E+04	2	5.00E+01	10	2.00E-01	1	--	X

Maximum score: 10

Bonus points: 2

Human Toxicity Score: 12

Source: WARM Toxicity Database

Range: 1-12

1.2 Mobility

Substance	Solubility Value (mg/L)	Score
Gasoline (benzene)	1.75E+03	3
Toluene	5.26E+02	2
Ethylbenzene	1.69E+02	2
Xylenes	1.71E+02	2

Maximum value: 3

Mobility Score: 3

Source: WARM Toxicity Database

Range: 1-3

1.3 Substance quantity

Quantity: 1,700 gallons

Basis: calculated from estimated possible area of free product (1,500 sq ft) and mean of last 4 measured LNAPL thicknesses (0.15 ft) in MW-2

Source: site reports

Substance Quantity Score: 4

Range: 1-10

2.1 Containment

Description: contamination has reached groundwater

Source: site reports

Containment Score: 10

Range: 0-10

SUBSTANCE PARAMETER CALCULATION

SUB = (Human Toxicity + Mobility + 3) x (Containment + 1) + Substance Quantity **202.0**

2.0 MIGRATION POTENTIAL

2.2 Net precipitation

Amount (in.):	23.3	Net Precipitation Score:	3
Source:	NOAA NCEA, ESRI	Range:	0-5

2.3 Subsurface Hydraulic Conductivity

Description:	silty sand		
Source:	site reports	Hydraulic Conductivity Score:	3
		Range:	1-4

2.4 Vertical Depth to Aquifer

Depth (ft):	contamination in groundwater	Depth to Aquifer Score:	8
Source:	site reports	Range:	1-8

MIGRATION PARAMETER CALCULATION

MIG = Depth to Aquifer + Net Precipitation + Hydraulic Conductivity **14.0**

3.0 TARGETS

3.1 Aquifer Usage

Description:	alternate sources available with minimum hookup requirements		
Source:	King County iMap, WDOH Find Water System	Aquifer Use Score:	4
		Range:	1-10

3.2 Distance to Nearest Drinking Water Well

Distance (ft):	3,400	Well Distance Score:	2
Source:	King County iMap, WDOH Find Water System	Range:	0-5

3.3 Population Served by Drinking Water Wells within Two Miles — Population Served Score: 3.2

No. of people:	10	Range:	0-100
Source:	WDOH Find Water System, WDOE Well Report Viewer		

3.4 Area Irrigated by Wells within Two Miles — Area Irrigated Score: 2.1

Area (acres):	8.1	Range:	0-50
Source:	WDOE Well Report Viewer		

TARGET PARAMETER CALCULATION

11.3

TAR = Aquifer Use + Well Distance + Population Served + Area Irrigated

4.0 RELEASE

Evid. of release?	confirmed detects in groundwater	Release Score (REL):	5.0
Source:	site reports	Range:	0 or 5

GROUND WATER ROUTE CALCULATION

44.7

GW = (SUB x 40/208) x {(MIG x 25/17) + REL + (TAR x 30/165)} / 24

Range: 0-100

Washington Ranking Method
Route Scoring Summary and Ranking Calculation

CSID: **2116**

Site: **Chevron 97451**

Human Health Route Scores

Pathway	Score	Quintile
Surface water		
Air	35.5	4
Groundwater	44.7	4

Quintile	Value
High (H)	4
Middle (M)	4
Low (L)	

Human Health Pathway Quintiles - February 2018

Quintile	Surface Water		Air		Groundwater	
1	<=	7.9	<=	8.5	<=	24.0
2	8.0	15.4	8.6	16.3	24.1	33.0
3	15.5	21.3	16.4	25.3	33.1	40.3
4	21.4	29.8	25.4	40.1	40.4	49.8
5	>=	29.9	>=	40.2	>=	49.9

$(H^2 + 2M + L) / 8$

Human Health Priority Bin Score: 3.0

Environmental Route Scores

Pathway	Score	Quintile
Surface water		
Air	1.5	2

Quintile	Value
High (H)	2
Low (L)	

Environmental Pathway Quintiles - February 2018

Quintile	Surface Water		Air	
1	<=	11.3	<=	1.2
2	11.4	24.1	1.3	1.5
3	24.2	32.0	1.6	14.1
4	32.1	49.6	14.2	27.7
5	>=	49.7	>=	27.8

$(H^2 + 2L) / 7$

Environmental Priority Bin Score: 0.6

FINAL MATRIX RANKING

Human Health Priority	Environmental 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

n/a - not applicable

NFA - no further action

Site Rank: 4