

SITE HAZARD ASSESSMENT

Worksheet 1

Summary Score Sheet

SITE INFORMATION:

Chevron 200410

15510 Aurora Ave N

Shoreline, King County, WA 98133

Cleanup Site ID: 2650

Facility/Site ID: 78597266

Section: 18

Latitude: 47.74177

Township: 26

Longitude: -122.34483

Range: 4E

Tax/Parcel ID: 6885900035

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

SITE DESCRIPTION:

The Chevron 200410 site (Site) is a gasoline station located in Shoreline, King County, Washington. The 0.83-acre property is located approximately 2,200 feet from Boeing Creek, and zoned for mixed business (MB) use.

The Site is bordered by vacant land to the east, the Interurban Trail and vacant land to the west (across Aurora Avenue), retail properties to the north and south (across 155th Street), and single family residences to the northeast.

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

The Site is located on the northeast corner of Aurora Avenue (SR 99) and 155th Street. It is covered by structures and pavement except for landscaped areas along the property boundaries. The convenience store building and dispenser islands are centrally located, and a separate car wash building is located on the eastern boundary. There are three underground storage tanks (USTs) on Site, located to the north of the dispenser islands. Each UST has a 12,000 gallon capacity. The Site is located in a ridge area, and was dug into the ridge to be generally flat. There are retaining walls on the eastern and southern boundaries 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>
	1980	Unknown	Service station
1980	1989	Unknown	Garden nursery
1989	2003	Chevron	Gas station with car wash (owned by Chevron)
2003	2006	Chevron	Gas station with car wash (owned by Bedrock Northwest Inc.)
2006	2018	Chevron	Gas station with car wash (owned by Chevron)

SITE CONTAMINATION:

In 1990 the Chevron 200410 site was reported to Washington State Department of Ecology (Ecology) and placed on the Confirmed and Suspected Contaminated Sites List (CSCSL).

Prior to Chevron purchase in 1989, a site assessment was performed to identify any contamination remaining from the previous service station located at the Site. Petroleum hydrocarbons were detected in soil at concentrations below MTCA Method A cleanup levels.

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During new station installation in 1990, 4,600 gallons of unleaded gasoline were released from a broken feeder line. The release was discovered during testing of the fuel pump systems. No additional releases have been reported for the Site.

Soil borings were analyzed in 2005 and 2011. The 2005 borings did not contain chemicals above MTCA Method A cleanup levels; locations of these borings are unclear from the reports available to Ecology. Samples were collected from borings MW-20 through -23 in 2011. Contamination above Method A cleanup levels was present in borings MW-20 (gasoline range petroleum hydrocarbons (TPH-G), ethylbenzene, xylenes at 20 feet below ground surface) and MW-23 (TPH-G at 17.5 feet below ground surface). Groundwater has been monitored consistently since 2008. The 2016 semi-annual groundwater samples indicated contamination above Method A cleanup levels remaining in MW-16 (TPH-G, diesel range petroleum hydrocarbons (TPH-D)), MW-23 (TPH-G, benzene), and MW-12 (light non-aqueous phase liquids (LNAPL) present during both 2016 sampling events).

REMEDIATION ACTIVITIES:

A vapor extraction system was installed on Site following discovery of the release in 1990. Exact dates of system operation are unknown, but available monitoring data indicates that it was run, at minimum, from May 2, 1990 to March 12, 1996. The system was shut down for a month in 1993 for upgrades, but otherwise operated continuously during this period. As of March 1996, the system was estimated to have removed 11,000 pounds (approximately 1,800 gallons) of hydrocarbons from the soil.

To address the LNAPL in MW-12, a surfactant injection was performed in December 2012. LNAPL has continued to be present in MW-12 after the injection.

CURRENT SITE CONDITIONS:

The Site is located in the city of Shoreline, and uses public utilities for water, sewer, and stormwater. The closest surface water is Boeing Creek, located 2,200 feet north as it passes through Darnell Park. Boeing Creek drains into the Puget Sound. Darnell Park is a green space with creek views and benches but no playground equipment or additional facilities.

There are four Ecology cleanup sites located within 1/4 mile of the Site. Two are designated as No Further Action and the other two are designated Cleanup Started. The closest school is the Northwest School for Deaf and Hard of Hearing Children, located 1,300 feet west southwest of the Site. The closest daycare is the Choober Doobers Family Home Daycare, located 1,500 feet northeast of the Site. The nearest drinking water well is over two miles away. There is one well used for irrigation located within two miles of the Site. This well is located on the other side of Lake Washington, and was not included in scoring due to presumed groundwater discontinuity between the Site and the well.

The vacant lot to the east of the Site was part of the Chevron property until 1994. No sampling has been conducted on this parcel, and documented areas of contamination on Site are not located near the eastern boundary. Groundwater flow direction does not suggest that Site contamination is moving toward the vacant parcel. The eastern parcel was not, therefore, considered as part of the Site for purposes of this SHA.

The approximate depth to groundwater is 5 - 30 feet below ground surface, with groundwater flowing to the southwest. Subsurface soils are sandy silt and silty sand.

SPECIAL CONSIDERATIONS:

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

☐ **Surface Water**

Not evaluated due to subsurface release.

☒ **Air**

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Volatile chemicals have been released to the subsurface.

☒ **Groundwater**

Chemicals have been detected in groundwater.

ROUTE SCORES:

Surface Water/ Human Health:		Surface Water/ Environment:	
Air/ Human Health:	41.8	Air/ Environment:	1.1
Groundwater/ Human Health:	44.4		

Overall Rank: 1

REFERENCES:

- 1 Emcon. 1996. Vapor Extraction System Monitoring (June 1, 1995 to March 12, 1996), Chevron Facility 90410, 15510 Aurora Avenue North, Seattle, Washington.
- 2 ESRI. Accessed 2018. World Annual Evapotranspiration Map. Accessed through <https://www.esri.com/arcgis-blog/products/arcgis-online/mapping/world-average-annual-evapotranspiration-web-map-now-available/>
- 3 King County iMap. Accessed 2018. <https://gismaps.kingcounty.gov/iMap/>
- 4 Leidos. 2016. Second Semi-annual 2016 Groundwater Monitoring and Sampling Report, Chevron Service Station No. 200410, 15510 Aurora Avenue North, Shoreline, Washington.
- 5 Missouri Census Data Center. Accessed 2018. Circular Area Profiles – Version 10C. <http://mcdc.missouri.edu/websas/caps10c.html>
- 6 NOAA National Centers for Environmental Information. Accessed 2018. Global Summary of the Year 2000 - 2017 – Seattle Sand Point Weather Forecast Office. Requested from <https://www.ncdc.noaa.gov/cdo-web/>
- 7 NOAA. Accessed 2018. Atlas 2: Precipitation Frequency Estimates. <http://www.nws.noaa.gov/oh/hdsc/noaaatlas2.htm>
- 8 Pacific Environmental Group, Inc. 1993. Stage II Vapor Recovery System Installation, Chevron Service Station No. 60200410, 15510 Aurora Avenue North, Seattle, Washington.
- 9 RZA. 1989. Geotechnical Engineering Report Level 1 Environmental Site Assessment, North 155th Street and Aurora Avenue North, Seattle, Washington.
- 10 RZA. 1989. Supplementary Subsurface Petroleum Hydrocarbon Evaluation, N. 155th Street & Aurora Avenue N. Site, Seattle, Washington.
- 11 SAIC. 2010. Site Investigation Work Plan Submission, Chevron Service Station No. 20-0410, 15510 Aurora Ave. North, Shoreline, Washington.
- 12 SAIC. 2011. Supplemental Site Assessment Report, Chevron Service Station No. 20-0410, 15510 Aurora Avenue North, Shoreline, Washington.
- 13 SAIC. 2012. Surfactant-Enhanced Recovery Work Plan, Chevron Service Station No. 20-0410, 15510 Aurora Avenue North, Shoreline, Washington.
- 14 Tetra Tech/KCM Inc. 2004. City of Shoreline Stream and Wetland Inventory and Assessment, Appendices. Prepared for City of Shoreline, Shoreline, Washington. Available at: <http://www.shorelinewa.gov/home/showdocument?id=5466>
- 15 WA Dept. of Ecology. Accessed 2018. What's in My Neighborhood. <https://fortress.wa.gov/ecy/neighborhood/>
- 16 WA Dept. of Ecology. Accessed 2018. Well Report Viewer. <https://fortress.wa.gov/ecy/waterresources/map/WCLSWebMap/default.aspx>

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- 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: 2650

Chevron 200410

Facility/Site ID: 78597266

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:

Benzene (TPH-G), ethylbenzene, toluene, xylenes

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

Volatile chemicals that have been detected in soil or groundwater on Site.

List those management units to be considered for scoring:

Soil, groundwater

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

Volatile chemicals have been detected in soil and groundwater.

3. GROUNDWATER ROUTE

List those substances to be considered for scoring:

Benzene (TPH-G), naphthalene (TPH-D), toluene, xylenes

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

Substances have been detected in groundwater.

List those management units to be considered for scoring:

Groundwater

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

Substances have been detected in groundwater.

Summary of groundwater sampling from November 2008 through August 2016.

WELL ID	WELL STATUS	LAST YEAR WITH ANY CONTAMINANT ABOVE MTCA METHOD A CLEANUP LEVELS ^a	CONTAMINANTS ABOVE MTCA METHOD A CLEANUP LEVELS		
			Chemical	Maximum concentration (µg/L)	Year of max. concentration
MW-1 MW-2 MW-3	sampling discontinued in 2009; dry/insufficient water during all 2008-2009 sampling events				
MW-7	sampling discontinued in 2009	2009	TPH-D TPH-G	2,800 5,200	2009 2009
MW-10	sampled through 2016	2010	TPH-D TPH-O	7,200 2,600	2009 2009
MW-11	sampled through 2016	2012	TPH-D TPH-O	2,100 800	2008 2008
MW-12	LNAPL present intermittently since 2008; last sampling event without LNAPL in 2012	2012	TPH-D TPH-O TPH-G xylenes	170,000 620 52,000 6,800	2008 2012 2009 2009
MW-13	sampled through 2016	2011	TPH-D TPH-O	2,000 1,200	2009 2009
MW-15	sampled through 2016	2014	TPH-D TPH-O	2,000 7,000	2009 2009
MW-16	sampled through 2016	2016	TPH-D TPH-O TPH-G benzene toluene xylenes	4,600 560 23,000 670 1,300 5,000	2009 2010 2014 2010 2010 2014

WELL ID	WELL STATUS	LAST YEAR WITH ANY CONTAMINANT ABOVE MTCA METHOD A CLEANUP LEVELS ^a	CONTAMINANTS ABOVE MTCA METHOD A CLEANUP LEVELS		
			Chemical	Maximum concentration (µg/L)	Year of max. concentration
MW-19	sampled through 2016	2011	TPH-O	1,600	2011
MW-20	sampled through 2016	2013	TPH-G	1,200	2008
			benzene	42	2013
MW-21	dry/insufficient water in all sampling events since 2008				
MW-23	sampled through 2016	2016	TPH-D	1,000	2012
			TPH-G	15,000	2014
			benzene	140	2013

Abbreviations: TPH-G – gasoline range petroleum hydrocarbons

TPH – D – diesel range petroleum hydrocarbons

TPH-O – oil range petroleum hydrocarbons

LNAPL – light non-aqueous phase liquid (AKA separate phase hydrocarbons)

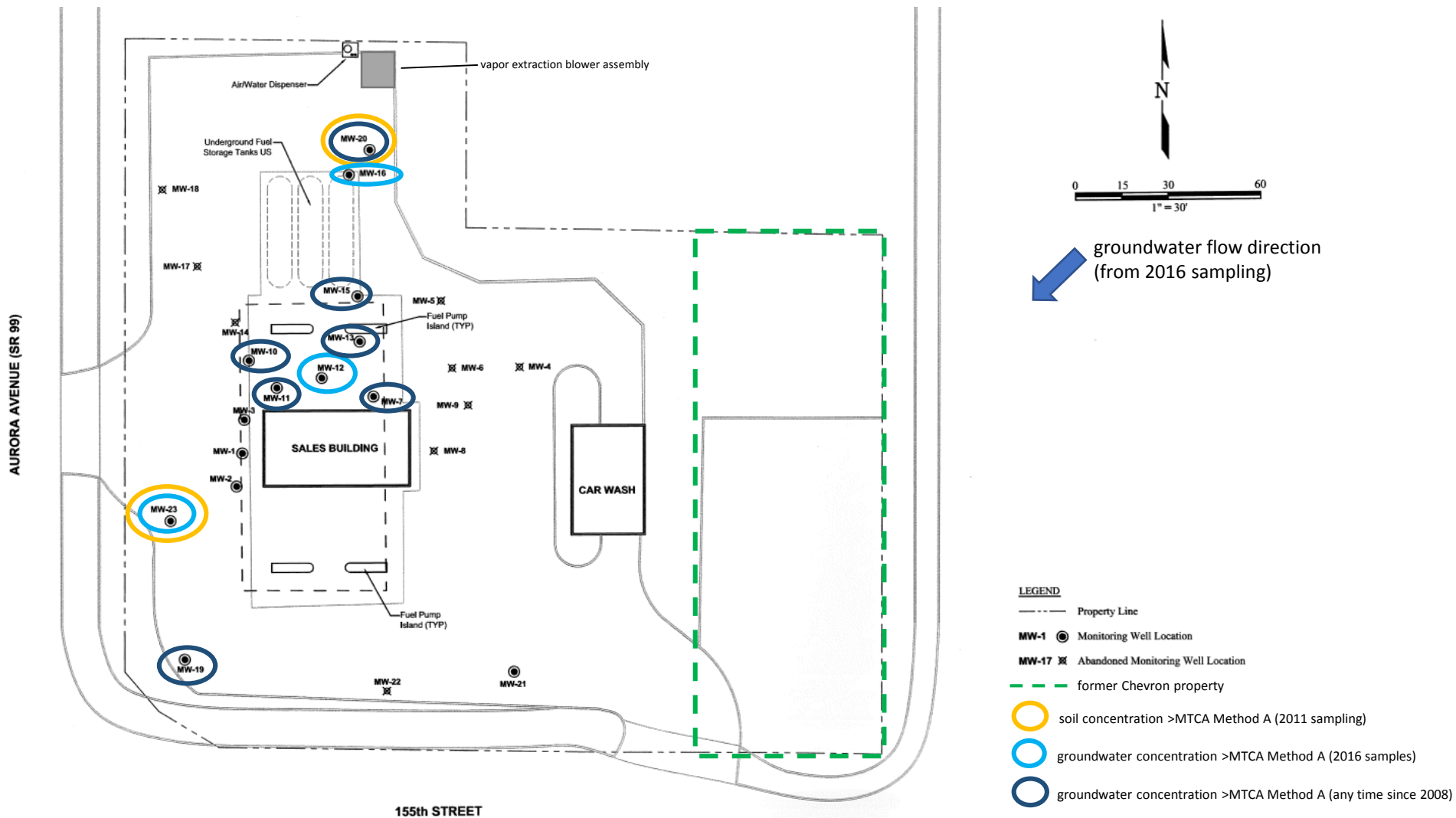
a – Method A cleanup levels are 5 µg/L benzene, 1,000 µg/L toluene, 1,000 µg/L xylenes, 800 µg/L TPH-G (with benzene present), 500 µg/L TPH-D, and 500 µg/L TPH-O



Site looking north from the sidewalk on the south side of N 155th St.



Site looking south from the southwest corner of the old vapor extraction blower assembly (see Site figure below). Both photos taken by Kim Wooten on 4/18/18.



Worksheet 4

Surface Water Route

CSID: 2650

Site: Chevron 200410

Not scored.

Worksheet 5

Air Route

CSID: 2650

Site: Chevron 200410

1.0 SUBSTANCE CHARACTERISTICS

1.1 Introduction

No scoring in Section 1.1.

1.2 Human Toxicity

Substance	Amb. Air Stnd.		Acute Toxicity		Chronic Toxicity		Carcinogenicity	
	Value	Score	Value	Score	Value	Score	Adj. CPFI (risk/mg/kg-day)	Score
	(ug/m ³)		(mg/m ³)		(mg/kg/day)			
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
xylene	--	X	2.17E+04	3	2.86E-02	5	--	X

Maximum score: 10

Bonus points: 2

Source: WARM Toxicity Database

Human Toxicity Score: 12

Range: 1-12

1.3 Mobility

Gaseous Mobility

Substance	Vapor Pressure		Henry's Law	
	Value	Score	Value (atm-m ³ /mol)	Score
	(mm Hg)			
benzene	9.50E+01	4	5.56E-03	4
toluene			6.6E-03	4
ethylbenzene	7.00E+00	3		
xylene	1.00E+01	3	6.80E-03	4

Maximum score: 4

Source: WARM Toxicity Database

Particulate Mobility

Soil type:

Erodibility factor:

Climatic factor:

Mobility value:

Source:

Mobility Score: 4

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

Acute		
Value		
Substance	(mg/m ³)	Score
benzene	3.19E+04	3
toluene	--	X
ethylbenzene	--	X
xylene	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: 2,800 gallons

Basis: spill - vapor extraction system removed (4,600 gal - 1,800 gal)

Source: site reports

Substance Quantity Score: 4
Range: 1-10

2.1 Containment

Description: subsurface spill (cover > 2 ft) with no current vapor 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: retail building to the north

Distance (ft): 20

Source: iMap

Nearest Population Score: 10
Range: 0-10

3.2 Nearest Sensitive Environment

Description: Darnell Park
Distance (ft): 2,200
Source: iMap

Nearest Sensitive Environment Score: 5
Range: 0-7

3.3 Population within One-Half Mile

Number: 4,240
Source: MO CDC

Population within Half Mile Score: 65.1
Range: 0-75

TARGET PARAMETER CALCULATIONS

Human Health Pathway

TARh: Nearest Population + Population within Half Mile

75.1

Environmental Pathway

TARe Nearest Sensitive Environment

5.0

4.0 RELEASE

Evid. of release? no reported air sample 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

41.8

Environmental Pathway

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

1.1

Range: 0-100

Worksheet 6

Groundwater Route

CSID: 2650

Site: Chevron 200410

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human toxicity

	Drink. Wat. Stnd		Acute Toxicity		Chronic Toxicity		Carcinogenicity	
	Value		Value		Value		Adj. CPFo	
Substance	(ug/L)	Score	(mg/kg)	Score	(mg/kg/day)	Score	(risk/mg/kg-day)	Score
benzene	5.00E+00	8	3.31E+03	3	4.00E-03	3	5.50E-02	5
naphthalene	--	X	4.90E+02	5	2.00E-02	1	--	X
toluene	1.00E+03	4	5.00E+03	3	8.00E-02	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

	Solubility	
	Value	
Substance	(mg/L)	Score
benzene	1.75E+03	3
naphthalene	3.10E+01	1
toluene	5.26E+02	2
xylenes	1.71E+02	2
Maximum value:	3	
Source:	WARM Toxicity Database	
		Mobility Score: 3
		Range: 1-3

1.3 Substance quantity

Quantity:	2,800 gallons	
Basis:	spill - vapor extraction system removed (4,600 gal - 1,800 gal)	
Source:	site reports	Substance Quantity Score: 4
		Range: 1-10

2.1 Containment

Description:	contaminants detected in 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

Source: NOAA NCEA, ESRI

Net Precipitation Score: 3

Range: 0-5

2.3 Subsurface Hydraulic Conductivity

Description: gravelly sandy silt and silty sand

Source: site reports

Hydraulic Conductivity Score: 3

Range: 1-4

2.4 Vertical Depth to Aquifer

Depth (ft): 0 (contaminants in groundwater)

Source: site reports

Depth to Aquifer Score: 8

Range: 1-8

MIGRATION PARAMETER CALCULATION

MIG = Depth to Aquifer + Net Precipitation + Hydraulic Conductivity

14.0

3.0 TARGETS

3.1 Aquifer Usage

Description: groundwater not used but usable

Source: King County iMap, WDOH Find Water System

Aquifer Use Score: 2

Range: 1-10

3.2 Distance to Nearest Drinking Water Well

Distance (ft): >2 mi

Source: King County iMap, WDOH Find Water System

Well Distance Score: 0

Range: 0-5

3.3 Population Served by Drinking Water Wells within Two Miles

No. of people: 0

Source: WDOH Find Water System, WDOE Well Report Viewer

Population Served Score: 0.0

Range: 0-100

3.4 Area Irrigated by Wells within Two Miles

Area (acres): 0

Source: WDOE Well Report Viewer

Area Irrigated Score: 0.0

Range: 0-50

TARGET PARAMETER CALCULATION

2.0

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

4.0 RELEASE

Evid. of release? confirmed detects in groundwater

Source: site reports

Release Score (REL): 5.0

Range: 0 or 5

GROUND WATER ROUTE CALCULATION

42.0

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

Range: 0-100

Washington Ranking Method

Route Scoring Summary and Ranking Calculation

CSID: 2650
Site: Chevron 200410

Human Health Route Scores

Pathway	Score	Quintile
Surface water	0.0	
Air	41.8	5
Groundwater	42.0	4

Quintile	Value
High (H)	5
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: 4.1

Environmental Route Scores

Pathway	Score	Quintile
Surface water	0.0	
Air	1.1	1

Quintile	Value
High (H)	1
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: 0.1

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: 1