



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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April 6, 2015

Mr. Paul Supple
Atlantic Richfield Company
2010 Crow Canyon Place STE 150
San Ramon CA 94583

Re: No Further Action at the following Site:

- **Site Name:** Hadi Mini Market (ARCO 5299)
- **Site Address:** 1101 South Sprague Avenue, Tacoma, Washington
- **Facility/Site No.:** 67538723
- **Cleanup Site No.:** 10127
- **VCP Project No.:** SW1437

Dear Mr. Supple:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your independent cleanup of the Hadi Mini Market (ARCO 5299) facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

Issue Presented and Opinion

Is further remedial action necessary to clean up contamination at the Site?

NO. Ecology has determined that no further remedial action is necessary to clean up contamination at the Site.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC (collectively "substantive requirements of MTCA"). The analysis is provided below.

Description of the Site

This opinion applies only to the Site described below. The Site is defined by the nature and extent of contamination associated with the following release:

- Petroleum into the soil.

Please note a parcel of real property can be affected by multiple sites. At this time, we have no information that the parcel(s) associated with this Site are affected by other sites.

Basis for the Opinion

This opinion is based on the information contained in the following documents:

1. *ARCO Property Underground Storage Tank Locate*, Apollo Geophysics Corporation, September 25, 2002.
2. *Limited Phase II Site Investigation*, Saltbush Environmental Services, Inc., October 17, 2002.
3. *Subsurface Investigation Report*, Delta Environmental Consultants, Inc., October 23, 2003.
4. *Subsurface Investigation Report*, Antea Group, October 10, 2014.
5. *Voluntary Cleanup Program Application*, Antea Group, October 14, 2014.

These documents are kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. You may make an appointment by calling the SWRO resource contact at (360) 407-6365.

This opinion is void if any of the information contained in those documents is materially false or misleading.

Analysis of the Cleanup

Ecology has concluded that **no further remedial action** is necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

1. Characterization of the Site.

Ecology has determined your characterization of the Site is sufficient to establish cleanup standards and select a cleanup action.

The 0.47-acre Site is located on the northeast corner of the intersection of South Sprague Avenue and Earnest S. Brazill Street, in Tacoma, Pierce County, Washington (Figure 1). A gasoline station has been present at the Site since circa 1925. Reportedly, a dry cleaner occupied the Site for a brief period. It is a currently operational gasoline service station. Surrounding land use consists of commercial and residential properties.

The current underground storage tank (UST) system consists of three 12,000-gallon gasoline tanks. They were installed in the mid 1980s. No information was available regarding the previous USTs other than they were located south of the current USTs.

The Site is located on a glacial upland in the Puget Sound basin. Glacial till was found to the deepest depth explored of 51.5 feet below ground surface (bgs). Groundwater is estimated to be at least 100 feet bgs and was not encountered during any investigations at the Site.

In 2002, a geophysical survey was conducted to determine if older tanks remained. An anomaly was found in the southwest corner. Four soil borings were advanced to collect samples (Figure 2). Seven samples were analyzed for Total Petroleum Hydrocarbons-Gasoline (TPH-G), benzene, toluene, ethylbenzene, and xylenes (BTEX); one was additionally analyzed for tetrachloroethylene. Boring BH4-10', collected at 10 feet bgs, had results, in milligrams per kilogram (mg/kg), of TPH-G at 1,700, benzene at 7.5, toluene at 25, ethylbenzene at 27, and xylenes at 140. All of these results are above their respective Method A cleanup levels. The result for tetrachloroethylene was non-detect.

In April 2003, seven soil samples were collected from former product piping trenches at depths of 4 to 4.5 feet bgs. Three soil borings were also advanced to a maximum depth of 25.5 feet bgs (Figure 3). Benzene above the Method A cleanup level was found in a piping trench sample collected north of the northeast dispenser at 4.5 feet bgs. Benzene and TPH-G above Method A were found at 10 feet bgs in boring B-1 near BH-4 where contamination was found in 2002. A total of 29.99 tons of contaminated soil generated during the product piping trenches was taken to TPS Technologies in Tacoma, Washington for disposal.

In May 2011, a subsurface investigation was conducted at the Site. Four borings were advanced, the deepest of which was 51.5 feet bgs (Figure 3). No distinct saturated zone was found in any of the three borings. Water was found at 7 feet bgs in the fourth boring so it was completed as monitoring well MW-4.

Soil samples were analyzed for TPH-G, BTEX, 1,2-dibromoethane, 1,2-dichloroethane, methyl tert-butyl ether, and lead. Four samples were also analyzed for arsenic. The only detection above cleanup levels was TPH-G at 330 mg/kg in AB-2 at 15 feet bgs. Three samples were analyzed for volatile and semivolatile organic compounds, volatile petroleum hydrocarbons (VPH), and extractable petroleum hydrocarbons (EPH). The VPH and EPH results were used to calculate Method B Site-specific cleanup values (Tables 1 through 6).

Water sampling was attempted in MW-4 on five occasions. Only two attempts were successful; the well was dry on the other attempts. The first sample, collected in June 2011, had as the only detections results of 210 micrograms per liter ($\mu\text{g/l}$) of total lead and 2 $\mu\text{g/l}$ of dissolved lead. Although this result is well above the Method A cleanup level of 15 $\mu\text{g/l}$, it does not appear to be representative of groundwater conditions. The second sample was collected in December 2012. All results were non-detect at appropriate detection limits.

Since groundwater is expected to be at least 100 feet bgs at the Site, the water found in MW-4 is most likely water trapped in the former UST excavation and is not considered true groundwater. It is also of very limited size and depth.

2. Establishment of cleanup standards.

Ecology has determined the cleanup levels and points of compliance you established for the Site meet the substantive requirements of MTCA.

Three samples, representative of Site conditions, were analyzed for volatile organic compounds, EPH, VPH, and semi-volatile organic compounds. The results from these analyses were used to calculate a direct-contact Site-specific Method B cleanup level for TPH-G of 2,817 mg/kg. Remaining contaminant concentrations are below the Method B cleanup levels calculated for the Site. Method B calculations are shown in Tables 1 through 6.

Based on data collected at the Site and research of the general area, several exposure routes are incomplete and are not considered. These routes include:

- Soil to groundwater pathway
- Soil vapor inhalation pathway
- Soil to surface water pathway
- Groundwater to surface water pathway

Standard points of compliance were established for the Site. For soil cleanup levels based on or human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance was established in the soils throughout the Site from the ground surface to 15 feet bgs.

3. Selection of cleanup action.

Ecology has determined the cleanup action you selected for the Site meets the substantive requirements of MTCA.

Cleanup actions conducted at the Site have included excavation and off-Site disposal of petroleum-contaminated soil to remediate concentrations of contamination to levels considered clean using Method B calculations.

4. Cleanup.

Ecology has determined the cleanup you performed meets the cleanup standards established for the Site.

Excavation and removal of soils in 2003 in the area of the former product piping was done at the Site. A total of approximately 30 tons of contaminated soil was removed from the Site for disposal at TPS, Technologies in Tacoma, Washington.

Using cleanup levels derived from Method B calculations, contamination left at the Site was determined to meet the direct contact cleanup standards. Leaching to groundwater was not considered to be a complete pathway due to the following:

- Depth to groundwater is a minimum of 100 feet bgs at the Site.
- Contaminated soil was removed to below Method B cleanup levels.
- The water found in monitoring well MW-4 is not considered groundwater but is water that has collected in the former UST nest. No groundwater was encountered in the deepest boring of 51.5 feet bgs advanced at the Site.

Listing of the Site

Based on this opinion, Ecology will remove the Site from our Confirmed and Suspected Contaminated Sites List.

Limitations of the Opinion

1. Opinion does not settle liability with the state.

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

2. Opinion does not constitute a determination of substantial equivalence.

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you performed is substantially equivalent. Courts make that determination. *See* RCW 70.105D.080 and WAC 173-340-545.

3. State is immune from liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70.105D.030(1)(i).

Termination of Agreement

Thank you for cleaning up the Site under the Voluntary Cleanup Program (VCP). This opinion terminates the VCP Agreement governing this project (#SW1437).

For more information about the VCP and the cleanup process, please visit our web site: www.

Mr. Paul Supple
April 6, 2015
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ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion or the termination of the Agreement, please contact me by phone at (360) 407-6263 or e-mail at cjoh461@ecy.wa.gov.

Sincerely,



Carol Al Johnston
SWRO Toxics Cleanup Program

CAJ: ANF

Enclosures (3 figures, 6 tables):

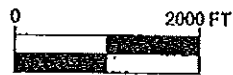
cc: Megan Richard
Elbastony LLC
Rob Olsen, TPCHD
Scott Rose, Ecology
Dolores Mitchell, Ecology

By Certified Mail: 70092250000190352443



R.3 E.

GENERAL NOTES:
 BASE MAP FROM U.S.G.S.
 TACOMA NORTH & SOUTH, WA.
 7.5 MINUTE TOPOGRAPHIC
 REVISED 1994



SCALE 1:24,000



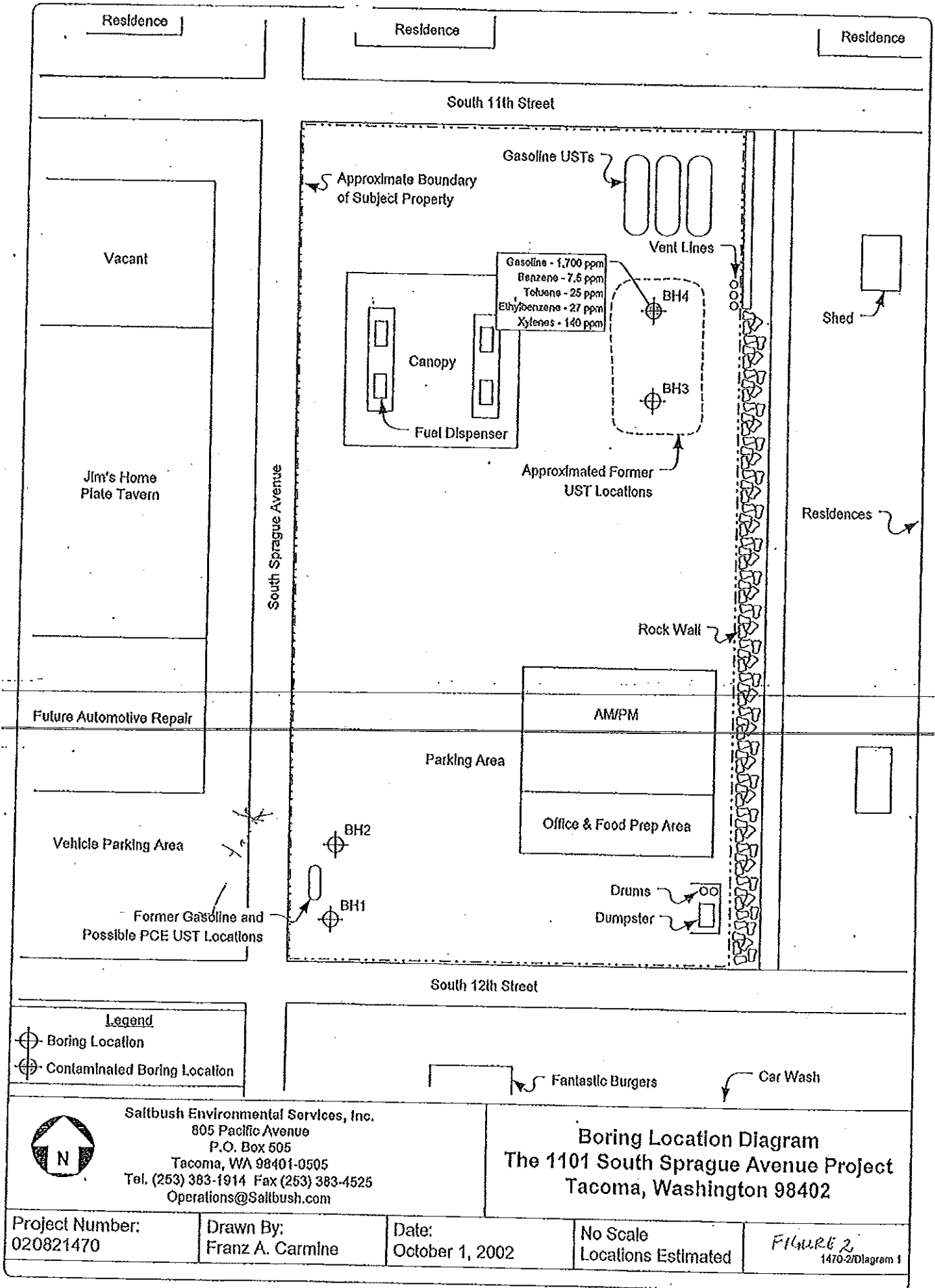
QUADRANGLE LOCATION

FIGURE 1
 SITE LOCATION MAP

ARCO FACILITY NO. 5299
 1101 S. SPRAGUE AVENUE
 TACOMA, WA.

PROJECT NO. AM85-958	DRAWN BY M.L. G/1103
FILE NO. AM85058A	PREPARED BY DAB
REVISION NO. 1	REVIEWED BY





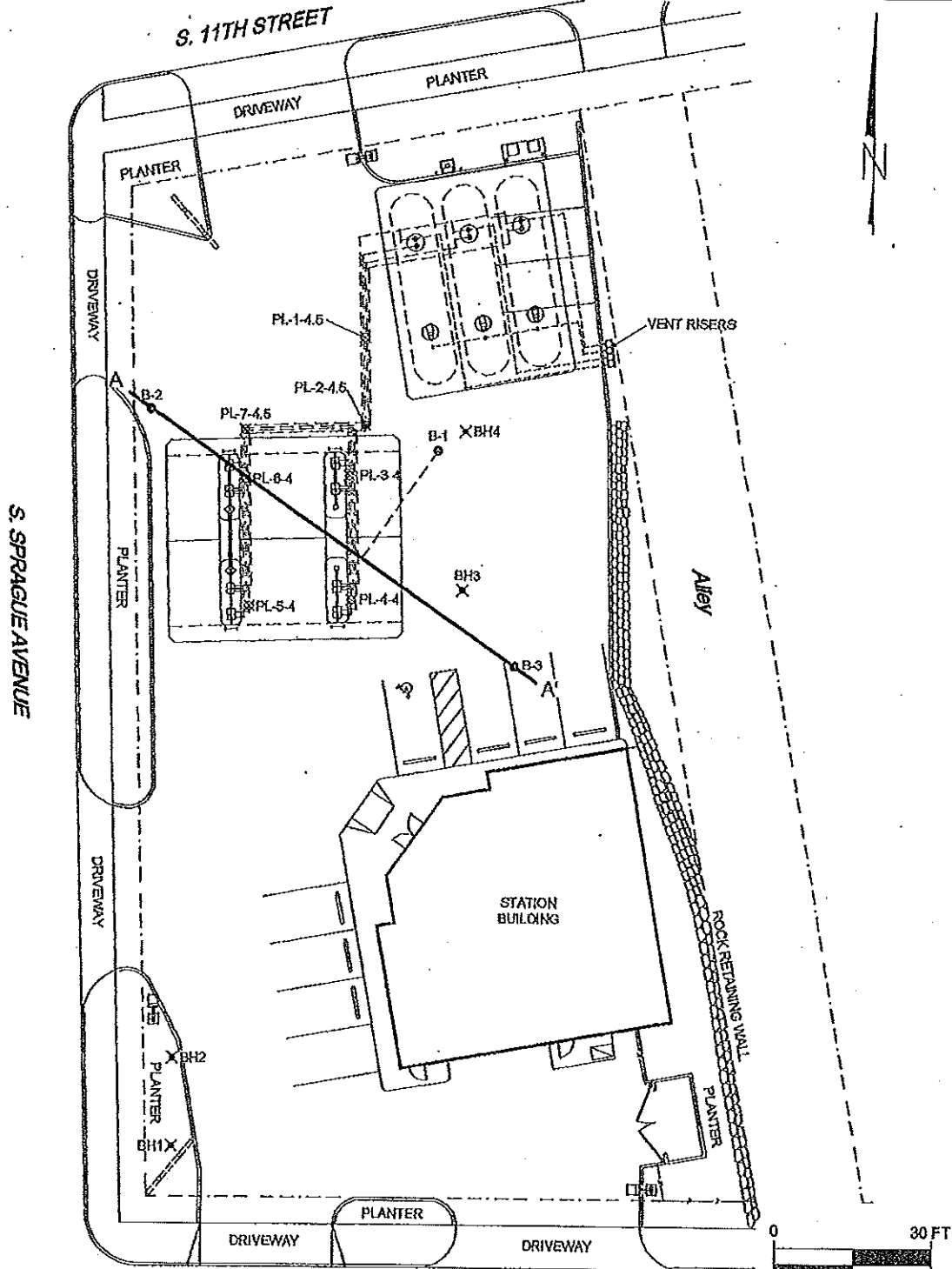
Legend
 ⊕ Boring Location
 ⊕ Contaminated Boring Location



Saltbush Environmental Services, Inc.
 805 Pacific Avenue
 P.O. Box 505
 Tacoma, WA 98401-0505
 Tel. (253) 383-1914 Fax (253) 383-4525
 Operations@Saltbush.com

Boring Location Diagram
The 1101 South Sprague Avenue Project
Tacoma, Washington 98402

Project Number: 020821470	Drawn By: Franz A. Carmine	Date: October 1, 2002	No Scale Locations Estimated	FIGURE 2 1470-2/Diagram 1
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- LEGEND:**
- ☐ HIGH LEVEL LOT LIGHT
 - - - CHAIN LINK FENCE
 - - - PRODUCT PIPING
 - - - VAPOR RECOVERY PIPING
 - - - VENT PIPING
 - B-1 SOIL BORING LOCATION
 - ⊗ PL-1-4.5 PRODUCT LINE SOIL SAMPLE LOCATION
 - ⊗ BH-1 SOIL BORING LOCATION (SALTBUSH ENV. 10/02)
 - A — A' GEOLOGIC CROSS SECTION TRACE (DASHED WHERE PROJECTED)

S. 12TH STREET

FIGURE 3
SITE MAP

ARCO FACILITY NO. 5299
1101 S. SPRAGUE AVENUE
TACOMA, WA.

PROJECT NO. AM85-958	DRAWN BY M.L. 10/31/03
FILE NO. AM85958B	PREPARED BY MRM
REVISION NO. 4	REVIEWED BY



A1 Soil Cleanup Levels: Worksheet for Soil Data Entry; Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 05/25/11
 Site Name: ARCO 5529
 Sample Name: AB-1-10

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc	Composition
	dry basis mg/kg	Ratio %
Petroleum EC Fraction		
AL_EC>5-6	0.0864	0.24%
AL_EC>6-8	0.09	0.25%
AL_EC>8-10	0.045	0.12%
AL_EC>10-12	0.1	0.28%
AL_EC>12-16	1.1	3.03%
AL_EC>16-21	1.1	3.03%
AL_EC>21-34	18	49.60%
AR_EC>8-10	0	0.00%
AR_EC>10-12	0.0847	0.23%
AR_EC>12-16	0.5447	1.50%
AR_EC>16-21	1.1	3.03%
AR_EC>21-34	14	38.58%
Benzene	0.015	0.04%
Toluene	0.0045	0.01%
Ethylbenzene	0.0045	0.01%
Total Xylenes	0.0045	0.01%
Naphthalene	0.00265	0.01%
1-Methyl Naphthalene	0.00265	0.01%
2-Methyl Naphthalene	0.00265	0.01%
n-Hexane	0.0036	0.01%
MTBE	0.00014	0.00%
Ethylene Dibromide (EDB)	0.00014	0.00%
1,2 Dichloroethane (EDC)	0.00014	0.00%
Benzo(a)anthracene	0	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	36.29127	100.00%

Notes for Data Entry Set Default Hydrogeology
 Clear All Soil Concentration Data Entry Cells
 Restore All Soil Concentration Data cleared

REMARK: To prevent double counting, n-Hexane results was subtracted from AL_EC>5-6, ethylbenzene and xylenes were subtracted from AR_EC>8-10, Naphthalene was subtracted AR_EC>10-12, and 1-Methyl Naphthalene and 2-Methyl Naphthalene were subtracted from AR_EC>12-16.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.43	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.13	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.001	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentration (if adjusted):

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

TABLE 1

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 5/25/2011
 Site Name: ARCO 5529
 Sample Name: AB-1-10
 Measured Soil TPH Concentration, mg/kg: 36,291

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,817	1.37E-08	8.17E-03	Pass
	Method C	53,836	2.29E-09	6.75E-04	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	7	5.31E-05	1.00E-01	Fail
	Target TPH GW Conc. @ 500 ug/L	100% NAPL	NA	NA	Pass

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	2,817.26	53,835.74
Most Stringent Criterion	EDB	HI=1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI=1	NO	4.44E+03	1.68E-06	1.00E+00	YES	5.38E+04	3.40E-06	1.00E+00
Total Risk=1E-5	NO	2.64E+04	1.00E-05	5.96E+00	NO	1.58E+05	1.00E-05	2.94E+00
Risk of Benzene= 1E-6	NO	4.39E+04	1.66E-05	9.90E+00	NA			
Risk of cPAHs mixture= 1E-6	NA	NA	NA	NA				
EDB	YES	2.82E+03	1.07E-06	6.34E-01				
EDC	NO	2.63E+06	9.95E-04	5.93E+02				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	Total Risk = 1E-5
Protective Ground Water Concentration, ug/L	2.90
Protective Soil Concentration, mg/kg	6.71

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	NO	6.40E+01	5.72E-04	1.00E+00	5.22E+02
Total Risk = 1E-5	YES	2.90E+00	1.00E-05	2.02E-02	6.71E+00
Total Risk = 1E-6	YES	3.15E-01	1.00E-06	2.06E-03	6.69E-01
Risk of cPAHs mixture= 1E-5	NA	NA	NA	NA	NA
Benzene MCL = 5 ug/L	NO	1.87E+01	1.01E-04	1.85E-01	7.07E+01
MTBE = 20 ug/L	NO	2.05E+02	2.08E-03	4.16E+00	6.01E+04

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 500 ug/L	2.08E+02	2.09E-03	4.19E+00	100% NAPL

TABLE 2

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 05/25/11
 Site Name: ARCO 5299
 Sample Name: AB-2-15

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC>5-6	53.85	16.83%
AL_EC>6-8	110	34.37%
AL_EC>8-10	34	10.62%
AL_EC>10-12	45	14.06%
AL_EC>12-16	0.1	0.03%
AL_EC>16-21	0.55	0.17%
AL_EC>21-34	1.1	0.34%
AR_EC>8-10	18.8	5.87%
AR_EC>10-12	48.99735	15.31%
AR_EC>12-16	1.0947	0.34%
AR_EC>16-21	1.1	0.34%
AR_EC>21-34	1.1	0.34%
Benzene	0.0032	0.00%
Toluene	0.004	0.00%
Ethylbenzene	1.6	0.50%
Total Xylenes	2.6	0.81%
Naphthalene	0.00265	0.00%
1-Methyl Naphthalene	0.00265	0.00%
2-Methyl Naphthalene	0.00265	0.00%
n-Hexane	0.15	0.05%
MTBE	0.00011	0.00%
Ethylene Dibromide (EDB)	0.00011	0.00%
1,2 Dichloroethane (DCE)	0.00011	0.00%
Benzo(a)anthracene	0	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	320.05753	100.00%

Notes for Data Entry Set Default Hydrogeology
 Clear All Soil Concentration Data Entry Cells
 Restore All Soil Concentration Data cleared

REMARK: To prevent double counting, n-Hexane result was subtracted from AL_EC>5-6, ethylbenzene and xylenes were subtracted from AR_EC>8-10, Naphthalene was subtracted AR_EC>10-12, and 1-Methyl Naphthalene and 2-Methyl Naphthalene were subtracted from AR_EC>12-16.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.43	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.13	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.001	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

TABLE 3

Washington State Department of Ecology, Toxics Cleanup Program: Soil Cleanup Level for TPH Sites - Main Data Entry Form and Calculation Summary

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 5/25/2011

Site Name: ARCO 5299

Sample Name: AB-2-15

Measured Soil TPH Concentration, mg/kg: 320.058

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	4,285	1.03E-08	7.47E-02	Pass
	Method C	83,185	1.74E-09	3.85E-03	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	57	2.77E-05	1.39E+00	Fail
	Target TPH GW Conc. @ 500 ug/L	59	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through -7494).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	4,284.63	83,184.83
Most Stringent Criterion	HI=1	HI=1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI=1	YES	4.28E+03	1.38E-07	1.00E+00	YES	8.32E+04	4.52E-07	1.00E+00
Total Risk=1E-5	NO	3.10E+05	1.00E-05	7.25E+01	NO	1.84E+06	1.00E-05	2.21E+01
Risk of Benzene= 1E-6	NO	1.82E+06	5.85E-05	4.24E+02	NA			
Risk of cPAHs mixture= 1E-6	NA	NA	NA	NA				
BDB	NO	3.16E+04	1.02E-06	7.38E+00				
EDC	NO	2.95E+07	9.51E-04	6.89E+03				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	492.01
Protective Soil Concentration, mg/kg	57.47

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	4.92E+02	7.12E-06	1.00E+00	5.75E+01
Total Risk = 1E-5	NO	5.97E+02	1.00E-05	1.17E+00	8.35E+01
Total Risk = 1E-6	YES	8.13E+01	1.00E-06	1.73E-01	7.85E+00
Risk of cPAHs mixture= 1E-5	NA	NA	NA	NA	NA
Benzene MCL = 5 ug/L	NO	9.73E+02	6.80E-05	1.42E+00	100% NAPL
MTBE = 20 ug/L	NO	9.73E+02	6.80E-05	1.42E+00	100% NAPL

Note: 100% NAPL is 64000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 500 ug/L	5.00E+02	7.30E-06	1.01E+00	5.91E+01

TABLE 4

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry; Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 05/25/11
 Site Name: ARCO 5299
 Sample Name: AB-2-30

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc	Composition
	dry basis mg/kg	Ratio %
Petroleum EC Fraction		
AL_EC >5-6	0.0044	0.13%
AL_EC >6-8	0.0044	0.13%
AL_EC >8-10	0.0044	0.13%
AL_EC >10-12	0.05	1.46%
AL_EC >12-16	0.55	16.10%
AL_EC >16-21	0.55	16.10%
AL_EC >21-34	0.55	16.10%
AR_EC >8-10	0	0.00%
AR_EC >10-12	0.0385	1.13%
AR_EC >12-16	0.55	16.10%
AR_EC >16-21	0.55	16.10%
AR_EC >21-34	0.55	16.10%
Benzene	0.00175	0.05%
Toluene	0.0044	0.13%
Ethylbenzene	0.0044	0.13%
Total Xylenes	0.0044	0.13%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0	0.00%
MTBB	0.000145	0.00%
Ethylene Dibromide (EDB)	0.000145	0.00%
1,2 Dichloroethane (EDC)	0.000145	0.00%
Benzo(a)anthracene	0	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	3.417085	100.00%

Notes for Data Entry Set Default Hydrogeology
 Clear All Soil Concentration Data Entry Cells
 Restore All Soil Concentration Data cleared

REMARK: To prevent double counting, ethylbenzene and xylenes were subtracted from AR_EC>8-10.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.43	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.13	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.001	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

Washington State Department of Ecology, Toxics Cleanup Program: Soil Cleanup Level for TPH Sites - Main Data Entry Form and Calculation Summary

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750.

Site Information

Date: 5/25/2011

Site Name: ARCO 5299

Sample Name: AB-2-30

Measured Soil TPH Concentration, mg/kg: 3.417

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	256	1.35E-08	1.17E-03	Pass
	Method C	15,021	2.27E-09	9.58E-05	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	1	5.25E-05	2.23E-02	Fail
	Target TPH GW Conc. @ 500 ug/L	22,230	NA	NA	Pass

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	256.12	15,020.79
Most Stringent Criterion	EDB	Total Risk=1E-5

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI=1	NO	2.91E+03	1.15E-05	1.00E+00	NO	3.57E+04	2.37E-05	1.00E+00
Total Risk=1E-5	NO	2.54E+03	1.00E-05	8.72E-01	YES	1.50E+04	1.00E-05	4.21E-01
Risk of Benzene= 1E-6	NO	3.55E+04	1.40E-04	1.22E+01	NA			
Risk of cPAHs mixture= 1E-6	NA	NA	NA	NA				
EDB	YES	2.56E+02	1.01E-06	8.80E-02				
EDC	NO	2.39E+05	9.42E-04	8.22E+01				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	Total Risk= 1E-5
Protective Ground Water Concentration, ug/L	1.83
Protective Soil Concentration, mg/kg	0.64

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	NO	1.79E+02	3.59E-03	1.00E+00	2.91E+02
Total Risk= 1E-5	YES	1.83E+00	1.00E-05	5.01E-03	6.43E-01
Total Risk= 1E-6	YES	1.46E-01	1.00E-06	4.36E-04	6.49E-02
Risk of cPAHs mixture= 1E-5	NA	NA	NA	NA	NA
Benzene MCL = 5 ug/L	NO	8.63E+01	8.48E-04	3.08E-01	5.68E+01
MTBE = 20 ug/L	NO	3.22E+02	1.10E-02	2.89E+00	2.17E+03

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 500 ug/L	5.00E+02	1.55E-02	4.29E+00	2.22E+04

