STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

December 21, 2009

Mr. Jeff Ahner
Frito Lay, Vancouver
4804 NW Fruit Valley Road
Vancouver, Washington 98660

Re: Further Action at the following Site:

- **Site Name:** Frito-Lay Vancouver
- **Site Address:** 4804 NW Fruit Valley Road, Vancouver, Washington 98660
- **Facility/Site No.:** 81587474
- **VCP Project No.:** SW1024

Dear Mr. Ahner:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your independent cleanup of the Frito-Lay Vancouver 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?

YES. Ecology has determined that 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 hydrocarbons and metals into the soil.

Enclosure A includes a detailed description and diagram of the Site, as currently known to Ecology. 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. Environmental Health Management, Inc., **Frito-Lay, Vancouver Processing Facility, Hydraulic Lift Area Soil Cleanup Project, Remedial Activity Report, Project Number 13001,** dated March 30, 2009.

2. Environmental Health Management, Inc., **Frito-Lay, Vancouver, Washington, Hydraulic Lift Area Petroleum Release, Remedial Investigation Workplan, Project Number 13002,** dated April 3, 2009.

3. Environmental Health Management, Inc., **Frito-Lay, Vancouver, Washington, Hydraulic Lift Area Petroleum Release, Remedial Investigation Report, Project Number 13002,** dated August 5, 2009. (EHM August 2009)

Those documents are kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. You can 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 **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 Site is described above and in **Enclosure A.**]

The applicant has satisfactorily defined the total petroleum hydrocarbon diesel and oil range soil contamination on the Site. The applicant has provided analytical information and analysis interpretation to demonstrate the groundwater was not impacted by the diesel and oil soil contamination (See Figure 4)

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.

In May 2009, Environmental Health Management, Inc. (EHM) conducted extractable petroleum hydrocarbon/volatile petroleum hydrocarbon fractionation analysis on the Site soils. Based on the analytical results from one soil sample, FL-07-2, collected at a depth of 1 foot below ground surface (bgs), EHM calculated a Method B total petroleum hydrocarbon (TPH) soil cleanup level (CUL) using the MTCATPH11.1 Excel workbook (see A2. 1B). EHM derived a TPH Method B Soil CUL protective of human health of 15,532 milligrams per kilogram (mg/kg). EHM provided an additional vertical migration calculation based on diffusion factors that demonstrated a diesel soil concentration of 2,000 mg/kg was achieved at 13.2 feet bgs (see Vertical Attenuation Estimate); 2,000 mg/kg is also the MTCA Method A CUL for diesel-range organics.

EHM also collected one groundwater sample from soil boring FL-07. Groundwater at that location was encountered at approximately 30 feet bgs. The extractable petroleum hydrocarbon/volatile petroleum hydrocarbon fractionation analysis was performed on the groundwater sample and the results indicated groundwater had a TPH concentration of 1,400 micrograms per liter (µg/l) in the C31-C34 range; no other range appeared to be impacted. The field blank also had a concentration of 600 µg/l in the same range. The result was attributed to exhaust emissions from plant machinery operating in the vicinity of the sample location. The sum TPH concentration derived from the groundwater fractionation analysis was 1,715 µg/l (see B). Using the MTCATPH11.1 Excel workbook, EHM calculated a groundwater Method B CUL protective of human health of 2,944 µg/l (see A2. 2).

Standard points of compliance are being used for the Site. The point of compliance for protection of groundwater will be established in the soils throughout the Site. For soil cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance shall be established in the soils throughout the Site from the ground surface to 15 feet bgs. In addition, the point of compliance for the groundwater is established throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest most depth that could potentially be affected by the Site.

3. Selection of cleanup action.

Ecology has determined the cleanup action you selected for the Site does not meet the substantive requirements of MTCA.

Cleanup Actions conducted to date have included excavation and off-Site disposal of accessible petroleum-contaminated soil (PCS). Residual PCS in excess of MTCA CULs remain in place beneath the hydraulic lift. Frito Lay has expressed a desire to manage the remainder of this contamination in place under an Environmental Covenant, which may be appropriate for this Site. However, before Ecology could consider approving a deed restriction for the site, a Feasibility Study [refer to WAC 173-340-350(8)] and Disproportionate Cost Analysis [refer to WAC 173-340-360(3)(e) and (f)] should be generated to identify all of the potential cleanup alternatives for the Site, including in-situ treatment and/or containment of the contamination, and the estimated costs of those alternatives.

Permanent solutions should be implemented to the maximum extent practicable. Permanent solutions (cleanup actions) are actions in which cleanup standards can be met without further action being required, such as monitoring or institutional controls. To select the most practicable permanent solution from among those cleanup action alternatives that are protective of human health and the environment requires conducting a disproportionate cost analysis. This analysis compares costs and benefits of alternatives and selecting the alternative whose incremental costs are not disproportionate to the incremental benefits. The comparison is quantitative, but is often qualitative and requires best professional judgment. Should it be determined that a permanent cleanup action cannot be implemented, a Disproportionate Cost Analysis shall be applied. The analysis shall compare costs and benefits of the cleanup action alternatives evaluated in the Feasibility Study.

4. Cleanup.

Ecology has determined the cleanup you performed does not meet any cleanup standards at the Site.

In December 2004, EHM characterized the soil in the area west of the hydraulic lift and removed all PCS in that area to a depth of 3 feet bgs. At 3 feet bgs the excavation encountered a silt and clay layer that extended across the bottom of the excavation. The soil contamination did not penetrate any appreciable distance into the layer, which was determined to be at least 10 feet in thickness. The soil samples were analyzed for ethylene dibromide, metals, pesticides, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, and total petroleum hydrocarbons in the gasoline, diesel, and oil range. Metals and petroleum hydrocarbon contamination was found in the Site soil above their respective MTCA Method A CULs for unrestricted uses. Once the contaminated soil was removed, the excavation sidewalls and bottom were sampled to confirm metals and petroleum hydrocarbon contamination was removed to below the MTCA Method CULs. Approximately 248 tons of PCS was excavated and transported to an off-Site disposal facility in Hillsboro, Oregon. Clean backfill was used to fill in the excavation and was then capped with concrete and the area was returned to service.

In January 2005, EHM characterized the soil under the hydraulic lift, identifying metals-contaminated soil (MCS) and PCS above their respective MTCA Method A CULs. No MCS or PCS was removed from this area due to limited access issues. The highest soil contamination values measured under the hydraulic lift were 4,790 mg/kg for diesel at Boring 13 and 16,900 mg/kg for oil at Boring 17. The deepest soil sample was collected from Boring 17 at 36 inches bgs. Metals analysis indicated that cadmium was just above the MTCA Method A CUL of 2 mg/kg, the highest concentration came from boring location 6-2 with a concentration of 2.532 mg/kg collected at 1.5 feet bgs. A 10-inch wide slurry wall was installed along the west side of the hydraulic lift to prevent the horizontal migration of the contamination into the western area that was previously remediated and the silt and clay layer inhibits the vertical migration of the contaminants.

The area around the hydraulic lift is capped with concrete and asphalt pavement that significantly reduces storm water infiltration. The EHM August 2009 report recommended the use of inspection and maintenance programs to maintain these caps and minimize stormwater infiltration, minimizing the potential to mobilize soil contaminants; however, no formal plan or analysis of cleanup alternatives has been presented to Ecology for review. As stated earlier, Ecology will need to review a Feasibility Study and Disproportionate Cost Analysis prior to approving any proposal that will allow contaminated soil to remain on Site.

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).

Contact Information

Thank you for choosing to clean up the Site under the Voluntary Cleanup Program (VCP). After you have addressed our concerns, you may request another review of your cleanup. Please do not hesitate to request additional services as your cleanup progresses. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion, please contact me by phone at (360) 407-7404 or e-mail at erad461@ecy.wa.gov.

Sincerely,

Eugene Radcliff, L.G.
Site Manager
SWRO Toxics Cleanup Program

GER: [SECRETARY INITIALS]

Enclosures (14):

A – Description and Diagrams of the Site	
Figure 1	Location Map
Figure 3	Sample Location Detail
Figure 4	Geologic Cross-Section, N/S Alignment
Table 1	Site Characterization Results
Table 2	Confirmation Samples, Metals & Petroleum Hydrocarbon Results
Table 2a	Soil Analytical Results
Table 2b	Soil Analytical Results
Table 3	Confirmation Samples, PAHs, Solids, and Other Organic Results
Table 3	Groundwater Analytical Results
Table 4	Residual Contamination Samples
A2. 1B	Worksheet for Calculating Soil Cleanup Levels
A2. 2	Worksheet for Calculating Soil Cleanup Level for Protection of Ground Water Quality (Leaching Pathway)
B	Worksheet for Calculating Ground Water Cleanup Levels
Vertical Attenuation Estimate	

By certified mail: (7009 1410 0002 4420 0310)

cc: Mr. John Ruddick, Environmental Health Management, Inc.
Mr. Bryan DeDoncker, Clark Co Health
Scott Rose – Ecology
Dolores Mitchell – Ecology (without enclosures)

Enclosure A

Description and Diagrams of the Site

Site Description

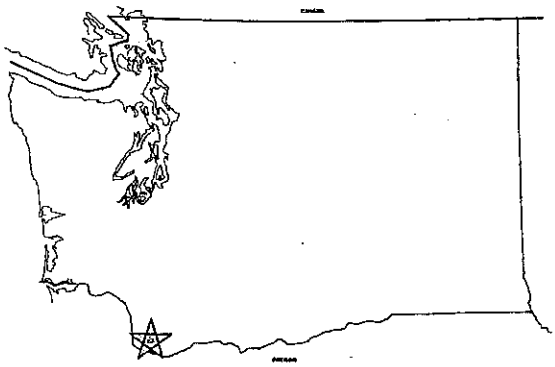
Media of Concern: Soil

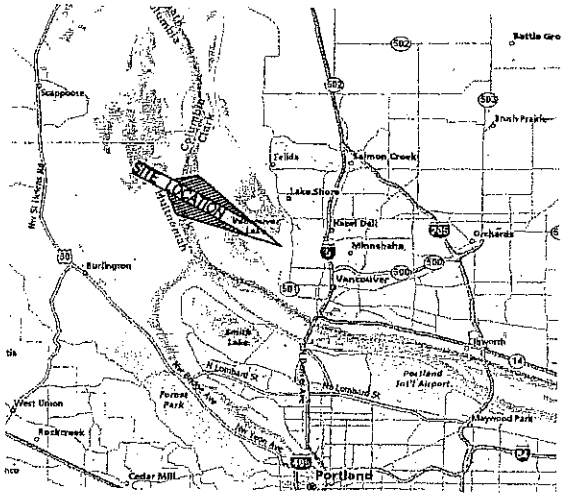
The Frito-Lay Vancouver facility (Site) is located at 4808 NW Fruit Valley Road in Vancouver, Clark County, Washington (see Figure 1). The Site has been used for agricultural purposes since at least the late-1800s until the 1970s when it began operations under Frito-Lay. The parcel on which facility is located encompasses approximately 17 acres and most of the parcel is covered by impervious surface. The Site is bordered on the east by NW Fruit Valley Road, on the south by agricultural land, on the west by undeveloped land and a parking lot, and on the north by semi-developed and undeveloped land. The Site is currently used as a food processing facility. The Clark County Assessor's office notes the Frito-Lay property has an assigned tax parcel number of 6727033.

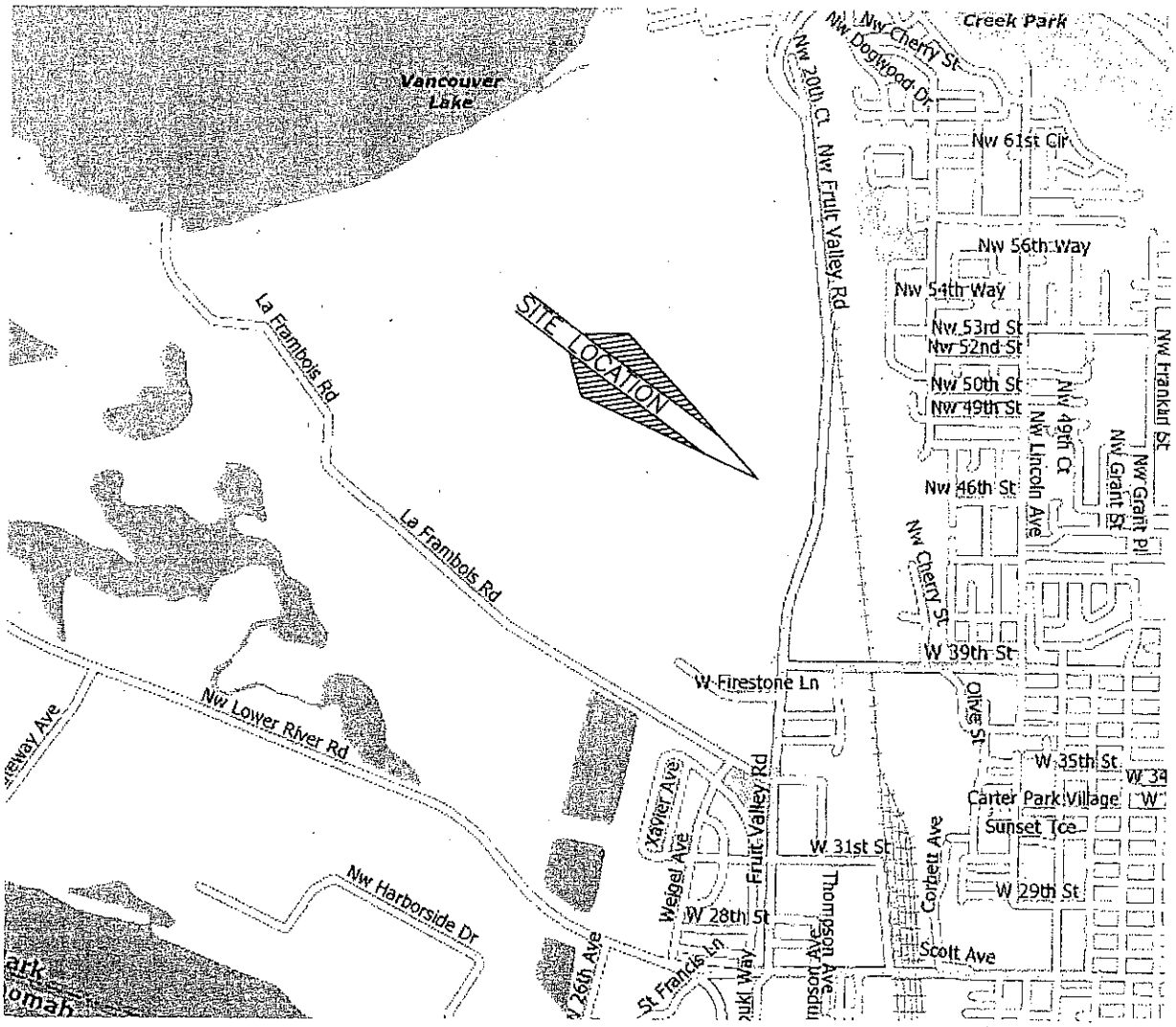
During a pavement removal project in 2004, Frito-Lay personnel discovered total petroleum hydrocarbons in the diesel range (TPH-D) and oil range (TPH-O). The spill was attributed to a 1991 spill that occurred as a result of a failure and collapse of the hydraulic lift, spilling diesel fuel from the vehicle that was on the lift and oil presumably from the lift itself. An estimated 300 gallon mixture of diesel fuel and hydraulic fluid was reportedly released. Soil cleanup activities were completed in the area west of the hydraulic lift in 2004. During subsequent investigation and cleanup activities in 2004 and 2005, Frito-Lay discovered that TPH-D and TPH-O soil contamination above the MTCA Method A Cleanup Level (CUL) for unrestricted uses was present under the hydraulic lift area (see Tables 1, 2, 3, and 4).

On May 26, 2009, EHM conducted soil and groundwater sampling around the hydraulic lift to complete contamination delineation activities. EHM collected and analyzed 11 soil samples for TPH as gasoline, TPH-D, and TPH-O; no sample analytical result exceeded their respective MTCA Method A CUL (see Figure 3). Soil sample FL-07-2 had detectable diesel and oil range contamination and the soil sample and groundwater collected from the boring was further analyzed via the extractable petroleum hydrocarbon/volatile petroleum hydrocarbon fractionation analysis (see Table 2a and 2b, and A2. 1B and B Worksheets).

The Site is located in the Portland Basin. The underlying rocks are mostly Eocene and Miocene age volcanic and sedimentary rocks that are overlain by the Troutdale formation, Pleistocene-Holocene alluvium and finally by Pleistocene glacial flood deposits. The soils overlying the flood deposits are described as gray, dense sands grading up to brown clay/silt surface layers ranging in depth from 10 feet below ground surface (bgs) to 35 ft bgs. Groundwater was measured in FL-07 to be 28.6 feet bgs. The direction of groundwater flow beneath the Site has not been determined; however, based on surface topography, groundwater flow appears to be to the west.

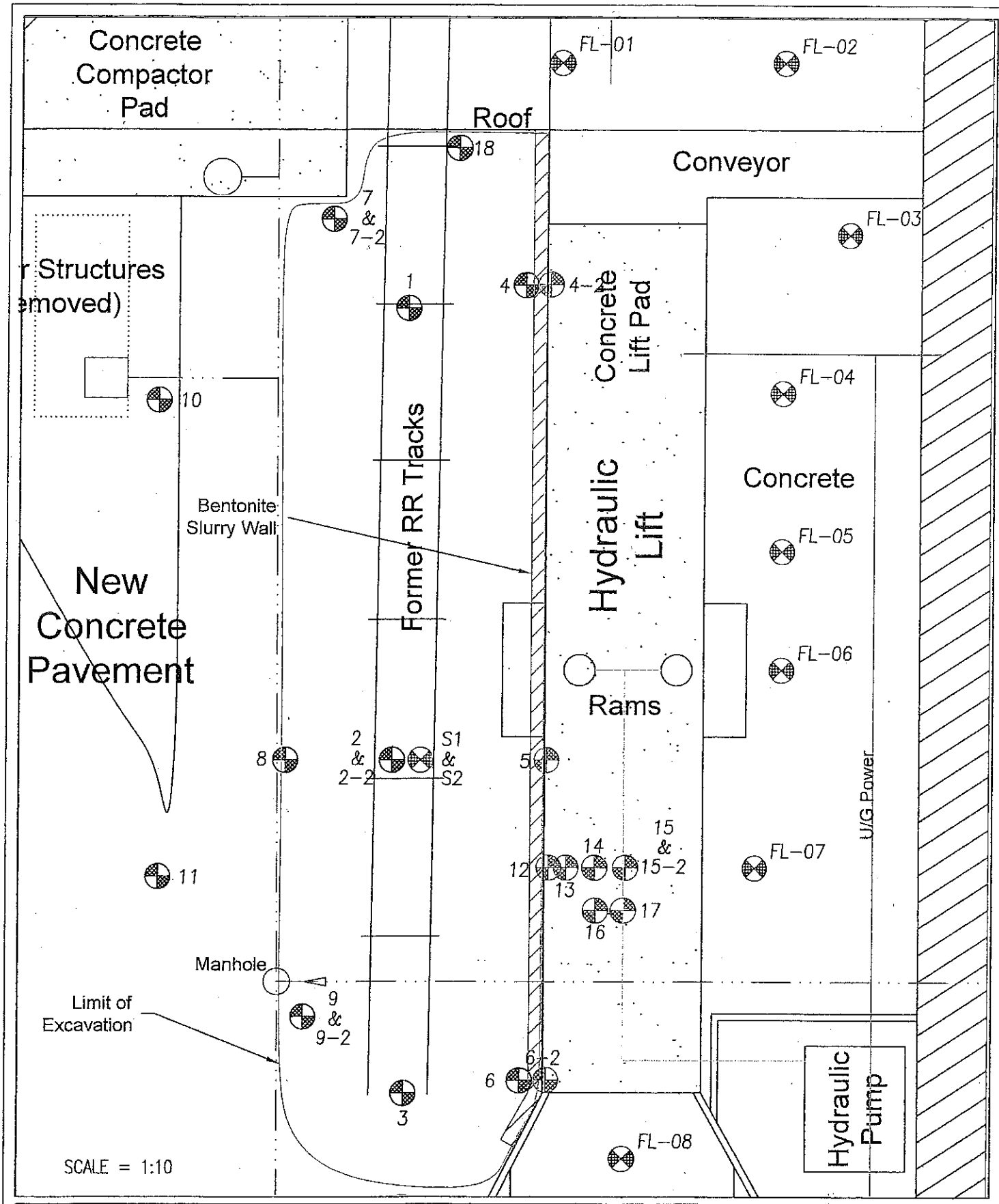






ENVIRONMENTAL HEALTH MANAGEMENT, Inc PO BOX 1746 Lake Oswego, Oregon 97035 (503) 287-4620	DRAWN BY: KIM APPROVED BY: JHR DATE: 3/26/09 JOB NO.: 13002	FRITO LAY – Vancouver Hydraulic Lift Area Investigation Location Map

FIGURE 1



ENVIRONMENTAL HEALTH MANAGEMENT, INC.
PO Box 1746
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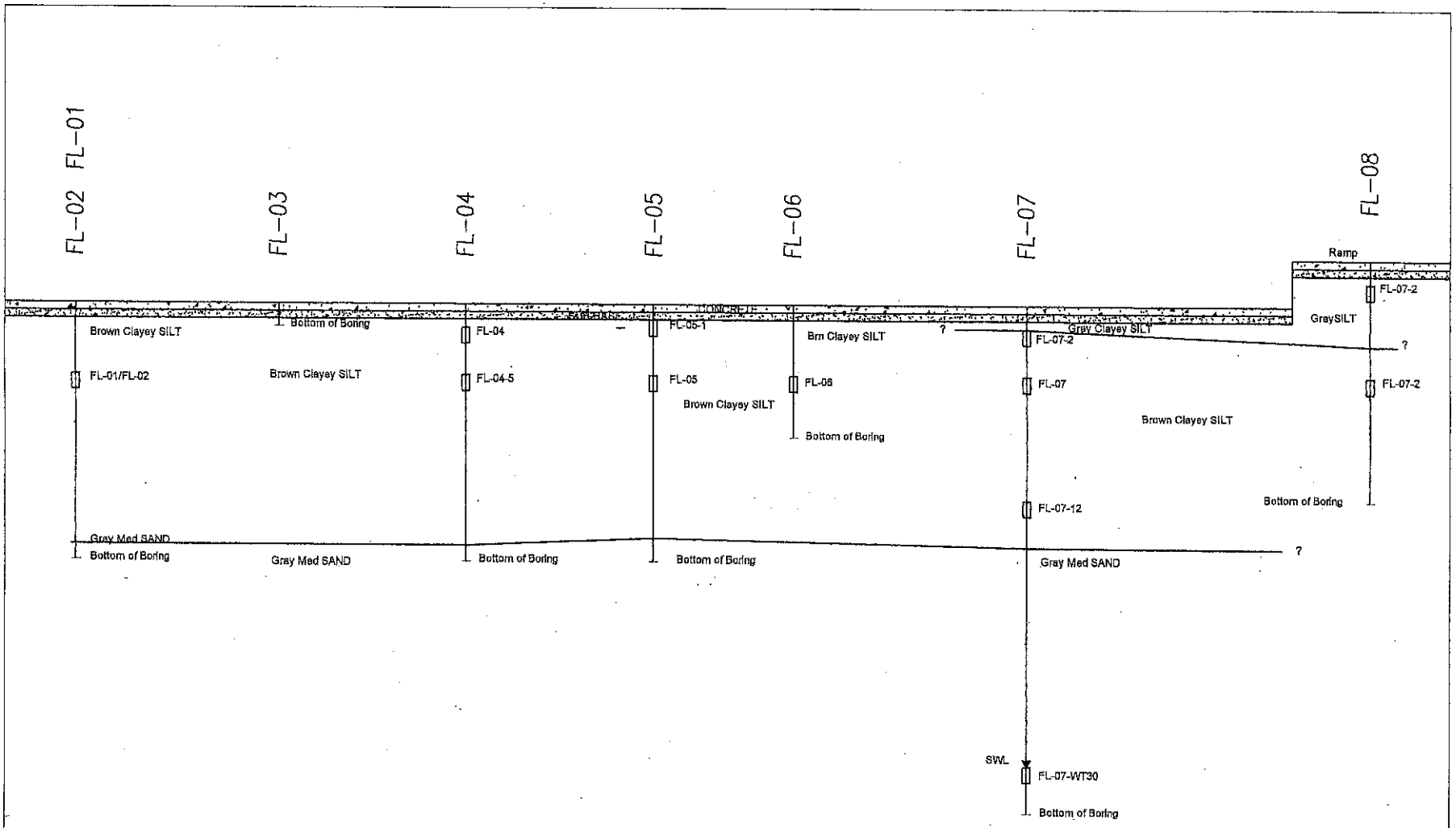
(503) 287-4620

DRAWN BY: KIM
APPROVED BY: JHR
DATE: 7/2/09
JOB NO.: 13002

FRITO-LAY, VANCOUVER, WA
Hydraulic Lift Area Investigation
Sample Location Detail

FIGURE 3



ENVIRONMENTAL HEALTH MANAGEMENT, Inc.
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(503) 287-4620

Geologic Cross—Section N/S Alignment

DRAWN BY:	JHR
APPROVED BY:	JHR
DATE:	7/19/09
PROJECT NO.:	13002

Frito Lay
Vancouver, Washington
Hydraulic Lift Investigation

FIGURE 4

TABLE 1:

FRITO-LAY
Hydraulic Lift Area Soil Cleanup Project
Site Characterization Results

Sample ID:		S-1	S-2	S-3	Rainwater	
Sample Date:	Units	12/28/2004	12/28/2004	12/28/2004	Units	12/28/2004
Metals, TCLP						
Arsenic	mg/L	0.500 U	N/A	N/A		N/A
Barium	mg/L	0.504	N/A	N/A		N/A
Cadmium	mg/L	0.100 U	N/A	N/A		N/A
Chromium	mg/L	0.150 U	N/A	N/A		N/A
Lead	mg/L	0.390 U	N/A	N/A		N/A
Mercury	mg/L	0.170 U	N/A	N/A		N/A
Selenium	mg/L	0.630 U	N/A	N/A		N/A
Silver	mg/L	0.130 U	N/A	N/A		N/A
Metals, Total						
Arsenic	mg/Kg	N/A	N/A	N/A		N/A
Cadmium	mg/Kg	N/A	N/A	N/A		N/A
Chromium	mg/Kg	N/A	N/A	N/A		N/A
Lead	mg/Kg	N/A	N/A	N/A		N/A
Mercury	mg/Kg	N/A	N/A	N/A		N/A
Chromium VI	mg/Kg	N/A	N/A	N/A		N/A
Petroleum						
NWTPH-Gx	mg/Kg	N/A	N/A	N/A		N/A
NWTPH-Dx Diesel	mg/Kg	N/A	N/A	N/A		N/A
NWTPH-Dx Oil	mg/Kg	N/A	N/A	N/A		N/A
NC6-12 Gas	mg/Kg	N/A	N/A	N/A		N/A
NC>12-22 Diesel	mg/Kg	N/A	N/A	N/A		N/A
NC>22-35 Lube Oil	mg/Kg	N/A	N/A	N/A		N/A
NC>35-40 Heavy Oil	mg/Kg	N/A	N/A	N/A		N/A
Total HC (418.1)	mg/Kg	4,700	235.1	265.4		N/A
PAHs						
Acenaphthene	mg/Kg	50 U	N/A	N/A		N/A
Acenaphthylene	mg/Kg	50 U	N/A	N/A		N/A
Anthracene	mg/Kg	50 U	N/A	N/A		N/A
Benzo(a)anthracene	mg/Kg	50 U	N/A	N/A		N/A
Benzo(a)pyrene	mg/Kg	50 U	N/A	N/A		N/A
Benzo(b)fluoranthene	mg/Kg	50 U	N/A	N/A		N/A
Benzo(g,h,i)perylene	mg/Kg	50 U	N/A	N/A		N/A
Benzo(k)fluoranthene	mg/Kg	50 U	N/A	N/A		N/A
Chrysene	mg/Kg	50 U	N/A	N/A		N/A
Dibenzo(a,h)anthracene	mg/Kg	50 U	N/A	N/A		N/A
Fluoranthene	mg/Kg	50 U	N/A	N/A		N/A
Fluorene	mg/Kg	50 U	N/A	N/A		N/A
Indeno(1,2,3-c,d)pyrene	mg/Kg	50 U	N/A	N/A		N/A
Naphthalene	mg/Kg	50 U	N/A	N/A		N/A
Phenanthrene	mg/Kg	50 U	N/A	N/A		N/A
Pyrene	mg/Kg	50 U	N/A	N/A		N/A
Volatile Organics						
EDB	mg/Kg [1]	0.003 U	N/A	N/A		N/A
Other	mg/Kg [1]	0.01 U	N/A	N/A	mg/L	0.100 U
Pesticides						
Lindane	mg/Kg	0.01 U	N/A	N/A		N/A
DDT	mg/Kg	0.01 U	N/A	N/A		N/A
PCBs						
Total PCBs	mg/Kg	0.05 U	N/A	N/A		N/A
Solids						
Total Solids	% (w/w)	N/A	N/A	N/A		N/A

Notes: 1) EDB and Volatile Organics incorrectly reported in mg/L by laboratory for sample S-1.

U = not detected at the limit of detection shown

N/A = Not analyzed for this analyte

TABLE 2:

FRITO-LAY
Hydraulic Lift Area Soil Cleanup Project
Confirmation Samples
Metals and Petroleum Hydrocarbon Results

Sample ID:		EPA PRG[a]		Ecology Human Health[b]			1	2	2-2	3	4	6
Sample Date:	**Units**	Residential	Industrial	Method A	Method B	B Industrial	12/30/2004	12/30/2004	1/7/2005	12/30/2004	12/30/2004	12/30/2004
Metals, TCLP												
Arsenic	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.500 U	N/A	N/A	N/A
Barium	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	2.106	N/A	N/A	N/A
Cadmium	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.100 U	N/A	N/A	N/A
Chromium	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.300	N/A	N/A	N/A
Lead	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.390 U	N/A	N/A	N/A
Mercury	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.170 U	N/A	N/A	N/A
Selenium	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.630 U	N/A	N/A	N/A
Silver	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.130 U	N/A	N/A	N/A
Metals, Total												
Arsenic [c]	mg/Kg	0.39	1.6	20	20	0.67	N/A	N/A	6.786	N/A	N/A	N/A
Barium	mg/Kg	5,400	67,000	N/E	N/E	5,600	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	mg/Kg	37	450	2	2	80	N/A	N/A	1.501	N/A	N/A	N/A
Chromium [d]	mg/Kg	100,000	10,000	2,000	2,000	120,000	N/A	N/A	20.084	N/A	N/A	N/A
Lead	mg/Kg	400	800	250	1,000	N/E	N/A	N/A	10.548	N/A	N/A	N/A
Mercury	mg/Kg	23	310	2.0	2.0	24	N/A	N/A	0.170 U	N/A	N/A	N/A
Selenium	mg/Kg	390	5,100	N/E	N/E	400	N/A	N/A	N/A	N/A	N/A	N/A
Silver	mg/Kg	390	5,100	N/E	N/E	400	N/A	N/A	N/A	N/A	N/A	N/A
Chromium (VI)	mg/Kg	30	64	19	19	240	N/A	N/A	0.20 U	N/A	N/A	N/A
Petroleum												
NWTPH-Gx	mg/Kg	N/E	N/E	30/100	30/100	N/E	N/A	N/A	N/A	N/A	N/A	N/A
NWTPH-Dx Diesel	mg/Kg	N/E	N/E	2,000	2,000	N/E	25.0 U	25.0 U	N/A	25.0 U	158	56.9
NWTPH-Dx Oil	mg/Kg	N/E	N/E	2,000	2,000	N/E	50.0 U	72.4	N/A	50.0 U	565	245
NC6-12 Gas	mg/Kg	N/E	N/E	30/100	30/100	N/E	N/A	N/A	50 U	N/A	N/A	N/A
NC>12-22 Diesel	mg/Kg	N/E	N/E	2,000	2,000	N/E	N/A	N/A	50 U	N/A	N/A	N/A
NC>22-35 Lube Oil	mg/Kg	N/E	N/E	2,000	2,000	N/E	N/A	N/A	50 U	N/A	N/A	N/A
NC>35-40 Heavy Oil	mg/Kg	N/E	N/E	2,000	2,000	N/E	N/A	N/A	50 U	N/A	N/A	N/A
NC6-40 Total HC	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	50 U	N/A	N/A	N/A

Notes:

[a] EPA Region IX 2004 Preliminary Remedial Goals (PRGs)

[b] CLARC Version 3.1 Spreadsheet Soil Values

[c] Arsenic background concentrations in Vancouver are typically > Human health risk-based criteria but generally less than 8.0 mg/Kg.

[d] Total chromium oxidation states not determined. PRGs and MTCA values are for Cr (III)

U = not detected at the limit of detection shown

N/E = Criterion not established for this analyte

N/A = Not analyzed for this analyte

Analytes exceeding one or more MTCA criterion are highlighted in RED.

TABLE 2:

FRITO-LAY
Hydraulic Lift Area Soil Cleanup Project
Confirmation Samples
Metals and Petroleum Hydrocarbon Results

Sample ID:	7	7-2	8	9	9-2	18
Sample Date:	1/3/2005	1/7/2005	1/3/2005	1/3/2005	1/7/2005	1/12/2005
Metals, TCLP						
Arsenic	N/A	0.500 U	N/A	N/A	0.500 U	0.500 U
Barium	N/A	1.442	N/A	N/A	0.300	0.100 U
Cadmium	N/A	0.100 U	N/A	N/A	0.100 U	0.100 U
Chromium	N/A	0.216	N/A	N/A	0.160	0.150 U
Lead	N/A	0.390 U	N/A	N/A	0.390 U	0.390 U
Mercury	N/A	0.170 U	N/A	N/A	0.170 U	0.170 U
Selenium	N/A	0.630 U	N/A	N/A	0.630 U	0.630 U
Silver	N/A	0.130 U	N/A	N/A	0.130 U	0.130 U
Metals, Total						
Arsenic [c]	N/A	0.500 U	N/A	N/A	3.080	0.50 U
Barium	N/A	N/A	N/A	N/A	N/A	151.51
Cadmium	N/A	1.396	N/A	N/A	1.112	1.065
Chromium [d]	N/A	7.968	N/A	N/A	14.007	14.401
Lead	N/A	3.554	N/A	N/A	5.872	12.548
Mercury	N/A	0.170 U	N/A	N/A	0.170 U	0.17 U
Selenium	N/A	N/A	N/A	N/A	N/A	0.63 U
Silver	N/A	N/A	N/A	N/A	N/A	0.346
Chromium (VI)	N/A	N/A	N/A	N/A	N/A	N/A
Petroleum						
NWTPH-Gx	4.00 U	N/A	N/A	4.00 U	N/A	4.0 U
NWTPH-Dx Diesel	55.1	N/A	25.0 U	54.5	N/A	41.4 U
NWTPH-Dx Oil	124.0	N/A	83.2	257.0	N/A	82.9 U
NC6-12 Gas	N/A	50 U	N/A	N/A	50 U	50 U
NC>12-22 Diesel	N/A	50 U	N/A	N/A	50 U	50 U
NC>22-35 Lube Oil	N/A	50 U	N/A	N/A	1,360	50 U
NC>35-40 Heavy Oil	N/A	50 U	N/A	N/A	110	50 U
NC6-40 Total HC	N/A	50 U	N/A	N/A	1,470	50 U

TABLE 2a:
Frito-Lay Vancouver
Soil Analytical Results
(mg/Kg)

Sample ID:	FL-01	FL-02	FL-04	FL-04-5	FL-05-1	FL-05	FL-06	FL-07-2	FL-07	FL-08-2	FL-08
Sample Date:	5/26/2009	5/26/2009	5/26/2009	5/26/2009	5/26/2009	5/26/2009	5/26/2009	5/26/2009	5/26/2009	5/26/2009	5/26/2009
Sample Depth (Feet below ground surface):	5.0	5.0	2.0	5.0	1.0	5.0	5.0	2.0	5.0	2.0 c	8.0 c
NWTPH Petroleum Hydrocarbons (mg/Kg)											
Gasoline	3.09 U	3.10 U	3.04 U	3.03 U	-	-	-	-	-	-	-
Diesel[b]	6.1	11.7	12.0	6.6	22.6	9.3	11.0	266	10.3	18.9 U	18.8 U
Lube Oil	61.7 U	62.0 U	60.8 U	60.6 U	80.4	61.7 U	63.1 U	957	60.9 U	63.1 U	62.5 U
Extractable Petroleum Hydrocarbons (EPH)											
>nC8-nC10 Aliphatic	-	-	-	-	-	-	-	6.20 U	-	-	-
>nC10-nC12 Aliphatic	-	-	-	-	-	-	-	6.20 U	-	-	-
>nC10-nC12 Aromatic	-	-	-	-	-	-	-	6.20 U	-	-	-
>nC12-nC16 Aliphatic	-	-	-	-	-	-	-	59.8	-	-	-
>nC12-nC16 Aromatic	-	-	-	-	-	-	-	6.20 U	-	-	-
>nC16-nC21 Aliphatic	-	-	-	-	-	-	-	170	-	-	-
>nC16-nC21 Aromatic	-	-	-	-	-	-	-	46.3	-	-	-
>nC21-nC34 Aliphatic	-	-	-	-	-	-	-	1,780	-	-	-
>nC21-nC34 Aromatic	-	-	-	-	-	-	-	120	-	-	-
Volatile Petroleum Hydrocarbons (VPH)											
Benzene	-	-	-	-	-	-	-	0.062 U	-	-	-
Toluene	-	-	-	-	-	-	-	0.062 U	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	0.062 U	-	-	-
Xylenes, Total	-	-	-	-	-	-	-	0.062 U	-	-	-
n-Hexane	-	-	-	-	-	-	-	0.31 U	-	-	-
C5-C6 Aliphatic	-	-	-	-	-	-	-	1.5 U	-	-	-
>C6-C8 Aliphatic	-	-	-	-	-	-	-	1.5 U	-	-	-
>C8-C10 Aliphatic	-	-	-	-	-	-	-	1.5 U	-	-	-
>C8-C10 Aromatic	-	-	-	-	-	-	-	1.5 U	-	-	-
>C10-C12 Aliphatic	-	-	-	-	-	-	-	1.5 U	-	-	-
>C10-C12 Aromatic	-	-	-	-	-	-	-	5.2	-	-	-
>C12-C13 Aromatic	-	-	-	-	-	-	-	6.7	-	-	-
Sheen Test	Neg	Neg	Neg	Neg	Pos	Neg	Neg	Pos	Neg	Neg	Neg
Color/Odor	None/None	None/None	None/None	None/None	Gray/HC	None/None	None/None	Gray/HC	None/None	Gray/None	None/None
Headspace by PID (ppmv)[a]	0.1	0.1	0.1	0.1	0.2	0.1	0.4	0.7	0.1	0.4	0.2

[a] Headspace vapor concentration - parts per million by volume as isobutylene

[b] Diesel concentrations are adjusted for 20.2 mg/Kg Diesel detected in the laboratory method blank

TABLE 2b:
Frito-Lay Vancouver
Soil Analytical Results
(mg/Kg)

Sample ID:	FL-07-2	
Sample Date:	5/26/2009	
Polycyclic Aromatics		
1-Methylnaphthalene	**0.0504**	
2-Methylnaphthalene	**0.0620**	
Acenaphthene	0.00827	U
Acenaphthylene	0.00827	U
Anthracene	0.00827	U
Benzo(a)anthracene	0.00827	U
Benzo(a)pyrene	0.00827	U
Benzo(b)fluoranthene	0.00827	U
Benzo(g,h,i)perylene	0.00827	U
Benzo(k)fluoranthene	0.00827	U
Chrysene	0.00827	U
Dibenzo(a,h)anthracene	0.00827	U
Fluoranthene	0.00827	U
Fluorene	**0.0107**	
Indeno(1,2,3-cd)pyrene	0.00827	U
Naphthalene	**0.0173**	
Phenanthrene	**0.0553**	
Pyrene	**0.0116**	
Volatile Organics		
1,2,4-Trimethylbenzene	0.0124	U
1,2-Dibromoethane	0.0124	U
1,2-Dichloroethane	0.0124	U
1,3,5-Trimethylbenzene	0.0124	U
Benzene	0.0124	U
Ethylebenzene	0.0124	U
Isopropylbenzene	0.0124	U
m,p-Xylenes	0.0248	U
Methyl tert-butyl ether	0.0124	U
n-Propylbenzene	0.0124	U
Naphthalene	**0.0261**	
o-Xylene	0.0124	U
Toluene	0.0124	U

U = Not found at the limit of detection shown

PAHs shown in RED are carcinogenic

TABLE 2b:
Frito-Lay Vancouver
Soil Analytical Results
(mg/Kg)

Sample ID:	FL-07-2	
Sample Date:	5/26/2009	
Polycyclic Aromatics		
1-Methylnaphthalene	**0.0504**	
2-Methylnaphthalene	**0.0620**	
Acenaphthene	0.00827	U
Acenaphthylene	0.00827	U
Anthracene	0.00827	U
Benzo(a)anthracene	0.00827	U
Benzo(a)pyrene	0.00827	U
Benzo(b)fluoranthene	0.00827	U
Benzo(g,h,i)perylene	0.00827	U
Benzo(k)fluoranthene	0.00827	U
Chrysene	0.00827	U
Dibenzo(a,h)anthracene	0.00827	U
Fluoranthene	0.00827	U
Fluorene	**0.0107**	
Indeno(1,2,3-cd)pyrene	0.00827	U
Naphthalene	**0.0173**	
Phenanthrene	**0.0553**	
Pyrene	**0.0116**	
Volatile Organics		
1,2,4-Trimethylbenzene	0.0124	U
1,2-Dibromoethane	0.0124	U
1,2-Dichloroethane	0.0124	U
1,3,5-Trimethylbenzene	0.0124	U
Benzene	0.0124	U
Ethylebenzene	0.0124	U
Isopropylbenzene	0.0124	U
m,p-Xylenes	0.0248	U
Methyl tert-butyl ether	0.0124	U
n-Propylbenzene	0.0124	U
Naphthalene	**0.0261**	
o-Xylene	0.0124	U
Toluene	0.0124	U

U = Not found at the limit of detection shown

PAHs shown in RED are carcinogenic

TABLE 3:

FRITO-LAY

Hydraulic Lift Area Soil Cleanup Project

Confirmation Samples

PAH, Solids and Other Organic Results

Sample ID:		EPA PRG[a]		Ecology Human Health[b]			1	2	2-2	3
Sample Date:		Residential	Industrial	A Unrestricted	A Industrial	B Unrestricted	12/30/2004	12/30/2004	1/7/2005	12/30/2004
PAHs	**Units**									
Acenaphthene	mg/Kg	3,700	29,000	N/E	N/E	4,800	N/A	N/A	0.50 U	N/A
Acenaphthylene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Anthracene	mg/Kg	22,000	100,000	N/E	N/E	24,000	N/A	N/A	0.50 U	N/A
Benzo(a)anthracene	mg/Kg	0.62	2.10	N/E	N/E	0.137	N/A	N/A	0.50 U	N/A
Benzo(a)pyrene	mg/Kg	0.062	0.21	0.1	2.0	0.137	N/A	N/A	0.50 U	N/A
Benzo(b)fluoranthene	mg/Kg	0.62	2.10	N/E	N/E	0.137	N/A	N/A	0.50 U	N/A
Benzo(j)fluoranthene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Benzo(k)fluoranthene	mg/Kg	6.2	21	N/E	N/E	0.137	N/A	N/A	0.50 U	N/A
Benzo(g,h,i)perylene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Chrysene	mg/Kg	62	210	N/E	N/E	0.137	N/A	N/A	0.50 U	N/A
Dibenz(a,h)acridine	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Dibenz(a,j)acridine	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Dibenzo(a,h)anthracene	mg/Kg	0.062	0.21	N/E	N/E	0.137	N/A	N/A	0.50 U	N/A
7H-Dibenzo(c,g)carbazole	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Dibenzo(a,e)pyrene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Dibenzo(a,h)pyrene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Dibenzo(a,l)pyrene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Fluoranthene	mg/Kg	2,300	22,000	N/E	N/E	3,200	N/A	N/A	0.50 U	N/A
Fluorene	mg/Kg	2,700	26,000	N/E	N/E	3,200	N/A	N/A	0.50 U	N/A
Indeno(1,2,3-c,d)pyrene	mg/Kg	0.62	2.10	N/E	N/E	0.137	N/A	N/A	0.50 U	N/A
3-methylcholanthrene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Naphthalene	mg/Kg	56	190	5	5	1,600	N/A	N/A	0.50 U	N/A
Phenanthrene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	0.50 U	N/A
Pyrene	mg/Kg	2,300	29,000	N/E	N/E	2,400	N/A	N/A	0.50 U	N/A
Volatile Organics	**Units**									
EDB	mg/Kg	0.032	0.073	0.005	0.005	0.0118	N/A	N/A	0.001 U	N/A
Other	mg/Kg	Varies	Varies	Varies	Varies	Varies	N/A	N/A	0.100 U	N/A
Pesticides	**Units**									
Lindane	mg/Kg	0.44	1.70	0.01	0.01	0.769	N/A	N/A	0.010 U	N/A
DDT	mg/Kg	1.7	7.0	3	4	2.94	N/A	N/A	0.010 U	N/A
PCBs	**Units**									
Total PCBs	mg/Kg	3.9/0.22	21/0.74	1	10	N/E	N/A	N/A	0.05 U	N/A
Solids	**Units**									
Total Solids	% (w/w)	N/E	N/E	N/E	N/E	N/E	80.3	77.1	N/A	81.5

Notes:

[a] EPA Region IX 2004 Preliminary Remedial Goals (PRGs)

[b] CLARC Version 3.1 Spreadsheet Soil Values

U = not detected at the limit of detection shown

N/E = Criterion not established for this analyte

N/A = Not analyzed for this analyte

Analytes exceeding one or more MTCA criterion are highlighted in RED.

TABLE 3:

FRITO-LAY

Hydraulic Lift Area Soil Cleanup Project

Confirmation Samples

PAH, Solids and Other Organic Results

Sample ID:	4	6	7	7-2	8	9	9-2	18
Sample Date:	12/30/2004	12/30/2004	1/3/2005	1/7/2005	1/3/2005	1/3/2005	1/7/2005	1/12/2005
PAHs								
Acenaphthene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Acenaphthylene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Anthracene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Benzo(a)anthracene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Benzo(a)pyrene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Benzo(b)fluoranthene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Benzo(j)fluoranthene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Benzo(k)fluoranthene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Benzo(g,h,i)perylene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Chrysene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Dibenz(a,h)acridine	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Dibenz(a,j)acridine	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Dibenzo(a,h)anthracene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
7H-Dibenzo(c,g)carbazole	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Dibenzo(a,e)pyrene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Dibenzo(a,h)pyrene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Dibenzo(a,l)pyrene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Fluoranthene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Fluorene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Indeno(1,2,3-c,d)pyrene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
3-methylcholanthrene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Naphthalene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Phenanthrene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Pyrene	N/A	N/A	N/A	0.50 U	N/A	N/A	0.50 U	0.50 U
Volatile Organics								
EDB	N/A	N/A	N/A	0.001 U	N/A	N/A	0.001 U	0.001 U
Other	N/A	N/A	N/A	0.100 U	N/A	N/A	0.100 U	0.100 U
Pesticides								
Lindane	N/A	N/A	N/A	0.010 U	N/A	N/A	0.010 U	0.010 U
DDT	N/A	N/A	N/A	0.010 U	N/A	N/A	0.010 U	0.010 U
PCBs								
Total PCBs	N/A	N/A	N/A	0.05 U	N/A	N/A	0.05 U	0.05 U
Solids								
Total Solids	90.9	92.0	93.0	N/A	88.8	92.9	N/A	81.4

TABLE 3:
Frito-Lay Vancouver
Groundwater Analytical Results
(µg/L)

Sample ID:	FL-07-W		FL-00-W	
Sample Date:	5/26/2009		5/26/2009	
Extractable Petroleum Hydrocarbons (EPH)				
>nC8-nC10 Aliphatic	95	U	95	U
>nC10-nC12 Aliphatic	95	U	95	U
>nC10-nC12 Aromatic	95	U	95	U
>nC12-nC16 Aliphatic	95	U	95	U
>nC12-nC16 Aromatic	95	U	95	U
>nC16-nC21 Aliphatic	95	U	95	U
>nC16-nC21 Aromatic	95	U	95	U
>nC21-nC34 Aliphatic	**1,400**		**600**	
>nC21-nC34 Aromatic	95	U	95	U
Volatile Petroleum Hydrocarbons (VPH)				
Benzene	1.0	U	1.0	U
Toluene	1.0	U	1.0	U
Ethylbenzene	1.0	U	1.0	U
Xylenes, Total	1.0	U	1.0	U
n-Hexane	5.0	U	5.0	U
C5-C6 Aliphatic	25	U	25	U
>C6-C8 Aliphatic	25	U	25	U
>C8-C10 Aliphatic	25	U	25	U
>C8-C10 Aromatic	25	U	25	U
>C10-C12 Aliphatic	25	U	25	U
>C10-C12 Aromatic	25	U	25	U
>C12-C13 Aromatic	25	U	25	U
Polycyclic Aromatics (µg/Kg)				
1-Methylnaphthalene	0.0473	U	0.0473	U
2-Methylnaphthalene	0.0473	U	0.0473	U
Acenaphthene	0.0473	U	0.0473	U
Acenaphthylene	0.0473	U	0.0473	U
Anthracene	0.0473	U	0.0473	U
Benzo(a)anthracene	0.0473	U	0.0473	U
Benzo(a)pyrene	0.0473	U	0.0473	U
Benzo(b)fluoranthene	0.0473	U	0.0473	U
Benzo(g,h,i)perylene	0.0473	U	0.0473	U
Benzo(k)fluoranthene	0.0473	U	0.0473	U
Chrysene	0.0473	U	0.0473	U
Dibenzo(a,h)anthracene	0.0473	U	0.0473	U
Fluoranthene	0.0473	U	0.0473	U
Fluorene	0.0473	U	0.0473	U
Indeno(1,2,3-cd)pyrene	0.0473	U	0.0473	U
Naphthalene	0.0473	U	0.0473	U
Phenanthrene	0.0473	U	0.0473	U
Pyrene	0.0473	U	0.0473	U

U = Not found at the limit of detection shown

TABLE 4:

FRITO-LAY
Hydraulic Lift Area Soil Cleanup Project
Residual Contamination Samples
Analytical Results

Sample ID:		EPA PRG[a]		Ecology Human Health[b]			12@6	13@12	14@24	15@38	15-2	16@24	17@36	5	4-2	6-2
Sample Date:	**Units**	**Residential**	**Industrial**	**A Unrestricted**	**A Industrial**	**B Unrestricted**	1/6/2005	1/6/2005	1/6/2005	1/6/2005	1/7/2005	1/6/2005	1/6/2005	12/30/2004	1/7/2005	1/7/2005
Metals, TCLP																
Arsenic	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	0.500 U	N/A	N/A	N/A	0.500 U	0.500 U
Barium	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	1.442	N/A	N/A	N/A	1.442	1.442
Cadmium	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	0.100 U	N/A	N/A	N/A	0.100 U	0.100 U
Chromium	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	0.216	N/A	N/A	N/A	0.216	0.216
Lead	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	0.390 U	N/A	N/A	N/A	0.390 U	0.390 U
Mercury	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	0.170 U	N/A	N/A	N/A	0.170 U	0.170 U
Selenium	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	0.630 U	N/A	N/A	N/A	0.630 U	0.630 U
Silver	mg/L	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	0.130 U	N/A	N/A	N/A	0.130 U	0.130 U
Metals, Total																
Arsenic	mg/Kg	0.39	1.6	20	20	0.67	N/A	N/A	N/A	N/A	0.520	N/A	N/A	N/A	0.500 U	2.851
Cadmium	mg/Kg	37	450	2	2	60	N/A	N/A	N/A	N/A	1.984	N/A	N/A	N/A	2.317	2.532
Chromium	mg/Kg	100,000	100,000	2,000	2,000	120,000	N/A	N/A	N/A	N/A	30.016	N/A	N/A	N/A	9.846	20.865
Lead	mg/Kg	400	800	250	1,000	N/E	N/A	N/A	N/A	N/A	10.555	N/A	N/A	N/A	3.118	10.226
Mercury	mg/Kg	23	310	2.0	2.0	24	N/A	N/A	N/A	N/A	0.170 U	N/A	N/A	N/A	0.170 U	0.170 U
Chromium VI	mg/Kg	30	64	19	19	240	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Petroleum																
NWTPH-Gx	mg/Kg	N/E	N/E	30/100	30/100	N/E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NWTPH-Dx Diesel	mg/Kg	N/E	N/E	2,000	2,000	N/E	1,150	4,780	3,380	4,960	N/A	2,740	4,010	2,910	N/A	N/A
NWTPH-Dx Oil	mg/Kg	N/E	N/E	2,000	2,000	N/E	2,740	8,650	7,910	12,700	N/A	10,800	16,900	6,750	N/A	N/A
NC6-12 Gas	mg/Kg	N/E	N/E	30/100	30/100	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	455	50 U
NC>12-22 Diesel	mg/Kg	N/E	N/E	2,000	2,000	N/E	N/A	N/A	N/A	N/A	135	N/A	N/A	N/A	3,980	68
NC>22-35 Lube Oil	mg/Kg	N/E	N/E	2,000	2,000	N/E	N/A	N/A	N/A	N/A	8,485	N/A	N/A	N/A	125	1,979
NC>35-40 Heavy Oil	mg/Kg	N/E	N/E	2,000	2,000	N/E	N/A	N/A	N/A	N/A	460	N/A	N/A	N/A	50 U	205
NC6-40 Total HC	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	9,080	N/A	N/A	N/A	4,560	2,270
PAHs																
Acenaphthene	mg/Kg	3,700	28,000	N/E	N/E	4,800	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Acenaphthylene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Anthracene	mg/Kg	22,000	100,000	N/E	N/E	24,000	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Benzo(a)anthracene	mg/Kg	0.62	2.10	N/E	N/E	0.137	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Benzo(a)pyrene	mg/Kg	0.062	0.210	0.1	2.0	0.137	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Benzo(b)fluoranthene	mg/Kg	0.62	2.10	N/E	N/E	0.137	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Benzo(j)fluoranthene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Benzo(k)fluoranthene	mg/Kg	6.2	21	N/E	N/E	0.137	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Benzo(g,h,i)perylene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Chrysene	mg/Kg	0.062	0.210	N/E	N/E	0.137	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Dibenz(a,h)acridine	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Dibenz(a,j)acridine	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Dibenzo(a,h)anthracene	mg/Kg	0	0	N/E	N/E	0.137	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
7H-Dibenzo(c,g)carbazole	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Dibenzo(a,e)pyrene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Dibenzo(e,h)pyrene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Dibenzo(a,i)pyrene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Fluoranthene	mg/Kg	2,300	22,000	N/E	N/E	3,200	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Fluorene	mg/Kg	2,700	28,000	N/E	N/E	3,200	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Indeno(1,2,3-c,d)pyrene	mg/Kg	0.62	2.10	N/E	N/E	0.137	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
3-methylcholanthrene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Naphthalene	mg/Kg	58	180	5	5	1,600	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Phenanthrene	mg/Kg	N/E	N/E	N/E	N/E	N/E	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Pyrene	mg/Kg	2,300	28,000	N/E	N/E	2,400	N/A	N/A	N/A	N/A	50 U	N/A	N/A	N/A	50 U	50 U
Volatile Organics																
EDB	mg/Kg	0.032	0.073	0.005	0.005	0.0118	N/A	N/A	0.001 U	N/A	0.001 U	N/A	N/A	N/A	0.001 U	0.001 U
Other	mg/Kg	Varies	Varies	Varies	Varies	Varies	N/A	N/A	0.10 U	N/A	0.100 U	N/A	N/A	N/A	3.128 [w]	0.100 U
Pesticides																
Lindane	mg/Kg	0.44	1.70	0.01	0.01	0.769	N/A	N/A	0.010 U	N/A	0.010 U	N/A	N/A	N/A	0.010 U	0.010 U
DDT	mg/Kg	1.7	7.0	3	4	2.94	N/A	N/A	0.010 U	N/A	0.010 U	N/A	N/A	N/A	0.010 U	0.010 U
PCBs																
Total PCBs	mg/Kg	3.9/0.22	21/0.74	1	10	N/E	N/A	N/A	0.05 U	N/A	0.05 U	N/A	N/A	N/A	0.05 U	0.05 U
Solids																
Total Solids	% (w/w)	N/E	N/E	N/E	N/E	N/E	81.1	86.5	86.6	88.5	N/A	90.3	81.8	84.7	N/A	N/A

NOTES: a: Total 8260 volatiles. Detected analytes are: benzene - 0.726 mg/Kg, ethylbenzene - 0.180 mg/Kg, toluene - 1.604 mg/Kg, xylenes - 0.618 mg/Kg.

U = not detected at the limit of detection shown

N/A = Not analyzed for this analyte

N/E = Criterion not established for this analyte

Analytes exceeding one or more MTCA criterion are highlighted in RED.

Worksheet for Calculating Soil Cleanup Levels for Protection of Human Health: (Soil Direct Contact Pathway)

Method B: Unrestricted Land Use (WAC 173-340-740)

Date: 5/26/2009
Site Name: Frito Lay Vancouver
Sample Name: FL-07-2

Chemical of Concern or EC group	Current Condition				Adjusted Condition			
	Measured Soil Conc @dry basis	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction								
AL_EC >5-6	0.75	5.97E-06			5.32E+00	4.24E-05		
AL_EC >6-8	0.75	5.97E-06			5.32E+00	4.24E-05		
AL_EC >8-10	0.75	3.38E-04			5.32E+00	2.40E-03		
AL_EC >10-12	0.75	3.38E-04			5.32E+00	2.40E-03		
AL_EC >12-16	59.8	3.59E-02			4.24E+02	2.55E-01		
AL_EC >16-21	170	1.53E-03			1.21E+03	1.09E-02		
AL_EC >21-34	1780	1.60E-02			1.26E+04	1.14E-01		
AR_EC >8-10	0.75	1.01E-04			5.32E+00	7.20E-04		
AR_EC >10-12	5.2	3.52E-03			3.69E+01	2.50E-02		
AR_EC >12-16	3.1	1.12E-03			2.20E+01	7.92E-03		
AR_EC >16-21	46.3	2.78E-02			3.29E+02	1.97E-01		
AR_EC >21-34	120	5.40E-02			8.52E+02	3.83E-01		
Benzene	0		0.00E+00		0.00E+00		0.00E+00	
Toluene	0				0.00E+00			
Ethylbenzene	0				0.00E+00			
Total Xylenes	0				0.00E+00			
Naphthalene	0.0261	2.16E-05			1.85E-01	1.53E-04		
1-Methyl Naphthalene	0.0504	1.29E-05			3.58E-01	9.19E-05		
2-Methyl Naphthalene	0.062	1.99E-04			4.40E-01	1.41E-03		
n-Hexane	0.16	3.61E-05			1.14E+00	2.56E-04		
MTBE	0				0.00E+00			
Ethylene Dibromide (EDB)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0.00414		3.99E-09	*For*	2.94E-02		2.83E-08	*For*
Benzo(b)fluoranthene	0.00414		3.99E-09	*all*	2.94E-02		2.83E-08	*all*
Benzo(k)fluoranthene	0.00414		3.99E-09	*cPAHs*	2.94E-02		2.83E-08	*cPAHs*
Benzo(a)pyrene	0.00414		3.99E-08		2.94E-02		2.83E-07	
Chrysene	0.00414		3.99E-10		2.94E-02		2.83E-09	
Dibenz(a,h)anthracene	0.00414		3.99E-09	ΣRisk=	2.94E-02		2.83E-08	ΣRisk=
Indeno(1,2,3-cd)pyrene	0.00414		3.99E-09	6.03E-08	2.94E-02		2.83E-08	4.28E-07
Sum	**2188.47748**	1.41E-01	6.03E-08		1.55E+04	1.00E+00	4.28E-07	

TEST CURRENT CONDITION

Measured TPH Soil Conc, mg/kg= 2188.477
HI= 1.409E-01
RISK= 6.030E-08

Pass or Fail? Pass

Check Residual Saturation (WAC340-747(10))

CALCULATE PROTECTIVE CONDITION

This tool allows the user to calculate protective TPH soil concentration based on various soil quality criteria. The Workbook uses the same composition ratio as for the measured data.

Calculate Protective TPH Soil Conc

Selected Criterion: @HI=1
Most Stringent? YES

Protctive TPH Soil Conc, mg/kg = 15531.72
HI = 1.00E+00
RISK = 4.28E-07

TEST ADJUSTED CONDITION

This tool allows the user to test whether a particular TPH soil concentration is protective of human health. The Workbook uses the same composition ratio as for the measured data.

Test Adjusted TPH Soil Conc

Tested TPH Soil Conc, mg/kg =
HI =
RISK =

Pass or Fail?

WAC 173-340-740 and 747

Date: 5/26/2009

Site Name: Frito Lay Vancouver

Sample Name: FL-07-2

Chemical of Concern or EC Group	Measured Soil Conc @dry basis	GW Cleanup Level	Adjusted Condition: Soil Conc being tested	Predicted Conc @Well	HQ @ Well	RISK @ Well	Pass or Fail?
	mg/kg	ug/L	mg/kg	ug/L	unitless	unitless	
Petroleum EC Fraction							
AL_EC >5-6	0.75		2.41E+01	2.66E+00	1.95E-04		
AL_EC >6-8	0.75		2.41E+01	3.25E-01	2.39E-05		
AL_EC >8-10	0.75		2.41E+01	1.99E-02	8.31E-05		
AL_EC >10-12	0.75		2.41E+01	1.28E-03	5.34E-06		
AL_EC >12-16	59.8		1.92E+03	1.83E-03	3.81E-06		
AL_EC >16-21	170		5.47E+03	6.58E-06	2.06E-10		
AL_EC >21-34	1780		5.72E+04	5.37E-10	1.68E-14		
AR_EC >8-10	0.75		2.41E+01	3.25E+00	4.06E-03		
AR_EC >10-12	5.2		1.67E+02	8.02E+00	5.01E-02		
AR_EC >12-16	3.1		9.97E+01	9.63E-01	1.20E-03		
AR_EC >16-21	46.3		1.49E+03	9.99E-01	2.08E-03		
AR_EC >21-34	120		3.86E+03	2.65E-02	4.15E-05		
Benzene	0	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Toluene	0	1000	0.00E+00	0.00E+00	0.00E+00		
Ethylbenzene	0	700	0.00E+00	0.00E+00	0.00E+00		
Total Xylenes	0	1000	0.00E+00	0.00E+00	0.00E+00		
Naphthalene	0.0261	160	8.39E-01	5.08E-02	3.17E-04		
1-Methyl Naphthalene	0.0504		1.62E+00	7.11E-02	1.78E-04		
2-Methyl Naphthalene	0.062		1.99E+00	8.60E-02	2.69E-03		
n-Hexane	0.16		5.14E+00	1.41E-01	2.94E-04		
MTBE	0	20	0.00E+00	0.00E+00	0.00E+00		
Ethylene Dibromide (EDB)	0	0.01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0.00414	for	1.33E-01	1.37E-06		1.14E-11	for
Benzo(b)fluoranthene	0.00414	all	1.33E-01	1.98E-07		1.65E-12	all
Benzo(k)fluoranthene	0.00414	cPAHs	1.33E-01	1.06E-07		8.81E-13	cPAHs
Benzo(a)pyrene	0.00414	Risk=	1.33E-01	2.14E-07		1.78E-11	
Chrysene	0.00414	1E-05	1.33E-01	2.33E-07		1.95E-13	
Dibenz(a,h)anthracene	0.00414		1.33E-01	2.98E-07		2.49E-12	Σ Risk=
Indeno(1,2,3-cd)pyrene	0.00414		1.33E-01	2.65E-09		2.21E-14	3.45E-11
Sum	2188.47748		7.04E+04	1.66E+01	6.13E-02	3.45E-11	Pass

Site-Specific Hydrogeological Properties previously entered:

Item	Symbol	Value	Units
Total soil porosity:	n	0.43	unitless
Volumetric water content:	Θ_w	0.3	unitless
Volumetric air content:	Θ_a	0.13	unitless
Soil bulk density measured:	ρ_b	1.5	kg/L
Fraction Organic Carbon:	f_{oc}	0.001	unitless
Dilution Factor:	DF	20	unitless

Target Ground Water TPH conc adjusted previously if any:

Target Ground Water TPH Conc, ug/L ⇒ 0

CALCULATE PROTECTIVE CONDITION OR TEST ADJUSTED CONDITION

Calculate or Test

@ HI=1

Pass or Fail? YES

Tested TPH Soil Conc, mg/kg = **100% NAPL**

Predicted TPH GW Conc, ug/L = 1.66E+01

RISK @ Well = 3.45E-11

HI @Well = 6.13E-02

DEDAILED MODEL RESULTS (TPH Range Test)

Type of model used for computation:	4-Phase Model	
Computation completed?	Yes!	
Initial Weighted Average MW of NAPL, g/mol:		351.9
Equilibrated Weighted Average MW of NAPL, g/mol:		352.0
Initial Weighted Average Density of NAPL, kg/L:		0.812
Volumetric NAPL Content, Θ_{NAPL} :		1.3E-01
NAPL Saturation (%), Θ_{NAPL}/n :		30.23%
100% NAPL, mg/kg		70368.5
Mass Distribution Pattern @ 4-phase in soil pore system:		(Mass Balance Pattern)
Total Mass distributed in Water Phase: 0.00%		in Solid: 0.00%
Total Mass distributed in Air Phase: 0.00%		in NAPL: 100.00%

Please Check Soil Residual Saturation TPH Levels: Refer to Table 747-5

B. Worksheet for Calculating Potable Ground Water Cleanup Levels
(Method B only) WAC 173-340-720

1. Enter Site Information

Date: 5/26/2009
Site Name: Frito Lay Vancouver
Sample info: FL-07-W

2. Enter Ground Water Concentration Measured

Notes for Data Entry

Chemical of Concern or EC Group	Measured GW Conc	GW Cleanup Level	Current Condition HQ	Current Condition RISK	Current Condition Pass or Fail?	Adjusted Condition GW Conc being tested	Adjusted Condition HQ	Adjusted Condition RISK	Adjusted Condition Pass or Fail?
	ug/L	ug/L	unitless	unitless		ug/L	unitless	unitless	
Petroleum EC Fraction									
AL_EC >5-6	12.5		9.19E-04			4.19E+01	3.08E-03		
AL_EC >6-8	12.5		9.19E-04			4.19E+01	3.08E-03		
AL_EC >8-10	12.5		5.21E-02			4.19E+01	1.74E-01		
AL_EC >10-12	12.5		5.21E-02			4.19E+01	1.74E-01		
AL_EC >12-16	47.5		9.90E-02			1.59E+02	3.31E-01		
AL_EC >16-21	47.5		1.48E-03			1.59E+02	4.97E-03		
AL_EC >21-34	1400		4.38E-02			4.69E+03	1.47E-01		
AR_EC >8-10	12.5		1.56E-02			4.19E+01	5.23E-02		
AR_EC >10-12	12.5		7.81E-02			4.19E+01	2.62E-01		
AR_EC >12-16	47.5		5.94E-02			1.59E+02	1.99E-01		
AR_EC >16-21	47.5		9.90E-02			1.59E+02	3.31E-01		
AR_EC >21-34	47.5		7.42E-02			1.59E+02	2.49E-01		
Benzene	0	5							
Toluene	0	1000							
Ethylbenzene	0	700							
Total Xylenes	0	1000							
Naphthalene	0.0237	160	1.48E-04			7.94E-02	4.96E-04		
1-Methyl Naphthalene	0.0237		5.93E-05			7.94E-02	1.98E-04		
2-Methyl Naphthalene	0.0237		7.41E-04			7.94E-02	2.48E-03		
n-Hexane	2.5		5.21E-03			8.37E+00	1.74E-02		
MTBE	0	20							
Ethylene Dibromide (EDB)	0	0.01							
1,2 Dichloroethane (EDC)	0	5							
Benzo(a)anthracene	0.0237	for		1.98E-07	*for*	7.94E-02		6.62E-07	*for*
Benzo(b)fluoranthene	0.0237	all		1.98E-07	*all*	7.94E-02		6.62E-07	*all*
Benzo(k)fluoranthene	0.0237	cPAHs		1.98E-07	*cPAHs*	7.94E-02		6.62E-07	*cPAHs*
Benzo(a)pyrene	0.0237	Risk =		1.98E-06		7.94E-02		6.62E-06	
Chrysene	0.0237	1E-05		1.98E-08		7.94E-02		6.62E-08	
Dibenz(a,h)anthracene	0.0237			1.98E-07	Σ Risk=	7.94E-02		6.62E-07	Σ Risk=
Indeno(1,2,3-cd)pyrene	0.0237			1.98E-07	2.99E-06	7.94E-02		6.62E-07	1.00E-05
Sum	1715.237		5.83E-01	2.99E-06		5.74E+03	1.95E+00	1.00E-05	*Fail*

TEST CURRENT CONDITION

Measured TPH GW Conc, ug/L = 1715.237
HI = 5.827E-01
RISK = 2.986E-06
Pass or Fail? Pass

Please check WAC 246-290-310!

CALCULATE PROTECTIVE CONDITION

This tool allows the user to calculate a protective TPH ground water concentration based on various ground water quality criteria. The Workbook uses the same composition ratio as for the measured data.

Calculate Protective TPH GW Conc

Selected Criterion: HI = 1
Most Stringent? YES

Protective TPH GW Conc, ug/L = 2943.82
HI = 1.00E+00
RISK = 5.12E-06

SUMMARY OF PROTECTIVE GW CONCENTRATIONS

Protective GW TPH Conc, ug/L	**2943.82**
Most Stringent Criterion	**HI = 1**

Ground Water Criteria	Most Stringent?	GW TPH, ug/L	RISK @	HI @
HI = 1	YES	2.94E+03	5.12E-06	1.00E+00
Total Risk = 1E-5	*NO*	5.74E+03	1.00E-05	1.95E+00
Total Risk = 1E-6	YES	5.74E+02	1.00E-06	1.95E-01
Benzene MCL = 5 ug/L	NA	NA	NA	NA
MTBE = 20 ug/L	NA	NA	NA	NA
Risk of cPAHs = 1E-5	*NO*	5.74E+03	1.00E-05	1.95E+00
Toluene =1000 ug/L	NA	NA	NA	NA
Ethylbenzene = 700 ug/L	NA	NA	NA	NA
Total Xylenes = 1000 ug/L	NA	NA	NA	NA

TEST ADJUSTED CONDITION

This tool allows the user to test whether a particular TPH soil concentration is protective of human health. The Workbook uses the same composition ratio as for the measured data.

Test Adjusted TPH GW Conc

Tested TPH GW Conc, ug/L=
HI=
RISK=
Pass or Fail?

Vertical Attenuation Estimate

Cleanup samples below ram area

Location	TPH mg/kg
12-6	3,890
13-12	13,440
14-24	11,290
15-36	17,560
15-2	9,080
16-24	13,540
17-36	20,910
Average	**12,816** mg/kg

Diameter	**10** ft	Width of lift
Area	79 ft^2	Calculated
Depth	**3** ft	Assumed from adjacent data
Angle of diffusion	**25** °	Assumed
Volume	236 ft^3	Volume of soil at average concentration
Assumed [HC] @ saturation	**2,000** mg.kg	MTCA Default
Total volume of soil needed	1509.82 ft^3	

Assume a frustum of a cone with top surface 10' diameter and slope angle of 25°

Diameter of base at h feet:	18.52615 feet	D
tan 25° =	0.466308 feet	
Length a =	4.663077 feet	
Diameter at top of frustrum:	10 feet	d
Volume of frustrum:	1513.728 ft^3	

pi/12 h (D^2+Dd+d^2)

angle =	25
h=	**9.2 Depth to equilibrium at saturation**
D=	18.52615
d=	10