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February 16, 2006

Mr. Ron Timm
Washington State Department of Ecology
3190 160th Avenue S.E.
Bellevue, WA 98008-5452

SUBJECT: SHOPS AT FIRST STREET—SOIL TO GROUNDWATER MODELING RESULTS
PROJECT NUMBER: BCC-BSE.09000

Dear Mr Timm:

This letter provides the results of modeling performed in response to a request from the Washington State Department of Ecology (Ecology) to predict the risk to groundwater from the residual levels of perchloroethene (PCE) remaining in soil at 100 108th Avenue NE in Bellevue, Washington (Shops at First Street site). In summary, the results of the modeling indicate that the residual concentrations of PCE remaining in site soils will not cause further degradation of groundwater quality

BACKGROUND

The Shops at First Street site is a currently developed commercial facility covered by buildings, a parking lot, and sidewalks/planter strips. The narrow planter strips total no more than 1 to 2 percent of the site area.

During redevelopment of the site in 1994, subsurface soil in two locations was found to be contaminated with PCE released from a former dry cleaning operation (FSM 2004). The first location was a floor drain directly underneath the former dry cleaner, which was located in a commercial building The second location was soil under a nearby manhole in a site parking lot (Figure1). Contaminated soils under the dry cleaner were excavated to a depth of 15 feet during the redevelopment of the property Around the manhole area, contaminated soils were first remediated using soil vapor extraction technology beginning in 1996. Groundwater contamination was subsequently discovered at the site in 2002. In response, a more aggressive approach was taken to the area around the manhole that contained the highest concentrations of PCE. As a groundwater protection measure, the contaminated soil around the manhole was removed to a depth of 20 feet in 2003.

The soil at the site is predominantly densely packed silty sand and the groundwater table is approximately 100 feet below ground surface (bgs). Prior borings performed to characterize the PCE release found that soil below the base of both excavations contains PCE at low concentrations[1] (Kennedy/Jenks 1994 and 2002a). Ecology requested modeling to evaluate if the low concentrations of PCE in this residually-contaminated deeper soil pose a further threat to groundwater at the site. Investigations of groundwater quality to date have established that two plumes of PCE exist in the upper aquifer, one downgradient of the former dry cleaners and

[1] Less than MTCA Method B soil cleanup levels for protection of human health at 19 6 mg/kg, but greater than the MTCA Method A soil cleanup level for groundwater protection at 0.05 mg/kg.

one downgradient of the manhole (Kennedy/Jenks 2002b). Deeper groundwater was recently tested by Floyd|Snider and found to be unaffected (Floyd|Snider 2005b) Prior modeling of both groundwater plumes by Floyd|Snider indicates that the plumes attenuate to cleanup levels within 600 feet of their origin (Floyd|Snider 2005a).

MODEL APPROACH

Modeling was performed to evaluate the rate and concentration at which the PCE would leach from the deeper soil to the groundwater table. A one-dimensional vertical transport analytical modeling approach was used. The specific modeling software used was SESoil (Version 6.3), a widely used model with a high degree of regulatory acceptance stemming from its ability to simulate remediation by natural attenuation based on diffusion, adsorption, volatilization, biodegradation, cation exchange, and hydrolysis. SESoil also has the ability to simulate climactic variations in specific locations, varying soil properties, and varying contaminant concentrations with depth. Contaminant transport can be modeled either:

- Without biological decay (as is modeled at this site)
- With biodegradation simulated as a first-order decay process

Further description of this model can be found on the Internet at: *http://www.seview.com/aboutsesoil.htm*

Site Parameters and Assumptions

Soil conditions are fairly well defined at both areas of residual contamination (i.e., under the manhole and underneath the former dry cleaner). Consistently higher PCE concentrations exist in the soil underlying the former dry cleaners than under the manhole area. Analytical results from borings performed at the former dry cleaners as part of a 1994 Remedial Investigation/Feasibility Study (RI/FS) by Kennedy/Jenks were used for defining soil conditions (Kennedy/Jenks 1994) To simulate the varying concentrations with depth, the borings were divided into 10-foot layers up to 100 feet bgs. The analytical results from all samples collected within those layers were then averaged. If PCE was not detected in a sample half of the reporting limit was used as the sample result. The average concentrations of PCE in the 10-foot layers ranged from 0.003 mg/kg to 1.21 mg/kg.

For the soil below the base of the excavation in the manhole area, data from the 1994 RI/FS and from soil samples collected during the installation of monitoring wells in 2002 were used to define the soil conditions (Kennedy/Jenks 1994 and 2002) To simulate the varying concentrations with depth, the soil column to 102 feet bgs was divided into layers and the analytical results from samples collected within those layers were averaged. The average PCE concentrations were then applied to the respective layers. Average concentrations in the layers ranged from 0.020 mg/kg to 1.656 mg/kg. For soil above 20 feet bgs, analytical results from the confirmational samples taken from the sidewalls and bottom of the final excavation limits were used to define the soil conditions (FSM 2004). The soil column for the upper 20 feet was divided into layers and the analytical results from the samples collected within those layers were averaged. The average concentrations of PCE in this area ranged from 0.037 to 1.265 mg/kg. The attached model outputs show the PCE concentration of leachate entering groundwater over time.

Other model inputs for both areas included bulk density, effective porosity, intrinsic permeability, soil pore disconnectedness, and organic carbon content Site-specific parameters were used whenever available, including organic carbon (average value of 0.1 percent based on prior testing). If site-specific parameters were not available, default model values or standard geological values for the soil types encountered were used. PCE physical and chemical parameters used in the model are based on USEPA Region 9 parameters and were selected from the SESoil chemical database. In order to achieve the most conservative results, the model was run assuming no biological decay, cation exchange, or hydrolysis. Tables 1 through 3 identify the various parameters used in each scenario

To simulate seasonal climate conditions, the Seattle climate file was selected from the SESoil climate database. This climate file provides average monthly precipitation, temperature values, and number and length of storms. The model does not directly simulate impervious surfaces, therefore, in order to simulate the impervious surface at the site, the amount of precipitation infiltrating into site soils was reduced to lower percentages[2] that would simulate various scenarios for the impervious surface at the site. To represent the area that precipitation would infiltrate through to reach the residually-contaminated PCE in soil, a rectangle was drawn around the limits of the remedial action areas and that computed area was used in the model (Figure 1).

Three scenarios were simulated for each of the two areas: the first contained the most probable chemical and soil parameters (Scenario 1), the other two were sensitivity analyses with different values for intrinsic permeability (Scenario 2) and organic carbon content (Scenario 3). Table 1 presents the modeling results for Scenario 1 at both locations. Table 2 presents the modeling results for Scenarios 2 and 3 at the former dry cleaners, and Table 3 presents the modeling results for Scenarios 2 and 3 at the manhole area. The specific results for the three scenarios are included in the attached model output files. For each scenario, four different simulations were run:

- Undeveloped with no impervious surfaces at the site (100 percent precipitation)
- Partially undeveloped (50 percent precipitation and volatilization)
- Mostly developed with limited infiltration (10 percent precipitation and volatilization)
- No infiltration (0 percent precipitation)

The model simulation was run for an appropriate amount of years for the maximum leachate concentration to occur and reach the groundwater table. Simulation beyond this time is unnecessary, as it results in decreased leachate concentrations and, therefore, reduced PCE concentrations in groundwater. In order to determine the peak PCE concentration in groundwater resulting from this leachate, the standard Ecology Dilution/Attenuation Factor of 20 was applied to the maximum leachate concentration.

CONCLUSIONS

Table 1 shows the modeling results for both the former dry cleaners and manhole area modeled with four different infiltration parameters, combined with the most probable other chemical and soil parameters In the simulation with 10 percent infiltration (which is conservative for the area around the storm sewer manhole) the peak groundwater concentration does not exceed

[2] To simulate a 90 percent impervious surface, the rainfall was reduced to 10 percent of the actual rainfall data.

0.09 µg/L at the former dry cleaners and 3.20 µg/L at the manhole area, both less than the MTCA Method A groundwater cleanup level of 5 µg/L. At 10 percent infiltration, PCE will reach the groundwater in between 18 and 90 years. As with the other simulations, the peak PCE concentration in groundwater occurs shortly after the leachate reaches the groundwater, with subsequent declines over time. The length of time required for remaining manhole-area PCE to be transported to groundwater allows a greater percentage of the PCE to be volatilized, and therefore not reach the groundwater. In the 10 percent infiltration simulation, more than 98 percent of the PCE in soil is volatilized and not available for leaching to the groundwater table

The zero infiltration scenario applies directly to the residual soil under the former dry cleaners because soil in that area is completely covered by a commercial building Without infiltration, the model generates no output indicating that leaching cannot occur and so there is no vertical transport of remaining PCE. Groundwater is therefore fully protected at this location. Incorrect on vertical infiltration

These are more representative

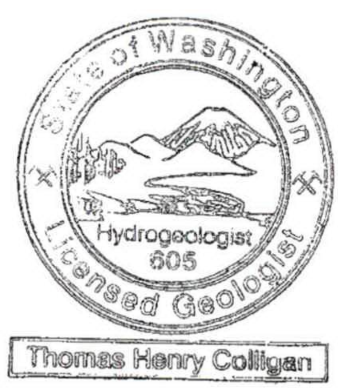
Table 1 also shows the modeling results for the 50 percent and 100 percent infiltration simulations. Use of these higher infiltration rates results in more rapid transport and modeled peak groundwater concentrations that exceed applicable standards, but are lower than the current groundwater conditions that attenuate to cleanup levels within a short distance downgradient (Floyd|Snider 2005a). However, note that these are conservative infiltration scenarios that are not representative of site conditions, which involve impervious surfaces completely covering the former dry cleaner location and virtually all of the manhole location

Sensitivity analysis Scenarios 2 and 3 model a more conservative transport and fate of the PCE, as these scenarios involve a lower value for intrinsic permeability (Scenario 2), and a lower organic carbon content (Scenario 3). Both Scenarios 2 and 3 result in maximum PCE concentrations in groundwater slightly higher than Scenario 1. However, all runs simulated with 10 percent infiltration result in maximum PCE concentrations in groundwater less than the MTCA Method A groundwater cleanup level of 5 µg/L. Results for the sensitivity analyses are shown in Tables 2 and 3.

In summary, modeling of current site conditions indicates that the remedial measures carried out at the site were successful in eliminating further risk to groundwater.

Sincerely yours,
FLOYD | SNIDER

Tom Colligan, LHG
Project Manager



Encl.: Reference List
Tables 1–3
Figure 1
Model Outputs—PCE loading output files are included; climate, hydrologic, and soil input files are available upon request

Copies: Leonard Kreppel, Benenson Capital, Inc.
Tom Newlon, Stoel Rives

REFERENCES

Floyd Snider McCarthy, Inc. (FSM). 2004. *Shops at First Street Cleanup Action Report.* Prepared for Benenson Bellevue Associates II Seattle, Washington. 4 April

Floyd|Snider. 2005a. Memo to Ron Timm, Washington State Department of Ecology. Bellevue, Washington. 6 January

Floyd|Snider. 2005b. Letter to Ron Timm, Washington State Department of Ecology Bellevue, Washington. 15 August.

Kennedy/Jenks Consultants. 1994. *Remedial Investigation/Feasibility Study Report*. Prepared for Benenson Bellevue II, L.P. November.

Kennedy/Jenks Consultants. 2002a. *Soil Evaluation Results and Findings, Storm Sewer Manhole*. Prepared for Ron Timm of Ecology. Bellevue, Washington. 8 July

Kennedy/Jenks Consultants. 2002b. *Groundwater Quality Evaluation*. 9 August.

Tables

Figures

Model Outputs

REFERENCES

Floyd Snider McCarthy, Inc. (FSM). 2004. *Shops at First Street Cleanup Action Report.* Prepared for Benenson Bellevue Associates II. Seattle, Washington. 4 April.

Floyd|Snider. 2005a. Memo to Ron Timm, Washington State Department of Ecology Bellevue, Washington. 6 January.

Floyd|Snider. 2005b Letter to Ron Timm, Washington State Department of Ecology Bellevue, Washington. 15 August

Kennedy/Jenks Consultants. 1994. *Remedial Investigation/Feasibility Study Report.* Prepared for Benenson Bellevue II, L.P. November.

Kennedy/Jenks Consultants 2002a. *Soil Evaluation Results and Findings, Storm Sewer Manhole.* Prepared for Ron Timm of Ecology. Bellevue, Washington. 8 July

Kennedy/Jenks Consultants 2002b. *Groundwater Quality Evaluation* 9 August.

Tables

Table 1
Transport of PCE to Groundwater Modeling Results, Most Probable Conditions

	Location	Former Dry Cleaner[1]				Manhole Area[2]			
	Precipitation	100%	50%	10%.	0%	100%.	50%	10%	0%
Soil	Hydraulic Conductivity, cm/sec.	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03
	Intrinsic Permeability[3], cm	1.0E-08	1.0E-08	1.0E-08	1.0E-08	1.0E-08	1.0E-08	1.0E-08	1.0E-08
	Soil Pore Disconnectedness	6	6	6	6	6	6	6	6
	Effective Porosity	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
	Organic Carbon Content (percent)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Climate	Precipitation	100%	50%	10%	0%	100%	50%	10%	0%
	Surface Volatilization Factor	100%	50%	10%	0%	100%	50%	10%	0%
Results	Percent Volatized	37.35%	76.22%	99.81%	NA	48.50%	80.57%	98.07%	NA
	Percent in Soil Air	0.76%	1.93%	0.04%	NA	0.66%	1.64%	0.48%	NA
	Percent Adsorbed on Soil	2.23%	5.30%	0.09%	NA	1.94%	4.51%	1.19%	NA
	Percent in Soil Moisture	0.40%	0.78%	0.01%	NA	0.34%	0.67%	0.11%	NA
	Percent in Groundwater Runoff	59.16%	15.66%	0.00%	NA	48.46%	12.49%	0.07%	NA
	PCE Mass, µg	4.85E+09	4.85E+09	4.85E+09	4.85E+09	1.52E+09	1.52E+09	1.52E+09	1.52E+09
	Output File	DRY100	DRY50	DRY10	NA	MAN100	MAN50	10MANPST	NA
	Years to Reach Groundwater	2	3	90	NA	1	2	18	NA
	Year of Peak PCE Concentration in Groundwater	12	13	90	NA	12	22	28	NA
	Peak Leachate Concentration, mg/L	4.30E-01	2.26E-01	1.74E-03	NA	5.27E-01	2.68E-01	6.39E-02	NA
	Peak PCE Concentration in Groundwater[4], µg/L	21.52	11.30	**0.09**	NA	26.34	13.38	**3.20**	NA

Default Parameters:

Soil	Chemical
Bulk Density = 1.58 g/cm^3 Cation Exchange Capacity = 0 Freundlich exponent = 1	Water Solubility = 200 mg/L Molecular Weight = 166 g/mol Henry's Law Constant = 1.80E-2 m^3*atm/mol Air Diffusion Coefficient = 0.072 cm^2/sec Organic Carbon Adsorption Coefficient (k_{oc}) = 265 (µg/g)/(µg/mL) Soil Partition Coefficient = 0 (µg/g)/(µg/mL)[5]

Notes:

Soil parameters based on May 16, 2005 MW-6 Boring Log, Floyd|Snider or standard geological values.
Results in **bold** are less than the MTCA Method A groundwater cleanup level of 5 µg/L.

1 Soil data below the former dry cleaner are based on a Kennedy/Jenks November 1994 RI/FS.
2 Soil data below the manhole area are based on a Kennedy/Jenks November 1994 RI/FS, July 2002 Kennedy/Jenks memo, and Floyd|Snider 2004 post-excavation analytical results.
3 Intrinsic Permeability is equal to the hydraulic conductivity multiplied by 1.0E-5.
4 Concentration in groundwater is based on Dilution/Attenuation Factor of 20 of the peak leachate concentration.
5 The distribution coefficient, K_d, is unknown, so it is based on the f_{oc} and k_{oc}. The soil partition coefficient is set at 0 to allow this computation to occur.
NA Not applicable—model cannot be run.
PCE Perchloroethene

Table 2
Transport of PCE to Groundwater Sensitivity Analysis Modeling Results
Former Dry Cleaners[1]

		2: Decreased Intrinsic Permeability (1×10^{-4} cm/sec)				3: Decreased Organic Carbon Content (0.05%)			
	Precipitation	100%	50%	10%.	0%	100%.	50%	10%	0%
Soil	Hydraulic Conductivity, cm/sec.	1.0E-04	1.0E-04	1.0E-04	1.0E-04	1.0E-03	1.0E-03	1.0E-03	1.0E-03
Soil	Intrinsic Permeability[2], cm	1.0E-09	1.0E-09	1.0E-09	1.0E-09	1.0E-08	1.0E-08	1.0E-08	1.0E-08
Soil	Soil Pore Disconnectedness	6	6	6	6	6	6	6	6
Soil	Effective Porosity	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Soil	Organic Carbon Content (percent)	0.1	0.1	0.1	0.1	0.05	0.05	0.05	0.05
Climate	Precipitation	100%	50%	10%	0%	100%	50%	10%	0%
Climate	Surface Volatilization Factor[3]	100%	50%	10%	0%	100%	50%	10%	0%
Results	Percent Volatized	13.57%	56.97%	99.90%	NA[4]	37.44%	79.13%	99.97%	NA
Results	Percent in Soil Air	1.31%	5.09%	0.01%	NA	0.19%	0.97%	0.00%	NA
Results	Percent Adsorbed on Soil	4.46%	15.70%	0.02%	NA	0.28%	1.33%	0.00%	NA
Results	Percent in Soil Moisture	1.07%	3.14%	0.00%	NA	0.10%	0.39%	0.00%	NA
Results	Percent in Groundwater Runoff	79.46%	18.94%	0.00%	NA	61.92%	18.10%	0.01%	NA
Results	PCE Mass, µg	4.85E+09	4.85E+09	4.85E+09	4.85E+09	4.85E+09	4.85E+09	4.85E+09	4.85E+09
Results	Output File	DRY100K	DRY50K	DRY10K	NA	DRY100OC	DRY50OC	DRY10OC	NA
Results	Years to Reach Groundwater	2	6	143	NA	1	3	60	NA
Results	Year of Peak PCE Concentration in Groundwater	15	29	143	NA	8	14	60	NA
Results	Peak Leachate Concentration, mg/L	5.77E-01	3.33E-01	3.45E-04	NA	6.43E-01	3.40E-01	2.68E-03	NA
Results	Peak PCE Concentration in Groundwater[4], µg/L	28.83	16.63	**0.02**	NA	32.13	17.02	**0.13**	NA

Default Parameters:

Soil	*Chemical*	
Bulk Density = 1.58 g/cm^3	Water Solubility = 200 mg/L	Air Diffusion Coefficient = 0.072 cm^2/sec
Cation Exchange Capacity = 0	Molecular Weight = 166 g/mol	Organic Carbon Adsorption Coefficient (k_{oc}) = 265 (µg/g)/(µg/mL)
Freundlich exponent = 1	Henry's Law Constant = 1.80E-2 m^3*atm/mol	Soil Partition Coefficient = 0 (µg/g)/(µg/mL)[5]

Notes:

Soil parameters based on May 16, 2005 MW-6 Boring Log, Floyd|Snider or standard geological values.
Results in **bold** are less than the MTCA Method A groundwater cleanup level of 5 µg/L.

1 Soil data below the former dry cleaner are based on a Kennedy/Jenks November 1994 RI/FS.
2 Intrinsic Permeability is equal to the hydraulic conductivity multiplied by 1.0E-5.
3 The surface volatilization factor is reduced to match the precipitation reduction to account for the reduced volatilization that accompanies an impervious surface.
4 Concentration in groundwater is based on Dilution/Attenuation Factor of 20 of the peak leachate concentration.
5 The distribution coefficient, K_d, is unknown, so it is based on the f_{oc} and k_{oc}. The soil partition coefficient is set at 0 to allow this computation to occur.
NA Not applicable—model cannot be run.
PCE Perchloroethene

Table 3
Transport of PCE to Groundwater Sensitivity Analysis Modeling Results
Manhole Area[1]

		Scenario	2: Decreased Intrinsic Permeability (1×10^{-4} cm/sec)				3: Decreased Organic Carbon Content (0.05%)			
		Precipitation	**100%**	**50%**	**10%**	**0%**	**100%**	**50%**	**10%**	**0%**
Soil	Hydraulic Conductivity, cm/sec.		1.0E-04	1.0E-04	1.0E-04	1.0E-04	1.0E-03	1.0E-03	1.0E-03	1.0E-03
	Intrinsic Permeability[2], cm		1.0E-09	1.0E-09	1.0E-09	1.0E-09	1.0E-08	1.0E-08	1.0E-08	1.0E-08
	Soil Pore Disconnectedness		6	6	6	6	6	6	6	6
	Effective Porosity		0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
	Organic Carbon Content (percent)		0.1	0.1	0.1	0.1	0.05	0.05	0.05	0.05
Climate	Precipitation		100%	50%	10%	0%	100%	50%	10%	0%
	Surface Volatilization Factor[3]		100%	50%	10%	0%	100%	50%	10%	0%
Results	Percent Volatized		24.30%	64.66%	99.61%	NA	48.56%	83.04%	99.85%	NA
	Percent in Soil Air		1.12%	4.30%	0.07%	NA	0.17%	0.84%	0.00%	NA
	Percent Adsorbed on Soil		3.81%	13.31%	0.19%	NA	0.25%	1.16%	0.00%	NA
	Percent in Soil Moisture		0.92%	2.68%	0.02%	NA	0.09%	0.34%	0.00%	NA
	Percent in Groundwater Runoff		69.72%	14.89%	0.03%	NA	50.84%	14.53%	0.09%	NA
	PCE Mass, µg		1.52E+09	1.52E+09	1.52E+09	1.52E+09	1.52E+09	1.52E+09	1.52E+09	1.52E+09
	Output File		MAN100K	MAN50K	MAN10K	NA	MAN100OC	MAN50OC	MAN10OC	
	Years to Reach Groundwater		1	3	19	NA	1	2	12	NA
	Year of Peak PCE Concentration in Groundwater		17	30	37	NA	8	14	18	NA
	Peak Leachate Concentration, mg/L		7.54E-01	3.99E-01	6.22E-02	NA	7.89E-01	4.00E-01	9.59E-02	NA
	Peak PCE Concentration in Groundwater[4], µg/L		37.72	19.95	**3.11**	NA	39.46	20.00	**4.80**	NA

Default Parameters:

Soil
Bulk Density = 1.58 g/cm^3
Cation Exchange Capacity = 0
Freundlich exponent = 1

Chemical
Water Solubility = 200 mg/L
Molecular Weight = 166 g/mol
Henry's Law Constant = 1.80E-2 m^3*atm/mol
Air Diffusion Coefficient = 0.072 cm^2/sec
Organic Carbon Adsorption Coefficient (k_{oc}) = 265 (µg/g)/(µg/mL)
Soil Partition Coefficient = 0 (µg/g)/(µg/mL)[5]

Notes:

Soil parameters based on May 16, 2005 MW-6 Boring Log, Floyd|Snider or standard geological values.
Results in bold are less than the MTCA Method A groundwater cleanup level of 5 µg/L.

1 Soil data below the manhole area are based on a Kennedy/Jenks November 1994 RI/FS, July 2002 Kennedy/Jenks memo, and Floyd|Snider 2004 post-excavation analytical results.
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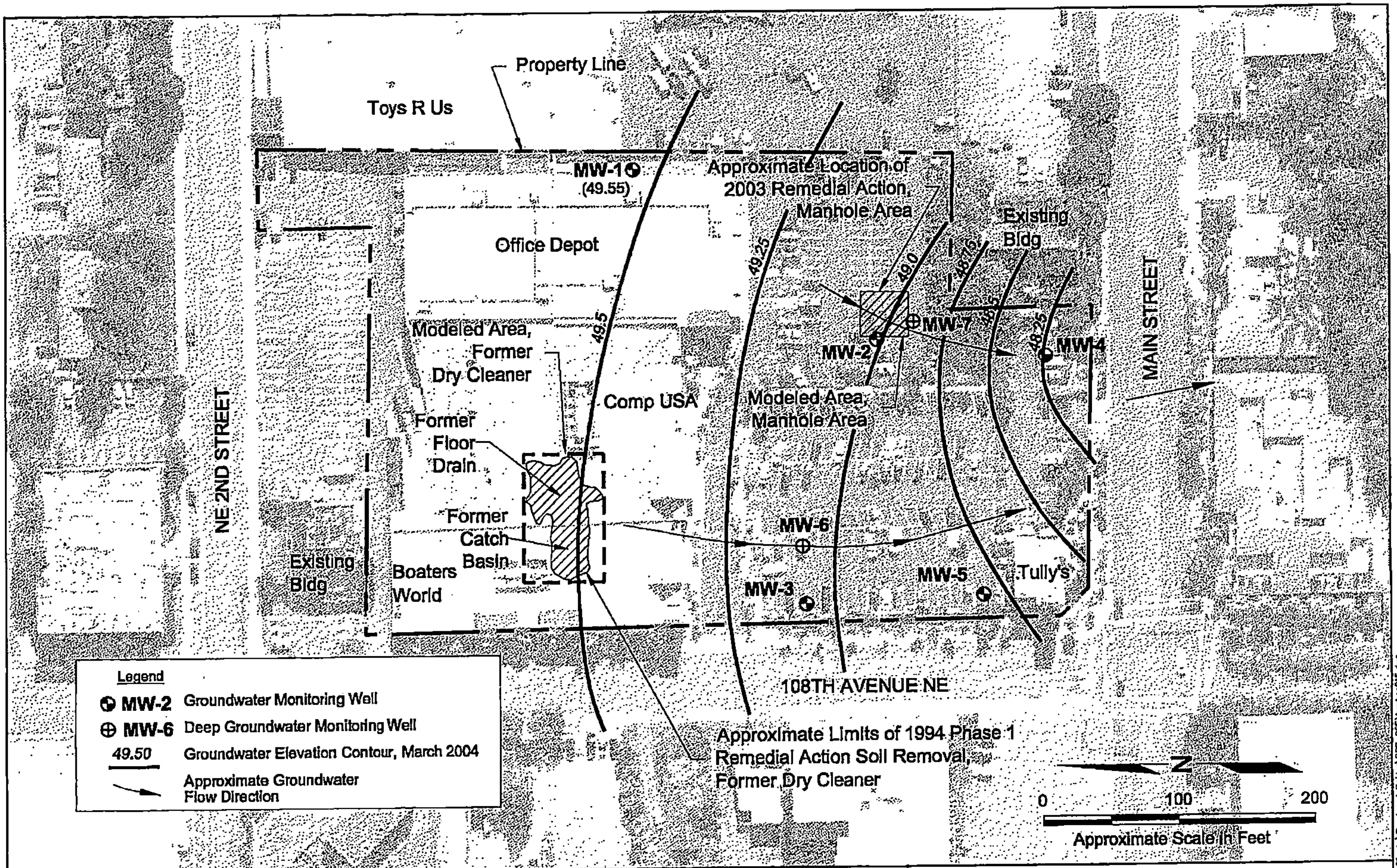
5 The distribution coefficient, K_d, is unknown, so it is based on the f_{oc} and K_{oc}. The soil partition coefficient is set at 0 to allow this computation to occur.
NA Not applicable—model cannot be run.
PCE Perchloroethene

Figures



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Soil to Groundwater Modeling Results Memo
Shops at First Street
Bellevue, Washington

Figure 1
Site Map

Model Outputs

SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 100% Precip, 100% Volatilization,

SESOIL Output File: C:\SEVIEW63\DRY100 OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1.810E+09	37 35
In Soil Air	3.688E+07	0.76
Sur. Runoff	0 000E+00	0.00
In Washld	0 000E+00	0.00
Ads On Soil	1 082E+08	2.23
Hydrol Soil	0 000E+00	0 00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0 00
Complexed	0 000E+00	0 00
Immobile CEC	0.000E+00	0 00
Hydrol CEC	0 000E+00	0.00
In Soil Moi	1 921E+07	0 40
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0 00
Gwr. Runoff	2.867E+09	59.16
Total Output	4.842E+09	99.90
Total Input	4.847E+09	
Input - Output	4.607E+06	

Maximum leachate concentration: 4.303E-01 mg/l

Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

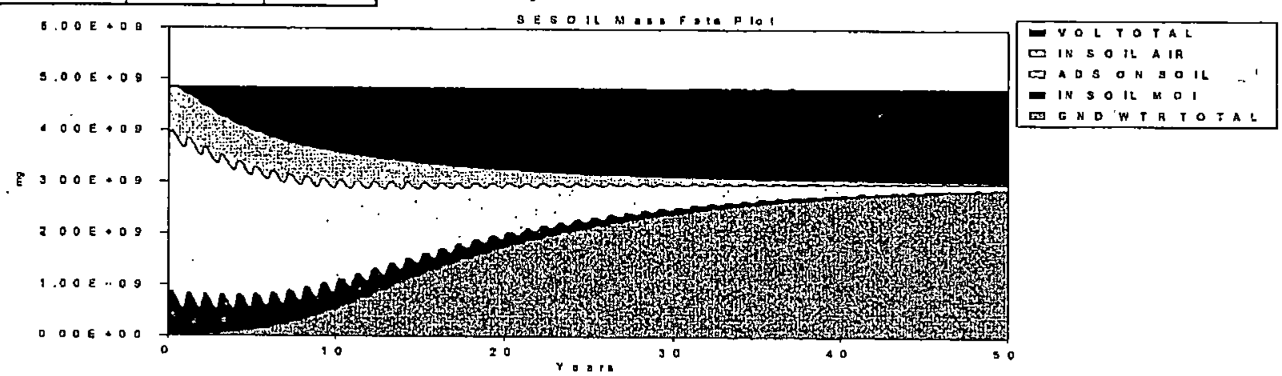
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 001
C:\SEVIEW63\SOILBCC SOI

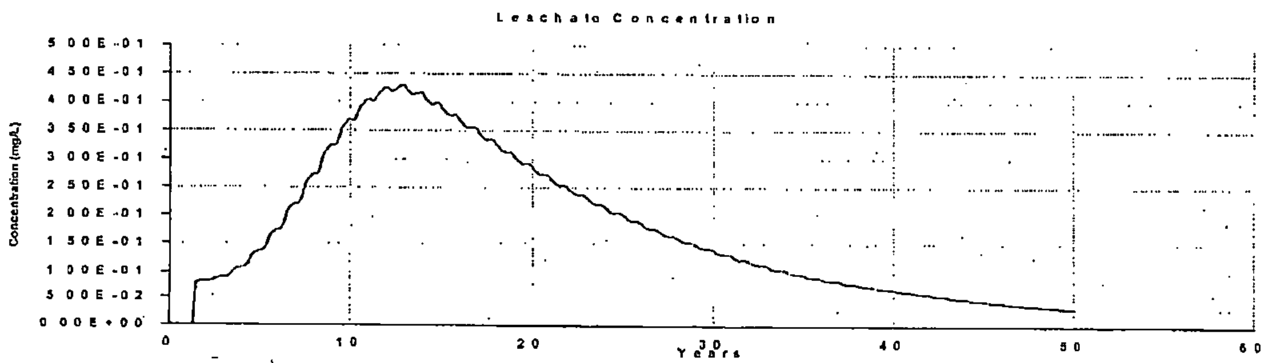
Application File: PCE at Dry Cleaner, 100% Precip Conditions
C:\SEVIEW63\BCC100 APL

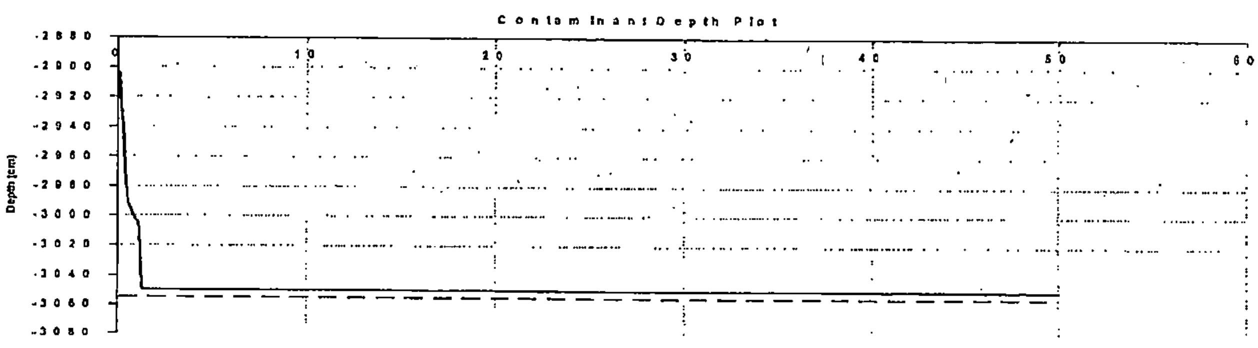
Starting Depth: 2904.00 cm

Ending Depth: 3050 00 cm

Total Depth: 3055.00 cm







2.7.06

SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 50% Precip, 50% Volatilization

SESOIL Output File: C:\SEVIEW63\DRY50 OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	3.694E+09	76.22
In Soil Air	9.330E+07	1.93
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	2.570E+08	5.30
Hydrol Soil	0.000E+00	0.00
Degrad Soil	0.000E+00	0.00
Pure Phase	0 000E+00	0.00
Complexed	0.000E+00	0.00
Immobile CEC	0.000E+00	0.00
Hydrol CEC	0.000E+00	0.00
In Soil Moi	3 798E+07	0 78
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0.000E+00	0.00
Other Trans	0 000E+00	0.00
Other Sinks	0.000E+00	0.00
Gwr. Runoff	7.588E+08	15.66
Total Output	4.841E+09	99.88
Total Input	4.847E+09	
Input - Output	5.595E+06	

Maximum leachate concentration: 2 260E-01 **mg/l**

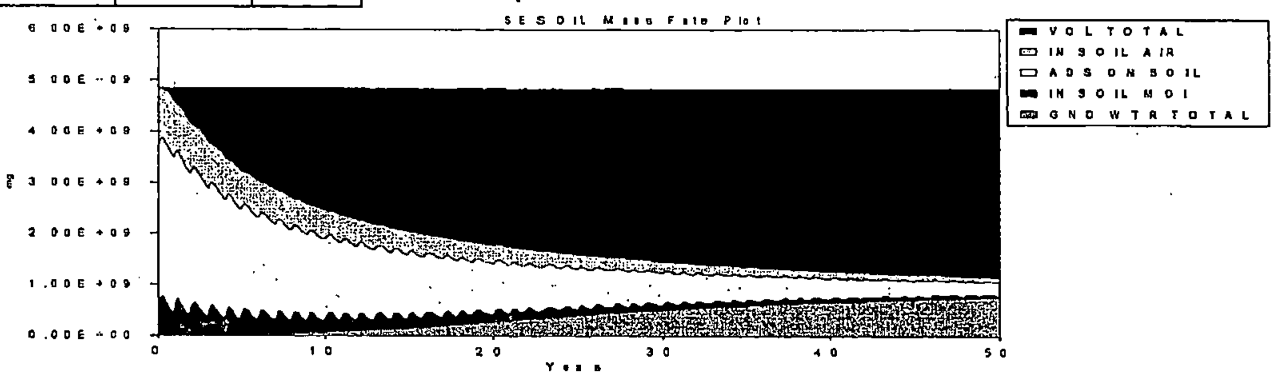
Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

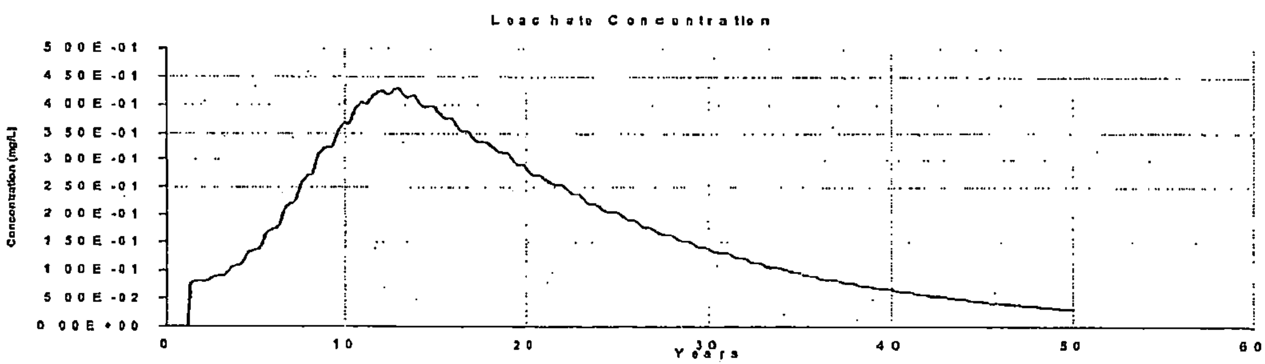
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC.CHM

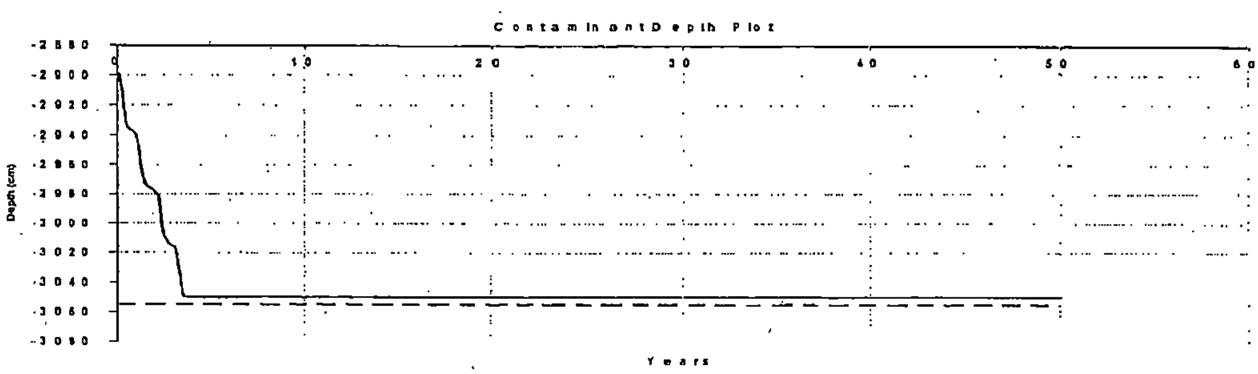
Soil File: Densely packed silty sand, C=6, n=0.27, K=0 001
C:\SEVIEW63\SOILBCC SOI

Application File: PCE at Dry Cleaner, 50% Precip Conditions
C:\SEVIEW63\DRY50 APL

Starting Depth: 2899 00 **cm**
Ending Depth: 3050 00 **cm**
Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 10% Precip, 10% Volatilization

SESOIL Output File: C:\SEVIEW63\DRY10 OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	4 837E+09	99.81
In Soil Air	1 738E+06	0.04
Sur. Runoff	0 000E+00	0.00
In Washld	0 000E+00	0.00
Ads On Soil	4 325E+06	0 09
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0.00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0 00
Immobile CEC	0 000E+00	0.00
Hydrol CEC	0 000E+00	0.00
In Soil Moi	4 148E+05	0.01
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0.00
Other Sinks	0 000E+00	0.00
Gwr. Runoff	4.402E+04	0.00
Total Output	4 844E+09	99 94
Total Input	4 847E+09	
Input - Output	2.714E+06	

Maximum leachate concentration: 1 740E-03 **mg/l**

Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

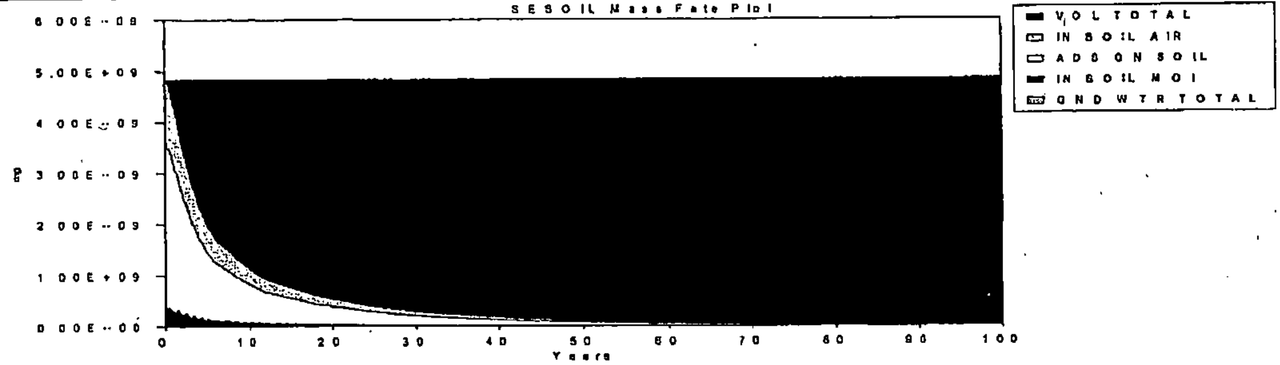
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

Soil File: Densely packed silty sand, C=6, n=0 27, K=0 001
C:\SEVIEW63\SOILBCC SOI

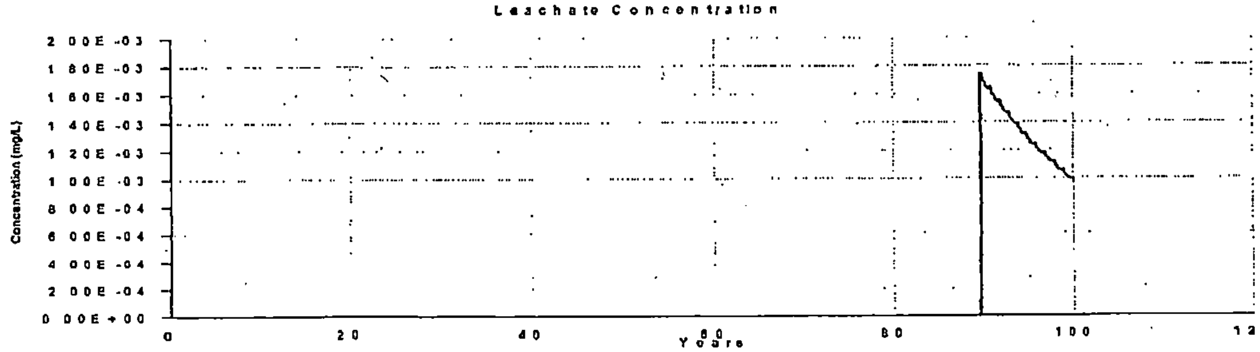
Application File: PCE at Dry Cleaner, 10% Precip Conditions
C:\SEVIEW63\DRY10 APL

Starting Depth: 2898.00 **cm**
Ending Depth: 3050.00 **cm**
Total Depth: 3055 00 **cm**

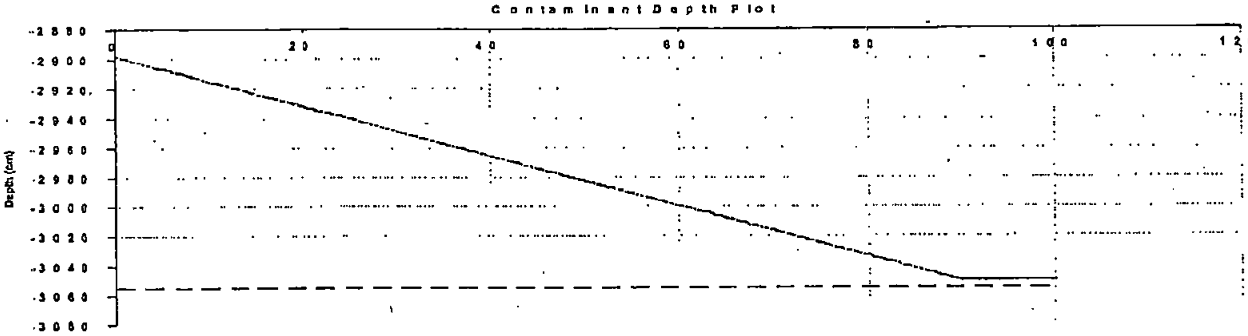
SESOIL Mass Fate Plot



Leachate Concentration



Contaminant Depth Plot



2.7.06

SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 100% Precip, 100% Volatilization

SESOIL Output File: C:\SEVIEW63\MAN100.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	7 371E+08	48 50
In Soil Air	1 002E+07	0 66
Sur. Runoff	0 000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	2.941E+07	1.94
Hydrol Soil	0.000E+00	0.00
Degrad Soil	0.000E+00	0.00
Pure Phase	0.000E+00	0.00
Complexed	0 000E+00	0.00
Immobile CEC	0 000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	5 223E+06	0 34
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0 00
Gwr. Runoff	7.365E+08	48.46
Total Output	1 518E+09	99 89
Total Input	1 520E+09	
Input - Output	1.605E+06	

Maximum leachate concentration: 5 268E-01 **mg/l**

Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

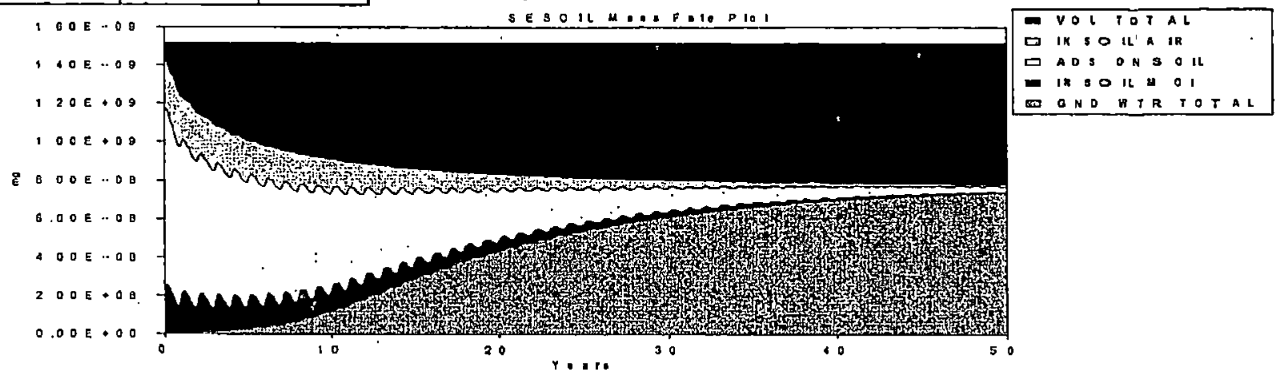
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 00 1
C:\SEVIEW63\SOILBCC SOI

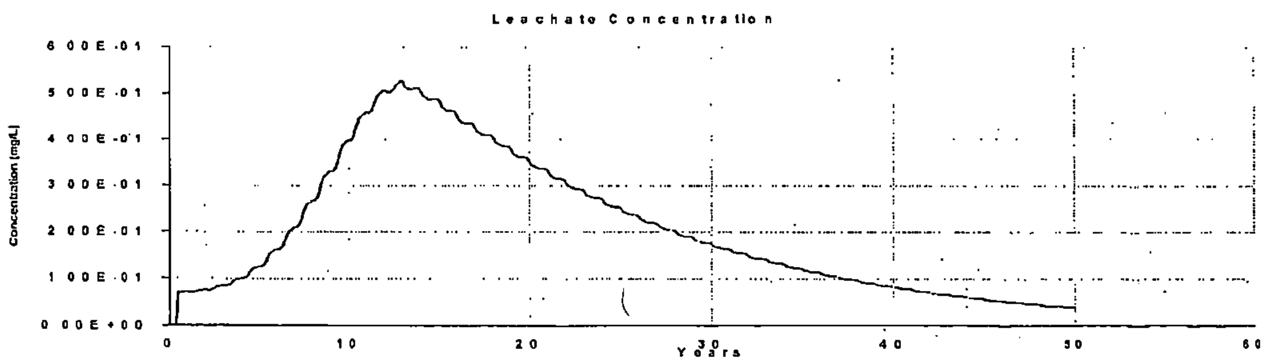
Application File: PCE at Manhole Post-excavation, 100% Precip and
C:\SEVIEW63\MAN100.APL

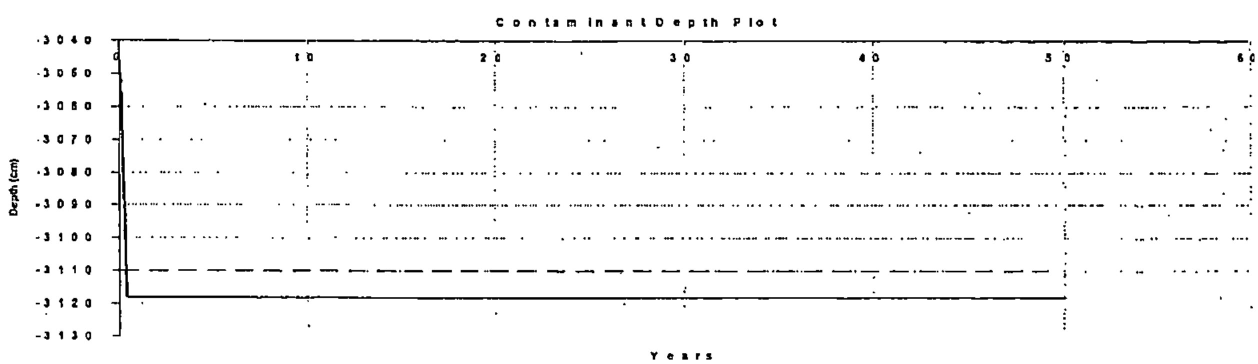
Starting Depth: 3050 00 **cm**

Ending Depth: 3118 00 **cm**

Total Depth: 3110 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 50% Precip, 50% Volatilization

SESOIL Output File: C:\SEVIEW63\MAN50 OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1 224E+09	80 57
In Soil Air	2 489E+07	1 64
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0 00
Ads On Soil	6 858E+07	4 51
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0.00
Pure Phase	0.000E+00	0.00
Complexed	0.000E+00	0 00
Immobile CEC	0.000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	1 013E+07	0 67
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0.00
Gwr. Runoff	1.897E+08	12.49
Total Output	1 518E+09	99 88
Total Input	1.520E+09	
Input - Output	1.844E+06	

Maximum leachate concentration: 2 676E-01 **mg/l**

Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

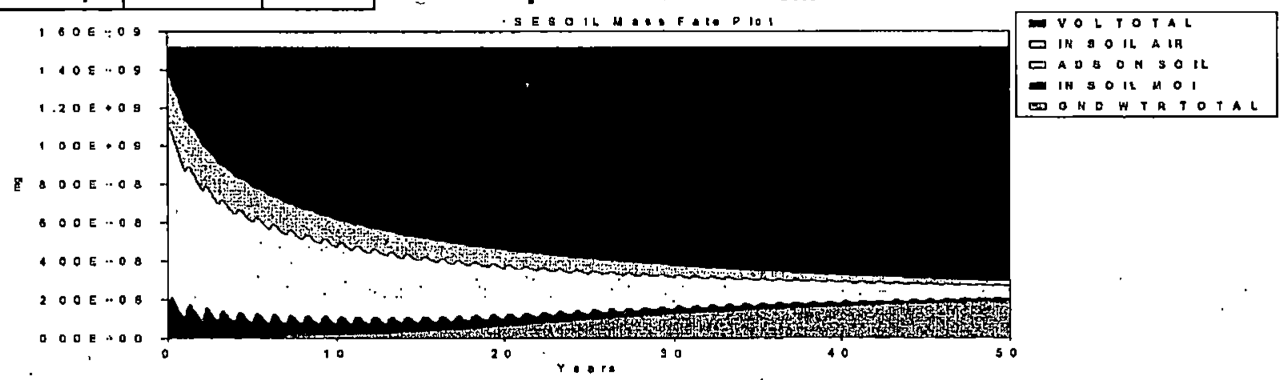
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 001
C:\SEVIEW63\SOILBCC.SOI

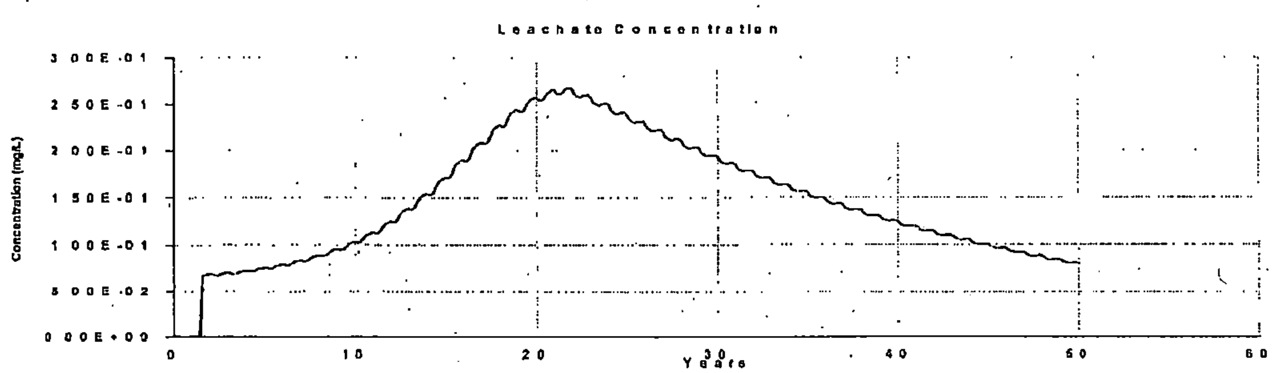
Application File: PCE at Manhole Post-excavation, 50% Precip and V
C:\SEVIEW63\MAN50 APL

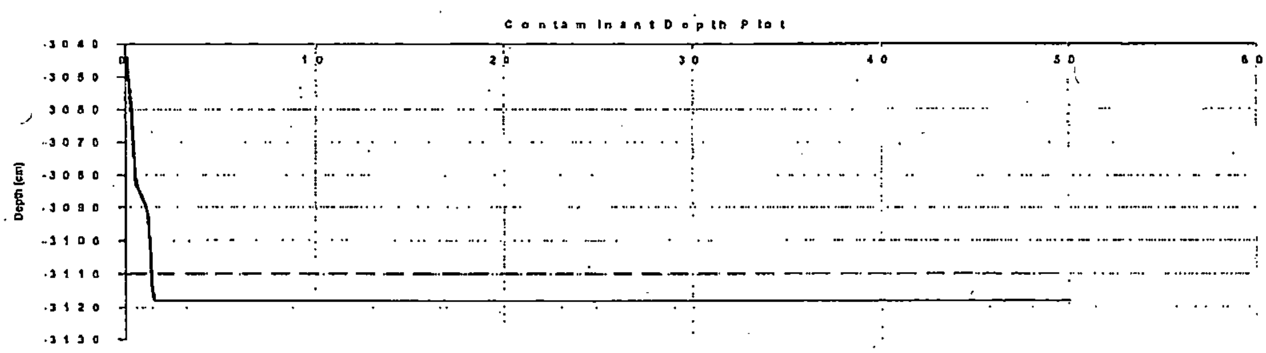
Starting Depth: 3044 00 **cm**

Ending Depth: 3118 00 **cm**

Total Depth: 3110.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 10% Precip, 10% Volatilization

SESOIL Output File: C:\SEVIEW63\MAN10 OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1 490E+09	98.07
In Soil Air	7 288E+06	0 48
Sur. Runoff	0 000E+00	0 00
In Washld	0.000E+00	0.00
Ads On Soil	1.813E+07	1 19
Hydrol Soil	0 000E+00	0 00
Degrad Soil	0 000E+00	0.00
Pure Phase	0.000E+00	0 00
Complexed	0 000E+00	0 00
Immobile CEC	0.000E+00	0.00
Hydrol CEC	0.000E+00	0 00
In Soil Moi	1 739E+06	0 11
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0.000E+00	0 00
Gwr. Runoff	1.053E+06	0.07
Total Output	1 518E+09	99.93
Total Input	1.520E+09	
Input - Output	1.055E+06	

Maximum leachate concentration: 6 394E-02 **mg/l**

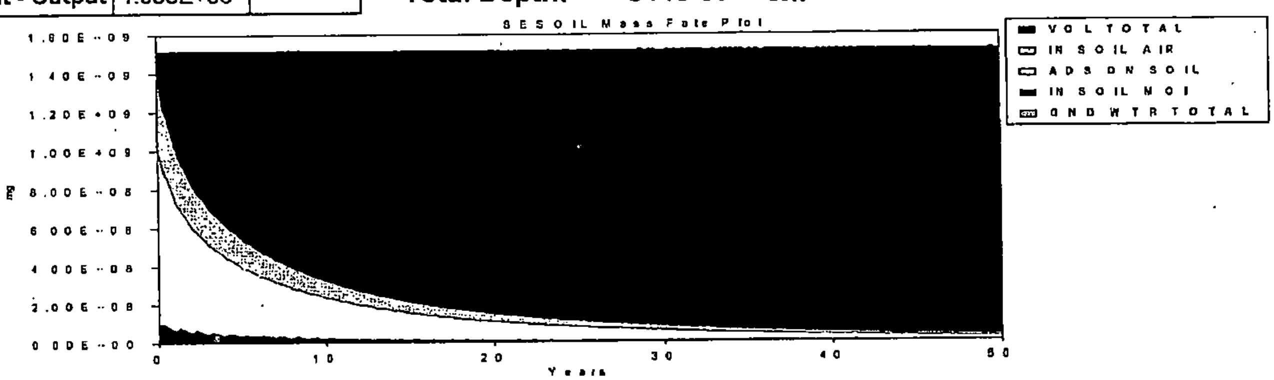
Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

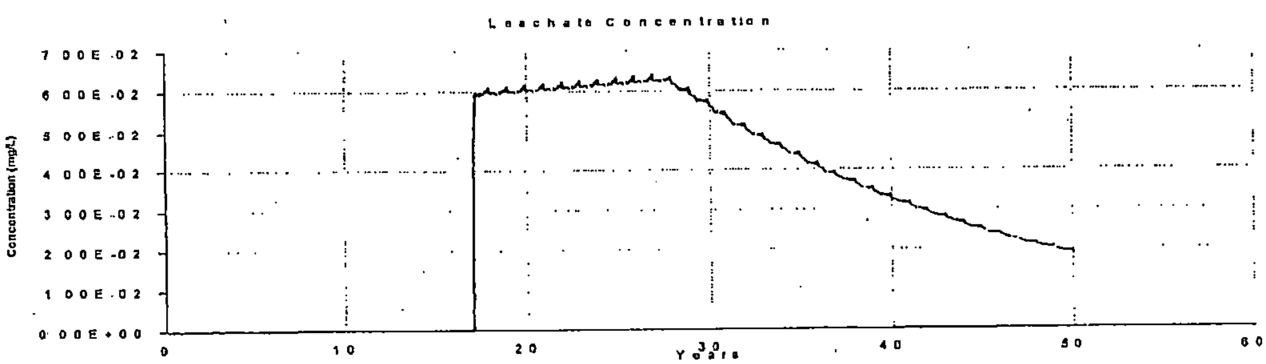
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

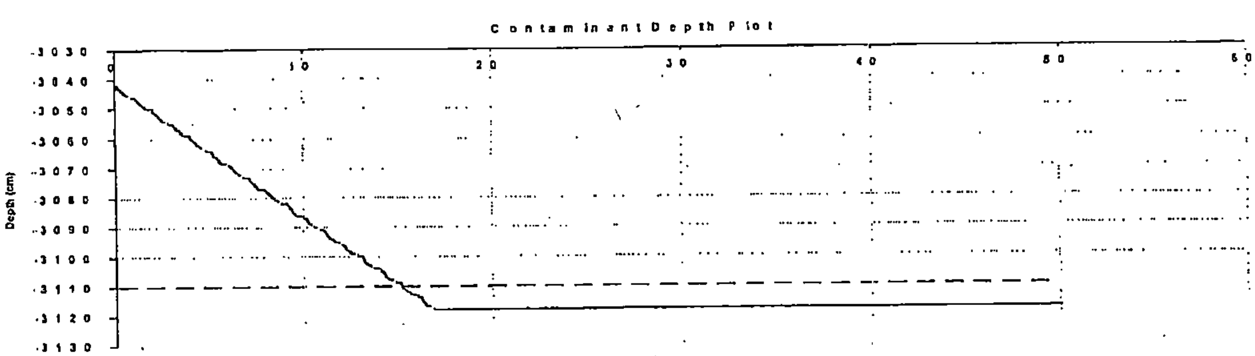
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 001
C:\SEVIEW63\SOILBCC SOI

Application File: PCE at Manhole Post-excavation, 10% Precip and V
C:\SEVIEW63\MAN10 APL

Starting Depth: 3042.00 **cm**
Ending Depth: 3118.00 **cm**
Total Depth: 3110 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 100% Precip, 100% Volatilization, K=0.0001

SESOIL Output File: C:\SEVIEW63\DRY100K.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	6 577E+08	13 57
In Soil Air	6 361E+07	1.31
Sur. Runoff	0 000E+00	0.00
In Washld	0.000E+00	0 00
Ads On Soil	2 162E+08	4 46
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0 00
Immobile CEC	0 000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	5 190E+07	1.07
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0 00
Gwr. Runoff	3.851E+09	79.46
Total Output	4.840E+09	99 88
Total Input	4 847E+09	
Input - Output	6.009E+06	

Maximum leachate concentration: 5 765E-01 **mg/l**

Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

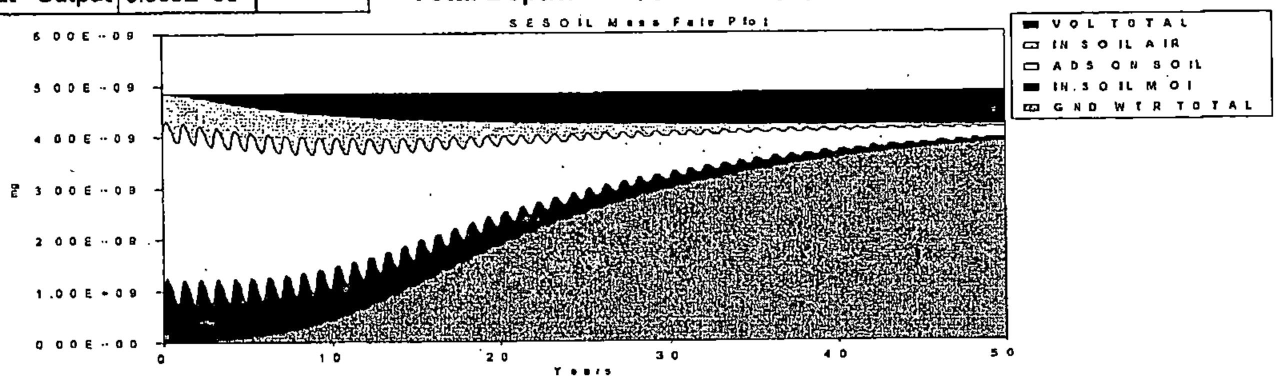
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 0001
C:\SEVIEW63\SOILBCC2 SOI

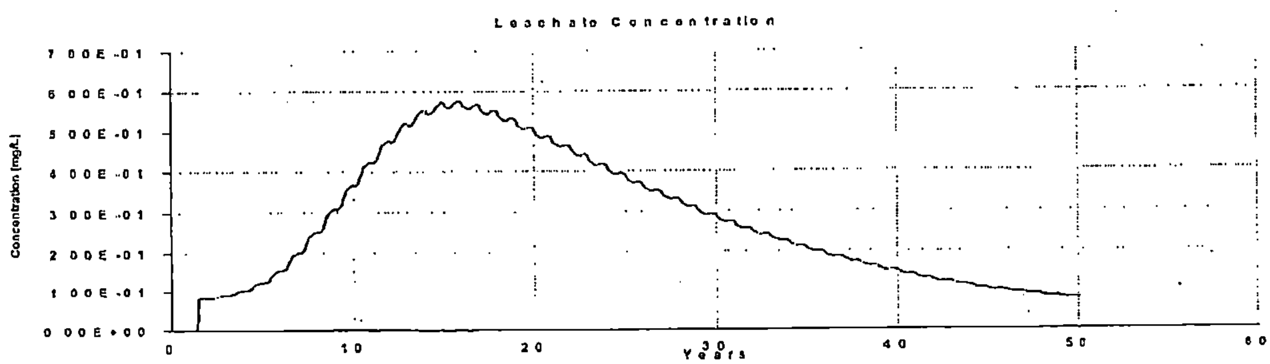
Application File: PCE at Dry Cleaner, 100% Precip Conditions
C:\SEVIEW63\BCC100 APL

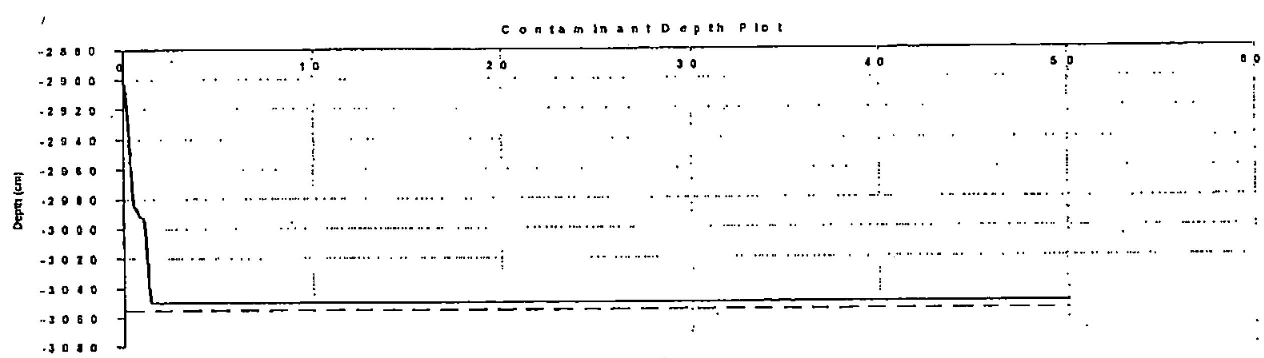
Starting Depth: 2903.00 **cm**

Ending Depth: 3050.00 **cm**

Total Depth: 3055.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 50% Precip, 50% Volatilazation, K=0.0001

SESOIL Output File: C:\SEVIEW63\DRY50K OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	2 761E+09	56 97
In Soil Air	2 464E+08	5 09
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0 00
Ads On Soil	7 610E+08	15 70
Hydrol Soil	0 000E+00	0 00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0 00
Complexed	0 000E+00	0 00
Immobile CEC	0 000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	1 522E+08	3 14
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0.000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0 00
Gwr. Runoff	9.179E+08	18.94
Total Output	4 838E+09	99 83
Total Input	4 847E+09	
Input - Output	8.149E+06	

Maximum leachate concentration: 3 326E-01 **mg/l**

Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

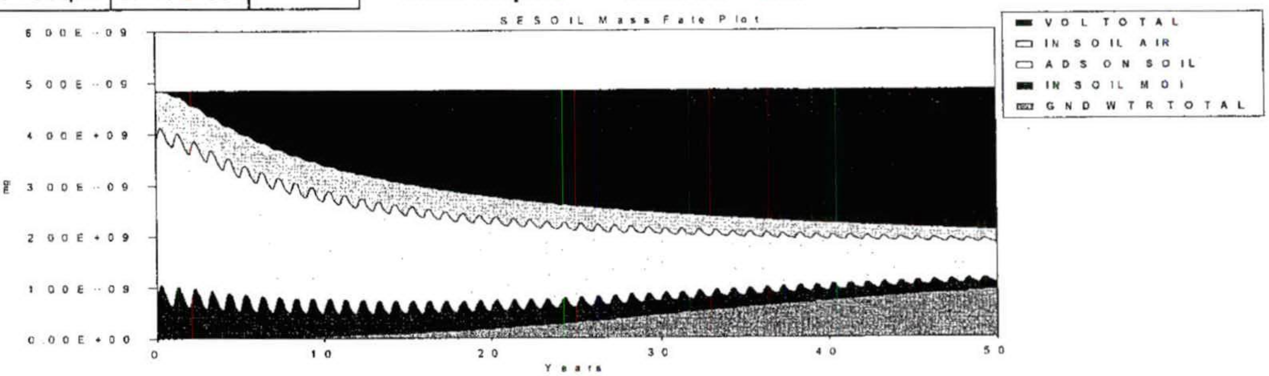
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 0001
C:\SEVIEW63\SOILBCC2 SOI

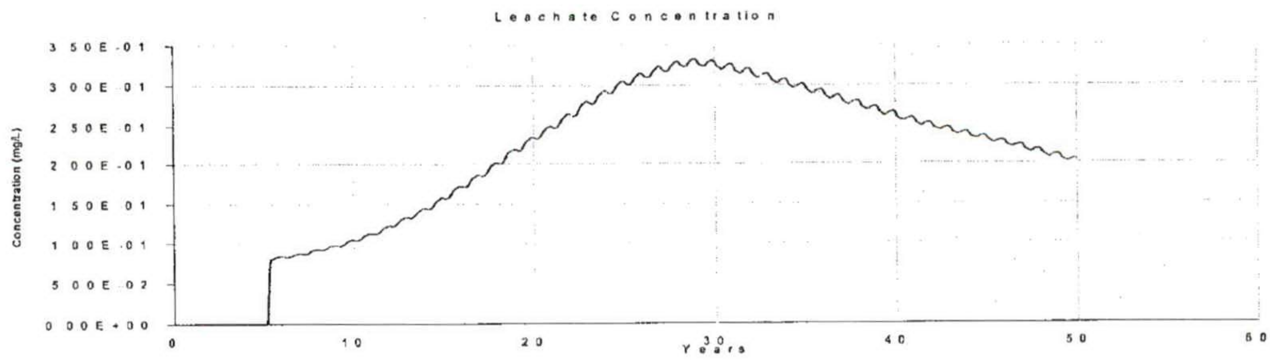
Application File: PCE at Dry Cleaner, 50% Precip Conditions
C:\SEVIEW63\DRY50 APL

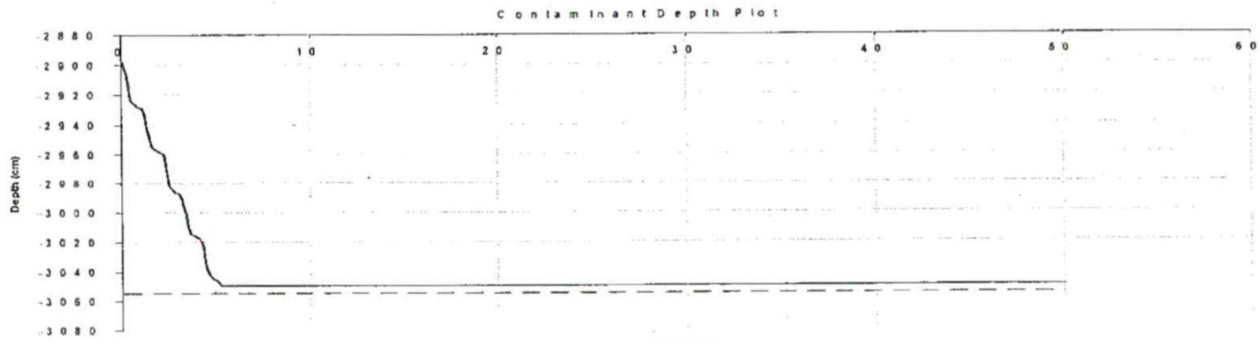
Starting Depth: 2898 00 **cm**

Ending Depth: 3050.00 **cm**

Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 10% Precip, 10% Volatilization, K=0.0001

SESOIL Output File: C:\SEVIEW63\DRY10K.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	4 842E+09	99 90
In Soil Air	4 226E+05	0 01
Sur. Runoff	0 000E+00	0.00
In Washld	0 000E+00	0.00
Ads On Soil	1.107E+06	0 02
Hydrol Soil	0.000E+00	0 00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0.00
Complexed	0.000E+00	0 00
Immobile CEC	0.000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	1 360E+05	0.00
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0 000E+00	0 00
Other Trans	0.000E+00	0 00
Other Sinks	0.000E+00	0 00
Gwr. Runoff	2.011E+03	0.00
Total Output	4 843E+09	99 93
Total Input	4 847E+09	
Input - Output	3.258E+06	

Maximum leachate concentration: 3.451E-04 **mg/l**

Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

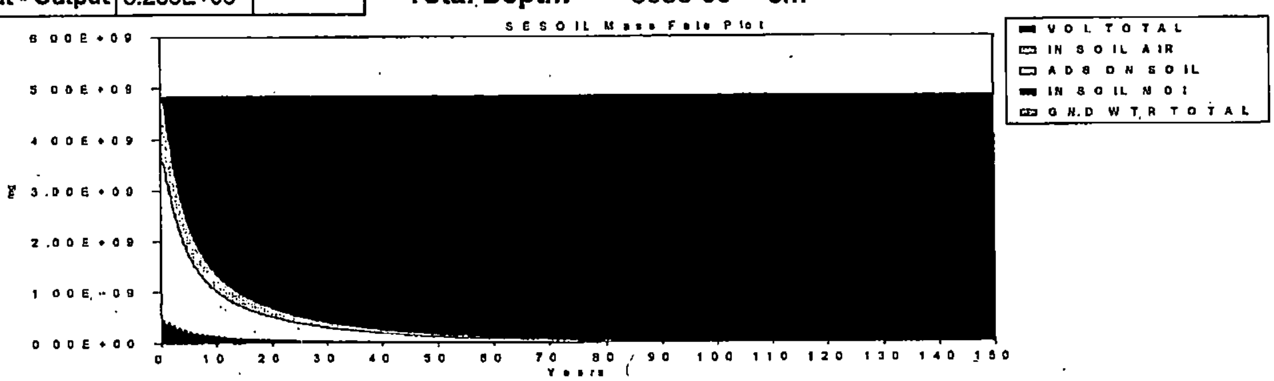
Soil File: Densely packed silty sand, C=6, n=0.27, K=0 0001
C:\SEVIEW63\SOILBCC2.SOI

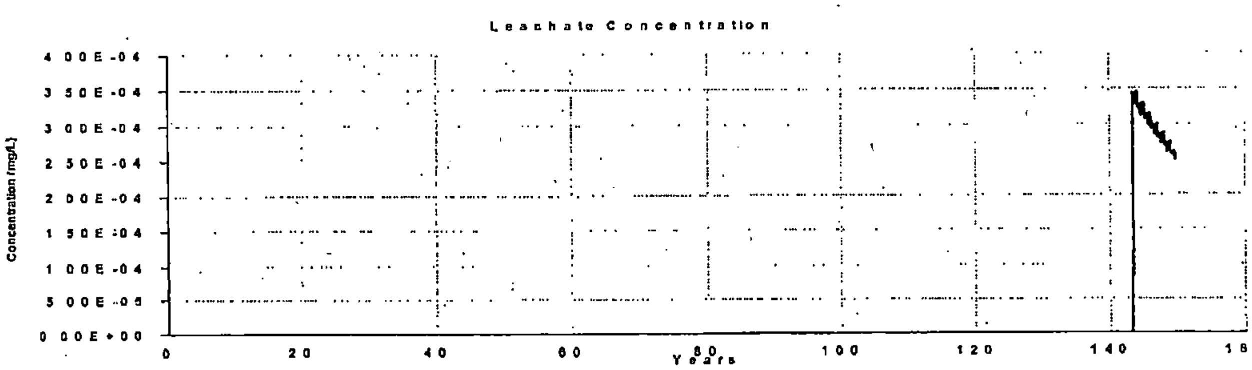
Application File: PCE at Dry Cleaner, 10% Precip Conditions
C:\SEVIEW63\DRY10 APL

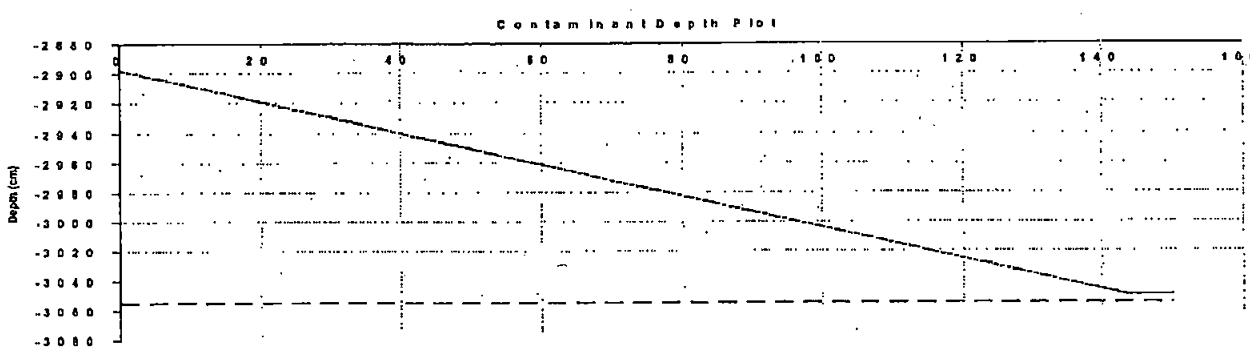
Starting Depth: 2898.00 **cm**

Ending Depth: 3050.00 **cm**

Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 100% Precip, 100% Volitilazation, foc=0 0005

SESOIL Output File: C:\SEVIEW63\DRY100OC.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1 814E+09	37.44
In Soil Air	9 350E+06	0 19
Sur. Runoff	0.000E+00	0 00
In Washld	0.000E+00	0 00
Ads On Soil	1.371E+07	0 28
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0 00
Immobile CEC	0.000E+00	0 00
Hydrol CEC	0.000E+00	0 00
In Soil Moi	4.871E+06	0 10
Hydrol Mois	0.000E+00	0.00
Degrad Mois	0 000E+00	0.00
Other Trans	0 000E+00	0.00
Other Sinks	0 000E+00	0.00
Gwr. Runoff	3.001E+09	61.92
Total Output	4 843E+09	99 94
Total Input	4.847E+09	
Input - Output	3.044E+06	

Maximum leachate concentration: 6 426E-01 **mg/l**

Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

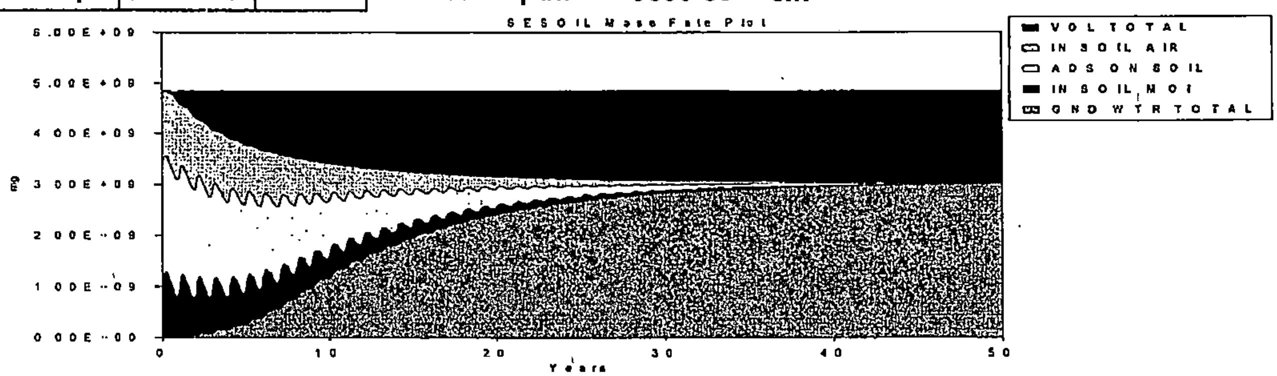
Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc=.000
C:\SEVIEW63\SOILBCCF SOI

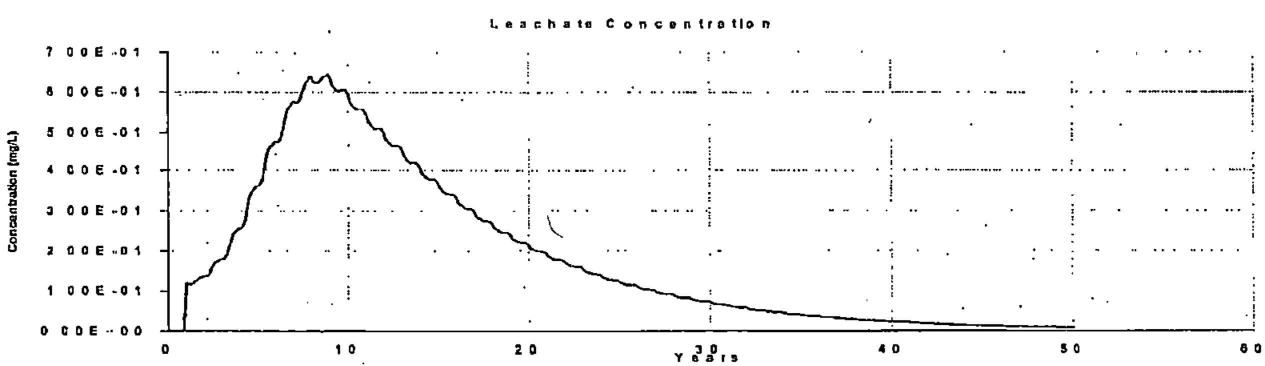
Application File: PCE at Dry Cleaner, 100% Precip Conditions
C:\SEVIEW63\BCC100 APL

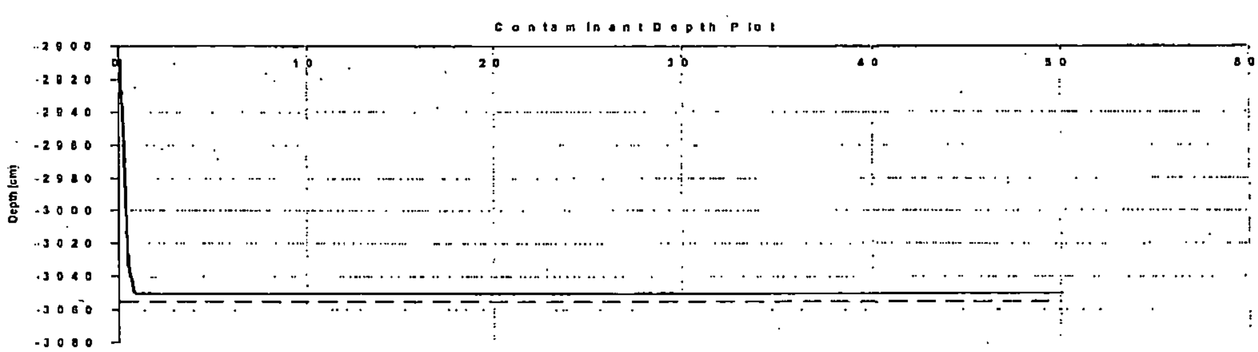
Starting Depth: 2908 00 **cm**

Ending Depth: 3050.00 **cm**

Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 50% Precip, 50% Volatilization, foc=0.0005

SESOIL Output File: C:\SEVIEW63\DRY50OC.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	3.835E+09	79 13
In Soil Air	4.694E+07	0.97
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0 00
Ads On Soil	6.465E+07	1 33
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0.00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0.00
Immobile CEC	0 000E+00	0.00
Hydrol CEC	0 000E+00	0.00
In Soil Moi	1 911E+07	0.39
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0 000E+00	0.00
Other Trans	0.000E+00	0.00
Other Sinks	0 000E+00	0.00
Gwr. Runoff	8.774E+08	18.10
Total Output	4 843E+09	99 92
Total Input	4 847E+09	
Input - Output	3.651E+06	

Maximum leachate concentration: 3 403E-01 **mg/l**

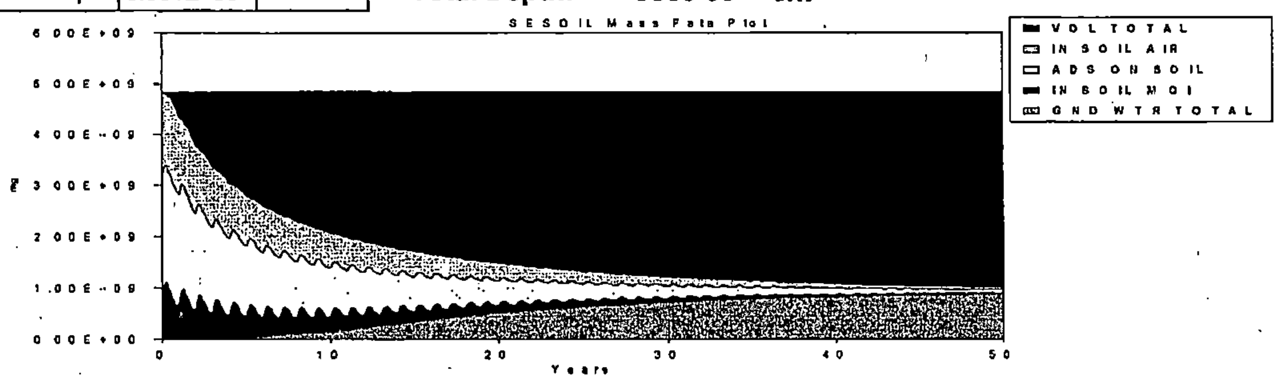
Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

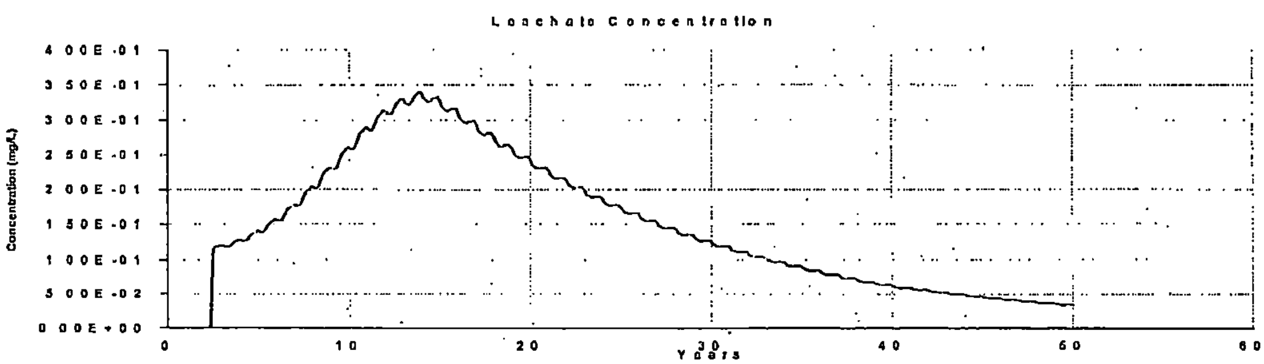
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

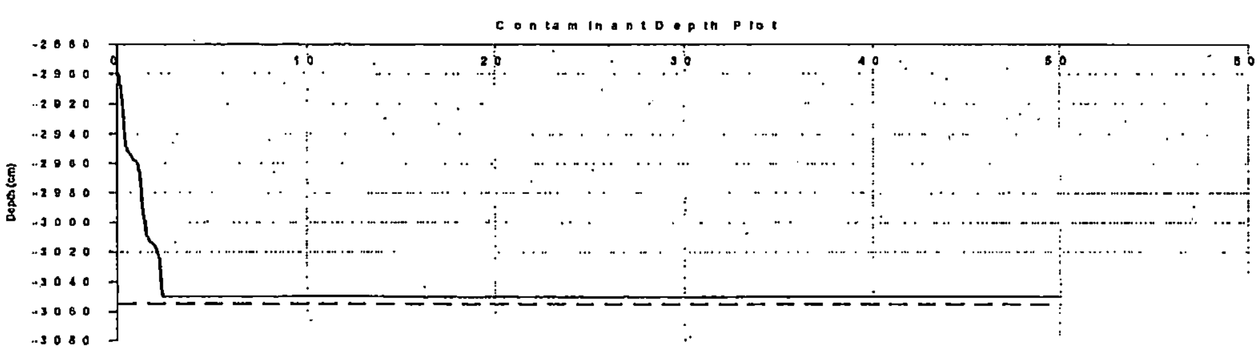
Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc=.000
C:\SEVIEW63\SOILBCCF SOI

Application File: PCE at Dry Cleaner, 50% Precip Conditions
C:\SEVIEW63\DRY50 APL

Starting Depth: 2900.00 **cm**
Ending Depth: 3050 00 **cm**
Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 10% Precip, 10% Volatilization, foc=0.0005

SESOIL Output File: C:\SEVIEW63\DRY10OC.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	4.845E+09	99 97
In Soil Air	2.600E+03	0 00
Sur. Runoff	0 000E+00	0.00
In Washld	0 000E+00	0.00
Ads On Soil	3.234E+03	0 00
Hydrol Soil	0.000E+00	0 00
Degrad Soil	0.000E+00	0 00
Pure Phase	0 000E+00	0 00
Complexed	0.000E+00	0.00
Immobile CEC	0.000E+00	0.00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	6 205E+02	0 00
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0.000E+00	0.00
Other Trans	0.000E+00	0 00
Other Sinks	0.000E+00	0 00
Gwr. Runoff	1.037E+05	0.00
Total Output	4 845E+09	99 97
Total Input	4 847E+09	
Input - Output	1.406E+06	

Maximum leachate concentration: 2.677E-03 **mg/l**

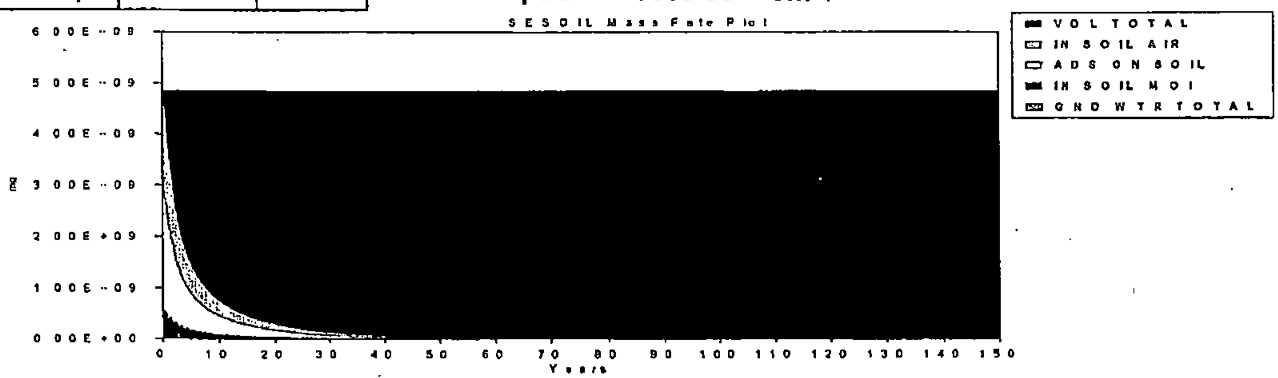
Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

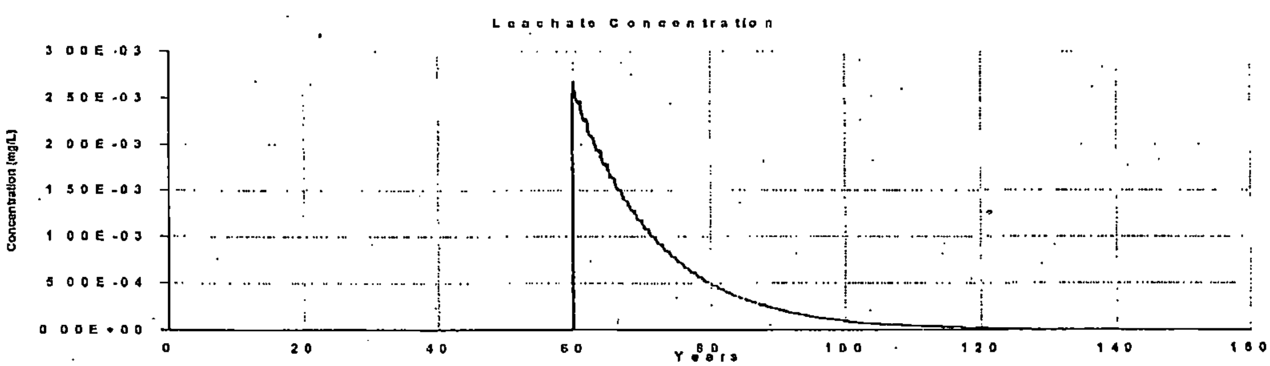
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

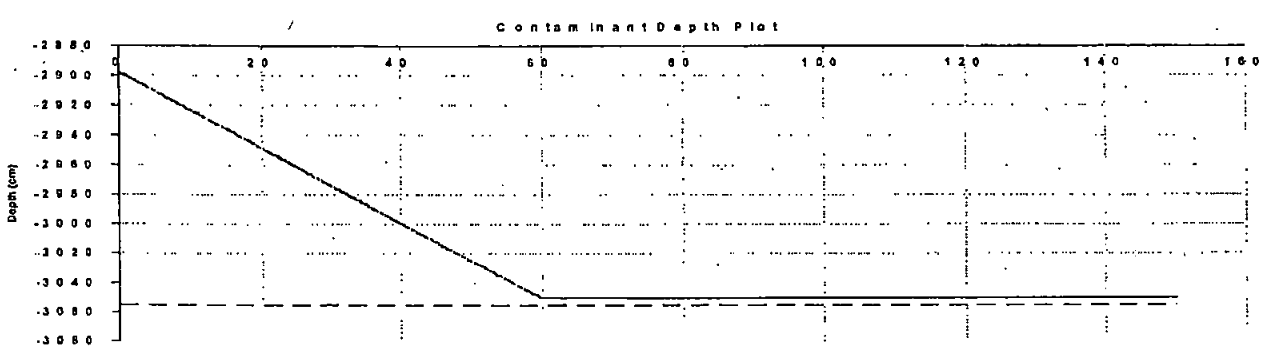
Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc=.000
C:\SEVIEW63\SOILBCCF SOI

Application File: PCE at Dry Cleaner, 10% Precip Conditions
C:\SEVIEW63\DRY10 APL

Starting Depth: 2898.00 **cm**
Ending Depth: 3050.00 **cm**
Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 100% Precip, 100% Volatilization, K=0.0001

SESOIL Output File: C:\SEVIEW63\MAN100K.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	3 694E+08	24 30
In Soil Air	1 699E+07	1 12
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0 00
Ads On Soil	5 786E+07	3 81
Hydrol Soil	0 000E+00	0 00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0.00
Immobile CEC	0 000E+00	0.00
Hydrol CEC	0 000E+00	0.00
In Soil Moi	1 392E+07	0 92
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0.000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0 00
Gwr. Runoff	1.059E+09	69.72
Total Output	1.517E+09	99 86
Total Input	1 520E+09	
Input - Output	2.135E+06	

Maximum leachate concentration: 7.544E-01 **mg/l**

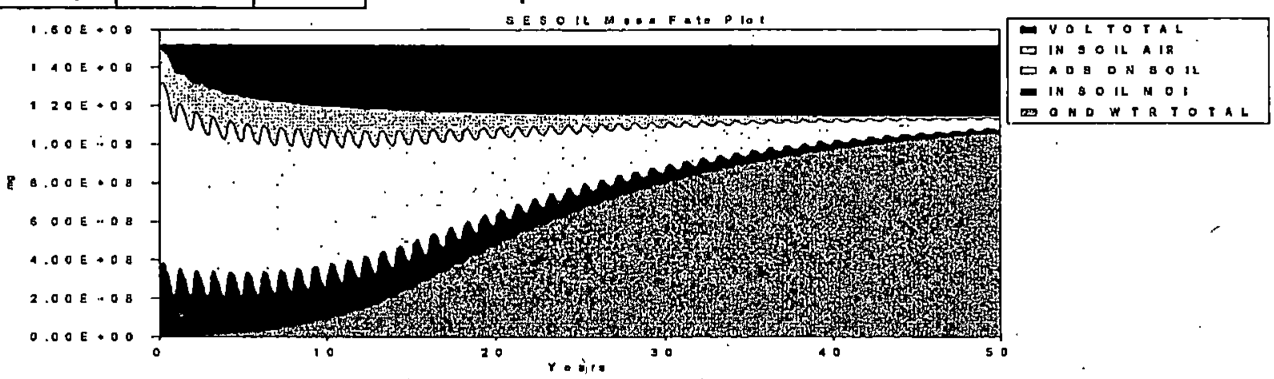
Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

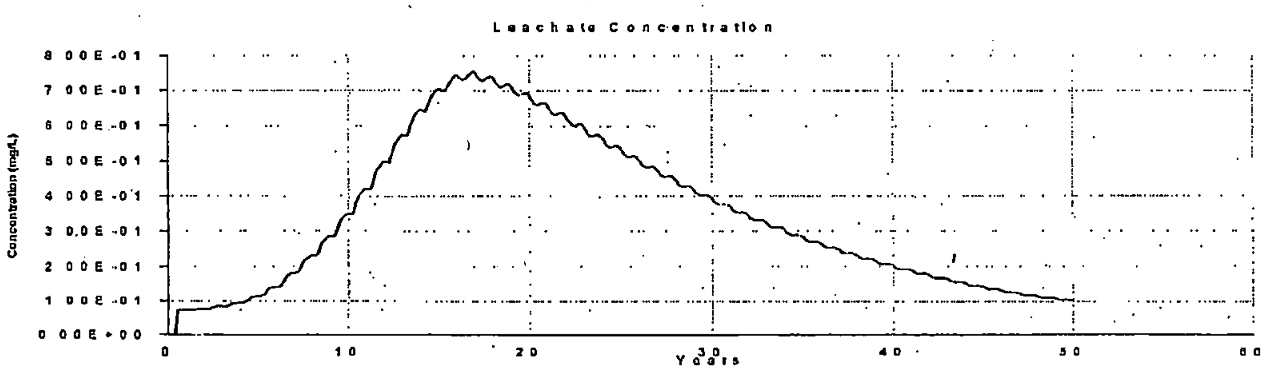
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

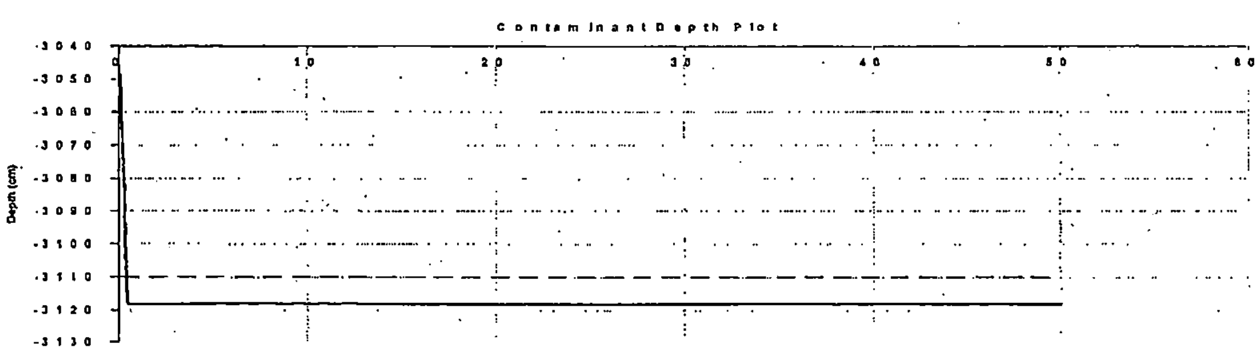
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 0001
C:\SEVIEW63\SOILBCC2 SOI

Application File: PCE at Manhole Post-excavation, 100% Precip and
C:\SEVIEW63\MAN100 APL

Starting Depth: 3049 00 **cm**
Ending Depth: 3118 00 **cm**
Total Depth: 3110 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 50% Precip, 50% Volatilization, K=0.0001

SESOIL Output File: C:\SEVIEW63\MAN50K OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	9 827E+08	64 66
In Soil Air	6 532E+07	4 30
Sur. Runoff	0 000E+00	0.00
In Washld	0 000E+00	0.00
Ads On Soil	2 022E+08	13.31
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0.00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0 00
Immobile CEC	0.000E+00	0 00
Hydrol CEC	0.000E+00	0 00
In Soil Moi	4.073E+07	2 68
Hydrol Mois	0.000E+00	0 00
Degrad Mois	0 000E+00	0.00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0.00
Gwr. Runoff	2.263E+08	14.89
Total Output	1 517E+09	99 83
Total Input	1 520E+09	
Input - Output	2.534E+06	

Maximum leachate concentration: 3.989E-01 **mg/l**

Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC.CHM

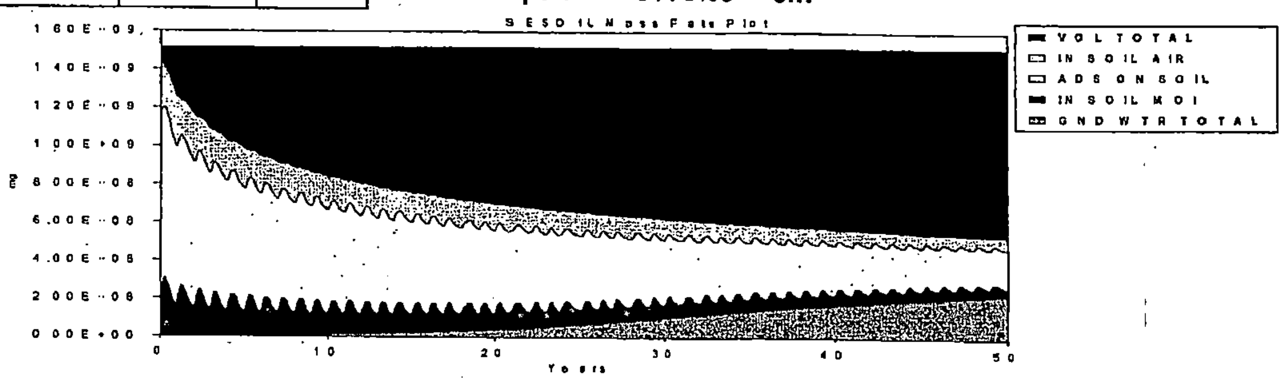
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 0001
C:\SEVIEW63\SOILBCC2 SOI

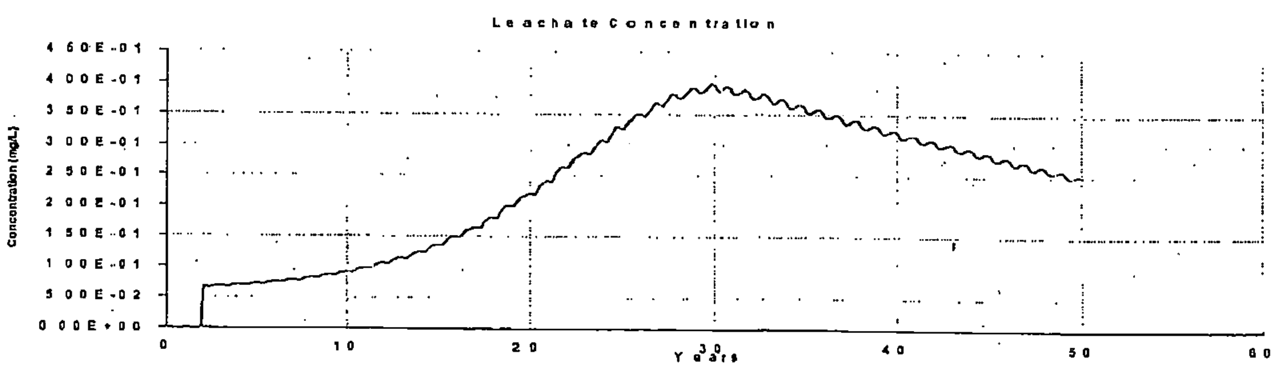
Application File: PCE at Manhole Post-excavation, 50% Precip and V
C:\SEVIEW63\MAN50 APL

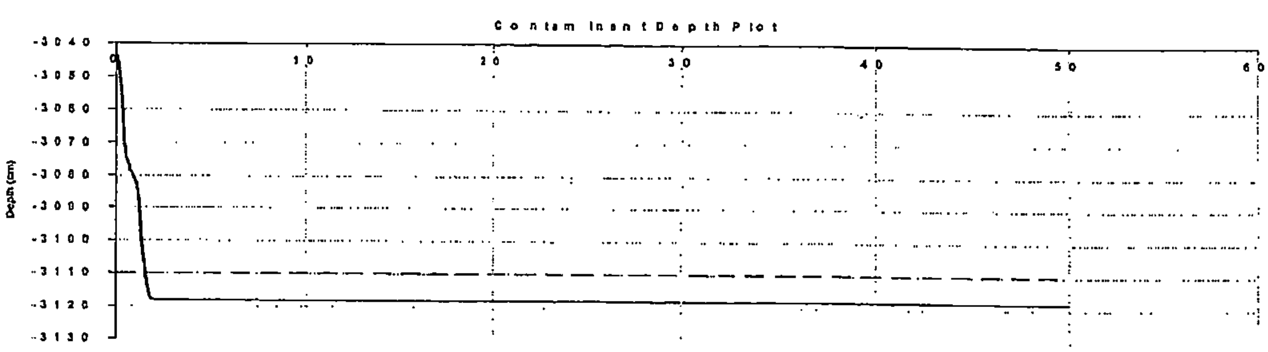
Starting Depth: 3044.00 **cm**

Ending Depth: 3118.00 **cm**

Total Depth: 3110.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 10% Precip, 10% Volatilization, K=0 0001

SESOIL Output File: C:\SEVIEW63\MAN10K.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1 513E+09	99 61
In Soil Air	1 108E+06	0 07
Sur. Runoff	0.000E+00	0 00
In Washld	0.000E+00	0 00
Ads On Soil	2.906E+06	0.19
Hydrol Soil	0.000E+00	0.00
Degrad Soil	0.000E+00	0.00
Pure Phase	0.000E+00	0.00
Complexed	0.000E+00	0 00
Immobile CEC	0 000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	3 590E+05	0 02
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0.00
Other Trans	0.000E+00	0.00
Other Sinks	0.000E+00	0.00
Gwr. Runoff	5.032E+05	0.03
Total Output	1.518E+09	99 93
Total Input	1 520E+09	
Input - Output	1.123E+06	

Maximum leachate concentration: 6 218E-02 **mg/l**

Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

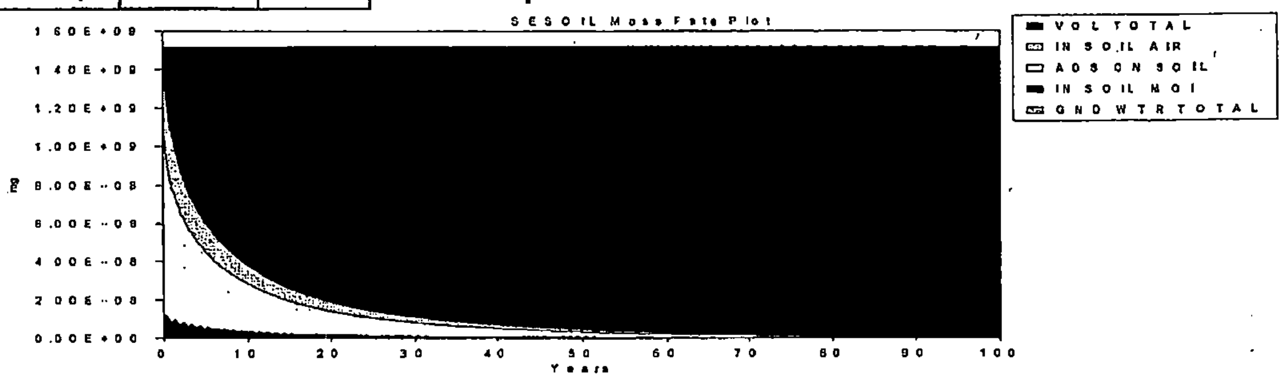
Soil File: Densely packed silty sand, C=6, n=0 27, K=0.0001
C:\SEVIEW63\SOILBCC2 SOI

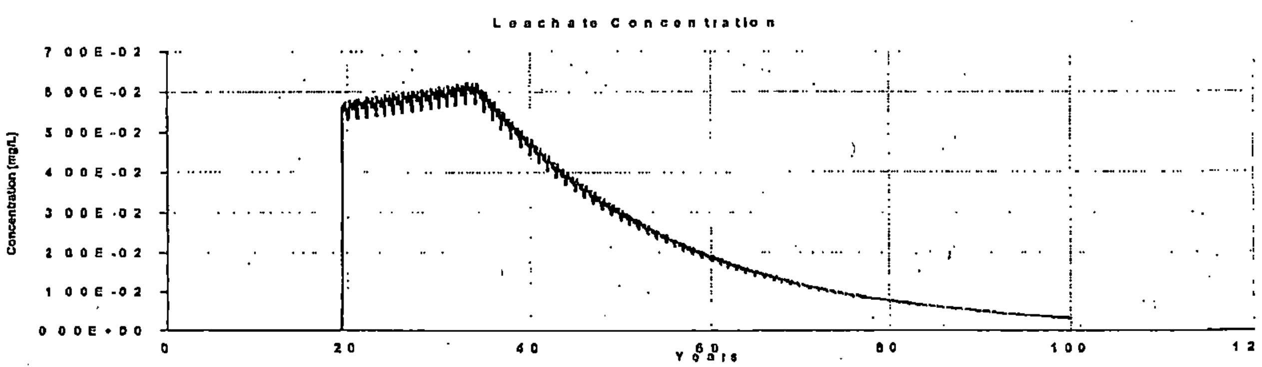
Application File: PCE at Manhole Post-excavation, 10% Precip and V
C:\SEVIEW63\MAN10 APL

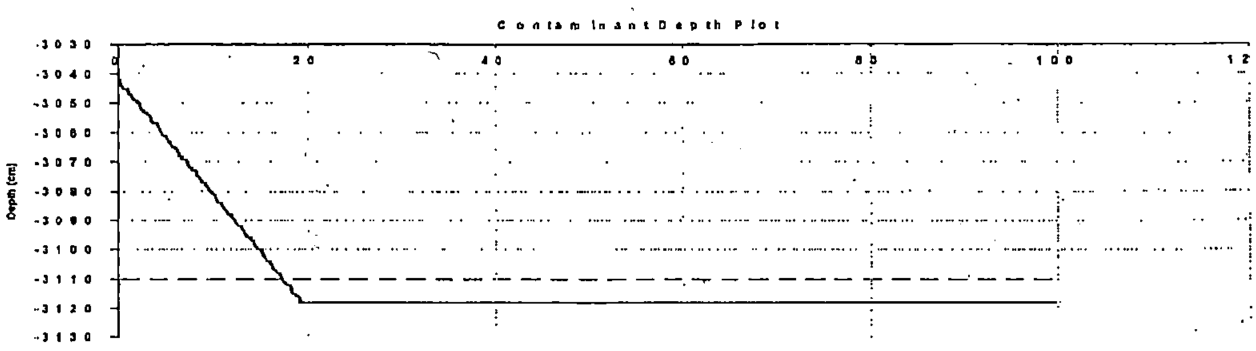
Starting Depth: 3042.00 **cm**

Ending Depth: 3118.00 **cm**

Total Depth: 3110.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 100% Precip, 100% Volatilization, foc=0 0005

SESOIL Output File: C:\SEVIEW63\MAN100OC.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	7.381E+08	48.56
In Soil Air	2.603E+06	0 17
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	3 818E+06	0 25
Hydrol Soil	0 000E+00	0 00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0 00
Complexed	0 000E+00	0 00
Immobile CEC	0 000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	1 356E+06	0 09
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0 00
Gwr. Runoff	7.728E+08	50.84
Total Output	1 518E+09	99 92
Total Input	1 520E+09	
Input - Output	1.262E+06	

Maximum leachate concentration: 7.892E-01 **mg/l**

Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

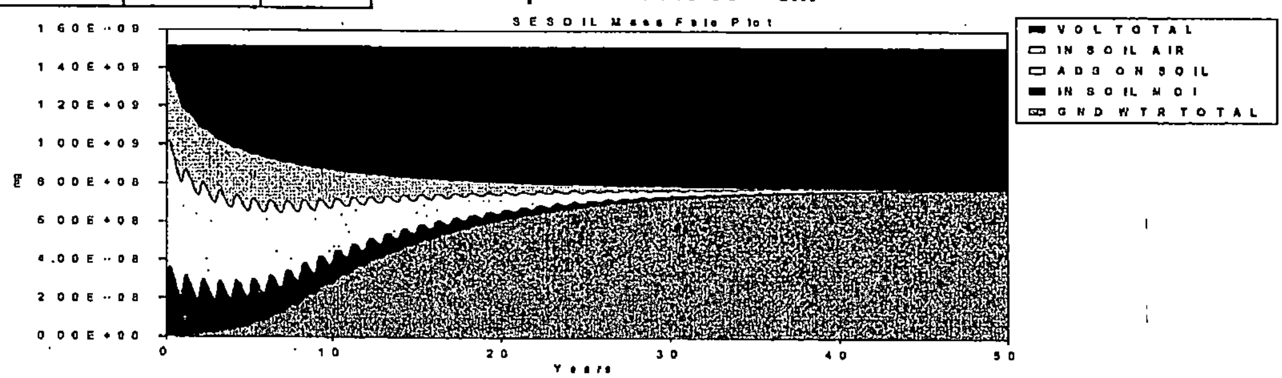
Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc=.000
C:\SEVIEW63\SOILBCCF SOI

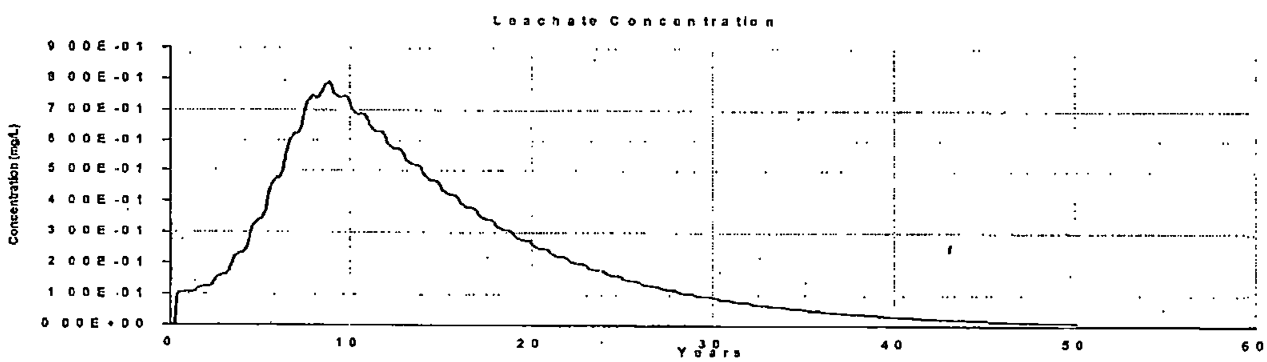
Application File: PCE at Manhole Post-excavation, 100% Precip and
C:\SEVIEW63\MAN100 APL

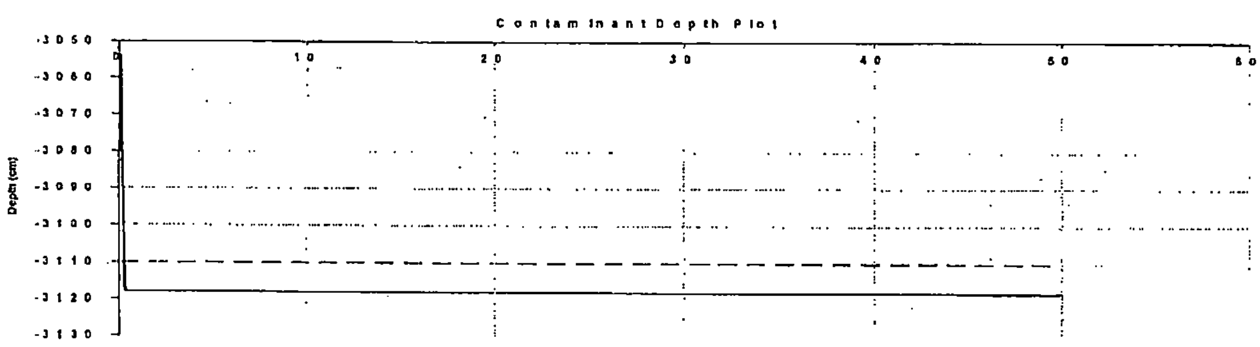
Starting Depth: 3054.00 **cm**

Ending Depth: 3118.00 **cm**

Total Depth: 3110.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 50% Precip, 50% Volatilization, foc=0 0005

SESOIL Output File: C:\SEVIEW63\MAN50OC.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1.262E+09	83 04
In Soil Air	1.275E+07	0.84
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0.00
Ads On Soil	1.756E+07	1.16
Hydrol Soil	0.000E+00	0.00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0 00
Complexed	0 000E+00	0.00
Immobile CEC	0.000E+00	0.00
Hydrol CEC	0.000E+00	0.00
In Soil Moi	5 191E+06	0 34
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0 00
Other Trans	0.000E+00	0.00
Other Sinks	0.000E+00	-0.00
Gwr. Runoff	2.208E+08	14.53
Total Output	1 518E+09	99 91
Total Input	1 520E+09	
Input - Output	1.397E+06	

Maximum leachate concentration: 4.000E-01 **mg/l**

Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

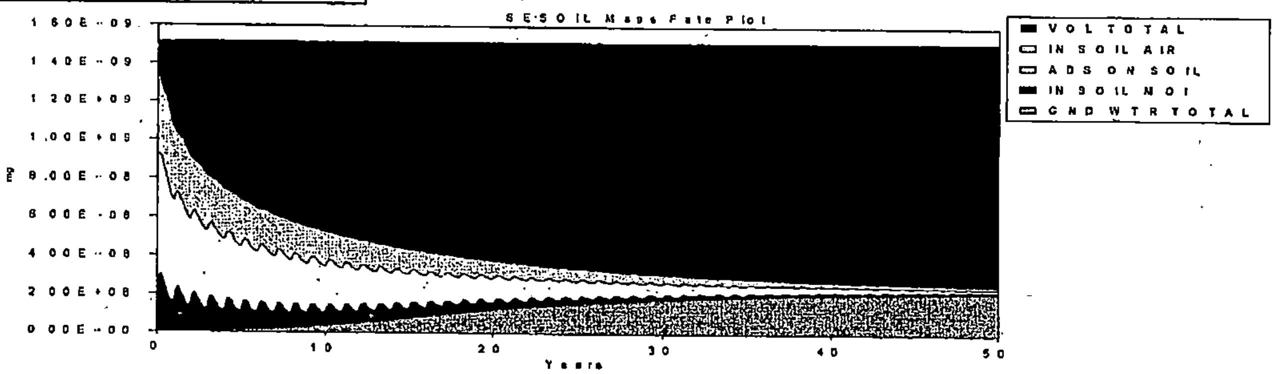
Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc= 000
C:\SEVIEW63\SOILBCCF.SOI

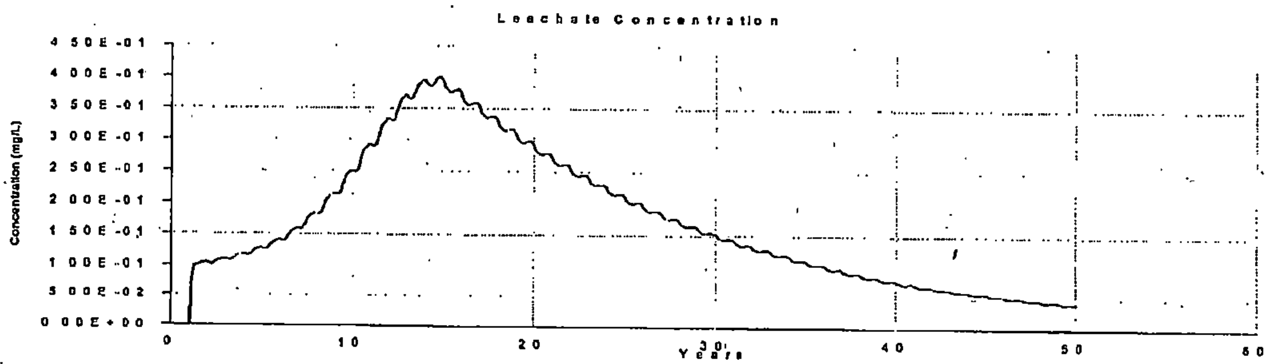
Application File: PCE at Manhole Post-excavation, 50% Precip and V
C:\SEVIEW63\MAN50 APL

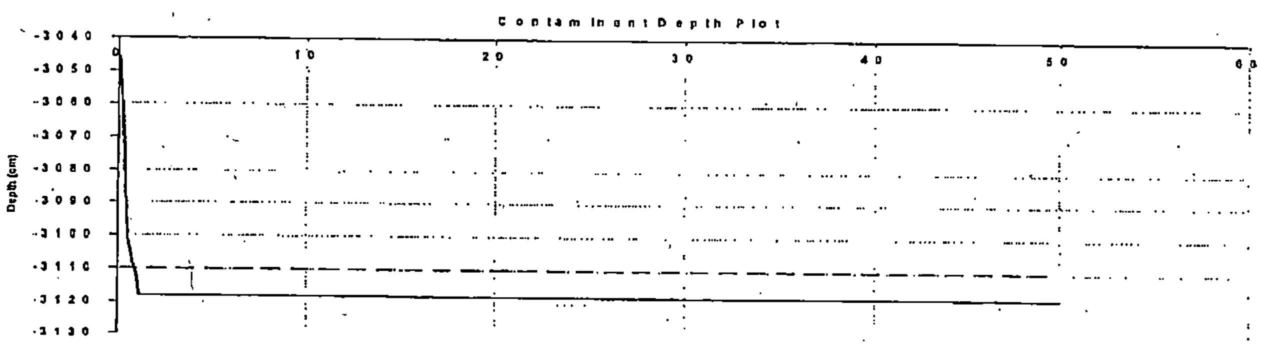
Starting Depth: 3046.00 **cm**

Ending Depth: 3118 00 **cm**

Total Depth: 3110 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 10% Precip, 10% Volatilization, foc=0 0005

SESOIL Output File: C:\SEVIEW63\MAN10OC OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1 517E+09	99 85
In Soil Air	4.521E+04	0.00
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0 00
Ads On Soil	5 625E+04	0 00
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0.00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0.00
Immobile CEC	0 000E+00	0.00
Hydrol CEC	0 000E+00	0.00
In Soil Moi	1 079E+04	0.00
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0.00
Other Trans	0.000E+00	0 00
Other Sinks	0.000E+00	0 00
Gwr. Runoff	1.302E+06	0.09
Total Output	1 519E+09	99 94
Total Input	1.520E+09	
Input - Output	8.772E+05	

Maximum leachate concentration: 9 594E-02 **mg/l**

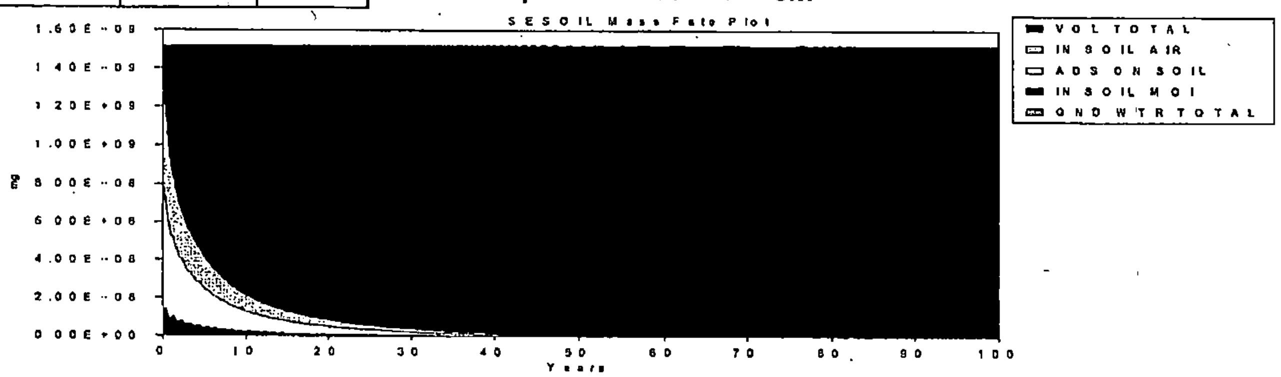
Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

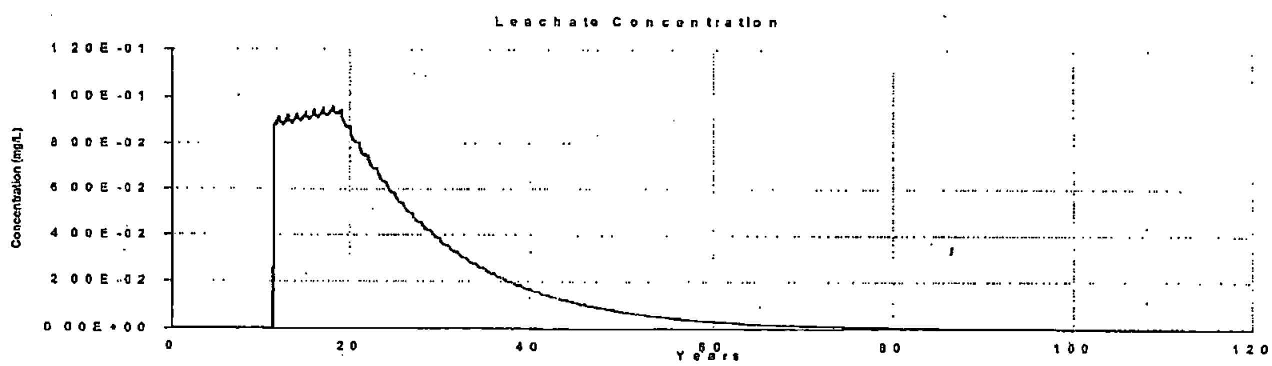
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

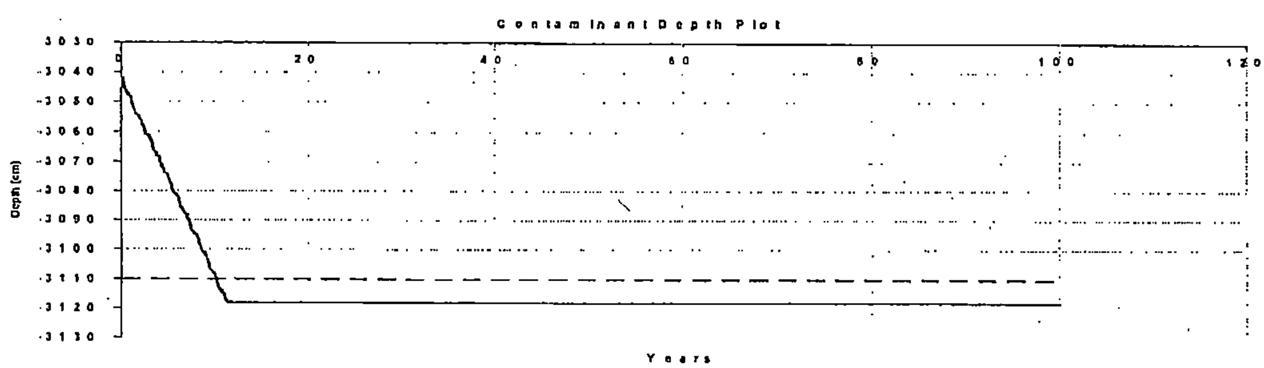
Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc= 000
C:\SEVIEW63\SOILBCCF SOI

Application File: PCE at Manhole Post-excavation, 10% Precip and V
C:\SEVIEW63\MAN10 APL

Starting Depth: 3042.00 **cm**
Ending Depth: 3118.00 **cm**
Total Depth: 3110.00 **cm**







CCI Analytical Laboratories, Inc.
8620 Holly Drive
Everett, WA 98208
Phone (425) 356-2600
(206) 292-9059 Seattle
(425) 356-2626 Fax
http://www.ccilabs.com

Chain Of Custody/ Laboratory Analysis Request

CCI Job# (Laboratory Use Only)

Date 6/30/03 Page 2 Of 2

PROJECT ID: BCC-BSE-0007
REPORT TO COMPANY: Tom Colligan / FSM
PROJECT MANAGER: Floyd Snider McCarthy, Inc.
ADDRESS: 83 South King St.
Seattle, WA 98104
PHONE: 206-292-2078 FAX:
P.O. NUMBER: E-MAIL:
INVOICE TO COMPANY: FSM
ATTENTION: c/o Tom Colligan
ADDRESS: SAB

ANALYSIS REQUESTED — OTHER (Specify)

	SAMPLE I.D.	DATE	TIME	TYPE	LAB#	NWTPH-HCID	NWTPH-DX	NWTPH-GX	BTEX by EPA-8021	MTBE by EPA-8021 ☐ EPA-8260 ☐	Halogenated Volatiles by EPA 8260	Volatile Organic Compounds by EPA 8260 (HVOC)	Ethylene dibromide (EDB) by EPA-8260 ☐ EPA-504.1 ☐	1,2 Dichloroethene (EDC) by EPA-8260	Semivolatile Organic Compounds by EPA 8270	Polycyclic Aromatic Hydrocarbons (PAH) by EPA-8270 SIM ☐	PCB ☐ Pesticides ☐ by EPA 8081/8082	Metals-MTCA-5 ☐ RCRA-8 ☐ Pri Pol ☐ TAL ☐	Metals Other (Specify)	TCLP-Metals ☐ VOA ☐ Semi-Vol ☐ Pest ☐ Herbs ☐	OTHER (Specify)	NUMBER OF CONTAINERS
1.	MW-4-100'	6/30	1308	S	11							✓										
2.	MW-4-102.5	6/30	1315	S	12																	
3.	MW-4-105	6/30	1323	S	13																	
4.	MW-4-107.5	6/30	1328	S	14																	
5.	MW-4-110	6/30	1335	S	15							✓										
6.																						
7.																						
8.																						
9.																						
10.																						

TC 6/30/03 [handwritten initials across empty rows]

SPECIAL INSTRUCTIONS

SIGNATURES (Name, Company, Date, Time):

1. Relinquished By: Tom Colligan FSM 7/1/03 10:00am
Received By: [signature] CCIAL 7/1/03 11:10
2. Relinquished By:
Received By:

TURNAROUND REQUESTED in Business Days*

Organic, Metals & Inorganic Analysis: 10 (Standard) 5 3 2 1 SAME DAY

Fuels & Hydrocarbon Analysis: 5 (Standard) 3 1 SAME DAY

OTHER:
Specify:

* Turnaround request less than standard may incur Rush

CCI Analytical Laboratories, Inc.
8620 Holly Drive
Everett, WA 98208
Phone (425) 356-2600
(206) 292-9059 Seattle
(425) 356-2626 Fax
http://www.ccilabs.com

Chain Of Custody/ Laboratory Analysis Request

CCI Job# (Laboratory Use Or

Date 6/30/03 Page 1 Of 2

PROJECT ID: BCC-BSE Task 07000
REPORT TO COMPANY: Tom Colligan / FSM
PROJECT MANAGER: Floyd Snider McCarthy, Inc
ADDRESS: 83 S. King St. Suite 614
Seattle WA 98104
PHONE: 206-292-2078 FAX: 206-682-7867
P.O. NUMBER: E-MAIL:
INVOICE TO COMPANY: FSM
ATTENTION: c/o Tom Colligan
ADDRESS: Same as above

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	TYPE	LAB#	NWTPH-HCID	NWTPH-DX	NWTPH-GX	BTEX by EPA-8021	MTBE by EPA-8021 ☐ EPA-8260 ☐	Halogenated Volatiles by EPA 8260	Volatile Organic Compounds by EPA 8260 (HVOC only)	Ethylene dibromide (EDB) by EPA-8260☐ EPA-504.1☐	1,2 Dichloroethene (EDC) by EPA-8260	Semivolatile Organic Compounds by EPA 8270	Polycyclic Aromatic Hydrocarbons (PAH) by EPA-8270 SIM ☐	PCB ☐ Pesticides ☐ by EPA 8081/8082	Metals-MTCA-5☐ RCRA-8 ☐ Pri Pol☐ TAL☐	Metals Other (Specify)	TCLP-Metals☐ VOA☐ Semi-Vol☐ Pest☐ Herbs☐	OTHER (Specify)	NUMBER OF CONTAINERS
1. MW-4-22'	6-30-03	09:30	S	1							✓										
2. MW-4-32'	↓	09:50	S	2																	
3. MW-4-42'		10:00	S	3							✓										
4. MW-4-52'		10:20	S	4																	
5. MW-4-62'		10:30	S	5							✓										
6. MW-4-72'		11:00	S	6																	
7. MW-4-82'		11:15	S	7							✓										
8. MW-4-92'		12:30	S	8																	
9. MW-4-94.5'		12:45	S	9																	
10. MW-4-97'		13:00	S	10																	

SPECIAL INSTRUCTIONS

CCI Analytical Laboratories, Inc accepts and processes this request on the terms and conditions set forth on the reverse side. By its signature hereon, Customer accepts these terms and conditic

SIGNATURES (Name, Company, Date, Time):

1. Relinquished By: Tom Colligan FSM 7/1/03, 10:22AM
   Received By: [signature] CCIAL 7/1/03 11:10
2. Relinquished By:
   Received By:

TURNAROUND REQUESTED in Business Days*

Organic, Metals & Inorganic Analysis: ☒ 10 (Standard) ☐ 5 ☐ 3 ☐ 2 ☐ 1 ☐ SAME DAY

Fuels & Hydrocarbon Analysis: ☐ 5 (Standard) ☐ 3 ☐ 1 ☐ SAME DAY

OTHER:
Specify:

* Turnaround request less than standard may incur Rush

CCI
ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: BLK
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: METHOD BLANK FOR EPA-8260

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: ____________

CCI ANALYTICAL LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: BLK
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: METHOD BLANK FOR EPA-8260

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

CCI
ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004

DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007

QUALITY CONTROL RESULTS

SURROGATE RECOVERY

SPIKE/ SPIKE DUPLICATE RESULTS

METHOD	SPIKE ID	ASSOCIATED SAMPLES	% SPIKE RECOVERY	% SPIKE DUP RECOVERY	REL % DIFF
EPA-8260	1,1 DICHLOROETHENE	307010-05,07,09,11,15,19	106	88	18
EPA-8260	TRICHLOROETHENE	307010-05,07,09,11,15,19	94	83	13
EPA-8260	CHLOROBENZENE	307010-05,07,09,11,15,19	93	85	9

APPROVED BY: ____________

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CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007

QUALITY CONTROL RESULTS

SURROGATE RECOVERY

CCIL SAMPLE ID	ANALYTE	SUR ID	% RECV
307004-01	EPA-8260	1,2-DCE-d4	113
307004-01	EPA-8260	4-BFB	111
307004-03	EPA-8260	1,2-DCE-d4	110
307004-03	EPA-8260	4-BFB	116
307004-05	EPA-8260	1,2-DCE-d4	110
307004-05	EPA-8260	4-BFB	109
307004-07	EPA-8260	1,2-DCE-d4	115
307004-07	EPA-8260	4-BFB	112
307004-11	EPA-8260	1,2-DCE-d4	111
307004-11	EPA-8260	4-BFB	114
307004-15	EPA-8260	1,2-DCE-d4	111
307004-15	EPA-8260	4-BFB	110

BLANK AND DUPLICATE RESULTS

METHOD	BLK RESULT	ASSOC SMPLS	DUP RESULT	ORIG RESULT	%RPD	ASSOC SMPLS
EPA-8260	SEE BLANK REPORT					

CCI
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CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 15
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-110' 6/30/03 13:35

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: CN

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CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 15
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-110' 6/30/03 13:35

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

CCI
ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 11
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-100' 6/30/03 13:08

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: [signature]

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CLIENT SAMPLE ID: MW-4-100' 6/30/03 13:08

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

CCI
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LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 7
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-82' 6/30/03 11:15

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

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APPROVED BY: [signature]

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CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-82' 6/30/03 11:15

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

CCI
ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 5
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-62' 6/30/03 10:30

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: ____________

CCI
ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 5
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-62' 6/30/03 10:30

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

CCI ANALYTICAL LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 3
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-42' 6/30/03 10:00

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: ____________

CCI
ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 3
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-42' 6/30/03 10:00

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

CCI ANALYTICAL LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 1
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-22' 6/30/03 09:30

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: [signature]

MW-4 Soil Samples from
well installation 6.30.03

CCI
ANALYTICAL
LABORATORIES, INC.

RECEIVED
JUL 15 2003
BY:

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 1
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-22' 6/30/03 09:30

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

MW-4 Soil Samples from well installation 6.30.03

CCI Analytical Laboratories, Inc.

RECEIVED JUL 15 2003 BY:

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307004
CCIL SAMPLE #: 1
DATE RECEIVED: 7/1/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-4-22' 6/30/03 09:30

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

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Draft Agenda
Management Team Meeting on Development
Of Toxicity Screening Values via the FPM
Wednesday March 22nd
10-noon

DEQ Northwest Region Offices, Room C
2020 SW 4th Avenue, 4th Floor, Portland, Oregon

Attendees: Keith Johnson- ODEQ, Dave Bradley- WA DOE, Cathy Tortorici- NMFS, Jeremy Buck- USFWS, Stephanie Stirling- USACE, Gary Voerman- EPA

Purpose: Scope out the coming year's work for revising, validating, and promulgating regional freshwater sediment screening values.

Discussion Objectives

- Our expectations.
- Expectations for use?
- Do we all understand what the FPM is?
- Role of agencies and partners
- Technical team- who are they? Roles and responsibilities
- Timeframes
- Funding

Topics

10-1015	Introductions and expectations and introductions; How we got here	Johnson, all
1015-1045	Agency perspectives on methodology and screening	All
1045- 1100	Review of methodology and use	Johnson
1100-1130	Approach to reevaluation, review of scoping document	Johnson
1130-noon	Roles and responsibilities- funding, participants, relationship to this group	All

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Everett, WA 98208
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(206) 292-9059 Seattle
(425) 356-2626 Fax
http://www.ccilabs.com

Chain Of Custody/ Laboratory Analysis Request

CCI Job# (Laboratory Use Only)

Date 7/2 Page 1 Of 2

PROJECT ID: BCC-BSE-0007
REPORT TO COMPANY: FSM
PROJECT MANAGER: Tom Colligan
ADDRESS: 93 South Kin St., Suite 614
Seattle, WA 98104
PHONE: 206-292-2078 FAX: 206-682-7867
P.O. NUMBER: E-MAIL:
INVOICE TO COMPANY: SAB
ATTENTION: Tom Colligan
ADDRESS: SAB

ANALYSIS REQUESTED / OTHER (Specify)

SAMPLE I.D.	DATE	TIME	TYPE	LAB#	NWTPH-HCID	NWTPH-DX	NWTPH-GX	BTEX by EPA-8021	MTBE by EPA-8021 ☐ EPA-8260 ☐	Halogenated Volatiles by EPA 8260	Volatile Organic Compounds by EPA 8260	Ethylene dibromide (EDB) by EPA-8260 ☐ EPA-504.1 ☐	1,2 Dichloroethene (EDC) by EPA-8260	Semivolatile Organic Compounds by EPA 8270	Polycyclic Aromatic Hydrocarbons (PAH) by EPA-8270 SIM ☐	PCB ☐ Pesticides ☐ by EPA 8081/8082	Metals-MTCA-5 ☐ RCRA-8 ☐ Pri Pol ☐ TAL ☐	Metals Other (Specify)	TCLP-Metals ☐ VOA ☐ Semi-Vol ☐ Pest ☐ Herbs ☐								NUMBER OF CONTAINERS	RECEIVED IN GOOD CONDITION?
MW-5-105	7/2	0850	S	11						X																		
MW-5-107.5	7/2	0856	S	12																								
MW-5-110	7/2	0905	S	13																								
MW-5-112.5	7/2	0915	S	14																								
MW-5-115	7/2	0926	S	15						X																		
MW-5-117.5	7/2	0930	S	16																								
MW-5-120	7/2	0945	S	17																								
MW-5-122.5	7/2	1015	S	18																								
MW-5-125	7/2	1030	S	19						X																		

REPORT COPY

SPECIAL INSTRUCTIONS

SIGNATURES (Name, Company, Date, Time):

Relinquished By: Stephen Bentsen FSM 7.2.03, 1:20 PM
Received By: [signature] CCIAL 7/2/03 2:45
Relinquished By:
Received By:

TURNAROUND REQUESTED in Business Days*

Organic, Metals & Inorganic Analysis: ☒ 10 (Standard) ☐ 5 ☐ 3 ☐ 2 ☐ 1 ☐ SAME DAY

Fuels & Hydrocarbon Analysis: ☐ 5 (Standard) ☐ 3 ☐ 1 ☐ SAME DAY

OTHER:
Specify:

* Turnaround request less than standard may incur Rush Charges

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Everett, WA 98208
Phone (425) 356-2600
(206) 292-9059 Seattle
(425) 356-2626 Fax
http://www.ccilabs.com

Chain Of Custody/ Laboratory Analysis Request

CCI Job# (Laboratory Use Only)

Date 7/1 Page 1 Of 2

JECT ID: BCC-~~BES~~ BSE-0007
ORT TO IPANY: FSM
JECT IAGER: Tom Colligan
RESS: 83 South King St, Suite 614
Seattle, WA 98104
NE: 206-292-2078 FAX: 206-682.7867
NUMBER: E-MAIL:
DICE TO IPANY: FSM
ENTION: Tom Colligan
RESS: SAB

ANALYSIS REQUESTED / OTHER (Specify)

SAMPLE I.D.	DATE	TIME	TYPE	LAB#	NWTPH-HCID	NWTPH-DX	NWTPH-GX	BTEX by EPA-8021	MTBE by EPA-8021 ☐ EPA-8260 ☐	Halogenated Volatiles by EPA 8260	Volatile Organic Compounds by EPA 8260	Ethylene dibromide (EDB) by EPA-8260 ☐ EPA-504.1 ☐	1,2 Dichloroethane (EDC) by EPA-8260	Semivolatile Organic Compounds by EPA 8270	Polycyclic Aromatic Hydrocarbons (PAH) by EPA-8270 SIM ☐	PCB ☐ Pesticides ☐ by EPA 8081/8082	Metals-MTCA-5 ☐ RCRA-8 ☐ Pri Pol ☐ TAL ☐	Metals Other (Specify)	TCLP-Metals ☐ VOA ☐ Semi-Vol ☐ Pest ☐ Herbs ☐	OTHER (Specify)	NUMBER OF CONTAINERS	RECEIVED IN GOOD CONDITION?
MW-5-12.5	7/1	~~1250~~ 1220	S	1																		
MW-5-22.5	7/1	1240	S	2																		
MW-5-32.5	7/1	1245	S	3																		
MW-5-42.5	7/1	1320	S	4																		
MW-5-52.5	7/1	1335	S	5					~~X~~	X												
MW-5-62.5	7/1	1348	S	6																		
MW-5-72.5	7/1	1359 [overwritten]	S	7						X												
MW-5-82.5	7/1	~~1408~~ 1459 [?]	S	8																		
MW-5-92.5	7/1	~~1435~~ 1428 [?]	S	9						X												
MW-5-102.5	7/2	0822	S	10																		

REPORT COPY

ECIAL INSTRUCTIONS [illegible]

SIGNATURES (Name, Company, Date, Time):
Relinquished By: Stephen Bratsch, FSM 7-2-03 13:20
Received By: [signature] CCIAL 7/2/03 2:45
Relinquished By:
Received By:

TURNAROUND REQUESTED in Business Days*

Organic, Metals & Inorganic Analysis
~~10~~ (Standard) 5 3 2 1 SAME DAY

Fuels & Hydrocarbon Analysis
5 (Standard) 3 1 SAME DAY

OTHER:
Specify:

* Turnaround request less than standard may incur Rush Charges

ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307010
CCIL SAMPLE #: 19
DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-5-125' 7/2/03 1030

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

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ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307010
CCIL SAMPLE #: 19
DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-5-125' 7/2/03 1030

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: ____________

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DATE: 7/8/03
CCIL JOB #: 307010

DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007

QUALITY CONTROL RESULTS

SURROGATE RECOVERY

CCIL SAMPLE ID	ANALYTE	SUR ID	% RECV
307010-05	EPA-8260	1,2-DCE-d4	108
307010-05	EPA-8260	4-BFB	108
307010-07	EPA-8260	1,2-DCE-d4	112
307010-07	EPA-8260	4-BFB	114
307010-09	EPA-8260	1,2-DCE-d4	116
307010-09	EPA-8260	4-BFB	108
307010-11	EPA-8260	1,2-DCE-d4	84
307010-11	EPA-8260	4-BFB	122*
307010-15	EPA-8260	1,2-DCE-d4	110
307010-15	EPA-8260	4-BFB	115
307010-19	EPA-8260	1,2-DCE-d4	110
307010-19	EPA-8260	4-BFB	112

BLANK AND DUPLICATE RESULTS

METHOD	BLK RESULT	ASSOC SMPLS	DUP RESULT	ORIG RESULT	%RPD	ASSOC SMPLS
EPA-8260	SEE BLANK REPORT					

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CERTIFICATE OF ANALYSIS

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83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307010

DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007

QUALITY CONTROL RESULTS

SURROGATE RECOVERY

SPIKE/ SPIKE DUPLICATE RESULTS

METHOD	SPIKE ID	ASSOCIATED SAMPLES	% SPIKE RECOVERY	% SPIKE DUP RECOVERY	REL % DIFF
EPA-8260	1,1 DICHLOROETHENE	307010-05,07,09,11,15,19	106	88	18
EPA-8260	TRICHLOROETHENE	307010-05,07,09,11,15,19	94	83	13
EPA-8260	CHLOROBENZENE	307010-05,07,09,11,15,19	93	85	9

* SURROGATE OUTSIDE OF CONTROL LIMITS OF 74-121%

APPROVED BY: [signature]

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LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307010
CCIL SAMPLE #: BLK
DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: METHOD BLANK FOR EPA-8260

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

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CCI ANALYTICAL LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307010
CCIL SAMPLE #: BLK
DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: METHOD BLANK FOR EPA-8260

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: ____________

8620 Holly Drive • Everett, WA 98208 • 425 356-2600 • FAX 425 356-2626 • Seattle 206 292-9059

ANALYTICAL LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307010
CCIL SAMPLE #: 15
DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-5-115' 7/2/03 0926

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: [signature]

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ANALYTICAL LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

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83 S. KING ST., SUITE 614
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DATE: 7/8/03
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CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-5-115' 7/2/03 0926

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

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ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307010
CCIL SAMPLE #: 11
DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-5-105' 7/2/03 0850

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/7/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

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APPROVED BY: [signature]

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CLIENT SAMPLE ID: MW-5-105' 7/2/03 0850

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/7/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/7/03	CCN

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ANALYTICAL LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307010
CCIL SAMPLE #: 9
DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-5-92.5' 7/1/03 1620

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

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DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

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ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307010
CCIL SAMPLE #: 7
DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-5-72.5' 7/1/03 1519

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

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DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

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CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
CCIL JOB #: 307010
CCIL SAMPLE #: 5
DATE RECEIVED: 7/2/03
WDOE ACCREDITATION #: C142

CLIENT CONTACT: TOM COLLIGAN

CLIENT PROJECT ID: BCC - BSE - 0007
CLIENT SAMPLE ID: MW-5-52.5' 7/1/03 1339

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
4-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3 DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,4-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMO 3-CHLOROPROPANE	EPA-8260	ND(<50)	UG/KG	7/3/03	CCN
1,2,4-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
HEXACHLORO1,3-BUTADIENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: ________

8620 Holly Drive • Everett, WA 98208 • 425 356-2600 • FAX 425 356-2626 • Seattle 206 292-9059

ANALYTICAL LABORATORIES, INC.

RECEIVED
JUL 15 2003
BY

CERTIFICATE OF ANALYSIS

CLIENT: FLOYD SNIDER McCARTHY, INC.
83 S. KING ST., SUITE 614
SEATTLE, WA 98104

DATE: 7/8/03
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CLIENT SAMPLE ID: MW-5-52.5' 7/1/03 1339

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
DICHLORODIFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
VINYL CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROFLUOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
METHYLENE CHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,2-DICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CHLOROFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,1-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CARBON TETRACHLORIDE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRICHLOROETHENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMODICHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TRANS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
CIS-1,3-DICHLOROPROPENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2-TRICHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,3-DICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
TETRACHLOROETHYLENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
DIBROMOCHLOROMETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2-DIBROMOETHANE	EPA-8260	ND(<5)	UG/KG	7/3/03	CCN
CHLOROBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOFORM	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,1,2,2-TETRACHLOROETHANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
1,2,3-TRICHLOROPROPANE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
BROMOBENZENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN
2-CHLOROTOLUENE	EPA-8260	ND(<10)	UG/KG	7/3/03	CCN

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Floyd Snider McCarthy, Inc. 83 South King Street Suite 614 Seattle, Washington 98104 tel: 206.292.2078 fax: 206.682.7867
Strategy & Technical Solutions for Contaminated Properties

May 13, 2004

Mr. Ron Timm
Northwest Region, Toxics Cleanup Program
Washington State Department of Ecology
3160 160th Ave SE
Bellevue WA 98008

SUBJECT: WORK PLAN FOR OFF-SITE GROUNDWATER INVESTIGATION, SHOPS AT FIRST STREET SITE, BELLEVUE, WASHINGTON

Dear Mr. Timm:

On behalf of Benenson Bellevue Associates II (Benenson), the owner of the above-referenced site, Floyd Snider McCarthy, Inc. (FSM) is submitting this work plan for review and comment as part of Benenson's participation in the Washington State Department of Ecology's (Ecology) Voluntary Cleanup Program.

BACKGROUND

During site redevelopment in 1994, perchloroethylene (PCE) was discovered in on-site soil. The PCE was attributed to releases from a former dry cleaning operation (Kennedy/Jenks 1994). PCE-impacted soil underlying the former dry cleaning facility was subsequently excavated to a depth of 15 feet below ground surface (bgs). Sampling during the subsequent remedial investigation revealed elevated concentrations of PCE in soil adjacent to a parking lot manhole. The greatest concentrations occurred directly below the base of the manhole at approximately 10 feet bgs and continued to a depth of 20 feet bgs. In September 2003, the PCE-impacted soil in the area of the manhole was excavated to a depth of 20 feet bgs. Following excavation, residual concentrations in the base and sidewalls of each excavation were typically less than 1 mg/kg. Soil samples collected from deep borings near the manhole and former dry cleaners currently indicate similar residual PCE concentrations (less than 1 mg/kg) in soil samples collected up to 100 feet bgs.

SITE CONDITIONS

In 2002 and 2003, five monitoring wells were installed at the site to evaluate impacts of PCE to groundwater. Figure 1 shows the locations of the five wells relative to former and current site features. Data from these wells sufficiently characterized on site geologic conditions and defined the groundwater flow direction as follows.

Subsurface soil samples revealed that the site is underlain by a thick sequence of dry, dense, glacially-compacted silty fine sand to sandy silt to a variable depth of between 60 and 120 feet bgs. Underneath the glacial deposit is a medium-grained sand deposit. In four of the site wells, groundwater was first encountered at approximately 100 feet bgs within the sand deposit or, in the case of MW-5, within the glacial silty sand deposit, which is unusually thick in this location. Each well is screened across the upper 15 to 20 feet of saturated soil.

Over the past year, seasonal groundwater elevations have revealed a consistent groundwater flow direction to the south. On-site groundwater elevations are approximately 50 feet above mean sea level (MSL). The likely discharge point for the groundwater is the Mercer Slough, located approximately 3/4 miles to the south. Groundwater is not currently used by Bellevue residents for drinking purposes. Mercer Slough is connected to Lake Washington, which has a typical surface elevation of 20 feet above MSL. This would imply a regional horizontal groundwater gradient from the site to the slough of 0.0075 ft/ft, approximately equal to the horizontal gradient within the site, which was calculated to be 0.006 ft/ft. Using the regional gradient, and assuming a porosity for the sand of 40 percent and a hydraulic conductivity of 0.002 cm/sec (typical of a medium sand), a groundwater seepage velocity of 3.24 cm/day can be calculated. This seepage velocity is equivalent to approximately 40 feet/year.

PCE IN ON-SITE GROUNDWATER

During the summer of 2003, PCE was detected in groundwater samples from four of the five wells at concentrations up to 99 µg/L. Well MW-1 did not contain detectable PCE, as it is located upgradient of the release areas. Conditions at the property boundary (or as close as practicable) are determined by Wells MW-4 and MW-5. At the location of MW-4, PCE concentrations are 9 µg/L. At MW-2, located 120 feet upgradient of MW-4 and adjacent to the manhole, PCE concentrations are 43 µg/L, indicating that PCE concentrations significantly decrease downgradient of the manhole. In contrast, PCE concentrations in MW-5 are 98 µg/L. This concentration is about equivalent to the 93 µg/L measured in Well MW-3, located 120 feet upgradient of MW-5 and directly downgradient of the former dry cleaners.

The differences in downgradient PCE concentrations are likely controlled by aquifer conditions. Well MW-4 is screened across very clean medium sands that are capable of transmitting a greater amount of groundwater than the more compact and finer-grained soils at MW-5. This results in greater groundwater flux past MW-4 and a more rapid transport and dissipation of PCE. Given that significant dissipation appears to be occurring in the on-site plume, it is expected that any off-site migration of PCE at concentrations greater than 5 ug/L is limited. really?

In contrast, the PCE concentrations at MW-5 are similar to those in upgradient Well MW-3. This is likely related to the tighter soils in this location. The slower movement of groundwater past this well limits the ability of the aquifer to dissipate the PCE. Additionally, the groundwater elevation at MW-5 is slightly higher than surrounding wells, which results in an eastward bending of contours towards Well MW-4 (Figure 1). This suggests that a significant portion of the PCE at MW-5 may be flowing towards MW-4. true but same on 108th ave to what extent

what are the PCE conc at mw 3,4 & 5?

DNAPL AND PCE PATHWAY TO GROUNDWATER

A DNAPL source for the PCE in the aquifer is highly unlikely for the following reasons:.

- PCE concentrations in groundwater at the site are 1,000 times less than the PCE solubility in water (150,000 µg/L). An accepted rule-of-thumb for the presence of DNAPL in an aquifer is a solvent concentration in groundwater of at least 1 percent of its solubility. For PCE, a 1 percent solubility concentration in groundwater would be 1,500 µg/L. Site concentrations of PCE in Well MW-2 are less than 100 µg/L, which does not support a DNAPL source.
- The soil data also demonstrate that the vast majority of PCE released at this site was contained in the upper 20 feet of dense glacial soil. Gravity migration of a DNAPL phase deeper than 20 feet would have resulted in much greater residual concentrations of PCE (i.e., greater than 1 mg/kg). Preferential migration through soil "fractures" cannot reasonably be considered a potential pathway for DNAPL because fractures were not observed in soil cores obtained during drilling or in excavation sidewalls.

The mechanism for transporting the trace amounts of PCE observed in soil at depths greater than 20 feet is suspected to be via infiltration waters that leached PCE from the upper 20 feet of soil and transported it down into the deeper soils over time. Eventually, this PCE-containing water (not a DNAPL) reached and recharged the aquifer but did not "sink" through it. The PCE content of this recharging water resulted in creation of the current PCE plume.

PURPOSE OF INVESTIGATION

The purpose of this investigation is to define the extent of PCE in groundwater downgradient of the site, and in particular downgradient of Well MW-4, where aquifer conditions indicate a higher potential for groundwater to flow off-property.

Specific objectives are as follows:

- **Define conditions downgradient from the site** – Data from the existing site wells indicates the likelihood for off-property migration of the plume. Installation of additional wells is necessary to evaluate the off-property extent of the plume.
- **Determine how PCE concentrations vary with aquifer depth** - The variability of PCE concentration with depth in the aquifer must be established to evaluate the possibility, however remote, of a DNAPL release. Evidence for a DNAPL release would be indicated if PCE concentrations were significantly greater in groundwater deeper within in the aquifer.

To accomplish these objectives, the following activities will be performed:

- **Install off-site groundwater monitoring wells.** Locations for off-site wells are constrained to the residential streets located within the Surrey Downs development to the south of Main Street. It is not possible to install wells along 108th due to overhead power lines and buried utilities. The Surrey Downs development is directly downgradient of Well MW-4, so it is ideally located. Two wells, MW-6A and MW-6B will be installed in the locations shown in Figure 1. This location is approximately 500 feet downgradient of the source areas.

  Well MW-6B will be a deep well installed above any aquitard encountered within the maximum drilling depth of a hollow stem auger (approximately 120 to 140 feet bgs).

If an aquitard is not encountered, the base of this well will be set 40 feet below the first saturated soil encountered, expected at a depth of 85 feet bgs. The second well, MW-6A, will be a shallow well set at least 10 feet higher than the top of the deeper well screen. The wells will be constructed of 2-inch PVC with a minimum screen length of 10 feet. To better define local groundwater flow direction and vertical gradient, both wells will be surveyed and groundwater elevations obtained at the same time as the on-site wells are installed.

- **Sample the existing and new wells.** A minimum of one week after well development, the four existing wells (except for clean upgradient Well MW-1) and the two new wells will be sampled in accordance with EPA Method 8260 for Volatile Organic Carbons (VOCs) using passive diffusion bags (PDBs) filled with deionized water. Sample collection will occur a minimum of one week after installation. The PDBs will be set at mid-screen elevations in the on-site wells. In the new off-site wells, two PDBs per well will be installed: an upper PDB near the top of the well screen and a lower PDB at the base of the well screen. This will allow contaminant concentration at four depths in the off-site aquifer to be determined.

REPORTING

A brief letter report will be provided to Ecology that describes and documents these activities through the groundwater sampling event. The data collected will be assessed and recommendations made concerning the need for additional monitoring and investigation. The following possible range of outcomes is anticipated:

1. *All PCE concentrations in the off-site well samples are less than 5 µg/L.* This outcome would indicate that limited off-site migration of the plume has occurred. No additional wells would be necessary to complete the off-site characterization of the plume. Long term monitoring of existing wells would be implemented to establish whether PCE concentrations in on-site wells are declining.
2. *PCE concentrations in the upper well exceed 5 µg/L and concentrations in the lower well are less than 5 µg/L.* This outcome would establish that off-site migration of the plume has occurred without evidence of a DNAPL release to deeper within the aquifer. Additional downgradient well(s) would be needed to define the extent of the plume, but they would be screened within the upper 20 feet of the aquifer. A potential location for additional downgradient wells is shown on Figure 1 as MW-7.
3. *PCE concentrations in the upper well are less than 5 µg/L and are significantly greater than 5 µg/L in the lower well.* This would indicate evidence of a deeper DNAPL source in the aquifer. Additional deeper downgradient wells would be recommended to establish the extent of the plume.
4. *PCE concentrations in the upper well and lower wells are greater than 5 µg/L but at similar concentrations.* This would indicate a wide distribution of the plume has occurred indicating that additional wells are necessary downgradient in both shallow and deeper sections of the aquifer.

Thank you for your time in reviewing this work plan. We look forward to receiving your comments.

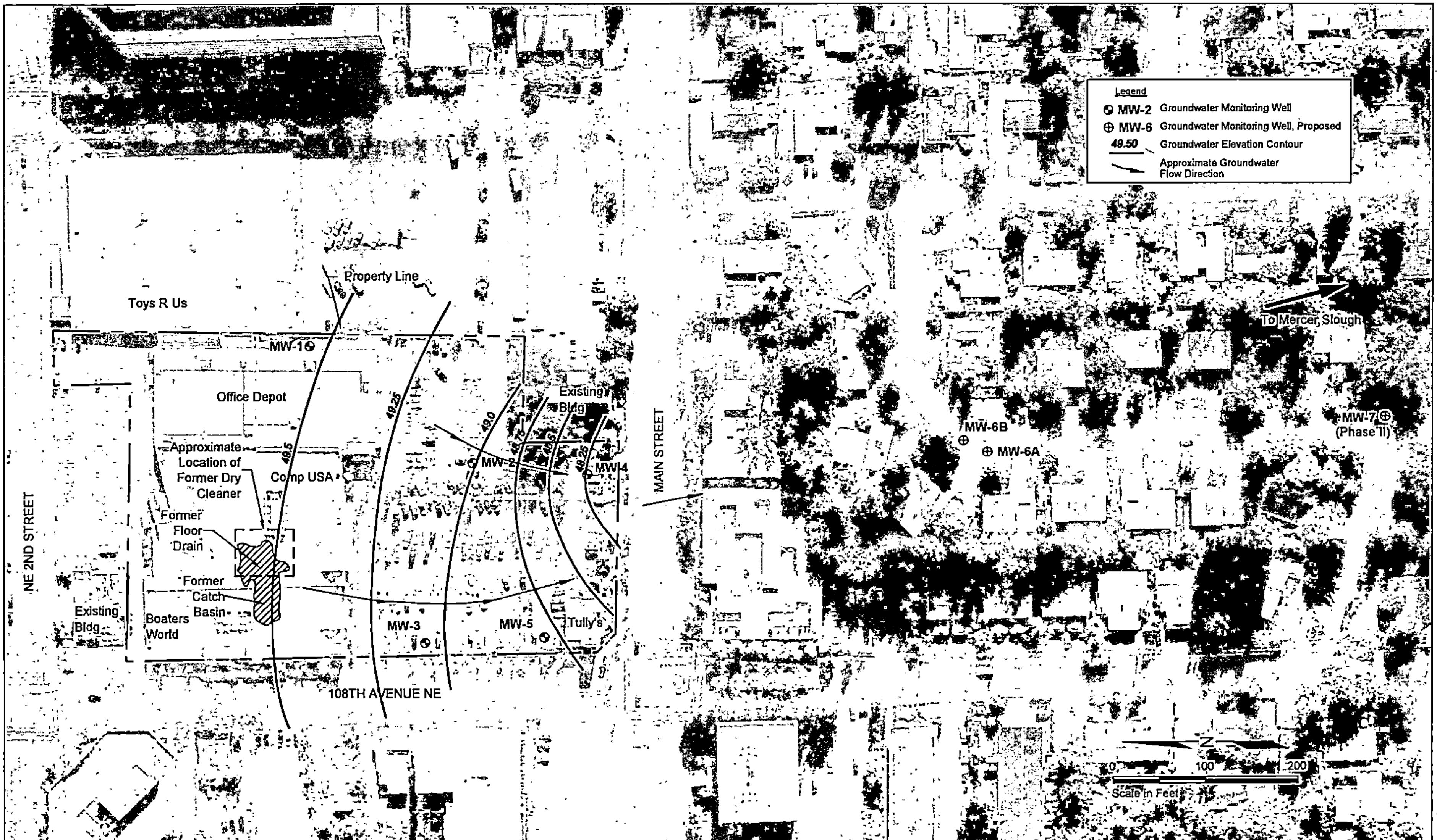
Sincerely yours,
Floyd Snider McCarthy, Inc.

Tom Colligan, L.H.G
Senior Project Manager

Encl.: Figure 1
Copies: Leonard Kreppel, Benenson Capital, Tom Newlon, Stoel Rives

Reference:

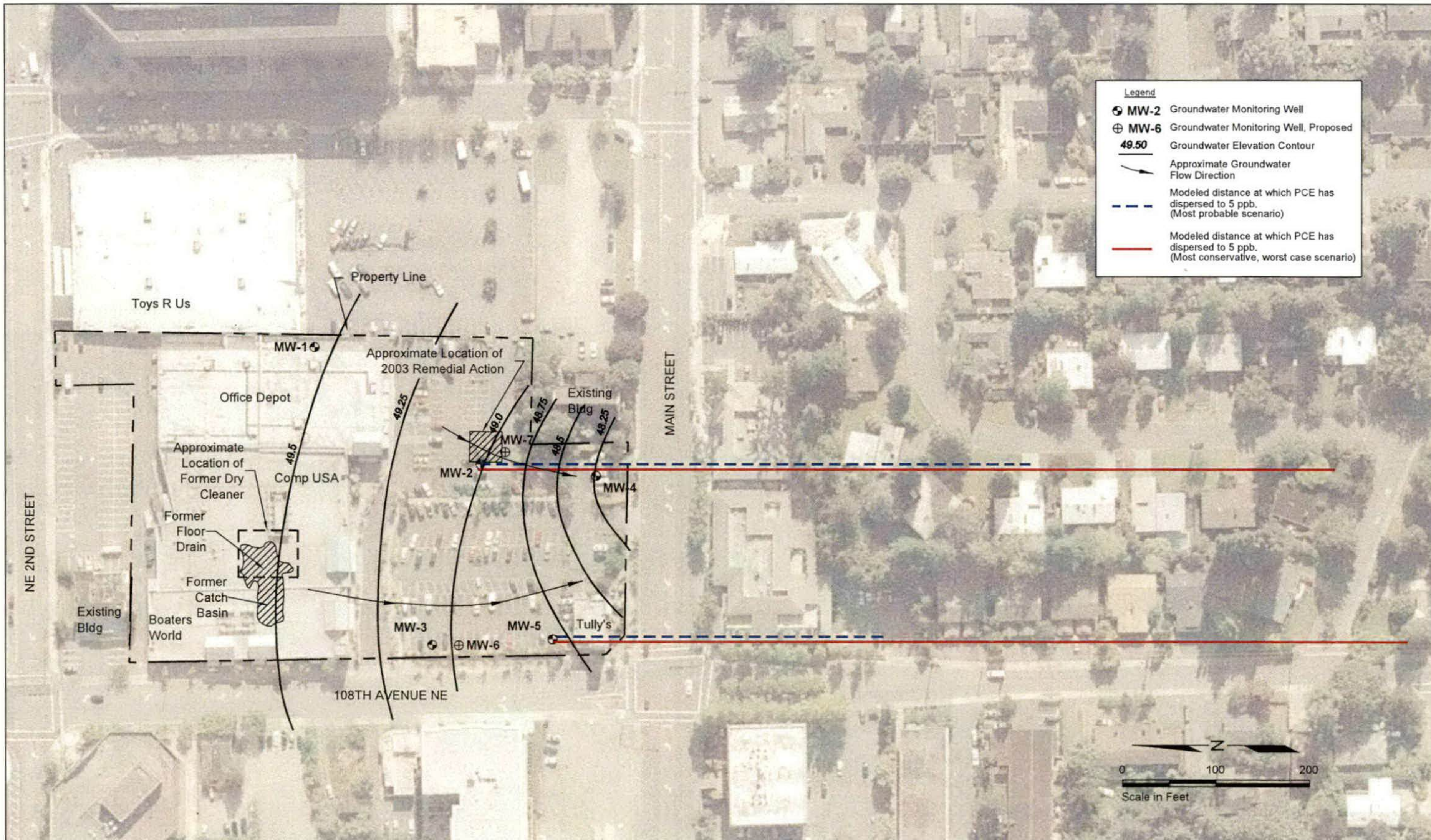
Kennedy/Jenks Consultants. 1994. Remedial Investigation / Feasibility Study Report (Revised). The Shops at First Street Project Site. Bellevue, WA. November.



Floyd Snider McCarthy, Inc.

Benenson Bellevue Associates II
Shops at First Street
Bellevue, Washington

Figure 1
Proposed Off-Site Well Locations



Floyd Snider McCarthy, Inc.

Benenson Bellevue Associates II
Shops at First Street
Bellevue, Washington

Figure 1
PCE Modeling Results and Proposed Deep Well Locations

DWG NAME: G:\project\Clients\Floyd and Snider\BCC_BSE\bccbse012.dwg

FLOYD | SNIDER
strategy • science • engineering

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Seattle, Washington 98104
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February 9, 2005

Mr. Ron Timm
Northwest Region, Toxics Cleanup Program
Washington State Department of Ecology
3160 160th Ave SE
Bellevue WA 98008

SUBJECT: WORK PLAN FOR ON-SITE DEEP WELL INSTALLATION INVESTIGATION, SHOPS AT FIRST STREET SITE, BELLEVUE, WASHINGTON

Dear Ron:

On behalf of Benenson Bellevue Associates II (Benenson), the owner of the above-referenced site, Floyd|Snider is submitting this work plan for your review and comment. This submittal has been prepared as part of Benenson's participation in the Washington State Department of Ecology's (Ecology) Voluntary Cleanup Program. This work plan has been revised to address Ecology's comments received at a meeting on January 25, 2005.

BACKGROUND

During site redevelopment in 1994, perchloroethylene (PCE) was discovered in on-site soil. The PCE was attributed to releases from a former dry cleaning operation (Kennedy/Jenks 1994). PCE-contaminated soil lying below the former dry cleaning facility was subsequently excavated to a depth of 15 feet below ground surface (bgs). A total of 2,140 cubic yards of contaminated soil was excavated. Subsequent soil borings showed that remaining soil concentrations were all less than 19.6 mg/kg, with a maximum concentration of 4.6 mg/kg at a depth of 40 feet.

Sampling during the subsequent remedial investigation revealed a second release of PCE in soil adjacent to a parking lot manhole. The highest concentrations of PCE were found adjacent to the manhole. In September 2003, 195 cubic yards of PCE-impacted soil in the area of the manhole was excavated to a depth of 20 feet bgs. Following excavation, residual concentrations in the base and sidewalls of each excavation were less than 1mg/kg. Soil samples collected from deep borings near the manhole indicated PCE concentrations of less than 1 mg/kg in soil samples collected up to 100 feet bgs.

SITE CONDITIONS

In 2002 and 2003, five monitoring wells were installed at the site to evaluate impacts of PCE to groundwater. Figure 1 shows the locations of the five wells relative to former and current site features. Data from these wells sufficiently characterized on-site geologic conditions and defined the groundwater flow direction as follows.

Subsurface soil samples revealed that the site is underlain by a thick sequence of dry, dense, glacially-compacted silty fine sand to sandy silt that is continuous to a variable depth of between 60 and 120 feet bgs. Underneath the glacial deposit is a medium-grained, loose, sand. In four of the site wells, groundwater was first encountered at approximately 100 feet bgs within the sand deposit or, in the case of MW-5, within the glacially compacted silty sand deposit, which is unusually thick in this location. Each well is screened across the upper 15 to 20 feet of saturated soil.

Over the past two years, seasonal groundwater elevations have revealed a consistent groundwater flow direction to the south. On-site groundwater elevations are approximately 50 feet above mean sea level (MSL). The likely discharge point for the groundwater is the Mercer Slough, located approximately .75 miles to the south. Groundwater is not currently used by Bellevue residents for water supply purposes. Mercer Slough is connected to Lake Washington, which has a typical surface elevation of 20 feet above MSL. This would imply a regional horizontal groundwater gradient from the site to the slough of 0.0075 feet per foot, approximately equal to the horizontal gradient within the site, which was calculated to be 0.006 feet per foot. Using the regional gradient, and assuming a porosity for the sand of 40 percent and a hydraulic conductivity of 0.002 cm/sec (typical of a medium sand), a groundwater seepage velocity of 3.24 cm/day can be calculated. This seepage velocity is equivalent to approximately 40 feet per year.

PCE concentrations in the upper section of the aquifer near the former release areas are determined by Wells MW-2 and MW-3 (26 and 76 µg/L, respectively in summer 2004). PCE concentrations further downgradient of the former release areas are determined by Wells MW-4 and MW-5. At the location of MW-4, downgradient of the manhole, the PCE concentration in the summer of 2004 was 11 µg/L, less than half of the concentration at the upgradient well MW-2. In contrast, the PCE concentration in MW-5 was 110 µg, which is significantly greater than the upgradient concentration of 76 µg/L.

This rise in downgradient PCE concentration is likely controlled by aquifer conditions. Well MW-4 is screened across very clean medium sands that are capable of transmitting a greater amount of groundwater than the more compact and finer-grained soils at MW-5. This results in greater groundwater flux past MW-4 and a more rapid transport and dissipation of PCE. Given that significant PCE dissipation appears to be occurring in the sandy aquifer, it is expected that any off-site migration of PCE at concentrations greater than 5 µg/L is limited. This expectation is supported by the results of the recent modeling, which were provided to you in a memo dated January 6, 2005. In that memo, we modeled the plume using Biochlor and predicted that the maximum downgradient extent of the plumes off-site was not greater than 750 feet, using conservative assumptions.

In contrast, the PCE concentrations at Well MW-5 are similar to those in upgradient Well MW-3. This is likely related to the tighter soils in this location. The slower movement of groundwater past this well limits the ability of the aquifer to dissipate the PCE. Additionally, the groundwater elevation at MW-5 is slightly higher than surrounding wells due to the lower permeability of the formation, which results in an eastward bending of contours towards Well MW-4 (Figure 1). The contours suggest that the groundwater plume at MW-5 may be flowing towards MW-4, and therefore entering more permeable sections of the aquifer.

DNAPL AND PCE PATHWAY TO GROUNDWATER

The focus of this investigation is to evaluate the potential for dense non-aqueous phase liquids (DNAPL) to have migrated to deeper sections of the sandy aquifer (i.e., that section of the aquifer below the uppermost portion that is currently being monitored). However, a DNAPL release to deeper groundwater is considered unlikely for the following reasons:

- PCE concentrations in groundwater at the site are 1,000 times less than the PCE solubility in water (150,000 µg/L). An accepted rule-of-thumb for the presence of DNAPL in an aquifer is a solvent concentration in groundwater of at least 1 percent of its solubility. For PCE, a 1 percent solubility concentration in groundwater would be 1,500 µg/L. The highest PCE concentrations ever measured at this site were approximately 100 µg/L, which does not support a DNAPL source.
- The soil data convincingly demonstrate that the vast majority of PCE released at this site was contained in the upper 20 feet of dense glacial soil. Gravity migration of a DNAPL phase deeper than 20 feet would have resulted in much greater concentrations of PCE in soil borings collected underneath the excavated areas (i.e., much greater than 4 mg/kg).

Infiltration waters are the likely mechanism for transporting the PCE observed in soil at depths greater than 20 feet. It is suspected that these infiltration waters leached PCE from the upper 20 feet of soil and transported it down into the deeper soils over time. Eventually, this PCE-containing water (not a DNAPL) reached and recharged the uppermost section of the sand aquifer but did not sink through it. The PCE content of this recharging water resulted in creation of the PCE plumes found in the uppermost 10-15 feet of the sand aquifer. The upper portions of both plumes are currently being monitored by the four on-site wells.

PURPOSE OF INVESTIGATION

The purpose of this investigation is to determine whether DNAPL, however unlikely, has migrated to deeper sections of the on-site sandy aquifer. Currently, only the uppermost 10 to 15 feet of the shallow aquifer are being monitored.

Specific objectives are as follows:

- **Define geologic conditions in deeper section of aquifer.** Collection of soil samples from deeper borings will allow evaluation of geologic conditions with increasing aquifer depth.
- **Determine PCE concentrations in soil and groundwater in deeper sections of the aquifer.** A DNAPL release would be indicated if PCE concentrations were significantly greater in deeper groundwater and/or soil.

To accomplish these objectives, the following activities will be performed:

- **Install two deep on-site groundwater monitoring wells.** Potential locations for these two wells are shown on Figure 1. These locations are selected to be as close as possible to the former source areas, but are constrained to the locations shown due to operational requirements and size of the drill rigs and supply truck. Proposed

Well MW-6 will be located near existing Well MW-3, approximately 150 feet downgradient of the former dry cleaners' site. The original source area is now the location of a retail store (Figure 1).

- The second well, MW-7, will be installed at the downgradient edge of the storm manhole excavation area. Ideally, each well will be screened in permeable sands above the first aquitard encountered underlying the sand unit. For this project, an aquitard is defined as a low permeability soil layer with a minimum thickness of 5 feet lying beginning at least 10 feet below the base of the current wells. A maximum exploratory drilling depth of 160 feet is proposed for each well. This depth is approximately 40 feet deeper than the base of the existing wells. If an aquitard is not encountered by a drilling depth of160 feet, then the wells will be screened from 150 to 160 feet below grade, which is equal to 30 to 40 feet below the base of the existing wells. The wells will be constructed of 2-inch PVC with a minimum screen length of 10 feet, depending on field conditions.
- **Sample soil atop the aquitard and across the screened interval.** Samples will be collected, logged, and analyzed to characterize aquifer and PCE concentrations with depth. A sonic rig will be used to drill the borings, which allows the collection of continuous soil cores. A minimum of three samples from each boring will be analyzed for VOCs using USEPA Method 8260. A photoionization detector will be used to screen the soil samples for analysis. Two samples from the aquifer sands will be collected per boring for Total Organic Carbon analysis. This will assist in refining the modeling of the migration distance of the plume.
- **Develop and Survey the Wells.** After well installation, the wells will be developed by pumping until the water runs clear. The top of casing elevation will be surveyed in. Static depth to water measurements will be collected on all wells to determine horizontal and vertical flow gradients.
- **Sample the new wells.** One to two weeks after well development, both new and existing wells (except upgradient Well MW-1) will be sampled using passive diffusion bags (PDBs) and samples analyzed for VOCs using USEPA Method 8260. The PBDs will be placed at the mid-point of the well screen. The PBDs will be left in place for a minimum of one week prior to sample collection.

REPORTING

A brief letter report will be provided to Ecology that documents the installation of the new wells and provides the results of the soil and groundwater sampling. Recommendations will be made concerning the need for additional wells or continued groundwater monitoring. The following possible range of outcomes is anticipated:

1. *PCE concentrations in groundwater from Wells MW-6 and MW-7 (the new deep on-site wells) are less than 5 µg/L and PCE is not detected in soil samples at concentrations greater than the MTCA A cleanup level (4 mg/kg).* This outcome would confirm that DNAPL is not of concern at this site. Additional wells, either on-site or off-site will not be recommended as the plumes are sufficiently characterized.

2. *PCE concentrations are significantly greater than 5 µg/L in one or both of the deep wells.* This may indicate a deeper PCE source in the aquifer. Additional deeper downgradient wells may be recommended to establish the extent of the deeper plume.

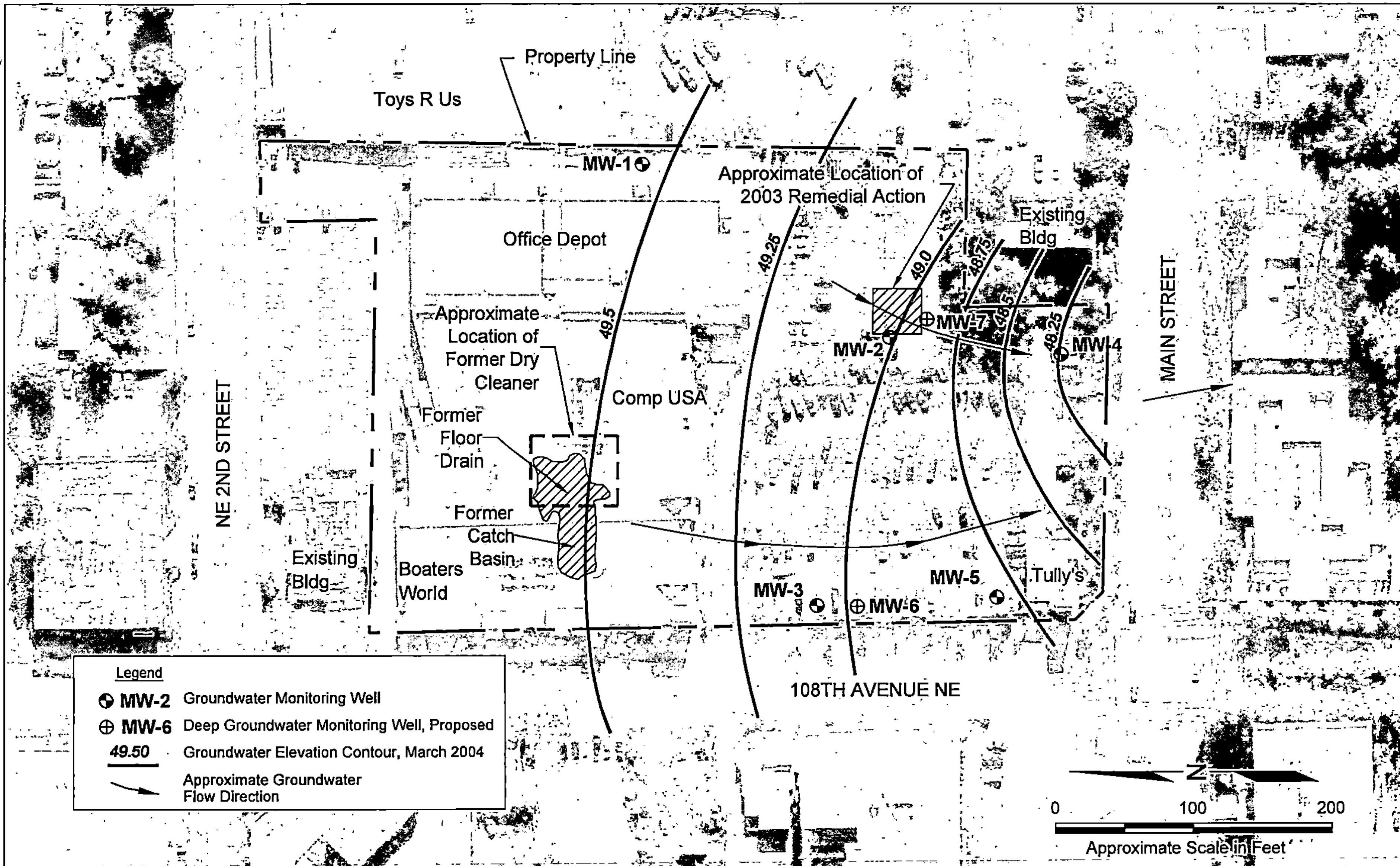
3. *PCE concentrations are similar to those measured in the shallow wells.* This may indicate that the shallow plume is more diffuse than expected, but not the result of a separate DNAPL source. Continued groundwater monitoring may be required to establish whether concentrations are declining as would be expected if the source has been controlled by the prior remedial actions.

Thank you for your time in reviewing this work plan. We look forward to receiving your comments.

Sincerely yours,
FLOYD | SNIDER

Tom Colligan, L.H.G
Senior Project Manager

Encl.: Figure 1
Copies: Leonard Kreppel, Benenson Capital; Tom Newlon, Stoel Rives



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strategy ▪ science ▪ engineering

Benenson Bellevue Associates II
Shops at First Street
Bellevue, Washington

Figure 1
Proposed On-Site Deep Well Locations

Cleanup Action Report
Shops at First Street

Prepared for

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Ecology Review Draft

December 22, 2003

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1.0 Introduction

This report was prepared by Floyd Snider McCarthy, Inc. (FSM) for Benenson Bellevue Associates, II to document the investigation and cleanup action for the tetrachloroethylene (PCE) releases at the 100 108th Ave NE site, also known as the Shops at First Street, in Bellevue, Washington. A cleanup action related to the PCE releases was performed as an independent remedial action under the Voluntary Cleanup Program (VCP) of the Washington State Department of Ecology (Ecology).

1.1 PURPOSE

The cleanup action at the site was conducted as an independent remedial action. Therefore, a final report of the cleanup action is required by Ecology to be filed within 90 days of the completion of the cleanup action. The purpose of this report is to document the cleanup action in sufficient detail to allow Ecology to determine if the cleanup action meets the substantive requirements of the Model Toxics Control Act, Chapter 173-340 WAC (MTCA).

1.2 SITE LOCATION

The site is the location of a shopping center in downtown Bellevue (Figure 1). Storefronts are developed along the northern portion of the site, with paved parking to the south. The site slopes from north to southeast. The portion of the site that underwent the cleanup described in this report surrounds a storm sewer catch basin (manhole) in the parking lot located in front of Office Depot (Figure 2).

2.0 Site Background

2.1 SUMMARY OF PREVIOUS INVESTIGATIONS AND CLEANUP ACTIONS

2.1.1 Initial Discovery of PCE

PCE was first discovered on June 22, 1994 during construction work at the former location of Bellevue Cleaning Village, a dry cleaner located at 110 108^{th} Ave. NE. The contractor, Turner Construction Company, halted construction and Environmental Management Resources, Inc. (EMR) initiated investigations to evaluate the nature and extent of soil contamination (Kennedy/Jenks 1994).

2.1.2 Excavation of PCE at the Former Dry Cleaner Location

A remedial action at the former dry cleaners was initiated by EMR in August 1994. This action consisted of excavating approximately 2,140 cubic yards (cy) of soil containing PCE. Soil was excavated to a depth of 15 feet. The soil was removed by West Pac Environmental, Inc. and disposed of at the Rabanco Regional Landfill in Roosevelt, Washington.

Samples were collected from the sidewalls and bottom of the excavation to ensure that the cleanup levels were reached. Concentrations of PCE remaining in the excavation base and sidewalls were appreciably less than the MTCA Method B Cleanup Level of 19.6 mg/kg.

In November 1994, Kennedy/Jenks conducted a Remedial Investigation (RI) that examined the extent of PCE remaining at the site following the cleanup action at the dry cleaners (Kennedy/Jenks 1994). Soil borings were advanced to a typical depth of 60 feet at and around the location of the excavation. Soil samples indicated low to non-detectable concentrations of PCE in soil (less than 19.6 mg/kg) underneath and adjacent to the excavation area, with a maximum detection of 4.6 mg/kg at a depth of 40 feet. Based on the results of the RI, it was determined that further remedial action was not necessary at the former dry cleaners portion of the site. ? why vs. .05 mg/kg

2.1.3 Discovery of PCE in the Vicinity of Storm Sewer Manhole

During the 1994 RI, Kennedy/Jenks advanced soil borings near the downgradient catch basin (manhole) and discovered PCE concentrations of 4,180 mg/kg in Soil Boring BB-15, located near the catch basin. Kennedy/Jenks also conducted a soil gas survey along the downstream storm sewer piping alignment to identify other areas where volatile organic compounds (VOCs) might have been released into the subsurface. Analytical results from the soil gas samples showed the greatest PCE concentrations (10.7 mg/L) in the area near the storm sewer manhole.

To identify other potential areas where PCE was disposed of or may have accumulated, Kennedy/Jenks collected and sampled sediment from six storm sewer catch basins. Samples were collected from five catch basins upgradient of the storm sewer manhole and one catch basin downgradient of the storm sewer manhole. No VOCs were detected in any of the catch basin samples. Kennedy/Jenks concluded that the PCE release at the manhole was associated with the former dry cleaning operation at the Bellevue Cleaning Village.

Kennedy/Jenks estimated that the highest concentrations of PCE around the manhole were located in a 20-foot radius from the manhole and extending from 10 to 20 feet below ground surface (bgs). Kennedy/Jenks evaluated various remedial alternatives and suggested *in-situ* soil vapor extraction (SVE) as the preferred remedial action (Kennedy/Jenks 1994).

2.1.4 SVE Around the Manhole

In 1996, a one-well SVE system was installed to reduce PCE concentrations in soil around the manhole. The system operated until April 2000. During the period of operation, the SVE system removed an estimated 200 pounds of PCE (Kennedy/Jenks 2002).

2.1.5 Soil Borings and Well Around the Manhole

Following suspension of the SVE operation, Kennedy/Jenks developed a work plan to evaluate the effectiveness of the SVE system. In May 2002, five soil borings, B-1 through B-5, were advanced near the manhole to evaluate PCE concentrations in soils surrounding the manhole. One of the borings, B-1, was converted to a groundwater monitoring well. Groundwater first occurs at an approximate depth of 100 feet bgs. Samples were taken from the soil borings and well and analyzed for PCE. Analytical results identified concentrations of PCE remaining in the soil up to a maximum concentration of 710 mg/kg. Below a depth of 20 feet, PCE concentrations decreased significantly to a maximum concentration of 1.9 mg/kg at 45 feet. PCE was detected in the monitoring well at a concentration of 99 ug/L. Kennedy/Jenks concluded that the SVE system had been effective in removing PCE in the immediate vicinity of the manhole, but that elevated concentrations remained within a 15-foot radius of the manhole, and that the PCE in soil presented a pathway for migration to the underlying groundwater.

3.0 Cleanup Action

3.1 CLEANUP ACTION OBJECTIVE

The objective of the cleanup action was to perform a timely and cost-effective cleanup for protection of human health and the environment. More specifically, the cleanup objective was to excavate the bulk of the PCE source material that could pose a threat to area groundwater. This objective was met by removing all soil that exceeded Method B cleanup levels, and continuing excavation to a depth of approximately 20 feet, where borings indicated that PCE concentrations dropped off dramatically. By excavating to a depth of 20 feet, the bulk of the PCE was removed, significantly mitigating the threat to groundwater under the manhole. However, excavation to remove all soil containing PCE to achieve the stringent MTCA Method A cleanup level was not possible. PCE occurs at levels slightly greater than the Method A cleanup level from 20 feet down to at least 50 feet bgs. Figure 2 shows the extent of the remedial action. The cleanup action was conducted according to the VCP with technical assistance provided by Ecology. Ecology reviewed and approved the work plan for the cleanup action. A copy of the work plan is provided as Appendix A. Cleanup consisted of the following:

- Preparation of bid documents and selection of a contractor.
- Acquisition of proper permits as required by the City of Bellevue (COB).
- Dismantling the existing SVE system and abandoning the existing vapor wells.
- Excavation of PCE-contaminated soil with concentrations exceeding the MTCA Method B Cleanup Level in the vicinity of the manhole.
- Characterization, segregation, and disposal of excavated soil in accordance with the work plan approved by Ecology.
- Removal of the existing manhole and installation of a new manhole.
- Reconnection of the new manhole to the existing storm sewer system.
- Restoration of the site to its original use as a parking area.

3.2 SOIL CLEANUP

Permits for cleanup action at the site included a Clearing and Grading Permit with State Environmental Policy Act (SEPA) Review, a Storm Connection Permit, and a Right of Way Use Permit (to allow truck traffic to access/leave the site). All permits were obtained prior to initiation of the remedial action.

The cleanup contractor, Wilder Construction Company (Wilder) of Everett, WA, was selected based on experience, ability to meet schedule, fee estimate, and approach to the work. Wilder prepared a Health and Safety Plan (HASP) to ensure that site safety requirements were met throughout the duration of the work. The plan also included the provision for daily safety meetings at the beginning of each workday. All site work was completed in adherence with this plan.

The excavation of the site was conducted in two phases:

- Phase 1 was focused on removing the bulk of contaminated soil posing a risk to groundwater as defined by Kennedy/Jenks 2002 soil borings (excavation to 20 feet bgs). This was also the practical depth limit for excavation in the limited operational area. Phase 1 began on September 23, 2003 when Wilder dismantled the existing SVE system, installed catch basin inserts to divert stormwater from entering the manhole, and began mobilization of their equipment.
- Phase 2 provided for additional excavation as necessary to remove contaminated soil remaining after Phase 1.

The limits of the Phase 1 and Phase 2 excavations are shown in Figure 3. Phases 1 and 2 are described further in Sections 3.2.2 and 3.2.3.

3.2.1 Soil Segregation and Handling

In an effort to minimize soil disposal costs, a soil segregation plan was developed and implemented during the cleanup action to aggressively segregate and classify soils. The protocols for soil segregation are detailed in the work plan (Appendix A). Soil segregation consisted of a rigorous screening process using a photo-ionization detector (PID) on all soil excavated from the site. The PID used was a MiniRAE Classic Plus® with a 10.2 EV lamp calibrated to isobutylene.

Each bucket of excavated soil was screened by FSM personnel and then classified. Screening was performed by creating 5 to 10 vapor "holes" in each bucket load of soil. Each "hole" was then screened with a PID. The soil was classified based on the highest PID reading recorded from each bucket. Soil was segregated according to the following table.

Soil Segregation

PID Reading (ppm)	Preliminary Classification
<10	Clean (PCE potentially under 0.5 mg/kg)
10 to 300	Subtitle D Soil (PCE potentially less than 19.6 mg/kg)
>300	Subtitle C Soil (PCE potentially greater than 19.6 mg/kg)

Soil that was classified as "clean" was placed in a stockpile at the southern end of the site. Subtitle D soil was stockpiled in an area north of the excavation. In accordance with the Temporary Erosion and Sedimentation Control Plan, stockpiled soil was placed on two layers of 6-mil thick plastic sheeting and surrounded with hay bales and sandbags to prevent stormwater runoff from entering the stockpile. At the end of each workday and during periods of wet weather the stockpiles were covered with plastic and secured with sandbags.

Soil identified by the PID as potentially hazardous (requiring transport to a Subtitle C hazardous waste landfill) was placed in plastic-lined metal "roll-off" containers provided by Waste Management Inc. Roll-off containers were used to avoid rehandling of soil, prevent run-off of contaminated soil or rainwater, and to allow for easy transport off-site. Each roll-off was covered and secured at the end of each workday and during periods of wet weather.

3.2.2 Phase 1 – Initial Excavation

The 2002 soil boring data indicated that the bulk of the PCE in soil lay within a cubic area measuring 15 feet wide (east-west) by 15 feet long (north-south) by 20 feet deep, beginning at a depth of approximately 10 feet, or the base of the manhole. Soil within 5 feet of the surface was anticipated to be clean. On September 24, 2003, Wilder began removing the asphalt and soil atop this area. As soil was excavated, it was screened and segregated as previously described. In order to provide stable slopes for the installation of the new catch basin, Wilder enlarged the footprint to slope the top 10 feet of the excavation to a 1:1 (H:V) gradient.

During the excavation the existing manhole, constructed of concrete bricks and mortar, was destroyed in place and removed from the excavation. Below a depth of 5 feet bgs, PID readings of the manhole itself escalated to above 10 ppm. Pieces of the manhole from below 5 feet bgs were removed and placed in a metal roll-off container to be disposed of at a Subtitle C Landfill. The storm sewer pipes were removed to the limits of the excavation and segregated appropriately.

PID readings from soil surrounding the manhole remained below 10 ppm until a depth of approximately 9 feet bgs. As the excavation deepened, PID readings ranged from 100 to 600 ppm with spikes as great as 2000 ppm at approximately 10 ft bgs. Soil excavated from this area was placed into the Subtitle C roll-offs. At this depth, ambient air concentrations exceeded 50 ppm and Level C protection protocols were was established on the project site in accordance with the HASP. This level of protection was continued until the end of Phase 2. However, PID readings began to decrease again at a depth of approximately 15 feet bgs.

Phase 1 was completed on September 26, 2003 when a depth of 20 feet bgs was reached. At this point approximately 300 cy of soil had been excavated. Confirmation samples were then collected from the excavation sidewalls and bottom as described in Section 3.3. Sample results indicated that soil with concentrations of PCE exceeding 19.6 mg/kg remained in the south and west sidewalls, requiring a Phase 2 excavation.

3.2.3 Phase 2 – Additional Excavation

On October 2, 2003, Wilder and FSM returned to the site and began additional excavation. Excavation continued approximately 4 feet in the westerly direction and 7 to 8 feet in the southerly direction until PID readings below 100 ppm were reached. Once PID readings from excavated soil were consistently less than 100 ppm, a second round of confirmation samples were collected. At the conclusion of Phase 2 approximately 350 cy of soil had been excavated. Photographs of the excavation activities are provided as Appendix B.

3.3 CONFIRMATION SAMPLING

3.3.1 Confirmation Sampling Collection and Handling Procedures

Samples were collected and analyzed from each sidewall at the following depth intervals: 5 to 10 feet bgs, 10 to 15 feet bgs and 15 to 20 feet bgs. The sidewalls from 0 to 5 feet bgs were not tested as this depth is well above the depth in which PCE was released to soil from the storm pipes entering the manhole, as indicated by PID readings.

To collect samples the excavator operator scraped the sidewall with the excavator bucket at the designated depth interval and brought the soil to the surface. FSM then screened the soil with a PID and collected a sample with the highest reading from within the bucket. At each depth interval, two to three soil samples were collected per sidewall, or one for every approximately 8 to 10 lineal feet of excavation perimeter. The sample with the highest PID reading per sidewall depth was then submitted for analysis. In Phase 1, this process was conducted for each of the four sidewalls. In Phase 2, samples were only collected from the southern and western sidewalls.

At the base of the excavation at 20 feet bgs, the base was divided into quadrants and four samples were collected. One sample was collected from each quadrant, or one for every approximately 60 square feet of excavation base.

Samples were collected using stainless steel trowels and 4-oz. glass jars with Teflon lined caps. Soil was collected and packed firmly to minimize the amount of headspace. Samples were then placed in a field cooler and packed with ice. The stainless steel trowels were decontaminated with an Alconox solution and rinsed with deionized water prior to each use. The sample containers were clearly labeled using a unique sample number, and standard chain-of-custody procedures were followed for all sampling events. The samples were then submitted to CCI Analytical, Inc. for analysis.

3.3.2 Analytical Results

Samples were analyzed for halogenated volatile organic compounds (HVOCs) using USEPA Method 8260. Lab reports are provided as Appendix C. Except for common lab contaminants, PCE was the only HVOC detected. Table 1 shows the results of confirmation sampling from the sidewalls and Table 2 shows results from the sampling of the base of the excavation. Except for samples taken from the southern and western walls, labeled "South (1) " and "West (1)", all other sidewalls and base samples contained PCE concentrations less than 19.6 mg/kg. After Phase 2 samples were taken from the expanded south and west sidewalls, final results verified that PCE remaining in site soil is at concentrations significantly less than the MTCA Method B cleanup level. The greatest concentration remaining in site soil is 5 mg/kg in the east sidewall. The greatest concentration detected in soil at the base of the excavation at 20 feet bgs is 0.055 mg/kg, indicating that the cleanup objective of removing the majority of the source material posing a threat to groundwater was achieved.

3.4 EXCAVATED SOIL SAMPLING

After initial segregation of the excavated soil via the PID, sampling was conducted to verify the classification of the soil to ensure proper disposal. Sampling was conducted in accordance with the work plan approved by Ecology.

3.4.1 Sample Collection and Handling Procedures

Stockpiled soil (clean soil and Subtitle D soil) was subdivided into sampling zones. Each zone contained roughly 30 tons of soil, or the approximate capacity of a single truck and trailer. Ten samples were collected from the clean soil stockpile and five samples were collected from the Subtitle D soil stockpile. For Subtitle C soil placed directly in roll-offs, one sample was collected per roll-off, which have a capacity of approximately 15 tons.

A PID reading was used to select the location of the sample. For each sample, 10 to 15 vapor "holes" were created using a 3 to 4 foot long rod. Each "hole" was screened with a PID. At the "hole" with the highest PID reading, soil was collected from a minimum 1-foot depth into the stockpile. Samples were then sent to CCI Analytical Inc. for HVOC analysis.

Samples were collected using stainless steel trowels and 4-oz. glass jars with Teflon lined caps. Soil was collected and packed firmly in the jars to minimize the amount of headspace. Samples were placed in a field cooler and packed with ice. The stainless steel trowels were decontaminated with an Alconox solution and rinsed with deionized water prior to each use. The sample containers were clearly labeled using a unique sample number, and standard chain-of-custody procedures were followed for all sampling events.

3.4.2 Analytical Results

Results of soil sampling for excavated soil in stockpiles and roll-offs are shown in Table 3. The soil stockpile results verified that the "clean" stockpile contained soil with PCE concentrations less than 0.05 mg/kg (the MTCA Method A Cleanup Level).

Analytical results verified that the Subtitle D soil stockpile contained PCE concentrations less than 19.6 mg/kg. Two samples (2-E and 2-W) from the Subtitle D soil stockpile were also tested for leachable organics using the toxicity characteristic leaching procedure (TCLP) methodology (performed for landfill profiling purposes). Leachable PCE was not detected.

Four of the seven roll-offs (3-2, 4-3, 4-4, and 4-5) that contained soil classified as Subtitle C soil based on PID readings actually contained soil with concentrations of PCE less than 19.6 mg/kg and were re-characterized as Subtitle D soil. The remaining three roll-offs contained soil with PCE concentrations greater than 19.6 mg/kg, confirming that their initial characterization as Subtitle C soil was correct.

3.5 SOIL DISPOSAL

Soil generated from the excavation was segregated into three classes. The final determination of the soil classification was based on analytical results obtained during sampling described above. Quantities of soil disposed off-site are shown in Table 4. The three classes of soil and their disposal protocols are described in the following three subsections.

3.5.1 Clean Soil

The clean soil stockpile was primarily used as backfill, except for approximately 85 tons that was deemed unsuitable for this purpose[1]. This soil was sent to the Alaska Street transload facility in Seattle where it was then loaded onto rail cars and transported to Waste Management's Columbia Ridge Landfill in Arlington, Oregon for use as alternative daily cover. Copies of truck tickets are provided in Appendix E.

3.5.2 Subtitle D Soil

According to contained-out letter received from Ecology for this site (Appendix F), soil that contained PCE concentrations of less than 19.6 mg/kg could be considered non-hazardous and disposed of as refuse at the Columbia Ridge Landfill, a permitted Subtitle D landfill. Ecology prohibits the soil from being used as alternative daily cover. Subtitle D soil that was in roll-offs or stockpiled was removed from the site and tansported to the Columbia Ridge Landfill for disposal as refuse. Approximately 200 tons of Subtitle D soil was disposed of at the Columbia Ridge Landfill. A total of five samples were collected from the Subtitle D stockpile. The concentrations ranged from non-detect to 2.5 mg/kg. Due to the mixed nature of the stockpile, the entire stockpile was disposed of as Subtitle D soil.

3.5.3 Subtitle C Soil

Three roll-offs with soil, including the demolished manhole, contained PCE with concentrations above 19.6 mg/kg and were classified as hazardous waste. The roll-offs were transported off-site under a manifest and sent by rail to the Chemical Waste Management Landfill in Arlington, Oregon, (ChemWaste) a permitted Subtitle C hazardous waste landfill. All three roll-offs contained soil with concentrations greater than 60 mg/kg. Under the Resource Conservation and Recovery Act (RCRA), soil with contamination levels greater than 60 mg/kg is unacceptable for direct disposal and must be treated to lower concentrations to levels that are less than 60 mg/kg prior to disposal. Treatment was performed at the landfill using a biotreatment process. Once appropriate concentration levels were achieved the soil could be directly disposed of at ChemWaste Landfill. Approximately 50 tons of soil/debris in three roll-offs were treated and disposed of at the ChemWaste Landfill.

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[1] The 85 tons also included metal debris, hay bales, trash, plastic, left over import soil, and other miscellaneous disposables.

3.6 SITE RESTORATION

Site restoration included the following elements:

- Backfill and compaction of the excavation with clean soil and imported fill to compaction requirements in accordance with COB regulations. Additional fill soil was imported to account for the soil transported off site to the Subtitle C and D landfills.
- Installation of a new Type 2 catch basin. New PVC storm sewer pipes were attached to the existing pipe at the excavation limits and extended to the new catch basin. All storm sewer components were installed at the previously existing invert and rim elevations.
- Grading, paving and striping of the site.
- Removal of existing SVE system from the site.
- Removal of the fence and temporary erosion control measures, and demobilization by Wilder.

3.7 DEVIATIONS FROM THE WORK PLAN

Adherence to the work plan was consistent with one exception: The alternative outlined in the work plan enabling treatment of SVE on-site, instead of at the landfill, was not performed on Subtitle C soil. The work plan outlined two separate classifications for Subtitle C soil. The first contained soil concentrations from 19.6 mg/kg to 60 mg/kg which could be directly disposed at Arlington. The second classification provided for soil greater than 60 mg/kg, which would require treatment prior to disposal.

During the excavation, it was determined that all Subtitle C soil in roll-offs contained PCE concentrations greater than 60 mg/kg. Based on the small quantity of this soil and its elevated PCE concentrations, it was determined that transporting the soil to Arlington for biotreatment would be more cost-effective and expeditious than on-site treatment.

4.0 Vapor Pathway Analysis

An analysis of the vapor pathway from soil to air inside the storm sewer manhole was conducted using the guidance published by the US Environmental Protection Agency (USEPA) using the Johnson and Ettinger Model (EQM 2000). The analysis was performed to identify the PCE concentration in soil that could create a health risk for a worker in the manhole, the only conceivable exposure scenario for the residual PCE vapors. Since this site is zoned for commercial purposes, a residential exposure scenario was not evaluated. Analysis for the model was performed using a depth-to-contamination scenario of 10 feet below the base of the manhole. This depth is based on the placement of 10 feet of clean fill in between the residually contaminated soil at 20 feet and the base of the catch basin. Site-specific model parameters such as soil properties, dimensions, and thickness of the manhole were used whenever available. If site-specific parameters were unavailable, default model values were used. The model assumes a worker in the manhole for a duration of 4 hours per day, 1 day per year, for 30 years, with an ambient air exchange rate of once every 4 hours. These assumptions are considered relatively conservative.

Using these parameters, the model predicted that a PCE concentration of 1,880 mg/kg in the soil at a depth of 20 feet would exceed MTCA requirements and create a carcinogenic risk of 10^{-6} for vapors inhaled by the worker. This concentration is more than 3,000 times the actual PCE concentration remaining at the site following the cleanup action. Vapor pathway analysis verified that the concentrations of PCE remaining in the soil do not exceed vapor risk levels. Model worksheets are provided as Appendix G.

5.0 Conclusions

This cleanup action report documented the remedial action conducted to excavate PCE-contaminated soil at the Shops at First Street site. The cleanup was conducted as an independent cleanup action under the VCP with technical guidance provided by Ecology in accordance with all MTCA requirements.

Previous site investigations and remedial actions have identified the source of the PCE and the extent to which it has spread, in both soil and groundwater. A combination of data from soil borings, soil gas surveys, and sampling of upgradient and downgradient catch basins has revealed that there were only two areas of concern for contamination of PCE in soil. The cleanup action completed in 1994 removed soils with PCE concentrations greater than MTCA Method B Cleanup Levels in the area of the former dry cleaner. Trace concentrations of PCE greater than the Method A Cleanup Level remain at depth.

The cleanup action report documents the removal of all soil in the vicinity of the storm sewer manhole that contained PCE concentrations greater than the Method B cleanup level, and additional over-excavation to a depth of 20 feet bgs to ensure that nearly all of the source material that could pose a threat to groundwater was removed. In total, approximately 600 tons (350 cy) of soil was excavated, of which approximately 250 tons (145 cy) contained concentrations of PCE greater than the MTCA Method A Cleanup Level, and so could not bebe backfilled on-site. This soil was segregated and sampled to provide a cost-effective method of disposal. Approximately 200 tons (120 cy) of the excavated soil at concentrations above Method A but less than the Method B cleanup level was transported to a Subtitle D landfill. Fifty tons (25 cy) greater than the Method B cleanup level were treated and disposed of at a Subtitle C landfill.

Analytical results from confirmational sampling of the sidewalls and the base of the excavation verified that the cleanup level was achieved. Residual concentrations of PCE do not pose a risk to indoor air even under very conservative scenarios.

6.0 References

Kennedy/Jenks .Consultants 2002. Soil Evaluation Results and Findings, Storm Sewer Manhole. Prepared for Ron Timm of Ecology. Bellevue Washington. 8 July

Kennedy/Jenks Consultants. 1994. Remedial Investigation/Feasibility Study Report. Prepared for Benenson Bellevue II, L.P. New York, New York. November 1994

EQM 2000. Users Guide for the Johnson and Ettinger Model (1991) for Subsurface Vapor Intrusion into Buildings. Prepared by Environmental Quality Management for US Environmental Protection Agency.

Table 1
Sidewall Confirmation Sampling Analytical Data

	Sidewall PCE Concentrations, mg/kg					
	Phase 1				Phase 2	
Depth (ft bgs)	North	East	*South (1)*	*West (1)*	South	West
7.5	0.015	5	*0.39*	*0.04*	0.024	0.021
12.5	0.2	0.046	*200*	*61*	0.55	0.15
17.5	0.57	0.26	*3,000*	*0.3*	0.16	0.37

Notes:
Italicized results show concentrations in soil removed during Phase 2.
bgs = below ground surface

Table 2
Base Confirmation Sampling Analytical Data

Base - 20 feet bgs	
Quadrant	**PCE Concentration, mg/kg**
NW	0.055
NE	0.035
SE	0.031
SW	0.027

Table 3
Stockpile Sampling Analytical Data

	Stockpile Sample	PCE Concentration (mg/kg)	Disposed of as
Clean Soil Stockpile	1 N to NE	0.049	Backfill
	1 NE to E	0.01	Backfill
	1 E to SE	0.015	Backfill
	1 SE to S	ND (< 0.01)	Backfill
	1 SW to S	ND (< 0.01)	Backfill
	1 W to SW	ND (< 0.01)	Backfill
	1 N to NW	0.021	Backfill
	1 NW to W	ND (< 0.01)	Backfill
	1 Frontwest II	0.03	Backfill
	1 Backwest II	0.022	Backfill
Subtitle D Soil Stockpile	2-E (A)	ND (< 0.01)	Subtitle D
	2 New A	0.012	Subtitle D
	2 New B	0.28	Subtitle D
	2 New C	0.015	Subtitle D
	3-N	2.5	Subtitle D
Roll-offs	3-2 R.O.	0.82	Subtitle D
	4-3 R.O.	11	Subtitle D
	4-4 R.O.	0.71	Subtitle D
	4-5 R.O.	0.42	Subtitle D
	3-1 R.O.	660	Subtitle C to be biotreated
	4-1 R.O.	470	Subtitle C to be biotreated
	4-2 R.O.	160	Subtitle C to be biotreated

Table 4
Quantities of Soil Disposed Off-site

Soil Disposal	Tons	Cubic Yards[1]
Subtitle D (Alternative Daily Cover)	84.85	49.91
Subtitle D (Contained In)	198.62	116.84
Subtitle C (Biotreatment)	49.13	28.90

Notes:
1. A conversion of 1.7 tons per cubic yards was assumed.

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Bellevue, Washington

Figure 1
Vicinity Map

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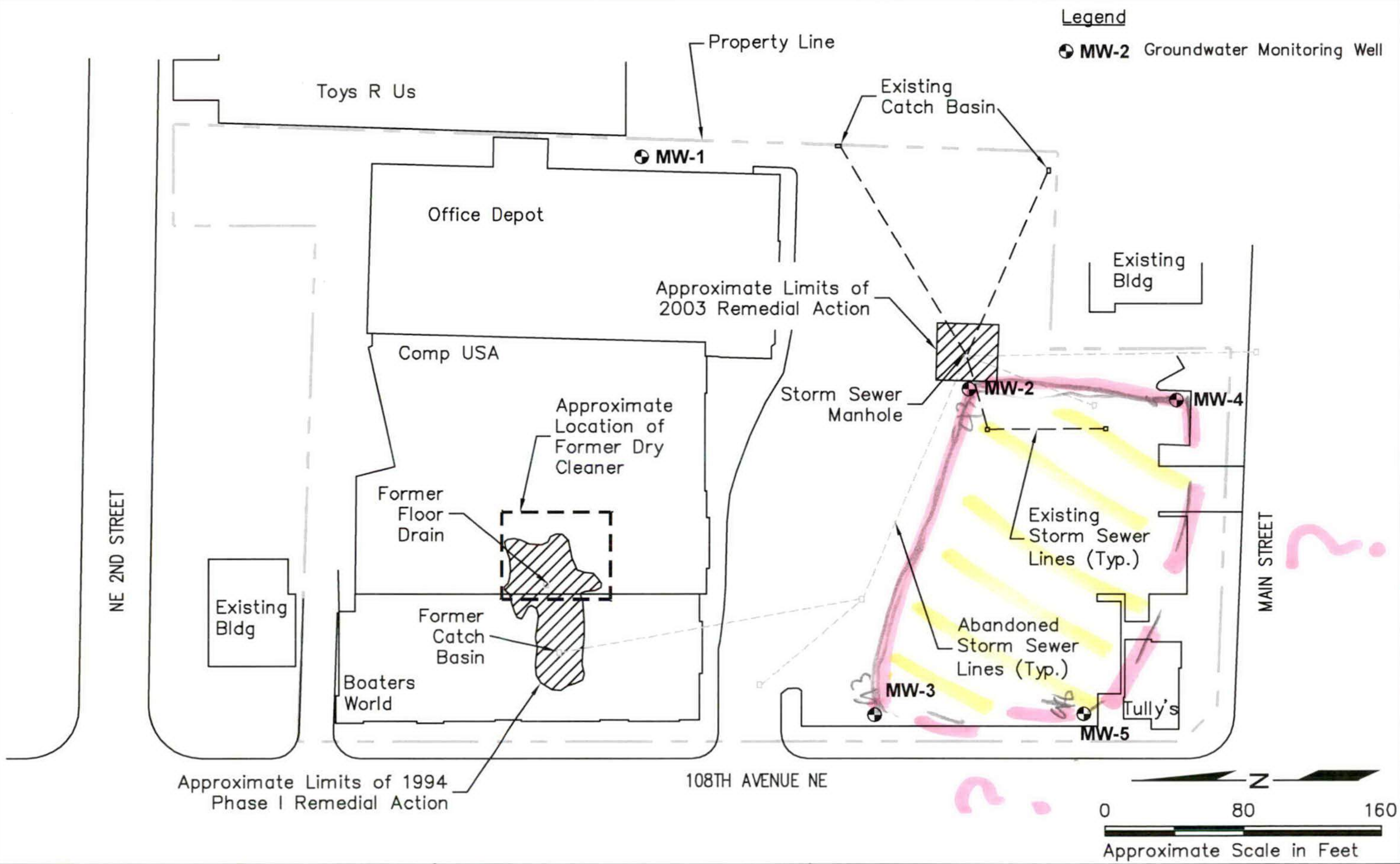

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Strategy & Technical Solutions for Contaminated Properties

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Shops at First Street
Bellevue, Washington

Figure 2
Site Map

DWG NAME: G:\project\Clients\Floyd and Snider\BCC_BSE\bccbse007.dwg
DATE: 11/11/03 09:39am

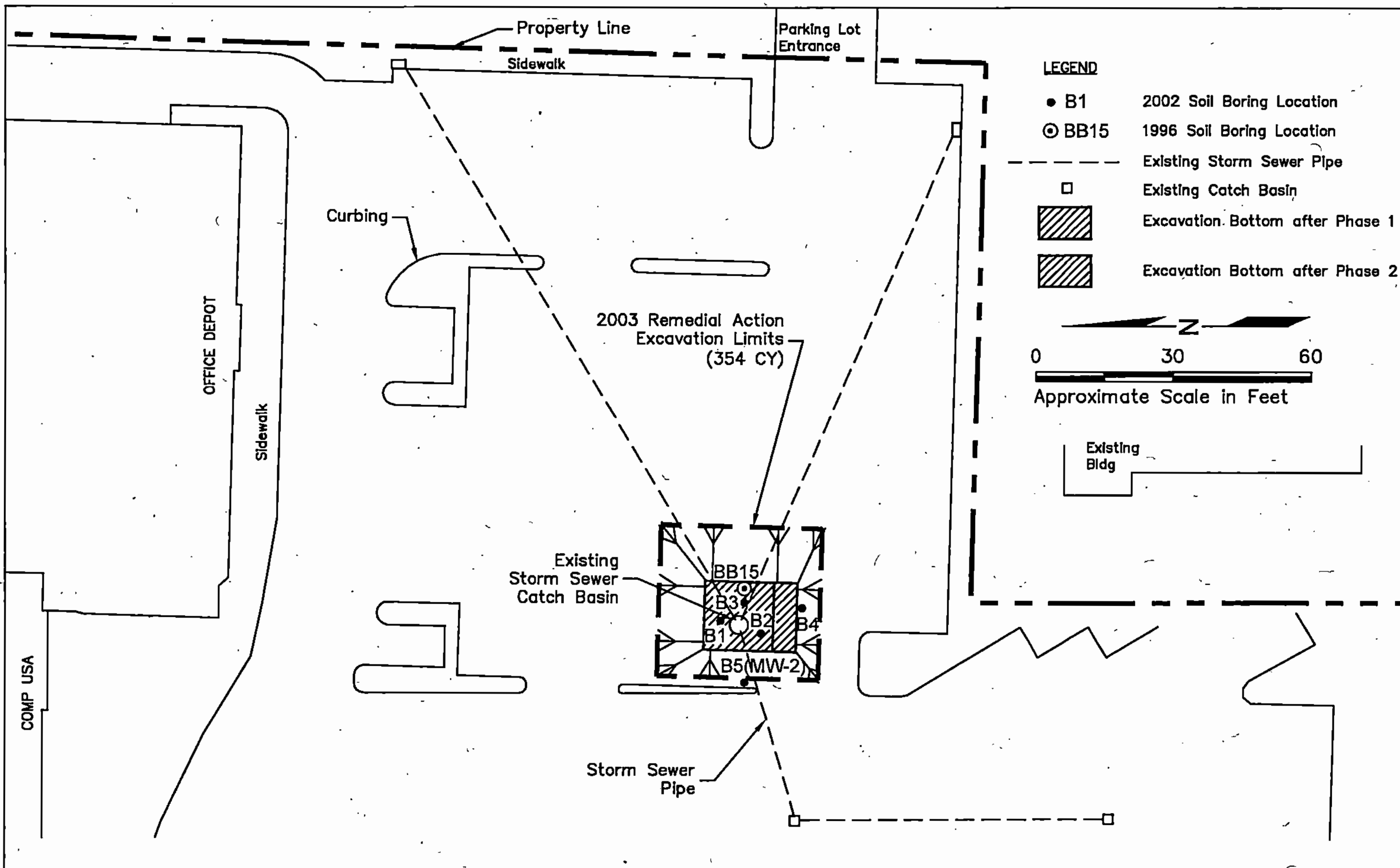

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Figure 3
2003 Remedial Action Soil Removal

FLOYD | SNIDER
strategy ▪ science ▪ engineering

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tel: 206.292.2078 fax: 206 682 7867

February 16, 2006

Mr. Ron Timm
Washington State Department of Ecology
3190 160th Avenue S.E.
Bellevue, WA 98008-5452

SUBJECT: SHOPS AT FIRST STREET—SOIL TO GROUNDWATER MODELING RESULTS
PROJECT NUMBER: BCC-BSE.09000

Dear Mr Timm:

This letter provides the results of modeling performed in response to a request from the Washington State Department of Ecology (Ecology) to predict the risk to groundwater from the residual levels of perchloroethene (PCE) remaining in soil at 100 108th Avenue NE in Bellevue, Washington (Shops at First Street site). In summary, the results of the modeling indicate that the residual concentrations of PCE remaining in site soils will not cause further degradation of groundwater quality

BACKGROUND

The Shops at First Street site is a currently developed commercial facility covered by buildings, a parking lot, and sidewalks/planter strips. The narrow planter strips total no more than 1 to 2 percent of the site area.

During redevelopment of the site in 1994, subsurface soil in two locations was found to be contaminated with PCE released from a former dry cleaning operation (FSM 2004). The first location was a floor drain directly underneath the former dry cleaner, which was located in a commercial building The second location was soil under a nearby manhole in a site parking lot (Figure1). Contaminated soils under the dry cleaner were excavated to a depth of 15 feet during the redevelopment of the property Around the manhole area, contaminated soils were first remediated using soil vapor extraction technology beginning in 1996. Groundwater contamination was subsequently discovered at the site in 2002. In response, a more aggressive approach was taken to the area around the manhole that contained the highest concentrations of PCE. As a groundwater protection measure, the contaminated soil around the manhole was removed to a depth of 20 feet in 2003.

The soil at the site is predominantly densely packed silty sand and the groundwater table is approximately 100 feet below ground surface (bgs). Prior borings performed to characterize the PCE release found that soil below the base of both excavations contains PCE at low concentrations[1] (Kennedy/Jenks 1994 and 2002a). Ecology requested modeling to evaluate the low concentrations of PCE in this residually-contaminated deeper soil pose a further threat to groundwater at the site. Investigations of groundwater quality to date have established that two plumes of PCE exist in the upper aquifer, one downgradient of the former dry cleaners and

[1] Less than MTCA Method B soil cleanup levels for protection of human health at 19 6 mg/kg, but greater than the MTCA Method A soil cleanup level for groundwater protection at 0.05 mg/kg.

one downgradient of the manhole (Kennedy/Jenks 2002b). Deeper groundwater was recently tested by Floyd|Snider and found to be unaffected (Floyd|Snider 2005b) Prior modeling of both groundwater plumes by Floyd|Snider indicates that the plumes attenuate to cleanup levels within 600 feet of their origin (Floyd|Snider 2005a).

MODEL APPROACH

Modeling was performed to evaluate the rate and concentration at which the PCE would leach from the deeper soil to the groundwater table. A one-dimensional vertical transport analytical modeling approach was used. The specific modeling software used was SESoil (Version 6.3), a widely used model with a high degree of regulatory acceptance stemming from its ability to simulate remediation by natural attenuation based on diffusion, adsorption, volatilization, biodegradation, cation exchange, and hydrolysis. SESoil also has the ability to simulate climactic variations in specific locations, varying soil properties, and varying contaminant concentrations with depth. Contaminant transport can be modeled either:

- Without biological decay (as is modeled at this site)
- With biodegradation simulated as a first-order decay process

Further description of this model can be found on the Internet at: *http://www.seview com/ aboutsesoil.htm*

Site Parameters and Assumptions

Soil conditions are fairly well defined at both areas of residual contamination (i.e., under the manhole and underneath the former dry cleaner). Consistently higher PCE concentrations exist in the soil underlying the former dry cleaners than under the manhole area. Analytical results from borings performed at the former dry cleaners as part of a 1994 Remedial Investigation/ Feasibility Study (RI/FS) by Kennedy/Jenks were used for defining soil conditions (Kennedy/ Jenks 1994) To simulate the varying concentrations with depth, the borings were divided into 10-foot layers up to 100 feet bgs. The analytical results from all samples collected within those layers were then averaged. If PCE was not detected in a sample half of the reporting limit was used as the sample result. The average concentrations of PCE in the 10-foot layers ranged from 0 003 mg/kg to 1.21 mg/kg.

For the soil below the base of the excavation in the manhole area, data from the 1994 RI/FS and from soil samples collected during the installation of monitoring wells in 2002 were used to define the soil conditions (Kennedy/Jenks 1994 and 2002) To simulate the varying concentrations with depth, the soil column to 102 feet bgs was divided into layers and the analytical results from samples collected within those layers were averaged. The average PCE concentrations were then applied to the respective layers. Average concentrations in the layers ranged from 0.020 mg/kg to 1.656 mg/kg. For soil above 20 feet bgs, analytical results from the confirmational samples taken from the sidewalls and bottom of the final excavation limits were used to define the soil conditions (FSM 2004). The soil column for the upper 20 feet was divided into layers and the analytical results from the samples collected within those layers were averaged. The average concentrations of PCE in this area ranged from 0.037 to 1 265 mg/kg. The attached model outputs show the PCE concentration of leachate entering groundwater over time.

Other model inputs for both areas included bulk density, effective porosity, intrinsic permeability, soil pore disconnectedness, and organic carbon content Site-specific parameters were used whenever available, including organic carbon (average value of 0.1 percent based on prior testing). If site-specific parameters were not available, default model values or standard geological values for the soil types encountered were used. PCE physical and chemical parameters used in the model are based on USEPA Region 9 parameters and were selected from the SESoil chemical database. In order to achieve the most conservative results, the model was run assuming no biological decay, cation exchange, or hydrolysis. Tables 1 through 3 identify the various parameters used in each scenario

To simulate seasonal climate conditions, the Seattle climate file was selected from the SESoil climate database. This climate file provides average monthly precipitation, temperature values, and number and length of storms. The model does not directly simulate impervious surfaces, therefore, in order to simulate the impervious surface at the site, the amount of precipitation infiltrating into site soils was reduced to lower percentages[2] that would simulate various scenarios for the impervious surface at the site. To represent the area that precipitation would infiltrate through to reach the residually-contaminated PCE in soil, a rectangle was drawn around the limits of the remedial action areas and that computed area was used in the model (Figure 1).

Three scenarios were simulated for each of the two areas: the first contained the most probable chemical and soil parameters (Scenario 1), the other two were sensitivity analyses with different values for intrinsic permeability (Scenario 2) and organic carbon content (Scenario 3). Table 1 presents the modeling results for Scenario 1 at both locations. Table 2 presents the modeling results for Scenarios 2 and 3 at the former dry cleaners, and Table 3 presents the modeling results for Scenarios 2 and 3 at the manhole area. The specific results for the three scenarios are included in the attached model output files. For each scenario, four different simulations were run:

- Undeveloped with no impervious surfaces at the site (100 percent precipitation)
- Partially undeveloped (50 percent precipitation and volatilization)
- Mostly developed with limited infiltration (10 percent precipitation and volatilization)
- No infiltration (0 percent precipitation)

The model simulation was run for an appropriate amount of years for the maximum leachate concentration to occur and reach the groundwater table. Simulation beyond this time is unnecessary, as it results in decreased leachate concentrations and, therefore, reduced PCE concentrations in groundwater. In order to determine the peak PCE concentration in groundwater resulting from this leachate, the standard Ecology Dilution/Attenuation Factor of 20 was applied to the maximum leachate concentration.

CONCLUSIONS

Table 1 shows the modeling results for both the former dry cleaners and manhole area modeled with four different infiltration parameters, combined with the most probable other chemical and soil parameters In the simulation with 10 percent infiltration (which is conservative for the area around the storm sewer manhole) the peak groundwater concentration does not exceed

[2] To simulate a 90 percent impervious surface, the rainfall was reduced to 10 percent of the actual rainfall data.

0.09 µg/L at the former dry cleaners and 3.20 µg/L at the manhole area, both less than the MTCA Method A groundwater cleanup level of 5 µg/L. At 10 percent infiltration, PCE will reach the groundwater in between 18 and 90 years. As with the other simulations, the peak PCE concentration in groundwater occurs shortly after the leachate reaches the groundwater, with subsequent declines over time. The length of time required for remaining manhole-area PCE to be transported to groundwater allows a greater percentage of the PCE to be volatilized, and therefore not reach the groundwater. In the 10 percent infiltration simulation, more than 98 percent of the PCE in soil is volatilized and not available for leaching to the groundwater table

The zero infiltration scenario applies directly to the residual soil under the former dry cleaners because soil in that area is completely covered by a commercial building Without infiltration, the model generates no output indicating that leaching cannot occur and so there is no vertical transport of remaining PCE. Groundwater is therefore fully protected at this location.

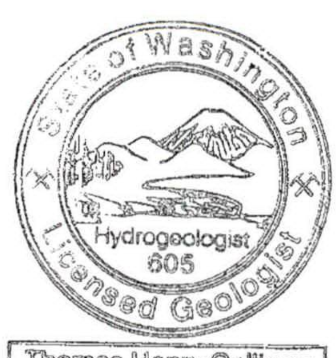
Table 1 also shows the modeling results for the 50 percent and 100 percent infiltration simulations. Use of these higher infiltration rates results in more rapid transport and modeled peak groundwater concentrations that exceed applicable standards, but are lower than the current groundwater conditions that attenuate to cleanup levels within a short distance downgradient (Floyd|Snider 2005a). However, note that these are conservative infiltration scenarios that are not representative of site conditions, which involve impervious surfaces completely covering the former dry cleaner location and virtually all of the manhole location

Sensitivity analysis Scenarios 2 and 3 model a more conservative transport and fate of the PCE, as these scenarios involve a lower value for intrinsic permeability (Scenario 2), and a lower organic carbon content (Scenario 3). Both Scenarios 2 and 3 result in maximum PCE concentrations in groundwater slightly higher than Scenario 1. However, all runs simulated with 10 percent infiltration result in maximum PCE concentrations in groundwater less than the MTCA Method A groundwater cleanup level of 5 µg/L. Results for the sensitivity analyses are shown in Tables 2 and 3.

In summary, modeling of current site conditions indicates that the remedial measures carried out at the site were successful in eliminating further risk to groundwater.

Sincerely yours,
FLOYD | SNIDER

Tom Colligan, LHG
Project Manager



Encl.: Reference List
Tables 1–3
Figure 1
Model Outputs—PCE loading output files are included; climate, hydrologic, and soil input files are available upon request

Copies: Leonard Kreppel, Benenson Capital, Inc.
Tom Newlon, Stoel Rives

REFERENCES

Floyd Snider McCarthy, Inc. (FSM). 2004. *Shops at First Street Cleanup Action Report.* Prepared for Benenson Bellevue Associates II Seattle, Washington. 4 April

Floyd|Snider. 2005a. Memo to Ron Timm, Washington State Department of Ecology. Bellevue, Washington. 6 January

Floyd|Snider. 2005b. Letter to Ron Timm, Washington State Department of Ecology Bellevue, Washington. 15 August.

Kennedy/Jenks Consultants. 1994. *Remedial Investigation/Feasibility Study Report.* Prepared for Benenson Bellevue II, L.P. November.

Kennedy/Jenks Consultants. 2002a. *Soil Evaluation Results and Findings, Storm Sewer Manhole.* Prepared for Ron Timm of Ecology. Bellevue, Washington. 8 July

Kennedy/Jenks Consultants. 2002b. *Groundwater Quality Evaluation.* 9 August.

Tables

Figures

Model Outputs

REFERENCES

Floyd Snider McCarthy, Inc. (FSM). 2004. *Shops at First Street Cleanup Action Report.* Prepared for Benenson Bellevue Associates II. Seattle, Washington. 4 April.

Floyd|Snider. 2005a. Memo to Ron Timm, Washington State Department of Ecology Bellevue, Washington. 6 January.

Floyd|Snider. 2005b Letter to Ron Timm, Washington State Department of Ecology Bellevue, Washington. 15 August

Kennedy/Jenks Consultants. 1994. *Remedial Investigation/Feasibility Study Report.* Prepared for Benenson Bellevue II, L.P. November.

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Kennedy/Jenks Consultants 2002b. *Groundwater Quality Evaluation* 9 August.

Tables

Table 1
Transport of PCE to Groundwater Modeling Results, Most Probable Conditions

	Location	Former Dry Cleaner[1]				Manhole Area[2]			
	Precipitation	100%	50%	10%.	0%	100%.	50%	10%	0%
Soil	Hydraulic Conductivity, cm/sec.	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03
	Intrinsic Permeability[3], cm	1.0E-08	1.0E-08	1.0E-08	1.0E-08	1.0E-08	1.0E-08	1.0E-08	1.0E-08
	Soil Pore Disconnectedness	6	6	6	6	6	6	6	6
	Effective Porosity	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
	Organic Carbon Content (percent)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Climate	Precipitation	100%	50%	10%	0%	100%	50%	10%	0%
	Surface Volatilization Factor	100%	50%	10%	0%	100%	50%	10%	0%
Results	Percent Volatized	37.35%	76.22%	99.81%	NA	48.50%	80.57%	98.07%	NA
	Percent in Soil Air	0.76%	1.93%	0.04%	NA	0.66%	1.64%	0.48%	NA
	Percent Adsorbed on Soil	2.23%	5.30%	0.09%	NA	1.94%	4.51%	1.19%	NA
	Percent in Soil Moisture	0.40%	0.78%	0.01%	NA	0.34%	0.67%	0.11%	NA
	Percent in Groundwater Runoff	59.16%	15.66%	0.00%	NA	48.46%	12.49%	0.07%	NA
	PCE Mass, µg	4.85E+09	4.85E+09	4.85E+09	4.85E+09	1.52E+09	1.52E+09	1.52E+09	1.52E+09
	Output File	DRY100	DRY50	DRY10	NA	MAN100	MAN50	10MANPST	NA
	Years to Reach Groundwater	2	3	90	NA	1	2	18	NA
	Year of Peak PCE Concentration in Groundwater	12	13	90	NA	12	22	28	NA
	Peak Leachate Concentration, mg/L	4.30E-01	2.26E-01	1.74E-03	NA	5.27E-01	2.68E-01	6.39E-02	NA
	Peak PCE Concentration in Groundwater[4], µg/L	21.52	11.30	**0.09**	NA	26.34	13.38	**3.20**	NA

Default Parameters:

Soil	Chemical
Bulk Density = 1.58 g/cm^3 Cation Exchange Capacity = 0 Freundlich exponent = 1	Water Solubility = 200 mg/L Molecular Weight = 166 g/mol Henry's Law Constant = 1.80E-2 m^3*atm/mol Air Diffusion Coefficient = 0.072 cm^2/sec Organic Carbon Adsorption Coefficient (k_{oc}) = 265 (µg/g)/(µg/mL) Soil Partition Coefficient = 0 (µg/g)/(µg/mL)[5]

Notes:

Soil parameters based on May 16, 2005 MW-6 Boring Log, Floyd|Snider or standard geological values.
Results in bold are less than the MTCA Method A groundwater cleanup level of 5 µg/L.

1 Soil data below the former dry cleaner are based on a Kennedy/Jenks November 1994 RI/FS.
2 Soil data below the manhole area are based on a Kennedy/Jenks November 1994 RI/FS, July 2002 Kennedy/Jenks memo, and Floyd|Snider 2004 post-excavation analytical results.
3 Intrinsic Permeability is equal to the hydraulic conductivity multiplied by 1.0E-5.
4 Concentration in groundwater is based on Dilution/Attenuation Factor of 20 of the peak leachate concentration.
5 The distribution coefficient, K_d, is unknown, so it is based on the f_{oc} and k_{oc}. The soil partition coefficient is set at 0 to allow this computation to occur.
NA Not applicable—model cannot be run.
PCE Perchloroethene

Table 2
Transport of PCE to Groundwater Sensitivity Analysis Modeling Results
Former Dry Cleaners[1]

	Scenario	2: Decreased Intrinsic Permeability (1×10^{-4} cm/sec)				3: Decreased Organic Carbon Content (0.05%)			
	Precipitation	**100%**	**50%**	**10%.**	**0%**	**100%.**	**50%**	**10%**	**0%**
Soil	Hydraulic Conductivity, cm/sec.	1.0E-04	1.0E-04	1.0E-04	1.0E-04	1.0E-03	1.0E-03	1.0E-03	1.0E-03
Soil	Intrinsic Permeability[2], cm	1.0E-09	1.0E-09	1.0E-09	1.0E-09	1.0E-08	1.0E-08	1.0E-08	1.0E-08
Soil	Soil Pore Disconnectedness	6	6	6	6	6	6	6	6
Soil	Effective Porosity	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Soil	Organic Carbon Content (percent)	0.1	0.1	0.1	0.1	0.05	0.05	0.05	0.05
Climate	Precipitation	100%	50%	10%	0%	100%	50%	10%	0%
Climate	Surface Volatilization Factor[3]	100%	50%	10%	0%	100%	50%	10%	0%
Results	Percent Volatized	13.57%	56.97%	99.90%	NA[4]	37.44%	79.13%	99.97%	NA
Results	Percent in Soil Air	1.31%	5.09%	0.01%	NA	0.19%	0.97%	0.00%	NA
Results	Percent Adsorbed on Soil	4.46%	15.70%	0.02%	NA	0.28%	1.33%	0.00%	NA
Results	Percent in Soil Moisture	1.07%	3.14%	0.00%	NA	0.10%	0.39%	0.00%	NA
Results	Percent in Groundwater Runoff	79.46%	18.94%	0.00%	NA	61.92%	18.10%	0.01%	NA
Results	PCE Mass, µg	4.85E+09	4.85E+09	4.85E+09	4.85E+09	4.85E+09	4.85E+09	4.85E+09	4.85E+09
Results	Output File	DRY100K	DRY50K	DRY10K	NA	DRY100OC	DRY50OC	DRY10OC	NA
Results	Years to Reach Groundwater	2	6	143	NA	1	3	60	NA
Results	Year of Peak PCE Concentration in Groundwater	15	29	143	NA	8	14	60	NA
Results	Peak Leachate Concentration, mg/L	5.77E-01	3.33E-01	3.45E-04	NA	6.43E-01	3.40E-01	2.68E-03	NA
Results	Peak PCE Concentration in Groundwater[4], µg/L	28.83	16.63	**0.02**	NA	32.13	17.02	**0.13**	NA

Default Parameters:

Soil
Bulk Density = 1.58 g/cm^3
Cation Exchange Capacity = 0
Freundlich exponent = 1

Chemical
Water Solubility = 200 mg/L
Molecular Weight = 166 g/mol
Henry's Law Constant = 1.80E-2 m^3*atm/mol
Air Diffusion Coefficient = 0.072 cm^2/sec
Organic Carbon Adsorption Coefficient (k_{oc}) = 265 (µg/g)/(µg/mL)
Soil Partition Coefficient = 0 (µg/g)/(µg/mL)[5]

Notes:

Soil parameters based on May 16, 2005 MW-6 Boring Log, Floyd|Snider or standard geological values.
Results in bold are less than the MTCA Method A groundwater cleanup level of 5 µg/L.

1 Soil data below the former dry cleaner are based on a Kennedy/Jenks November 1994 RI/FS.
2 Intrinsic Permeability is equal to the hydraulic conductivity multiplied by 1.0E-5.
3 The surface volatilization factor is reduced to match the precipitation reduction to account for the reduced volatilization that accompanies an impervious surface.
4 Concentration in groundwater is based on Dilution/Attenuation Factor of 20 of the peak leachate concentration.
5 The distribution coefficient, K_d, is unknown, so it is based on the f_{oc} and k_{oc}. The soil partition coefficient is set at 0 to allow this computation to occur.
NA Not applicable—model cannot be run.
PCE Perchloroethene

Table 3
Transport of PCE to Groundwater Sensitivity Analysis Modeling Results
Manhole Area[1]

		Scenario	2: Decreased Intrinsic Permeability (1×10^{-4} cm/sec)				3: Decreased Organic Carbon Content (0.05%)			
		Precipitation	100%	50%	10%.	0%	100%.	50%	10%	0%
Soil	Hydraulic Conductivity, cm/sec.		1.0E-04	1.0E-04	1.0E-04	1.0E-04	1.0E-03	1.0E-03	1.0E-03	1.0E-03
Soil	Intrinsic Permeability[2], cm		1.0E-09	1.0E-09	1.0E-09	1.0E-09	1.0E-08	1.0E-08	1.0E-08	1.0E-08
Soil	Soil Pore Disconnectedness		6	6	6	6	6	6	6	6
Soil	Effective Porosity		0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Soil	Organic Carbon Content (percent)		0.1	0.1	0.1	0.1	0.05	0.05	0.05	0.05
Climate	Precipitation		100%	50%	10%	0%	100%	50%	10%	0%
Climate	Surface Volatilization Factor[3]		100%	50%	10%	0%	100%	50%	10%	0%
Results	Percent Volatized		24.30%	64.66%	99.61%	NA	48.56%	83.04%	99.85%	NA
Results	Percent in Soil Air		1.12%	4.30%	0.07%	NA	0.17%	0.84%	0.00%	NA
Results	Percent Adsorbed on Soil		3.81%	13.31%	0.19%	NA	0.25%	1.16%	0.00%	NA
Results	Percent in Soil Moisture		0.92%	2.68%	0.02%	NA	0.09%	0.34%	0.00%	NA
Results	Percent in Groundwater Runoff		69.72%	14.89%	0.03%	NA	50.84%	14.53%	0.09%	NA
Results	PCE Mass, µg		1.52E+09	1.52E+09	1.52E+09	1.52E+09	1.52E+09	1.52E+09	1.52E+09	1.52E+09
Results	Output File		MAN100K	MAN50K	MAN10K	NA	MAN100OC	MAN50OC	MAN10OC	
Results	Years to Reach Groundwater		1	3	19	NA	1	2	12	NA
Results	Year of Peak PCE Concentration in Groundwater		17	30	37	NA	8	14	18	NA
Results	Peak Leachate Concentration, mg/L		7.54E-01	3.99E-01	6.22E-02	NA	7.89E-01	4.00E-01	9.59E-02	NA
Results	Peak PCE Concentration in Groundwater[4], µg/L		37.72	19.95	**3.11**	NA	39.46	20.00	**4.80**	NA

Default Parameters:

Soil	Chemical	
Bulk Density = 1.58 g/cm^3	Water Solubility = 200 mg/L	Air Diffusion Coefficient = 0.072 cm^2/sec
Cation Exchange Capacity = 0	Molecular Weight = 166 g/mol	Organic Carbon Adsorption Coefficient (k_{oc}) = 265 (µg/g)/(µg/mL)
Freundlich exponent = 1	Henry's Law Constant = 1.80E-2 m^3*atm/mol	Soil Partition Coefficient = 0 (µg/g)/(µg/mL)[5]

Notes:

Soil parameters based on May 16, 2005 MW-6 Boring Log, Floyd|Snider or standard geological values.

Results in bold are less than the MTCA Method A groundwater cleanup level of 5 µg/L.

1 Soil data below the manhole area are based on a Kennedy/Jenks November 1994 RI/FS, July 2002 Kennedy/Jenks memo, and Floyd|Snider 2004 post-excavation analytical results.

2 Intrinsic Permeability is equal to the hydraulic conductivity multiplied by 1.0E-5.

3 The surface volatilization factor is reduced to match the precipitation reduction to account for the reduced volatilization that accompanies an impervious surface.

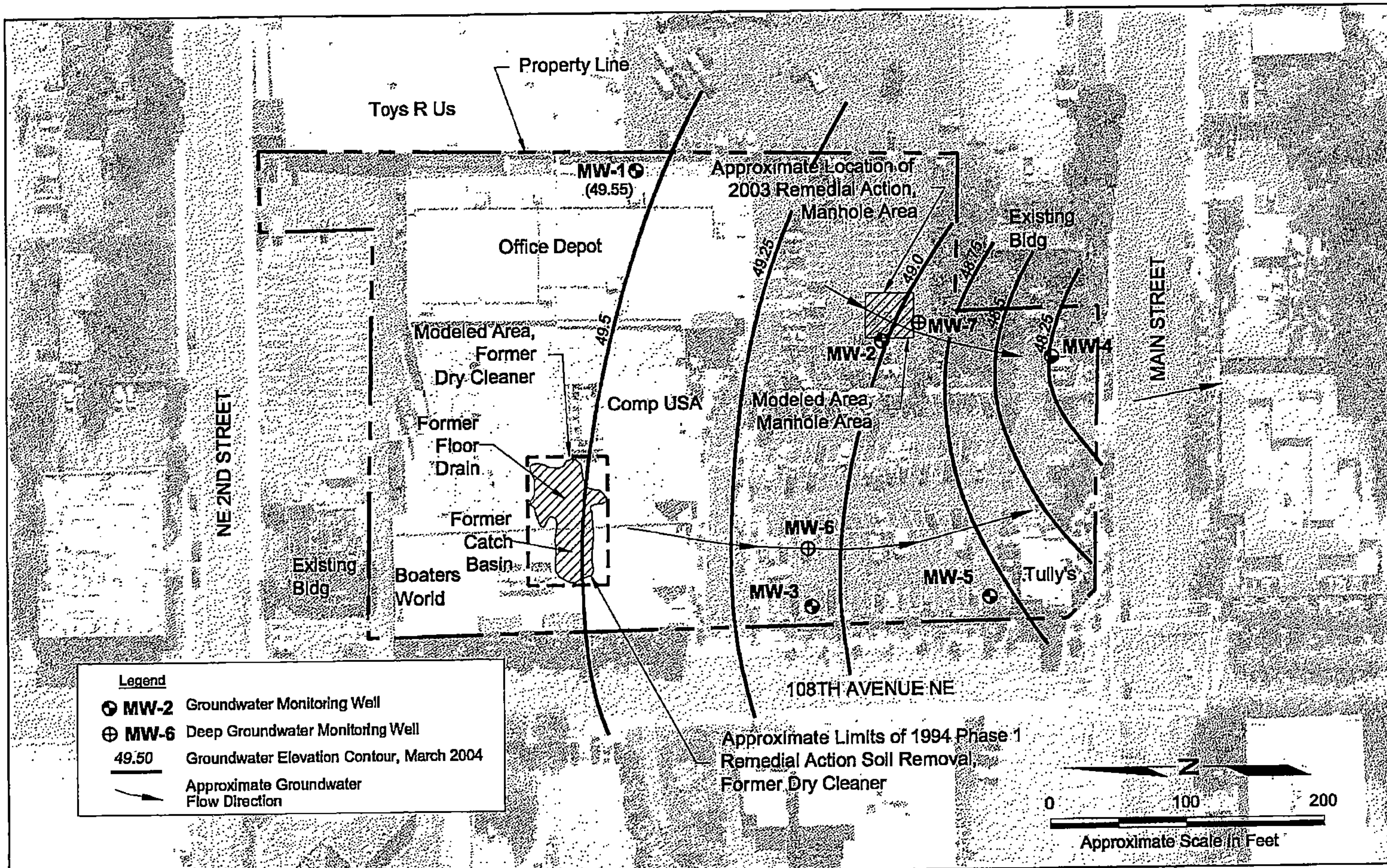
4 Concentration in groundwater is based on Dilution/Attenuation Factor of 20 of the peak leachate concentration.

5 The distribution coefficient, K_d, is unknown, so it is based on the f_{oc} and k_{oc}. The soil partition coefficient is set at 0 to allow this computation to occur.

NA Not applicable—model cannot be run.

PCE Perchloroethene

Figures



FLOYD | SNIDER
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Soil to Groundwater Modeling Results Memo
Shops at First Street
Bellevue, Washington

Figure 1
Site Map

Model Outputs

SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 100% Precip, 100% Volatilization,

SESOIL Output File: C:\SEVIEW63\DRY100 OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1.810E+09	37 35
In Soil Air	3.688E+07	0.76
Sur. Runoff	0 000E+00	0.00
In Washld	0 000E+00	0.00
Ads On Soil	1 082E+08	2.23
Hydrol Soil	0 000E+00	0 00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0 00
Complexed	0 000E+00	0 00
Immobile CEC	0.000E+00	0 00
Hydrol CEC	0 000E+00	0.00
In Soil Moi	1 921E+07	0 40
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0 00
Gwr. Runoff	2.867E+09	59.16
Total Output	4.842E+09	99.90
Total Input	4.847E+09	
Input - Output	4.607E+06	

Maximum leachate concentration: 4.303E-01 **mg/l**

Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

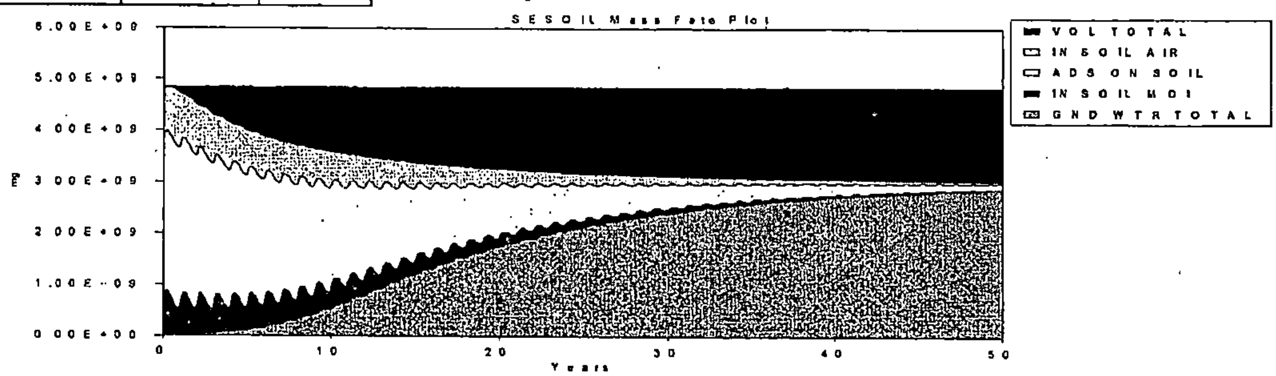
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 001
C:\SEVIEW63\SOILBCC SOI

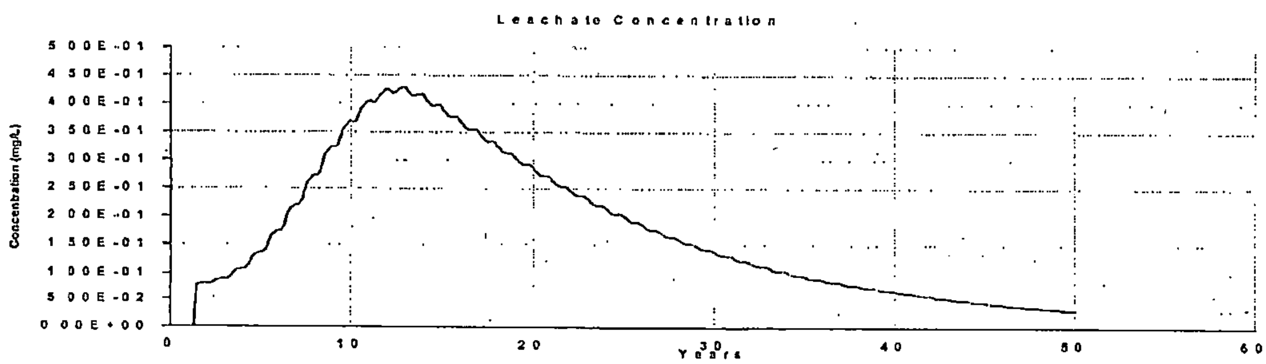
Application File: PCE at Dry Cleaner, 100% Precip Conditions
C:\SEVIEW63\BCC100 APL

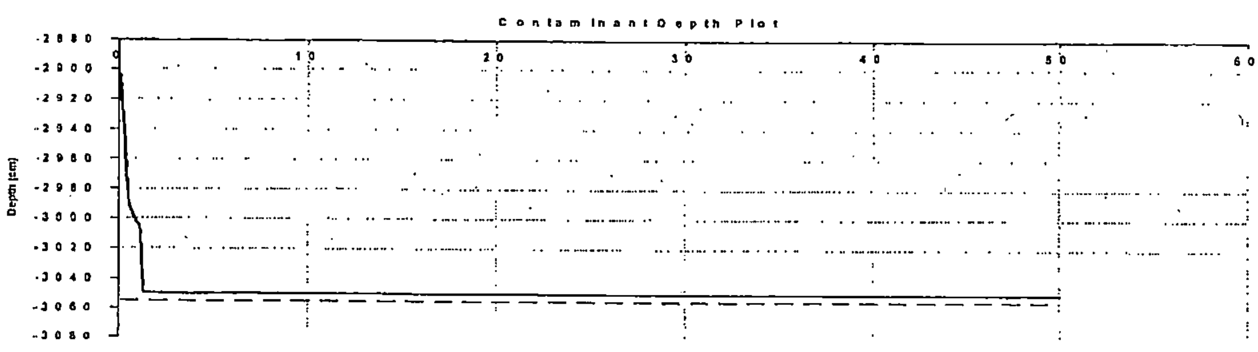
Starting Depth: 2904.00 **cm**

Ending Depth: 3050 00 **cm**

Total Depth: 3055.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 50% Precip, 50% Volatilization

SESOIL Output File: C:\SEVIEW63\DRY50 OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	3.694E+09	76.22
In Soil Air	9.330E+07	1.93
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	2.570E+08	5.30
Hydrol Soil	0.000E+00	0.00
Degrad Soil	0.000E+00	0.00
Pure Phase	0 000E+00	0.00
Complexed	0.000E+00	0.00
Immobile CEC	0.000E+00	0.00
Hydrol CEC	0.000E+00	0.00
In Soil Moi	3 798E+07	0 78
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0.000E+00	0.00
Other Trans	0 000E+00	0.00
Other Sinks	0.000E+00	0.00
Gwr. Runoff	7.588E+08	15.66
Total Output	4.841E+09	99.88
Total Input	4.847E+09	
Input - Output	5.595E+06	

Maximum leachate concentration: 2 260E-01 **mg/l**

Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC.CHM

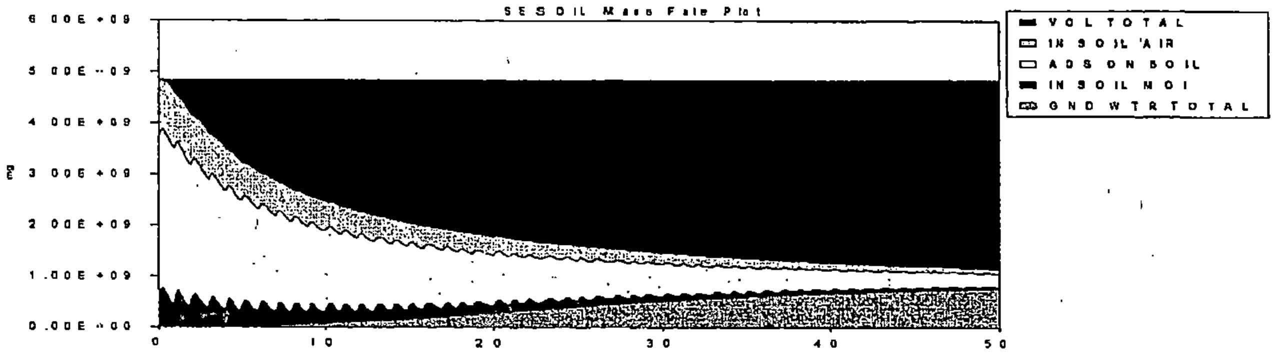
Soil File: Densely packed silty sand, C=6, n=0.27, K=0 001
C:\SEVIEW63\SOILBCC SOI

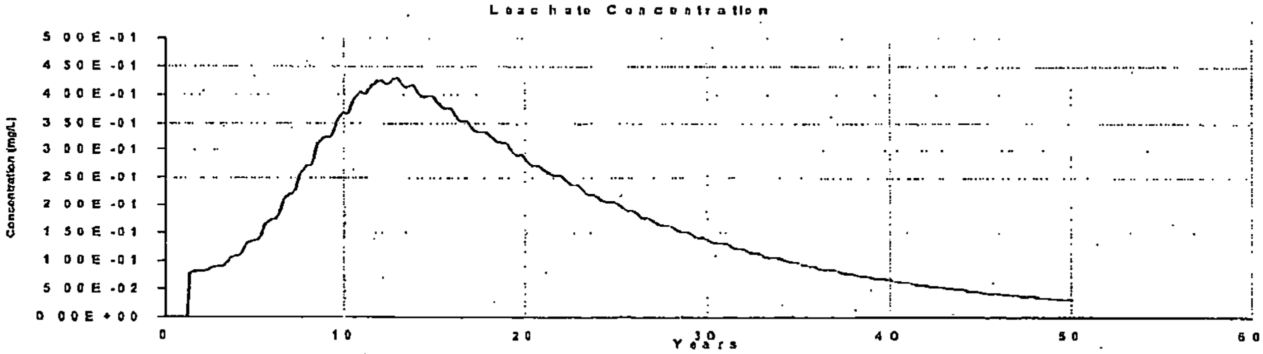
Application File: PCE at Dry Cleaner, 50% Precip Conditions
C:\SEVIEW63\DRY50 APL

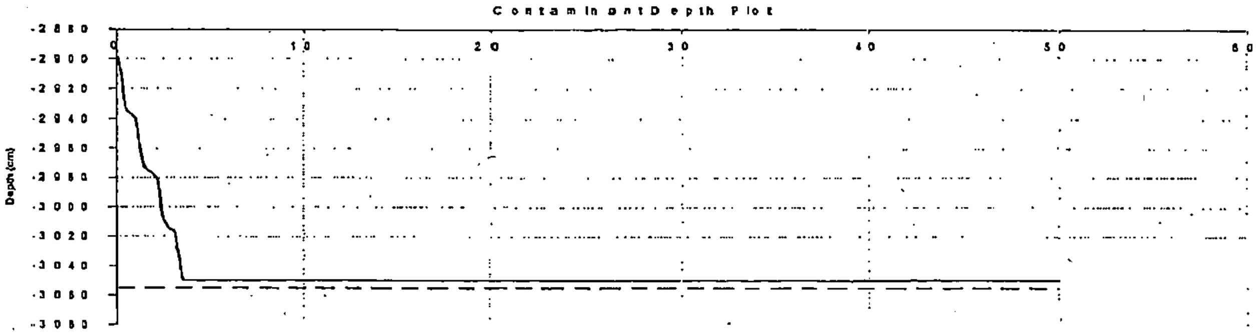
Starting Depth: 2899 00 **cm**

Ending Depth: 3050 00 **cm**

Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 10% Precip, 10% Volatilization

SESOIL Output File: C:\SEVIEW63\DRY10 OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	4 837E+09	99.81
In Soil Air	1 738E+06	0.04
Sur. Runoff	0 000E+00	0.00
In Washld	0 000E+00	0.00
Ads On Soil	4 325E+06	0 09
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0.00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0 00
Immobile CEC	0 000E+00	0.00
Hydrol CEC	0 000E+00	0.00
In Soil Moi	4 148E+05	0.01
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0.00
Other Sinks	0 000E+00	0.00
Gwr. Runoff	4.402E+04	0.00
Total Output	4 844E+09	99 94
Total Input	4 847E+09	
Input - Output	2.714E+06	

Maximum leachate concentration: 1 740E-03 **mg/l**

Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

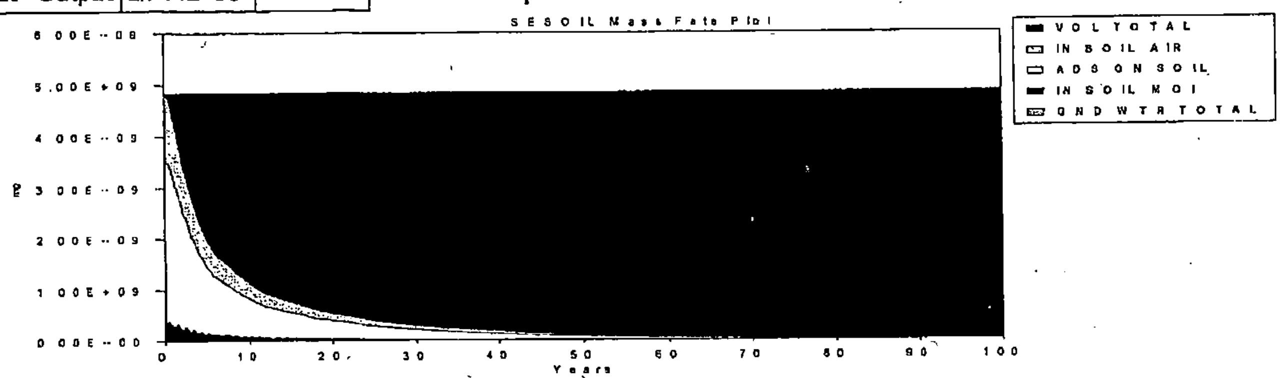
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 001
C:\SEVIEW63\SOILBCC SOI

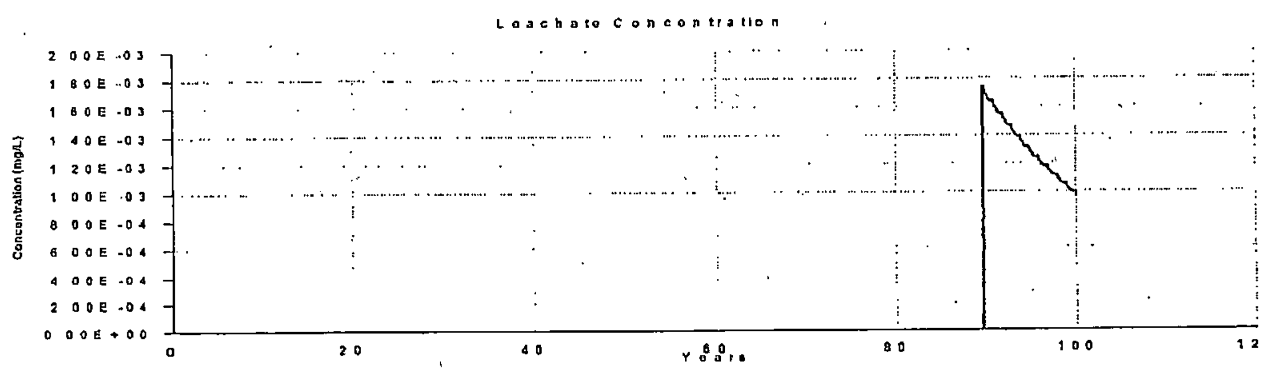
Application File: PCE at Dry Cleaner, 10% Precip Conditions
C:\SEVIEW63\DRY10 APL

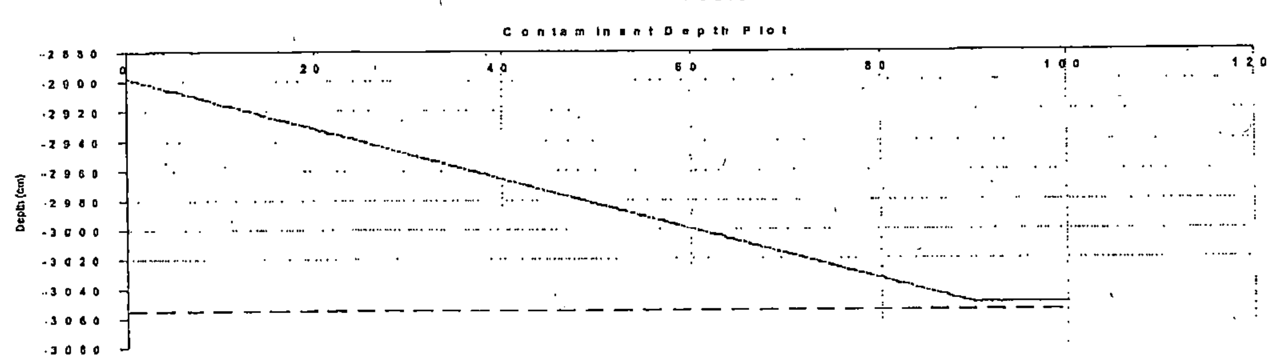
Starting Depth: 2898.00 **cm**

Ending Depth: 3050.00 **cm**

Total Depth: 3055 00 **cm**







2.7.06

SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 100% Precip, 100% Volatilization

SESOIL Output File: C:\SEVIEW63\MAN100.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	7 371E+08	48 50
In Soil Air	1 002E+07	0 66
Sur. Runoff	0 000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	2.941E+07	1.94
Hydrol Soil	0.000E+00	0.00
Degrad Soil	0.000E+00	0.00
Pure Phase	0.000E+00	0.00
Complexed	0 000E+00	0.00
Immobile CEC	0 000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	5 223E+06	0 34
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0 00
Gwr. Runoff	7.365E+08	48.46
Total Output	1 518E+09	99 89
Total Input	1 520E+09	
Input - Output	1.605E+06	

Maximum leachate concentration: 5 268E-01 **mg/l**

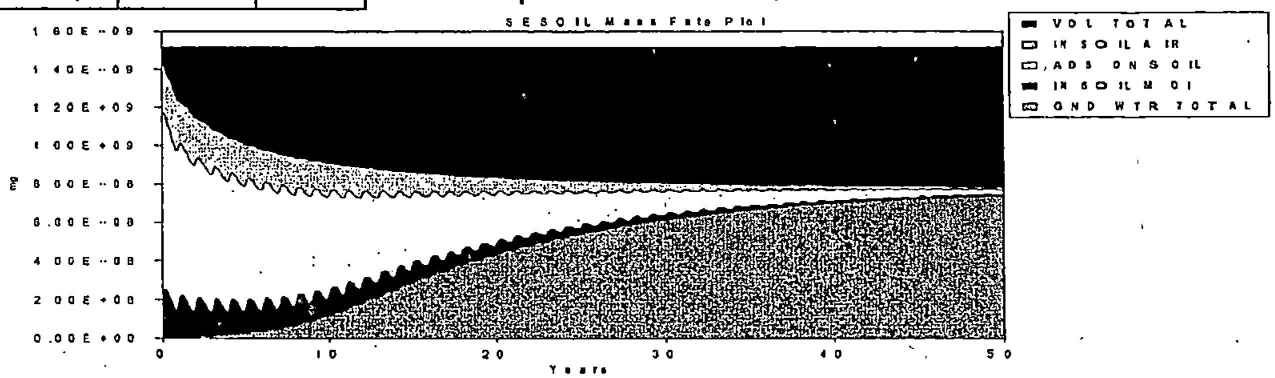
Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

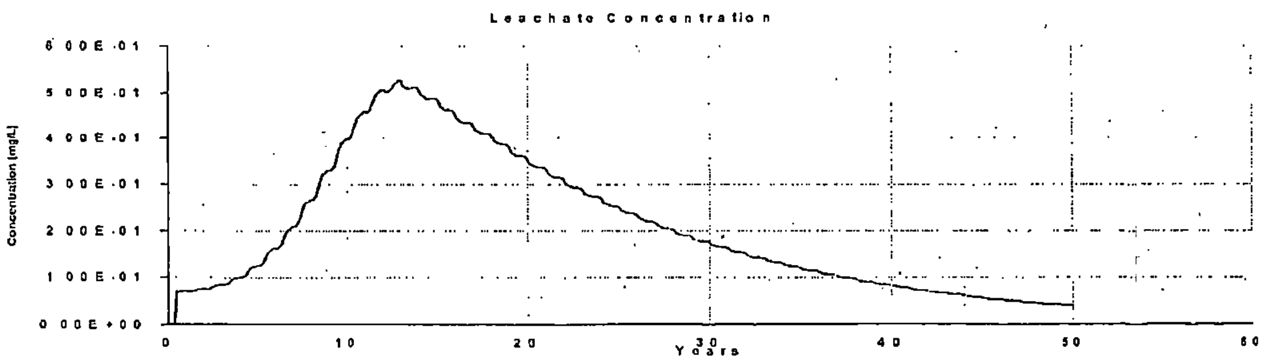
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

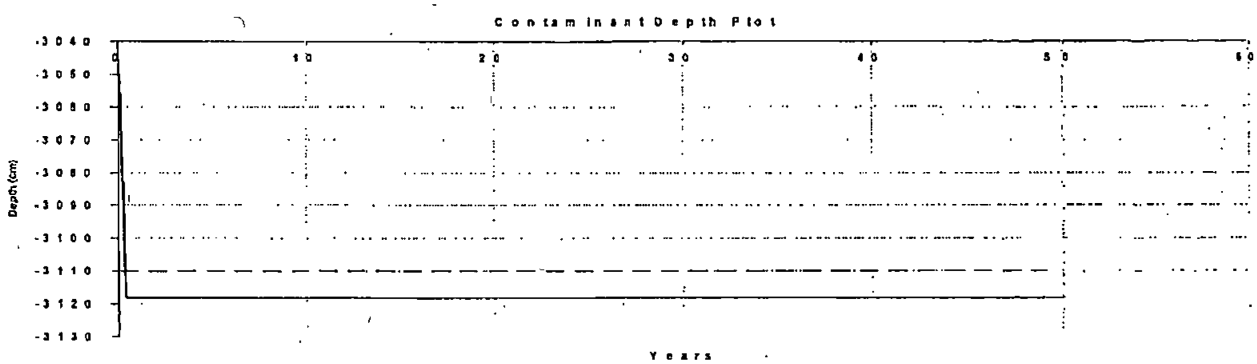
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 00 1
C:\SEVIEW63\SOILBCC SOI

Application File: PCE at Manhole Post-excavation, 100% Precip and
C:\SEVIEW63\MAN100.APL

Starting Depth: 3050 00 **cm**
Ending Depth: 3118 00 **cm**
Total Depth: 3110 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 50% Precip, 50% Volatilization

SESOIL Output File: C:\SEVIEW63\MAN50 OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1 224E+09	80 57
In Soil Air	2 489E+07	1 64
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0 00
Ads On Soil	6 858E+07	4 51
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0.00
Pure Phase	0.000E+00	0.00
Complexed	0.000E+00	0 00
Immobile CEC	0.000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	1 013E+07	0 67
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0.00
Gwr. Runoff	1.897E+08	12.49
Total Output	1 518E+09	99 88
Total Input	1.520E+09	
Input - Output	1.844E+06	

Maximum leachate concentration: 2 676E-01 **mg/l**

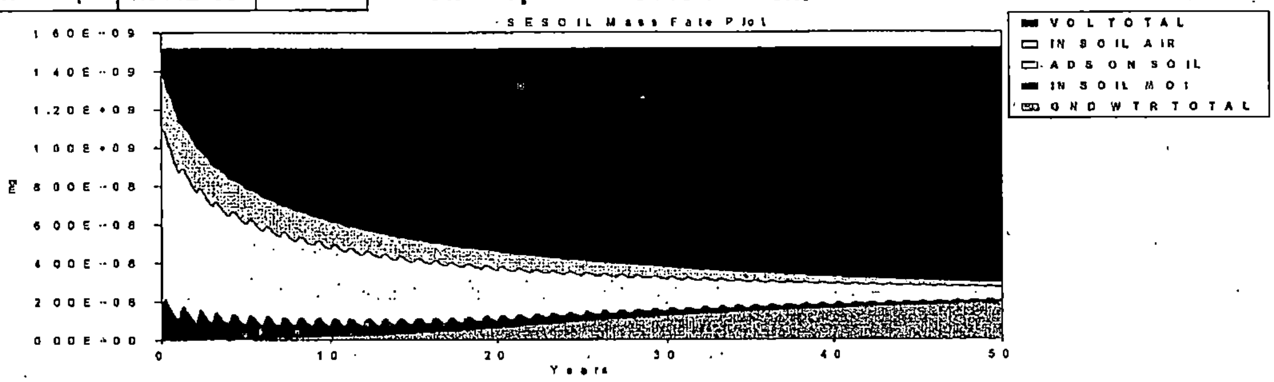
Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

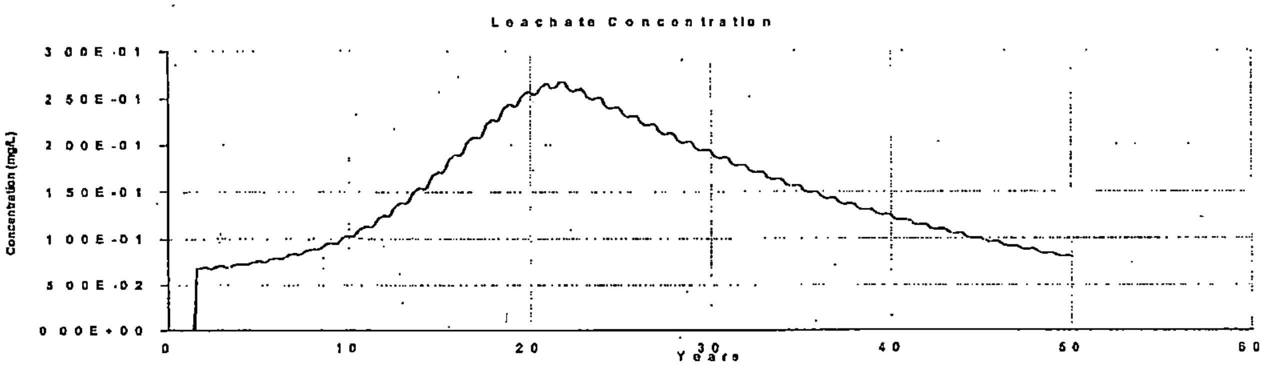
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

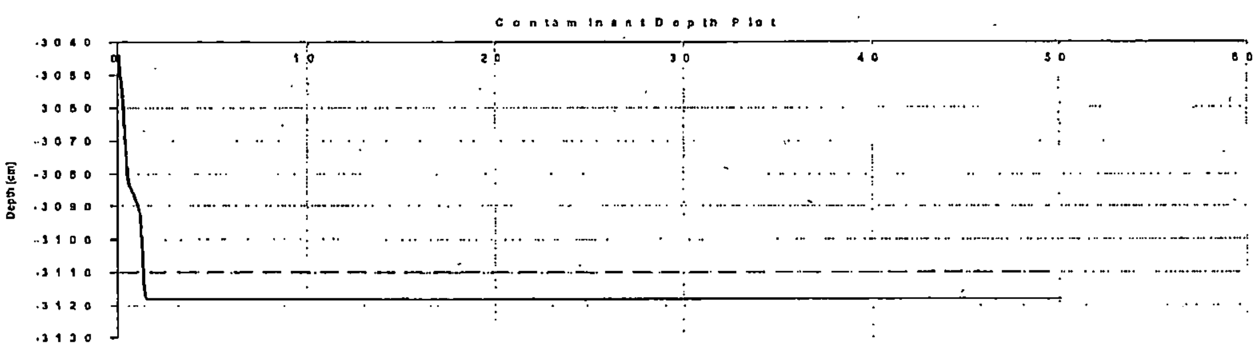
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 001
C:\SEVIEW63\SOILBCC.SOI

Application File: PCE at Manhole Post-excavation, 50% Precip and V
C:\SEVIEW63\MAN50 APL

Starting Depth: 3044 00 **cm**
Ending Depth: 3118 00 **cm**
Total Depth: 3110.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 10% Precip, 10% Volatilization

SESOIL Output File: C:\SEVIEW63\MAN10 OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1 490E+09	98.07
In Soil Air	7 288E+06	0 48
Sur. Runoff	0 000E+00	0 00
In Washld	0.000E+00	0.00
Ads On Soil	1.813E+07	1 19
Hydrol Soil	0 000E+00	0 00
Degrad Soil	0 000E+00	0.00
Pure Phase	0.000E+00	0 00
Complexed	0 000E+00	0 00
Immobile CEC	0.000E+00	0.00
Hydrol CEC	0.000E+00	0 00
In Soil Moi	1 739E+06	0 11
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0 000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0.000E+00	-0 00
Gwr. Runoff	1.053E+06	0.07
Total Output	1 518E+09	99.93
Total Input	1 520E+09	
Input - Output	1.055E+06	

Maximum leachate concentration: 6 394E-02 **mg/l**

Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

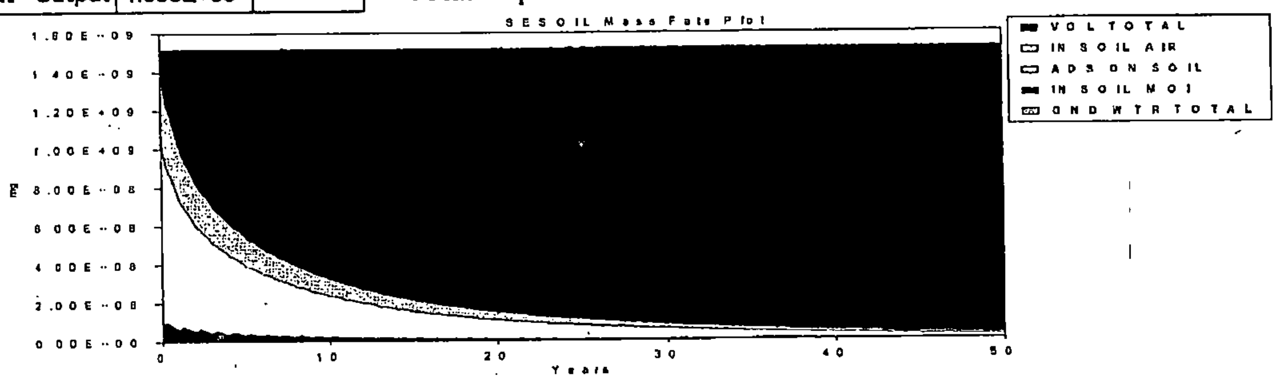
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 001
C:\SEVIEW63\SOILBCC SOI

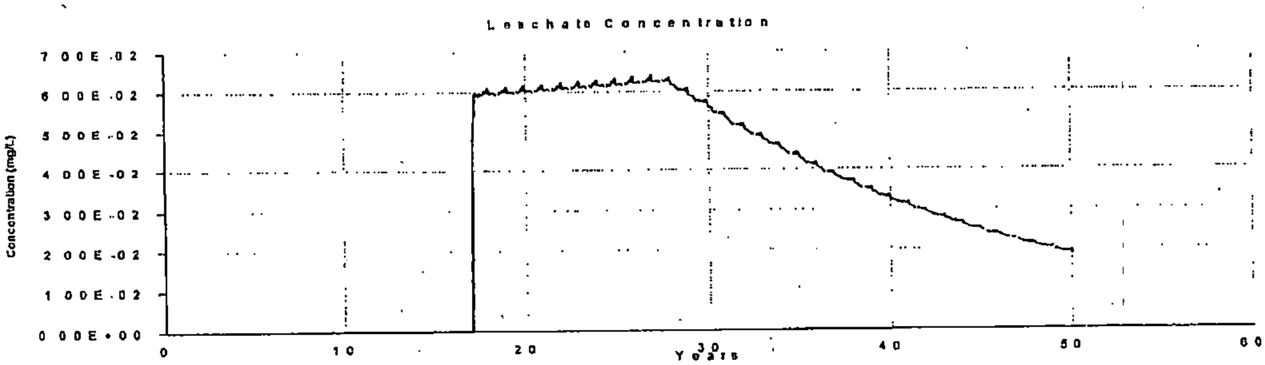
Application File: PCE at Manhole Post-excavation, 10% Precip and V
C:\SEVIEW63\MAN10 APL

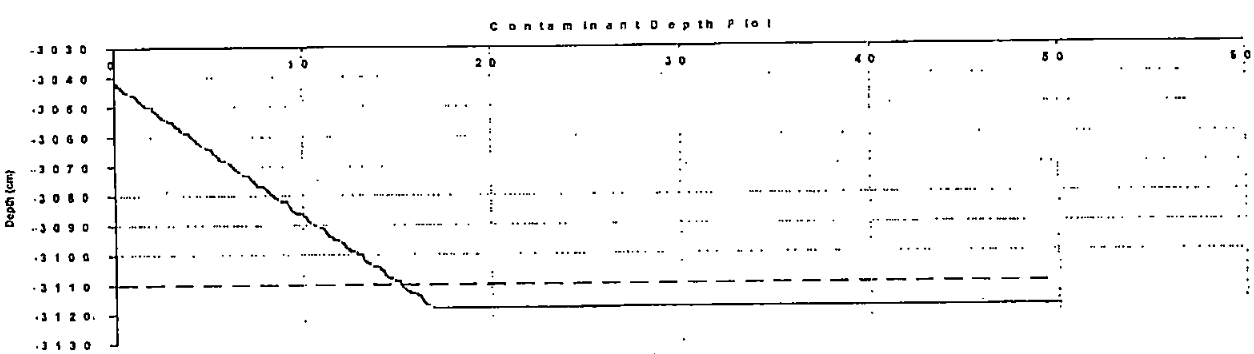
Starting Depth: 3042.00 **cm**

Ending Depth: 3118.00 **cm**

Total Depth: 3110 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 100% Precip, 100% Volatilization, K=0.0001

SESOIL Output File: C:\SEVIEW63\DRY100K.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	6.577E+08	13.57
In Soil Air	6.361E+07	1.31
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	2.162E+08	4.46
Hydrol Soil	0.000E+00	0.00
Degrad Soil	0.000E+00	0.00
Pure Phase	0.000E+00	0.00
Complexed	0.000E+00	0.00
Immobile CEC	0.000E+00	0.00
Hydrol CEC	0.000E+00	0.00
In Soil Moi	5.190E+07	1.07
Hydrol Mois	0.000E+00	0.00
Degrad Mois	0.000E+00	0.00
Other Trans	0.000E+00	0.00
Other Sinks	0.000E+00	0.00
Gwr. Runoff	3.851E+09	79.46
Total Output	4.840E+09	99.88
Total Input	4.847E+09	
Input - Output	6.009E+06	

Maximum leachate concentration: 5.765E-01 **mg/l**

Climate File: SEATTLE
C:\SEVIEW63\SEATTLE.CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC.CHM

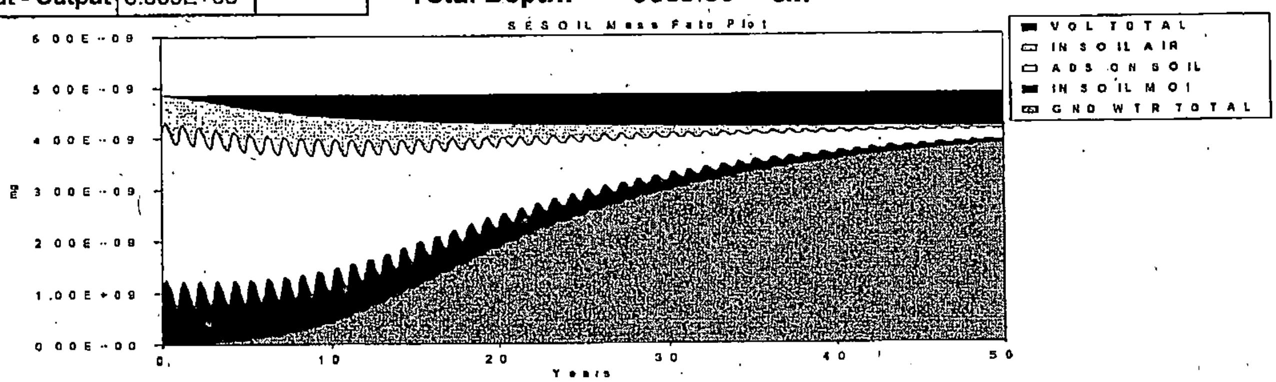
Soil File: Densely packed silty sand, C=6, n=0.27, K=0.0001
C:\SEVIEW63\SOILBCC2.SOI

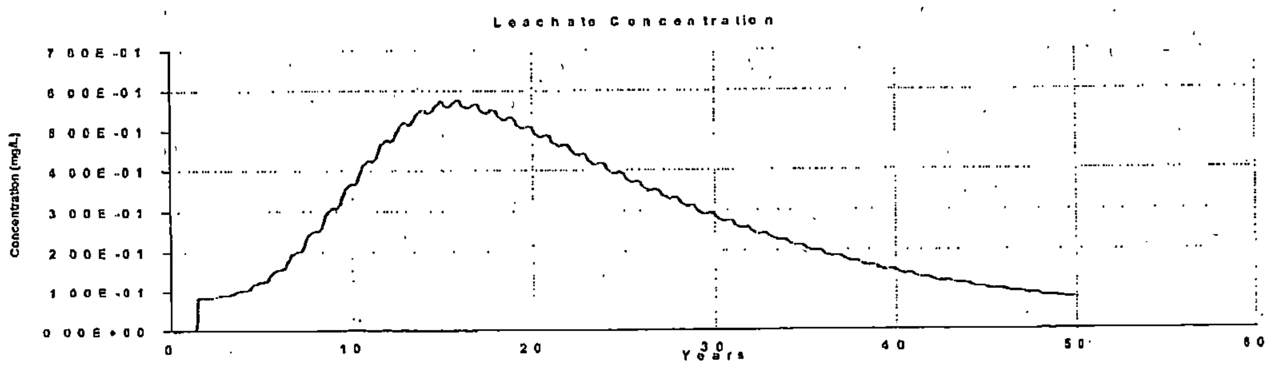
Application File: PCE at Dry Cleaner, 100% Precip Conditions
C:\SEVIEW63\BCC100.APL

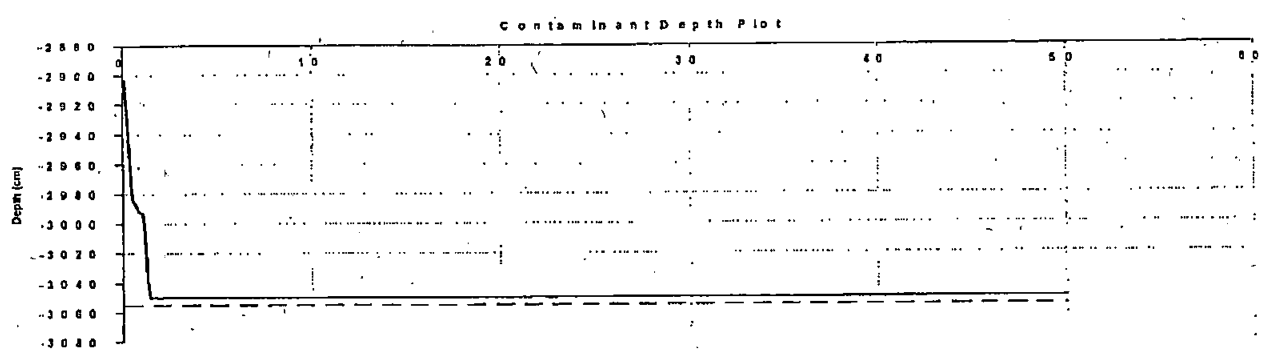
Starting Depth: 2903.00 **cm**

Ending Depth: 3050.00 **cm**

Total Depth: 3055.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 50% Precip, 50% Volatilazation, K=0.0001

SESOIL Output File: C:\SEVIEW63\DRY50K OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	2 761E+09	56.97
In Soil Air	2 464E+08	5 09
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0.00
Ads On Soil	7.610E+08	15.70
Hydrol Soil	0 000E+00	0 00
Degrad Soil	0 000E+00	0 00
Pure Phase	0.000E+00	0 00
Complexed	0.000E+00	0.00
Immobile CEC	0 000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	1 522E+08	3 14
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0.000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0 00
Gwr. Runoff	9.179E+08	18.94
Total Output	4 838E+09	99 83
Total Input	4 847E+09	
Input - Output	8.149E+06	

Maximum leachate concentration: 3.326E-01 **mg/l**

Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC.CHM

Soil File: Densely packed silty sand, C=6, n=0.27, K=0 0001
C:\SEVIEW63\SOILBCC2 SOI

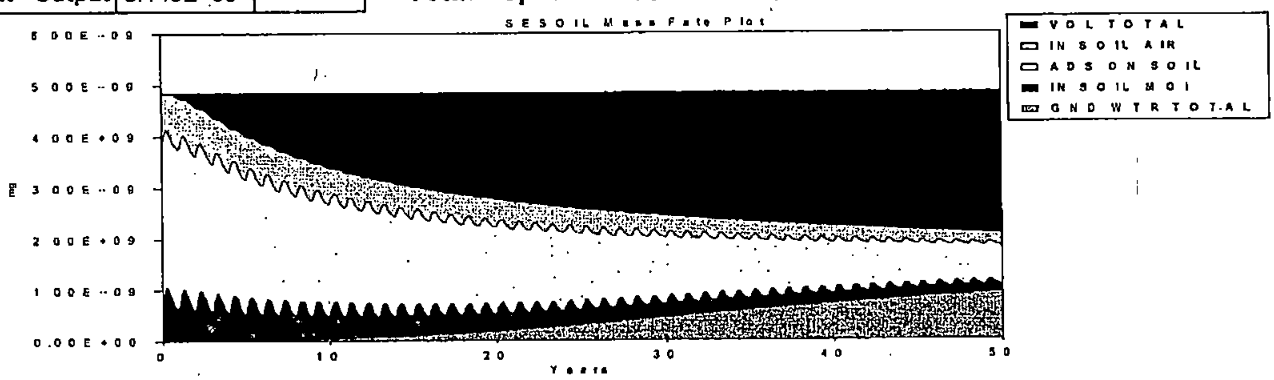
Application File: PCE at Dry Cleaner, 50% Precip Conditions
C:\SEVIEW63\DRY50 APL

Starting Depth: 2898 00 **cm**

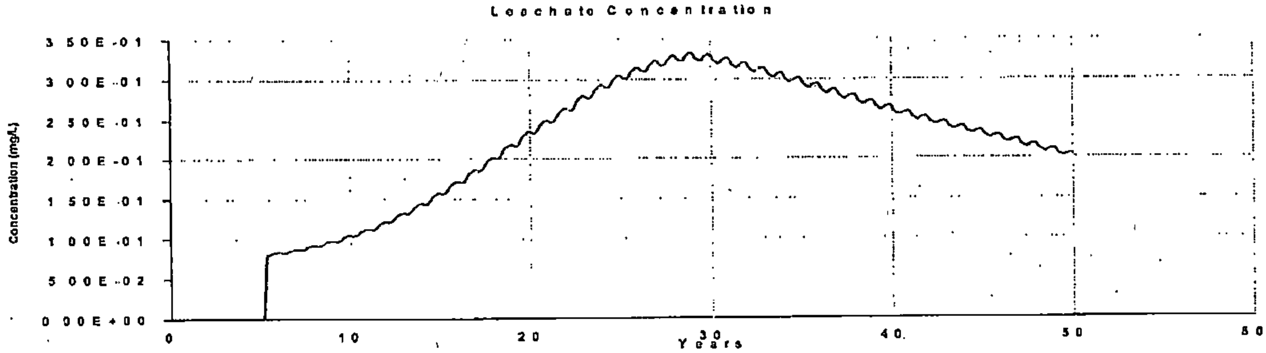
Ending Depth: 3050.00 **cm**

Total Depth: 3055 00 **cm**

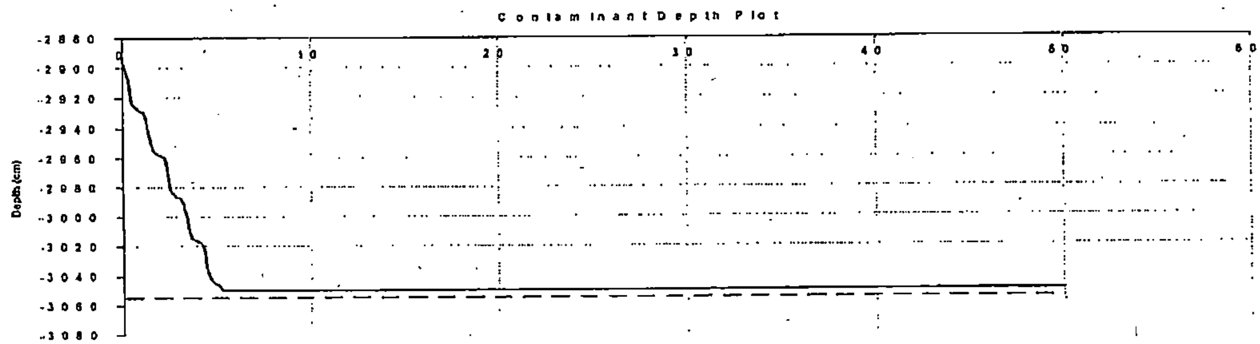
SESOIL Mass Fate Plot



Leachate Concentration



Contaminant Depth Plot



SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 10% Precip, 10% Volatilization, K=0.0001

SESOIL Output File: C:\SEVIEW63\DRY10K.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	4 842E+09	99 90
In Soil Air	4 226E+05	0 01
Sur. Runoff	0 000E+00	0.00
In Washld	0 000E+00	0.00
Ads On Soil	1.107E+06	0 02
Hydrol Soil	0.000E+00	0 00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0.00
Complexed	0.000E+00	0 00
Immobile CEC	0.000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	1 360E+05	0.00
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0 000E+00	0 00
Other Trans	0.000E+00	0 00
Other Sinks	0.000E+00	0 00
Gwr. Runoff	2.011E+03	0.00
Total Output	4 843E+09	99 93
Total Input	4 847E+09	
Input - Output	3.258E+06	

Maximum leachate concentration: 3.451E-04 **mg/l**

Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

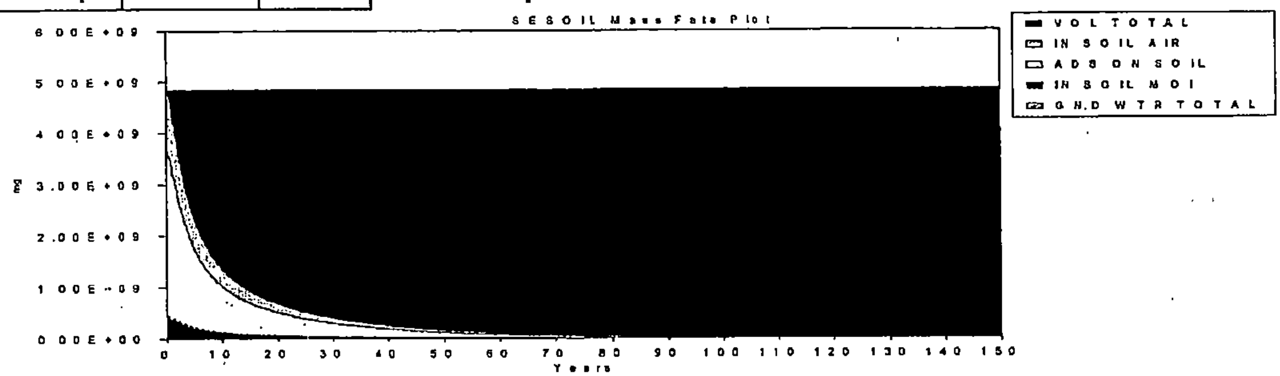
Soil File: Densely packed silty sand, C=6, n=0.27, K=0 0001
C:\SEVIEW63\SOILBCC2.SOI

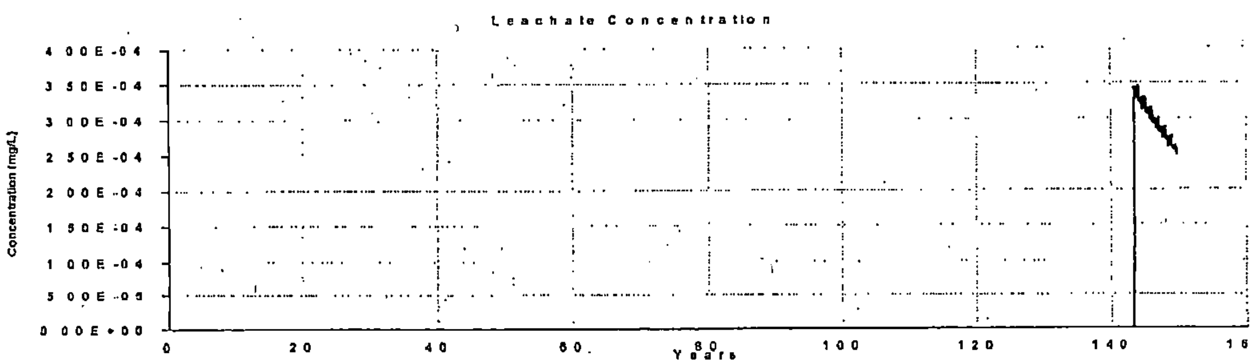
Application File: PCE at Dry Cleaner, 10% Precip Conditions
C:\SEVIEW63\DRY10 APL

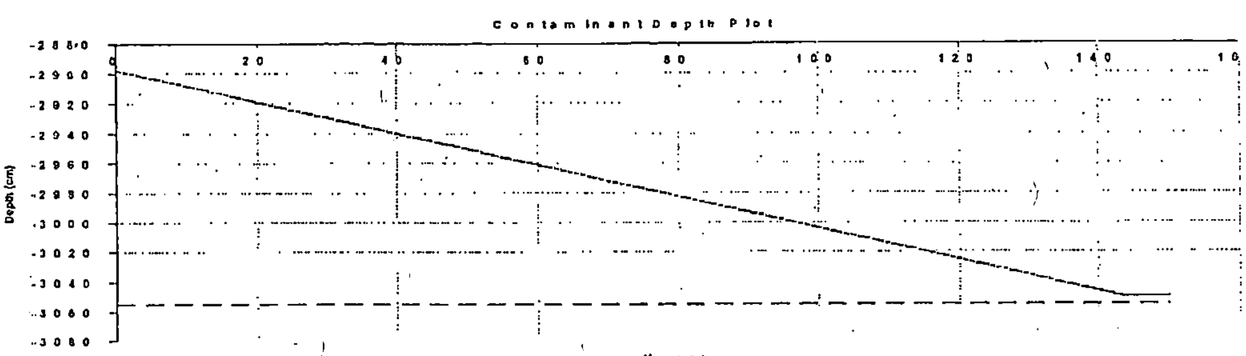
Starting Depth: 2898.00 **cm**

Ending Depth: 3050.00 **cm**

Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 100% Precip, 100% Volitilazation, foc=0 0005

SESOIL Output File: C:\SEVIEW63\DRY100OC.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1 814E+09	37.44
In Soil Air	9 350E+06	0 19
Sur. Runoff	0.000E+00	0 00
In Washld	0.000E+00	0 00
Ads On Soil	1.371E+07	0 28
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0 00
Immobile CEC	0.000E+00	0 00
Hydrol CEC	0.000E+00	0 00
In Soil Moi	4.871E+06	0 10
Hydrol Mois	0.000E+00	0.00
Degrad Mois	0 000E+00	0.00
Other Trans	0 000E+00	0.00
Other Sinks	0 000E+00	0.00
Gwr. Runoff	3.001E+09	61.92
Total Output	4.843E+09	99 94
Total Input	4.847E+09	
Input - Output	3.044E+06	

Maximum leachate concentration: 6 426E-01 **mg/l**

Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

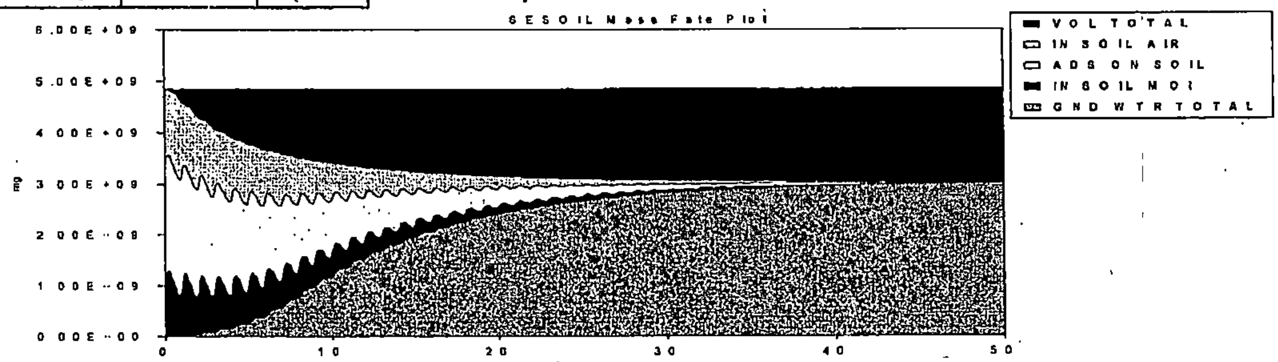
Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc=.000
C:\SEVIEW63\SOILBCCF SOI

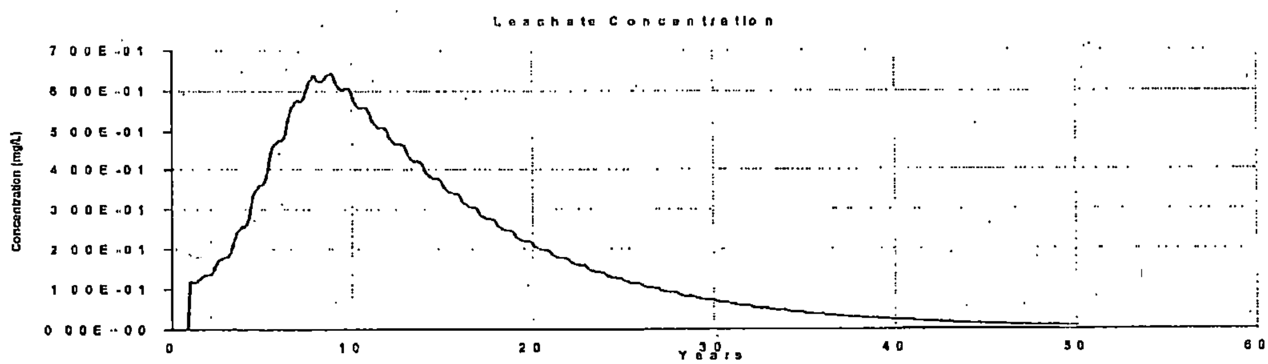
Application File: PCE at Dry Cleaner, 100% Precip Conditions
C:\SEVIEW63\BCC100 APL

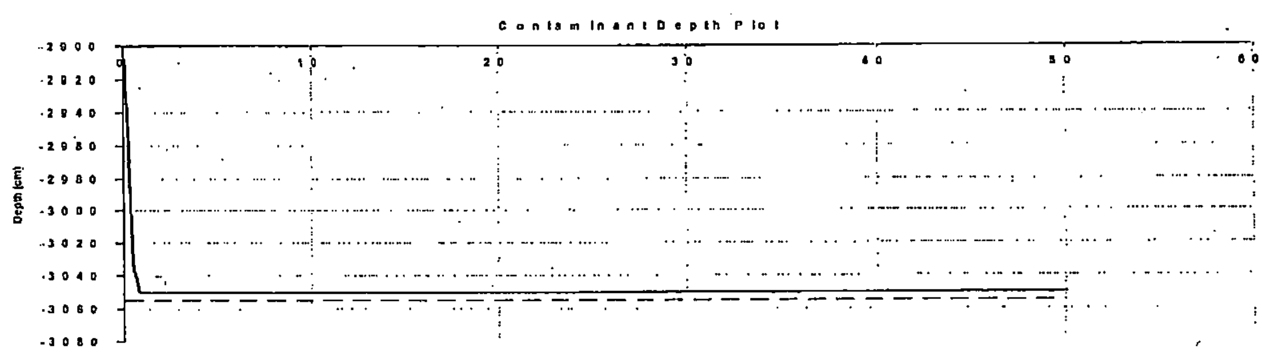
Starting Depth: 2908 00 **cm**

Ending Depth: 3050.00 **cm**

Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 50% Precip, 50% Volatilization, foc=0.0005

SESOIL Output File: C:\SEVIEW63\DRY50OC.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	3.835E+09	79 13
In Soil Air	4.694E+07	0.97
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0 00
Ads On Soil	6.465E+07	1 33
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0.00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0.00
Immobile CEC	0 000E+00	0.00
Hydrol CEC	0 000E+00	0.00
In Soil Moi	1 911E+07	0.39
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0 000E+00	0.00
Other Trans	0 000E+00	0.00
Other Sinks	0 000E+00	0.00
Gwr. Runoff	8.774E+08	18.10
Total Output	4 843E+09	99 92
Total Input	4 847E+09	
Input - Output	3.651E+06	

Maximum leachate concentration: 3 403E-01 **mg/l**

Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

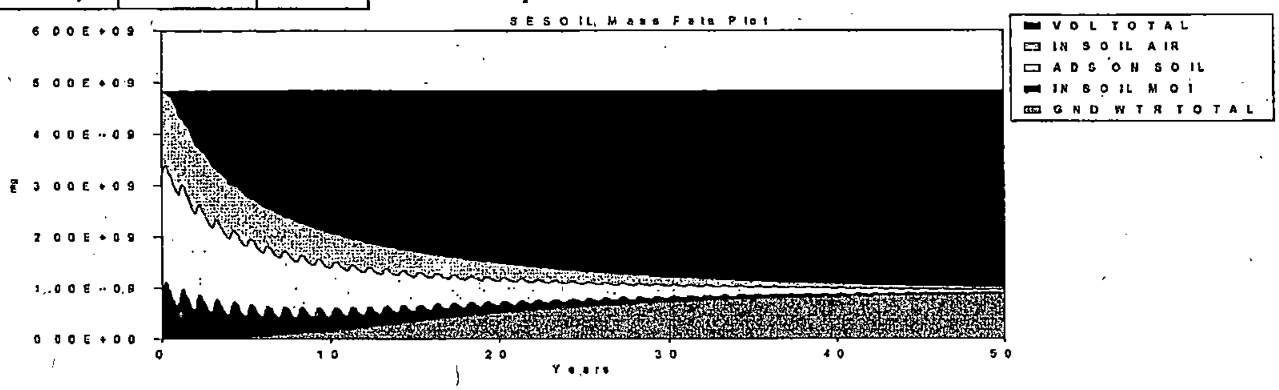
Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc=.000
C:\SEVIEW63\SOILBCCF SOI

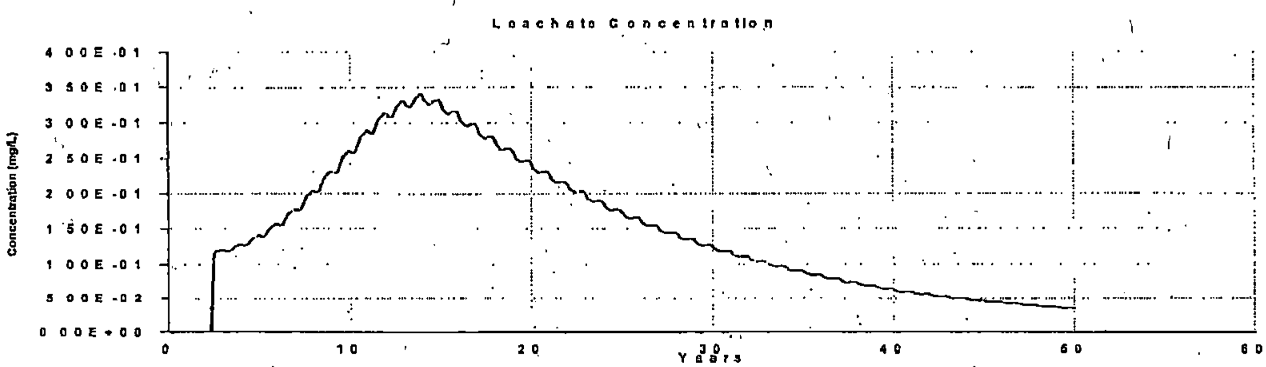
Application File: PCE at Dry Cleaner, 50% Precip Conditions
C:\SEVIEW63\DRY50 APL

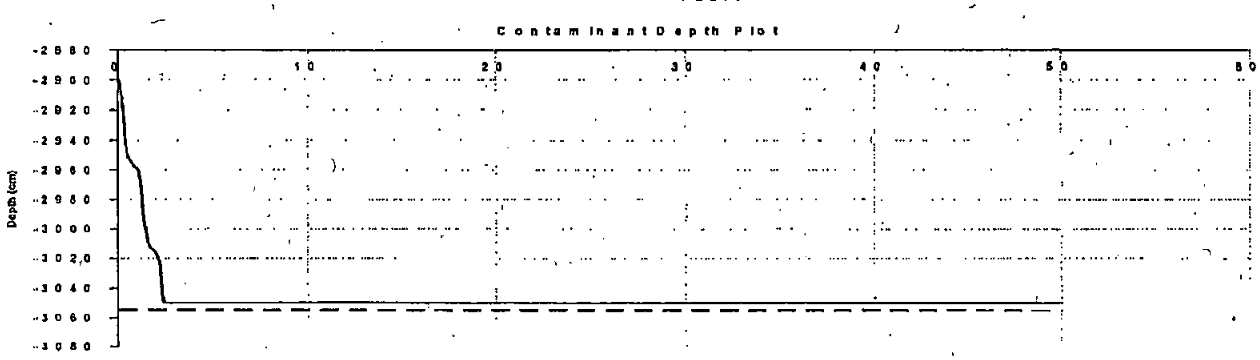
Starting Depth: 2900.00 **cm**

Ending Depth: 3050 00 **cm**

Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Dry Cleaner, 10% Precip, 10% Volatilization, foc=0.0005

SESOIL Output File: C:\SEVIEW63\DRY10OC.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	4.845E+09	99 97
In Soil Air	2.600E+03	0 00
Sur. Runoff	0 000E+00	0.00
In Washld	0 000E+00	0.00
Ads On Soil	3.234E+03	0 00
Hydrol Soil	0.000E+00	0 00
Degrad Soil	0.000E+00	0 00
Pure Phase	0 000E+00	0 00
Complexed	0.000E+00	0.00
Immobile CEC	0.000E+00	0.00
Hydrol CEC	0 000E+00	0 00
In Soil Moi	6 205E+02	0 00
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0.000E+00	0.00
Other Trans	0.000E+00	0 00
Other Sinks	0.000E+00	0 00
Gwr. Runoff	1.037E+05	0.00
Total Output	4 845E+09	99 97
Total Input	4 847E+09	
Input - Output	1.406E+06	

Maximum leachate concentration: 2.677E-03 **mg/l**

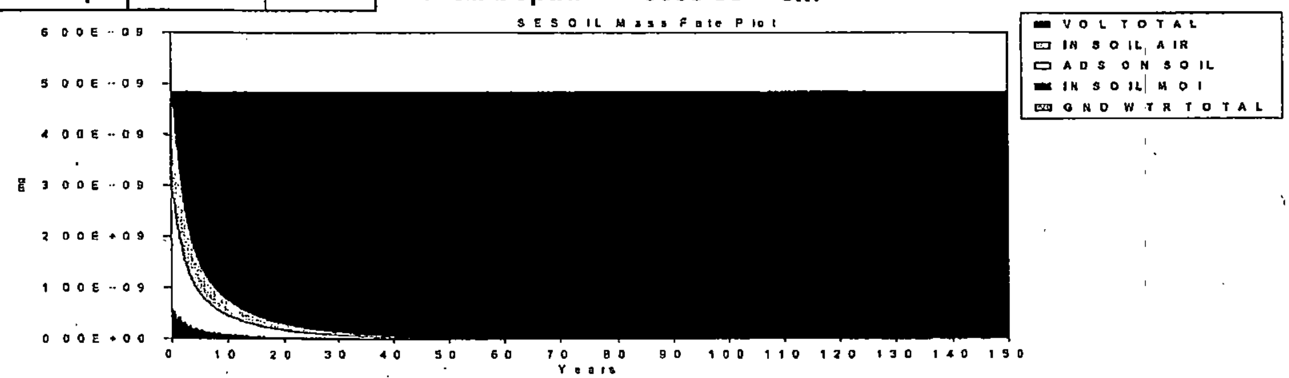
Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

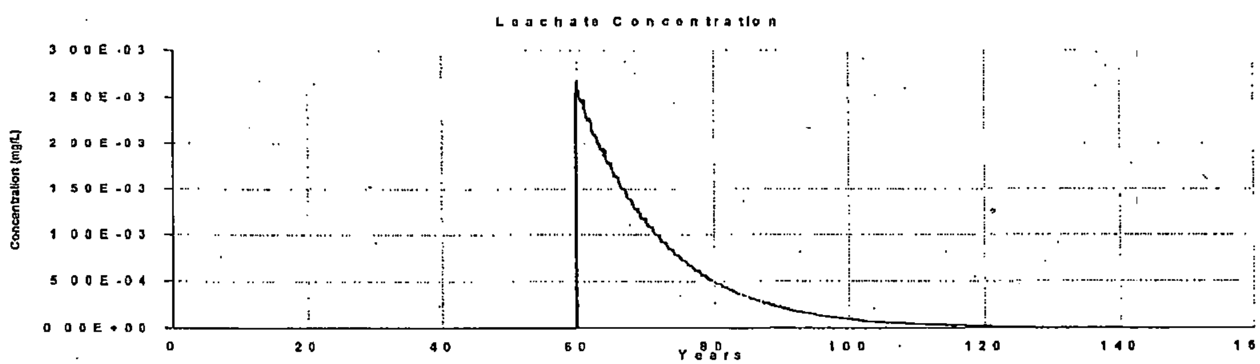
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCCBCC CHM

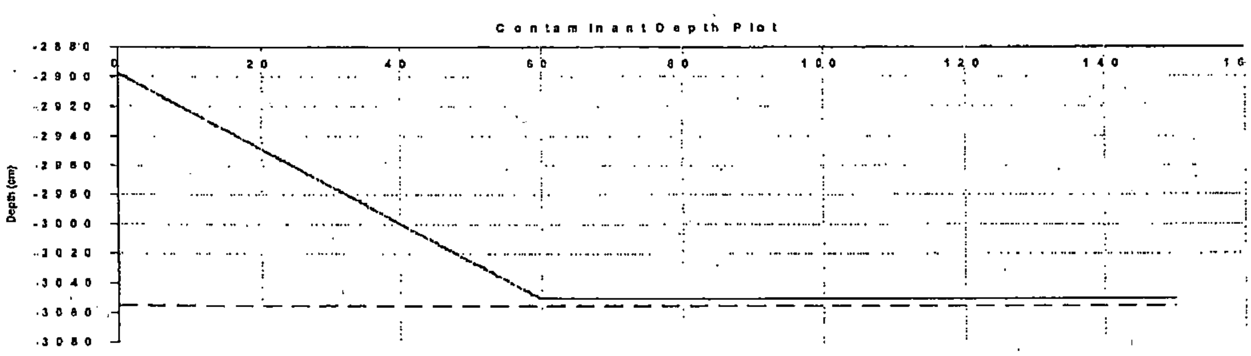
Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc=.000
C:\SEVIEW63\SOILBCCF SOI

Application File: PCE at Dry Cleaner, 10% Precip Conditions
C:\SEVIEW63\DRY10 APL

Starting Depth: 2898.00 **cm**
Ending Depth: 3050.00 **cm**
Total Depth: 3055 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 100% Precip, 100% Volatilization, K=0.0001

SESOIL Output File: C:\SEVIEW63\MAN100K.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	3 694E+08	24 30
In Soil Air	1 699E+07	1 12
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0 00
Ads On Soil	5 786E+07	3 81
Hydrol Soil	0 000E+00	0 00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0.00
Immobile CEC	0 000E+00	0.00
Hydrol CEC	0 000E+00	0.00
In Soil Moi	1 392E+07	0 92
Hydrol Mois	0 000E+00	0.00
Degrad Mois	0.000E+00	0 00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0 00
Gwr. Runoff	1.059E+09	69.72
Total Output	1.517E+09	99 86
Total Input	1 520E+09	
Input - Output	2.135E+06	

Maximum leachate concentration: 7.544E-01 **mg/l**

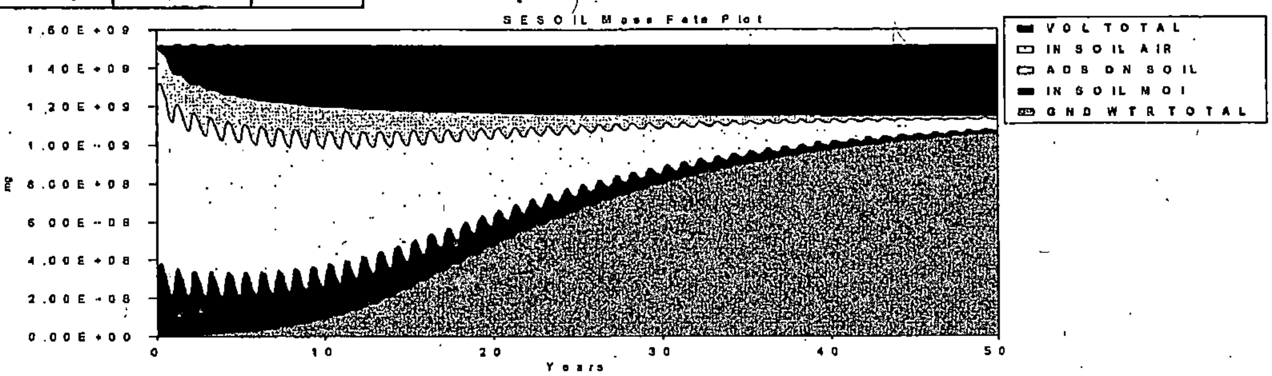
Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

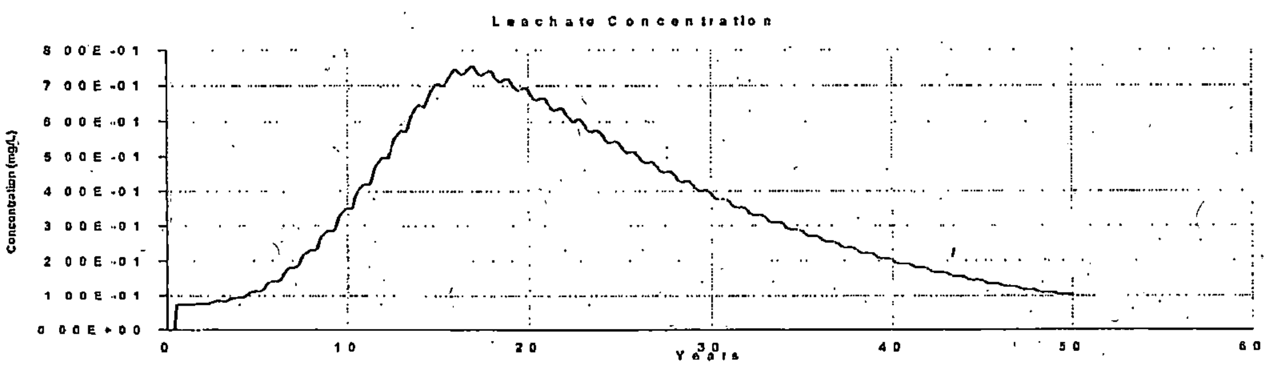
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

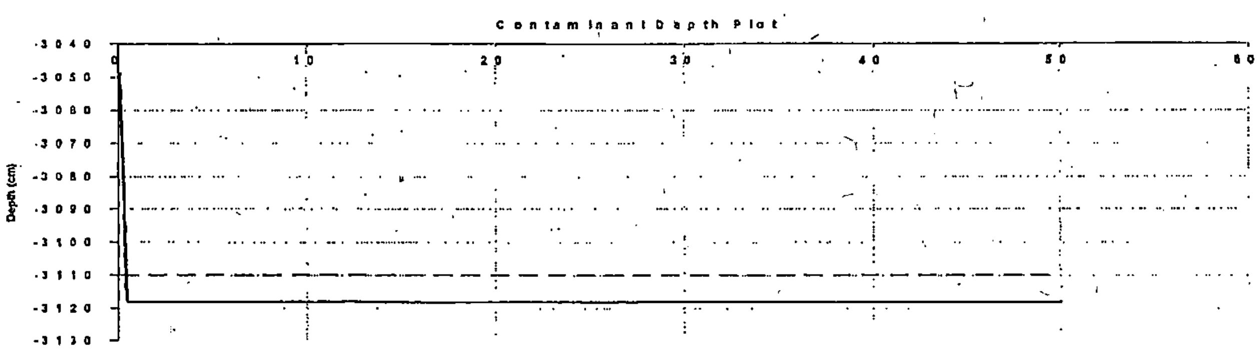
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 0001
C:\SEVIEW63\SOILBCC2 SOI

Application File: PCE at Manhole Post-excavation, 100% Precip and
C:\SEVIEW63\MAN100 APL

Starting Depth: 3049 00 **cm**
Ending Depth: 3118 00 **cm**
Total Depth: 3110 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 50% Precip, 50% Volatilization, K=0.0001

SESOIL Output File: C:\SEVIEW63\MAN50K OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	9 827E+08	64 66
In Soil Air	6 532E+07	4 30
Sur. Runoff	0 000E+00	0.00
In Washld	0 000E+00	0.00
Ads On Soil	2 022E+08	13.31
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0.00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0 00
Immobile CEC	0.000E+00	0 00
Hydrol CEC	0.000E+00	0 00
In Soil Moi	4.073E+07	2 68
Hydrol Mois	0.000E+00	0 00
Degrad Mois	0 000E+00	0.00
Other Trans	0 000E+00	0 00
Other Sinks	0 000E+00	0.00
Gwr. Runoff	2.263E+08	14.89
Total Output	1 517E+09	99 83
Total Input	1 520E+09	
Input - Output	2.534E+06	

Maximum leachate concentration: 3.989E-01 **mg/l**

Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC.CHM

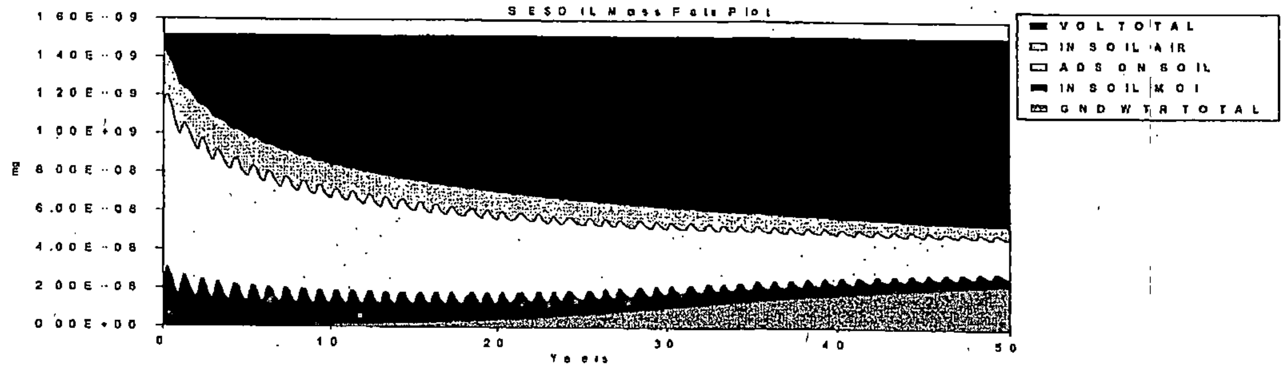
Soil File: Densely packed silty sand, C=6, n=0 27, K=0 0001
C:\SEVIEW63\SOILBCC2 SOI

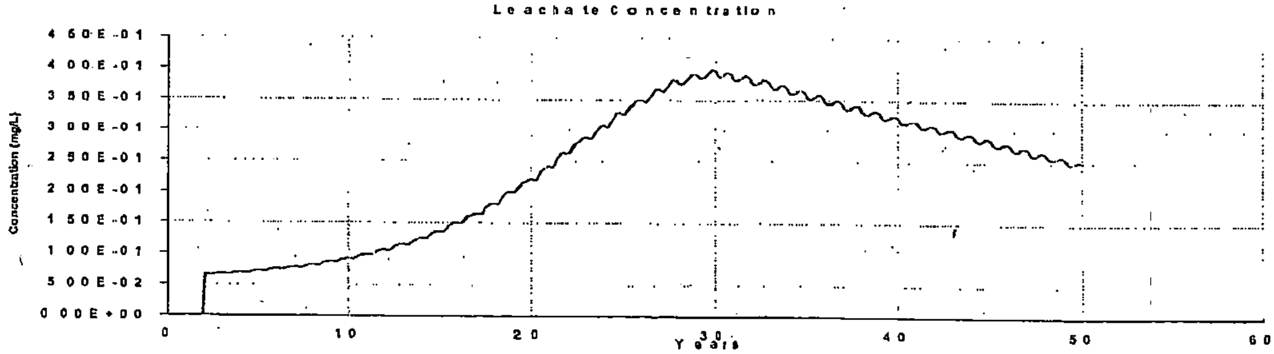
Application File: PCE at Manhole Post-excavation, 50% Precip and V
C:\SEVIEW63\MAN50 APL

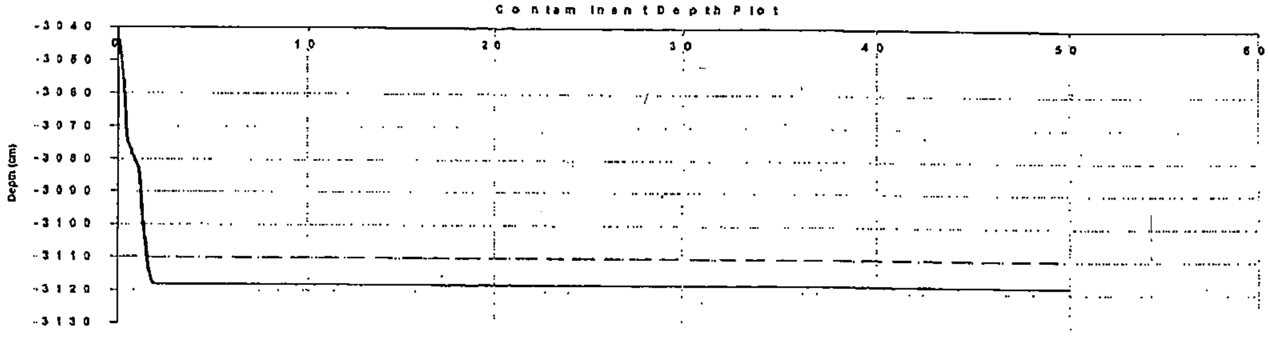
Starting Depth: 3044.00 **cm**

Ending Depth: 3118.00 **cm**

Total Depth: 3110.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 10% Precip, 10% Volatilization, K=0 0001

SESOIL Output File: C:\SEVIEW63\MAN10K.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1 513E+09	99 61
In Soil Air	1 108E+06	0 07
Sur. Runoff	0.000E+00	0 00
In Washld	0.000E+00	0 00
Ads On Soil	2.906E+06	0.19
Hydrol Soil	0.000E+00	0.00
Degrad Soil	0.000E+00	0.00
Pure Phase	0.000E+00	0.00
Complexed	0.000E+00	0 00
Immobile CEC	0 000E+00	0 00
Hydrol CEC	0 000E+00	0 00
In Soil Moi.	3 590E+05	0 02
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0.00
Other Trans	0.000E+00	0.00
Other Sinks	0.000E+00	0.00
Gwr. Runoff	5.032E+05	0.03
Total Output	1.518E+09	99 93
Total Input	1 520E+09	
Input - Output	1.123E+06	

Maximum leachate concentration: 6 218E-02 **mg/l**

Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

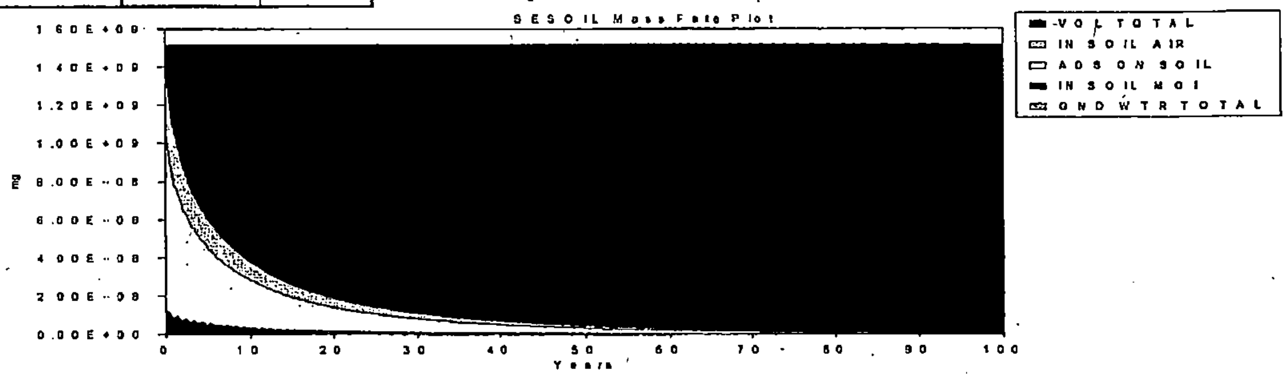
Soil File: Densely packed silty sand, C=6, n=0 27, K=0.0001
C:\SEVIEW63\SOILBCC2 SOI

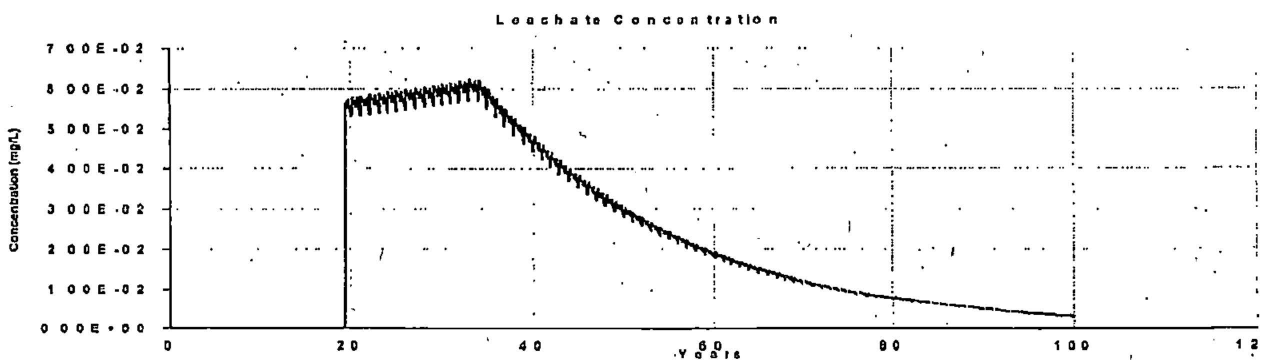
Application File: PCE at Manhole Post-excavation, 10% Precip and V
C:\SEVIEW63\MAN10 APL

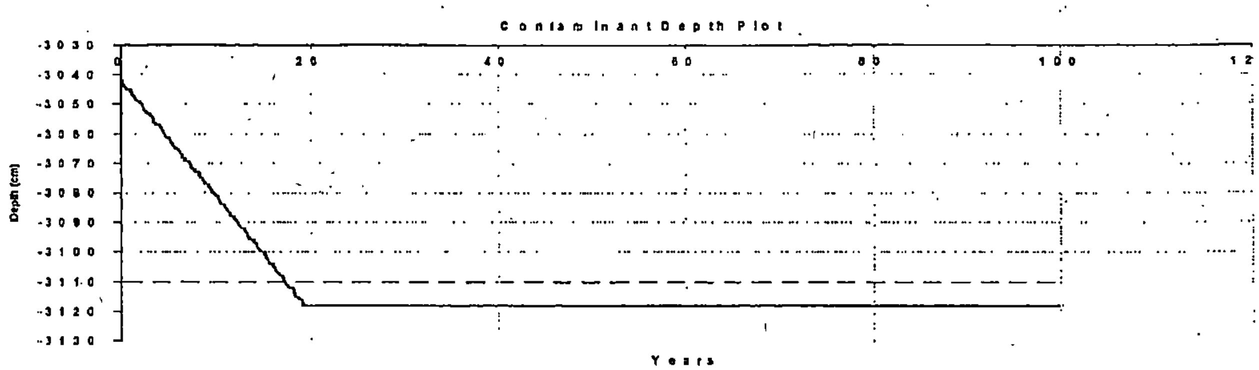
Starting Depth: 3042.00 **cm**

Ending Depth: 3118.00 **cm**

Total Depth: 3110.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 100% Precip, 100% Volatilization, foc=0.0005

SESOIL Output File: C:\SEVIEW63\MAN100OC.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	7.381E+08	48.56
In Soil Air	2.603E+06	0.17
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	3.818E+06	0.25
Hydrol Soil	0.000E+00	0.00
Degrad Soil	0.000E+00	0.00
Pure Phase	0.000E+00	0.00
Complexed	0.000E+00	0.00
Immobile CEC	0.000E+00	0.00
Hydrol CEC	0.000E+00	0.00
In Soil Moi	1.356E+06	0.09
Hydrol Mois	0.000E+00	0.00
Degrad Mois	0.000E+00	0.00
Other Trans	0.000E+00	0.00
Other Sinks	0.000E+00	0.00
Gwr. Runoff	7.728E+08	50.84
Total Output	1.518E+09	99.92
Total Input	1.520E+09	
Input - Output	1.262E+06	

Maximum leachate concentration: 7.892E-01 **mg/l**

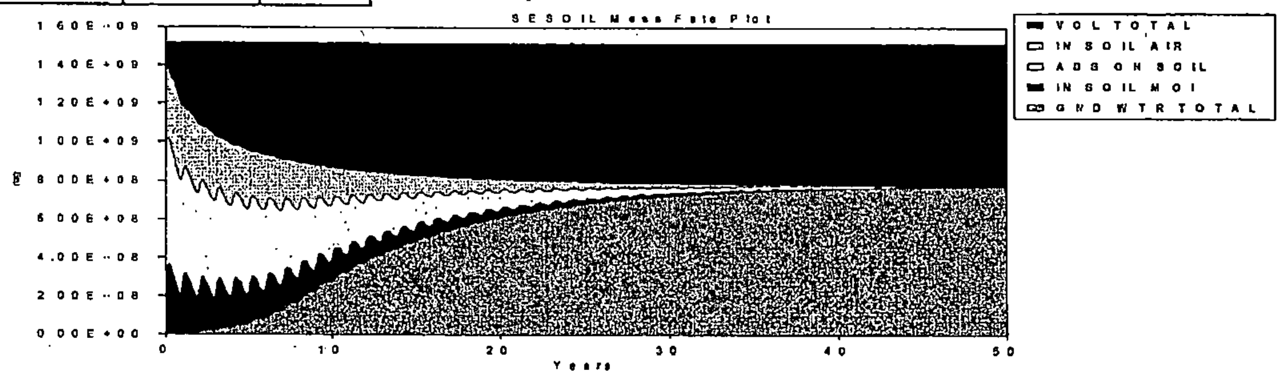
Climate File: SEATTLE
C:\SEVIEW63\SEATTLE CLM

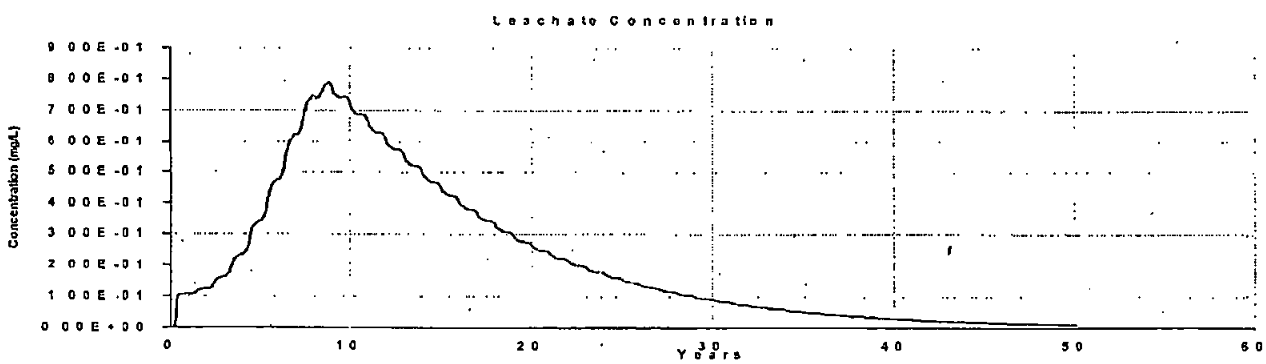
Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

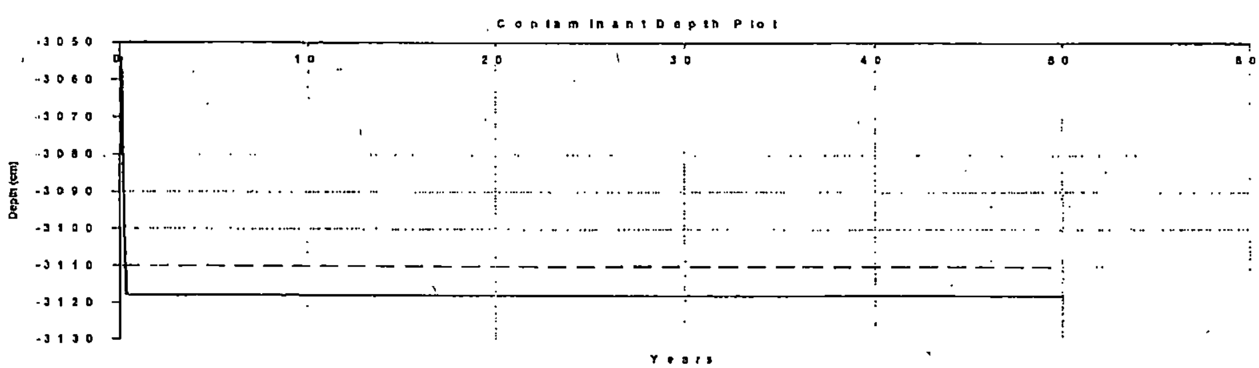
Soil File: Dense silty sand, C=6, n=0.27, K=0.001, foc=.000
C:\SEVIEW63\SOILBCCF SOI

Application File: PCE at Manhole Post-excavation, 100% Precip and
C:\SEVIEW63\MAN100 APL

Starting Depth: 3054.00 **cm**
Ending Depth: 3118.00 **cm**
Total Depth: 3110.00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 50% Precip, 50% Volatilization, foc=0 0005

SESOIL Output File: C:\SEVIEW63\MAN50OC.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1.262E+09	83 04
In Soil Air	1.275E+07	0 84
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0.00
Ads On Soil	1.756E+07	1.16
Hydrol Soil	0.000E+00	0.00
Degrad Soil	0 000E+00	0 00
Pure Phase	0 000E+00	0 00
Complexed	0 000E+00	0.00
Immobile CEC	0.000E+00	0.00
Hydrol CEC	0.000E+00	0.00
In Soil Moi	5 191E+06	0 34
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0 00
Other Trans	0.000E+00	0.00
Other Sinks	0.000E+00	0.00
Gwr. Runoff	2.208E+08	14.53
Total Output	1 518E+09	99 91
Total Input	1 520E+09	
Input - Output	1.397E+06	

Maximum leachate concentration: 4.000E-01 **mg/l**

Climate File: SEATTLE50
C:\SEVIEW63\SEA50 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

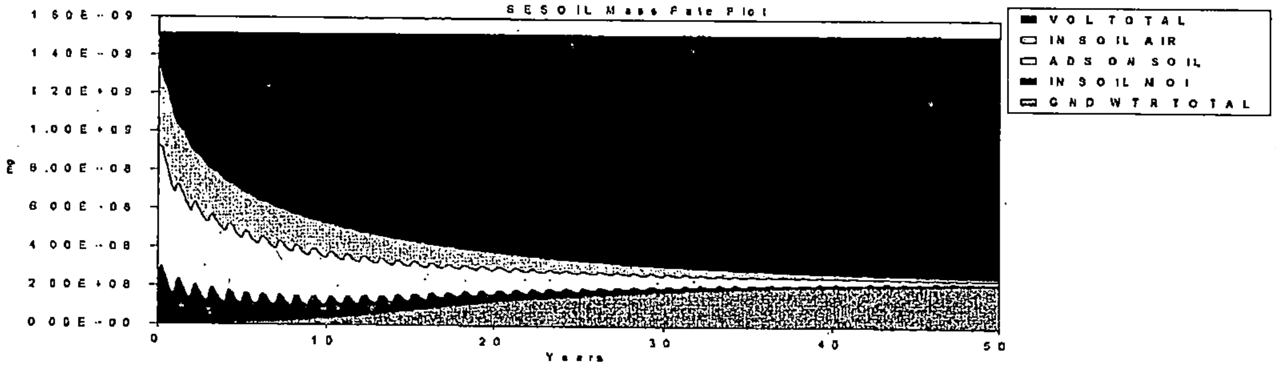
Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc= 000
C:\SEVIEW63\SOILBCCF.SOI

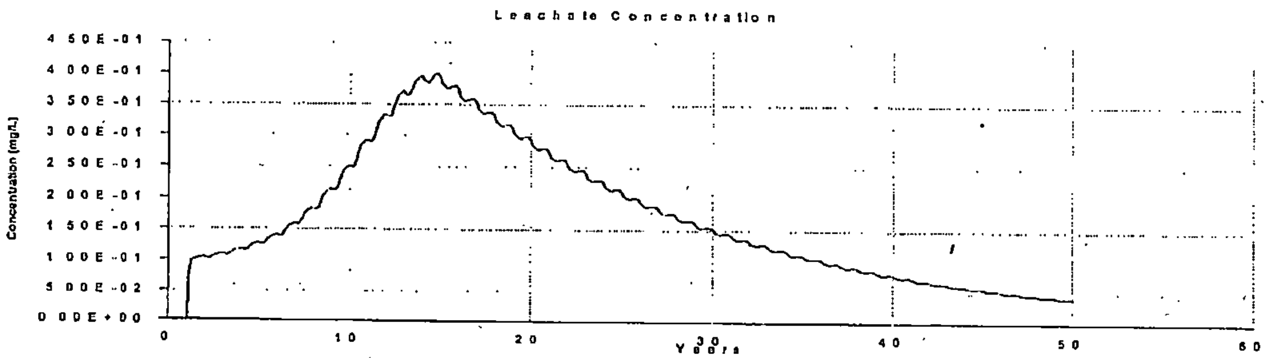
Application File: PCE at Manhole Post-excavation, 50% Precip and V
C:\SEVIEW63\MAN50 APL

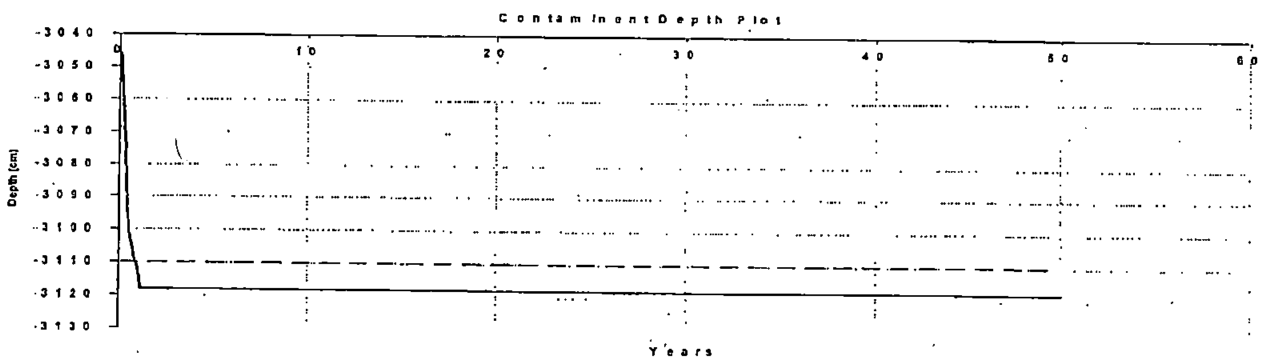
Starting Depth: 3046.00 **cm**

Ending Depth: 3118 00 **cm**

Total Depth: 3110 00 **cm**







SESOIL Pollutant Cycle Report

Scenario Description: Manhole, 10% Precip, 10% Volatilization, foc=0 0005

SESOIL Output File: C:\SEVIEW63\MAN10OC OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	1 517E+09	99 85
In Soil Air	4.521E+04	0.00
Sur. Runoff	0 000E+00	0 00
In Washld	0 000E+00	0 00
Ads On Soil	5 625E+04	0 00
Hydrol Soil	0 000E+00	0.00
Degrad Soil	0 000E+00	0.00
Pure Phase	0 000E+00	0.00
Complexed	0 000E+00	0.00
Immobile CEC	0 000E+00	0.00
Hydrol CEC	0 000E+00	0.00
In Soil Moi	1 079E+04	0.00
Hydrol Mois	0 000E+00	0 00
Degrad Mois	0 000E+00	0.00
Other Trans	0.000E+00	0 00
Other Sinks	0.000E+00	0 00
Gwr. Runoff	1.302E+06	0.09
Total Output	1 519E+09	99 94
Total Input	1.520E+09	
Input - Output	8.772E+05	

Maximum leachate concentration: 9 594E-02 **mg/l**

Climate File: Seattle, 10% Precipitation
C:\SEVIEW63\SEA10 CLM

Chemical File: PCE (Tetrachloroethylene) R9
C:\SEVIEW63\PCEBCC CHM

Soil File: Dense silty sand, C=6, n=0 27, K=0 001, foc= 000
C:\SEVIEW63\SOILBCCF SOI

Application File: PCE at Manhole Post-excavation, 10% Precip and V
C:\SEVIEW63\MAN10 APL

Starting Depth: 3042.00 **cm**

Ending Depth: 3118.00 **cm**

Total Depth: 3110.00 **cm**