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MEMORANDUM

Date: June 14, 2018

From: Weston Solutions, Inc., Anchorage, Alaska

To: Alaska Department of Environmental Conservation, Division of Spill Prevention and Response, Juneau, Alaska

Subject: Wrangell Monofill Project Support – Contaminant Fate & Transport Model Results

INTRODUCTION

The Department of Natural Resource (DNR) Rock Pit #2 has been proposed for use as a monofill (the Site) to dispose of treated contaminated soil (the waste) from the Wrangell Junkyard Site. This technical memorandum summarizes the contaminant fate and transport modeling performed for the Site based upon the proposed monofill cap design. Modeling was performed for lead, naphthalene, and total phosphorus using proprietary software SEVIEW, the results of which are summarized herein. The conceptual site model prepared to guide the fate and transport modeling is also detailed in this memorandum.

PHYSICAL SETTINGS

The DNR Rock Pit #2 is a former rock quarry, located within the Pats Creek watershed, in the mid-west area of Wrangell Island. Regionally, Pats Creek is topographically downgradient from the Rock Pit; locally, the Rock Pit is higher at its south end than its northern end, and is surrounded on three sides (south, west, and east) by high, steep rock walls. The quarry floor slopes toward the quarry opening and Pat Creek Road, in the northerly direction. The edge of the Rock Pit creates a divide that diverts precipitation in the footprint of the Rock Pit to flow inwards to the Rock Pit, and outside to flow outwards (see Drainage Basis Map, Figure 1 from the Ecology and Environment, Inc. [E&E] Basis of Design Report [E&E, 2017]).

Crushed rocks have been brought into the pit to raise and even the grade to prepare the surface for waste placement. Native rock debris was removed from the top of the fractured schist and hornfels bedrock at the Site and replaced with 2 feet (ft) of crushed rock (6 inches [in] minus) beneath a thin layer (4-6 in thickness) of D1 material (1 inch minus aggregate). The sides of the Rock Pit are of similar formation as the fractured bedrock floor, which is considered a low permeability formation.

According to the landfill basis of design (E&E, 2017), the waste would be deposited as an "island" on the prepared quarry floor in the south portion of the rock pit. The waste would be placed directly on top of the crushed rock overburden without a bottom liner. The waste would meet a minimum compaction

of 95% in 6- to 12-inch lifts, with a minimum 1% grade in the top deck planar area and 4:1 Horizontal:Vertical in the slope planar area on waste surface. The landfill at completion would be 289 ft long and 110 ft wide, with top deck planar area of 0.38 acres (16,550 ft2) and side slope planar area of 0.4 acres (17,420 ft2). The maximum waste height would be approximately 38 ft, with an additional approximately 44-inch thick cap and 2 ft of crushed rock beneath the waste. The cap of the landfill from bottom to top consists of a 4 inch thick 3/8" aggregate support layer, 60-mil high density polyethylene (HDPE) liner, a geocomposite liner (non-woven geotextile heat bonded to both sides of a geonet), 4-inch thick 3/8" aggregate, 12-inch thick 1" aggregate drainage layer, and 24-inch cover soil. Flat layers are assumed for modeling. A waste thickness of 40 ft will be used for modeling (consistent with the updated HELP modeling performed by Weston [2018]).

HYDROGEOLOGICAL SETTINGS

Inside the Rock Pit, the floor (top of fractured bedrock) within the footprint of the landfill is approximately 20 to 40 ft below the natural ground surface outside the Rock Pit, which can potentially create a hydrogeological low and serve as a sink for groundwater in the fractured bedrock in the vicinity. It also likely creates a generally upward hydraulic gradient in the fractured bedrock beneath the Rock Pit.

A shallow groundwater table was encountered in the overburden inside the Rock Pit. The multi-year average groundwater table is unknown and was assumed to be 5 ft below the new grade (where waste would be placed). The saturated thickness is assumed to be approximately 5 ft in the crushed rock overburden. The crushed rock is highly permeable material, and the hydraulic conductivity is expected to be higher than 3/8" minus gravel (hydraulic conductivity estimated to be approximately 190 ft/day). It is expected that the water levels in the overburden have relatively low fluctuation, as the elevation is largely regulated by the weir-like barrier where the groundwater exits the Rock Pit as surface flow. The horizontal hydraulic gradient was estimated to be 0.0077 ft/ft in the overburden groundwater and the overall flow direction was north. The value of the hydraulic gradient based on a single sampling event with a limited number of wells is considered to have high uncertainty.

INFILTRATION

In this landfill system, infiltration in contact with the waste is expected to be a very small portion of the total precipitation. Precipitation that would not be impacted by the waste includes: (1) surface runoff, (2) evapotranspiration (ET), (3) drainage collected at the drain layer above the geomembrane liner, and (4) drainage (passing through the geomembrane liner) collected at the 3/8" drain layer on top of the waste (low permeability). The portion that penetrates the surface of the waste layer is the infiltration of concern. The revised HELP model performed by Weston estimated the infiltration of concern to be 1,963 gallons/acre/year (0.072 inch /year) (Weston, 2018), which is considered conservative for modeling (i.e., favorable for chemical leaching) because only a small portion penetrates the entire thickness of the waste layer according to the HELP modeling. For modeling purposes, the landfill cap will be considered as a single layer which allows 1,963 gallons/acre/year infiltration to penetrate the waste layer.

CHEMICAL FATE AND TRANSPORT

Chemicals of potential migration concern

The waste to be placed in the landfill contains soil contaminated with lead as the primary contaminant of concern. Waste soil has been treated by ECOBOND, a phosphate-based reagent, to stabilize lead and heavy metals in soil. The ECOBOND reagent was added to encapsulate and chemically bind metals in nearly insoluble forms, so that very low levels of soluble metal would leach out from the treated waste into water. After treatment, the waste is considered generally homogeneous. Three chemicals of potential migration concern (COPMC) have been identified by DEC, as discussed below.

- Lead – The portion of lead in waste soil that was not effectively bound by the reagent has the potential to release into water. The results of waste samples for metals by toxicity characteristic leaching procedure (TCLP) and pore water samples for dissolved metals indicate that leachable lead is present in the waste.
- Naphthalene – The ECOBOND reagent has limited effectiveness to stabilize organic compounds in soil. The results of pore water samples indicate that leachable naphthalene is present in the waste.
- Total phosphorus – An excess of phosphate reagent over its stoichiometric amount would commonly be added to ensure effective stabilization of target metals. The excess amount of phosphate reagent has the potential to release phosphorus compounds into groundwater. These phosphorus compounds can likely immobilize a small amount of dissolved lead leaching from the waste. Because there are no published criteria for total phosphorus (or phosphorus compounds) in groundwater or surface water, evaluation of total phosphorus concentrations in the pore water to certainty criteria is not applicable. Total phosphorus is included in the model as a COPMC for comparison purposes.

Chemicals in pore water are considered in equilibration with those in the solid waste. Pore water concentrations reflect the highest level for the COPMCs in the landfill system assuming no further significant change of conditions in the waste. If the levels of chemicals in the pore water samples meet the regulatory criteria for groundwater and surface water to protect receptors, it is highly unlikely that the chemical would be at a level in groundwater posing unacceptable risk at the points of compliance given the attenuation along the flow path.

The initial leachable concentrations in soil can be estimated as follows:

1. Lead: derive using the TCLP results based on the soil/water weight, assuming all leachable mass partitioned into the TCLP extraction solution; uncertainty of estimation is considered medium.
2. Naphthalene: use the total concentration as measured in the waste samples; uncertainty of estimation is considered low.
3. Total phosphorus: use one portion (e.g., 95%) of the total phosphorus concentration determined based on the dosage added for the waste treatment, assuming the portion of the phosphorus

reagent that was not bound by metals for stabilization is leachable; uncertainty of estimation is considered medium (and biased to be conservative).

Migration Pathway

The migration pathway of the COPMCs present in the waste is through leaching to the pore water mixed with infiltration, draining to the groundwater table, and traveling with groundwater to downgradient areas where sensitive receptors may be present.

Migration in the Waste

When water infiltrating through the cap layers comes in contact with the waste, mass transfer of chemicals occurs from soil surface to water (through a stagnant pore water membrane). As a low infiltration rate results in long contact time in the landfill system, equilibration is assumed for the leachable chemicals between soil particles and the infiltration. The equilibrated concentrations in soil and in water are correlated (linear relationship assumed) with the sorption coefficient Kd (defined as Csoil [soil concentration]/Cwater [water concentration]).

Migration in Groundwater

Infiltration coming through the waste layer is loaded with dissolved COPMC and referred to as leachate. When reaching the groundwater table, the leachate experiences significant dilution in the groundwater flow. Chemical reactions to reduce their concentrations in groundwater may also occur (e.g., precipitation/immobilization of phosphorus compounds with high level of calcium in water, and precipitation/immobilization of lead at a higher pH in groundwater). For a conservative consideration in the modeling, no chemical reaction is assumed to take place.

Because of the high hydraulic conductivity of the overburden crushed rock, leachate would be quickly mixed in groundwater and migrate primarily along the groundwater flow direction. The chemicals would also spread in the lateral and vertical direction because of dispersion.

Migration Simulation Point

Because the leachate impacted groundwater flow would be collected in the drainage ditch, simulation of groundwater flow in the downgradient area is not applicable. Migration simulation is limited to the north extent of the landfill area, where a monitoring well is proposed to be placed. The chemical concentrations modeled at this monitoring well will be used to evaluate the maximum concentration in groundwater before being collected in the drainage ditch and discharging to the french drain of the landfill.

Natural attenuation of the COPMCs is expected to be limited to dilution in the crushed rock layer due to its low natural organic content and ion-exchange capabilities. Over a very long time period, as chemicals gradually leach out of the soil, the amount of leachable chemicals will continue to decrease in the waste, and chemical concentrations in the leachate will consequently decrease.

MODELING RESULTS

Fate and transport modeling was performed using SEVIEW Pro Version 7.1.18 by Environmental Software Consultants Inc., LLC. The model setup, including model size, key parameters and value selections for modeling, is provided in Table 1. For this modeling task, simulation was conducted for 100 years, except when noted for identifying overall trends. Longer time periods were not modeled because uncertainties over a longer period of time would likely override valid predictions, possibly generating unrealistic results. The modeling results are summarized in Table 2, with sensitivity analysis data presented in Tables 3 through 5. The derivation of the parameter values is included in Attachment A. The SEVIEW output files containing the concentration graphs and model parameter values are included in Attachment B.

Table 1
Summary of Model Setup

Model Size			
"Parameter	**Value**	**Units**	**Notes**
Length	279	ft	Parallel to groundwater flow, north
Width	128	ft	Perpendicular to groundwater flow
Thickness of Waste	40	ft	Weston HELP Model value (Weston, 2018)
Thickness of Base	5	ft	Rock layer between waste and groundwater
SESOIL – Leaching Modeling			
Parameter	**Value**	**Units**	**Notes**
Infiltration of Concern	1,963	gallons/year	Weston HELP Model value (Weston, 2018)
Bulk Density	1,860	g/cm³	E&E report value (only one value is allowed) (E&E, 2017)
Effective Porosity	0.25		Default SEVIEW value for sandy loam/silty clay (only one value is allowed)
Hydraulic Conductivity			
Waste	3.70E-06	cm/sec	E&E report value (E&E, 2017)
Crushed Rock	0.066	cm/sec	E&E report value (E&E, 2017)
Organic Content			
Waste	0.50%		Estimated, lower end of soil in the area, (E&E, 2017)
Crushed Rocks	0.005%		Estimated, 1% of waste

Table 1 (Continued)

AT123D – Groundwater Transport Modeling			
Parameter	**Value**	**Units**	**Notes**
Groundwater Gradient	0.0077	ft/ft	E&E report value (E&E, 2017)
Aquifer Thickness	5	ft	Estimated
Hydraulic Conductivity	0.066	cm/se	E&E report value (E&E, 2017)
Organic Content	0.005%		Estimated for crushed rocks
Dispersivity			
Longitudinal	4.13	meters	Longitudinal, estimated using SEVIEW formula
Transverse	0.413	meters	Transverse, estimated using SEVIEW formula
Vertical	0.0413	meters	Vertical, estimated using SEVIEW formula
Chemical-Specific Input			
Parameter in Waste	**Value**	**Units**	**Notes**
Lead Leachable Mass Load	1.44	mg/kg	Based on TCLP mean[1] concentration of 0.072 mg/L (Nortech, 2018)
Lead Sorption Coefficient	75.5	L/kg	Based on pore water mean concentration of 19 µg/L
Naphthalene Leachable Mass Load	0.044	mg/kg	Based on measured mean total concentrations (Nortech, 2018)
Naphthalene Sorption Coefficient	7.2	L/kg	Derived from Pore water mean concentration of 6.1 µg/L and total soil concentration of 44 µg/kg (SEVIEW value of 10 L/kg based on default Koc and foc of 0.5% was less conservative and not used)
Total Phosphorus Leachable Mass Load	3,700	mg/kg	Based on usage of ECOBOND 3%
Total Phosphorus Sorption Coefficient	3.4	L/kg	Based on pore water mean concentration of 1,080 mg/L

Notes:
[1] Whenever mean concentrations were calculated, the geometric mean was used in order to reduce influence from potential outliers in the data. Refer to Attachment A for a list of input parameter determinations.

Base Scenario

As shown in Table 2, under the base scenario (with the conservative values selected for the parameters for SEVIEW modeling), the maximum concentrations of lead, naphthalene, and total phosphorus at PMW-03 were predicted to be 0.05 micrograms per liter (µg/L), 0.025 µg/L, and 6.8 milligrams per liter (mg/L), respectively. Lead and naphthalene are both below the lowest applicable criteria to protect potential groundwater and surface water receptors (10.94 µg/L lead and 1.7 µg/L naphthalene; total phosphorus does not have established criteria). The time when the leachate reaches groundwater (Time to Groundwater, TTG) was estimated to be 5 to 14 years, depending on the difference of retardation in the crushed rock base layer below the waste.

Table 2
Summary of Modeling Results – Base Scenario

Chemical Of Potential Migration Concern	Maximum Leachate Concentration	Time to Groundwater (TTG)	Maximum Concentration at PMW-03	Time of Maximum Concentration
	µg/L	Years	µg/L	Years
Lead	21.3	8	0.05	10
Naphthalene	6.8	14	0.025	15
Total Phosphorus	1,200,000	5	6,800	100

Simulations predicted that the concentrations of all COPMCs would experience a consistent pattern of fluctuation within a year, which is attributed to the cycling variation of moisture retention in the waste corresponding to temperature change in a year with the highest concentration in each year maintained at a nearly constant level over time (see the plots of predicted concentration over time at modeled location PMW-03 in Attachment B). Due to the high sorption coefficient of lead and naphthalene, the thickness of waste (~40 ft), and a small amount of infiltration into the waste layer each year, the concentration of these chemicals is expected to remain steady over a long period of time before a significant decline. A test run of 500 years under the base scenario for lead predicted no appreciable change in the maximum lead concentration at PMW-03. For total phosphorus, which has a lower sorption coefficient, a slight increase in its concentration was predicted over time. A test run of the base scenario for 500 years predicted an increase of 10% in the period from the TTG to 500 years.

These results indicate that the predicted contaminant concentrations would be very low in comparison to their criteria for receptor protection, and would not be sensitive to elapsed time in a reasonable timeframe.

Sensitivity Analysis

Sensitivity analysis was performed for the following parameters that were determined to have medium or high uncertainty that would produce results biased toward higher predicted concentrations at the proposed monitoring well PMW-03. Sensitivity analysis results are displayed in Tables 3 through 5.

- Leachable mass load for lead and naphthalene, a value of 10 times that used in the base scenario to evaluate the uncertainty in the estimate of leachable mass in the waste.
- Hydraulic gradient of overburden groundwater, for all compounds, using a value of 0.0015 (one-fifth of measured value of 0.0077 ft/ft, reported in E&E Basis of Design Report [E&E, 2017]) to evaluate the uncertainty in the estimate of groundwater flow in overburden groundwater.
- Sorption coefficient for total phosphorus, using a value of 0.68 liters per kilogram (L/kg) (one-fifth of estimated value, along with the leachable mass load reduced to one-fifth to match with observed Pore Water Mean Concentration), to evaluate the uncertainty in the estimate of the sorption coefficient and correlated leachable mass.

Sensitivity analysis results of lead and naphthalene indicate that the predicted concentrations are proportionate to the change of the leachable mass load in the waste, and approximately inversely proportionate to the hydraulic gradient. The change of the values for these parameters within a reasonably expected range is not expected to result in unacceptable concentrations of lead and naphthalene predicted at PMW-03.

Similar results were observed for phosphorus with regard to dependence on the hydraulic gradient. With a lower sorption coefficient (0.68 L/kg) and thus lower mass load, the depletion of total phosphorus was predicted to occur at a quicker pace. However, a similar maximum concentration was predicted, and, overall, concentrations are comparable to those determined in the base scenario over a timeframe of several hundred years.

Overall, the modeling results are considered conservative with use of multiple conservative settings in the base scenario, including use of high infiltration rate, uniform waste layer thickness, and no chemical or biological reactions.

Table 3
Summary of Sensitivity Analysis for Lead

Chemical Of Potential Migration Concern	Maximum Leachate Concentration	Time to Groundwater (TTG)	Maximum Concentration at PMW-03	Time of Maximum Concentration
	µg/L	Years	µg/L	Years
Base Scenario	21	8	0.05	10
10X Leachable Mass Load	210	8	0.5	11
1/5 of Groundwater Flow	21	8	2.2	14

Table 4
Summary of Sensitivity Analysis for Naphthalene

Chemical Of Potential Migration Concern	Maximum Leachate Concentration	Time to Groundwater (TTG)	Maximum Concentration at PMW-03	Time of Maximum Concentration
	µg/L	Years	µg/L	Years
Base Scenario	6.8	14	0.025	15
10X Leachable Mass Load	68	14	0.2	19
1/5 of Groundwater Flow	6.8	14	0.08	16

Table 5
Summary of Sensitivity Analysis for Total Phosphorus

Chemical Of Potential Migration Concern	Maximum Leachate Concentration	Time to Groundwater (TTG)	Maximum Concentration at PMW-03	Time of Maximum Concentration
	mg/L	Years	mg/L	Years
Base Scenario	1,200	5	6.8	100
1/5 Kd and Leachable Mass Load	1,300	3	3.7	100
1/5 of Groundwater Flow	1,200	5	15	100

REFERENCES CITED

Ahtna (Ahtna Engineering Services, LLC). 2017. *Proposed Wrangell Monofill Report of Findings, Wrangell, Alaska.* 27 January.

E&E (Ecology and Environment, Inc.). 2017. *Volume I, Basis of Design; Wrangell Junkyard Repository Site Wrangell, Alaska; TDD:17-01-0015*. 9 June.

Nortech. 2018. *Sampling and Analysis Report, Treated Stockpile and Monofill Sites, Wrangell, Alaska.* Prepared for NRC Alaska LLC. April 11.

Weston (Weston Solutions, Inc.). 2018. *Wrangell Monofill Project Support – HELP Model Evaluation Report, Wrangell, Alaska.* April.

FIGURES

LEGEND

- HORIZONTAL CONTROL POINT (ESTABLISHED)
- TEMPORARY BENCH MARK (ESTABLISHED)
- TOP OF BANK
- TOE OF SLOPE
- 18" CORRUGATED PLASTIC PIPE CULVERT
- 95' MAJOR CONTOUR LINE
- MINOR CONTOUR LINE
- TREE LINE
- GRAVEL SURFACE
- BASIN DEMARCATION LINE
- FLOW DIRECTION

Source: R&M

R & M ENGINEERING
ENGINEERS GEOLOGISTS SURVEYORS

November 17, 2016

Drainage Basis Map, Figure 1 from the Ecology and Environment, Inc. Basis of Design Report (E&E, 2017)

ecology and environment, inc.
Global Environmental Specialists
Seattle, Washington

0' 15' 30' 60' 120'
CONTOUR INTERVAL = 2 FOOT

WRANGELL JUNKYARD
Wrangell, Alaska

FIGURE 1
DRAINAGE BASIN MAP

Date:	Drawn by:	
4/6/17		10:START IV\17010015\fig

ATTACHMENT A
MODEL INPUT PARAMETER VALUES

Table A-1

Solid Analysis Results for the Treated Waste

Sample ID	TCLP-Lead	Naphthalene	Phosphorus	Total Lead	Notes
Units	mg/L	mg/kg	mg/kg	mg/kg	
TSP1-2	0.341	0.12	NA	497	
TSP1-4	NA	0.106	NA	564	
TSP2-2	0.0823	0.02	NA	1470	Note 1
TSP2-4	0.0782	0.0511	NA	610	
TSP3-2 (DUP1)	0.085	0.02	NA	2980	Note 1
TSP20-2 (DUP1)	0.0815	0.02	NA	6250	Note 1
TSP3-6	0.0505	0.0425	NA	1140	
TSP4-2	0.0874	0.02	NA	720	Note 1
TSP4-6	0.0758	0.02	NA	698	Note 1
TSP5-2	0.025	0.0406	NA	518	Note 1
TSP5-6	0.025	0.02	NA	406	Note 1
TSP6-2	0.423	0.02	NA	1297	Notes 1, 2
TSP7-2	0.141	0.02	NA	954	Note 1
TSP7-6	0.0911	0.02	NA	765	Note 1
TSP8-2	0.114	0.02	NA	810	Note 1
TSP8-6	0.025	0.171	NA	1460	Note 1
TSP9-2	0.025	0.154	NA	914	Note 1
TSP9-6	0.0609	2.65	NA	946	
TSP10-2	0.106	0.02	NA	791	Note 1
TSP10-6	0.025	0.0502	NA	502	Note 1
Mean Level	**0.072**	**0.044**	**NA**	**926.4**	Note 3

Table A-2

Pore Water Analysis Results for the Treated Waste

Sample ID	Lead	Naphthalene	Phosphorous	Notes
Units	**ug/L**	**ug/L**	**mg/L**	
W1	12.3	5.49	739	
W2	144	18.5	584	
W20	NA	NA	833	
W3	14.3	4.02	2160	
W30	5.26	3.43	1890	
Mean Level	**19.1**	**6.12**	**1080**	Note 3

Table A-3

Calculations for Derived Values of Lead for Model Input

Parameter	Value	Units	Derivation	Notes
TCLP concentration (C_tclp)	0.072	mg/L	Table A-1	Mean Level
Solid sample (M_s)	100	g	Assumed	Canceled in calc.
Extracting Liquid (M_l)	2000	g	20 X M_s	Note 4
Liquid Density (ρ)	1000	g/L		
Liquid Volume (V)	2	L	M_l / ρ	
Lead mass in Liquid (M_pb)	0.144	mg	V * C_tclp	
Leachable lead in waste (C_pbs)	0.00144	mg/g	M_pb / M_s	
	1.44	**ug/g or mg/kg**		Units conversion
Pore Water Lead Level (C_pbw)	19.1	ug/L	Table A-2	Mean Level
	0.0191	ug/mL		Units conversion
Sorption Coefficient (Kd_pb)	**75.5**	**(ug/g)/(ug/mL)**	C_pbs / C_pbw	

Table A-4
Calculations for Derived Values of Naphthalene for Model Input

Parameter	Value	Units	Derivation	Notes
Naphthalene in waste (C_nas)	0.044	mg/kg	Table A-1	
	0.044	**ug/g**		Units conversion
Pore Water Lead Level (C_naw)	6.1	ug/L	Table A-2	Mean Level
	0.0061	ug/mL		Units conversion
Sorption Coefficient (Kd_na)	**7.2**	**(ug/g)/(ug/mL)**	C_nas / C_naw	

Table A-5
Calculations for Derived Values of Total Phosphorus (TP) for Model Input

Parameter	Value	Units	Derivation	Notes
TP in Unit Waste				
Unit Treated Waste Mass (M_w)	1	kg		Canceled in calc.
Reagent Dosage (D_r)	3%			Provided by ADEC
Phosphate in Reagent (R_p4)	40%			Provided by ADEC
Phosphorus in Phoshate (R_tp)	33%		P / (P + O * 4)	P ratio in PO4^3-
TP in Unit Waste (C_tps)	0.00392	kg/kg	D_r * R_p4 * R_tp	
	126	mmol/kg	MW=31 g/mol	Units conversion
	3.92	ug/g		Units conversion
TP consumed in binding metals				
Total Lead level (C_tpb)	926.39	mg/kg	Table A-1	
	4.48	mmol/kg	MW=207 g/mol	Units conversion
consumed by lead (TP_pb)	2.98	mmol/kg		
consumed by all metals (TP_m)	6.0	mmol/kg	TP_pb * 2	Estimated
Leachable TP (C_ltp)	120	mmol/kg	C_tps - C_ltp	
	3,720	mg/kg	MW=31 g/mol	Units conversion
	3720	**ug/g**		Units conversion
Pore Water Lead Level (C_tpw)	1100	mg/L	Table A-2	Mean Level
	1100	ug/mL		Units conversion
Sorption Coefficient (Kd_tp)	**3.4**	**(ug/g)/(ug/mL)**	C_ltp / C_tpw	

Notes

1. The ND results were converted to half of the lowest detected concentrations,
   i.e. 0.025 mg/L for lead TCLP, and 0.02 mg/kg for total naphthalene;
2. Value of sample TSP6-2 was arithmetic mean of the primary sample and two duplicate samples.
3. Geometric mean was used to calculate the mean value of concentrations to reduce impact of outliers.
4. According EPA Standard Method 1311, TCLP uses extracting liquid in amount of 20 times of solid sample.

g - grams
kg - kilograms
L - liter
MW - molecular weight
mg - milligrams
mL - milliliter
mmol/kg - millimoles per kilogram
NA - not analyzed
TP - total phosphorus
ug - micrograms

ATTACHMENT B
SESOIL MODEL RESULTS

ATTACHMENT B

SEVIEW MODEL OUTPUT FILES

Included in Order Following this Page:

Attachment B-1 – Output Files Containing Assumed General Conditions for the Covered Monofill Landfill

Attachment B-2 – Output Files for Lead Simulation

Attachment B-3 – Output Files for Naphthalene Simulation

Attachment B-4 – Output Files for Total Phosphorus Simulation

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ATTACHMENT B-1

ASSUMED GENERAL CONDITIONS FOR THE COVERED MONOFILL LANDFILL

Included in order:

1. Climate Report (based on SEVIEW default conditions, modified to simulate covered landfill conditions);
2. SESOIL Hydrologic Cycle Report (based on the Climate Report, a simulated condition with the lowest groundwater runoff rate, January in a year, to equal to 1,953 gallons/acre/year = 0.0725 inches/year = 0.015 cm/month).

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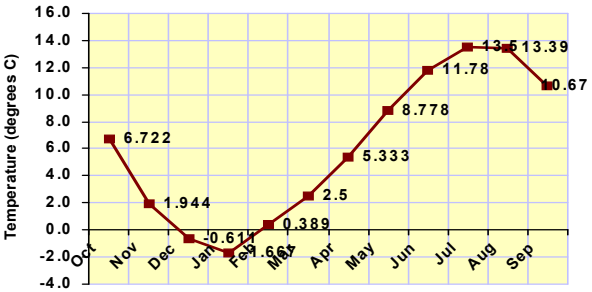
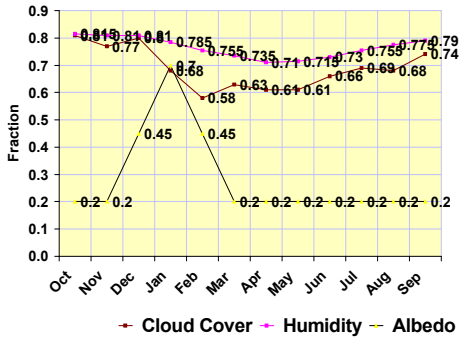
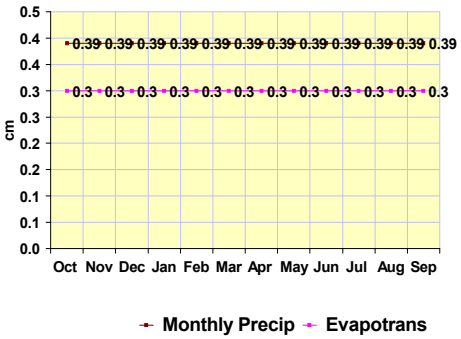
Climate Report

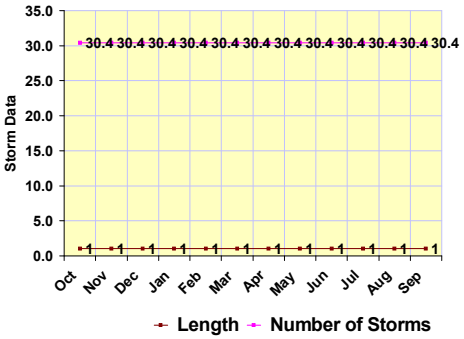
Location Description: WRANGELL HELP-WESTON
Climatic Input File: c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

Month	Temperature		Precipitation		Evapotranspiration Rate		Storms		Cloud Cover	Albedo	Humidity
Units	^{o}C	^{o}F	cm	Inches	cm	Inches	# per Month	Length Days	Fraction	Fraction	Fraction
October	6.722	44.10	0.39	0.15	0.30	0.12	30.4	1.0	0.810	0.200	0.815
November	1.944	35.50	0.39	0.15	0.30	0.12	30.4	1.0	0.770	0.200	0.810
December	-0.611	30.90	0.39	0.15	0.30	0.12	30.4	1.0	0.800	0.450	0.810
January	-1.667	29.00	0.39	0.15	0.30	0.12	30.4	1.0	0.680	0.700	0.785
February	0.389	32.70	0.39	0.15	0.30	0.12	30.4	1.0	0.580	0.450	0.755
March	2.500	36.50	0.39	0.15	0.30	0.12	30.4	1.0	0.630	0.200	0.735
April	5.333	41.60	0.39	0.15	0.30	0.12	30.4	1.0	0.610	0.200	0.710
May	8.778	47.80	0.39	0.15	0.30	0.12	30.4	1.0	0.610	0.200	0.715
June	11.78	53.20	0.39	0.15	0.30	0.12	30.4	1.0	0.660	0.200	0.730
July	13.50	56.30	0.39	0.15	0.30	0.12	30.4	1.0	0.690	0.200	0.755
August	13.39	56.10	0.39	0.15	0.30	0.12	30.4	1.0	0.680	0.200	0.775
September	10.67	51.21	0.39	0.15	0.30	0.12	30.4	1.0	0.740	0.200	0.790
Total			4.68	1.84	3.60	1.42					





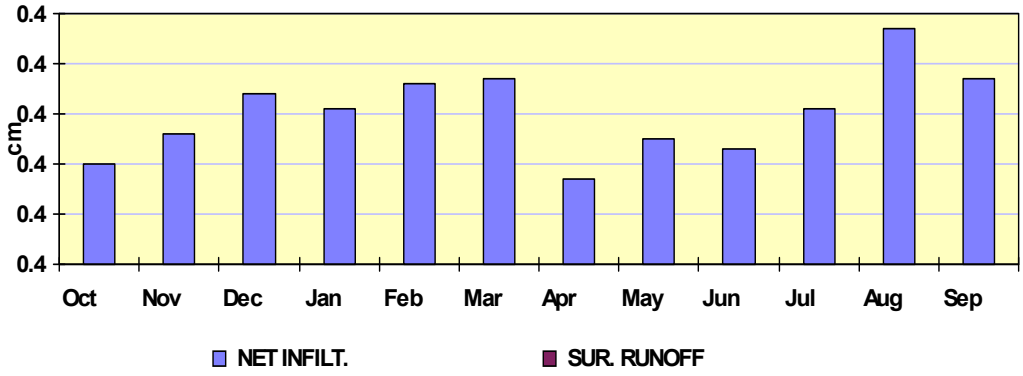


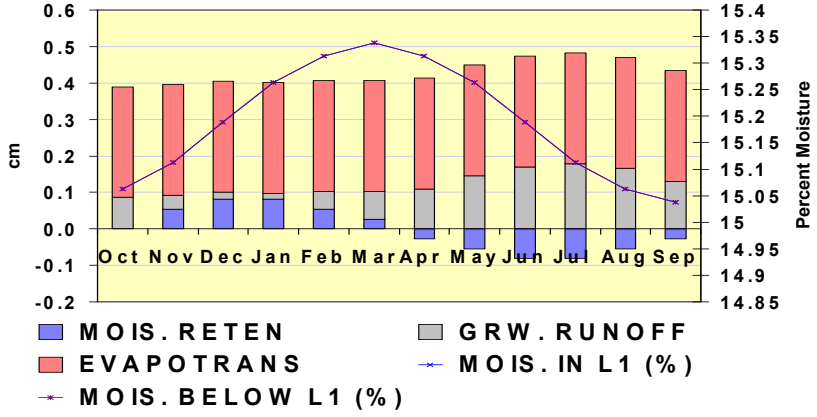


SESOIL Hydrologic Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S01.OUT





	Surface Water Runoff		Net Infiltration		Evapotranspiration		Soil Moisture Retention		Groundwater Runoff (Recharge)		Soil Moisture	
											Layer 1	Below Layer 1
Units	cm	Inches	cm	Inches	cm	Inches	cm	Inches	cm	Inches	Percent	Percent
October	0.00	0.00	0.39	0.15	0.30	0.12	0.00	0.00	0.09	0.04	15.06	15.06
November	0.00	0.00	0.40	0.16	0.30	0.12	0.05	0.02	0.04	0.02	15.11	15.11
December	0.00	0.00	0.40	0.16	0.30	0.12	0.08	0.03	0.02	0.01	15.19	15.19
January	0.00	0.00	0.40	0.16	0.30	0.12	0.08	0.03	0.02	0.01	15.26	15.26
February	0.00	0.00	0.41	0.16	0.30	0.12	0.05	0.02	0.05	0.02	15.31	15.31
March	0.00	0.00	0.41	0.16	0.30	0.12	0.03	0.01	0.08	0.03	15.34	15.34
April	0.00	0.00	0.39	0.15	0.30	0.12	-0.03	-0.01	0.11	0.04	15.31	15.31
May	0.00	0.00	0.40	0.16	0.30	0.12	-0.05	-0.02	0.15	0.06	15.26	15.26
June	0.00	0.00	0.39	0.15	0.30	0.12	-0.08	-0.03	0.17	0.07	15.19	15.19
July	0.00	0.00	0.40	0.16	0.30	0.12	-0.08	-0.03	0.18	0.07	15.11	15.11
August	0.00	0.00	0.42	0.17	0.30	0.12	-0.05	-0.02	0.17	0.07	15.06	15.06
September	0.00	0.00	0.41	0.16	0.30	0.12	-0.03	-0.01	0.13	0.05	15.04	15.04
Total	0.00	0.00	4.80	1.89	3.65	1.44	-0.03	-0.01	1.18	0.47	- -	- -

ATTACHMENT B-2

OUTPUT FILES FOR LEAD SIMULATION

Included in order:

Base Scenario for Lead (100 years):

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

Sensitivity Analysis Scenario for 10 Times Mass Load of Lead in the Waste:

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

Sensitivity Analysis Scenario for 0.2 Times Hydraulic Conductivity in Groundwater:

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

Base Scenario for Lead for 500 years:

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

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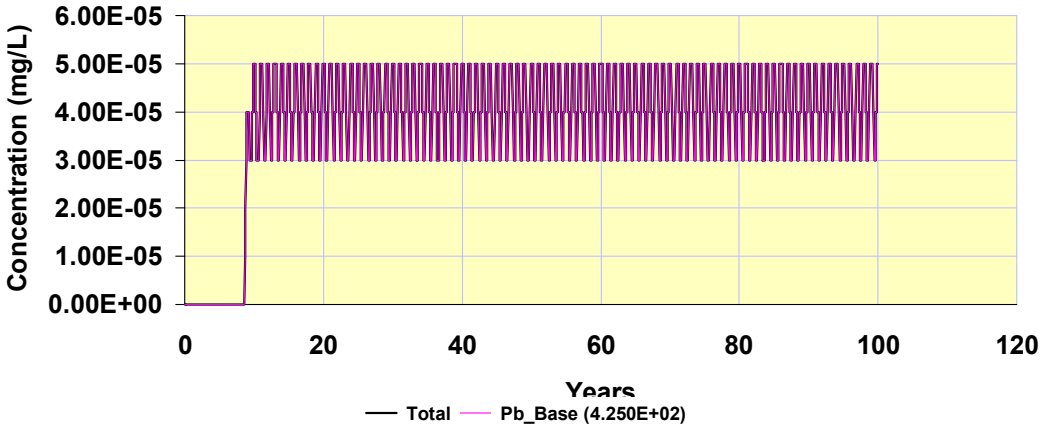
PMW-03
Wrangell



Maximum Concentration: 5.000E-05 mg/L

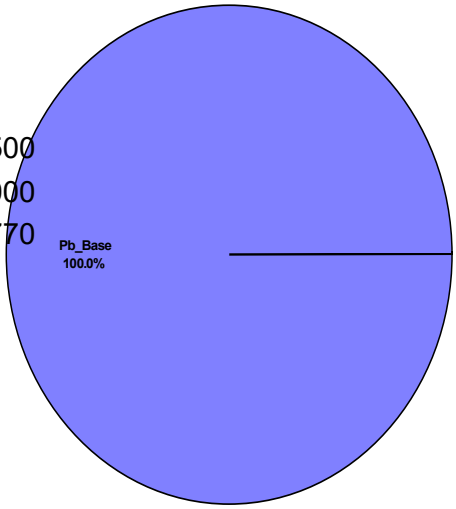
Year of Maximum Concentration: 9.92

Input Parameters

Organic Carbon Content (percent): 0.00500

Effective Porosity: 0.25000

Hydraulic Gradient (m/m): 0.00770



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft	
Aquifer Depth:	Infinite	m	Infinite	ft	
Retardation Factor:			6.647E+00		
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3	
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec	
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day	
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec	
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)	
Kd:	7.500E-04	m3/kg	7.500E-01	(ug/g)(ug/ml)	
Retarded Darcy Velocity:			1.284E-02	m/hr	3.566E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:			5.304E-02	m2/hr	1.473E-01 cm2/sec
Retarded Lateral Dispersion Coefficient:			5.304E-03	m2/hr	1.473E-02 cm2/sec
Retarded Vertical Dispersion Coefficient:			5.304E-04	m2/hr	1.473E-03 cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S01.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	0.000E+00	0.00
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	1.082E+11	99.57
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	1.213E+08	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	7.456E+07	0.07
Total Output	1.084E+11	99.75
Total Input	1.087E+11	
Input - Output	2.735E+08	

Maximum leachate concentration: 2.125E-02 **mg/l**

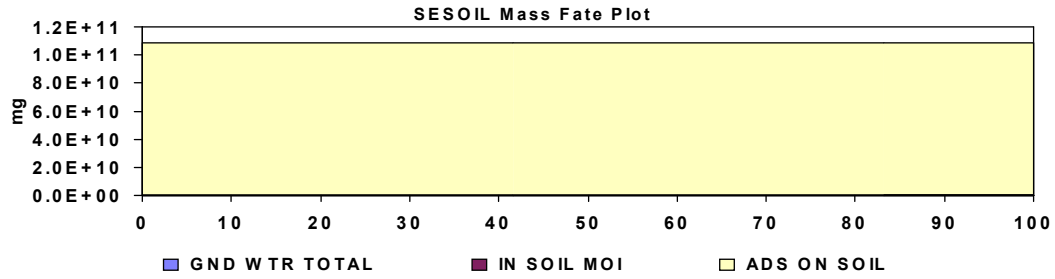
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

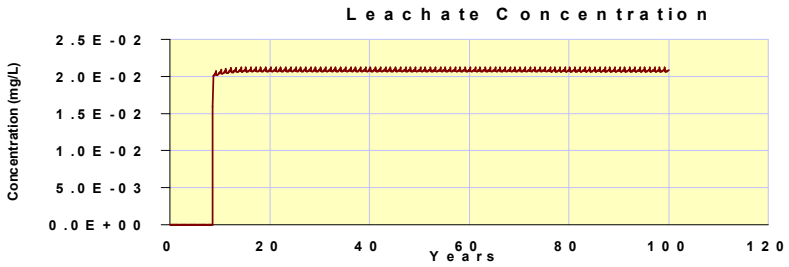
Chemical File: Lead And Compounds (Kd)
c:\SEV7 WIN7\WRANGELL_LEAD.CHM

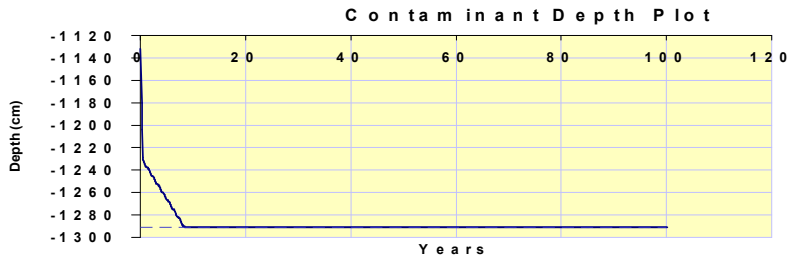
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

Application File: SEVIEW Wrangell Lead Application Parameters
C:\SEV7 WIN7\WRANGELL_LEAD_BASE_REV1.APL

Time to Groundwater: 8.08 **years**
Starting Depth: 1132.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	µg/g / µg/mL	mEq / 100 g soil	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.76	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.01	75.50	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.01	0.01	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

Chemical Parameters

Water Solubility	(µg/mL)	9.58E+3	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	0.00	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.76		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	0.00	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	0.00	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	207.00	**Acid Hydrolysis** (L/mol/day)	0.00

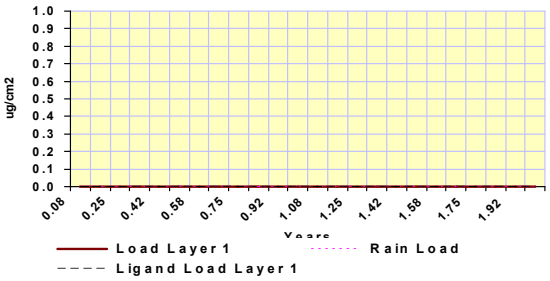
Output File: Wrangell
c:\SEV7 WIN7\S01.OUT

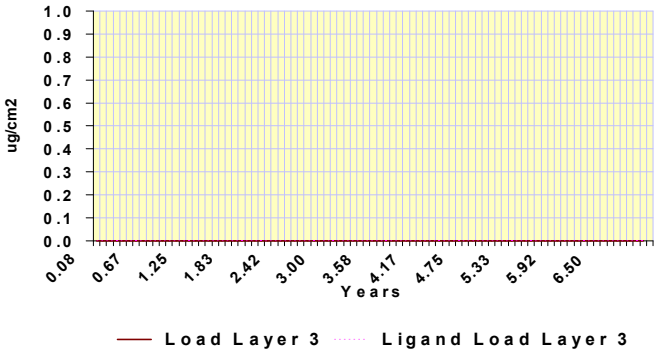
Chemical File: Lead And Compounds (Kd)
c:\SEV7 WIN7\WRANGELL_LEAD.CHM

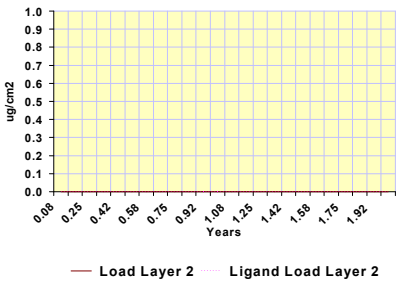
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

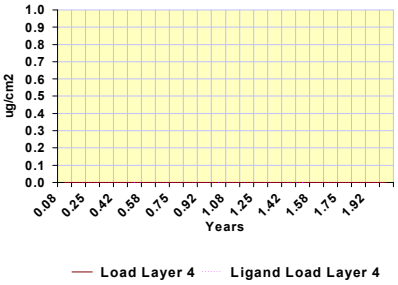
Application File: SEVIEW Wrangell Lead Application Parameters
C:\SEV7 WIN7\WRANGELL_LEAD_BASE_REV1.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	1.44E+00	1.44E+00	1.44E+00	1.44E+00	1.44E+00					
Layer 3 (ug/g)										
Layer 4 (ug/g)										



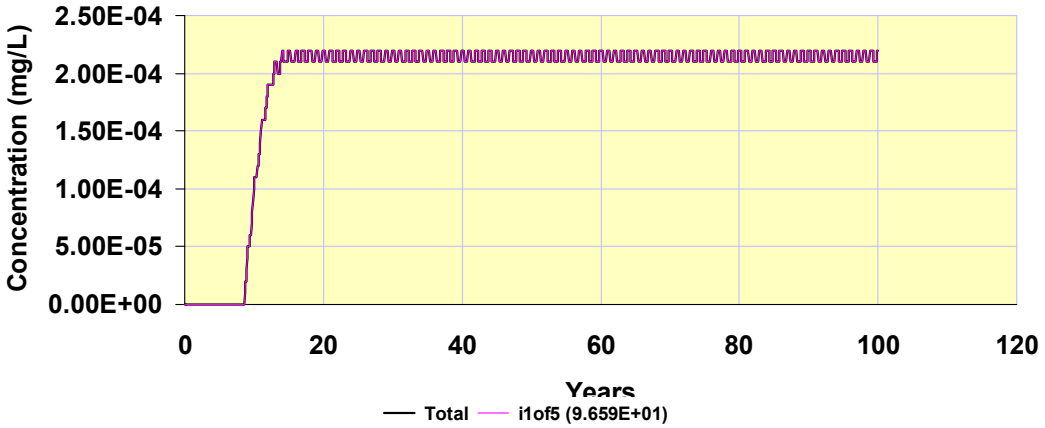






PMW-03

Wrangell



Maximum Concentration: 2.200E-04 mg/L

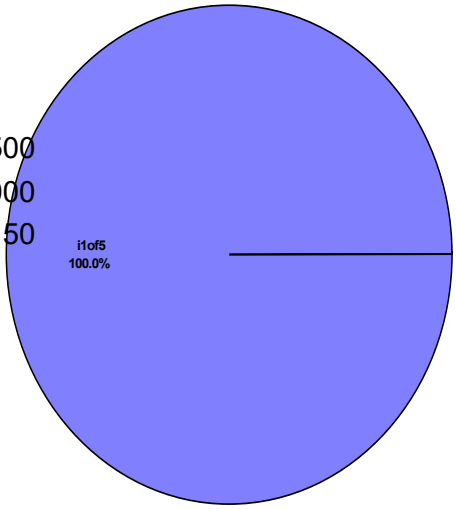
Year of Maximum Concentration: 14.00

Input Parameters

Organic Carbon Content (percent): 0.00500

Effective Porosity: 0.25000

Hydraulic Gradient (m/m): 0.00150



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft
Aquifer Depth:	Infinite	m	Infinite	ft
Retardation Factor:			6.647E+00	
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)
Kd:	7.500E-04	m3/kg	7.500E-01	(ug/g)(ug/ml)
Retarded Darcy Velocity:			2.502E-03	m/hr 6.950E-03 cm/sec
Retarded Longitudinal Disp. Coefficient:			1.033E-02	m2/hr 2.869E-02 cm2/sec
Retarded Lateral Dispersion Coefficient:			1.033E-03	m2/hr 2.869E-03 cm2/sec
Retarded Vertical Dispersion Coefficient:			1.033E-04	m2/hr 2.869E-04 cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S01.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	0.000E+00	0.00
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	1.082E+11	99.57
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	1.213E+08	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	7.456E+07	0.07
Total Output	1.084E+11	99.75
Total Input	1.087E+11	
Input - Output	2.735E+08	

Maximum leachate concentration: 2.125E-02 **mg/l**

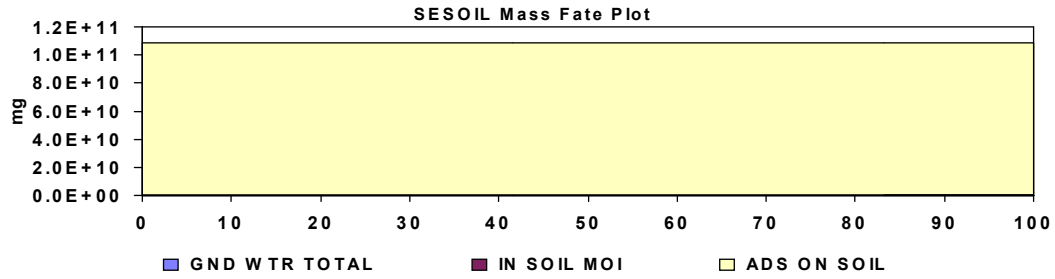
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

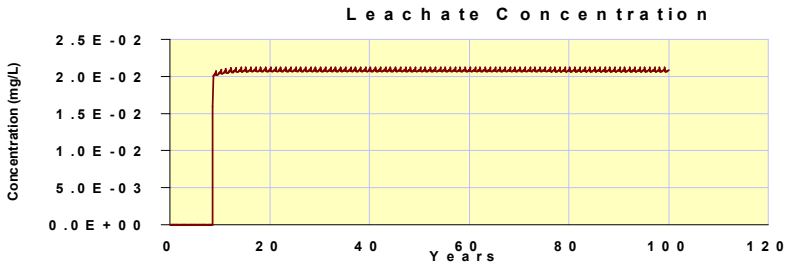
Chemical File: Lead And Compounds (Kd)
c:\SEV7 WIN7\WRANGELL_LEAD.CHM

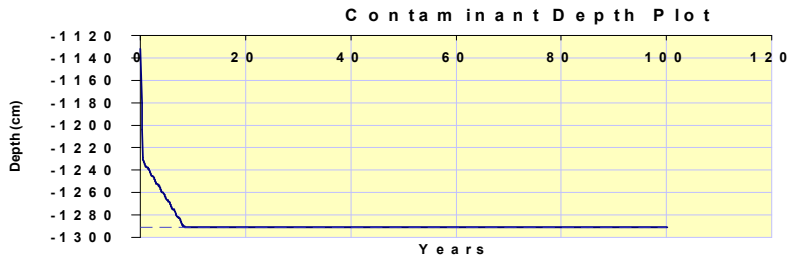
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

Application File: SEVIEW Wrangell Lead Application Parameters
c:\SEV7 WIN7\WRANGELL_LEAD_BASE_REV1.APL

Time to Groundwater: 8.08 **years**
Starting Depth: 1132.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	µg/g / µg/mL	mEq / 100 g soil	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.76	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.01	75.50	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.01	0.01	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

Chemical Parameters

Water Solubility	(µg/mL)	9.58E+3	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	0.00	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.76		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	0.00	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	0.00	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	207.00	**Acid Hydrolysis** (L/mol/day)	0.00

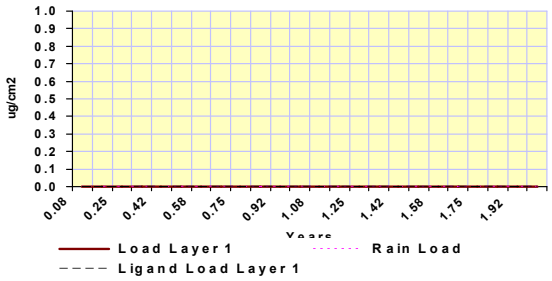
Output File: Wrangell
c:\SEV7 WIN7\S01.OUT

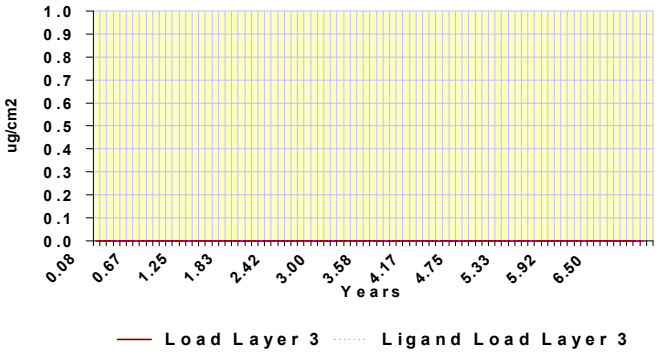
Chemical File: Lead And Compounds (Kd)
c:\SEV7 WIN7\WRANGELL_LEAD.CHM

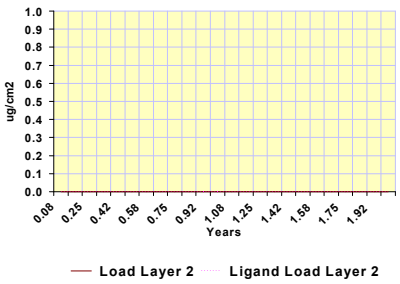
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

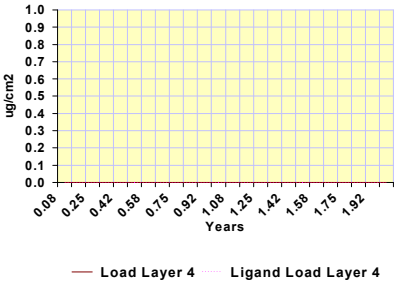
Application File: SEVIEW Wrangell Lead Application Parameters
c:\SEV7 WIN7\WRANGELL_LEAD_BASE_REV1.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	1.44E+00	1.44E+00	1.44E+00	1.44E+00	1.44E+00					
Layer 3 (ug/g)										
Layer 4 (ug/g)										

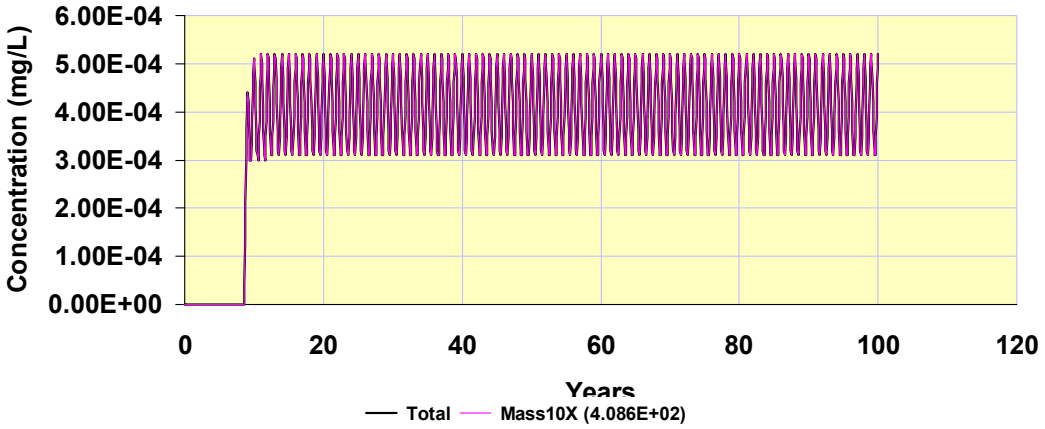








PMW-03
Wrangell

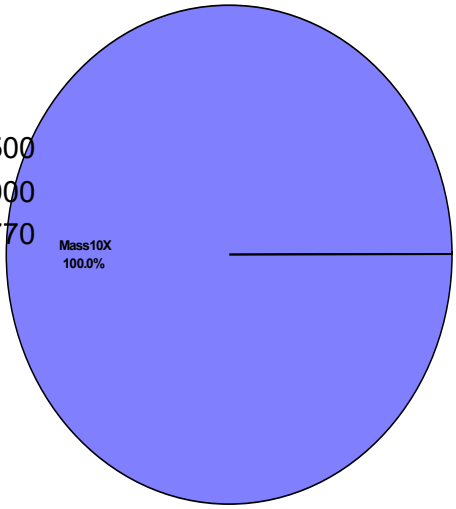


Maximum Concentration: 5.200E-04 mg/L

Year of Maximum Concentration: 11.00

Input Parameters

Organic Carbon Content (percent):	0.00500
Effective Porosity:	0.25000
Hydraulic Gradient (m/m):	0.00770



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft	
Aquifer Depth:	Infinite	m	Infinite	ft	
Retardation Factor:			6.647E+00		
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3	
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec	
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day	
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec	
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)	
Kd:	7.500E-04	m3/kg	7.500E-01	(ug/g)(ug/ml)	
Retarded Darcy Velocity:			1.284E-02	m/hr	3.566E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:			5.304E-02	m2/hr	1.473E-01 cm2/sec
Retarded Lateral Dispersion Coefficient:			5.304E-03	m2/hr	1.473E-02 cm2/sec
Retarded Vertical Dispersion Coefficient:			5.304E-04	m2/hr	1.473E-03 cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S01.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	0.000E+00	0.00
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	1.081E+12	99.52
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	1.212E+09	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	7.453E+08	0.07
Total Output	1.083E+12	99.70
Total Input	1.087E+12	
Input - Output	3.236E+09	

Maximum leachate concentration: 2.125E-01 **mg/l**

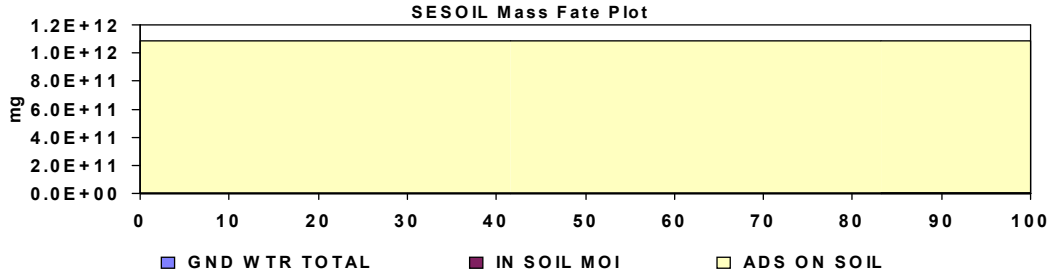
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

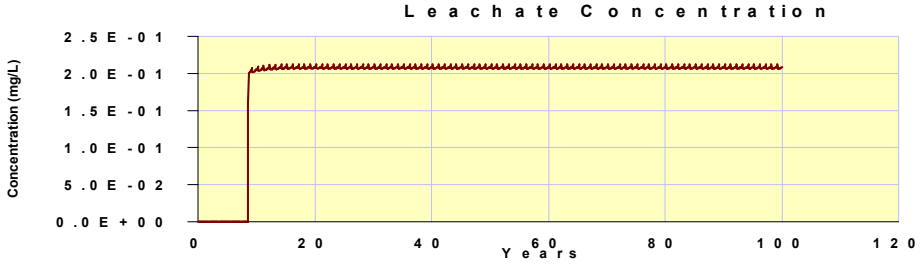
Chemical File: Lead And Compounds (Kd)
c:\SEV7 WIN7\WRANGELL_LEAD.CHM

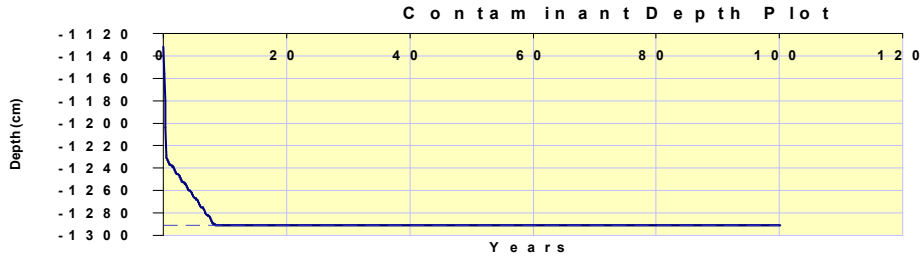
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

Application File: SEVIEW Wrangell Lead Application Parameters
C:\SEV7 WIN7\WRANGELL_LEAD_M10X_REV1.APL

Time to Groundwater: 8.08 **years**
Starting Depth: 1132.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	µg/g / µg/mL	mEq / 100 g soil	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.76	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.01	75.50	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.01	0.01	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

Chemical Parameters

Water Solubility	(µg/mL)	9.58E+3	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	0.00	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.76		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	0.00	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	0.00	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	207.00	**Acid Hydrolysis** (L/mol/day)	0.00

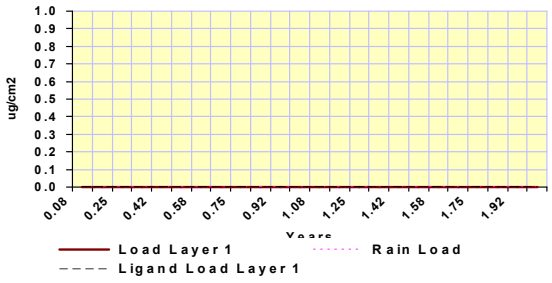
Output File: Wrangell
c:\SEV7 WIN7\S01.OUT

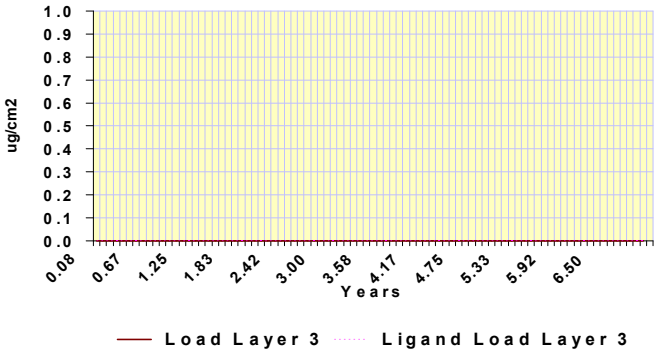
Chemical File: Lead And Compounds (Kd)
c:\SEV7 WIN7\WRANGELL_LEAD.CHM

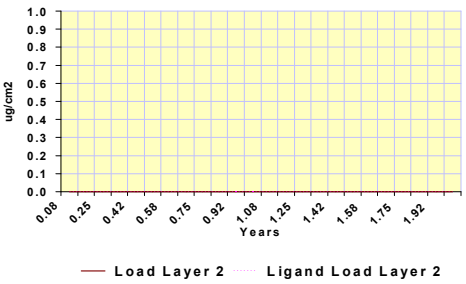
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

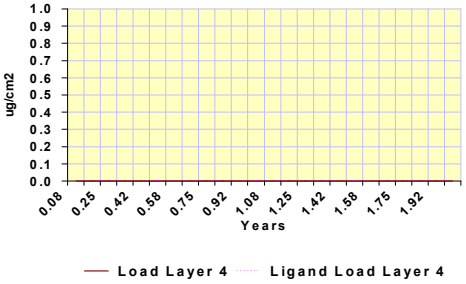
Application File: SEVIEW Wrangell Lead Application Parameters
C:\SEV7 WIN7\WRANGELL_LEAD_M10X_REV1.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	1.44E+01	1.44E+01	1.44E+01	1.44E+01	1.44E+01					
Layer 3 (ug/g)										
Layer 4 (ug/g)										

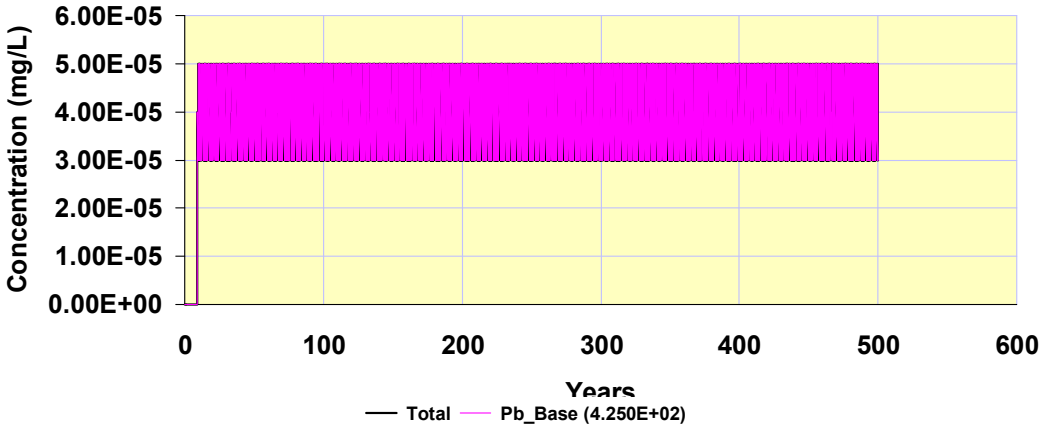








PMW-03
Wrangell



Maximum Concentration: 5.000E-05 mg/L

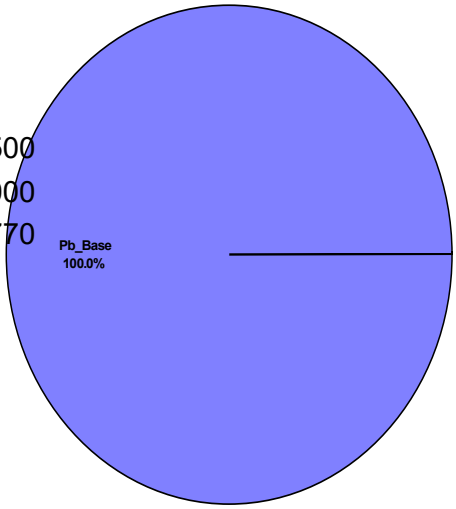
Year of Maximum Concentration: 9.92

Input Parameters

Organic Carbon Content (percent): 0.00500

Effective Porosity: 0.25000

Hydraulic Gradient (m/m): 0.00770



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft	
Aquifer Depth:	Infinite	m	Infinite	ft	
Retardation Factor:			6.647E+00		
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3	
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec	
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day	
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec	
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)	
Kd:	7.500E-04	m3/kg	7.500E-01	(ug/g)(ug/ml)	
Retarded Darcy Velocity:			1.284E-02	m/hr	3.566E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:			5.304E-02	m2/hr	1.473E-01 cm2/sec
Retarded Lateral Dispersion Coefficient:			5.304E-03	m2/hr	1.473E-02 cm2/sec
Retarded Vertical Dispersion Coefficient:			5.304E-04	m2/hr	1.473E-03 cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S01.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	0.000E+00	0.00
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	1.066E+11	98.09
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	1.195E+08	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	3.997E+08	0.37
Total Output	1.071E+11	98.56
Total Input	1.087E+11	
Input - Output	1.560E+09	

Maximum leachate concentration: 2.125E-02 **mg/l**

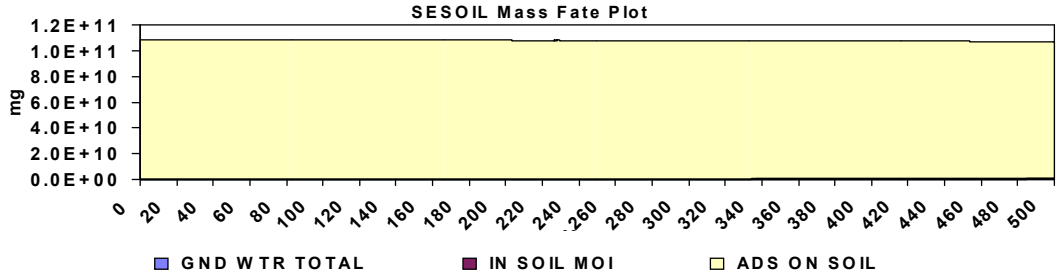
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

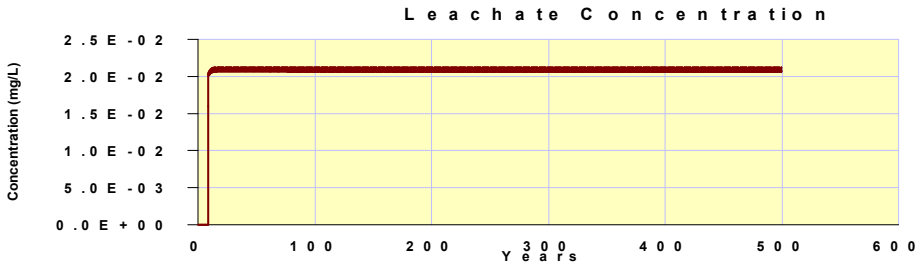
Chemical File: Lead And Compounds (Kd)
c:\SEV7 WIN7\WRANGELL_LEAD.CHM

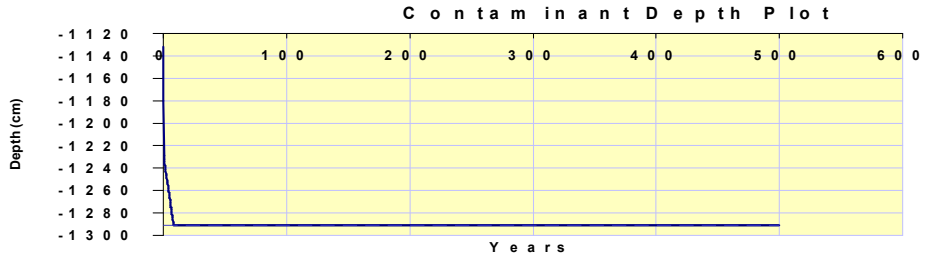
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

Application File: SEVIEW Wrangell Lead Application Parameters
c:\SEV7 WIN7\WRANGELL_LEAD_BASE_REV1.APL

Time to Groundwater: 8.08 **years**
Starting Depth: 1132.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	$\frac{\mu g/g}{\mu g/mL}$	$\frac{mEq}{100\ g\ soil}$	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.76	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.01	75.50	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.01	0.01	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

Chemical Parameters

Water Solubility	(µg/mL)	9.58E+3	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	0.00	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.76		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	0.00	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	0.00	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	207.00	**Acid Hydrolysis** (L/mol/day)	0.00

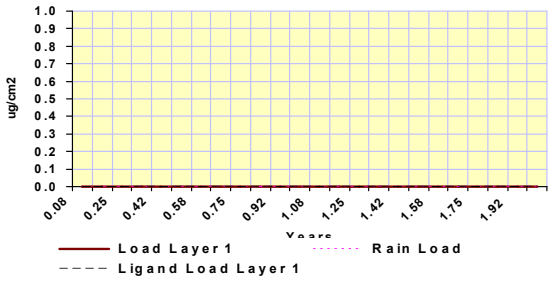
Output File: Wrangell
c:\SEV7 WIN7\S01.OUT

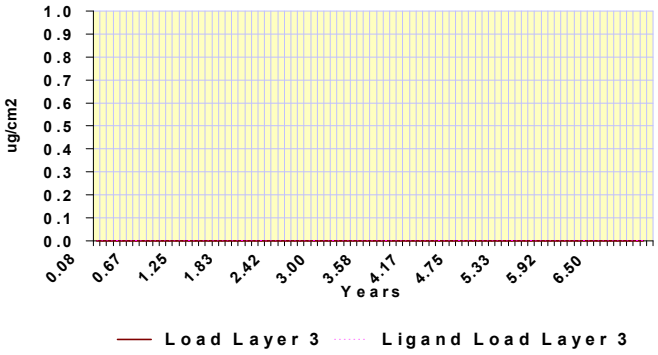
Chemical File: Lead And Compounds (Kd)
c:\SEV7 WIN7\WRANGELL_LEAD.CHM

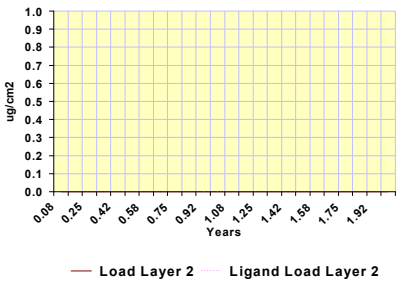
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

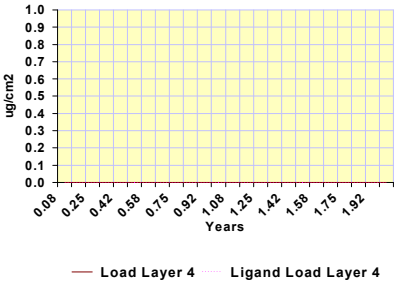
Application File: SEVIEW Wrangell Lead Application Parameters
C:\SEV7 WIN7\WRANGELL_LEAD_BASE_REV1.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	1.44E+00	1.44E+00	1.44E+00	1.44E+00	1.44E+00					
Layer 3 (ug/g)										
Layer 4 (ug/g)										









ATTACHMENT B-3

OUTPUT FILES FOR NAPHTHALENE SIMULATION

Included in order:

Base Scenario for Naphthalene:

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

Sensitivity Analysis Scenario for 10 Times Mass Load of Naphthalene in the Waste:

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

Sensitivity Analysis Scenario for 0.2 Times Hydraulic Conductivity in Groundwater:

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

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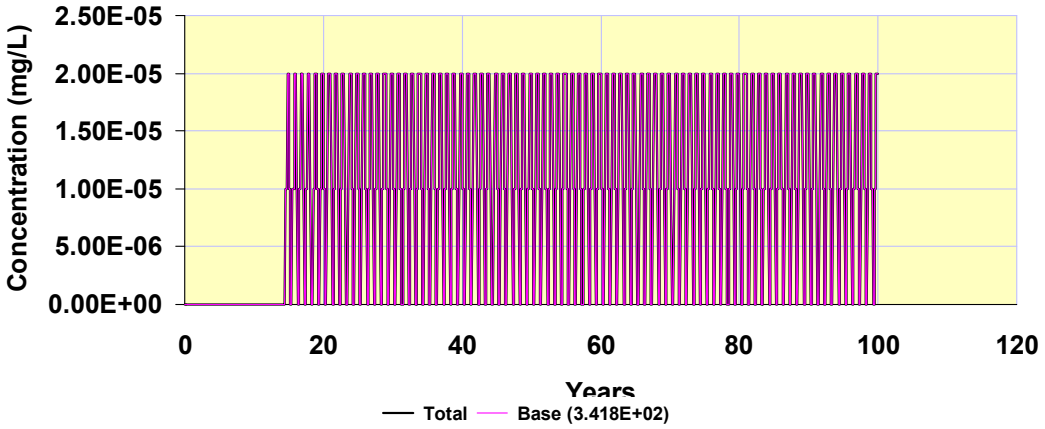
PMW-03
Wrangell

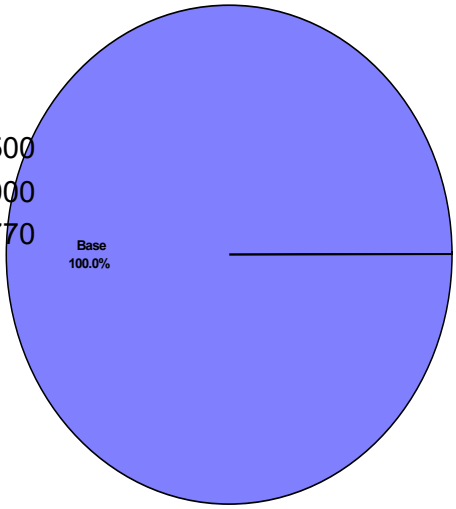


Maximum Concentration: 2.000E-05 mg/L

Year of Maximum Concentration: 14.83

Input Parameters

Organic Carbon Content (percent):	0.00500
Effective Porosity:	0.25000
Hydraulic Gradient (m/m):	0.00770



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft		
Aquifer Depth:	Infinite	m	Infinite	ft		
Retardation Factor:			1.539E+00			
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3		
Molecular Diffusion:	2.700E-06	m2/hr	7.500E-06	cm2/sec		
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day		
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec		
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)		
Kd:	7.000E-05	m3/kg	7.000E-02	(ug/g)(ug/ml)		
Retarded Darcy Velocity:			5.549E-02	m/hr	1.541E-01	cm/sec
Retarded Longitudinal Disp. Coefficient:			2.292E-01	m2/hr	6.366E-01	cm2/sec
Retarded Lateral Dispersion Coefficient:			2.293E-02	m2/hr	6.369E-02	cm2/sec
Retarded Vertical Dispersion Coefficient:			2.299E-03	m2/hr	6.386E-03	cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S02.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	1.316E+06	0.04
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	3.251E+09	97.85
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	3.824E+07	1.15
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	2.225E+07	0.67
Total Output	3.313E+09	99.71
Total Input	3.323E+09	
Input - Output	9.741E+06	

Maximum leachate concentration: 6.837E-03 **mg/l**

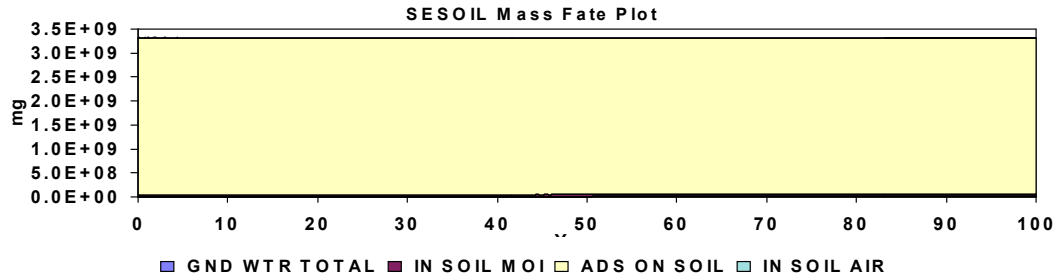
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

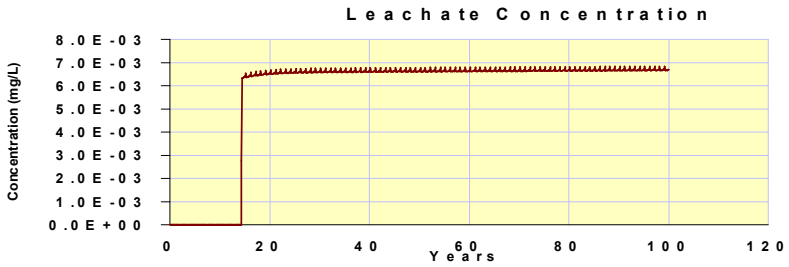
Chemical File: Naphthalene
c:\SEV7 WIN7\WRANGELL_NAPH_REV1.CHM

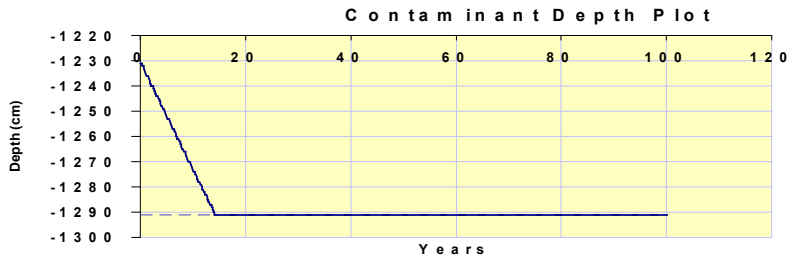
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP.SOI

Application File: SEVIEW Wrangell Naphthalene Application Paramete
C:\SEV7 WIN7\WRANGELL_NAPH_BASE_REV2.APL

Time to Groundwater: 14.08 **years**
Starting Depth: 1231.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	µg/g / µg/mL	mEq / 100 g soil	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.07	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.50	7.20	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.00	0.07	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

Chemical Parameters

Water Solubility	(µg/mL)	31.0	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	1.23E-3	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.07		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	5.90E-2	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	7.50E-6	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	128.00	**Acid Hydrolysis** (L/mol/day)	0.00

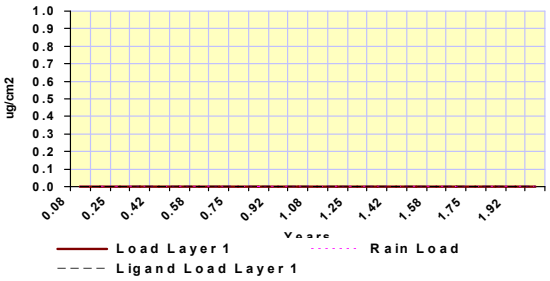
Output File: Wrangell
c:\SEV7 WIN7\S02.OUT

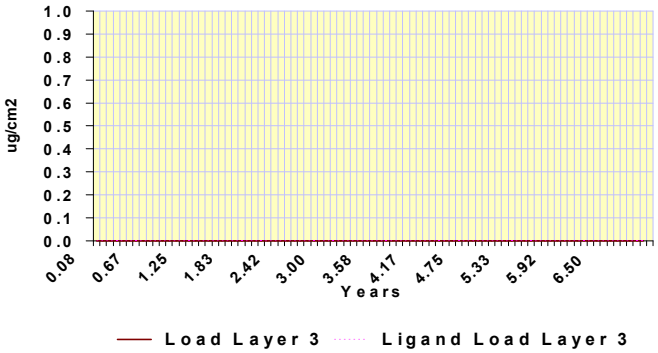
Chemical File: Naphthalene
c:\SEV7 WIN7\WRANGELL_NAPH_REV1.CHM

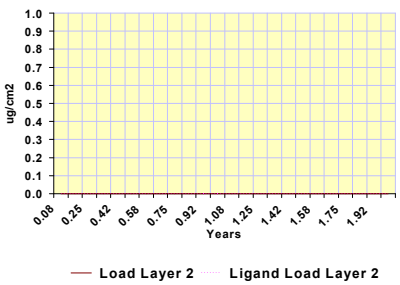
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP.SOI

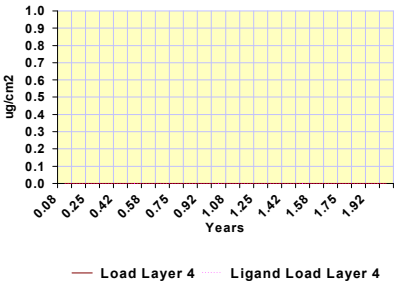
Application File: SEVIEW Wrangell Naphthalene Application Paramete
C:\SEV7 WIN7\WRANGELL_NAPH_BASE_REV2.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	4.40E-02	4.40E-02	4.40E-02	4.40E-02	4.40E-02					
Layer 3 (ug/g)										
Layer 4 (ug/g)										

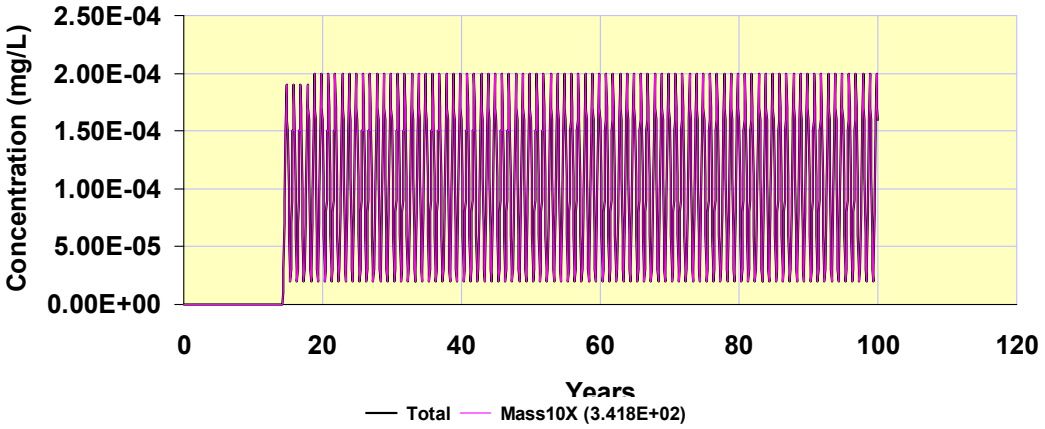








PMW-03
Wrangell



Maximum Concentration: 2.000E-04 mg/L

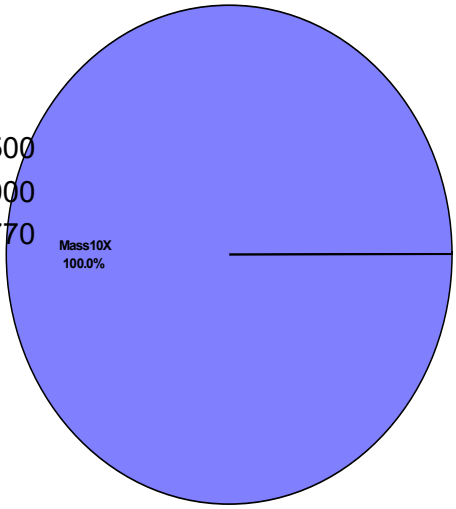
Year of Maximum Concentration: 18.83

Input Parameters

Organic Carbon Content (percent): 0.00500

Effective Porosity: 0.25000

Hydraulic Gradient (m/m): 0.00770



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft		
Aquifer Depth:	Infinite	m	Infinite	ft		
Retardation Factor:			1.539E+00			
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3		
Molecular Diffusion:	2.700E-06	m2/hr	7.500E-06	cm2/sec		
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day		
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec		
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)		
Kd:	7.000E-05	m3/kg	7.000E-02	(ug/g)(ug/ml)		
Retarded Darcy Velocity:			5.549E-02	m/hr	1.541E-01	cm/sec
Retarded Longitudinal Disp. Coefficient:			2.292E-01	m2/hr	6.366E-01	cm2/sec
Retarded Lateral Dispersion Coefficient:			2.293E-02	m2/hr	6.369E-02	cm2/sec
Retarded Vertical Dispersion Coefficient:			2.299E-03	m2/hr	6.386E-03	cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S02.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	1.315E+07	0.04
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	3.249E+10	97.80
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	3.822E+08	1.15
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	2.225E+08	0.67
Total Output	3.311E+10	99.66
Total Input	3.323E+10	
Input - Output	1.146E+08	

Maximum leachate concentration: 6.837E-02 **mg/l**

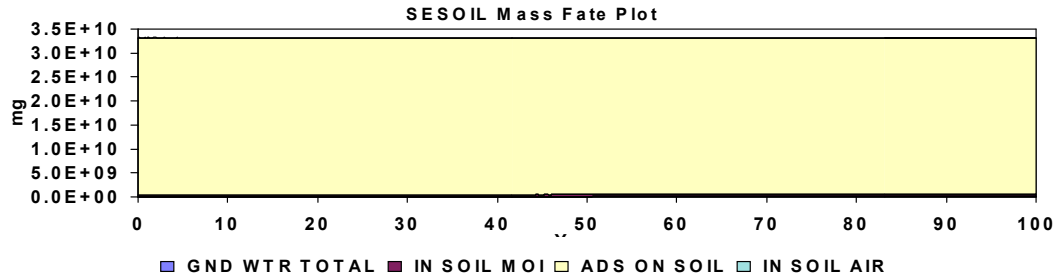
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

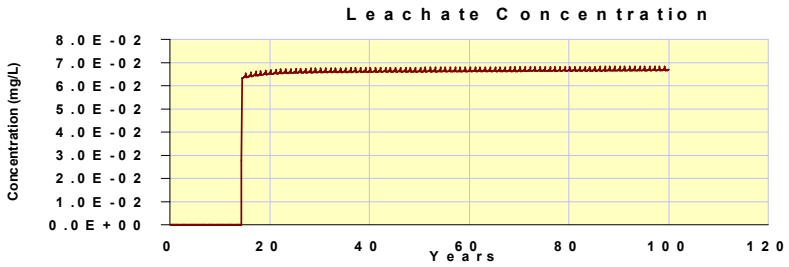
Chemical File: Naphthalene
c:\SEV7 WIN7\WRANGELL_NAPHTHALENE.CHM

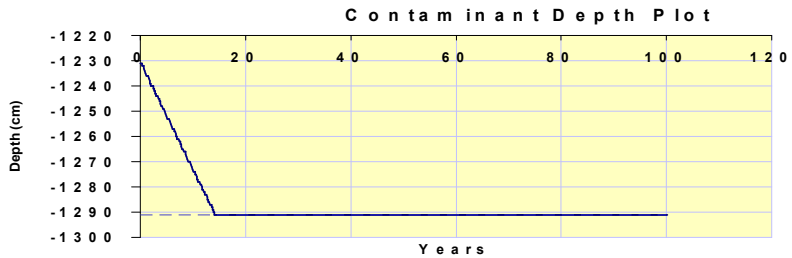
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP.SOI

Application File: SEVIEW Wrangell Naphthalene Application Paramete
C:\SEV7 WIN7\WRANGELL_NAPH_M10X_REV2.APL

Time to Groundwater: 14.08 **years**
Starting Depth: 1231.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	µg/g / µg/mL	mEq / 100 g soil	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.07	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.01	7.20	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.01	0.07	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

Chemical Parameters

Water Solubility	(µg/mL)	31.0	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	1.23E-3	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.07		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	5.90E-2	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	7.50E-6	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	128.00	**Acid Hydrolysis** (L/mol/day)	0.00

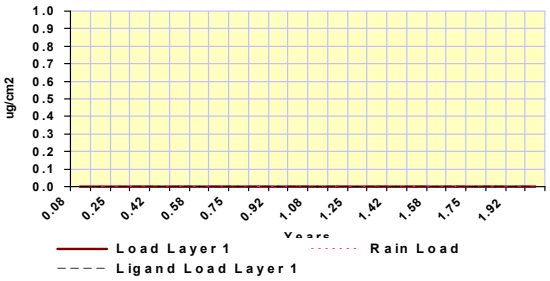
Output File: Wrangell
c:\SEV7 WIN7\S02.OUT

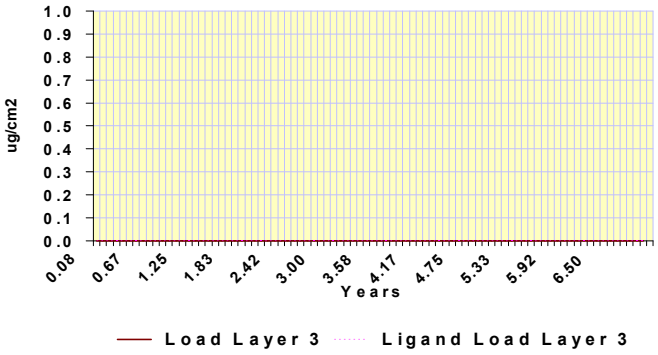
Chemical File: Naphthalene
c:\SEV7 WIN7\WRANGELL_NAPHTHALENE.CHM

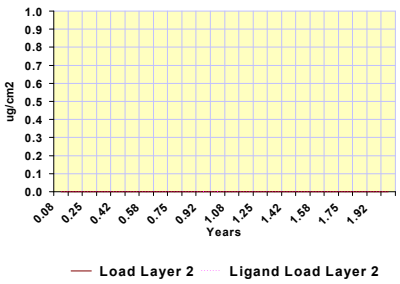
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP.SOI

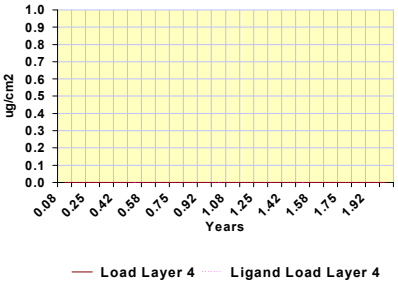
Application File: SEVIEW Wrangell Naphthalene Application Paramete
C:\SEV7 WIN7\WRANGELL_NAPH_M10X_REV2.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	4.40E-01	4.40E-01	4.40E-01	4.40E-01	4.40E-01					
Layer 3 (ug/g)										
Layer 4 (ug/g)										

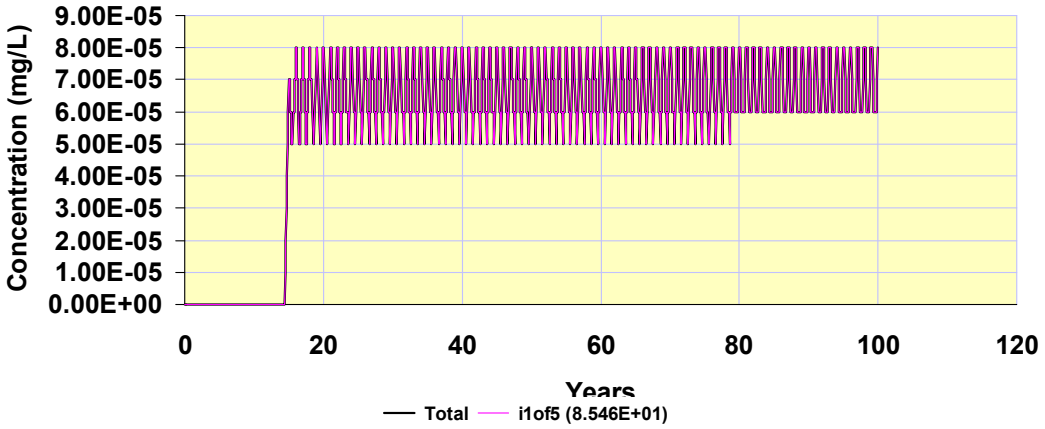








PMW-03
Wrangell

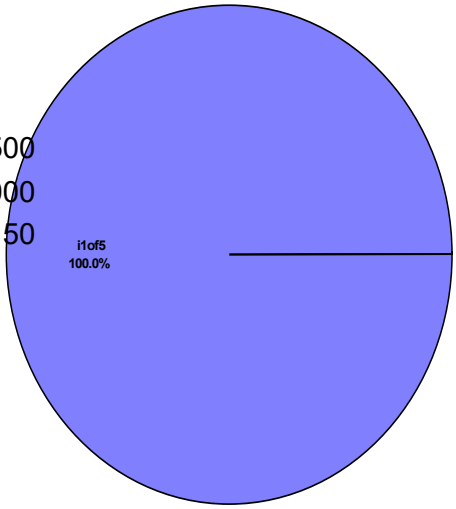


Maximum Concentration: 8.000E-05 mg/L

Year of Maximum Concentration: 16.00

Input Parameters

Organic Carbon Content (percent):	0.00500
Effective Porosity:	0.25000
Hydraulic Gradient (m/m):	0.00150



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft		
Aquifer Depth:	Infinite	m	Infinite	ft		
Retardation Factor:			1.539E+00			
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3		
Molecular Diffusion:	2.700E-06	m2/hr	7.500E-06	cm2/sec		
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day		
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec		
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)		
Kd:	7.000E-05	m3/kg	7.000E-02	(ug/g)(ug/ml)		
Retarded Darcy Velocity:			1.081E-02	m/hr	3.002E-02	cm/sec
Retarded Longitudinal Disp. Coefficient:			4.465E-02	m2/hr	1.240E-01	cm2/sec
Retarded Lateral Dispersion Coefficient:			4.472E-03	m2/hr	1.242E-02	cm2/sec
Retarded Vertical Dispersion Coefficient:			4.535E-04	m2/hr	1.259E-03	cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S02.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	1.316E+06	0.04
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	3.251E+09	97.85
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	3.824E+07	1.15
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	2.225E+07	0.67
Total Output	3.313E+09	99.71
Total Input	3.323E+09	
Input - Output	9.741E+06	

Maximum leachate concentration: 6.837E-03 **mg/l**

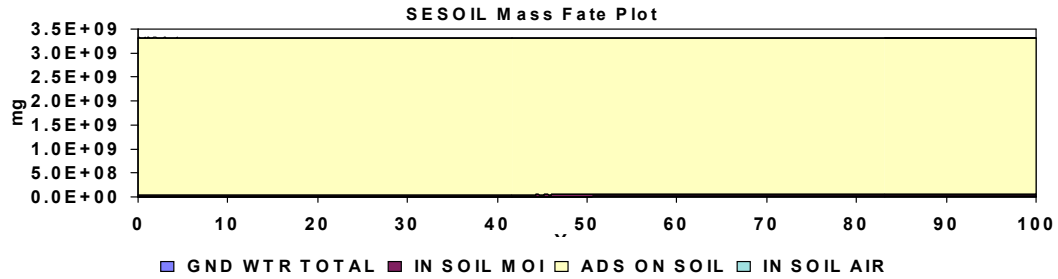
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

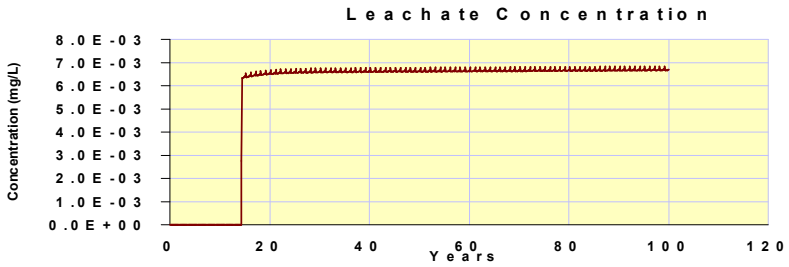
Chemical File: Naphthalene
c:\SEV7 WIN7\WRANGELL_NAPH_REV1.CHM

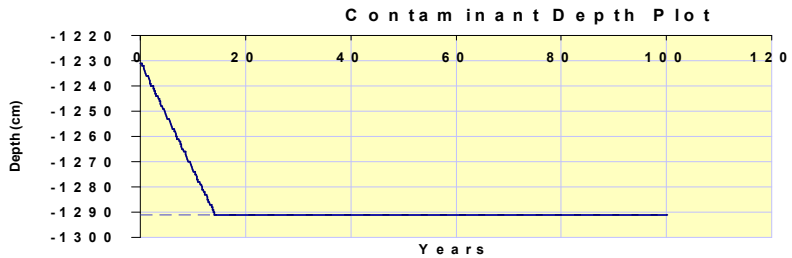
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP.SOI

Application File: SEVIEW Wrangell Naphthalene Application Paramete
C:\SEV7 WIN7\WRANGELL_NAPH_BASE_REV2.APL

Time to Groundwater: 14.08 **years**
Starting Depth: 1231.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	µg/g / µg/mL	mEq / 100 g soil	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.07	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.50	7.20	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.00	0.07	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

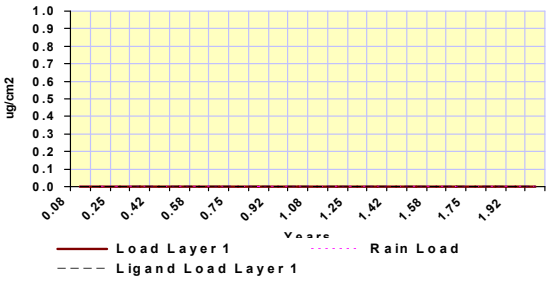
Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

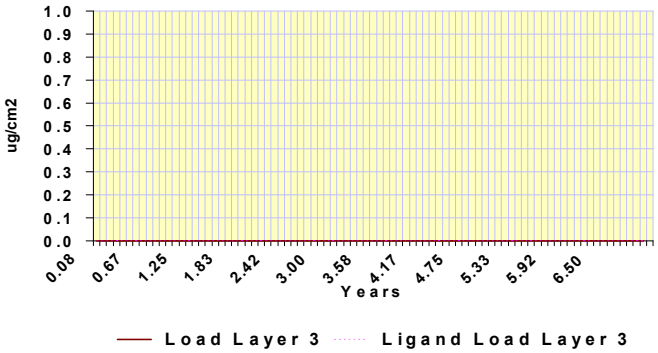
Chemical Parameters

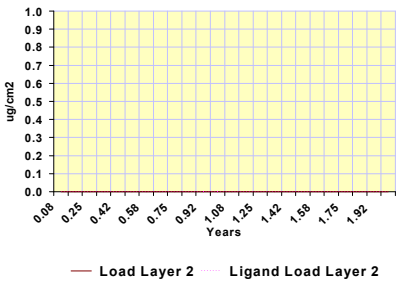
Water Solubility	(µg/mL)	31.0	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	1.23E-3	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.07		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	5.90E-2	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	7.50E-6	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	128.00	**Acid Hydrolysis** (L/mol/day)	0.00

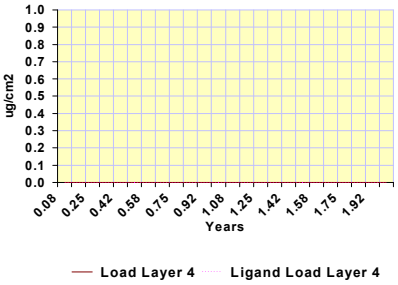
Output File: Wrangell
c:\SEV7 WIN7\S02.OUT
Chemical File: Naphthalene
c:\SEV7 WIN7\WRANGELL_NAPH_REV1.CHM
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP.SOI
Application File: SEVIEW Wrangell Naphthalene Application Paramete
C:\SEV7 WIN7\WRANGELL_NAPH_BASE_REV2.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	4.40E-02	4.40E-02	4.40E-02	4.40E-02	4.40E-02					
Layer 3 (ug/g)										
Layer 4 (ug/g)										









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ATTACHMENT B-4

OUTPUT FILES FOR TOTAL PHOSPHORUS SIMULATION

Included in order:

Base Scenario for Total Phosphorus (100 years):

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

Sensitivity Analysis Scenario for 0.2 Times Sorption Coefficient (thus 0.2 Times of Mass Load of Total Phosphorus) in the Waste:

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

Sensitivity Analysis Scenario for 0.2 Times Hydraulic Conductivity in Groundwater:

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

Base Scenario for Total Phosphorus (for 500 years):

1. AT123D Predicted Concentrations at PMW-03 and Model Parameter Values
2. SESOIL Pollutant cycle Report
3. SESOIL Profile and Load Report

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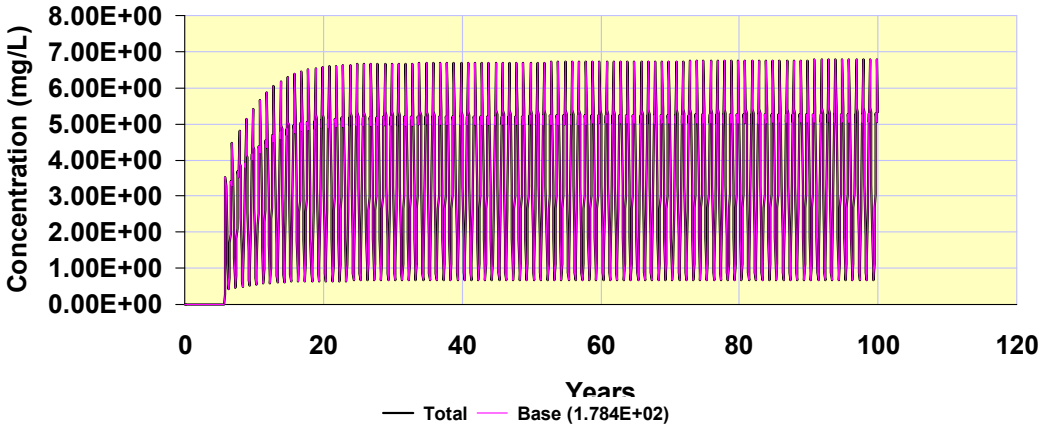
PMW-03

Wrangell

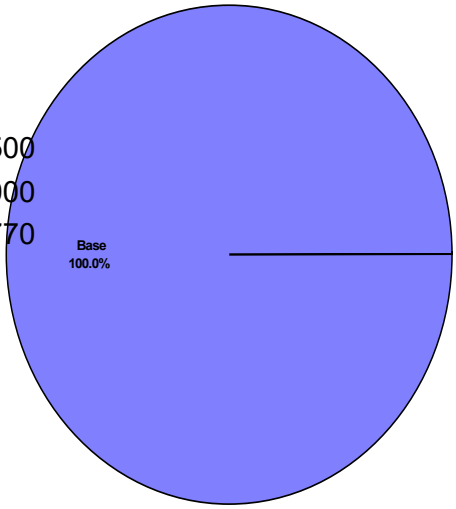


Maximum Concentration: 6.780E+00 mg/L

Year of Maximum Concentration: 97.83

Input Parameters

Organic Carbon Content (percent):	0.00500
Effective Porosity:	0.25000
Hydraulic Gradient (m/m):	0.00770



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft		
Aquifer Depth:	1.520E+00	m	4.986E+00	ft		
Retardation Factor:			1.254E+00			
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3		
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec		
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day		
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec		
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)		
Kd:	3.000E-05	m3/kg	3.000E-02	(ug/g)(ug/ml)		
Retarded Darcy Velocity:			6.807E-02	m/hr	1.890E-01	cm/sec
Retarded Longitudinal Disp. Coefficient:			2.811E-01	m2/hr	7.808E-01	cm2/sec
Retarded Lateral Dispersion Coefficient:			2.811E-02	m2/hr	7.808E-02	cm2/sec
Retarded Vertical Dispersion Coefficient:			2.811E-03	m2/hr	7.808E-03	cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S01.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	1.402E+00	0.00
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	2.643E+14	94.61
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	6.598E+12	2.36
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	4.242E+12	1.52
Total Output	2.751E+14	98.49
Total Input	2.794E+14	
Input - Output	4.227E+12	

Maximum leachate concentration: 1.210E+03 **mg/l**

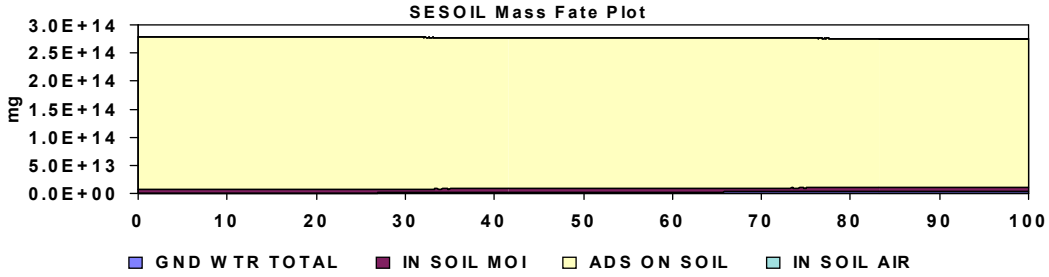
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

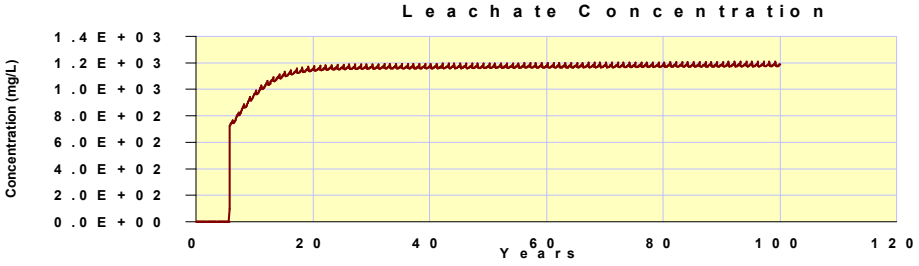
Chemical File: Phosphoric Acid (Koc)
C:\SEV7 WIN7\WRANGELL_PHOS_BASE_REV1.CHM

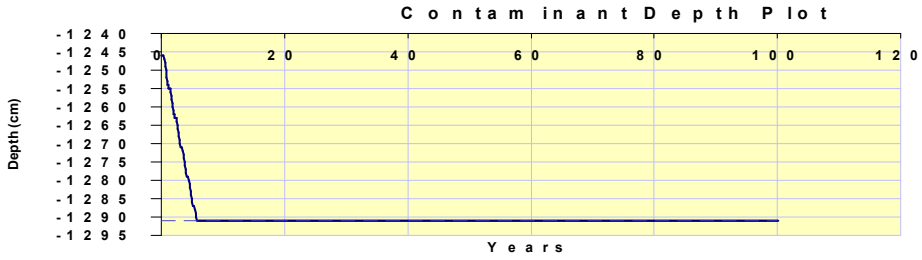
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

Application File: SEVIEW Wrangell Phosphorus Application Parameter
C:\SEV7 WIN7\WRANGELL_PHOS_BASE_REV1.APL

Time to Groundwater: 5.08 **years**
Starting Depth: 1246.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	µg/g / µg/mL	mEq / 100 g soil	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.03	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.01	3.40	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.00	0.00	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

Chemical Parameters

Water Solubility	(µg/mL)	5.39E+5	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	8.00E-15	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.03		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	0.00	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	0.00	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	98.00	**Acid Hydrolysis** (L/mol/day)	0.00

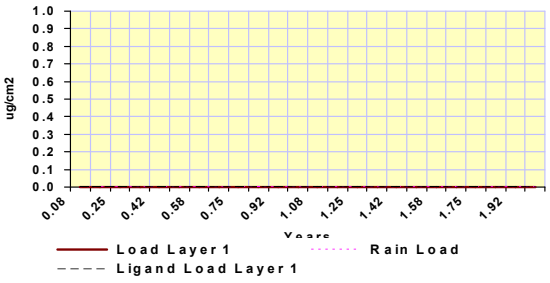
Output File: Wrangell
c:\SEV7 WIN7\S01.OUT

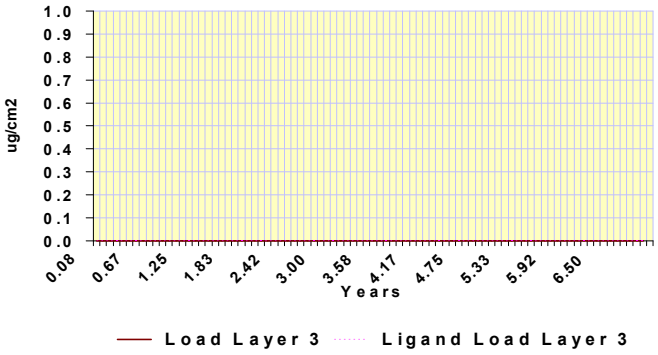
Chemical File: Phosphoric Acid (Koc)
C:\SEV7 WIN7\WRANGELL_PHOS_BASE_REV1.CHM

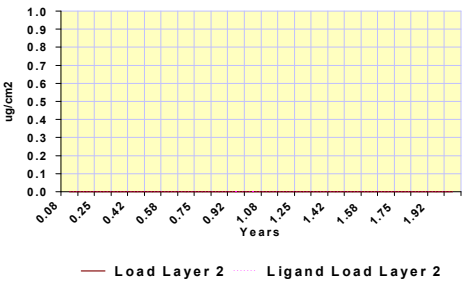
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

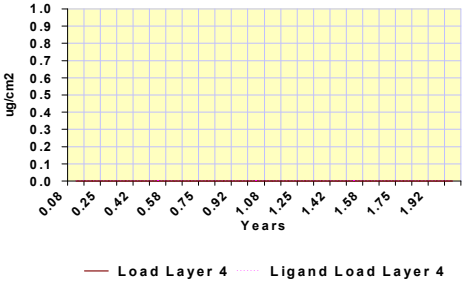
Application File: SEVIEW Wrangell Phosphorus Application Parameter
C:\SEV7 WIN7\WRANGELL_PHOS_BASE_REV1.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	3.70E+03	3.70E+03	3.70E+03	3.70E+03	3.70E+03					
Layer 3 (ug/g)										
Layer 4 (ug/g)										



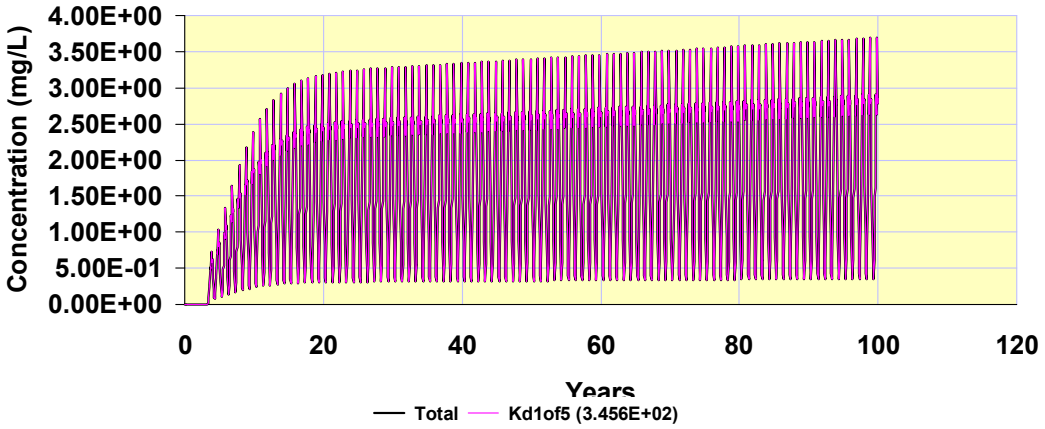






PMW-03

Wrangell

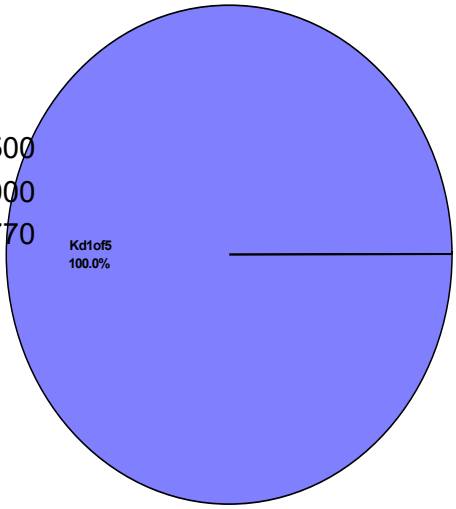


Maximum Concentration: 3.697E+00 mg/L

Year of Maximum Concentration: 99.83

Input Parameters

Organic Carbon Content (percent):	0.00500
Effective Porosity:	0.25000
Hydraulic Gradient (m/m):	0.00770



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft		
Aquifer Depth:	Infinite	m	Infinite	ft		
Retardation Factor:			1.254E+00			
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3		
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec		
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day		
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec		
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)		
Kd:	3.000E-05	m3/kg	3.000E-02	(ug/g)(ug/ml)		
Retarded Darcy Velocity:			6.807E-02	m/hr	1.890E-01	cm/sec
Retarded Longitudinal Disp. Coefficient:			2.811E-01	m2/hr	7.808E-01	cm2/sec
Retarded Lateral Dispersion Coefficient:			2.811E-02	m2/hr	7.808E-02	cm2/sec
Retarded Vertical Dispersion Coefficient:			2.811E-03	m2/hr	7.808E-03	cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S01.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	1.228E+00	0.00
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	4.575E+13	81.22
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	5.777E+12	10.26
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	4.200E+12	7.46
Total Output	5.573E+13	98.94
Total Input	5.633E+13	
Input - Output	5.997E+11	

Maximum leachate concentration: 1.278E+03 **mg/l**

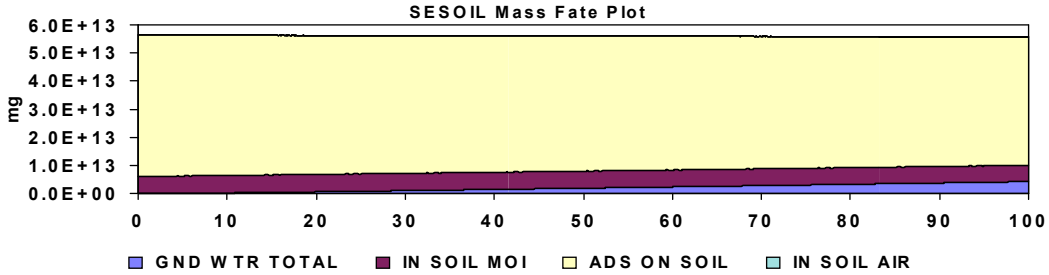
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

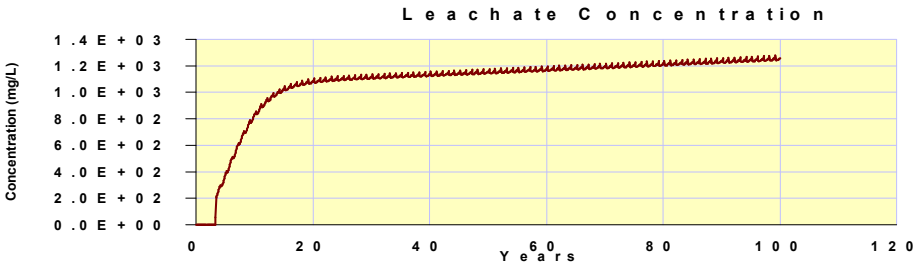
Chemical File: Phosphoric Acid (Koc)
c:\SEV7 WIN7\WRANGELL_PHOS.CHM

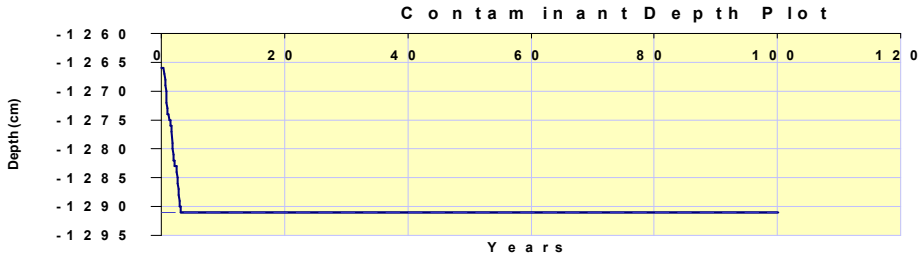
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

Application File: SEVIEW Wrangell Phosphorus Application Parameter
C:\SEV7 WIN7\WRANGELL_PHOS_KD1OF5_REV1.APL

Time to Groundwater: 3.08 **years**
Starting Depth: 1266.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	µg/g / µg/mL	mEq / 100 g soil	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.03	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.01	0.68	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.01	0.00	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

Chemical Parameters

Water Solubility	(µg/mL)	5.39E+5	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	8.00E-15	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.03		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	0.00	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	0.00	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	98.00	**Acid Hydrolysis** (L/mol/day)	0.00

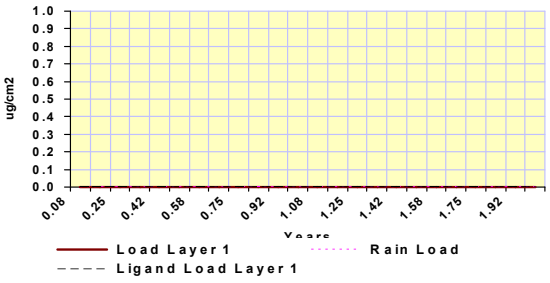
Output File: Wrangell
c:\SEV7 WIN7\S01.OUT

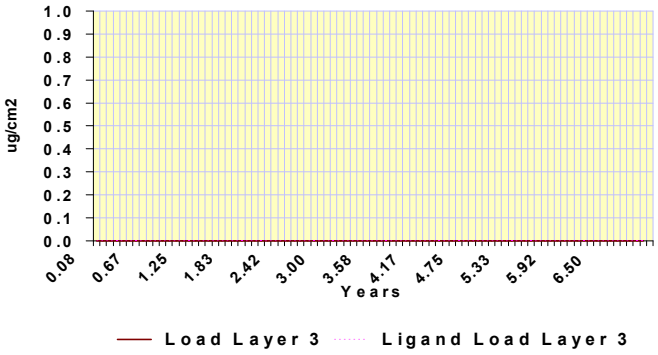
Chemical File: Phosphoric Acid (Koc)
c:\SEV7 WIN7\WRANGELL_PHOS.CHM

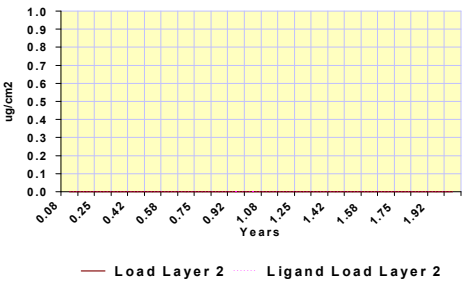
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

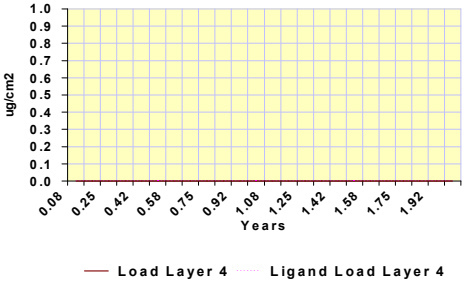
Application File: SEVIEW Wrangell Phosphorus Application Parameter
C:\SEV7 WIN7\WRANGELL_PHOS_KD1OF5_REV1.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	7.46E+02	7.46E+02	7.46E+02	7.46E+02	7.46E+02					
Layer 3 (ug/g)										
Layer 4 (ug/g)										



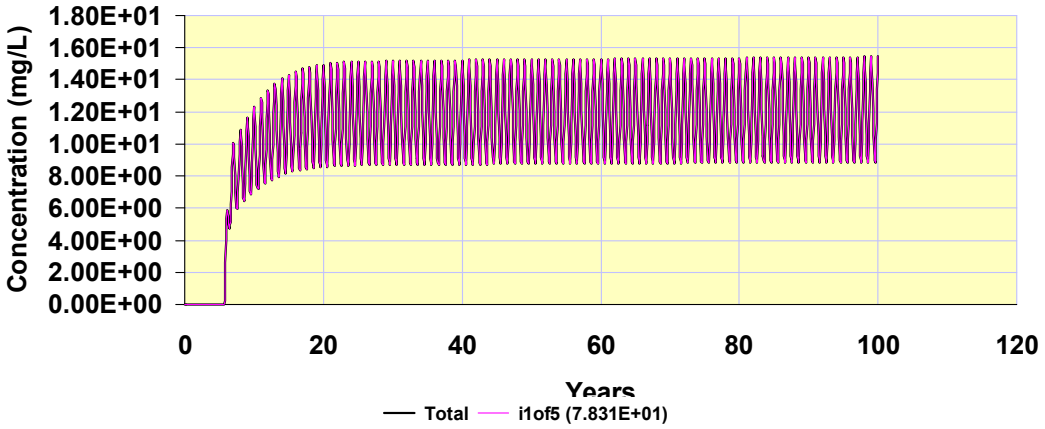






PMW-03

Wrangell



Maximum Concentration: 1.545E+01 mg/L

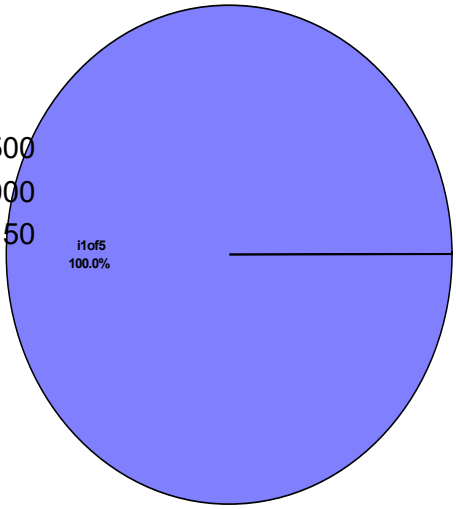
Year of Maximum Concentration: 98.00

Input Parameters

Organic Carbon Content (percent): 0.00500

Effective Porosity: 0.25000

Hydraulic Gradient (m/m): 0.00150



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft	
Aquifer Depth:	Infinite	m	Infinite	ft	
Retardation Factor:			1.254E+00		
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3	
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec	
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day	
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec	
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)	
Kd:	3.000E-05	m3/kg	3.000E-02	(ug/g)(ug/ml)	
Retarded Darcy Velocity:			1.326E-02	m/hr	3.683E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:			5.476E-02	m2/hr	1.521E-01 cm2/sec
Retarded Lateral Dispersion Coefficient:			5.476E-03	m2/hr	1.521E-02 cm2/sec
Retarded Vertical Dispersion Coefficient:			5.476E-04	m2/hr	1.521E-03 cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S01.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	1.402E+00	0.00
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	2.643E+14	94.61
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	6.598E+12	2.36
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	4.242E+12	1.52
Total Output	2.751E+14	98.49
Total Input	2.794E+14	
Input - Output	4.227E+12	

Maximum leachate concentration: 1.210E+03 **mg/l**

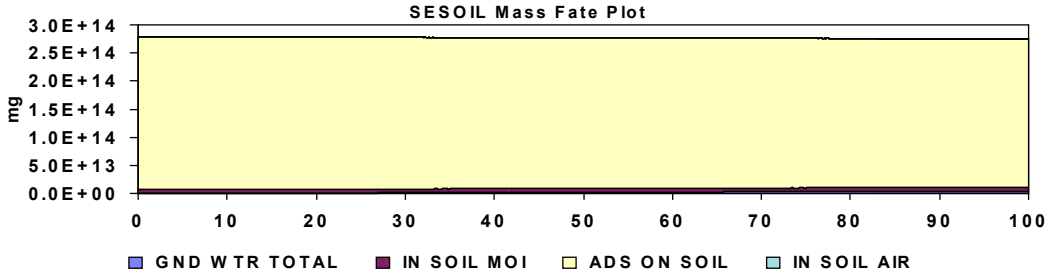
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

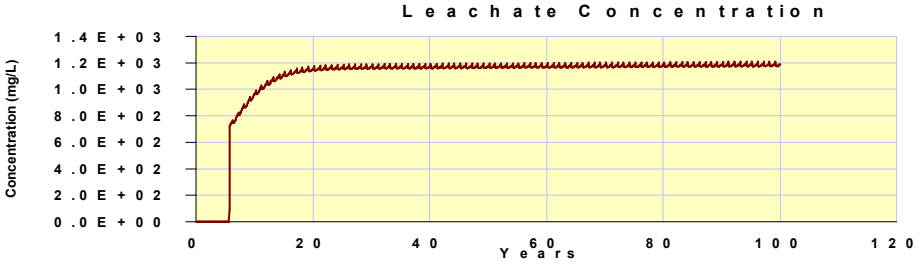
Chemical File: Phosphoric Acid (Koc)
c:\sev7 win7\WRANGELL_PHOS_BASE_REV1.CHM

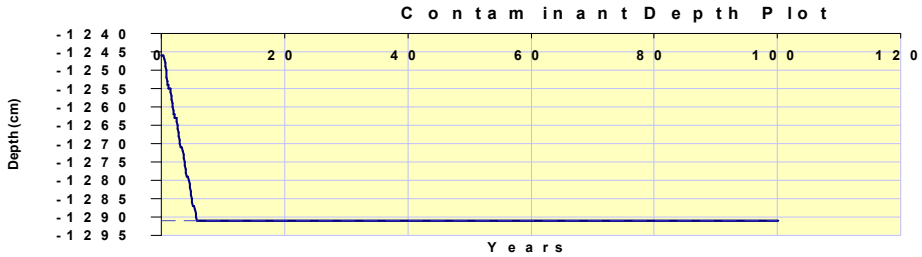
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

Application File: SEVIEW Wrangell Phosphorus Application Parameter
C:\SEV7 WIN7\WRANGELL_PHOS_BASE_REV1.APL

Time to Groundwater: 5.08 **years**
Starting Depth: 1246.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	µg/g / µg/mL	mEq / 100 g soil	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.03	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.01	3.40	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.00	0.00	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

Chemical Parameters

Water Solubility	(µg/mL)	5.39E+5	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	8.00E-15	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.03		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	0.00	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	0.00	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	98.00	**Acid Hydrolysis** (L/mol/day)	0.00

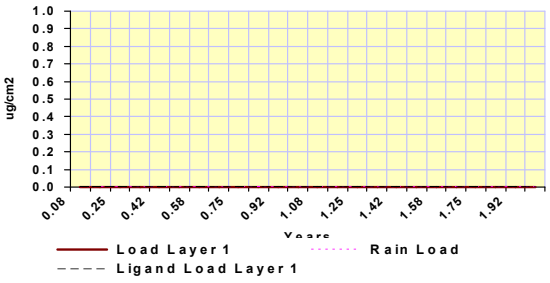
Output File: Wrangell
c:\SEV7 WIN7\S01.OUT

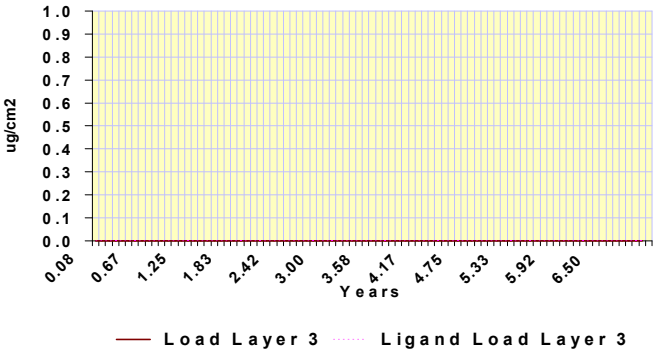
Chemical File: Phosphoric Acid (Koc)
c:\sev7 win7\WRANGELL_PHOS_BASE_REV1.CHM

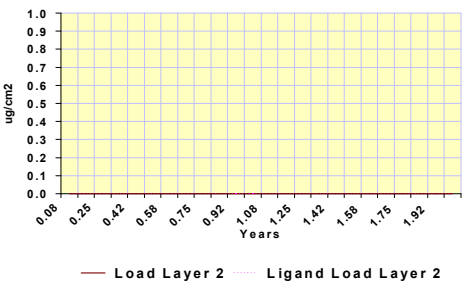
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

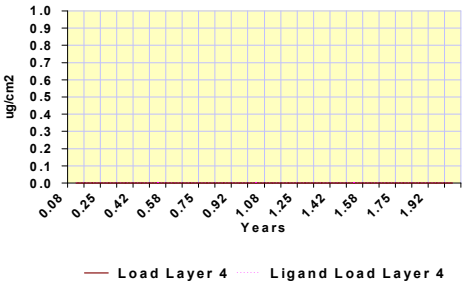
Application File: SEVIEW Wrangell Phosphorus Application Parameter
C:\SEV7 WIN7\WRANGELL_PHOS_BASE_REV1.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	3.70E+03	3.70E+03	3.70E+03	3.70E+03	3.70E+03					
Layer 3 (ug/g)										
Layer 4 (ug/g)										



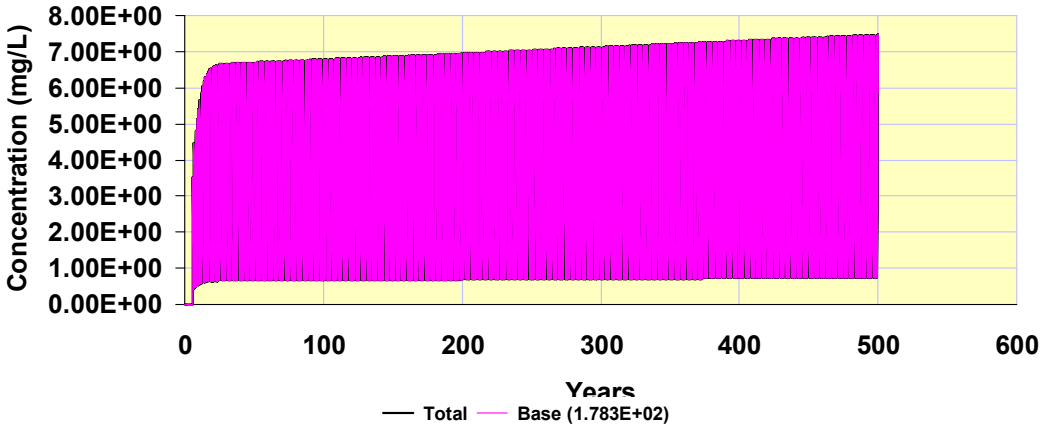






PMW-03

Wrangell

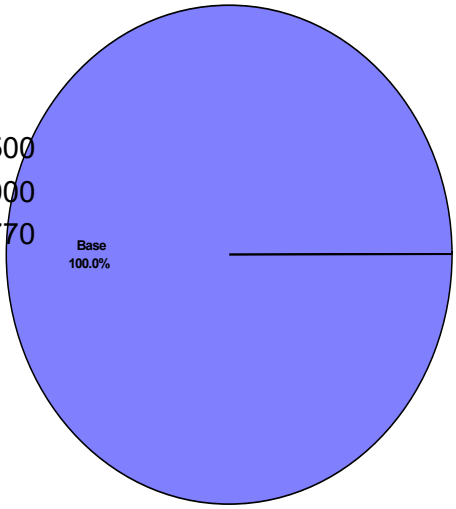


Maximum Concentration: 7.470E+00 mg/L

Year of Maximum Concentration: 499.83

Input Parameters

Organic Carbon Content (percent):	0.00500
Effective Porosity:	0.25000
Hydraulic Gradient (m/m):	0.00770



Dispersivities	Meters	Feet
Longitudinal:	4.130E+00	1.354E+01
Lateral:	4.130E-01	1.354E+00
Vertical:	4.130E-02	1.354E-01

Aquifer Width:	Infinite	m	Infinite	ft		
Aquifer Depth:	1.520E+00	m	4.986E+00	ft		
Retardation Factor:			1.254E+00			
Soil Bulk Density:	1.870E+03	kg/m3	1.870E+00	g/cm3		
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec		
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day		
Hydraulic Conductivity:	2.772E+00	m/hr	7.700E-02	cm/sec		
Carbon Adsorption Coeff:			0.0000E+0	(ug/g)(ug/ml)		
Kd:	3.000E-05	m3/kg	3.000E-02	(ug/g)(ug/ml)		
Retarded Darcy Velocity:			6.807E-02	m/hr	1.890E-01	cm/sec
Retarded Longitudinal Disp. Coefficient:			2.811E-01	m2/hr	7.808E-01	cm2/sec
Retarded Lateral Dispersion Coefficient:			2.811E-02	m2/hr	7.808E-02	cm2/sec
Retarded Vertical Dispersion Coefficient:			2.811E-03	m2/hr	7.808E-03	cm2/sec

SESOIL Pollutant Cycle Report

Scenario Description: Wrangell

SESOIL Output File: c:\SEV7 WIN7\S01.OUT

SESOIL Process	Pollutant Mass (µg)	Percent of Total
Volatilized	0.000E+00	0.00
In Soil Air	1.248E+00	0.00
Sur. Runoff	0.000E+00	0.00
In Washld	0.000E+00	0.00
Ads On Soil	2.322E+14	83.11
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	5.873E+12	2.10
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	2.372E+13	8.49
Total Output	2.618E+14	93.71
Total Input	2.794E+14	
Input - Output	1.757E+13	

Maximum leachate concentration: 1.332E+03 **mg/l**

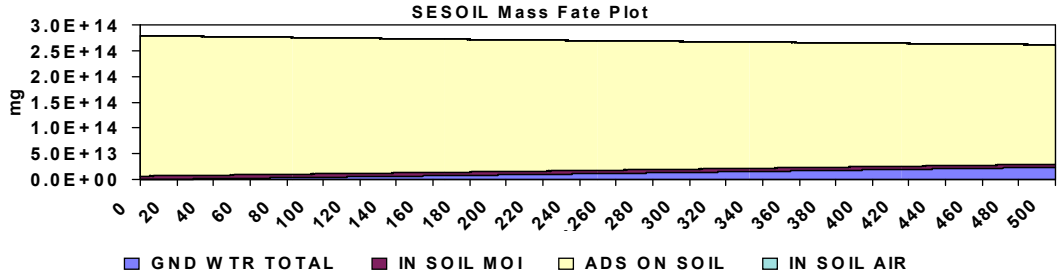
Climate File: WRANGELL HELP-WESTON
c:\SEV7 WIN7\WRANGELL_HELP_WESTON.CLM

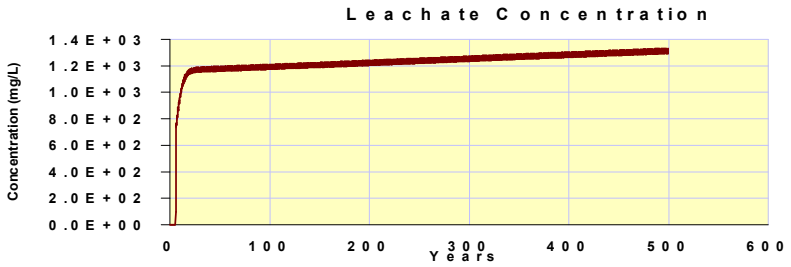
Chemical File: Phosphoric Acid (Koc)
c:\SEV7 WIN7\WRANGELL_PHOS_BASE_REV1.CHM

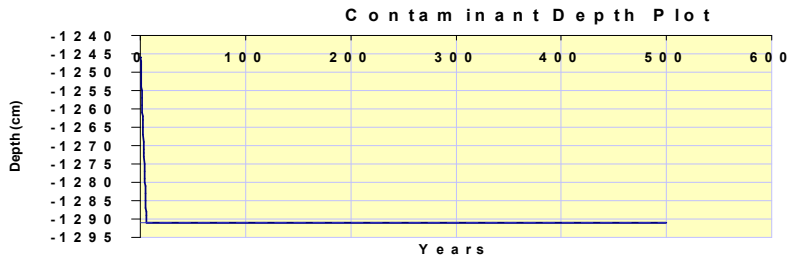
Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

Application File: SEVIEW Wrangell Phosphorus Application Parameter
c:\SEV7 WIN7\WRANGELL_PHOS_BASE_REV1.APL

Time to Groundwater: 5.08 **years**
Starting Depth: 1246.00 **cm**
Ending Depth: 1291.00 **cm**
Total Depth: 1291.00 **cm**







SESOIL Profile and Load Report

Layer No.	Number of Sub-Layers	Thickness		Intrinsic Permeability	Organic Carbon Content	Adsorption Coefficient	Cation Exchange Capacity	Freundlich Exponent	Solid Phase Degradation Rate	Liquid Phase Degradation Rate	Soil pH
		cm	feet	cm^2	percent	µg/g / µg/mL	mEq / 100 g soil	unitless	1/day	1/day	pH
1	1	10.0	0.33	7.70E-7	0.01	0.03	0.00	1.00	0.00E+00	0.00E+00	7.00
2	5	1220.0	40.03	4.30E-11	0.01	3.40	0.00	1.00	0.00E+00	0.00E+00	7.00
3	3	61.0	2.00	7.70E-7	0.00	0.00	0.00	1.00	0.00E+00	0.00E+00	7.00
4		0.0	0.00	.0	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00

Soil Parameters

Bulk Density (g/cm^3)	1.87
Effective Porosity (fraction)	0.25
Soil Pore Disconnectedness	6.00

Application Parameters

Area	cm^2	3.31E+7
	ft^2	3.56E+4
Latitude	degrees	56.5
Spill Index		1

Chemical Parameters

Water Solubility	(µg/mL)	5.39E+5	**Moles Ligand / Moles Chemical**	0.00
Henry's Law	(M^3-atm/mol)	8.00E-15	**Ligand Molecular Weight** (g/mol)	0.00
K_{oc} Adsorp	(µg/g)/(µg/mL)	0.00		
K_d Adsorp	(µg/g)/(µg/mL)	0.03		
Valence	(g/mole)	0.00	**Ligand Dissociation Constant**	0.00
Air Diffusion	(cm^2/sec)	0.00	**Base Hydrolysis Rate** (L/mol/day)	0.00
Water Diffusion	(cm^2/sec)	0.00	**Neutral Hydrolysis** (L/mol/day)	0.00
Molecular Weight	(g/mol)	98.00	**Acid Hydrolysis** (L/mol/day)	0.00

Output File: Wrangell
c:\SEV7 WIN7\S01.OUT

Chemical File: Phosphoric Acid (Koc)
c:\SEV7 WIN7\WRANGELL_PHOS_BASE_REV1.CHM

Soil File: Waste Material, Perm = 3.7E-06 cm/sec
c:\SEV7 WIN7\WASTETOP_LEAD.SOI

Application File: SEVIEW Wrangell Phosphorus Application Parameter
c:\SEV7 WIN7\WRANGELL_PHOS_BASE_REV1.APL

Sublayer Loads	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Layer 1 (ug/g)										
Layer 2 (ug/g)	3.70E+03	3.70E+03	3.70E+03	3.70E+03	3.70E+03					
Layer 3 (ug/g)										
Layer 4 (ug/g)