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### REPORTS

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ENVIRONMENTAL BUREAU OIL CONSERVATION DIVISION

### **BASELINE RISK ASSESSMENT REPORT**

TEXAS - NEW MEXICO PIPE LINE COMPANY TNM-96-15 LEA COUNTY, NEW MEXICO



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### BASELINE RISK ASSESSMENT REPORT

### TEXAS - NEW MEXICO PIPE LINE COMPANY TNM-96-15 LEA COUNTY, NEW MEXICO

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### **EXECUTIVE SUMMARY**

The Texas-New Mexico Pipe Line Company release site designated as TNM-96-15 in Lea County, New Mexico was evaluated according to the United States Environmental Protection Agency (EPA) guidance documents listed in the REFERENCES section. The objective of the assessment was to evaluate the actual or reasonable potential for public and environmental exposure to constituents of concern, to evaluate the potential human health risks from that exposure, and to determine risk-based cleanup levels for constituents which pose an unacceptable risk.

The site is a crude oil pipeline release identified as TNM-96-15 in Lea County, New Mexico. A Site Location Map showing the location of the site in relation to the surrounding area is presented as FIG. 1. Details of the site are shown on FIG. 2.

The soils on site are sand, sandy clay, clay and caliche. Ground water was not encountered on site during drilling (to a depth of approximately 33 feet bgs). There are no existing registered water wells within a one-half mile radius of the site. The site is in a remote, undeveloped rural location.

Based on the results of laboratory analyses, the constituents of concern are BTEX, TPH, and the polynuclear aromatic hydrocarbons (PAHs) chrysene, naphthalene, pyrene and phenanthrene.

Complete pathways selected for exposure assessment included:

- on-site residents ingestion of ground water (ground water protection)
- on-site residents ingestion of soil, dermal contact with soil, and inhalation of volatiles and particulates from soil
- construction workers ingestion of soil, dermal contact with soil, and inhalation of volatiles and particulates from soil

The estimated risks are presented on WORKSHEETS 4 and 5. When the resulting risks were unacceptable, Site Specific Target Levels (SSTLs) which result in acceptable risks were calculated. Detected site concentrations are compared to the SSTLs on WORKSHEET 7.

The maximum total carcinogenic risk and maximum total hazard index for each type of pathway is presented below:

	SOIL PATHWAYS (0-15 feet)	GROUND WATER PROTECTION PATHWAYS
Maximum Total Carcinogenic Risk	8.20 x 10 <sup>-7</sup>	1.13 x 10 <sup>-7</sup>
Maximum Total Hazard Index	2.99	0.542

The most stringent SSTL for each constituent of concern in soil is compared to the maximum detected site concentrations below.

CONSTITUENT	SOIL SSTL (0'-15') (mg/kg)	MAXIMUM SOIL CONCENTRATION (0'-15') (mg/kg)
Benzene	4.5	3.48
Chrysene	>4	0.4
Ethylbenzene	52.7	43.0
Naphthalene	18.1	4.9
Phenanthrene	2.95	2.0
Pyrene	7.81	.40
Toluene	20.1	18.9
Xylenes	76.1	57.7
ТРН	3,060	10,000

Analysis of the risk assessment for the site indicates corrective action is required for soil. We recommend an evaluation of remedial alternatives for this site.

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### INTRODUCTION

This report presents the methodology and results of a baseline risk assessment conducted for the Texas-New Mexico Pipe Line Company (TNMPL) release site designated as TNM-96-15 in Lea County, New Mexico. The site is located in Section 17, Township 18 South, Range 32 East. This risk assessment follows the approach included in the United States Environmental Protection Agency (EPA) guidance documents listed in the REFERENCES section. These guidance documents were used because they contain the most pertinent information for conducting risk assessments and because they are used and approved by the EPA. These documents are intended to provide guidance only, and considerable professional judgment must be exercised in applying these guidance documents to sitespecific risk assessments. Consequently, this risk assessment incorporates several conservative (protective) assumptions in evaluating potential risks at the Texas-New Mexico Pipe Line Company site.

The objective of the assessment was to evaluate the actual or reasonable potential for public and environmental exposure to constituents of concern, to evaluate the potential risk from that exposure, and to determine risk-based cleanup levels for constituents which pose an unacceptable risk.

Conducting the baseline risk assessment requires:

- identification of the constituent(s) of concern and their toxicity
- identification of potential receptors at the site
- identification of exposure scenarios for each receptor
- quantification of exposure, dose and risk to each receptor
- calculation of site specific risk-based cleanup levels for constituents which pose an unacceptable risk

### CHRONOLOGY OF PREVIOUS SITE ACTIVITIES

A chronological listing of significant events and activities is presented below.

4/96: Crude oil pipeline release discovered. Initial response activities included:

- pipeline repair
- excavation of heavily impacted soils

3/9/98: KEI installed two soil borings to delineate vertical extent of contamination.

6/24/98: KEI submits Draft Soil Remediation Work Plan.

A description of the procedures and conclusions of KEI's site investigation activities, including the results of laboratory analysis of soil and ground water samples, is presented in the Subsurface Investigation Report, May 1, 1998.

### CONSTITUENTS OF CONCERN

The following compounds were detected by laboratory analysis and make up the constituents of concern (COCs) for this site: benzene, toluene, ethylbenzene, and xylenes

(BTEX), total petroleum hydrocarbons (TPH), and the polynuclear aromatic hydrocarbons (PAHs) chrysene, pyrene, naphthalene, and phenanthrene.

### METHODOLOGY TO CALCULATE HAZARD QUOTIENT FOR TPH

Crude oil is a mixture of numerous hydrocarbons, many of which have no published toxicity factors. Therefore, a surrogate approach involving the assignment of conservative toxicity values and chemical property values to mass fraction groups based on their number of carbon atoms and structural similarities was implemented in order to estimate the hazard quotient for crude oil as a whole. The surrogate approach consists of a 4 step process.

- Identify groups of compounds based on their number of carbon atoms and structural similarities and measure the mass fraction of each group in the crude oil sample. The results of this "fingerprinting" analysis are presented in APPENDIX A.
- Identify representative toxicity values and chemical property values for groups of compounds identified above.
- Estimate the hazard quotient for each mass fraction group using the same equations used for individual compounds.
- Compute the hazard quotient for the crude oil as a whole by weighting the results for each group on a mass fraction basis. The following equation is used to compute the weighted hazard quotient for TPH:

$$HQ_w = \Sigma (HQ_i \times m_i)$$

where

HQw	=	the weighted hazard quotient
HQi	=	the hazard quotient of mass fraction group 'i' (unitless)
mi	=	the mass fraction of group 'i' in the product (mg/mg)

The results of the implementation of this approach for the crude oil sample obtained at the subject site are presented on each calculation sheet.

### EXPOSURE ASSESSMENT

### SITE CONDITIONS

The TNM-96-15 release site occurs on undeveloped, remote rural land along a crude oil pipeline located in Lea County, New Mexico. The land is slightly rolling to flat with sparse native grasses.

The soils on site are sand, sandy clay, clay and caliche. Ground water was not encountered on site during drilling (at depths up to 33 feet) so ground water data is unavailable. According to the <u>Geology and Ground-Water Conditions in Southern Lea County</u>, New Mexico, a well located approximately 2 miles northeast of the site recorded a depth of 86 feet.

### Land Use

It is possible that the site may not remain vacant, but could be used for residential or commercial purposes. The nearest residence is more than 0.5 miles away. Adjacent land consists of vegetated sand dunes.

### Water Use

There are no existing registered water wells within a one-half mile radius of the site. The drinking water in the vicinity of this site is supplied from ground water.

### **RECEPTORS OF CONCERN**

On-site receptors of concern include:

- residents
- workers
- site visitors
- construction workers

Off-site receptors of concern include:

- residents
- workers

The exposure assumptions for the on-site resident are greater in every instance than those for the on-site worker, the site visitor, the off-site resident, and the off-site worker. Therefore, the on-site worker, the site visitor, the off-site resident, and the off-site worker pathways are not considered in this risk assessment.

The construction worker scenario assumes that a pit  $10m \times 10m \times 5m$  is excavated at the site and the construction worker spends 8 hours a day/5 days a week in the pit for a period of 3 months, the assumed duration of construction.

### MEDIA OF CONCERN

### Soil

Exposure to COCs present in the soils at the site can occur by incidental ingestion of contaminated soil and dermal contact with contaminated soil. Additionally, COCs present in the soil may leach into the ground water.

### Air

Volatile emissions from residual hydrocarbons in soil at the site could lead to exposure through inhalation. Dispersion and transport of these volatiles in the atmosphere may cause on-site and off-site ambient air concentrations to be impacted. Due to the potential of contaminants to adsorb to particulates, inhalation of contaminated particulates is also possible during construction activities.

### Ground Water

Assuming that a future resident installed a domestic well on site, exposure to COCs present in the ground water under the site could occur by ingestion of drinking water.

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### COMPLETE EXPOSURE PATHWAYS

Ground water is greater than 15 feet deep, therefore, exposure to volatile emissions from ground water and exposure through dermal contact with ground water are considered incomplete pathways.

Ground water was not encountered on site during drilling and no registered water wells exist within 0.5 miles of the site; however, to be conservative, it was assumed that a water well would be installed on the site for residential domestic use. Therefore, exposure to contaminants via ingestion of drinking water is considered a complete pathway for on-site residents under future conditions.

Complete pathways selected for exposure assessment included:

- on-site residents ingestion of ground water (ground water protection)
- on-site residents ingestion of soil, dermal contact with soil, and inhalation of volatiles and particulates from soil
- construction workers ingestion of soil, dermal contact with soil, and inhalation of volatiles and particulates from soil

### ESTIMATION OF RECEPTOR POINT CONCENTRATIONS

The above scenarios require that the contaminant concentrations in soil, ground water, and air at the point where exposure with the human receptor occurs be estimated. Site specific data is available for subsurface soil concentrations at the site. On-site ambient air concentrations, when needed, were estimated using screening level contaminant fate and transport equations. On-site ground water concentrations were estimated using a dilution/attenuation factor (DAF) calculated from the Jury and AT123D models. The DAF predicts the potential migration from soil into ground water for each constituent of concern. A summary of DAF calculations is provided in APPENDIX E. Potential ground water concentrations were then calculated by multiplying the soil concentration times the respective DAF for each constituent of concern.

The site-specific input parameters used in these calculations are presented in WORKSHEET 2. COC-specific parameters and risk equations are presented in APPENDIX B and APPENDIX C.

The following conservative assumptions were used in these calculations:

For the soil pathways:

- The maximum COC soil concentrations detected between 0 and 15 feet during assessment activities at the site exist homogeneously in the subsurface from the ground surface to a depth of 15 feet throughout the soil source area.
- It was assumed that a residence will be constructed in the source area.
- It was assumed that for non-carcinogens a child resident will ingest 200 mg of soil per day, 350 days per year for 6 years, for carcinogens an adult resident will ingest 124 mg of soil per day, 350 days per year for 30 years, and for both carcinogens and non-carcinogens that an adult resident will inhale 15 m<sup>3</sup> of air per day and will have 5800 cm<sup>2</sup> of skin surface area in contact with the soil, 350 days per year for 30 years. These exposure parameters represent the maximum potential (worst-case) exposure assumptions listed in EPA guidelines.

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 It was assumed that a construction worker will inhale 20 m<sup>3</sup>/day, will ingest 480 mg/day, and will have 3300 cm<sup>2</sup> of skin surface area in contact with the soil 5 days/week for 12 weeks.

For the ground water protection pathway:

- The maximum COC soil concentrations detected in the vadose zone during assessment activities at the site exist homogeneously in the vadose zone throughout the soil source area.
- It was assumed that a new domestic drinking water well will be installed in the middle of the source area.
- The depth to water was assumed to be 86 feet below ground surface.
- It was assumed that the resident will ingest 2 liters of ground water per day, 350 days per year for 30 years. These exposure parameters represent the maximum potential (worst-case) exposure assumptions listed in EPA guidelines.

### EXPOSURE FACTORS AND ESTIMATION OF DOSE

The receptor point concentrations are combined with exposure factors to estimate dose using the relationships described in EPA RAGS. Exposure factor assumptions are chosen to reflect EPA guidance and site-specific conditions and represent conservative and reasonable estimates of potential exposure. Exposure factors used in this risk assessment are presented in WORKSHEET 3.

Note that for the residential soil ingestion pathway the age-adjusted ingestion rate is used with the other adult exposure factors for carcinogens and the child ingestion rate is used with the other child exposure factors for toxicants.

### **RISK CHARACTERIZATION**

The overall impact to human health due to exposure to chemicals is estimated by combining the estimated dose and the critical toxicity values (slope factor for carcinogens, reference dose for non-carcinogens). A carcinogenic risk value was calculated for benzene and a Hazard Quotient value was calculated for each non-carcinogen considered a constituent of concern. The Hazard Quotients were then summed to calculate the total Hazard Index for each soil pathway. The calculated carcinogenic risk and the Hazard Index values for each pathway are summarized in WORKSHEET 4 for soil (0 to 15 feet) and WORKSHEET 5 for vadose zone soil. The risk calculation equations, exposure factor inputs, and chemical-specific inputs such as toxicity values are presented in APPENDIX B and APPENDIX C.

The maximum total carcinogenic risk and maximum total Hazard Index for each type of pathway is presented below:

	SOIL PATHWAYS (0-15 feet)	GROUND WATER PROTECTION PATHWAYS
Maximum Total Carcinogenic Risk	8.20 x 10 <sup>-7</sup>	1.13 x 10 <sup>-7</sup>
Maximum Total Hazard Index	2.99	0.542

The carcinogenic risk exceeds the acceptable level of  $1.0 \times 10^{-6}$ . The Hazard Index exceeds the acceptable level of 1.0 for the soil (0-15 feet) pathway.

### **RISK-BASED TARGET LEVEL CALCULATIONS**

For each complete pathway with estimated risk over the acceptable levels, Site-Specific Target Levels (SSTLs) were calculated for each COC. The same conservative assumptions and input parameters used in the risk calculations were used in the SSTL calculations to ensure those concentration limits will be protective of human health. The SSTL calculations are presented in APPENDIX D. The SSTLs for soil are presented in WORKSHEET 7.

The most stringent SSTL for each constituent of concern in soil is compared to the maximum detected site concentrations below.

CONSTITUENT	SOIL SSTL (0'-15') (mg/kg)	MAXIMUM SOIL CONCENTRATION (0'-15') (mg/kg)
Benzene	4.5	3.48
Chrysene	>4	0.4
Ethylbenzene	52.7	43.0
Naphthalene	18.1	4.9
Phenanthrene	2.95	2.0
Pyrene	7.81	.40
Toluene	20.1	18.9
Xylenes	76.1	57.7
ТРН	3,060	10,000

### UNCERTAINTIES

As in any risk assessment, there is uncertainty in the results obtained. There may be uncertainty in the following components of these assessments:

- Delineation of contaminants in the subsurface.
- Future use of the site and surrounding land use.
- Modeling input parameters.
- Exposure pathway analysis.
- Chemical toxicity values.

Although uncertainty exists, the conservative nature of the risk assessment conducted makes it unlikely that small changes in these components would impact the conclusion for this site.

### CONCLUSIONS

Analysis of the risk assessment for the site indicates corrective action is required for soil. We recommend an evaluation of remedial alternatives for this site.

### REFERENCES

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Texas-New Mexico Pipe Line Co. TNM-96-15 Lea County, New Mexico <b>Ground Water</b>	WORKSHEET 1 EXPOSURE PATHWAY ANALYSIS
Lea County, New Mexico Ground Water	EXPOSURE PATHWAY ANALYSIS
Ground Water	
Ground Water	
Potential Exposure Pathways Y/N	Explanation / Source
Is Ground Water Ingestion Pathway Complete? N	5round water data unavailable. See ground water protection pathway.
Is Construction Worker Pathway Complete? N	Ground water is > 15 feet deep.
Is Inhalation of Volatiles Pathway Complete? N	Ground water is > 15 feet deep.
Soils	
Potential Exposure Pathways Y/N	Explanation / Source
Is Inhalation/Ingestion Pathway Complete? Y	Contaminants of concern detected in soil 0'-15'.
Is Construction Worker Pathway Complete?	Construction activity in the source area is possible.
Is Construction Worker Exposed to Both Soil N and Ground Water Simultaneously?	One pathway is closed.
Is Ground Water Protection Pathway Complete? Y	Contaminants of concern detected in vadose zone soil . Sround water concentrations modelled using the Jury and AT123D models.

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		BASE	LINE RISK ASSESSMENT
Texas-New Mexico Pipe Line Co. TNM-96-15 Lea County, New Mexico			WORKSHEET 2 SITE-SPECIFIC INPUT PARAMETERS - SOIL
			Soil Parameters
Parameter	Value	Units	Comments
Soil Bulk Density:	1.8	g/cc	Default Value.
Total Porosity in the Vadose Zone:	0.32	1	Default Value.
Moisture Content in the Vadose Zone:	0.1	1	Default Value.
Fraction of Organic Carbon in Vadose Zone:	0.010	I	Measured from a sample obtained at a depth of 5-6 feet on March 10, 1998.
Width of Source Area	120.0	Ħ	See FIGURE 2.
Total Soil Source Area	12,000	ft²	See FIGURE 2.
Width of Source Area, Costruction Worker	15.5	Ħ	Default Value.
Total Soil Source Area, Construction Worker	1,170	ft²	Default Value.
			Air Parameters
Parameter	Value	Units	Comments
Average Wind Speed	4.92	m/sec	
Average Wind Speed, Construction Worker	0.492	m/sec	Assumed to be 10% of average wind speed.
Diffusion Height	6.5	Ħ	Based on height of person
Distance to Residential Receptor	0	#	See FIGURE 1.
Distance to Commercial Receptor	0	Ħ	See FIGURE 1.

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Input ParametersResidentInput ParametersUnitsResidentBody weightAdultChildWorkeBody weightkg701570Averaging Time (carcinogens)years30625Averaging Time (non-carcinogens) - soilyears30625Averaging Time (non-carcinogens) - ground wateryears30625Averaging Time (non-carcinogens) - ground wateryears30625Exposure Frequencydays/yr350350250Exposure Frequencydays/yr350625Exposure Erequency, dermal contact w' soilyears30625Exposure Duration, soilyears30625Exposure Duration, ground wateryears30625Sci Ingestion Ratem <sup>3</sup> /day1520050Age adjusted Soil Ingestion Ratemg-yr/kg-day12411Mater Ingestion Ratemg-yr/kg-day258005800Skin Surface Area in contact w' soilcm <sup>2</sup> 580058005800Soil to Skin Adherence Factormg/cm <sup>2</sup> 1111					XPOSURE	INPU I PAKAN	<b>METERS - SOIL</b>
Body weightkg701570Averaging Time (carcinogens)years701570Averaging Time (carcinogens)years30625Averaging Time (non-carcinogens) - soilyears30625Averaging Time (non-carcinogens) - ground wateryears30625Exposure Frequencydays/yr350350250Exposure Frequency, dermal contact w/ soildays/yr350625Exposure Duration, soilyears30625Exposure Duration, soilyears30625Exposure Duration, soilm³/day1520050Exposure Duration, soilm³/day1520050Malation Ratemg/day1247470500Vater Ingestion Ratemg/day2580058005800Soil to Skin Surface Area in contact w/ soilcm²580058005800Soil to Skin Adherence Factormg/cm²111	Input Parameters	Units	Resi Adult	dent Child	Worker	Construction Worker	Con. Wkr. Units
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Age-adjusted Soil Ingestion Ratemg-yr/kg-day1241Water Ingestion RateItters/day21Skin Surface Area in contact w/ soilcm²58005800Soil to Skin Adherence Factormg/cm²11	estion Rate	mg/day		200	50	480	mg/day
Water Ingestion Rateliters/day21Skin Surface Area in contact w/ soilcm²58005800Soil to Skin Adherence Factormg/cm²11	usted Soil Ingestion Rate	-yr/kg-day	124				
Skin Surface Area in contact w/ soilcm²58005800Soil to Skin Adherence Factormg/cm²11	Igestion Rate	ters/day	2		1		
Soil to Skin Adherence Factor mg/cm <sup>2</sup> 1 1	face Area in contact w/ soil	cm <sup>2</sup>	5800		5800	3300	cm <sup>2</sup>
	kin Adherence Factor	mg/cm <sup>2</sup>	-		1	0.12	mg/cm <sup>2</sup>
Skin Surface Area in contact w/ ground water	face Area in contact w/ ground water					6170	cm <sup>2</sup>
Dermal Contact Event Frequency	Contact Event Frequency					2	events/day
Duration of Dermal Contact Event	of Dermal Contact Event					6	hr

**BASELINE RISK ASSESSMENT** 

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Texas-New Mexico Pipe L TNM-96-15 Lea County, New Mexico	ine Co.	RISK a	nd HAZARD INDE FOR SUI	WORKSHEET 4 EX CALCULATED BSURFACE SOIL
Risk	and Hazard Inc	lex for SOILS	0 to 15 feet	
'X' indicate	s pathway is complete:	X	×	×
	Soil	On-Site	On-Site	Construction
Constituent	Concentrations	Worker	Resident	Worker
of	Maximum	Inhalation +	Inhalation +	Inhalation +
Concern	(mg/kg)	Ingestion+Dermal	Ingestion+Dermal	Ingestion+Dermal
Carcinogens				
Benzene	3.48e+0	5.41e-7	7.74e-7	5.64e-8
Chrysene	4.00e-1	2.54e-8	4.67e-8	6.35e-11
_	Total Risk:	5.67e-7	8.20e-7	5.64e-8
Non-Carcinogens				
Ethylbenzene	4.30e+1	7.73e-4	6.04e-3	8.15e-3
Naphthalene	4.90e+0	9.23e-4	2.70e-3	2.46e-3
Phenanthrene	2.00e+0	5.26e-4	6.78e-3	2.61e-3
Pyrene	4.00e-1	2.51e-4	5.12e-4	8.09e-5
Toluene	1.89e+1	1.30e-3	2.41e-3	1.41e-2
Xylene (mixed isomers)	5.77e+1	2.44e-3	2.69e-3	2.66e-2
TPH - New Method	1.00e+4	9.59e-1	2:97e+0	1.86e+0
	Hazard Index:	9.65e-1	2.99e+0	1.92e+0

**BASELINE RISK ASSESSMENT** 

1.00e+4 Hazard Index:

	BASELIN	IE RISK A	SSESSM	ENT			
Texas-New Mexico Pipe L TNM-96-15 Lea County, New Mexico	ine Co.		RISK a FOR SOIL	and HAZARE (GROUND \	WOR NINDEX CAI WATER PR(	KSHEET 5 LCULATED DTECTION)	
Risk and H	azard Index for	SOIL - G	ROUND M	ATER PR(	DTECTION		
'X' indicates	s pathway is complete:	×		X			
	Soil	ons	Site	Ou	Site	Constr.	
Constituent	Concentrations	Wor	ker	Resi	dent	Worker	
of	Maximum					Inhalation	
Concern	(mg/kg)	Ingestion	Inhalation	Ingestion	Inhalation	+ Dermal	
Carcinogens		:					
Benzene	3.48e+0	3.36e-8		1.13e-7			
Chrysene	4.00e-1	0.00e+0		0.00e+0			
	Total Risk:	3.36e-8		1.13e-7			
Non-Carcinogens							- C 4
Ethylbenzene	4.30e+1	0.00e+0		0.00e+0			
Naphthalene	4.90e+0	0.00e+0		0.00e+0			
Phenanthrene	2.00e+0	0.00e+0		0.00e+0			
Pyrene	4.00e-1	0.00e+0		0.00e+0			
Toluene	1.89e+1	5.82e-4		1.63e-3		· · · · · ·	
Xylene (mixed isomers)	5.77e+1	6.53e-4		1.83e-3			_
TPH - New Method	1.00e+4	1.93e-1		5.39e-1			
	Hazard Index:	1.94e-1		5.42e-1			

# TARGET LEVEL CALCULATIONS

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Texas-New Mexico Pipe Line Co. TNM-96-15 Lea County, New Mexico

## WORKSHEET 6 EXPOSURE PATHWAYS WITH UNACCEPTABLE RISK

Ground Water		
Potential Exposure Pathways	YNN	Explanation / Source
Is Ground Water Ingestion Pathway Complete	z	See Ground Water Protection pathway.
and Without Controls and Creates Risk?		Controls proposed or in place: None
Is Construction Worker Pathway Complete	z	Ground water is > 15 feet deep.
and Without Controls and Creates Risk?		Controls proposed or in place: None
Is Inhalation of Volatiles Pathway Complete	z	Ground water is > 15 feet deep.
and Without Controls and Creates Risk?		Controls proposed or in place: None

Soils		
Potential Exposure Pathways	٨ï٨	Explanation / Source
Is Inhalation/Ingestion Pathway Complete	≻	Maximum soil concentrations create unacceptable risk.
and Without Controls and Creates Risk?		No impervious cover over soil source area.
		Controls proposed or in place: None
Is Construction Worker Pathway Complete	۲	Maximum soil concentrations create unacceptable risk.
and Without Controls and Creates Risk?		Construction activity in the source area is possible.
		Controls proposed or in place: None
Is Construction Worker Exposed to Both Soil	z	Ground water is > 15 feet deep.
and Ground Water Simultaneously?		Controls proposed or in place: None
Is Ground Water Protection Pathway Complete	≻	Maximum soil concentrations create unacceptable risk (GWP pathway).
and Without Controls and Creates Risk?		Controls proposed or in place: None
	]	

SITE CONCENTRATIONS COMPARED TO SITE-SPECIFIC TARGET LEVELS (SSTL's) FOR SUBSURFACE SOIL WORKSHEET 7 95th UCL (mg/kg) A/A N/A N/A N/A N/A N/A N/A N/A Concentrations Soil Maximum 3.48e+0 4.00e-1 4.90e+0 2.00e+0 00e+4 4.30e+1 1.89e+1 5.77e+1 (mg/kg) 4.00e-1 7.81e+0 4.50e+0 2.01e+1 SSTL's for SUBSURFACE SOILS - 0 to 15 feet BGS (mg/kg) 5.27e+1 1.81e+1 2.95e+0 3.06e+3 Critical 7.61e+1 SSTL **4**< × Construction TARGET LEVEL CALCULATIONS Inh+Ing+Der 4.89e+3 6.17e+1 2.00e+1 Worker (mg/kg) 7.67e+0 5.27e+1 2.01e+1 7.61e+1 >49 \ 4 × Inh+Ing+Der Resident 1.81e+1 4.50e+0 **On-Site** 2.95e+0 7.81e+0 3.06e+3 7.12e+1 1.18e+2 (mg/kg) >493 **4**< × Inh+Ing+Der 6.43e+0 5.56e+2 **On-Site** Worker 5.31e+1 3.80e+1 l.60e+1 2.18e+2 9.49e+3 (mg/kg) >493 4 × X' indicates pathway is complete: 0.010 0.010 0.010 HQ's 0.010 0.015 0.035 0.910 000 Texas-New Mexico Pipe Line Co. Hazard Index: Lea County, New Mexico Xylene (mixed isomers) Constituent Concern **TPH - New Method** Non-Carcinogens Ethylbenzene Phenanthrene Naphthalene TNM-96-15 Carcinogens Chrysene Benzene Toluene Pyrene

Note:

95th UCL = One-sided upper 95th confidence limit of the mean

SSTL = Site Specific Target Level





Texas-New Mexico Pipe Line Co. TNM-96-15 Lea County, New Mexico

### TPH MASS FRACTIONS AND RELATIVE CONCENTRATIONS

Constituent of Concern	Fingerprint (mg/kg)	Mass Fraction (%)	Maximum Concentration (mg/kg)
TPH - New Method	10,000	100%	10,000
TPH-Arom-EC>8-10	40	0.40%	40
TPH-Arom-EC>10-12	220	2.20%	220
TPH-Arom-EC>12-16	923	9.23%	923
TPH-Arom-EC>16-21	1,324	13.24%	1,324
TPH-Arom-EC>21-35	1,115	11.15%	1,115
TPH-Aliph-EC 5-6	0	0.00%	0
TPH-Aliph-EC>6-8	0	0.00%	0
TPH-Aliph-EC>8-10	198	1.98%	198
TPH-Aliph-EC>10-12	665	6.65%	665
TPH-Aliph-EC>12-16	1,690	16.90%	1,690
TPH-Aliph-EC>16-35	3,826	38.26%	3,826

### Calculation Sheet GROUND WATER PROTECTION Worker -- Ingestion of Ground Water Pathway

	(m)
0.01	0
	0.01

For carcinogens:

Risk = Conc<sub>s-v</sub> \* DAF \* IR<sub>gw</sub> \* EF \* ED \* SF / BW \* 70 \* 365

For non-carcinogens:

 $HQ = Conc_{s-v} * DAF * IR_{gw} * EF / RfD * BW * 365$ 

Constituent	SF	RfD	Conc <sub>s-v</sub>	DAF	Conc <sub>gwp</sub>	Risk
of Concern	(1/mg/kg-d)	(mg/kg-d)	(mg/kg)		(mg/L)	or HQ
Carcinogens					<u> </u>	
Benzene	2.90e-2		3.48e+0	9.53e-5	3.32e-4	3.36e-8
Chrysene	7.30e-3		4.00e-1	0.00e+0	0.00e+0	0.00e+0
					Total Risk:	3.36e-8
Non-Carcinogens						
Ethylbenzene		1.00e-1	4.30e+1	0.00e+0	0.00e+0	0.00e+0
Naphthalene		4.00e-2	4.90e+0	0.00e+0	0.00e+0	0.00e+0
Phenanthrene		4.00e-3	2.00e+0	0.00e+0	0.00e+0	0.00e+0
Pyrene		3.00e-2	4.00e-1	0.00e+0	0.00e+0	0.00e+0
Toluene		2.00e-1	1.89e+1	6.29e-4	1.19e-2	5.82e-4
Xylene (mixed isomers)		2.00e+0	5.77e+1	2.31e-3	1.33e-1	6.53e-4
TPH - New Method					_	1.93e-1
			Hazard Index:		azard Index:	1.94e-1
TPH-Arom-EC>8-10		4.00e-2	4.00e+1	4.34e-3	1.74e-1	4.25e-2
TPH-Arom-EC>10-12		4.00e-2	2.20e+2	1.50e-3	3.30e-1	8.07e-2
TPH-Arom-EC>12-16		4.00e-2	9.23e+2	1.75e-6	1.62e-3	3.95e-4
TPH-Arom-EC>16-21		3.00e-2	1.32e+3	0.00e+0	0.00e+0	0.00e+0
TPH-Arom-EC>21-35		3.00e-2	1.12e+3	0.00e+0	0.00e+0	0.00e+0
TPH-Aliph-EC 5-6		6.00e-2	0.00e+0	1.02e-2	0.00e+0	0.00e+0
TPH-Aliph-EC>6-8		6.00e-2	0.00e+0	4.96e-3	0.00e+0	0.00e+0
TPH-Aliph-EC>8-10		1.00e-1	1.98e+2	1.81e-3	3.58e-1	3.51e-2
TPH-Aliph-EC>10-12		1.00e-1	6.65e+2	4.10e-4	2.73e-1	2.67e-2
TPH-Aliph-EC>12-16		1.00e-1	1.69e+3	4.34e-5	7.33e-2	7.18e-3
TPH-Aliph-EC>16-35		2.00e+0	3.83e+3	0.00e+0	0.00e+0	0.00e+0

### NOTES:

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Conc(s-v) = Concentration in soil vadose zone Conc(gwp) = Concentration in ground water SF = Slope Factor HQ = Hazard Quotient RfD = Reference Dose foc = fraction organic carbon BW = Body Weight IR<sub>GW</sub> = Ingestion Rate EF = Exposure Frequency ED = Exposure Duration Risk = Carcinogenic Risk DAF = Dilution attenuation factor

### Calculation Sheet GROUND WATER PROTECTION Resident -- Ingestion of Ground Water Pathway

Texas-New Mexico Pipe Line Co.	BW	IRgw	EF	ED	foc	Dist
TNM-96-15	(kg)	(L/day)	(days/yr)	(years)		(m)
Lea County, New Mexico	70	2.0	350	30	0.010	0
		L			L	

For carcinogens:

 $Risk = Conc_{s-v} * DAF * IR_{gw} * EF * ED * SF / BW * 70 * 365$ 

For non-carcinogens:

HQ =  $Conc_{s-v} * DAF * IR_{gw} * EF / RfD * BW * 365$ 

Constituent	SF	RfD	Conc <sub>s-v</sub>	DAF	Conc <sub>gwp</sub>	Risk
of Concern	(1/mg/kg-d)	(mg/kg-d)	(mg/kg)		(mg/L)	or HQ
Carcinogens						
Benzene	2.90e-2		3.48e+0	9.53e-5	3.32e-4	1.13e-7
Chrysene	7.30e-3		4.00e-1	0.00e+0	0.00e+0	0.00e+0
					Total Risk:	1.13e-7
Non-Carcinogens						
Ethylbenzene		1.00e-1	4.30e+1	0.00e+0	0.00e+0	0.00e+0
Naphthalene		4.00e-2	4.90e+0	0.00e+0	0.00e+0	0.00e+0
Phenanthrene		4.00e-3	2.00e+0	0.00e+0	0.00e+0	0.00e+0
Pyrene		3.00e-2	4.00e-1	0.00e+0	0.00e+0	0.00e+0
Toluene		2.00e-1	1.89e+1	6.29e-4	1.19e-2	1.63e-3
Xylene (mixed isomers)		2.00e+0	5.77e+1	2.31e-3	1.33e-1	1.83e-3
TPH - New Method						5.39e-1
				н	azard Index:	5.42e-1
TPH-Arom-EC>8-10		4.00e-2	4.00e+1	4.34e-3	1.74e-1	1.19e-1
TPH-Arom-EC>10-12		4.00e-2	2.20e+2	1.50e-3	3.30e-1	2.26e-1
TPH-Arom-EC>12-16		4.00e-2	9.23e+2	1.75e-6	1.62e-3	1.11e-3
TPH-Arom-EC>16-21		3.00e-2	1.32e+3	0.00e+0	0.00e+0	0.00e+0
TPH-Arom-EC>21-35		3.00e-2	1.12e+3	0.00e+0	0.00e+0	0.00e+0
TPH-Aliph-EC 5-6		6.00e-2	0.00e+0	1.02e-2	0.00e+0	0.00e+0
TPH-Aliph-EC>6-8		6.00e-2	0.00e+0	4.96e-3	0.00e+0	0.00e+0
TPH-Aliph-EC>8-10		1.00e-1	1.98e+2	1.81e-3	3.58e-1	9.82e-2
TPH-Aliph-EC>10-12		1.00e-1	6.65e+2	4.10e-4	2.73e-1	7.47e-2
TPH-Aliph-EC>12-16		1.00e-1	1.69e+3	4.34e-5	7.33e-2	2.01e-2
TPH-Aliph-EC>16-35		2.00e+0	3.83e+3	0.00e+0	0.00e+0	0.00e+0

### NOTES:

Conc(s-v) = Concentration in soil vadose zone Conc(gwp) = Concentration in ground water SF = Slope Factor HQ = Hazard Quotient RfD = Reference Dose foc = fraction organic carbon BW = Body Weight IR<sub>GW</sub> = Ingestion Rate EF = Exposure Frequency

ED = Exposure Duration

Risk = Carcinogenic Risk DAF = Dilution attenuation factor

xas-New Mexico Pipe Line Co.	BW	IRair	Ш	G	LS	>	Н	٩ '	B	ш	foc	ΡEI
TNM-96-15	(kg)	(m <sup>3</sup> /day)	(days/yr)	(years)	ĵ.	(m/s)	(L)	(m <sup>2</sup> )	(g/cc)	1	1	(kg/m
Lea County, New Mexico	02	20	250	25	37	4.92	2.0	1116	1.80	0.32	0.01	6.066
										_		
For carcinogens:	Kisk ≡	(Conc <sub>soll</sub>	(VF + PE	F) I UAF	"IKair" E	τ Ευ.	PL BW	ru - 305			UIST (m)	AU
For non-carcinogens:	)) = ()	Conc <sub>soll</sub> * (	VF + PEF	/ DAF) '	' IR <sub>air</sub> * EF	* (1/RfD)	/ BW * 3(	55			0	1.0
	VF = (;	2 * Dei * E	* Kas * 10	-3)/(Г	HQ * V * 8	/A)*(3	.14 * alpt	1a * ED * 3	3.15E+7 ) <sup>6</sup>	1.5		
Constituent	Conc <sub>soll</sub>	SF	RfD	Deì	Kd Kd	Ŧ	Kas (_ (am <sup>3</sup> )	alpha	VF رسائیہ	Risk or HO		
	(mg/kg)		(n-fiv/fill)		(6/ 1117)	I	(111) 6)	1111 1261	(64/ 11)	5		
<u>Carcinogens</u> Benzene	3.48e+0	2.91e-2		2.05e-2	8.32e-1	2.32e-1	2.80e-1	9.70e-4	7.40e-5	5.23e-7	_	
Chrysene	4.00e-1	6.10e-3		5.45e-3	2.00e+3	4.37e-5	2.19e-8	2.12e-11	1.04e-8	1.79e-12		
•								F	otal Risk:	5.23e-7		
Non-Carcinogens	1 300+1		7 Rfe_1	1 64a 2	1 100+1	7 67a-1	2 440-2	7 10e.5	1 01e-5	5 630-4		
Luigiberizerie Nachthalene	4 90e+0		4.00e-2	1.30e-2	1.29e+1	5.38e-2	4.17e-3	9.61e-6	7.02e-6	1.68e-4		
Phenanthrene	2.00e+0		4.00e-3	1.19e-3	1.41e+2	6.63e-3	4.69e-5	9.89e-9	2.25e-7	2.20e-5		
Pvrene	4.00e-1		3.00e-2	5.98e-3	3.80e+2	2.13e-4	5.59e-7	5.94e-10	5.51e-8	1.44e-7		
Toluene	1.89e+1		1.14e-1	1.84e-2	3.02e+0	2.65e-1	8.77e-2	2.83e-4	3.86e-5	1.25e-3		
Xylene (mixed isomers)	5.77e+1		2.00e-1	1.63e-2	2.40e+0	2.93e-1	1.22e-1	3,45e-4	4.29e-5	2.43e-3		
TPH - New Method	1.00e+4									1.06e-1		
								Haze	Ind Index:	1.11e-1		
TPH-Arom-EC>8-10	4.00e+1		5.71e-2	2.20e-2	1.58e+1	4.84e-1	3.05e-2	1,19e-4	2.48e-5	3.39e-3		
TPH-Arom-EC>10-12	2.20e+2		5.71e-2	2.20e-2	2.51e+1	1.36e-1	5.42e-3	2.12e-5	1.04e-5	7.85e-3		
TPH-Arom-EC>12-16	9.23e+2		5.71e-2	2.20e-2	5.01e+1	5.16e-2	1.03e-3	4.02e-6	4.54e-6	1.43e-2		
TPH-Arom-EC>16-21	1.32e+3		3.00e-2	2.20e-2	1.58e+2	1.18e-1	7.43e-4	2.90e-6	3.85e-6	3.33e-2		
TPH-Arom-EC>21-35	1.12e+3		3.00e-2	2.20e-2	1.26e+3	6.65e-3	5.29e-6	2.06e-8	3.25e-7	2.36e-3		
TPH-Aliph-EC 5-6	0.00e+0		5.71e-2	2.20e-2	7.94e+0	3.28e+1	4.12e+0	9.29e-3	3.78e-4	0.00e+0		
7PH-Aliph-EC>6-8	0.00e+0		5.71e-2	2.20e-2	3.98e+1	4.85e+1	1.22e+0	3.91e-3	1.72e-4	0.00e+0		
TPH-Aliph-EC>8-10	1.98e+2		2.86e-1	2.20e-2	3.16e+2	7.92e+1	2.51e-1	9.37e-4	7.23e-5	9.81e-3	_	
TPH-Aliph-EC>10-12	6.65e+2		2.86e-1	2.20e-2	2.51e+3	1.23e+2	4.91e-2	1,90e-4	3.15e-5	1.43e-2		
TPH-Aliph-EC>12-16	1.69e+3		2.86e-1	2.20e-2	5.01e+4	5.25e+2	1.05e-2	4,09e-5	1.45e-5	1.68e-2		
TPH-Aliph-EC>16-35	3.83e+3		2.00e+0	2.20e-2	1.00e+7	6.57e+4	6.57e-3	2.56e-5	1.15e-5	4.29e-3		
Conc(soil) = Concentration in soil (0-15 feet)		BW = body v	/eight		V = Velocity	of Wind			H' = unitless Kd = organiz	Henry's Law	Constant ion coefficien	* for
KISK = Calcillogenic KISK		IB. = Inhala	inn rate			Soil Source			foc = fraction	ornanic carb		8
ur = olope i actor HO = Hazard Oitotient		EF ≈ exposu	re frequency		B = Bulk So	il Density			Kas = H'/K	, ,		
R() = Reference Dose		ED = exposu	re duration		E = Effective	Porositv			alnha = Dei	-F/(F+B/	Kas )	

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Calculation of Risk Worker - Inhalation of Volatiles from Soil

Worker - Ingestion of Soil & Dermal Contact with Soil **Calculation of Risk** 

Levas-New Mexico Pine Line Co	RW	CF	IRsoil	Ľ	ED		ΔS	٩L
		5			ן נ	- dermai	<u></u> כַּיַ	ť
CI-06-IAINI	(kg)	(mg/kg)	(mg/day)	(days/yr)	(years)	(days/yr)	(cm <sup>-</sup> )	(mg/cm <sup>^</sup> )
Lea County, New Mexico	70	1.00E+06	20	250	25	250	5,800	1.00
For carcinogens:	Risk <sub>ing</sub> =	= Conc <sub>soll</sub> *	IR <sub>soll</sub> * EF	* ED * SF	/ BW * 7	0 * 365 * CF		
	Risk <sub>der</sub>	= Conc <sub>soll</sub> *	SA*AF'	ABS*EF	* ED * 0	5F / BW * 70	* 365 * 0	_ <u></u>
For non-carcinogens:	HQ <sub>ING</sub> ≡	Conc <sub>soll</sub> * IF	R <sub>solt</sub> * EF *	(1/RfD) / I	305 * WE	5* CF		

HQ<sub>DER</sub> = Conc<sub>soll</sub> \* SA \* AF\* ABS \* EF \* (1/RfD) / BW \* 365 \* CF

Constituent	Concsoil	SFo	RfDo	Risking		SFd	RfDd	ABS	Risk <sub>DER</sub>
of Concern	(mg/kg)	(1/mg/kg-d)	(mg/kg-d)	or HQ <sub>ING</sub>		(1/mg/kg-d)	(mg/kg-d)	I	or HQ <sub>DER</sub>
Carcinogens					<u></u>				
Benzene	3.48e+0	0.029		1.76E-08		0.029		000.0	0.00E+00
Chrysene	4.00e-1	0.0073		5.10E-10		0.0236		0.130	2.49E-08
		Tc	otal Risk:	1.81e-8			To	otal Risk:	2.49e-8
Non-Carcinogens						-			
Ethylbenzene	4.30e+1		0.10	2.10E-04			0.10	0.000	0.00E+00
Naphthaiene	4.90e+0		0.04	5.99E-05			0.04	0.100	6.95E-04
Phenanthrene	2.00e+0		00.0	2.45E-04			0.02	0.050	2.59E-04
Pyrene	4.00e-1		0.03	6.52E-06			0.01	0.100	2.44E-04
Toluene	1.89e+1		0.20	4.62E-05			0.20	0.000	0.00E+00
Xylene (mixed isomers)	5.77e+1		2.00	1.41E-05			2.00	000.0	0.00E+00
TPH - New Method	1.00e+4			6.77E-02					7.85E-01
		Haza	rd Index:	6.83e-2			Hazai	rd Index:	7.86e-1
TPH-Arom-EC>8-10	4.00e+1		0.04	4.89E-04			0.04	0.100	5.68E-03
TPH-Arom-EC>10-12	2.20e+2		0.04	2.69E-03			0.04	0.100	3.12E-02
TPH-Arom-EC>12-16	9.23e+2		0.04	1.13E-02			0.04	0.100	1.31E-01
TPH-Arom-EC>16-21	1.32e+3		0.03	2.16E-02			0.03	0.100	2.50E-01
TPH-Arom-EC>21-35	1.12e+3		0.03	1.82E-02			0.03	0.100	2.11E-01
TPH-Aliph-EC 5-6	0.00e+0		0.06	0.00E+00			0.06	0.100	0.00E+00
TPH-Aliph-EC>6-8	0.00e+0		0.06	0.00E+00			0.06	0.100	0.00E+00
TPH-Aliph-EC>8-10	1.98e+2		0.10	9.69E-04			0.10	0.100	1.12E-02
TPH-Aliph-EC>10-12	6.65e+2		0.10	3.25E-03			0.10	0.100	3.77E-02
TPH-Aliph-EC>12-16	1.69e+3		0.10	8.27E-03			0.10	0.100	9.59E-02
TPH-Aliph-EC>16-35	3.83e+3		2.00	9.36E-04	<b>`</b>		2.00	0.100	1.09E-02
NDTES:									
Conc(soil) = Concentration in soil (0-15 feet) Risk = Carcinonenic Risk		RfD = Reference BW = bodv weig	: Dose ht		IR <sub>sul</sub> = Inge FF = expos	estion rate ure frequency		SA = skin su AF = adhere	urface area ince factor
SF = Slope Factor		AT = averaging 1	time		ED = expos	ure duration		ABS = derm	al absorption frac

0.00E+00	1.12E-02	3.77E-02	9.59E-02	1.09E-02	
0.100	0.100	0.100	0.100	0.100	
0.06	0.10	0.10	0.10	2.00	5

Conc(soil) = Concentration in soil (0-15 feet) Risk = Carcinogenic Risk HQ = Hazard Quotient SF = Slope Factor

Worker – Combined Risk for Soil Texas-New Mexico Pipe Line Co. **Calculation of Risk** 

If On-Site: Risk<sub>wkr-solt</sub> = Risk<sub>ING</sub> + Risk<sub>DëR</sub> + Risk<sub>iNHAL</sub>

If Off-Site: Risk<sub>wkr-soll</sub> = Risk<sub>INHAL</sub>

Constituent	Risking	Risk
of Concern	or HQ <sub>ING</sub>	or HQ <sub>DER</sub>
Carcinogens		-
Benzene	1.76E-08	0.00E+00
Chrysene	5.10E-10	2.49E-08
Non-Carcinogens		
Ethylbenzene	2.10E-04	0.00E+00
Naphthalene	5.99E-05	6.95E-04
Phenanthrene	2.45E-04	2.59E-04
Pyrene	6.52E-06	2.44E-04
Toluene	4.62E-05	0.00E+00
Xylene (mixed isomers)	1.41E-05	0.00E+00
TPH - New Method	6.77E-02	7.85E-01
TPH-Arom-EC>8-10	4.89E-04	5.68E-03
TPH-Arom-EC>10-12	2.69E-03	3.12E-02
TPH-Arom-EC>12-16	1.13E-02	1.31E-01
TPH-Arom-EC>16-21	2.16E-02	2.50E-01
TPH-Arom-EC>21-35	1.82E-02	2.11E-01
TPH-Aliph-EC 5-6	0.00E+00	0.00E+00
TPH-Aliph-EC>6-8	0.00E+00	0.00E+00
TPH-Aliph-EC>8-10	9.69E-04	1.12E-02
TPH-Aliph-EC>10-12	3.25E-03	3.77E-02
TPH-Aliph-EC>12-16	8.27E-03	9.59E-02
TPH-Aliph-EC>16-35	9.36E-04	1.09E-02

<u>L</u>															
Riskinhal or HQINHAL	5.23E-07 1.79E-12	5.63E-04 1.68E-04	2.20E-05 1.44E-07	1.25E-03	2.43E-03 1.06E-01	3.39E-03	7.85E-03 1.43E-02	3.33E-02	2.36E-03	0.00E+00	0.00E+00	9.81E-03	1.43E-02	1.68E-02	4.29F-03
·															
k <sub>DER</sub> LO <sub>DER</sub>	0E+00 9E-08	)E+00 5E-04	ЭЕ-04 4Е-04	00+ <u>10</u>	1E +00	3E-03	2E-02	н 10-11	IE-01	00+30	E+00	2E-02	7E-02	ЭЕ-02	9E-02

Riskwkr-soil or HQwkr-soil	5.41E-07 2.54E-08	7.73E-04 9.23E-04 5.26E-04 2.51E-04 1.30E-03 2.44E-03 9.59E-01	9.56E-03 4.18E-02 1.57E-01 3.05E-01 3.05E-01 2.31E-01 0.00E+00 0.00E+00 2.20E-02 5.53E-02 1.21E-01 1.61E-01
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NOTES: Risk = Carcinogenic Risk HQ = Hazard Quotient

		Resid	ent - In	alculation	on of Ris of Volat	k tiles fror	n Soil					
Texas-New Mexico Pipe Line Co.	BW	lRair	ЕF	8	LS	>	Н	۲ '	æ	ш	foc	PEF.
I NM-96-15	(kg)	(m²/day)	(days/yr)	(years)	(E) [c	(s/m)	Ē	(m;)	(g/cc)	1 6	1 60	(kg/m <sup>*</sup> )
Lea County, New Mexico	2		000	8	5	4.92	7.U	0	00.1	72.0	0.0	0.0001-11
For carcinogens:	Risk =	(Conc <sub>soll</sub> *	(VF + PE	F) / DAF)	* IR <sub>alr</sub> * E	F*ED*S	F / BW *	70 * 365			Dist (m)	DAF
For non-carcinogens:	HQ = ((	conc <sub>solt</sub> * (\	/F + PEF	/ DAF) *	IR <sub>air</sub> * EF	* (1/RfD)	/ BW * 36	35			0	1.00
	VF = (2	2 * Dei * E •	. Kas * 10	-3)/(FS	H0 * V * ;	/ A ) * ( 3.	14 * alpt	la * ED * 3	15E+7 ) <sup>6</sup>	.5		
4	,	SE C	DfD	iou	גא		Кас	chule	VE	Dick		
constituent of Concern	(mg/kg)	3F   (1/mg/kg-d)	(mg/kg-d)	(cm²/sec)	רט (cm³/g)		(g /cm <sup>3</sup> )	dipiid (cm²/sec)	V F (m³/kg)	or HQ		
Carcinogens				1					ו נ ו	1 0 0		
Benzene	3.48e+U	2.91e-2		2.05e-2	8.32e-1	2.32e-1	2.80e-1	9.70e-4	c-904.7	0.02e-1		
Chrysene	4.00e-1	b.10e-3		o.40e-3	Z.UUe+3	4.3/e-5	2.13e-0	z.1ze-11 To	1.04e-o otal Risk:	6.02e-12		
Non-Carcingens												
Ethylbenzene	4.30e+1		2.86e-1	1.64e-2	1.10e+1	2.67e-1	2.44e-2	7.10e-5	1.91e-5	5.40e-4		
Naphthalene	4.90e+0		4.00e-2	1.30e-2	1.29e+1	5.38e-2	4.17e-3	9.61e-6	7.02e-6	1.61e-4		
Phenanthrene	2.00e+0		4.00e-3	1.19e-3	1.41e+2	6.63e-3	4.69e-5	9.89e-9	2.25e-7	2.11e-5		
Pyrene	4.00e-1		3.00e-2	5.98e-3	3.80e+2	2.13e-4	5.59e-7	5.94e-10	5.51e-8	1.38e-7		
Toluene	1.89e+1		1.14e-1	1.84e-2	3.02e+0	2.65e-1	8.77e-2	2.83e-4	3.86e-5	1.20e-3		
Xylene (mixed isomers)	5.77e+1		2.00e-1	1.63e-2	2.40e+0	2.93e-1	1.22e-1	3.45e-4	4.29e-5	2.33e-3		
TPH - New Method	1.00e+4							Нага	rd Index:	1.02e-1 1.06e-1		
TPH-Arom-EC>8-10	4.00e+1		5.71e-2	2.20e-2	1.58e+1	4.84e-1	3.05e-2	1.19e-4	2.48e-5	3.25e-3		
TPH-Arom-EC>10-12	2.20e+2		5.71e-2	2.20e-2	2.51e+1	1.36e-1	5.42e-3	2.12e-5	1.04e-5	7.52e-3		
TPH-Arom-EC>12-16	9.23e+2		5.71e-2	2.20e-2	5.01e+1	5.16e-2	1.03e-3	4.02e-6	4.54e-6	1.37e-2		
TPH-Arom-EC>16-21	1.32e+3		3.00e-2	2.20e-2	1.58e+2	1.18e-1	7.43e-4	2.90e-6	3.85e-6	3.19e-2		
TPH-Arom-EC>21-35	1.12e+3		3.00e-2	2.20e-2	1.26e+3	6.65e-3	5.29e-6	2.06e-8	3.25e-7	2.27e-3		
TPH-Aliph-EC 5-6	0.00e+0		5.71e-2	2.20e-2	7.94e+0	3.28e+1	4.12e+0	9.29e-3	3.78e-4	0.00e+0		
TPH-Aliph-EC>6-8	0.00e+0		5.71e-2	2.20e-2	3.98e+1	4.85e+1	1.22e+0	3.91e-3	1.72e-4	0.00e+0		
TPH-Aliph-EC>8-10	1.98e+2		2.86e-1	2.20e-2	3.16e+2	7.92e+1	2.51e-1	9.37e-4	7.23e-5	9.40e-3		
TPH-Aliph-EC>10-12	6.65e+2		2.86e-1	2.20e-2	2.51e+3	1.23e+2	4.91e-2	1.90e-4	3.15e-5	1.37e-2		
TPH-Aliph-EC>12-16	1.69e+3		2.86e-1	2.20e-2	5.01e+4	5.25e+2	1.05e-2	4.09e-5	1.45e-5	1.61e-2		
TPH-Aliph-EC>16-35	3.83e+3		2.00e+0	2.20e-2	1.00e+7	6.57e+4	6.57e-3	2.56e-5	1.15e-5	4.11e-3		
NOTES:									;	-		
Conc(soit) = Concentration in soit (0-15 feet) Risk = Carrinonenic Risk		BW = body w AT = averagin	eight a time		V = Velocity ( DH = Diffusio	of Wind in Height			H' = unitiess Kd = organic	Henry's Law : carbon partit	Constant tion coefficient	foc
SF = Slope Factor		IRA = Inhalati	on rate		A = Area of S	soil Source			foc = fraction	i organic carb	uo	
HQ = Hazard Quotient		EF = exposur	e frequency		B ≈ Bulk Soil	Density			Kas = H'/K	q		
RtD = Reference Dose		ED = exposur	e duration		E = Effective	Porosity			alpha = Dei '	E/(E+B/	Kas )	
		LS = Length o	of Source Are	a	Dei = effectiv	e diffusion co	efficient		PEF = Partic	ulate Emissio	ons Factor	

Resident - Ingestion of Soil & Dermal Contact with Soil **Calculation of Risk** 

Fexas-New Mexico Pipe Line Co.	BW	сF	IRsoil	EF	ED	EF <sub>dermat</sub>	SA	AF
TNM-96-15	(kg)	(mg/kg)	(mg/day)	(days/yr)	(years)	(days/yr)	(cm²)	(mg/cm <sup>2</sup> )
Lea County, New Mexico	70	1.00E+06	124	350	30	350	5,800	1.00
For carcinogens:	Risk <sub>ing</sub> :	= Conc <sub>soli</sub> *	IR <sub>soll</sub> * EF	* ED * SF	/ BW * 7	0 * 365 * CF		
	Risk <sub>DER</sub>	= Conc <sub>soll</sub> *	SA * AF '	ABS*EF	* ED * 3	SF / BW * 70	* 365 * 0	Ŀ
For non-carcinogens:	HQ <sub>ING</sub> =	Conc <sub>soll</sub> * IF	2 <sup>soll</sup> * EF *	(1/RfD) / I	BW * 36!	5 * CF		

HQ<sub>DER</sub> = Conc<sub>soll</sub> \* SA \* AF\* ABS \* EF \* (1/RfD) / BW \* 365 \* CF

Constituent	Concsoil	SFO	RIDo	RISKING		SFd	KtUd	ABS	<b>RISK</b> DER	
of Concern	(mg/kg)	(1/mg/kg-d)	(mg/kg-d)	or HQ <sub>ING</sub>	1	(1/mg/kg-d)	(mg/kg-d)	1	or HQ <sub>DER</sub>	
Carcinogens										
Benzene	3.48e+0	0.029		1.71E-07		0.029		0.000	0.00E+00	
Chrysene	4.00e-1	0.0073		4.96E-09		0.0236		0.130	4.18E-08	
		Tc	otal Risk:	1.76e-7			To	otal Risk:	4.18e-8	
Non-Carcinogens		-								
Ethylbenzene	4.30e+1		0.10	5.50E-03			0.10	0.000	0.00E+00	
Naphthalene	4.90e+0		0.04	1.57E-03			0.04	0.100	9.73E-04	
Phenanthrene	2.00e+0		0.00	6.39E-03			0.02	0.050	3.63E-04	
Pyrene	4.00e-1		0.03	1.70E-04			0.01	0.100	3.42E-04	
Toluene	1.89e+1		0.20	1.21E-03			0.20	0.000	0.00E+00	
Xylene (mixed isomers)	5.77e+1		2.00	3.69E-04			2.00	0.000	0.00E+00	
TPH - New Method	1.00e+4			1.77E+00					1.10E+00	
		Haza	rd Index:	1.78e+0			Hazaı	rd Index:	1.10e+0	
TPH-Arom-EC>8-10	4.00e+1		0.04	1.28E-02			0.04	0.100	7.95E-03	
TPH-Arom-EC>10-12	2.20e+2		0.04	7.03E-02			0.04	0.100	4.37E-02	
TPH-Arom-EC>12-16	9.23e+2		0.04	2.95E-01			0.04	0.100	1.83E-01	
TPH-Arom-EC>16-21	1.32e+3		0.03	5.64E-01	,		0.03	0.100	3.51E-01	
TPH-Arom-EC>21-35	1.12e+3		0.03	4 75E-01			0.03	0.100	2.95E-01	
TPH-Aliph-EC 5-6	0.00e+0		0.06	0.00E+00			0.06	0.100	0.00E+00	
TPH-Aliph-EC>6-8	0.00e+0		0.06	0.00E+00			0.06	0.100	0.00E+00	
TPH-Aliph-EC>8-10	1.98e+2		0.10	2.53E-02			0.10	0.100	1.57E-02	
TPH-Aliph-EC>10-12	6.65e+2		0.10	8.50E-02			0.10	0.100	5.28E-02	
TPH-Aliph-EC>12-16	1.69e+3		0.10	2.16E-01			0.10	0.100	1.34E-01	
TPH-Aliph-EC>16-35	3.83e+3		2.00	2.45E-02			2.00	0.100	1.52E-02	
NOTES:										
Conc(soil) = Concentration in soil (0-15 feet)		RfD = Reference	: Dose		IR <sub>sell</sub> = Inge	stion rate	•,	SA = skin su	irface area	
Risk = Carcinogenic Risk SF = Slope Factor		BW = body weig AT = averaging 1	ht time		EF = expos ED = expos	ure frequency ure duration		AF = adherei ABS = derma	nce factor al absorption frac	tion
HQ = Hazard Quotient										

Calculation of Risk Resident -- Combined Risk for Soil Texas-New Mexico Pipe Line Co.

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If On-Site: Risk<sub>res-SolL</sub> = Risk<sub>ING</sub> + Risk<sub>DER</sub> + Risk<sub>INHAL</sub>

If Off-Site: Risk<sub>res-SolL</sub> = Risk<sub>INHAL</sub>

of Concern         or HQ <sub>hest</sub>	Constituent	Risking	Risk	Riskinhal	Riskres-soil
Carcinogens         Concerton         6.02E-07         7.74E-07           Benzene         1.71E-07         0.00E+00         6.02E-07         7.74E-07           Benzene         1.71E-07         4.96E-03         4.96E-03         4.56F-08           Non-Carcinogens         5.50E-03         9.73E-04         1.61E-04         6.04E-03           Naphthalene         5.50E-03         9.73E-04         1.61E-04         2.70E-03           Pyrene         1.57E-03         9.73E-04         1.33E-04         5.12E-04           Pyrene         1.276E-03         3.65E-04         1.33E-04         1.33E-04         5.12E-04           Pyrene         1.276E-03         3.65E-04         1.33E-04         1.33E-03         2.71E-03           Naphthalene         6.34E-04         1.37E-04         1.33E-04         1.33E-04         1.32E-04           Pyrene         1.276E-03         3.65E-04         1.00E+00         1.02E-01         2.97E+00           Toluene         1.276E-03         1.06E+00         1.02E-01         1.22E-03         1.22E-03         1.22E-03           TPH-Arom-EC>10-12         1.28E-03         1.00E+00         1.00E+00         1.02E-01         1.27E-03           TPH-Arom-EC>210-12         2.96E-01 <t< th=""><th>of Concern</th><th>or HQ<sub>ING</sub></th><th>or HQ<sub>DER</sub></th><th>or HQ<sub>INHAL</sub></th><th>or HQres-soil</th></t<>	of Concern	or HQ <sub>ING</sub>	or HQ <sub>DER</sub>	or HQ <sub>INHAL</sub>	or HQres-soil
Benzene         1.71E-07         0.00E+00         6.02E-07         7.74E-07           Chrysene         4.96E-03         1.71E-07         0.00E+00         6.02E-07         7.74E-07           Chrysene         4.96E-03         4.96E-03         4.57E-03         4.67E-03         4.67E-03           Non-Carcinogens         5.50E-03         0.00E+00         5.40E-04         6.04E-03         4.67E-03           Naphthalene         1.57E-03         9.75E-04         1.61E-04         2.70E-03         2.70E-03           Prenanthrene         1.57E-03         3.42E-04         1.38E-07         2.71E-05         6.78E-03           Pyrene         1.21E-03         3.42E-04         1.38E-07         2.74E-03         2.41E-03           Xylene (mixed isomers)         1.77E+00         1.10E+00         1.20E-03         2.41E-03         2.75E-03           Xylene (mixed isomers)         3.68E-04         1.00E+00         2.33E-03         2.41E-03         2.41E-03           Xylene (mixed isomers)         1.77E+03         1.38E-01         1.38E-07         2.41E-03         2.41E-03           Xylene (mixed isomers)         1.77E+03         1.38E-03         1.38E-03         2.41E-03         2.41E-03           Xylene (mixed isomers)         1.77E+03	Carcinogens				
Chrysene         4.96E-09         4.18E-08         2.06E-12         4.67E-08           Non-Carcinogens         5.50E-03         0.00E+00         5.40E-04         6.04E-03           Rihylbenzene         1.57E-03         9.73E-04         1.61E-04         2.70E-03           Rihylbenzene         1.57E-03         9.73E-04         1.61E-04         2.70E-03           Namuthene         6.38E-03         3.65E-04         1.61E-04         2.70E-03           Phenauthrene         1.70E-04         3.42E-04         1.61E-04         2.70E-03           Pyrene         1.70E-04         3.42E-04         1.38E-07         5.12E-04         2.76E-03           Toluene         1.70E-03         3.65E-04         1.00E+00         1.26E-03         2.41E-03         2.41E-03           TPH-Arom-EC>+10         1.27E+00         1.77E+00         1.10E+00         1.37E-03         2.41E-03           TPH-Arom-EC>+12-16         2.56E-01         1.37E-02         2.41E-03         2.41E-03         2.41E-03           TPH-Arom-EC>+12-16         2.56E-01         1.37E-02         1.37E-03         1.22E-01         1.37E-02           TPH-Arom-EC>+13         2.56E-01         1.36E-01         2.41E-03         2.41E-01         2.75E-03         1.22E-03	Benzene	1.71E-07	0.00E+00	6.02E-07	7.74E-07
Non-Carcinogens         5.50E-03         0.00E+00         5.40E-04         6.04E-03         6.04E-03         5.40E-04         6.04E-03         5.40E-04         6.04E-03         5.40E-04         6.04E-03         5.70E-03         5.72E-04         5.72E-04         5.72E-03         5.72E-03         5.72E-03         5.72E-03         5.72E-03         2.71E-05         5.72E-03         2.71E-03         2.97E+00         2.97E+01         2.27E+03         2.24E+01         2.25E+01         2.27E+03	Chrysene	4.96E-09	4.18E-08	2.06E-12	4.67E-08
Morr-andiagens         5.50E-03         0.00E+00         5.40E-04         6.04E-03           Rtylbenzene         1.57E-03         9.73E-04         1.61E-04         2.70E-03           Naphthalene         6.39E-03         3.53E-04         1.38E-07         6.76E-03           Pyrene         1.70E-04         3.42E-04         1.38E-07         6.74E-03           Pyrene         1.70E-04         3.42E-04         1.38E-07         5.12E-03           Sylene (mixed isomers)         1.21E-03         0.00E+00         2.33E-03         2.41E-03           Xylene (mixed isomers)         1.77E+00         1.10E+00         1.20E-01         2.97E+00           TPH-New Method         1.77E+00         1.10E+00         2.33E-03         2.97E+00           TPH-New Method         1.10E+00         1.38E-07         5.92E-01         1.22E-01           TPH-Arom-EC>10-12         7.73E-01         1.37E-02         1.27E-01         1.22E-01           TPH-Arom-EC>10-12         7.03E-01         2.35E-03         2.46E-02         1.23E-01           TPH-Arom-EC>10-12         7.03E-01         2.35E-03         2.46E-02         1.27E-01           TPH-Arom-EC>10-12         2.95E-01         1.33E-02         1.37E-02         1.23E-01           TP					
Ethylbenzene         5.50E-03         0.00E+00         5.40E-04         6.04E-03           Naphthalene         1.57E-03         9.73E-04         1.61E-04         2.77E-03           Phenanthrene         1.57E-03         3.42E-04         1.61E-04         2.77E-03           Pyrene         1.70E-04         1.57E-03         3.63E-04         1.61E-04         2.77E-03           Pyrene         1.70E-04         3.63E-04         1.61E-04         2.71E-05         6.78E-03           Pyrene         1.70E-04         3.63E-04         1.21E-03         3.63E-04         1.51E-03         2.71E-05           Toluene         1.70E-04         1.21E-03         0.00E+00         1.23E-03         2.41E-03         2.41E-03           TPH-Arom-EC>10         1.21E-03         0.00E+00         1.77E+00         1.20E-01         2.97E+00           TPH-Arom-EC>10-12         1.28E-02         7.35E-03         1.22E-03         1.22E-03         2.40E-02           TPH-Arom-EC>10-12         2.95E-01         1.88E-07         3.55E-03         1.22E-03         1.22E-01           TPH-Arom-EC>10-12         2.95E-01         1.35E-02         1.37E-02         9.47E-01         1.37E-02           TPH-Arom-EC>21-621         5.64E-01         2.95E-01 <td< td=""><td>NON-Cal Cinogens</td><td></td><td></td><td></td><td></td></td<>	NON-Cal Cinogens				
Naphthalene         1.57E-03         9.73E-04         1.61E-04         2.70E-03           Phenanthrene         1.70E-04         3.42E-04         1.50E-03         5.12E-04           Pyrene         1.70E-04         3.42E-04         1.38E-07         5.12E-04           Toluene         3.42E-04         1.20E-03         5.12E-03         5.12E-04           Toluene         1.77E+00         1.21E-03         0.000E+00         1.26E-01         2.41E-03           Xylene (mixed isomers)         3.66E-04         1.77E+00         1.10E+00         1.20E-03         2.41E-03           TPH-Arom-EC>8-10         1.77E+00         1.10E+00         1.02E-01         2.97E+00           TPH-Arom-EC>1-12         7.35E-03         1.02E-01         2.97E+00           TPH-Arom-EC>10-12         7.35E-03         1.37E-02         4.97E-01           TPH-Arom-EC>10-12         7.35E-03         1.27E-03         1.27E-01           TPH-Arom-EC>10-12         7.35E-03         1.27E-03         1.27E-03           TPH-Arom-EC>10-12         2.95E-01         3.351E-01         3.351E-01           TPH-Arom-EC>10-12         2.95E-01         3.351E-01         3.351E-02         7.37E-02           TPH-Arom-EC>10         0.00E+000         0.00E+000	Ethylbenzene	5.50E-03	0.00E+00	5.40E-04	6.04E-03
Phenanthrene         6.39E-03         3.63E-04         2.11E-05         6.78E-03           Pyrene         1.70E-04         3.42E-04         1.38E-07         5.12E-04           Toluene         1.70E-04         3.42E-04         1.21E-03         5.12E-04           Toluene         1.77E+00         1.21E-03         0.00E+00         2.41E-03         2.41E-03           Xylene (mixed isomers)         3.69E-04         1.77E+00         1.10E+00         1.22E-01         2.41E-03           TPH-Arom-EC>8-10         1.77E+00         1.10E+00         2.33E-03         2.46E-01         2.97E+00           TPH-Arom-EC>10-12         7.03E-01         1.36E-01         2.27E-03         2.46E-01         2.47E-01           TPH-Arom-EC>12-16         2.95E-01         1.83E-01         3.19E-02         4.75E-01         2.47E-01           TPH-Arom-EC>21-35         1.00E+00         1.37E-02         4.75E-01         3.42E-04         4.75E-01           TPH-Arom-EC>16-21         5.64E-01         3.51E-01         3.19E-02         4.92E-01         4.75E-01           TPH-Arom-EC>216-35         0.00E+000         0.00E+000         0.00E+000         0.00E+000         0.00E+000         0.00E+000           TPH-Aliph-EC>16-35         2.46E-01         1.57E-02	Naphthalene	1.57E-03	9.73E-04	1.61E-04	2.70E-03
Pyrene         1.70E-04         3.42E-04         1.38E-07         5.12E-04           Toluene         0.006 +00         1.21E-03         0.006 +00         1.20E-03         2.41E-03           Xylene (mixed isomers)         3.69E-04         0.006 +00         1.20E-03         2.41E-03         2.41E-03           Xylene (mixed isomers)         3.69E-04         0.006 +00         1.20E-01         2.41E-03         2.41E-03           TPH - New Method         1.77E+00         1.10E +00         2.33E-03         2.97E+00         2.47E-01           TPH - Arom-EC>101         1.28E-02         7.95E-03         1.02E-01         2.47E-01         2.47E-01           TPH - Arom-EC>12-16         2.95E-01         1.83E-01         3.51E-01         3.51E-01         3.52E-03         1.22E-01           TPH - Arom-EC>12-16         2.95E-01         1.83E-01         3.51E-01         3.51E-01         3.75E-02         4.92E-01           TPH - Arom-EC>135         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00         9.47E-01           TPH - Aliph-EC>6         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00 <t< td=""><td>Phenanthrene</td><td>6.39E-03</td><td>3.63E-04</td><td>2.11E-05</td><td>6.78E-03</td></t<>	Phenanthrene	6.39E-03	3.63E-04	2.11E-05	6.78E-03
Toluene         1.21E-03         0.00E+00         1.20E-03         2.41E-03         2.41E-03         2.41E-03         2.41E-03         2.41E-03         2.41E-03         2.41E-03         2.41E-03         2.41E-03         2.40E-03         2.41E-03         2.40E-03         2.41E-03         2.69E-03         2.47E+00         1.77E+00         1.77E+00         1.10E+00         1.02E-01         2.97E+00         2.40E-02         2.40E-02         2.40E-02         2.40E-02         2.40E-02         2.47E-01         2.27E-03         1.22E-01         1.22E-01         1.22E-01         1.22E-01         2.27E-03         1.27E-02         2.47E-01         2.27E-03         1.27E-01         2.27E-03         1.27E-01         2.27E-03         1.27E-01         2.27E-03         1.27E-01         2.27E-03         2.47E-01         2.27E-03         2.47E-01         2.27E-03         2.47E-01         2.27E-03         2.27E-03         2.27E-03         2.27E-03         2.27E-03	Pyrene	1.70E-04	3.42E-04	1.38E-07	5.12E-04
Xylene (mixed isomers)         3.69E-04         0.00E +00         2.33E-03         2.69F=03           TPH - New Method         1.77E+00         1.77E+00         1.10E+00         2.33E-03         2.697E+00           TPH - New Method         1.77E+00         1.10E+00         1.28E-02         7.95E-03         2.40E-02           TPH - Arom-EC>10         1.28E-02         7.95E-03         3.25E-03         1.22E-01           TPH - Arom-EC>10-12         7.03E-02         7.95E-01         1.37E-02         1.22E-01           TPH - Arom-EC>16-21         5.64E-01         3.51E-01         3.19E-02         7.52E-03         1.22E-01           TPH - Arom-EC>16-21         5.64E-01         3.51E-01         3.19E-02         7.75E-01         9.47E-01           TPH - Arom-EC>16-21         5.64E-01         3.51E-01         2.35E-02         7.77E-02         9.47E-01           TPH - Arom-EC>16-21         5.64E-01         2.95E-01         2.95E-01         2.27F-03         7.77E-01           TPH - Aliph-EC>6-8         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH - Aliph-EC>12         2.53E-02         1.57E-02         1.57E-02         1.57E-01         1.57E-01           TPH - Aliph-EC>12         2.45E-02         1	Toluene	1.21E-03	0.00E+00	1.20E-03	2.41E-03
TPH - New Method         1.77E+00         1.10E+00         1.02E-01         2.97E+00           TPH - Arom-EC>8-10         1.77E+00         1.10E+00         1.02E-01         2.97E+00           TPH - Arom-EC>10         1.28E-02         7.95E-03         3.25E-03         2.40E-02           TPH - Arom-EC>10-12         7.03E-02         7.95E-01         1.22E-01         1.22E-01           TPH - Arom-EC>12-16         2.96E-01         1.83E-01         1.37E-02         4.75E-01           TPH - Arom-EC>12-15         2.95E-01         3.51E-01         3.19E-02         9.47E-01           TPH - Arom-EC>135         2.95E-01         3.51E-01         3.19E-02         9.47E-01           TPH - Arom-EC>16-21         5.64E-01         2.95E-01         1.37E-02         9.47E-01           TPH - Ariph-EC>6         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH - Aliph-EC>6-8         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH - Aliph-EC>10-12         8.50E-02         1.57E-02         1.37E-02         1.52E-01         1.57E-01           TPH - Aliph-EC>10-12         2.16E-01         1.34E-01         1.37E-02         1.52E-01         1.57E-02         1.57E-02      <	Xylene (mixed isomers)	3.69E-04	0.00E+00	2.33E-03	2.69E-03
TPH-Arom-EC>8-10         1.28E-02         7.95E-03         3.25E-03         2.40E-02           TPH-Arom-EC>10-12         7.03E-02         7.37E-02         7.52E-03         1.22E-01           TPH-Arom-EC>10-12         7.03E-02         4.37E-02         7.52E-03         1.22E-01           TPH-Arom-EC>12-16         2.95E-01         1.83E-01         3.51E-01         3.37E-02         4.92E-01           TPH-Arom-EC>16-21         5.64E-01         3.51E-01         3.51E-01         3.19E-02         9.47E-01           TPH-Arom-EC>16-21         5.64E-01         3.51E-01         3.19E-02         7.73E-01         9.47E-01           TPH-Arom-EC>16-21         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH-Aliph-EC>6-8         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH-Aliph-EC>10-12         8.50E-02         1.57E-02         1.57E-02         1.57E-02         1.57E-01           TPH-Aliph-EC>10-12         2.46E-02         1.57E-02         1.57E-02         1.57E-01         1.52E-01           TPH-Aliph-EC>10-12         2.16E-01         1.57E-02         1.37E-02         1.52E-01         1.57E-02           TPH-Aliph-EC>16-35         2.46E-02         1.52E-02	TPH - New Method	1.77E+00	1.10E+00	1.02E-01	2.97E+00
TPH-Arom-EC>8-10 $1.28E-02$ $7.95E-03$ $3.25E-03$ $2.40E-02$ TPH-Arom-EC>10-12 $7.03E-02$ $7.37E-02$ $7.52E-03$ $1.22E-01$ TPH-Arom-EC>10-12 $7.03E-02$ $7.37E-02$ $7.52E-03$ $1.22E-01$ TPH-Arom-EC>12-16 $2.95E-01$ $1.83E-01$ $3.51E-01$ $3.752E-03$ $1.22E-01$ TPH-Arom-EC>12-15 $2.95E-01$ $3.51E-01$ $3.51E-01$ $3.77E-02$ $4.92E-01$ TPH-Arom-EC>16-21 $5.64E-01$ $3.51E-01$ $3.77E-02$ $9.47E-01$ TPH-Ariph-EC>6 $0.00E+00$ $0.00E+00$ $0.00E+00$ $0.00E+00$ TPH-Aliph-EC>8 $0.00E+00$ $0.00E+00$ $0.00E+00$ $0.00E+00$ TPH-Aliph-EC>8-10 $2.53E-02$ $1.57E-02$ $1.57E-02$ $1.57E-02$ TPH-Aliph-EC>10-12 $8.50E-02$ $1.57E-02$ $1.37E-02$ $1.52E-01$ TPH-Aliph-EC>10-12 $2.45E-02$ $1.52E-02$ $1.52E-02$ $1.52E-01$ TPH-Aliph-EC>10-13 $2.45E-02$ $1.52E-02$ $1.37E-02$ $1.52E-01$ TPH-Aliph-EC>10-13 $2.45E-02$ $1.52E-02$ $4.11E-03$ $4.38E-02$					
TPH-Arom-EC>10-12         7.03E-02         4.37E-02         7.52E-03         1.22E-01           TPH-Arom-EC>12-16         2.95E-01         1.83E-01         1.37E-02         4.92E-01           TPH-Arom-EC>12-16         2.95E-01         1.83E-01         1.37F-02         4.92E-01           TPH-Arom-EC>12-16         5.64E-01         3.51E-01         3.19E-02         9.47E-01           TPH-Arom-EC>16-21         5.64E-01         3.51E-01         3.19E-02         9.47E-01           TPH-Arom-EC>16-21         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH-Aliph-EC<5-6	TPH-Arom-EC>8-10	1.28E-02	7.95E-03	3.25E-03	2.40E-02
TPH-Arom-EC>12-16         2.95E-01         1.83E-01         1.37E-02         4.92E-01           TPH-Arom-EC>16-21         5.64E-01         3.51E-01         3.19E-02         9.47E-01           TPH-Arom-EC>16-21         5.64E-01         3.51E-01         3.19E-02         9.47E-01           TPH-Arom-EC>1-35         4.75E-01         3.51E-01         3.19E-02         9.47E-01           TPH-Arom-EC>21-35         4.75E-01         2.95E-01         0.00E+00         0.00E+00           TPH-Aliph-EC>6-8         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH-Aliph-EC>6-8         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH-Aliph-EC>910         2.53E-02         1.57E-02         9.40E-03         5.04E-02           TPH-Aliph-EC>10-12         8.50E-02         1.34E-01         1.37E-02         1.52E-01           TPH-Aliph-EC>10-13         2.46E-02         1.52E-02         4.11E-03         4.38E-02	TPH-Arom-EC>10-12	7.03E-02	4.37E-02	7.52E-03	1.22E-01
TPH-Arom-EC>16-21         5.64E-01         3.51E-01         3.19E-02         9.47E-01           TPH-Arom-EC>16-21         5.64E-01         3.51E-01         3.19E-02         9.47E-01           TPH-Arom-EC>21-35         4.75E-01         2.95E-01         2.27E-03         7.73E-01           TPH-Aliph-EC<5-6	TPH-Arom-EC>12-16	2.95E-01	1.83E-01	1.37E-02	4.92E-01
TPH-Arom-EC>21-35         4.75E-01         2.95E-01         2.27E-03         7.73E-01           TPH-Ariph-EC 5-6         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH-Aliph-EC 5-8         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH-Aliph-EC>6-8         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH-Aliph-EC>6-8         0.00E+00         0.00E+00         0.00E+00         0.00E+00         0.00E+00           TPH-Aliph-EC>8-10         2.53E-02         1.57E-02         9.40E-03         5.04E-02           TPH-Aliph-EC>10-12         8.50E-02         5.28E-02         1.37E-02         1.52E-01           TPH-Aliph-EC>12-16         2.16E-01         1.34E-01         1.61E-02         3.66E-01           TPH-Aliph-EC>16-35         2.45E-02         1.52E-02         4.11E-03         4.38E-02	TPH-Arom-EC>16-21	5.64E-01	3.51E-01	3.19E-02	9.47E-01
TPH-Aliph-EC 5-6         0.00E+00	TPH-Arom-EC>21-35	4.75E-01	2.95E-01	2.27E-03	7.73E-01
TPH-Aliph-EC>6-8         0.00E+00         0.00E+01         1.52E-01         1.52E-01         1.52E-01         1.52E-01         1.52E-01         1.52E-01         1.52E-01         1.52E-01         1.52E-01         3.66E-01         3.66E-01         3.66E-01         1.52E-02         4.11E-03         4.38E-02	TPH-Aliph-EC 5-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TPH-Aliph-EC>8-10         2.53E-02         1.57E-02         9.40E-03         5.04E-02           TPH-Aliph-EC>10-12         8.50E-02         5.28E-02         1.37E-02         1.52E-01           TPH-Aliph-EC>12-16         2.16E-01         1.34E-01         1.52E-01         3.66E-01           TPH-Aliph-EC>12-16         2.45E-02         1.52E-02         4.11E-02         4.38E-02	TPH-Aliph-EC>6-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TPH-Aliph-EC>10-12         8.50E-02         5.28E-02         1.37E-02         1.52E-01           TPH-Aliph-EC>12-16         2.16E-01         1.34E-01         1.61E-02         3.66E-01           TPH-Aliph-EC>12-15         2.45E-02         1.52E-02         4.11E-03         4.38E-02	TPH-Aliph-EC>8-10	2.53E-02	1.57E-02	9.40E-03	5.04E-02
TPH-Aliph-EC>12-16         2.16E-01         1.34E-01         1.61E-02         3.66E-01           TPH-Aliph-EC>16-35         2.45E-02         1.52E-02         4.11E-03         4.38E-02	TPH-Aliph-EC>10-12	8.50E-02	5.28E-02	1.37E-02	1.52E-01
TPH-Aliph-EC>16-35 2.45E-02 1.52E-02 4.11E-03 4.38E-02	TPH-Aliph-EC>12-16	2.16E-01	1.34E-01	1.61E-02	3.66E-01
	TPH-Aliph-EC>16-35	2.45E-02	1.52E-02	4.11E-03	4.38E-02

Risk = Carcinogenic Risk HQ = Hazard Quotient

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For non-carcinogens:	HQ = C	conc <sub>soll</sub> * (V	rF + PEF)	* IR <sub>air</sub> * E	F * (1/RfC	* W8 / (0	365				
	VF = (;	2 * Dei * E ·	* Kas * 10	-3 ) / ( FS	H0 * V * ;	/A)*(3	.14 * alph	a * ED * 3	.15E+7 ) <sup>0</sup>	чç	
Constituent	Concso	SF	RfD	Dei	Кd	Ŧ	Kas	alpha	ΥF	Risk	
of Concern	(mg/kg)	(1/mg/kg-d)	(mg/kg-d)	(cm <sup>2</sup> /sec)	(cm³/g)	1	(g /cm³)	(cm <sup>2</sup> /sec)	(m³/kg)	or HQ	
Carcinogens											
Benzene	3.48e+0	2.91e-2		2.05e-2	8.32e-1	2.32e-1	2.80e-1	9.70e-4	7.40e-5	5.48e-8	
Chrysene	4.00e-1	6.10e-3		5.45e-3	2.00e+3	4.37e-5	2.19e-8	2.12e-11	1.04e-8	1.86e-13	
							,	T	otal Risk:	5.48e-8	
Non-Carcinogens			1 000 1	1 6 4 5 5		1 575 0		7 4 0 0 1	1 010 1	6 120 2	
Ethylbenzene	4.3Ue+1		Z.808-1	1.04e-2	1.1ue+1	Z.D/e-1	7-946-7	C-901.7	C-916.1	0.136-3	
Naphthalene	4.90e+0		4.00e-2	1.30e-2	1.29e+1	5.38e-2	4.17e-3	9.61e-6	7.02e-6	1.83e-3	
Phenanthrene	2.00e+0		4.00e-3	1.19e-3	1.41e+2	6.63e-3	4.69e-5	9.89e-9	2.25e-7	2.40e-4	
Pyrene	4.00e-1		3.00e-2	5.98e-3	3.80e+2	2.13e-4	5.59e-7	5.94e-10	5.51e-8	1.57e-6	
Toluene	1.89e+1		1.14e-1	1.84e-2	3.02e+0	2.65e-1	8.77e-2	2.83e-4	3.86e-5	1.37e-2	
Xylene (mixed isomers)	5.77e+1		2.00e-1	1.63e-2	2.40e+0	2.93e-1	1.22e-1	3.45e-4	4.29e-5	2.64e-2	
TPH - New Method	1.00e+4									1.16e+0	
								Haza	rd Index:	1.21e+0	
TPH-Arom-EC>8-10	4.00e+1		5.71e-2	2.20e-2	1.58e+1	4.84e-1	3.05e-2	1.19e-4	2.48e-5	3.70e-2	
TPH-Arom-EC>10-12	2.20e+2		5.71e-2	2.20e-2	2.51e+1	1.36e-1	5.42e-3	2.12e-5	1.04e-5	8.55e-2	
TPH-Arom-EC>12-16	9.23e+2		5.71e-2	2.20e-2	5.01e+1	5.16e-2	1.03e-3	4.02e-6	4.54e-6	1.56e-1	
TPH-Arom-EC>16-21	1.32e+3		3.00e-2	2.20e-2	1.58e+2	1.18e-1	7.43e-4	2.90e-6	3.85e-6	3.63e-1	
TPH-Arom-EC>21-35	1.12e+3		3.00e-2	2.20e-2	1.26e+3	6.65e-3	5.29e-6	2.06e-8	3.25e-7	2.58e-2	
TPH-Aliph-EC 5-6	0.00e+0		5.71e-2	2.20e-2	7.94e+0	3.28e+1	4.12e+0	9.29e-3	3.78e-4	0.00e+0	
TPH-Aliph-EC>6-8	0.00e+0		5.71e-2	2.20e-2	3.98e+1	4.85e+1	1.22e+0	3.91e-3	1.72e-4	0.00e+0	
TPH-Aliph-EC>8-10	1.98e+2		2.86e-1	2.20e-2	3.16e+2	7.92e+1	2.51e-1	9.37e-4	7.23e-5	1.07e-1	
TPH-Aliph-EC>10-12	6.65e+2		2.86e-1	2.20e-2	2.51e+3	1.23e+2	4.91e-2	1.90e-4	3.15e-5	1.56e-1	
TPH-Aliph-EC>12-16	1.69e+3		2.86e-1	2.20e-2	5.01e+4	5.25e+2	1.05e-2	4.09e-5	1.45e-5	1.83e-1	
TPH-Aliph-EC>16-35	3.83e+3		2.00e+0	2.20e-2	1.00e+7	6.57e+4	6.57e-3	2.56e-5	1.15e-5	4.67e-2	
VOTES:											
Conc(soil) = Concentration in soil (0-15 feet)		BW = body w	eight		V = Velocity	of Wind			H' = unitless	Henry's Law Co	onstant
Risk = Carcinogenic Risk SF = Stone Factor		AT = averagin IRA = Inhalati	ig time on rate		DH = Diffusic A = Area of S	in Height Soil Source			Kd = organic foc = fraction	carbon partition organic carbor	n coefficient *
un – Hazard Oriotiant		FF = exnosit	e frequency		B = Bulk Soil	Density			$Kas = H'/K_{0}$	T	
			e di tration		E = Effortivo	Domeihv			alnha = Dei *	F//F+B/K	1 20
KIU ≈ Kelerence Dose		EU - Exposu					1				1 1
DAF = Ditution attenuation factor		LS = Length o	of Source Are	g	Dei = effectiv	e diffusion co	efficient		PEF = Partici	ulate Emission:	s Factor

Calculation of Risk Construction Worker – Inhalation of Volatiles from Soil

(kg/m³) 4.58e-11 PEF 1 0.0 foc 0.32 шТ (g/cc) 1.80 Ω 109 ۲ (m 50 J DH 0.49 (s/ш) > S E ഹ (years) ED 12 (days/yr) Ш ഹ (m<sup>3</sup>/day) 20 lRair 70 (kg) Texas-New Mexico Pipe Line Co. Lea County, New Mexico TNM-96-15

For carcinogens: Risk = Conc<sub>soll</sub> \* (VF + PEF) \* IR<sub>alr</sub> \* EF \* ED \* SF / BW \* 70 \* 365

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Calculation of Risk Construction Worker – Ingestion of Soil & Dermal Contact with Soil

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Texas-New Mexico Pipe Line Co.	BW	СF	IRsoil	EF	ED	EF <sub>dermal</sub>	SA	AF
TNM-96-15	(kg)	(mg/kg)	(mg/day)	(days/yr)	(years)	(days/yr)	(cm²)	(mg/cm <sup>2</sup> )
Lea County, New Mexico	0/	1.00E+06	480	5	12	5	3,300	0.12
For carcinogens:	Risk <sub>ing</sub> :	= Conc <sub>soll</sub> *	IR <sub>soll</sub> * EF	* ED * SF	/ BW * 7	0 * 365 * CF		
	Risk <sub>per</sub>	= Conc <sub>soli</sub> *	SA * AF	* ABS * EF	S * ED *	SF / BW * 70	* 365 * (	Ľ.
For non-carcinogens:	HQ <sub>ING</sub> =	Conc <sub>soll</sub> * II	R <sub>soll</sub> * EF *	(1/RfD) / I	30 * 36	5 * CF		
	HQ <sub>der</sub> =	Conc <sub>soll</sub> * 5	SA * AF* /	ABS*EF*	(1/RfD)	/ BW * 365 *	CF	

Interaction         Interact Induction         Interact Indu	Constituent of Concern	Conc <sub>solt</sub>	SFO	RfDo	Risk <sub>ing</sub>		SFd	RfDd	ABS	Risk <sub>DER</sub>
		(Ru/Run)	(n-Ru/Ruini)	1-5-5-1	DNIN	_1_	(n-fru/fru/)	(n-Ru/Run)		CI - CUEK
care $3.48+0$ $0.023$ $1.63E-09$ $0.002$ $0.002-00$ $0.000-00$ $0.000-00$ sere $4.706-11$ $1.061$ $1.616$ $1.010$ $1.63E-11$ $1.63E-11$ Carcinogens $4.30e+1$ $0.010$ $2.025$ $0.002$ $0.002$ $0.002$ $0.002$ $0.002$ $0.000$ $0.000-0$ Bencene $4.30e+1$ $0.10$ $5.75E-04$ $0.001$ $0.100$ $4.75E-05$ Bencene $2.00+0$ $0.004$ $5.75E-04$ $0.002$ <td>inogens</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	inogens									
Sene         4.00e-1         0.073         4.70E-11         0.0236         0.130         1.63e-11           Carcinogens         2         0.10         7.01al Risk:         1.67e-9         0.010         0.000 </td <td>tene</td> <td>3.48e+0</td> <td>0.029</td> <td></td> <td>1.63E-09</td> <td></td> <td>0.029</td> <td></td> <td>0.000</td> <td>0.00E+00</td>	tene	3.48e+0	0.029		1.63E-09		0.029		0.000	0.00E+00
Total Risk:         1 67-9         Total Risk:         1 67-9         Total Risk:         1 63-11           Garcinogens $4.30e+1$ $0.10$ $2.02-0.3$ $0.10$ $0.00$ $0.06+0.5$ hanne $4.30e+1$ $0.10$ $2.75\pm0.4$ $0.01$ $0.10$ $0.00$ $0.06+0.5$ anthrene $2.00e+0$ $0.00$ $2.35\pm0.3$ $0.01$ $0.10$ $0.17\pm0.5$ anthrene $4.30e+1$ $0.02$ $3.55\pm0.3$ $0.02$ $0.00$ $0.00\pm0.0$ anthrene $4.30e+1$ $0.03$ $5.56-01$ $1.77\pm0.3$ $0.00$ $0.06\pm0.0$ ne (mixed isomers) $5.77e+1$ $2.00$ $1.00e+3$ $5.76-01$ $1.77\pm0.5$ Arom EC>10-12 $2.00e+10$ $0.04$ $4.76-0.3$ $0.00-0.000+00$ $5.36e.02$ Arom EC>10-12 $2.20e+10$ $0.04$ $4.76-0.3$ $0.01$ $0.100$ $0.06+00$ Arom EC>10-12 $2.20e+2$ $0.04$ $1.06+3$ $0.04$ $0.02$ $0.02$ $0.02$ Arom EC>	sene	4.00e-1	0.0073		4.70E-11		0.0236		0.130	1.63E-11
Carcinogens         Carcinogens <thcarcinogens< th=""> <thcarcinogens< th=""></thcarcinogens<></thcarcinogens<>			Te	otal Risk:	1.67e-9			Ţ	otal Risk:	1.63e-11
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	-Carcinogens									
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	lbenzene	4.30e+1		0.10	2.02E-03			0.10	0.000	0.00E+00
anthrene         200e+0         0.00         2.35E-03         0.02         0.050         1.77E-05           ne         4.00e+1         0.03         6.26E-05         0.01         0.100         1.67E-05           ere         (mixed isomers)         5.77e+1         2.00         1.36E-04         0.00         0.01         0.100         1.67E-05           ere         (mixed isomers)         5.77e+1         2.00         1.36E-04         0.20         0.00         0.00E+00           ne         (mixed isomers)         5.77e+1         2.00         1.36E-04         0.20         0.00         0.00E+00           nom-EC>8-10         4.00e+1         0.024         4.00E-03         2.36E-02         0.04         0.100         3.77E-04           Arom-EC>12-16         9.23e+2         0.04         1.010         3.87E-04         5.37E-01           Arom-EC>12-15         1.12e+3         0.03         1.77E-01 <b>Mazard Index</b> 5.37E-01           Arom-EC>135         1.12e+3         0.03         1.77E-01         0.04         0.100         1.71E-02           Arom-EC>135         1.12e+3         0.03         0.04         0.100         1.71E-02           Arom-EC>135         0.03	nthalene	4.90e+0		0.04	5.75E-04			0.04	0.100	4.75E-05
ne         4.00e-1         0.03         5.26E-05         0.01         0.100         1.67E-05           ne         1.89e+1         0.20         4.44E-04         0.20         0.01         0.100         1.67E-05           ne         1.89e+1         0.20         4.44E-04         0.20         0.36E-01         0.000         0.00E+00           ne         1.00e+4         1.00e+4         2.00         1.36E-03         5.77e+1         2.00         0.026+00         0.00E+00           Nom-EC>8-10         4.00e+1         0.04         0.010         0.02         0.000         0.016+00         5.37e-2           Arom-EC>10-12         2.20e+2         0.04         1.06E+10         5.37e-3         0.024         0.024         0.010         3.7E-03           Arom-EC>10-12         2.20e+2         0.04         1.00E+10         3.7E-03         3.7E-03         3.7E-03         0.024         0.026         0.000         0.00E+00         0.010         0.17E-02         3.7E-02         0.026+00         0.006+00         0.166         0.000         0.006+00         0.166         0.000         0.006+00         0.166         0.000         0.006+00         0.010         0.17E-02         0.010         0.166         0.000 <th< td=""><td>anthrene</td><td>2.00e+0</td><td></td><td>0.00</td><td>2.35E-03</td><td></td><td></td><td>0.02</td><td>0.050</td><td>1.77E-05</td></th<>	anthrene	2.00e+0		0.00	2.35E-03			0.02	0.050	1.77E-05
ene         189e+1         0.20         4.44E-04         0.20         0.000         0.006+00 <td>ne</td> <td>4.00e-1</td> <td></td> <td>0.03</td> <td>6.26E-05</td> <td></td> <td></td> <td>0.01</td> <td>0.100</td> <td>1.67E-05</td>	ne	4.00e-1		0.03	6.26E-05			0.01	0.100	1.67E-05
ne (mixed isomers)         5.77e+1         2.00         1.36E-04         2.00         0.000         0.00E+00         5.36E-02           1- New Method         1.00e+4         Hzzard Index:         6.50E-01         Hzzard Index:         5.37e-2         5.36E-02           Arom-EC>8-10         4.00e+1         0.04         4.70E-03         0.04         0.100         3.87E-04           Arom-EC>8-10         2.20e+2         0.04         2.58E-02         0.04         0.100         3.87E-04           Arom-EC>10-12         2.20e+2         0.04         2.13E-03         0.04         0.100         8.94E-03           Arom-EC>10-12         2.20e+2         0.04         1.08E-01         0.04         0.100         8.94E-03           Arom-EC>10-12         0.206+00         0.060+00         0.06E+00         0.04         0.100         1.41E-02           Arom-EC>10-12         0.206+00         0.06E+00         0.06E+00         0.060         0.006+00         0.066+00           Arom-EC>10-12         0.206+00         0.060         0.006         0.06E+00         0.06         0.006         0.066         0.006         0.066         0.006         0.006         0.006         0.006         0.006         0.010         0.010         0.0	ene	1.89e+1		0.20	4.44E-04			0.20	0.000	0.00E+00
- New Method         1.00e+4 $6.56e-01$ Hazard Index: $6.36E-02$ $3.37E-04$ Arom-EC>8-10         4.00e+1 $0.04$ $4.70E-03$ $0.04$ $0.100$ $3.37E-04$ $5.36e-02$ Arom-EC>10-12         2.20e+2 $0.04$ $4.70E-03$ $0.04$ $0.100$ $3.37E-04$ Arom-EC>10-12         2.20e+2 $0.04$ $1.08E-01$ $0.04$ $0.100$ $3.37E-04$ Arom-EC>12-16 $9.23e+2$ $0.04$ $1.08E-01$ $0.04$ $0.100$ $3.37E-04$ Arom-EC>12-16 $1.32e+3$ $0.03$ $1.75E-01$ $0.04$ $0.100$ $1.74e-02$ Arom-EC>1-15 $1.12e+3$ $0.03$ $1.75E-01$ $0.03$ $0.100$ $1.74E-02$ Ariph-EC5-6 $0.00e+0$ $0.06$ $0.06+0$ $0.03$ $0.100$ $1.74E-02$ Ariph-EC5-6 $0.00e+0$ $0.06$ $0.06+0$ $0.06$ $0.00$ $0.03$ $0.100$ $1.74E-02$ Aliph-EC5-6 $0.00e+0$ $0.06$ $0.06$ $0.06$ <	ne (mixed isomers)	5.77e+1		2.00	1.36E-04			2.00	0.000	0.00E+00
Hazard Index: $6.55e-1$ Hazard Index: $5.37e-2$ Arom-EC>810 $4.00e+1$ $0.04$ $4.70e-63$ $0.04$ $0.100$ $3.87e-04$ Arom-EC>10-12 $2.20e+2$ $0.04$ $1.08e-01$ $0.04$ $0.100$ $3.87e-04$ Arom-EC>10-12 $2.20e+2$ $0.04$ $1.08e-01$ $0.04$ $0.100$ $3.87e-04$ Arom-EC>12-16 $9.23e+2$ $0.04$ $1.08e-01$ $0.04$ $0.100$ $3.87e-04$ Arom-EC>12-16 $1.32e+3$ $0.03$ $1.75E-01$ $0.04$ $0.100$ $1.71E-02$ Arom-EC>21-35 $1.12e+3$ $0.03$ $1.75E-01$ $0.03$ $0.100$ $1.71E-02$ Arom-EC>10 $0.06+0$ $0.06+0$ $0.06+0$ $0.06$ $0.066$ $0.006+00$ Aliph-EC>6 $0.00e+0$ $0.06$ $0.06$ $0.000$ $0.00$ $0.00$ $0.00$ $0.00$ $0.00$ $0.00$ $0.00$ $0.00$ $0.00$ $0.00$ $0.00$ $0.00$ $0.00$ $0.00$	- New Method	1.00e+4			6.50E-01					5.36E-02
Arom-EC>8-104.00e+10.044.70E-030.040.1003.87E-04Arom-EC>10-122.20e+20.041.08E-010.040.1002.13E-03Arom-EC>10-122.20e+20.041.08E-010.040.1002.13E-03Arom-EC>12-169.23e+20.031.75E-010.040.1008.94E-03Arom-EC>12-151.12e+30.031.75E-010.040.1001.71E-02Arom-EC>21-351.12e+30.031.75E-010.030.1001.74E-02Arom-EC>21-350.00e+00.060.006+000.060.0060.006Aliph-EC>60.00e+00.060.060.060.060.06Aliph-EC>10-121.98e+20.103.12E-020.100.1007.67E-04Aliph-EC>10-121.69e+30.107.94E-020.100.1007.67E-04Aliph-EC>16-353.83e+30.107.94E-020.100.1007.67E-04Aliph-EC>16-353.83e+30.107.94E-020.100.1007.67E-04Aliph-EC>16-353.83e+30.107.94E-020.100.1007.67E-04Aliph-EC>16-353.83e+32.008.98E-030.1000.1007.67E-04Aliph-EC>16-353.83e+32.008.98E-030.1000.1007.67E-04Aliph-EC>16-353.83e+32.008.98E-030.1000.1007.67E-04Soll = Concentration in soll (0-15 feet)18W = body weight17.44E-020.10<			Haza	rd Index:	6.55e-1			Haza	rd Index:	5.37e-2
Arom-EC>10-12         2.20e+2         0.04         2.58E-02         0.04         0.100         2.13E-03           Arom-EC>12-16         9.23e+2         0.04         1.08E-01         0.03         0.100         1.71E-02           Arom-EC>12-16         1.32e+3         0.03         1.75E-01         0.03         0.700         1.71E-02           Arom-EC>21-35         1.12e+3         0.03         1.75E-01         0.03         0.700         1.74E-02           Arom-EC>21-35         1.12e+3         0.03         1.75E-01         0.03         0.700         1.44E-02           Arom-EC>21-35         1.12e+3         0.03         1.75E-01         0.00         0.006         0.006+0         0.100         1.74E-02           Aliph-EC>6         0.00e+0         0.06         0.006+0         0.10         0.100         1.74E-02           Aliph-EC>6         0.00e+0         0.10         3.12E-02         0.10         0.100         7.67E-04           Aliph-EC>8         1.98e+2         0.10         3.12E-02         0.10         0.100         0.100         7.67E-04           Aliph-EC>8         1.68e+3         0.10         7.94E-02         0.10         0.100         7.67E-04           Aliph-EC>8	-Arom-EC>8-10	4.00e+1		0.04	4.70E-03		-	0.04	0.100	3.87E-04
Arom-EC>12-16 $9.23e+2$ $0.04$ $1.08E-01$ $0.04$ $0.100$ $8.94E-03$ Arom-EC>16-21 $1.32e+3$ $0.03$ $2.07E-01$ $0.03$ $0.100$ $1.71E-02$ Arom-EC>21-35 $1.12e+3$ $0.03$ $1.75E-01$ $0.03$ $0.100$ $1.71E-02$ Arom-EC>21-35 $1.12e+3$ $0.03$ $1.75E-01$ $0.006+0$ $0.06e+00$ $0.066+00$ Aliph-EC>21-35 $0.00e+0$ $0.066+00$ $0.066+00$ $0.066+00$ $0.006+00$ Aliph-EC>6-8 $0.00e+0$ $0.066+00$ $0.066+00$ $0.006+00$ $0.006+00$ Aliph-EC>6-10 $1.98e+2$ $0.10$ $9.30E-03$ $0.100$ $0.100$ $0.006+00$ Aliph-EC>10-12 $6.65e+2$ $0.10$ $9.30E-03$ $0.100$ $0.100$ $7.67E-04$ Aliph-EC>10-12 $6.65e+2$ $0.10$ $7.94E-02$ $0.10$ $0.100$ $7.67E-04$ Aliph-EC>10-12 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $0.100$ $7.67E-04$ Aliph-EC>10-12 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $0.100$ $7.67E-04$ Aliph-EC>16-35 $3.83e+3$ $0.10$ $7.94E-02$ $0.10$ $0.100$ $7.67E-04$ Aliph-EC>16-35 $3.83e+3$ </td <td>-Arom-EC&gt;10-12</td> <td>2.20e+2</td> <td></td> <td>0.04</td> <td>2.58E-02</td> <td></td> <td></td> <td>0.04</td> <td>0.100</td> <td>2.13E-03</td>	-Arom-EC>10-12	2.20e+2		0.04	2.58E-02			0.04	0.100	2.13E-03
Arom-EC>16-211.32e+30.03 $2.07E-01$ 0.03 $0.100$ $1.71E-02$ Arom-EC>21-351.12e+30.03 $1.75E-01$ 0.03 $0.100$ $1.44E-02$ Arom-EC>21-351.12e+30.06 $0.00E+00$ $0.06$ $0.00E+00$ $0.00E+00$ Aliph-EC>6-80.00e+0 $0.06$ $0.06$ $0.00E+00$ $0.00E+00$ Aliph-EC>6-80.00e+0 $0.06$ $0.06$ $0.00E+00$ $0.00E+00$ Aliph-EC>6-80.00e+0 $0.06$ $0.00E+00$ $0.00E+00$ Aliph-EC>1-12 $1.98e+2$ $0.10$ $3.12E-02$ $0.10$ $0.100$ $7.67E-04$ Aliph-EC>10-12 $6.65e+2$ $0.10$ $3.12E-02$ $0.10$ $0.100$ $7.67E-04$ Aliph-EC>10-12 $6.65e+2$ $0.10$ $3.12E-02$ $0.10$ $0.100$ $7.67E-04$ Aliph-EC>12-16 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $0.100$ $7.67E-04$ Solip Econ $0.10$ $1.69e+3$ $0.10$ $7.96E-03$ $0.10$ $0.100$ $7.67E-04$ Solip Econ $1.68e+3$ $0.10$ $7.96E-03$ $0.10$ $0.10$ <td< td=""><td>-Arom-EC&gt;12-16</td><td>9.23e+2</td><td></td><td>0.04</td><td>1.08E-01</td><td></td><td></td><td>0.04</td><td>0.100</td><td>8.94E-03</td></td<>	-Arom-EC>12-16	9.23e+2		0.04	1.08E-01			0.04	0.100	8.94E-03
Arom-EC>21-351.12e+30.031.75E-010.030.1001.44E-02Aliph-EC 5-60.00e+00.00e+00.00e0.060.00E+000.00E+00Aliph-EC 5-6-80.00e+00.00e+00.060.00E+000.00E+00Aliph-EC>6-80.00e+00.00e+00.060.00E+000.00E+00Aliph-EC>6-80.00e+00.0060.000.00E+000.00E+00Aliph-EC>101.98e+20.109.30E-030.1007.67E-04Aliph-EC>12-161.69e+30.107.94E-020.107.67E-04Aliph-EC>12-161.69e+30.107.94E-020.100.1007.67E-04Aliph-EC>12-161.69e+30.107.94E-020.100.1007.67E-04Aliph-EC>12-161.69e+30.107.94E-020.107.0100.1007.67E-04Aliph-EC>12-161.69e+30.107.94E-020.107.94E-020.100.1007.67E-04Aliph-EC>12-161.69e+30.107.94E-020.107.94E-020.100.1007.67E-03Aliph-EC>12-161.69e+30.107.94E-020.107.94E-020.100.1007.67E-03Aliph-EC>12-161.69e+30.107.94E-020.107.94E-020.100.1007.67E-03Aliph-EC>12-161.69e+30.107.94E-020.107.94E-020.100.1007.67E-03Solip Econ1.60e+1RM = body weightRM = body weightEF = exposure frequ	-Arom-EC>16-21	1.32e+3		0.03	2.07E-01			0.03	0.100	1.71E-02
Aliph-EC 5-6 $0.00e+0$ $0.06$ $0.00E+00$ $0.06$ $0.00E+00$ $0.06$ $0.00E+00$ Aliph-EC>6-8 $0.00e+0$ $0.06$ $0.00E+00$ $0.06$ $0.00E+00$ $0.06$ $0.100$ $0.00E+00$ Aliph-EC>8-10 $1.98e+2$ $0.10$ $9.30E-03$ $0.10$ $9.30E-03$ $0.100$ $0.06E+00$ Aliph-EC>10-12 $6.65e+2$ $0.10$ $3.12E-02$ $0.10$ $3.12E-02$ $0.10$ $0.100$ $7.67E-04$ Aliph-EC>10-12 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $7.94E-02$ $0.10$ $7.67E-04$ Aliph-EC>10-12 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $7.010$ $0.100$ $7.67E-04$ Aliph-EC>10-12 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $7.010$ $0.100$ $7.67E-04$ Aliph-EC>10-12 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $7.16E-04$ $0.100$ $7.67E-04$ Aliph-EC>12-16 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $7.16E-04$ $0.100$ $7.67E-04$ Solip Econtation in soli (0-15 feet) $RD = Reference DoseR_{at} = Ingestion rateR_{at} = Ingestion rateR_{at} = adhence factorSolip EcontRO = body weightEF = exposure frequencyRS = dermal absorption factorSolip EcontRI = averaging timeED = exposure durationRS = dermal absorption factor$	-Arom-EC>21-35	1.12e+3		0.03	1.75E-01			0.03	0.100	1.44E-02
Aliph-EC>6-8 $0.00e+0$ $0.06$ $0.00E+00$ $0.06$ $0.100$ $0.00E+00$ Aliph-EC>8-10 $1.98e+2$ $0.10$ $9.30E-03$ $0.10$ $3.67E-04$ Aliph-EC>10-12 $6.65e+2$ $0.10$ $3.12E-02$ $0.10$ $7.67E-04$ Aliph-EC>12-16 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $7.67E-04$ Aliph-EC>12-16 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $7.67E-04$ Aliph-EC>12-16 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $7.41E-04$ Sol) = Concentration in soli (0-15 feet)RID = Reference Dose $R_{sat}$ = Ingestion rate $2.00$ $0.100$ $7.41E-04$ sol) = Concentration in soli (0-15 feet)RID = Reference DoseRtatE = exposure frequency $A = adherence factorsolip = Concentration in soli (0-15 feet)RID = Reference DoseRtatE = exposure frequencyA = adherence factorsolip = ConcentrationA = action frequencyA = adherence factorA = adherence factorA = adherence factorSolip FactorA = averaging timeE = exposure durationAB = demal absorption fraction$	-Aliph-EC 5-6	0.00e+0		0.06	0.00E+00			0.06	0.100	0.00E+00
Aliph-EC>8-10       1.98e+2       0.10       9.30E-03       0.10       0.100       7.67E-04         Aliph-EC>10-12 $6.65e+2$ $0.10$ $3.12E-02$ $0.10$ $3.12E-02$ $0.10$ $2.68E-03$ $0.100$ $7.67E-04$ Aliph-EC>10-12 $6.65e+2$ $0.10$ $3.12E-02$ $0.10$ $7.94E-02$ $0.10$ $7.94E-02$ Aliph-EC>12-16 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $7.00$ $0.100$ $7.55E-03$ Aliph-EC>16-35 $3.83e+3$ $2.00$ $8.98E-03$ $0.100$ $7.41E-04$ soll = Concentration in soli (0-15 feet)       RtD = Reference Dose $R_{tat}$ = Ingestion rate $2.00$ $0.100$ $7.41E-04$ soll = Concentration in soli (0-15 feet)       RtD = Reference Dose $R_{tat}$ = Ingestion rate $SA = skin surface area         solo = Four endence       Distribution feetion       EF = exposure frequency       AF = adherence factor         solo = Four endence       ET = exposure frequency       AF = adherence factor       AF = adherence factor         solo = Four endence       ET = exposure function       AB = adherence factor       AF = adherence factor   $	-Aliph-EC>6-8	0.00e+0		0.06	0.00E+00			0.06	0.100	0.00E+00
Aliph-EC>10-12 $6.65e+2$ $0.10$ $3.12E-02$ $0.10$ $0.10$ $2.58E-03$ Aliph-EC>12-16 $1.69e+3$ $0.10$ $7.94E-02$ $0.10$ $7.94E-02$ Aliph-EC>16-35 $3.83e+3$ $0.10$ $7.94E-02$ $0.10$ $7.00$ $0.100$ $2.58E-03$ Solil = Concentration in soil (0-15 feet)       RtD = Reference Dose       IR <sub>at</sub> = Ingestion rate $2.00$ $0.100$ $7.41E-04$ Solil = Concentration in soil (0-15 feet)       RtD = Reference Dose       IR <sub>at</sub> = Ingestion rate $SA = skin surface area         Carcinogenic Risk       AT = averaging time       EF = exposure frequency       AF = adherence factor   $	-Aliph-EC>8-10	1.98e+2		0.10	9.30E-03			0.10	0.100	7.67E-04
Aliph-EC>12-161.69e+3 $0.10$ $7.94E-02$ $0.10$ $0.100$ $6.55E-03$ Aliph-EC>16-35 $3.83e+3$ $2.00$ $8.98E-03$ $2.00$ $0.100$ $7.41E-04$ Soli) = Concentration in soil (0-15 feet)RtD = Reference Dose $R_{saf}$ = Ingestion rate $SA$ = skin surface areacarcinogenic RiskAT = averaging timeEF = exposure frequencyAF = adherence factorSlope FactorAT = averaging timeED = exposure durationABS = dermal absorption fraction	-Aliph-EC>10-12	6.65e+2		0.10	3.12E-02			0.10	0.100	2.58E-03
Aliph-EC>16-35 $3.83e+3$ $2.00$ $8.98E-03$ $2.00$ $0.100$ $7.41E-04$ soil) = Concentration in soil (0-15 feet)RfD = Reference Dose $R_{saf}$ = Ingestion rateSA = skin surface areasoil = Concentration in soil (0-15 feet)RfD = Reference Dose $R_{saf}$ = Ingestion rateSA = skin surface areac. carcinogenic RiskBW = body weightEF = exposure frequencyAF = adherence factorSide FactorAT = averaging timeED = exposure durationABS = dermal absorption fraction	-Aliph-EC>12-16	1.69e+3		0.10	7.94E-02			0.10	0.100	6.55E-03
(soil) = Concentration in soil (0-15 feet) RfD = Reference Dose IR <sub>set</sub> = Ingestion rate SA = skin surface area c Carcinogenic Risk BV = body weight EF = exposure frequency AF = adherence factor Stope Factor AT = averaging time ED = exposure duration ABS = dermal absorption fraction	-Aliph-EC>16-35	3.83e+3		2.00	8.98E-03			2.00	0.100	7.41E-04
(soil) = Concentration in soil (0-15 feet)     RfD = Reference Dose     IR <sub>ted</sub> = Ingestion rate     SA = skin surface area       c carcinogenic Risk     BW = body weight     EF = exposure frequency     AF = adherence factor       Slope F actor     AT = averaging time     ED = exposure duration     ABS = dermal absorption fraction						I				
= Carcinogenic Risk BW = body weight EF = exposure frequency AF = adherence factor Slope Factor AT = averaging time ED = exposure duration ABS ≈ dermal absorption fraction	(soil) = Concentration in soil (0-15 feet)		RfD = Reference	: Dose		R <sub>sol</sub> = Inge	stion rate		SA = skin su	irface area
	- Carcinogenic Risk Slobe Factor		BW = body weig AT = averaging I	ht time		EF = exposi	ure frequency ure duration		AF = adherei ABS ≈ dermi	nce factor af absorption frac
	(		) )			-				-

Construction Worker – Combined Risk for Soil Texas-New Mexico Pipe Line Co. **Calculation of Risk** 

## Risk<sub>ING</sub> + Risk<sub>DER</sub> + Risk<sub>INHAL</sub> 11 **Risk**cw-solL

Riskcw-soll or HQcw-soll		5.64E-08	6.35E-11		8.15E-03	2.46E-03	2.61E-03	8.09E-05	1.41E-02	2.66E-02	1.86E+00	 4.20E-02	1.13E-01	2.74E-01	5.87E-01	2.15E-01	0.00E+00	0.00E+00	1.17E-01	1.90E-01	2.69E-01	5.65E-02
Risk <sub>inhal</sub> or HQ <sub>inhal</sub>		5.48E-08	1.86E-13		6.13E-03	1.83E-03	2.40E-04	1.57E-06	1.37E-02	2.64E-02	1.16E+00	 3.70E-02	8.55E-02	1.56E-01	3.63E-01	2.58E-02	0.00E+00	0.00E+00	1.07E-01	1.56E-01	1.83E-01	4.67E-02
Risk <sub>ber</sub> or HQ <sub>per</sub>		0.00E+00	1.63E-11		0.00E+00	4.75E-05	1.77E-05	1.67E-05	0.00E+00	0.00E+00	5.36E-02	3.87E-04	2.13E-03	8.94E-03	1.71E-02	1.44E-02	0.00E+00	0.00E+00	7.67E-04	2.58E-03	6.55E-03	7.41E-04
Risk <sub>ING</sub> or HQ <sub>ING</sub>		1.63E-09	4.70E-11		2.02E-03	5.75E-04	2.35E-03	6.26E-05	4.44E-04	1.36E-04	6.50E-01	4.70E-03	2.58E-02	1.08E-01	2.07E-01	1.75E-01	0.00E+00	0.00E+00	9.30E-03	3.12E-02	7.94E-02	8.98E-03
Constituent of Concern	Carcinogens	Benzene	Chrysene	Non-Carcinogens	Ethylbenzene	Naphthalene	Phenanthrene	Pyrene	Toluene	Xylene (mixed isomers)	TPH - New Method	TPH-Arom-EC>8-10	TPH-Arom-EC>10-12	TPH-Arom-EC>12-16	TPH-Arom-EC>16-21	TPH-Arom-EC>21-35	TPH-Aliph-EC 5-6	TPH-Aliph-EC>6-8	TPH-Aliph-EC>8-10	TPH-Aliph-EC>10-12	TPH-Aliph-EC>12-16	TPH-Aliph-EC>16-35

- NOTES:
- Risk = Carcinogenic Risk HQ = Hazard Quotient

Calculation of Site-Specific Target Levels Worker – Inhalation of Volatiles from Soil

PEF	(kg/m³)	6.066E-11	
foc	1	0.01	
ш	I	0.32	
ß	(cc)	1.80	
 ٩	(m <sup>2</sup> )	1116	
 НО	(m)	2.0	
>	(m/s)	4.92	
ΓS	(m)	37	
 ED	(years)	25	
Ш	(days/yr)	250	
lRair	(m³/day)	20	
BW	(kg)	20	
Texas-New Mexico Pipe Line Co.	TNM-96-15	Lea County, New Mexico	

DAF	1.00	
s: SSTL = DAF * TR * BW * 70 * 365 / IR <sub>air</sub> * EF * ED * SF * (VF + PEF )	s: SSTL = DAF * HQ * BW * 365 / IR <sub>air</sub> * EF * (1/RfD) * ( VF + PEF )	VF = (2*Dei*E*Kas*10-3)/(LS*V*DH/A)*(3.14*alpha*ED*3.15E+7) <sup>0.5</sup>
For carcinogens	For non-carcinogens	

of concern – (1) Carcinogens Benzene 1.00e-6 1 Chrysene 1.00e-6 1 Non-Carcinogens Ethybenzene	(1/mg/kg	। च	(mg/kg-d)	(cm <sup>2</sup> /sec)	(cm³/g)	1	(g /cm³)	(cm <sup>2</sup> /sec)	(m <sup>3</sup> /kg)	(ma/ka)
Carcinogens Benzene 1.00e-6 5 Chrysene 1.00e-6 6 <u>Non-Carcinogens</u> Ethvlbenzene										(Augue)
Benzene 1.00e-6 2 Chrysene 1.00e-6 6 <u>Non-Carcinogens</u> Ethvbenzene										
Chrysene 1.00e-6 6 <u>Non-Carcinogens</u> Ethybenzene	3 2.91e-:	2		2.05e-2	8.32e-1	2.32e-1	2.80e-1	9.70e-4	7.40e-5	6.65e+0
<u>Non-Carcinogens</u> Ethylbenzene	3 6.10e-(	m		5.45e-3	2.00e+3	4.37e-5	2.19e-8	2.12e-11	1.04e-8	2.24e+5
Ethylbenzene										
-		0.01	0.29	1.64e-2	1.10e+1	2.67e-1	2.44e-2	7.10e-5	1.91e-5	7.64e+2
Naphthalene		0.01	0.04	1.30e-2	1.29e+1	5.38e-2	4.17e-3	9.61e-6	7.02e-6	2.91e+2
Phenanthrene		0.01	0.00	1.19e-3	1.41e+2	6.63e-3	4.69e-5	9.89e-9	2.25e-7	9.08e+2
Pyrene		0.01	0.03	5.98e-3	3.80e+2	2.13e-4	5.59e-7	5.94e-10	5.51e-8	2.78e+4
Toluene		0.02	0.11	1.84e-2	3.02e+0	2.65e-1	8.77e-2	2.83e-4	3.86e-5	2.26e+2
Xylene (mixed isomers)		0.04	0.20	1.63e-2	2.40e+0	2.93e-1	1.22e-1	3.45e-4	4.29e-5	8.33e+2
TPH - New Method		0.91								8.55e+4
TPH-Arom-EC>8-10		0.004	0.06	2.20e-2	1.58e+1	4.84e-1	3.05e-2	1.19e-4	2.48e-5	1.18e+4
TPH-Arom-EC>10-12		0.022	0.06	2.20e-2	2.51e+1	1.36e-1	5.42e-3	2.12e-5	1.04e-5	2.80e+4
TPH-Arom-EC>12-16		0.092	0.06	2.20e-2	5.01e+1	5.16e-2	1.03e-3	4.02e-6	4.54e-6	6.43e+4
TPH-Arom-EC>16-21		0.132	0.03	2.20e-2	1.58e+2	1.18e-1	7.43e-4	2.90e-6	3.85e-6	3.98e+4
TPH-Arom-EC>21-35		0.112	0.03	2.20e-2	1.26e+3	6.65e-3	5.29e-6	2.06e-8	3.25e-7	4.72e+5
TPH-Aliph-EC 5-6		0.000	0.06	2.20e-2	7.94e+0	3.28e+1	4.12e+0	9.29e-3	3.78e-4	7.73e+2
TPH-Aliph-EC>6-8		0.000	0.06	2.20e-2	3.98e+1	4.85e+1	1.22e+0	3.91e-3	1.72e-4	1.70e+3
TPH-Aliph-EC>8-10		0.020	0.29	2.20e-2	3.16e+2	7.92e+1	2.51e-1	9.37e-4	7.23e-5	2.02e+4
TPH-Aliph-EC>10-12		0.067	0.29	2.20e-2	2.51e+3	1.23e+2	4.91e-2	1.90e-4	3.15e-5	4.64e+4
TPH-Aliph-EC>12-16		0.169	0.29	2.20e-2	5.01e+4	5.25e+2	1.05e-2	4.09e-5	1.45e-5	1.01e+5
TPH-Aliph-EC>16-35		0.383	2.00	2.20e-2	1.00e+7	6.57e+4	6.57e-3	2.56e-5	1.15e-5	8.92e+5

NOTES:

SSTL = Site specific Target Level TR = Target Risk SF = Slope Factor HQ = hazard quotient RID = Reference Dose DAF = Dilution attenuation factor

BW = body weight AT = averaging time IR<sub>A</sub> = Inhalation rate EF = exposure frequency ED = exposure duration LS = Length of Source Area

V = Velocity of Wind DH = Diffusion Height A = Area of Soil Source B = Bulk Soil Density E = Effective Porosity Dei = effective diffusion coefficient

H' = unitiess Henry's Law Constant Kd = organic carbon partition coefficient \* foc foc = fraction organic carbon Kas = H' / Kd alpha = Dei \* E / ( E + B / Kas ) PEF = Particulate Emissions Factor

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Calculation of Site-Specific Target Levels Worker -- Ingestion of Soil & Dermal Contact with Soil

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Texas-New Mexico Pipe Line Co.	BW	CF	IRsoil	ш	ED	EF <sub>dermal</sub>	SA	AF
TNM-96-15	(kg)	(mg/kg)	(mg/day)	(days/yr)	(years)	(days/yr)	(cm²)	(mg/cm <sup>2</sup> )
Lea County, New Mexico	70	1.00E+06	50	250	25	250	5,800	1.00
For carcinogens:	SSTLING	= TR * BV	N * 70 * 3	65 * CF / IF	R <sub>soll</sub> * EF * E	D*SF		
	SSTLDER	= TR * B	W * 70 * 3	65 * CF / S	5A * AF * AE	3S*EF*E	0 * SF	
For non-carcinogens:	SSTLING	= HQ * B	W * 365 *	CF / IR <sub>soli</sub> *	EF * (1/RfC	â		
	SSTLDER	= HQ * B	W * 365 *	CF / SA *	AF* ABS * E	EF * (1/RfD		

Constituent	TR	SFo	ğH	RfDo	SSTLING		SFd	RfDd	ABS	SSTLDER	
of Concern	1	(1/mg/kg-d)	I	(mg/kg-d)	(mg/kg)		(1/mg/kg-d)	(mg/kg-d)	1	(ba/gm)	
Carcinogens											
Benzene	1.00e-6	2.90e-2			1.97e+2		2.90e-2		0.000	9.99e+99	
Chrysene	1.00e-6	7.30e-3			7.84e+2		2.36e-2		0.130	1.61e+1	
Non-Carcinorans											
			200	010	010100			010			
Ethytoenzene			0.01	0.10	Z.U46+3			0.10	0.000	9.996+99	
Naphthalene			0.01	0.04	8.18e+2			0.04	0.100	7.05e+1	
Phenanthrene			0.01	0.00	8.18e+1			0.02	0.050	7.72e+1	
Pyrene			0.01	0.03	6.13e+2			0.01	0.100	1.64e+1	
Totuene			0.02	0.20	6.13e+3			0.20	000.0	9.99e+99	
Xylene (mixed isomers)			0.04	2.00	1.43e+5			2.00	0.000	9.99e+99	
TPH - New Method			0.91		1.34e+5					1.16e+4	
TPH-Arom-EC>8-10			0.004	0.04	8.18e+4			0.04	0.100	7.05e+3	
TPH-Arom-EC>10-12			0.022	0.04	8.18e+4			0.04	0.100	7.05e+3	
TPH-Arom-EC>12-16			0.092	0.04	8.18e+4			0.04	0.100	7.05e+3	
TPH-Arom-EC>16-21			0.132	0.03	6.13e+4			0.03	0.100	5.29e+3	
TPH-Arom-EC>21-35			0.112	0.03	6.13e+4			0.03	0.100	5.29e+3	
TPH-Aliph-EC 5-6			0.000	0.06	1.23e+5			0.06	0.100	1.06e+4	
TPH-Aliph-EC>6-8			0.000	0.06	1.23e+5			0.06	0.100	1.06e+4	
TPH-Aliph-EC>8-10			0.020	0.10	2.04e+5			0.10	0.100	1.76e+4	
TPH-Aliph-EC>10-12			0.067	0.10	2.04e+5			0.10	0.100	1.76e+4	
TPH-Aliph-EC>12-16			0.169	0.10	2.04e+5			0.10	0.100	1.76e+4	
TPH-Aliph-EC>16-35			0.383	2.00	4.09e+6			2.00	0.100	3.52e+5	
NOTES:											
SSTL = Site specific Target Level		RfD = Referen	ce Dose		IRsol = Ingestion	rate		SA = skin surf	face area		
TR = Target Risk		BW = body we	ight		EF = exposure fr	equency		AF = adheren	ce factor		
SF = Slope Factor		AT = averaging	) time		ED = exposure d	uration		ABS = dermat	absorption fra	stion	
HQ = hazard quotient											
	Calculation of Worker Texas-Ne	Site-Specific Target L Combined SSTL for S w Mexico Pipe Line Co.	evels oil								
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If On-Site:	SSTL <sub>wkr-solt</sub> =		~								
		( (1 / SSTL <sub>ING</sub> ) + (	1 / SSTL <sub>DER</sub> ) + (1	/ SSTL <sub>INHAL</sub> ) )							
If Off-Site:	SSTL <sub>wkr-soll</sub> =	SSTL <sub>INHAL</sub>									
Constituent		SSTI 2	SCTI	SCTI							
of Concern	(mg/kg)	(mg/kg)	(mg/kg)								
Carcinogens											
Benzene	1.9/6+2	9.996+99	6.65e+U	6.436+0							
Chrysene	7.84e+2	1.61e+1	2.24e+5	1.58e+1							
Non-Carcinogens											
Ethylbenzene	2.04e+3	9.99e+99	7.64e+2	5.56e+2							
Naphthalene	8.18e+2	7.05e+1	2.91e+2	5.31e+1							
Phenanthrene	8.18e+1	7.72e+1	9.08e+2	3.80e+1							
Pyrene	6.13e+2	1.64e+1	2.78e+4	1.60e+1							
Toluene	6.13e+3	9.99e+99	2.26e+2	2.18e+2							
Xylene (mixed isomers)	1.43e+5	9.99e+99	8.33e+2	8.28e+2							
TPH - New Method	1.34e+5	1.16e+4	8.55e+4	9.49e+3							
NOTES:											
SSTL = Site specific Target Level											

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		Calc Reside	ulation ant - In	of Site-S halation	pecific T of Vola	arget Le tiles froi	vels m Soil					
Texas-New Mexico Pipe Line Co.	BW	lRair	ш	ED	LS	>	Н	٩,	B	ш	foc	PEF
C1-96-MIN1	(kg)	(m'/day)	(days/yr)	(years)	Ē	(s/m)	Ē	(,u)	(a/cc)	1		(kg/m <sup>3</sup> )
	2	0	Des	8	3/	4.92	5.0	1116	1.80	0.32	0.01	6.066E-11
For carcinogens:	SSTL =	DAF * TR	* BW * 7	0 * 365 /	IR <sub>air</sub> * EF *	ED * SF	* ( VF + P	EF)				DAF
For non-carcinogens:	SSTL =	DAF * HQ	* BW *	65 / IR <sub>air</sub>	* EF * (1/I	RD) * (VF	( + PEF )					1.00
	VF = (2	2 * Dei * E *	Kas * 1	)-3 ) / ( F:	HQ * V * 8	/A)*(3	.14 * alph	a * ED * 3	3.15E+7 ) <sup>0</sup>	2		
Constituent	TR	SF	ġ	RfD	Dei	Кd	Ŧ	Kas	aloha	VF		SSTL
of Concern	1	(1/mg/kg-d)	I	(mg/kg-d)	(cm²/sec)	(cm <sup>3</sup> /g)	; 1	(g /cm <sup>3</sup> )	(cm²/sec)	(m <sup>3</sup> /kg)		(mg/kg)
Carcinogens												
Benzene	1.00e-6	2.91e-2			2.05e-2	8.32e-1	2.32e-1	2.80e-1	9.70e-4	6.75e-5		5.78e+0
Chrysene	1.00e-6	6.10e-3			5.45e-3	2.00e+3	4.37e-5	2.19e-8	2.12e-11	9.51e-9		1.95e+5
Non-Carcinogens												
Ethylbenzene			0.01	0.29	1.64e-2	1.10e+1	2.67e-1	2.44e-2	7.10e-5	1.75e-5		7.97e+2
Naphthalene			0.01	0.04	1.30e-2	1.29e+1	5.38e-2	4.17e-3	9.61e-6	6.41e-6		3.04e+2
Phenanthrene			0.01	0.00	1.19e-3	1.41e+2	6.63e-3	4.69e-5	9.89e-9	2.05e-7		9.48e+2
Pyrene			0.01	0.03	5.98e-3	3.80e+2	2.13e-4	5.59e-7	5.94e-10	5.03e-8		2.90e+4
Toluene			0.02	0.11	1.84e-2	3.02e+0	2.65e-1	8.77e-2	2.83e-4	3.53e-5		2.36e+2
Xylene (mixed isomers)			0.04	0.20	1.63e-2	2.40e+0	2.93e-1	1.22e-1	3.45e-4	3.92e-5		8.69e+2
TPH - New Method			0.91									8.92e+4
TPH-Arom-EC>8-10			0.00	0.06	2.20e-2	1.58e+1	4.84e-1	3.05e-2	1.19e-4	2.26e-5		1.23e+4
TPH-Arom-EC>10-12			0.02	0.06	2.20e-2	2.51e+1	1.36e-1	5.42e-3	2.12e-5	9.51e-6		2.92e+4
TPH-Arom-EC>12-16			0.09	0.06	2.20e-2	5.01e+1	5.16e-2	1.03e-3	4.02e-6	4.14e-6		6.71e+4
TPH-Arom-EC>16-21			0.13	0.03	2.20e-2	1.58e+2	1.18e-1	7.43e-4	2.90e-6	3.52e-6		4.15e+4
TPH-Arom-EC>21-35			0.11	0.03	2.20e-2	1.26e+3	6.65e-3	5.29e-6	2.06e-8	2.97e-7		4.92e+5
TPH-Aliph-EC 5-6			0.00	0.06	2.20e-2	7.94e+0	3.28e+1	4.12e+0	9.29e-3	3.45e-4		8.06e+2
TPH-Aliph-EC>6-8			0.00	0.06	2.20e-2	3.98e+1	4.85e+1	1.22e+0	3.91e-3	1.57e-4		1.77e+3
TPH-Aliph-EC>8-10			0.02	0.29	2.20e-2	3.16e+2	7.92e+1	2.51e-1	9.37e-4	6.60e-5		2.11e+4
TPH-Aliph-EC>10-12			0.07	0.29	2.20e-2	2.51e+3	1.23e+2	4.91e-2	1.90e-4	2.87e-5		4.84e+4
TPH-Aliph-EC>12-16			0.17	0.29	2.20e-2	5.01e+4	5.25e+2	1.05e-2	4.09e-5	1.32e-5		1.05e+5
TPH-Aliph-EC>16-35			0.38	2.00	2.20e-2	1.00e+7	6.57e+4	6.57e-3	2.56e-5	1.05e-5	1	9.30e+5
NOTES:			:						:			
SSTL = Site specific Target Level		BW = body we	ght		V = Velocity	of Wind			H' = unitless	Henry's Law Co	onstant	
TR = Target Risk		AT = averaging	time		DH = Diffusio	on Height			Kd = organic	carbon partitio	n coefficient	foc
SF ≈ Slope Factor		IR <sub>A</sub> = Inhalatio	n rate		A = Area of S	soil Source			foc = fraction	organic carbor	_	
HQ = hazard quotient		EF = exposure	frequency		B = Bulk Soil	Density			Kas = H'/Ko			
RfD = Reference Dose		ED = exposure	duration		E = Effective	Porosity			alpha = Dei *	E/(E+B/K	as )	
DAF = Dilution attenuation factor		LS = Length of	Source Are	8	Dei = effectiv	e diffusion co	efficient		PEF = Particu	Itate Emissions	s Factor	

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Calculation of Site-Specific Target Levels Resident -- Ingestion of Soil & Dermal Contact with Soil

Texas-New Mexico Pipe Line Co.	BW	СF	lRsoil	Ц	ED	EF <sub>dermal</sub>	SA	AF
TNM-96-15	(kg)	(mg/kg)	(mg/day)	(days/yr)	(years)	(days/yr)	(cm²)	(mg/cm <sup>2</sup>
Lea County, New Mexico	70	1.00E+06	124	350	30	350	5,800	1.00
For carcinogens:	SSTLING	= TR * BV	N * 70 * 3	65 * CF / II	R <sub>soll</sub> * EF * E	D*SF		
	SSTL <sub>DER</sub>	= TR * B	W * 70 * 3	65 * CF / S	5A * AF * AI	3S*EF*E	D*SF	
For non-carcinogens:	SSTLING	= HQ * B	W * 365 *	CF / IR <sub>soll</sub>	* EF * (1/Rfi	6		
	SSTLDER	= HQ * B	W * 365 *	CF / SA *	AF* ABS * I	EF * (1/RfD		

Constituent	TR	SFo	OH	RfDo	SSTINC	0	Ed	RfDd	ABS	SSTI or .
of Concern		(1/mg/kg-d)	1	(mg/kg-d)	(mg/kg)	ш/1)	g/kg-d) (	(p-g/kg-d)	1	(mg/kg)
Carcinogens										
Benzene	1.00e-6	2.90e-2			2.03e+1	2.6	0e-2		0.000	9.99e+99
Chrysene	1.00e-6	7.30e-3			8.06e+1	5.3	16e-2		0.130	9.57e+0
Non-Carcinogens										
Ethylbenzene			0.01	0.10	7.82e+1			0.10	0.000	9.99e+99
Naphthalene			0.01	0.04	3.13e+1			0.04	0.100	5.03e+1
Phenanthrene			0.01	00.00	3.13e+0			0.02	0.050	5.51e+1
Pyrene			0.01	0.03	2.35e+1			0.01	0.100	1.17e+1
Toluene			0.02	0.20	2.35e+2			0.20	0.000	9.99e+99
Xylene (mixed isomers)			0.04	2.00	5.48e+3			2.00	0.000	9.99e+99
TPH - New Method			0.91		5.15e+3					8.28e+3
TPH-Arom-EC>8-10			00.0	0.04	3.13e+3			0.04	0.100	5.03e+3
TPH-Arom-EC>10-12			0.02	0.04	3.13e+3			0.04	0.100	5.03e+3
TPH-Arom-EC>12-16			0.09	0.04	3.13e+3			0.04	0.100	5.03e+3
TPH-Arom-EC>16-21			0.13	0.03	2.35e+3			0.03	0.100	3.78e+3
TPH-Arom-EC>21-35			0.11	0.03	2.35e+3			0.03	0.100	3.78e+3
TPH-Aliph-EC 5-6			0.00	0.06	4.69e+3			0.06	0.100	7.55e+3
TPH-Aliph-EC>6-8			0.00	0.06	4.69e+3			0.06	0.100	7.55e+3
TPH-Aliph-EC>8-10			0.02	0.10	7.82e+3			0.10	0.100	1.26e+4
TPH-Aliph-EC>10-12			0.07	0.10	7.82e+3			0.10	0.100	1.26e+4
TPH-Aliph-EC>12-16			0.17	0.10	7.82e+3			0.10	0.100	1.26e+4
TPH-Aliph-EC>16-35			0.38	2.00	1.56e+5			2.00	0.100	2.52e+5
NOTES:										
SSTL = Site specific Target Level		RfD = Referenc	ce Dose		IR <sub>set</sub> = Ingestion	rate	S	A = skin surfa	ice area	
TR = Target Risk		BW = body we	ight		EF = exposure fre	quency	A	F = adherenc	e factor	
SF = Slope Factor		AT = averaging	l time		ED = exposure du	ration	A	BS = dermal a	absorption frac	tion
HQ = hazard quotient										

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Calculation of Site-Specific Target Levels Resident -- Combined SSTL for Soil Texas-New Mexico Pipe Line Co.

If On-Site: SSTL<sub>res-SolL</sub> =

( (1 / SSTL<sub>ING</sub>) + (1 / SSTL<sub>DER</sub>) + (1 / SSTL<sub>INHAL</sub>) )

If Off-Site: SSTL<sub>res-SOIL</sub> = SSTL<sub>INHAL</sub>

**SSTL<sub>ING</sub>** 

(mg/kg)

8.06e+1

2.03e+1

Constituent of Concern	<u>arcinogens</u> enzene	hrysene	on-Carcinogens	hylbenzene	aphthalene	henanthrene	yrene	bluene	ylene (mixed isomers)	PH - New Method	
	Carcir Benze	Chrys	Non-O	Ethylt	Napht	Phena	Pyren	Tolue	Xylen	- HdT	NOTES.

3.13e+0

2.35e+1

7.82e+1 3.13e+1 2.35e+2 5.48e+3 5.15e+3

SSTL = Site specific Target Level

SSTL <sub>INHAL</sub> (mg/kg)	5.78e+0 1.95e+5	7.97e+2 3.04e+2 9.48e+2 2.90e+4 2.36e+2 8.69e+2 8.69e+2
SSTL <sub>DER</sub> (mg/kg)	9.99e+99 9.57e+0	9.99e+99 5.03e+1 5.51e+1 1.17e+1 9.99e+99 9.99e+99 8.28e+3

SSTLres-Sc (mg/kg) 4.50e+0 8.56e+0 8.56e+0 7.12e+1 1.81e+1 2.95e+0 7.81e+0 1.18e+2 7.50e+2 7.60e+2
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	S	Calc	ulation o Worker	f Site-Sp - Inhal	ecific Ta ation of	Indet Lev Volatiles	els from S	oil				
Texas-New Mexico Pipe Line Co.	BW	lRair	EF	ED	ΓS	>	На	۲ '	B	ш	foc	PEF.
TNM-96-15	(kg)	(m <sup>1</sup> /day)	(days/wk)	(weeks)	Ē	(m/s)	Ē	(m,	(g/cc)	1	1	(kg/m <sup>3</sup> )
Lea County, New Mexico	2	20	5	12	37	4.92	2.0	109	1.80	0.32	0.01	4.5/9E-11
For carcinogens:	SSTL =	TR * BW *	70 * 365	/ IR <sub>air</sub> * EI	: * ED * S	F * ( VF +	PEF )					
For non-carcinogens:	SSTL =	HQ * BW '	. 365 / IR <sub>a</sub>	<sub>ir</sub> * EF * (1	/RfD) * (	VF + PEF	-					
	VF = (2	:* Dei * E *	Kas * 10	-3)/(FS	H0 * V *	(A)*(3.	14 * alphi	a * ED * 3	.15E+7 ) <sup>0.1</sup>			
Constituent of Concern	TR 1	SF (1/ma/ka-d)	Ч.	RfD (ma/ka-d)	Dei (cm <sup>2</sup> /sec)	Kd (cm <sup>3</sup> /a)	τı	Kas (a /cm³)	alpha (cm²/sec)	VF (m³/kg)		SSTL (mg/kg)
Carcinogens				n		ĥ		2				
Benzene	1.00e-6	2.91e-2			2.05e-2	8.32e-1	2.32e-1	2.80e-1	9.70e-4	6.75e-5		6.36e+1
Chrysene	1.00e-6	6.10e-3			5.45e-3	Z.006+3	c-9/6.4	Z.196-0	2.12e-11	9.016-9		0+901.2
Non-Carcinogens												
Ethylbenzene			0.01	0.29	1.64e-2	1.10e+1	2.67e-1	2.44e-2	7.10e-5	1.75e-5		7.01e+1
Naphthalene			0.01	0.04	1.30e-2	1.29e+1	5.38e-2	4.17e-3	9.61e-6	6.41e-6		2.67e+1
Phenanthrene			0.01	0.00	1.19e-3	1.41e+2	6.63e-3	4.69e-5	9.89e-9	2.05e-7		8.34e+1
Pyrene			0.01	0.03	5.98e-3	3.80e+2	2.13e-4	5.59e-7	5.94e-10	5.03e-8		2.55e+3
Toluene			0.02	0.11	1.84e-2	3.02e+0	2.65e-1	8.77e-2	2.83e-4	3.53e-5		2.08e+1
Xylene (mixed isomers)			0.04	0.20	1.63e-2	2.40e+0	2.93e-1	1.22e-1	3.45e-4	3.92e-5		7.65e+1
TPH - New Method			0.91									1.85e+3
TPH-Arom-EC>8-10			0.00	0.06	2.20e-2	1.58e+1	4.84e-1	3.05e-2	1.19e-4	2.26e-5		1.08e+3
TPH-Arom-EC>10-12			0.02	0.06	2.20e-2	2.51e+1	1.36e-1	5.42e-3	2.12e-5	9.51e-6		2.57e+3
TPH-Arom-EC>12-16			0.09	0.06	2.20e-2	5.01e+1	5.16e-2	1.03e-3	4.02e-6	4.14e-6		5.91e+3
TPH-Arom-EC>16-21			0.13	0.03	2.20e-2	1.58e+2	1.18e-1	7.43e-4	2.90e-6	3.52e-6		3.65e+3
TPH-Arom-EC>21-35			0.11	0.03	2.20e-2	1.26e+3	6.65e-3	5.29e-6	2.06e-8	2.97e-7		4.33e+4
TPH-Aliph-EC 5-6			0,00	0.06	2.20e-2	7.94e+0	3.28e+1	4.12e+0	9.29e-3	3.45e-4		7.09e+1
TPH-Aliph-EC>6-8			0.00	0.06	2.20e-2	3.98e+1	4.85e+1	1.226+U	3.91e-3 0.376-4	1.5/e-4 6.60 5		1.306+2 1.854+2
IPH-Aliph-EC>8-10			70'0	67.D	7-202.2	0.10ETZ	1.326.1	1-510.2		0.000.0		C. 200.1
TPH-Aliph-EC>10-12	÷		0.07	0.29	2.20e-2	Z.51e+3	1.23e+2	4.91e-Z	1.906-4	C-9/0.7		4.20e+3
TPH-Aliph-EC>12-16			0 C	R7.0	Z-902.2	0.01674	24907.0		4.036-5	1. 10 L		9.20510
TPH-Aliph-EC>16-35			0.38	2.00	Z-206-2	1.00e+/	4+9/C.0	0.0/e-3	C-90C.2	1.008-0		0.106+4
SSTI = Site snerific Tarnet I evel		BW = bodv w	eiaht		V = Velocity	of Wind			H' = unitless	Henry's Law C	onstant	
TR = Taroet Risk		AT = averagir	ig time		DH = Diffusio	on Height			Kd = organic	carbon partitic	in coefficient	foc
SF = Slope Factor		IR <sub>A</sub> = Inhalat	on rate		A = Area of S	soil Source			foc = fraction	organic carbo	c	
HQ = hazard quotient		EF = exposur	e frequency		B = Bulk Soi	Density			Kas = H' / K	-		
RtD = Reference Dose		ED = exposul	e duration		E = Effective	Porosity			alpha = Dei *	E/(E+B/K	(as )	
		LS = Length (	of Source Are	ŋ	Dei = effectiv	re diffusion co	efficient		PEF = Partici	ulate Emission	s Factor	

Calculation of Site-Specific Target Levels Construction Worker - Ingestion of Soil & Dermal Contact with Soil

Texas-New Mexico Pipe Line Co.	BW	CF	IRsoil	EF	ED	SA	AF	
TNM-96-15	(kg)	(mg/kg)	(mg/day)	(days/wk)	(weeks)	(cm²)	(mg/cm <sup>1</sup> )	
Lea County, New Mexico	70	1.00E+06	480	5	12	3,300	0.12	
For carcinogens:	SSTLING	= TR * BV	N * 70 * 3	65 * CF / II	R <sub>soll</sub> * EF * EI	O * SF		
	SSTLDER	= TR * BI	W * 70 * 3	65 * CF / S	8A * AF * AB	S*EF*E	ED * SF	
For non-carcinogens:	SSTLING	= HQ * B\	W * 365 *	CF / IR <sub>soll</sub>	* EF * (1/RfD	(		
	SSTL <sub>DER</sub>	= HQ*B	W * 365 *	CF / SA*	AF* ABS * E	:F * (1/RfL	6	

TR SFo HQ RfDo SSTL <sub>ING</sub>	o HQ RfDo STL <sub>ING</sub>	RfDo SSTL <sub>ING</sub>	SSTL <sub>ING</sub>		S I	d RfDd	ABS	SSTL <sub>DER</sub>
	kg-d) — (mg/kg-d) (mg/kg)	(mg/kg-d) (mg/kg)	(mg/kg)	Т	(1/mg	/kg-d) (mg/kg-	1	-
1.00e-6 2.90e-2 2.14e+	e-2 2.14e+	2.14e+	2.14e+	 	2.90	)e-2	0.000	9.99e+99
1.00e-6 7.30e-3 8.51e	e-3 8.51e	8.51e	8.51e	φ	2.36	be-2	0.130	2.45e+4
				<b></b> i				
0.01 0.10 2.13e	0.01 0.10 2.13e	0.10 2.13e	2.13e	42		0.10	0.000	9.99e+99
0.01 0.04 8.52	0.01 0.04 8.52	0.04 8.52	8.52	6+1		0.04	0.100	1.03e+3
0.01 0.00 8.52	0.01 0.00 8.52	0.00 8.52	8.52	e+0		0.02	0:050	1.13e+3
0.01 0.03 6.39	0.01 0.03 6.39	0.03 6.39	6.39	e+1		0.01	0.100	2.40e+2
0.02 0.20 6.39	0.02 0.20 6.39	0.20 6.39	6.39	e+2		0.20	0.000	9.99e+99
0.04 2.00 1.49	0.04 2.00 1.49	2.00 1.49	1.49	e+4		2.00	0.000	9.99e+99
0.91 1.40	0.91 1.4(	1.4(	1.4	Je+4				1.70e+5
0.00 0.04 8.52	0.00 0.04 8.52	0.04 8.52	8.52	2e+3		0.04	0.100	1.03e+5
0.02 0.04 8.5	0.02 0.04 8.5	0.04 8.5	8.5	i2e+3		0.04	0.100	1.03e+5
0.09 0.04 8.	0.09 0.04 8.	0.04 8.	8	52e+3		0.04	0.100	1.03e+5
0.13 0.03 6.	0.13 0.03 6.	0.03 6.	Ö	39e+3	-	0.03	0.100	7.74e+4
0.11 0.03 6.3	0.11 0.03 6.3	0.03 6.3	9	39e+3		0.03	0.100	7.74e+4
0.00 0.06 1.2	0.00 0.06 1.2	0.06 1.2	1.2	8e+4		0.06	0.100	1.55e+5
0.00 0.06 1.2	0.00 0.06 1.2	0.06 1.2	-	8e+4		0.06	0.100	1.55e+5
0.02 0.10 2.1	0.02 0.10 2.1	0.10 2.1	2.1	3e+4		0.10	0.100	2.58e+5
0.07 0.10 2.1	0.07 0.10 2.1	0.10 2.1	2.1	3e+4		0.10	0.100	2.58e+5
0.17 0.10 2.1	0.17 0.10 2.1	0.10 2.1	N,	13e+4		0.10	0.100	2.58e+5
0.38 2.00 4.2	0.38 2.00 4.2	2.00 4.2	4.2	26e+5		2.00	0.100	5.16e+6
RfD = Reference Dose	keference Dose IR <sub>set</sub> =	Rsot -	IR sol	<ul> <li>Ingestion rat</li> </ul>	U	SA = skin	surface area	
BW = body weight EF = o	ody weight EF = o	EF = (	Ĩ	exposure frequ	ency	AF = adh	erence factor	
AT = averaging time ED =	eraging time ED =	ED =	Ē	exposure durat	ion	ABS = de	rmal absorption fre	ction

HQ = hazard quotient

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Calculation of Site-Specific Target Levels Construction Worker -- Combined SSTL for Soil Texas-New Mexico Pipe Line Co.

SSTL<sub>CW-SOIL</sub> =

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( (1 / SSTL<sub>ING</sub>) + (1 / SSTL<sub>DER</sub>) + (1 / SSTL<sub>INHAL</sub>) )

Constituent
of Concern
Carcinogens
Benzene
Chrysene
Non-Carcinogens
Ethylbenzene
Naphthalene
Phenanthrene
Pyrene
Toluene
Xylene (mixed isomers)
TPH - New Method

NOTES:

SSTL = Site specific Target Level

SSTL <sub>ING</sub> (mg/kg)	2.14e+3 8.51e+3	2.13e+2 8.52e+1 8.52e+0	6.39e+1 6.39e+2 1.49e+4 1.40e+4

	<b>.</b>		
SSTL <sub>DER</sub> (mg/kg)	9.99e+99 2.45e+4	9.99e+99 1.03e+3 1.13e+3 2.40e+2	9.99e+99 9.99e+99 1.70e+5

	·····	
SSTL <sub>INHAL</sub> (mg/kg)	6.36e+1 2.15e+6	7.01e+1 2.67e+1 8.34e+1 2.55e+3 2.08e+1 7.65e+1 7.85e+3

Jury Output File Analysis for Example Problem

\*\*\* COMMON INPUT PARAMETERS \*\*\*

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PARAMETER NAME	UNITS	VALUE
Porosity	(cc/cc)	0.25
Bulk Density	(g/cc)	1.8
Water Content	(cc/cc)	0.1
Fractional Organic Carbon	(mg/mg)	1.00E-02
Incorporation Depth	(cm)	457
Clean Soil Thickness	(cm)	0
Simulation Time	(yrs)	70
Length of Soil Column	(cm)	2620
Infiltration Rate	(cm/day)	5.55E-02
Source Length	(m)	30.5
Source Width	(m)	36.6
Boundary Layer Thickness	(cm)	5

## Chemical Specific Input Parameters for TPH-AL08-10

Parameter Name Units Value		
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 8640 0.864 3410 3.16E+04 0
Outputs for TPH-AL08-10		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	7427 1.74E-06 0.1078 0.1078
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8068 1.01E-05 0.2864 0.2864
Time = 3 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	8360 1.45E-05 0.2468 0.2468
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8537 1.53E-05 0.1747 0.1747
nne –		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8658 1.48E-05 0.1177 0.1177

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Time = 10 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8960 9.5E-06 0.01041 0.01042
Time = 15 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9095 6.33E-06 -0.00762 -0.00761
Time = 20 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9176 4.55E-06 -0.01071 -0.01071
nne – 25 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9231 3.46E-06 -0.01053 -0.01053
Time = 30 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 35 yrs	(g) (g/day) (g/day) (g/day)	9271 2.74E-06 -0.00961 -0.0096
*======================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9303 2.24E-06 -0.00859 -0.00858
Time = 40 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9329 1.87E-06 -0.00764 -0.00764

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Time =	45 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9350 1.59E-06 -0.00682 -0.00682
Time = 50 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 55 yrs	(g) (g/day) (g/day) (g/day)	9368 1.38E-06 -0.00612 -0.00611
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9383 1.21E-06 -0.00551 -0.00551
Time = 60 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 65 yrs	(g) (g/day) (g/day) (g/day)	9396 1.07E-06 -0.005 -0.00499
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9408 9.57E-07 -0.00455 -0.00455
Time = 70 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9419 8.62E-07 -0.00416 -0.00416

# Chemical Specific Input Parameters for TPH-AL10-12

PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 8640 0.864 5410 2.51E+05 0
Outputs for TPH-AL10-12		
Time = 1 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	5921 4.94E-11 1.6E-05 1.6E-05
Time = 2 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	6909 3.63E-08 0.005669 0.005669
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7386 3.06E-07 0.0312 0.0312
Time = 4 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 5 yrs	(g) (g/day) (g/day) (g/day)	7680 8.25E-07 0.06157 0.06157
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day)	7885 1.42E-06 0.08215

Advective Mass Loading Rate to Groundwater(g/day)Diffusive Mass Loading Rate to Groundwater(g/day)Advective & Diffusive Mass Loading Rate to Groundwater(g/day)

0.08215

Time =	10 v	rs
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Cumulative Emissions to Air	(g)	8403
Advective Mass Loading Rate to Groundwater	(g/day)	3.01E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.07427
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.07427
Time = 15 yrs ====================================		
Cumulative Emissions to Air	(g)	8637
Advective Mass Loading Rate to Groundwater	(g/day)	3.02E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.04063
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.04063
Time = 20 yrs ====================================		
Cumulative Emissions to Air	(g)	8778
Advective Mass Loading Rate to Groundwater	(g/day)	2.68E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.02086
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.02086
Time = 25 yrs		
Cumulative Emissions to Air	(g)	8874
Advective Mass Loading Rate to Groundwater	(g/day)	2.31E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.01016
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.01016
Time = 30 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 35 yrs	(g) (g/day) (g/day) (g/day)	8945 1.99E-06 0.004248 0.00425
Cumulative Emissions to Air	(g)	9001
Advective Mass Loading Rate to Groundwater	(g/day)	1.73E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.000892
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.000893
Time = 40 yrs ====================================		
Cumulative Emissions to Air	(g)	9045
Advective Mass Loading Rate to Groundwater	(g/day)	1.51E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00106
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00105

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Time =	45 yrs		
Cumulative Advective M Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9082 1.33E-06 -0.00219 -0.00219
nme =	50 yrs ====================================		
Cumulative Advective M Diffusive Ma Advective & Time =	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater 55 yrs	(g) (g/day) (g/day) (g/day)	9114 1.19E-06 -0.00285 -0.00285
==========			
Cumulative   Advective M Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9141 1.07E-06 -0.00322 -0.00322
Time =	60 yrs		
=========			
Cumulative I Advective M Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9164 9.62E-07 -0.0034 -0.0034
Time = =========	65 yrs		
Cumulative I Advective M Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9185 8.74E-07 -0.00347 -0.00347
Time = ==========	70 yrs		
Cumulative I Advective M Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9204 7.98E-07 -0.00347 -0.00347

## Chemical Specific Input Parameters for TPH-AL12-16

PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 8640 0.864 2.25E+04 5.01E+06 0
Outputs for TPH-AL12-16		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	3485 2.18E-30 1.64E-23 1.64E-23
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4664 1.43E-18 4.43E-12 4.43E-12
Time = 3 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	5362 1.35E-14 2.63E-08 2.63E-08
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	5834 1.36E-12 1.94E-06 1.94E-06
Time = 5 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	6180 2.2E-11 2.47E-05 2.47E-05

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Time =	10 v	vrs
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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7116 5.68E-09 0.003092 0.003092
Time = 15 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 20 yrs	(g) (g/day) (g/day) (g/day)	7562 3.27E-08 0.01155 0.01155
***************************************		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7836 7.19E-08 0.01847 0.01847
Time = 25 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8026 1.09E-07 0.02155 0.02155
Time = 30 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8167 1.37E-07 0.0218 0.0218
Time = 35 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8278 1.56E-07 0.0205 0.0205
Time = 40 yrs		
Cumulativo Emissione to Air	(~)	0007
Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8367 1.68E-07 0.01854 0.01854

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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8442 1.74E-07 0.01639 0.01639
Time = 50 yrs		
=======================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8505 1.77E-07 0.0143 0.0143
Time = 55 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8560 1.77E-07 0.01237 0.01237
Time = 60 vrs		
78=====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 65 yrs	(g) (g/day) (g/day) (g/day)	8607 1.74E-07 0.01065 0.01065
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8650 1.71E-07 0.009139 0.009139
Time = 70 vrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8687 1.67E-07 0.007823 0.007823

Time = 45 yrs

## Chemical Specific Input Parameters for TPH-AL16-35

PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 8640 0.864 2.66E+05 1.00E+09 0
Outputs for TPH-AL16-35		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	871.5 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1234 0 0 0
Time = 3 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	1511 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1746 0 0 0
Fime = 5 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1952 0 0 0

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Time	=	10	vrs
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Cumulative Emissions to Air	(g)	2756
Advective Mass Loading Rate to Groundwater	(g/day)	1.65E-47
Diffusive Mass Loading Rate to Groundwater	(g/day)	3.15E-39
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	3.15E-39
Time = 15 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 20 yrs	(g) (g/day) (g/day) (g/day)	3351 9.89E-35 9.94E-27 9.94E-27
Cumulative Emissions to Air	(g)	3819
Advective Mass Loading Rate to Groundwater	(g/day)	2.52E-28
Diffusive Mass Loading Rate to Groundwater	(g/day)	1.7E-20
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	1.7E-20
Cumulative Emissions to Air	(g)	4200
Advective Mass Loading Rate to Groundwater	(g/day)	1.81E-24
Diffusive Mass Loading Rate to Groundwater	(g/day)	9.12E-17
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	9.12E-17
Time = 30 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 35 yrs	(g) (g/day) (g/day) (g/day)	4517 6.82E-22 2.75E-14 2.75E-14
Cumulative Emissions to Air	(g)	4786
Advective Mass Loading Rate to Groundwater	(g/day)	4.77E-20
Diffusive Mass Loading Rate to Groundwater	(g/day)	1.61E-12
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	1.61E-12
Time = 40 yrs		
Cumulative Emissions to Air	(g)	5017
Advective Mass Loading Rate to Groundwater	(g/day)	1.17E-18
Diffusive Mass Loading Rate to Groundwater	(g/day)	3.36E-11
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	3.36E-11

Time = 45 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to G	(g) (g/day) (g/day) Groundwater (g/day)	5219 1.41E-17 3.55E-10 3.55E-10
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to G Time = 55 yrs	(g) (g/day) (g/day) Froundwater (g/day)	5397 1.04E-16 2.33E-09 2.33E-09
	=======	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to G	(g) (g/day) (g/day) Groundwater (g/day)	5556 5.34E-16 1.08E-08 1.08E-08
Time = 60 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to G	(g) (g/day) (g/day) Groundwater (g/day)	5699 2.1E-15 3.86E-08 3.86E-08
Time = 65 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to G	(g) (g/day) (g/day) Groundwater (g/day)	5827 6.7E-15 1.13E-07 1.13E-07
Time = 70 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to G	(g) (g/day) (g/day) Groundwater (g/day)	5944 1.82E-14 2.83E-07 2.83E-07

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## Chemical Specific Input Parameters for TPH-AR08-10

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 8640 0.864 20.4 1590 0
Outputs for TPH-AR08-10		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	5158 4.13E-12 8.3E-09 8.3E-09
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	6270 1.33E-07 0.000126 0.000126
Time = 3 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	6831 .4318E-05 .2687E-02 .2691E-02
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7184 .2384E-04 .1097E-01 .1100E-01
Time = 5 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7432 .6409E-04 .2325E-01 .2332E-01

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Time = 10 yrs

Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8067 .3552E-03 .5896E-01 .5931E-01
Time = 15 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 20 yrs	(g) (g/day) (g/day) (g/day)	8357 .5010E-03 .4982E-01 .5032E-01
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 25 yrs	(g) (g/day) (g/day) (g/day)	8531 .5275E-03 .3480E-01 .3533E-01
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8651 .5055E-03 .2316E-01 .2367E-01
Time = 30 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 35 yrs	(g) (g/day) (g/day) (g/day)	8740 .4676E-03 .1513E-01 .1560E-01
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8809 .4270E-03 .9706E-02 .1013E-01
nme = 40 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8865 .3883E-03 .6020E-02 .6408E-02

Time = 45 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Groun Diffusive Mass Loading Rate to Groun Advective & Diffusive Mass Loading F	indwater idwater Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8912 .3533E-03 .3489E-02 .3842E-02
Time = 50 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate to Grou Diffusive Mass Loading Rate to Groun Advective & Diffusive Mass Loading F	indwater idwater Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8951 .3222E-03 .1730E-02 .2052E-02
Time = 55 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate to Grou Diffusive Mass Loading Rate to Groun Advective & Diffusive Mass Loading F	indwater idwater Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8985 .2947E-03 .4959E-03 .7906E-03
Time = 60 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate to Grou Diffusive Mass Loading Rate to Groun Advective & Diffusive Mass Loading R	Indwater Idwater Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9014 .2706E-03 .3767E-03 .1061E-03
Time = 65 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate to Grou Diffusive Mass Loading Rate to Groun Advective & Diffusive Mass Loading F	indwater idwater Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9040 .2493E-03 .9958E-03 .7465E-03
Time = 70 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate to Grou Diffusive Mass Loading Rate to Grour Advective & Diffusive Mass Loading F	Indwater Indwater Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9063 .2305E-03 .1435E-02 .1204E-02

AT123D Output File Analysis for Example Problem

Chemicals in the analysis TPH-AL08-10 TPH-AL10-12 TPH-AL12-16 TPH-AL16-35 TPH-AR08-10

Number of years simulated: 70

# GENERAL INPUT DATA

NO. OF POINTS IN X-DIRECTION NO. OF POINTS IN Y-DIRECTION NO. OF POINTS IN Z-DIRECTION NO. OF ROOTS: NO. OF SERIES TERMS NO. OF BEGINNING TIME STEPS NO. OF ENDING TIME STEP NO. OF TIME INTERVALS FOR PRINTED OUT SOLUTION INSTANTANEOUS SOURCE CONTROL = 0 FOR INSTANT SOURCE SOURCE CONDITION CONTROL = 0 FOR STEADY SOURCE INTERMITTENT OUTPUT CONTROL = 0 NO SUCH OUTPUT CASE CONTROL =1 THERMAL, = 2 FOR CHEMICAL, = 3 RAD	1 10 1000 1 70 1 70 1 2
X-COORDINATE OF RECEPTOR WELL (METERS) Y-COORDINATE OF RECEPTOR WELL (METERS) AQUIFER DEPTH, = 0.0 FOR INFINITE DEEP (METERS) AQUIFER WIDTH, = 0.0 FOR INFINITE WIDE (METERS) BEGIN POINT OF X-SOURCE LOCATION (METERS) END POINT OF X-SOURCE LOCATION (METERS) BEGIN POINT OF Y-SOURCE LOCATION (METERS) END POINT OF Y-SOURCE LOCATION (METERS) BEGIN POINT OF Z-SOURCE LOCATION (METERS) END POINT OF Z-SOURCE LOCATION (METERS) END POINT OF Z-SOURCE LOCATION (METERS)	1.53E+01 1.83E+01 3.05E+00 0.00E+00 3.05E+01 0.00E+00 3.66E+01 0.00E+00 0.00E+00
POROSITY	2.50E-01
HYDRAULIC CONDUCTIVITY (METER/YEAR)	3.15E+01
HYDRAULIC GRADIENT	2.00E-02
LONGITUDINAL DISPERSIVITY (METER)	0.00E+00
LATERAL DISPERSIVITY (METER)	0.00E+00
VERTICAL DISPERSIVITY (METER)	0.00E+00
BULK DENSITY OF THE SOIL (KG/M**3)	1.80E+03
TIME INTERVAL SIZE FOR THE DESIRED SOLUTION (YR)	1.00E+00
DISCHARGE TIME (YR)	7.00E+01

INPUT DATA/RESULTS FOR CHEMICAL: TPH-AL08-10

INST. WAST	E RELEASE	(KG) VALID	FOR INST C	ASE ONLY	1.00E+(	00
DISTRIBUTI		CIENT, KD (N	//**3/KG)		6.32E-0	01
MOLECULAR	RDIFFUSION		ENT (M	**2/YR)	3.15E-0	)2 22
	ISTANT (1/Y				0.00E+0	00
	ANSIENT SU		ASE RAIE	4205 01		
.394E-01	1955 01	1185 01	.030E-01	2805-01		
.204E-01	.105E-01	.110E-01	.707E-02	.300E-02		
.1490-02	00000000	00000000	00000+00	000E+00		
00000000	00000+00	000E+00	00000000	000E+00		
000E+00	00000+00	00000000	000000000	000E+00		
000E+00	000E+00	00000000	000E+00	000E+00		
000E+00	00000+00	00000000	000E+00	000000000		
000E+00	000E+00	000E+00	000E+00	000E+00		
000E+00	000E+00	000E+00	000E+00	000E+00		
000E+00	0005+00	000E+00	000E+00	000E+00		
000E+00	000E+00	0005+00	000E+00	000E+00		
000E+00	000E+00	000E+00	000E+00	000E+00		
000E+00	000E+00	000E+00	000E+00	.0002.00		
	ON FACTOR	20002.00			4 55E+	03
RETARDED	SEEPAGE V				5 54E-	04
RETARDED		NAL DISPER	SION COEF	(M**2/YR)	2.77E-	05
RETARDED	LATERAL DI	SPERSION	COEFFICIEN	T (M**2/YR)	2.77E-	05
RETARDED		ISPERSION		NT (M**2/YR).	2.77E-	05
				. ,		
time [yr] =	1.00	avg	. conc. [mg/l]	= .155E-05		
time [yr] =	5.00	avg	. conc. [mg/l]	= .181E-02		
		-				
time [yr] =	10.0	avg	. conc. [mg/l]	= .141E-02		
time [yr] =	15.0	avg	. conc. [mg/l]	= .103E-02		
time [yr] =	20.0	avg	. conc. [mg/l]	= .848E-03		
time [yr] =	25.0	avg	. conc. [mg/l]	= .739E-03		
time [yr] =	30.0	avg	. conc. [mg/l]	= .664E-03		
time [yr] =	35.0	a∨g	. conc. [mg/l]	= .609E-03		
time [yr] =	40.0	avg	. conc. [mg/l]	= .565E-03		
time [yr] =	45.0	avg	. conc. [mg/l]	= .529E-03		
time [yr] =	50.0	avg	. conc. [mg/l]	= .500E-03		
time [yr] =	55.0	avg	. conc. [mg/l]	= .475E-03		
time [yr] =	60.0	avg	ı. conc. [mg/l]	= .453E-03		
time [yr] =	65.0	avg	ı. conc. [mg/l]	= .434E-03		
time [yr] =	70.0	avg	. conc. [mg/l]	= .418E-03		

INPUT DATA/RESULTS FOR CHEMICAL: TPH-AL10-12

INST. WAST DISTRIBUTION MOLECULAN DECAY CON	E RELEASE ON COEFFIC R DIFFUSION ISTANT ( 1/Y	(KG) VALID FOR INST CASE ONLY CIENT, KD (M**3/KG) N COEFFICIENT (M**2/YR) /R )	1.00E+00 5.02E+00 3.15E-02 0.00E+00
LIST OF TRA	ANSIENT SO	URCE RELEASE BATE	
5925 05	2075 02		
.5022-05	.2072-02	.114E-01 .225E-01 .300E-01	
.333E-01	.337E-01	.322E-01 .298E-01 .271E-01	
.243E-01	.216E-01	.191E-01 .169E-01 .148E-01	
.130E-01	.114E-01	.998E-02 .873E-02 .761E-02	
663E-02	5765-02	100E_02 /31E_02 371E_02	
.0032-02	.5702-02		
.317E-02	.269E-02	.227E-02 .189E-02 .155E-02	
.125E-02	.979E-03	.737E-03 .520E-03 .326E-03	
.152E-03	.000E+00	.000E+00 .000E+00 .000E+00	
0005+00	0005+00	000E+00 000E+00 000E+00	
.000	.0002100	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
000=+00	0005+00		
.000E+00	.0002+00	000000000000000000000000000000000000000	
.000E+00	.000E+00	.000E+00 .000E+00	
RETARDATI	ON FACTOR		3.61E+04
RETARDED	SEEPAGE V	ELOCITY (M/YR)	6.97E-05
PETADDED			3 405 06
RETARDED			3.492-00
RETARDED	LATERAL DI	SPERSION COEFFICIENT (M**2/YR).	3.49E-06
RETARDED	VERTICAL D	DISPERSION COEFFICIENT (M**2/YR).	3.49E-06
time but -	1 00		
time [yr] =	1.00	avg. conc. $[mg/I] = .000E+00$	
time [vr] =	5.00	avg. conc. [mg/l] = .109E-03	
there a final -	10.0		
ume [yr] =	10.0	avg. conc. [mg/i] = .343⊑-03	
time [vr] =	15.0	avg. conc. [mg/l] = .410E-03	
		5 1 5 1	
	<u></u>		
time [yr] =	20.0	avg. conc. $[mg/I] = .378E-03$	
time [vr] =	25.0	avg. conc $Img/II = .342E-03$	
time [yr] =	30.0	avg. conc. [mg/I] = .299E-03	
time [vr] =	35.0	avg. conc. [mg/l] = .265E-03	
11	40.0		
time [yr] =	40.0	avg. conc. $[mg/I] = .236E-03$	
time [vr] =	45.0	avg. conc. [mg/l] = .215E-03	
<b>.</b> .			
time [yr] =	50.0	avg. conc. [mg/I] = .200E-03	
time [vr] =	55.0	$a_{VII} = 188 E_{-}03$	
une Dil			
time [yr] =	60.0	avg. conc. [mg/l] = .177E-03	
time [vr] -	65.0	$ava conc [ma/l] = 169E_03$	
anie [yi] –	55.0	avg. conc. [mg/i]1032-00	
time [yr] =	70.0	avg. conc. [mg/l] = .161E-03	

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INPUT DATA/RESULTS FOR CHEMICAL: TPH-AL12-16

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INST. WAST	E RELEASE	E (KG) VALID FOR INST CASE ONLY ICIENT, KD (M**3/KG)	1.00E+00 1.00E+02
MOI ECULAR		N COEFFICIENT (M**2/YR)	3 15E-02
DECAY CON	ISTANT ( 1/	YR)	0.00E+00
LIST OF TRA	NSIENT S	OURCE RELEASE RATE	0.002.00
598E-23	162E-11	959E-08 706E-06 902E-05	
479E-04	154E-03	361E-03 687E-03 113E-02	
167E-02	227E-02	292E-02 357E-02 421E-02	
482E-02	5395-02	590E-02 635E-02 674E-02	
7075 02	725 02	757E 02 774E 02 787E 02	
.707E-02	.735E-02	201E-02 200E 02 206E 02	
.795E-02	.000E-02		
.709E-02	.701E-02	7075 02 6025 02 6775 02	
.735E-02	.721E-02	.707E-02 .692E-02 .677E-02	
.661E-02	.646E-02	.630E-02 .614E-02 .598E-02	
.583E-02	.567E-02	.552E-02 .537E-02 .522E-02	
.507E-02	.493E-02	.479E-02 .465E-02 .452E-02	
.438E-02	.425E-02	.413E-02 .401E-02 .389E-02	
.377E-02	.366E-02	.355E-02 .344E-02 .334E-02	
.323E-02	.314E-02	.304E-02 .295E-02	
RETARDATI	ON FACTO	R	7.21E+05
RETARDED	SEEPAGE '	VELOCITY (M/YR)	3.49E-06
RETARDED	LONGITUD	INAL DISPERSION COEF. (M**2/YR)	1.75E-07
RETARDED	LATERAL D	DISPERSION COEFFICIENT (M**2/YR) .	1.75E-07
RETARDED	VERTICAL	DISPERSION COEFFICIENT (M**2/YR).	1.75E-07
time [yr] =	1.00	avg. conc. [mg/l] = .000E+00	
		· · · · ·	
time [vr] =	5.00	ava. conc. $[ma/l] = .000E+00$	
time [vr] =	10.0	avg_conc. $[mg/l] = .362E-06$	
	10.0		
time [vr] =	15.0	$a_{VQ} = c_{QQ} [m_{Q}/l] = 378E-05$	
une [Ji] -	10.0		
timo [vr] -	20.0	$a_{1}a_{2}a_{2}a_{3}a_{2}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3$	
unie [yi] –	20.0	avg. conc. [mg/i] = .102E-04	
1	05.0		
time [yr] =	25.0	avg. conc. $[mg/I] = .187E-04$	
time [yr] =	30.0	avg. conc. [mg/l] = .258E-04	
time [yr] =	35.0	avg. conc. [mg/l] = .324E-04	
time [yr] =	40.0	avg. conc. [mg/l] = .367E-04	
time [yr] =	45.0	avg. conc. [mg/l] = .402E-04	
time [yr] =	50.0	avg. conc. [mg/l] = .420E-04	
time [vr] =	55.0	avg. conc. [mg/]] = .435E-04	
time [vr] =	60.0	$av_{0} conc [mg/l] = 437E-04$	
2010 [31] -	00.0		
time [vr] =	65.0	ave conc $Img/II = 440E_04$	
une Dil -	00.0	avg. conc. [mg/i]440C-04	
timo furl -	70.0	21/0 cono [ma/1] - 1215 01	
ume [yi] =	10.0	avg. conc. [mg/i]454⊑-04	

INPUT DATA/RESULTS FOR CHEMICAL: TPH-AL16-35

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INST. WAST DISTRIBUTI MOLECULAI DECAY CON	E RELEASE ON COEFFI R DIFFUSIC ISTANT ( 1/	E (KG) VALID FOR INST CASE ONLY CIENT, KD (M**3/KG) NN COEFFICIENT (M**2/YR) YR )	1.00E+00 2.00E+04 3.15E-02 0.00E+00
LIST OF TR/ .000E+00 .297E-35 .132E-24 .481E-19 .125E-15 .252E-13 .115E-11 .206E-10 .195E-09 .118E-08 .518E-08 .177E-07	ANSIENT S .000E+00 .000E+00 .206E-32 .313E-23 .309E-18 .422E-15 .596E-13 .219E-11 .337E-10 .289E-09 .163E-08 .675E-08 .221E-07	DURCE RELEASE RATE .000E+00 .000E+00 .000E+00 .000E+00 .774E-43 .115E-38 .521E-30 .597E-28 .363E-26 .521E-22 .645E-21 .621E-20 .168E-17 .797E-17 .333E-16 .131E-14 .376E-14 .100E-13 .134E-12 .286E-12 .586E-12 .400E-11 .711E-11 .123E-10 .540E-10 .845E-10 .130E-09 .420E-09 .602E-09 .851E-09 .221E-08 .297E-08 .394E-08 .870E-08 .111E-07 .141E-07 .274E-07 .338E-07 .413E-07	0.002+00
.502E-07 RETARDATI RETARDED RETARDED RETARDED RETARDED	.606E-07 ON FACTO SEEPAGE V LONGITUD LATERAL D VERTICAL	./28E-07 .869E-07 R VELOCITY (M/YR) INAL DISPERSION COEF. (M**2/YR) DISPERSION COEFFICIENT (M**2/YR) . DISPERSION COEFFICIENT (M**2/YR).	1.44E+08 1.75E-08 8.76E-10 8.76E-10 8.76E-10 8.76E-10
time [yr] =	1.00	avg. conc. [mg/l] = .000E+00	
time [yr] =	5.00	avg. conc. [mg/I] = .000E+00	
time [yr] =	10.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	15.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	20.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	25.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	30.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	35.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	40.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	45.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	50.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	55.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	60.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	65.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	70.0	avg. conc. [mg/l] = .000E+00	

INPUT DATA/RESULTS FOR CHEMICAL: TPH-AL16-35

INST. WAST	E RELEASE	E (KG) VALID FOR INST CASE ONLY	1.00E+00
		N COEFEICIENT (M**2/YR)	3 15 - 02
	STANT ( 1/		0.00=+00
		NIRCE RELEASE RATE	0.002100
0005+00	00000000	000E+00 774E 43 115E-38	
	2065 22	501E 20 E07E 28 262E 26	
120 - 33	2125 22	.321E-30 .397E-20 .303E-20	
.1325-24	.313E-23	.5212-22 .0452-21 .0212-20	
.481E-19	.309E-18	.168E-1/ ./9/E-1/ .333E-16	
.125E-15	.422E-15	.131E-14 .376E-14 .100E-13	
.252E-13	.596E-13	.134E-12 .286E-12 .586E-12	
.115E-11	.219E-11	.400E-11 .711E-11 .123E-10	
.206E-10	.337E-10	.540E-10 .845E-10 .130E-09	
.195E-09	.289E-09	.420E-09 .602E-09 .851E-09	
.118E-08	.163E-08	.221E-08 .297E-08 .394E-08	
.518E-08	.675E-08	.870E-08 .111E-07 .141E-07	
.177E-07	.221E-07	.274E-07 .338E-07 .413E-07	
.502E-07	.606E-07	.728E-07 .869E-07	
RETARDATIO	ON FACTO	२	1.44E+08
RETARDED	SEEPAGE	VELOCITY (M/YR)	1.75E-08
RETARDED I	LONGITUD	INAL DISPERSION COEF. (M**2/YR)	8.76E-10
RETARDED I	LATERAL D	SPERSION COEFFICIENT (M**2/YR)	8.76E-10
RETARDED '	VERTICAL	DISPERSION COEFFICIENT (M**2/YR).	8.76E-10
••=			
time [vr] =	1.00	ava. conc. $[ma/l] = .000E+00$	
time [vr] =	5.00	avg conc $[mg/l] = .000E+00$	
	0.00		
time [vr] =	10.0	$a_{VQ} = c_{QQ} c_{QQ} = 000E+00$	
	10.0		
time [vr] =	15.0	ava conc $\left[ ma/l \right] = 000E+00$	
	10.0		
timo [ur] -	20.0		
titte [yt] –	20.0		
the second second second	05.0		
time [yr] =	25.0	$avg. conc. [mg/i] = .000\pm+00$	
time [yr] =	30.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	35.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	40.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	45.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	50.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	55.0	avg. conc. [mg/l] = .000E+00	
		0 1 0 1	
time [vr] =	60.0	ava, conc. [mg/l] = .000E+00	
time (vr) =	65.0	avg conc. [mg/l] = 000F+00	
anio [31]			
time Ivrl -	70 N	ava conc $[ma/l] = 000E+00$	
une [yi] -	10.0	avy. conc. [mg/i]0000+00	

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INPUT DATA/RESULTS FOR CHEMICAL: TPH-AR08-10

INST. WAST	E RELEASE	E (KG) VALID FOR INST CASE ONLY ICIENT_KD (M**3/KG)	1.00E+00 3.18E-02
MOLECULA	R DIFFUSIC	N COEFFICIENT (M**2/YR)	3.15E-02
DECAY CON	ISTANT (1/	YR )	0.00E+00
LIST OF TR	ANSIENT SO	OURCE RELEASE RATE	
.303E-08	462E-04	.982E-03 401E-02 .851E-02	
131E-01	168E-01	194E-01 210E-01 216E-01	
217E_01	212E-01	204E-01 104E-01 184E-01	
1725 01	1615 01	1505 01 1205 01 1205 01	
.1/2E-01	.1012-01		
.119E-01	.110E-01	.102E-01 .937E-02 .864E-02	
.796E-02	.732E-02	.674E-02 .620E-02 .569E-02	
.523E-02	.480E-02	.441E-02 .404E-02 .370E-02	
.338E-02	.309E-02	.282E-02 .257E-02 .234E-02	
.212E-02	.192E-02	.174E-02 .156E-02 .140E-02	
.125E-02	.111E-02	.983E-03 .862E-03 .749E-03	
.644E-03	.546E-03	.454E-03 .368E-03 .289E-03	
.214E-03	144E-03	791E-04 182E-04 000E+00	
000E+00		000E+00 000E+00 000E+00	
0000000	00000+00	0005+00 0005+00	
		.000E+00 .000E+00	
RETARDATI	ON FACTO		2.30E+02
RETARDED	SEEPAGE	VELOCITY (M/YR)	1.10E-02
RETARDED	LONGITUD	INAL DISPERSION COEF. (M**2/YR)	5.49E-04
RETARDED	LATERAL D	DISPERSION COEFFICIENT (M**2/YR) .	5.49E-04
RETARDED	VERTICAL	DISPERSION COEFFICIENT (M**2/YR).	5.49E-04
time [vr] =	1.00	avg. conc. [mg/l] = .000E+00	
time [vr] =	5.00	$a_{1/2}$ conc $[ma/l] = 220E_{-}03$	
anic [yi] -	5.00		
time [url -	10.0		
ume [yi] –	10.0		
time [yr] =	15.0	avg. conc. [mg/l] = .379E-02	
time [yr] =	20.0	avg. conc. [mg/l] = .418E-02	
time [vr] =	25.0	avg. conc. [mg/l] = .434E-02	
time [vr] =	30.0	$a_{1}a_{2}a_{3}a_{4}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5$	
une [yi] -	30.0		
time funt -	25.0		
time [yr] =	35.0	avg. conc. $[mg/I] = .402E-02$	
time [yr] =	40.0	avg. conc. [mg/l] = .380E-02	
time [yr] =	45.0	avg. conc. [mg/l] = .365E-02	
time [yr] =	50.0	avg. conc. [mg/l] = .348E-02	
., .			
time [vr] =	55.0	$avg conc [mg/l] = 334F_{-}02$	
	00.0	avg. cono. [mg/i]co+c-oz	
time furl -	60.0	$a_{10} = a_{10} = a$	
une [yr] =	00.0	avy. conc. [mg/i] – .321E-02	
time [yr] =	65.0	avg. conc. [mg/I] = .312E-02	
time [yr] =	70.0	avg. conc. [mg/l] = .305E-02	

Jury Output File Analysis for Example Problem

\*\*\* COMMON INPUT PARAMETERS \*\*\*

PARAMETER NAME	UNITS	VALUE
Deresity	(00/00)	0.25
Porosity		0.25
Bulk Density	(g/cc)	1.8
Water Content	(cc/cc)	0.1
Fractional Organic Carbon	(mg/mg)	1.00E-02
Incorporation Depth	(cm)	457
Clean Soil Thickness	(cm)	0
Simulation Time	· (yrs)	70
Length of Soil Column	(cm)	2620
Infiltration Rate	(cm/day)	5.55E-02
Source Length	(m)	30.5
Source Width	(m)	36.6
Boundary Layer Thickness	(cm)	5

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## Chemical Specific Input Parameters for TPH-AL05-06

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Parameter Name Units Value		
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 8640 0.864 1410 794 0
Outputs for TPH-AL05-06		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8060 4.75E-05 0.5651 0.5652
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8531 7.33E-05 0.3514 0.3515
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8743 6.59E-05 0.1584 0.1584
Time = 4 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8870 5.51E-05 0.0664 0.06645
Time = 5 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8957 4.59E-05 0.02226 0.0223

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Time = 10 yrs

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Cumulative Emissions to Air	(g)	9173
Advective Mass Loading Rate to Groundwater	(g/day)	2.2E-05
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.02112
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.0211
Time = 15 yrs		
Cumulative Emissions to Air	(g)	9270
Advective Mass Loading Rate to Groundwater	(g/day)	1.33E-05
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.01914
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.01913
Time = 20 yrs ====================================		
Cumulative Emissions to Air	(g)	9327
Advective Mass Loading Rate to Groundwater	(g/day)	9.08E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.01528
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.01527
Time = 25 yrs		
Cumulative Emissions to Air	(g)	9366
Advective Mass Loading Rate to Groundwater	(g/day)	6.7E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.01224
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.01224
Time = 30 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 35 yrs	(g) (g/day) (g/day) (g/day)	9395 5.21E-06 -0.01001 -0.01
Cumulative Emissions to Air	(g)	9418
Advective Mass Loading Rate to Groundwater	(g/day)	4.19E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00835
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00835
Time = 40 yrs		
Cumulative Emissions to Air	(g)	9436
Advective Mass Loading Rate to Groundwater	(g/day)	3.47E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00709
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00709

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Time = 45 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9451 2.93E-06 -0.00611 -0.00611
Time = 50 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9464 2.52E-06 -0.00533 -0.00533
Time = 55 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 60 yrs	(g) (g/day) (g/day) (g/day)	9475 2.2E-06 -0.00471 -0.00471
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9484 1.94E-06 -0.00419 -0.00419
Time = 65 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9493 1.73E-06 -0.00377 -0.00376
Time = 70 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9500 1.55E-06 -0.00341 -0.0034

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# Chemical Specific Input Parameters for TPH-AR10-12

PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 8640 0.864 5.82 2510 0
Outputs for TPH-AR10-12		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	2547 2.23E-48 1.24E-44 1.26E-44
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3551 5.71E-26 1.04E-22 1.04E-22
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4232 1.83E-18 1.96E-15 1.96E-15
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4731 1.08E-14 8.15E-12 8.16E-12
Time = 5 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	5115 2.02E-12 1.18E-09 1.18E-09

Time = 10 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	6227 7.82E-08 2.16E-05 2.16E-05
Time = 15 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 20 yrs	(g) (g/day) (g/day) (g/day)	6790 2.71E-06 0.000489 0.000491
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7143 1.55E-05 0.002064 0.002079
Time = 25 yrs		
	<i>.</i>	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7391 4.25E-05 0.004466 0.004508
Time = 30 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7578 8.07E-05 0.006959 0.00704
lime = 35 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7725 0.000125 0.009039 0.009163
Time = 40 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7845 0.000169 0.01052 0.01069
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	7944 0.00021 0.01142 0.01163
--	--------------------------------------	--
Time = 50 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 55 vrs	(g) (g/day) (g/day) (g/day)	8029 0.000246 0.01183 0.01208
RE		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8102 0.000278 0.01187 0.01215
Time = 60 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 65 yrs	(g) (g/day) (g/day) (g/day)	8167 0.000304 0.01165 0.01195
2======================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8223 0.000324 0.01124 0.01156
Time = 70 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8274 0.000341 0.01072 0.01106

Time = 45 yrs

#### Chemical Specific Input Parameters for TPH-AR12-16

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 8640 0.864 2.25 5010 0
Outputs for TPH-AR12-16		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	1129 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1597 0 0 0
Time = 3 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	1955 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	2256 1.06E-60 3.69E-57 0
=======================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	2520 2.4E-49 5.29E-46 0

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Time =	10 yrs		
========			
Cumulative Advective Diffusive M Advective	e Emissions to Air Mass Loading Rate to Groundwater lass Loading Rate to Groundwater & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3512 1.38E-26 9.9E-24 9.91E-24
Time	15 yrs		
Cumulative Advective I Diffusive N Advective 3	e Emissions to Air Mass Loading Rate to Groundwater lass Loading Rate to Groundwater & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4186 5.78E-19 2.43E-16 2.44E-16
Time = =======	20 yrs		
Cumulative Advective I Diffusive M Advective 3	e Emissions to Air Mass Loading Rate to Groundwater lass Loading Rate to Groundwater & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4681 3.9E-15 1.16E-12 1.16E-12
Time ≠ ========	25 yrs		
Cumulative Advective I Diffusive M Advective 6	e Emissions to Air Mass Loading Rate to Groundwater lass Loading Rate to Groundwater & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	5062 7.91E-13 1.82E-10 1.82E-10
Time	30 yrs		
Cumulative Advective I Diffusive M Advective a	e Emissions to Air Mass Loading Rate to Groundwater lass Loading Rate to Groundwater & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	5367 2.78E-11 5.19E-09 5.22E-09
Time = ========	35 yrs		
Cumulative Advective I Diffusive M Advective o	e Emissions to Air Mass Loading Rate to Groundwater lass Loading Rate to Groundwater & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	5619 3.56E-10 5.63E-08 5.66E-08
Time	40 yrs		
Cumulative Advective I Diffusive M Advective	e Emissions to Air Mass Loading Rate to Groundwater lass Loading Rate to Groundwater & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	5830 2.43E-09 3.32E-07 3.35E-07

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Time = 45 yrs

Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	6011 1.09E-08 1.31E-06 1.32E-06
Time = 50 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 55 yrs	(g) (g/day) (g/day) (g/day)	6168 3.61E-08 3.9E-06 3.93E-06
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	6306 9.64E-08 9.42E-06 9.52E-06
Time = 60 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 65 yrs	(g) (g/day) (g/day) (g/day)	6429 2.19E-07 1.95E-05 1.97E-05
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	6539 4.38E-07 3.59E-05 3.63E-05
Time = 70 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	6638 7.92E-07 6.01E-05 6.09E-05

# Chemical Specific Input Parameters for TPH-AR16-21


PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 8640 0.864 0.54 1.58E+04 0
Outputs for TPH-AR16-21		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	309.8 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	439 0 0 0
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	537.9 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	621.2 0 0 0
Time = 5 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	694.4 0 0 0

Time = 10 yrs	
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Cumulative Emissions to Air	(g)	981.1
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 15 yrs ====================================		
Cumulative Emissions to Air	(g)	1200
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 20 yrs		
Cumulative Emissions to Air	(g)	1384
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Cumulative Emissions to Air	(g)	1546
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 30 yrs		
Cumulative Emissions to Air	(g)	1692
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 35 yrs ====================================		
Cumulative Emissions to Air	(g)	1826
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 40 yrs		
Cumulative Emissions to Air	(g)	1950
Advective Mass Loading Rate to Groundwater	(g/day)	1.53E-78
Diffusive Mass Loading Rate to Groundwater	(g/day)	2.41E-75
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0

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Time = 45 yrs

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Cumulative Emissions to Air	(g)	2067
Advective Mass Loading Rate to Groundwater	(g/day)	2.67E-70
Diffusive Mass Loading Rate to Groundwater	(g/day)	3.14E-67
Advective & Diffusive Mass Loading Rate to Groundwate	er (g/day)	0
Time = 50 yrs	=	
Cumulative Emissions to Air	(g)	2177
Advective Mass Loading Rate to Groundwater	(g/day)	1.06E-63
Diffusive Mass Loading Rate to Groundwater	(g/day)	9.71E-61
Advective & Diffusive Mass Loading Rate to Groundwate	er (g/day)	0
Time = 55 yrs ====================================	=	
Cumulative Emissions to Air	(g)	2281
Advective Mass Loading Rate to Groundwater	(g/day)	2.65E-58
Diffusive Mass Loading Rate to Groundwater	(g/day)	1.98E-55
Advective & Diffusive Mass Loading Rate to Groundwate	er (g/day)	0
Time = 60 yrs	-	
Cumulative Emissions to Air	(g)	2380
Advective Mass Loading Rate to Groundwater	(g/day)	8.41E-54
Diffusive Mass Loading Rate to Groundwater	(g/day)	5.26E-51
Advective & Diffusive Mass Loading Rate to Groundwate	er (g/day)	0
Time = 65 yrs ====================================	-	
Cumulative Emissions to Air	(g)	2475
Advective Mass Loading Rate to Groundwater	(g/day)	5.44E-50
Diffusive Mass Loading Rate to Groundwater	(g/day)	2.9E-47
Advective & Diffusive Mass Loading Rate to Groundwate	er (g/day)	0
Time = 70 yrs ====================================	=	
Cumulative Emissions to Air	(g)	2566
Advective Mass Loading Rate to Groundwater	(g/day)	1.01E-46
Diffusive Mass Loading Rate to Groundwater	(g/day)	4.68E-44
Advective & Diffusive Mass Loading Rate to Groundwate	er (g/day)	4.62E-44

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#### Chemical Specific Input Parameters for TPH-AR21-35

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 8640 0.864 2.83E-02 1.26E+05 0
Outputs for TPH-AR21-35		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	22.53 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	32.91 0 0 0
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	40.87 .0000 .0000 .0000
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 5 vrs	(g) (g/day) (g/day) (g/day)	47.58 .0000 .0000 .0000
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	53.48 .0000 .0000 .0000

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Time = 10 yr	-s		
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Cumulative Emiss	ions to Air	(a)	76 54
Advective Mass L	pading Rate to Groundwater	(g/dav)	0.00
Diffusive Mass Lo	ading Rate to Groundwater	(g/day)	0000
Advective & Diffus	sive Mass Loading Rate to Groundwater	(g/day)	.0000
		(3 ))	
Time = 15 yi	"S		
=======================			
Cumulativo Emiss	ions to Air		04.14
Advective Mass L	ons to All	(g) (g/dav)	94.14
Diffusive Mass Lo	ading Rate to Groundwater	(g/day)	0000.
Advective & Diffus	sive Mass Loading Rate to Groundwater	(g/day)	0000.
	Ğ		
Time = 20 yr	ĩs 		
Cumulative Emiss	ions to Air	(g)	108.9
Advective Mass Lo	pading Rate to Groundwater	(g/day)	.0000
Diffusive Mass Loa	ading Rate to Groundwater	(g/day)	.0000
Advective & Diffus	sive Mass Loading Rate to Groundwater	(g/day)	.0000
Time = 25 vi	2		
================================			
	· / ··		
Cumulative Emiss	ions to Air	(g) (a (day)	121.9
Advective Mass L	Dading Rate to Groundwater	(g/day)	.0000
Dimusive Mass Lo	ading Rate to Groundwater	(g/day)	.0000
Advective & Dinus	sive mass coading Rate to Groundwater	(g/uay)	.0000
Time = 30 yı	S		
2002272220222	=======================================		
Cumulative Emiss	ions to Air	(a)	133.5
Advective Mass Lo	bading Rate to Groundwater	(g/dav)	.0000
Diffusive Mass Lo	ading Rate to Groundwater	(g/day)	.0000
Advective & Diffus	vive Mass Loading Rate to Groundwater	(g/day)	.0000
======================================	5 ====================================		
Cumulative Emiss	ions to Air	(g)	144.2
Advective Mass Lo	pading Rate to Groundwater	(g/day)	.0000
Diffusive Mass Lo	ading Rate to Groundwater	(g/day)	.0000
Advective & Diffus	sive Mass Loading Rate to Groundwater	(g/day)	.0000
Time = 40 yr			
==================			
Cumulative Emiss	ions to Air	$(\mathbf{c})$	151 4
	ons to All Dading Rate to Groundwater	(9) (0/day)	104.1
Diffusive Mass Lo	ading Rate to Groundwater	(g/uay) (g/day)	0000.
Advective & Diffus	sive Mass Loading Rate to Groundwater	(g/dav)	.0000
	<b>G</b>		

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Time = 45 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	163.4 .0000 .0000 .0000
Time = 50 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	172.2 .0000 .0000 .0000
Time = 55 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 60 yrs	(g) (g/day) (g/day) (g/day)	180.5 .0000 .0000 .0000
***************************************		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	188.4 .0000 .0000 .0000
Time = 65 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	196.0 .0000 .0000 .0000
Time = 70 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) · (g/day)	203.3 .0000 .0000 .0000

AT123D Output File Analysis for Example Problem

Chemicals in the analysis TPH-AL05-06 TPH-AR10-12 TPH-AR12-16 TPH-AR16-21 TPH-AR21-35

Number of years simulated: 70

# GENERAL INPUT DATA

NO. OF POINTS IN X-DIRECTION ..... 1 NO. OF POINTS IN Y-DIRECTION ..... 1 NO. OF POINTS IN Z-DIRECTION ..... 10 NO. OF ROOTS: NO. OF SERIES TERMS ..... 1000 NO. OF BEGINNING TIME STEPS ..... 1 NO. OF ENDING TIME STEP ..... 70 NO. OF TIME INTERVALS FOR PRINTED OUT SOLUTION .... 1 INSTANTANEOUS SOURCE CONTROL = 0 FOR INSTANT SOURCE 1 SOURCE CONDITION CONTROL = 0 FOR STEADY SOURCE .... 70 INTERMITTENT OUTPUT CONTROL = 0 NO SUCH OUTPUT .... 1 CASE CONTROL =1 THERMAL, = 2 FOR CHEMICAL, = 3 RAD 2 X-COORDINATE OF RECEPTOR WELL (METERS) ..... 1.53E+01 Y-COORDINATE OF RECEPTOR WELL (METERS) ..... 1.83E+01 AQUIFER DEPTH, = 0.0 FOR INFINITE DEEP (METERS) .... 3.05E+00 AQUIFER WIDTH, = 0.0 FOR INFINITE WIDE (METERS) .... 0.00E+00 BEGIN POINT OF X-SOURCE LOCATION (METERS) ...... 0.00E+00 END POINT OF X-SOURCE LOCATION (METERS) ..... 3.05E+01 BEGIN POINT OF Y-SOURCE LOCATION (METERS) ...... 0.00E+00 END POINT OF Y-SOURCE LOCATION (METERS) ..... 3.66E+01 BEGIN POINT OF Z-SOURCE LOCATION (METERS) ...... 0.00E+00 END POINT OF Z-SOURCE LOCATION (METERS) ..... 0.00E+00 POROSITY ..... 2.50E-01 HYDRAULIC CONDUCTIVITY (METER/YEAR) ..... 3.15E+01 HYDRAULIC GRADIENT ..... 2.00E-02 LONGITUDINAL DISPERSIVITY (METER) ..... 0.00E+00 LATERAL DISPERSIVITY (METER) ..... 0.00E+00 VERTICAL DISPERSIVITY (METER) ..... 0.00E+00 BULK DENSITY OF THE SOIL (KG/M\*\*3) ..... 1.80E+03 TIME INTERVAL SIZE FOR THE DESIRED SOLUTION (YR) ... 1.00E+00 DISCHARGE TIME (YR) ..... 7.00E+01

INPUT DATA/RESULTS FOR CHEMICAL: TPH-AL05-06

INST. WASTE RELE DISTRIBUTION COE MOLECULAR DIFFU	EASE (KG) VALID FOR INST CASE ONLY EFFICIENT, KD (M**3/KG) JSION COEFFICIENT (M**2/YR)	1.00E+00 1.59E-02 3.15E-02
DECAY CONSTANT	(1/YR)	0.00E+00
LIST OF TRANSIEN	IT SOURCE RELEASE RATE	
206F+00 128F	+00 578E-01 243E-01 814E-02	
733E-04 000E	+00 000E+00 000E+00 000E+00	
0005+00 0005		
.000E+00 .000E	+00 .000E+00 .000E+00 .000E+00	
.000E+00 .000E	+00 .000E+00 .000E+00 .000E+00	
.000E+00 .000E	+00 .000E+00 .000E+00 .000E+00	
.000E+00 .000E	+00 .000E+00 .000E+00 .000E+00	
.000E+00 .000E	E+00 .000E+00 .000E+00 .000E+00	
.000E+00 .000E	E+00 .000E+00 .000E+00 .000E+00	
.000E+00 .000E	+00 .000E+00 .000E+00 .000E+00	
000E+00 000E	+00 000E+00 000E+00 000E+00	
000000000000000000000000000000000000000	100 000E+00 000E+00 000E+00	
.000E+00 .000E	+00 000E+00 000E+00 000E+00	
.000E+00 .000E		
.000E+00 .000E	2+00 .000E+00 .000E+00	
RETARDATION FAC	CTOR	1.15E+02
RETARDED SEEPA	GE VELOCITY (M/YR)	2.19E-02
RETARDED LONG	TUDINAL DISPERSION COEF. (M**2/YR)	1.09E-03
RETARDED LATER	AL DISPERSION COEFFICIENT (M**2/YR) .	1.09E-03
RETARDED VERTIC	CAL DISPERSION COEFFICIENT (M**2/YR).	1.09E-03
time $[vr] = 1.00$	$a_{1}a_{2}a_{2}a_{3}a_{2}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3$	
r: (] = 5.00		
time [yr] = 5.00	avg. conc. [mg/I] = .102E-01	
time [yr] = 10.0	avg. conc. [mg/l] = .624E-02	
time [yr] = 15.0	avg. conc. [mg/l] = .529E-02	
time (vr] = 20.0	$avg_{conc} [mg/l] = .489E-02$	
time furl = $25.0$		
une [yi] - 25.0		
time $[yr] = 30.0$	avg. conc. $[mg/I] = .449E-02$	
time [yr] = 35.0	avg. conc. [mg/l] = .436E-02	
time [yr] = 40.0	avg. conc. [mg/l] = .426E-02	
<i>ts</i> 1	• • • • •	
time $[vr] = 45.0$	$a_{VG} = c_{OBC} [m_G/l] = 418E_{-0.2}$	
time $[yr] = 50.0$	avg. conc. $[mg/I] = .411E-02$	
time [yr] = 55.0	avg. conc. [mg/l] = .405E-02	
time [yr] = 60.0	avg. conc. [mg/l] = .400E-02	
te a t		
time (vr) = 65.0	$a_{VG}$ conc $[m_0/l] = 396F_02$	
$t_{\rm max} = t_{\rm max} = -70.0$		
time [yr] = 70.0	avg. conc. [mg/I] = .392E-02	

INPUT DATA/RESULTS FOR CHEMICAL: TPH-AR10-12

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INST. WAST	E RELEASE	E (KG) VALID FOR INST CASE ONLY	1.00E+00
			5.02E-02
		NCUEFFICIENT (M <sup></sup> 2/YR)	3.15E-02
			0.000+00
		JURGE RELEASE RATE 745E 15 - 208E 11 - 421E 00	
.4310-44	.30UE-22	715-15 .290-11 .431-09	
.11/E-0/	.122E-06		
.188E-04	.385E-04	./01E-04 .116E-03 .1/9E-03	
.260E-03	.360E-03	.4//E-03 .610E-03 .759E-03	
.920E-03	.109E-02	.127E-02 .146E-02 .165E-02	
.184E-02	.202E-02	.221E-02 .239E-02 .257E-02	
.274E-02	.290E-02	.306E-02 .321E-02 .334E-02	
.347E-02	.359E-02	.371E-02 .381E-02 .390E-02	
.399E-02	.406E-02	.413E-02 .419E-02 .424E-02	
.429E-02	.433E-02	.436E-02 .439E-02 .441E-02	
.442E-02	.443E-02	.444E-02 .444E-02 .443E-02	
.443E-02	.441E-02	.440E-02 .438E-02 .436E-02	
.434E-02	.431E-02	.428E-02 .425E-02 .422E-02	
.419E-02	.415E-02	.412E-02 .408E-02	
RETARDATI	ON FACTO	R	3.62E+02
RETARDED	SEEPAGE	VELOCITY (M/YR)	6.95E-03
RETARDED		INAL DISPERSION COEF. (M**2/YR)	3.48E-04
RETARDED	ATERAL D	SPERSION COFFICIENT (M**2/YR)	3 48E-04
RETARDED		DISPERSION COEFFICIENT (M**2/YR)	3 48E-04
			002 0.
time [yr] =	1.00	avg. conc. [mg/l] = .000E+00	
time [vr] =	5.00	avg. conc. [mg/l] = .000E+00	
		5 1 5 1	
time [vr] =	10.0	avo, conc, [mo/l] = .887E-07	
01		5 1 5 1	
time [vr] =	15.0	avg. conc. [mg/l] = .687E-05	
time [vr] =	20.0	$a_{10} c_{00} c_{10} [m_0/l] = 428 E_0 4$	
anie [Ji] –	20.0		
timo [vr] -	25.0	$a_{10} = a_{10} = a$	
une [yi] -	23.0		
tion of fearly -	20.0		
time [yr] =	30.0	avg. conc. $[mg/I] = .278E-03$	
time [yr] =	35.0	avg. conc. $[mg/I] = .477E-03$	
time [yr] =	40.0	avg. conc. [mg/l] = .641E-03	
time [yr] =	45.0	avg. conc. [mg/l] = .854E-03	
time [yr] =	50.0	avg. conc. [mg/l] = .995E-03	
time [yr] =	55.0	avg. conc. [mg/l] = .118E-02	
-* •			
time [yr] =	60.0	avg. conc. [mg/l] = .128E-02	
time [vr] =	65.0	ava. conc. [mg/l] = .143E-02	
time [vr] =	70.0	$avg conc [mg/l] = 150E_02$	
anie [91] –	10.0	$a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}$	

INPUT DATA/RESULTS FOR CHEMICAL: TPH-AR12-16

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INST. WAST DISTRIBUTI	E RELEASE	E (KG) VALID FOR INST CASE ONLY ICIENT, KD (M**3/KG)	1.00E+00 1.00E-01
MOLECULA	R DIFFUSIC	DN COEFFICIENT (M**2/YR)	3.15E-02
DECAY CON	ISTANT (1/	YR )	0.00E+00
LIST OF TRA	ANSIENT SO	DURCE RELEASE RATE	
.000E+00	.000E+00	.000E+00 .000E+00 .193E-45	
.523E-38	.106E-32	.999E-29 .123E-25 .362E-23	
.378E-21	.181E-19	.477E-18 .786E-17 .890E-16	
.742E-15	.481E-14	.253E-13 .112E-12 .424E-12	
.142E-11	423E-11	115E-10 287E-10 666E-10	
145E-09	2965-09	576E-09 107E-08 191E-08	
3275-08	542E-08	870E-08 136E-07 207E-07	
307E-07	.042E-00	636E-07 889E-07 122E-06	
1655.06	2205.06	200E 06 376E 06 482E 06	
.10JE-00	.220E-00		
.012E-00	.700E-00	.9550-06 .1180-05 .1440-05	
.174E-05	.209E-05	.249E-05 .295E-05 .347E-05	
.406E-05	.4/5E-05	.547E-05 .629E-05 .721E-05	
.821E-05	.932E-05	.105E-04 .118E-04 .133E-04	
.148E-04	.165E-04	.183E-04 .202E-04	
RETARDATI	ON FACTO	R	7.22E+02
RETARDED	SEEPAGE '	VELOCITY (M/YR)	3.49E-03
RETARDED	LONGITUD	INAL DISPERSION COEF. (M**2/YR)	1.75E-04
RETARDED	LATERAL D	DISPERSION COEFFICIENT (M**2/YR) .	1.75E-04
RETARDED	VERTICAL	DISPERSION COEFFICIENT (M**2/YR).	1.75E-04
time [yr] =	1.00	avg. conc. [mg/l] = .000E+00	
time [yr] =	5.00	avg. conc. [mg/l] = .000E+00	
		0 1 0 1	
time [vr] =	10.0	ava. conc. [ma/l] = .000E+00	
		0 1 0 1	
time [vr] =	15.0	avg. conc. [mg/l] = .000E+00	
time [vr] =	20.0	avg conc [mg/l] = 000E+00	
	20.0		
time [vr] -	25.0	and cone $[ma/l] = 000E\pm00$	
une [yi] -	23.0		
time furl -	20.0		
une [yi] –	30.0		
time [yr] =	35.0	avg. conc. [mg/i] = .000E+00	
time [yr] =	40.0	avg. conc. [mg/l] = .406E-08	
time [yr] =	45.0	avg. conc. [mg/l] = .218E-07	
time [yr] =	50.0	avg. conc. [mg/l] = .692E-07	
time [yr] =	55.0	avg. conc. [mg/l] = .210E-06	
time [yr] =	60.0	avg. conc. [mg/l] = .457E-06	
time [vr] =	65.0	ava. conc. [ma/I] = _101E-05	
time (vr) =	70.0	ava conc $lma/ll = 175E_{-}05$	
and Dil -	10.0		

INPUT DATA/RESULTS FOR CHEMICAL: TPH-AR16-21

INST. WAST	E RELEASE	(KG) VALID FOR IN	IST CASE	ONLY	1.0	0E+00
MOLECIILAR	DIN COEFFIC	ICOFFEICIENT	י) (M**クハ	(R)	ວ. ເ	15E-01
DECAY CON	ISTANT ( 1/)	R)			0.0	0E+00
LIST OF TRA	NSIENT SC	URCE RELEASE R	ATE			
.000E+00	.000E+00	.000E+00 .000E+	+00 .000	E+00		
.000E+00	.000E+00	.000E+00 .000E+	000.000	E+00		
.000E+00	.000E+00	.000E+00 .000E+	+00 .000	E+00		
.000E+00	.000E+00	.000E+00 .000E+	-00 .000	E+00		
.000E+00	.000E+00	.000E+00 .000E+	-00 .000	E+00		
.000E+00	.000E+00	.000E+00 .000E+	000. 00	E+00		
.000E+00	.000E+00	,000E+00 ,000E+	000, 00	E+00		
.000E+00	.000E+00	.000E+00 .000E+	+00 .000	E+00		
.000E+00	.000E+00	.000E+00 .000E+	000. 00	E+00		
.000E+00	.000E+00	.000E+00 .000E+	+00 .000	E+00		
.000E+00	.000E+00	.000E+00 .000E+	+00 .000	E+00		
.000E+00	.000E+00	.000E+00 .000E+	000. 004	E+00		
.000E+00	.000E+00	.000E+00 .280E-	47 .112	E-46		
.504E-46	.233E-45	.102E-44 .425E-	-44			
RETARDATI	ON FACTOR				2.2	8E+03
RETARDED	SEEPAGE V	ELOCITY (M/YR)			1.	11E-03
RETARDED	LONGITUDI	NAL DISPERSION C	OEF. (M*	*2/YR)	5.	54E-05
RETARDED	LATERAL D	SPERSION COEFF	ICIENT (N	1**2/YR).	5.	54E-05
RETARDED	VERTICAL D	ISPERSION COEFI	FICIENT (	M**2/YR).	5.	54E-05
				,		
time [yr] =	1.00	avg. conc.	[mg/i] = .0	000E+00		
		5				
time [yr] =	5.00	avg. conc.	[mg/i] =(	000E+00		
		•				
time [yr] =	10.0	avg. conc.	[mg/l] =(	000E+00		
time [yr] =	15.0	avg. conc.	[mg/l] = .(	000E+00		
time [yr] =	20.0	avg. conc.	[mg/l] = _(	000E+00		
time [yr] =	25.0	avg. conc.	[mg/l] =(	000E+00		
time [yr] =	30.0	avg. conc.	[mg/l] =(	000E+00		
time [yr] =	35.0	avg. conc.	[mg/l] = _!	000E+00		
time [yr] =	40.0	avg. conc.	[mg/l] = _!	000E+00		
time [yr] =	45.0	avg. conc.	[mg/l] = _!	000E+00		
time [yr] =	50.0	avg. conc.	[mg/l] = .	000E+00		
time [yr] =	55.0	avg. conc.	[mg/l] = .	000E+00		
time [yr] =	60.0	avg. conc.	[mg/l] = .	000E+00		
time [yr] =	65.0	avg. conc.	[mg/l] = .	000E+00		
time [yr] =	70.0	avg. conc.	[mg/l] = .	000E+00		

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INPUT DATA/RESULTS FOR CHEMICAL: TPH-AR21-35

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INST. WASTE RELEASE	(KG) VALID FOR INST CASE ONLY	1.00E+00
DISTRIBUTION COEFFIC	CIENT, KD (M**3/KG)	2.52E+00
MOLECULAR DIFFUSION	N COEFFICIENT (M**2/YR)	3.15E-02
DECAY CONSTANT (1/Y	Ϋ́R )	0.00E+00
LIST OF TRANSIENT SO	OURCE RELEASE RATE	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	,000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	,000E+00 .000E+00 .000E+00	
.000E+00 .000E+00	.000E+00 .000E+00	
RETARDATION FACTOR		1.81E+04
RETARDED SEEPAGE V	ELOCITY (M/YR)	1.39E-04
RETARDED LONGITUDI	NAL DISPERSION COEF. (M**2/YR)	6.95E-06
RETARDED LATERAL DI	SPERSION COEFFICIENT (M**2/YR)	6.95E-06
RETARDED VERTICAL	SPERSION COEFFICIENT (M**2/YR)	6 95E-06
time $[vr] = 1.00$	ava, conc. [mg/l] = .000E+00	
time $(vr) = 5.00$	$a_{VG} conc [mg/l] = 000E+00$	
time $[vr] = 10.0$	ave conc $[mg/l] = 000E+00$	
time $[vr] = 15.0$	ave conc $\left[ m \alpha / l \right] = 000E+00$	
time $[yr] = 20.0$	$a_{1}a_{2}a_{2}a_{3}a_{4}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5$	
time [wr] = 25.0		
time [yi] = 25.0		
time $[yr] = 30.0$	avg. conc. $[mg/I] = .000E+00$	
time $[yr] = 35.0$	avg. conc. $[mg/I] = .000E+00$	
time $[yr] = 40.0$	avg. conc. [mg/I] = .000E+00	
time [yr] = 45.0	avg. conc. [mg/l] = .000E+00	
time [yr] = 50.0	avg. conc. [mg/l] = .000E+00	
time [yr] = 55.0	avg. conc. [mg/l] = .000E+00	
time [yr] = 60.0	avg. conc. [mg/l] = .000E+00	
time [yr] = 65.0	avg. conc. [mg/l] = .000E+00	
time [yr] = 70.0	avg. conc. [mg/l] = .000E+00	

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Jury Output File Analysis for Example Problem

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\*\*\* COMMON INPUT PARAMETERS \*\*\*

PARAMETER NAME	UNITS	VALUE
Porosity	(cc/cc)	0.25
Bulk Density	(g/cc)	1.8
Water Content	(cc/cc)	0.1
Fractional Organic Carbon	(mg/mg)	1.00E-02
Incorporation Depth	(cm)	457
Clean Soil Thickness	(cm)	0
Simulation Time	(yrs)	70
Length of Soil Column	(cm)	2620
Infiltration Rate	(cm/day)	5.55E-02
Source Length	(m)	30.5
Source Width	(m)	36.6
Boundary Layer Thickness	(cm)	5

#### Chemical Specific Input Parameters for Benzene

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/mg/L)] (cc/g) (1/day)	1 7517 0.8467 0.249 83 5.48E-04
Outputs for Benzene		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	2337 2.75E-44 5.1E-42 5.13E-42
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3021 4.35E-23 2.7E-21 2.75E-21
Time = 3 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3389 4.82E-16 1.76E-14 1.81E-14
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 5 yrs	(g) (g/day) (g/day) (g/day)	3606 1.52E-12 3.91E-11 4.06E-11
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3740 1.8E-10 3.58E-09 3.76E-09

Time = 10 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3973 1.53E-06 1.4E-05 1.56E-05	
Time = 15 yrs ====================================			
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 20 yrs	(g) (g/day) (g/day) (g/day)	4014 1.61E-05 9.44E-05 0.000111	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 25 yrs	(g) (g/day) (g/day) (g/day)	4024 3.05E-05 0.000128 0.000159	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4026 2.87E-05 9.17E-05 0.00012	
lime = 30 yrs ====================================			
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4027 1.89E-05 4.8E-05 6.69E-05	
Time = 35 yrs ====================================			
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4027 1.03E-05 2.11E-05 3.14E-05	
Time = 40 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4027 4.92E-06 8.34E-06 1.33E-05	

Time = 45 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Diffusive Mass Loading Rate to Advective & Diffusive Mass Loa	o Groundwater Groundwater ading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4027 2.18E-06 3.08E-06 5.26E-06
Time = 50 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate t Diffusive Mass Loading Rate to Advective & Diffusive Mass Loa	o Groundwater Groundwater ading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4027 9.12E-07 1.08E-06 2E-06
Time = 55 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate t Diffusive Mass Loading Rate to Advective & Diffusive Mass Loa	o Groundwater Groundwater ading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4027 3.67E-07 3.69E-07 7.36E-07
Time = 60 yrs ====================================	=========================		
Cumulative Emissions to Air Advective Mass Loading Rate t Diffusive Mass Loading Rate to Advective & Diffusive Mass Loa	o Groundwater Groundwater ading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4027 1.44E-07 1.22E-07 2.66E-07
Time = 65 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate t Diffusive Mass Loading Rate to Advective & Diffusive Mass Loa	o Groundwater Groundwater ading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4027 5.52E-08 3.97E-08 9.48E-08
Time = 70 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate t Diffusive Mass Loading Rate to Advective & Diffusive Mass Loa	o Groundwater Groundwater ading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4027 2.08E-08 1.26E-08 3.35E-08

#### Chemical Specific Input Parameters for Ethylbenzene

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/mg/L)] (cc/g) (1/day)	1 5702 0.5875 0.287 1100 0
Outputs for Ethylbenzene		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	687.9 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	967.9 0 0 0
Time = 3 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	1180 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1358 0 0 0
Time = 5 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1513 0 0 0

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Time = 10 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	2110 4.04E-62 1.29E-59 0
Time = 15 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 20 yrs	(g) (g/day) (g/day) (g/day)	2554 2.48E-42 3.54E-40 3.57E-40
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 25 yrs	(g) (g/day) (g/day) (g/day)	2913 2.03E-32 1.8E-30 1.82E-30
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3214 1.84E-26 1.17E-24 1.19E-24
Time = 30 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3471 1.76E-22 8.65E-21 8.83E-21
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3695 1.24E-19 4.96E-18 5.09E-18
Time = 40 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3891 1.7E-17 5.76E-16 5.94E-16

lime = 4	5	vrs
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Cumulative Em	issions to Air	(g)	4064
Advective Mass	Loading Rate to Groundwater	(g/day)	7.91E-16
Diffusive Mass	Loading Rate to Groundwater	(g/day)	2.31E-14
Advective & Dif	fusive Mass Loading Rate to Groundwater	(g/day)	2.39E-14
Time = 50	) yrs		
Cumulative Em Advective Mass Diffusive Mass Advective & Dif Time = 55	issions to Air Loading Rate to Groundwater Loading Rate to Groundwater fusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	4220 1.71E-14 4.4E-13 4.58E-13
Cumulative Em	issions to Air	(g)	4359
Advective Mass	Loading Rate to Groundwater	(g/day)	2.13E-13
Diffusive Mass	Loading Rate to Groundwater	(g/day)	4.89E-12
Advective & Dif	fusive Mass Loading Rate to Groundwater	(g/day)	5.1E-12
Time = 60	) yrs ====================================		
Cumulative Em	issions to Air	(g)	4486
Advective Mass	Loading Rate to Groundwater	(g/day)	1.75E-12
Diffusive Mass	Loading Rate to Groundwater	(g/day)	3.62E-11
Advective & Dif	fusive Mass Loading Rate to Groundwater	(g/day)	3.79E-11
Cumulative Em	issions to Air	(g)	4602
Advective Mass	Loading Rate to Groundwater	(g/day)	1.04E-11
Diffusive Mass	Loading Rate to Groundwater	(g/day)	1.96E-10
Advective & Dif	fusive Mass Loading Rate to Groundwater	(g/day)	2.07E-10
Time = 70	) yrs		
Cumulative Em	issions to Air	(g)	4707
Advective Mass	Loading Rate to Groundwater	(g/day)	4.81E-11
Diffusive Mass	Loading Rate to Groundwater	(g/day)	8.32E-10
Advective & Dif	fusive Mass Loading Rate to Groundwater	(g/day)	8.81E-10

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#### Chemical Specific Input Parameters for Toluene

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/mg/L)] (cc/g) (1/day)	1 6739 0.743 0.284 300 0
Outputs for Toluene		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	1398 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1956 8.32E-73 4.69E-70 0
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	2375 2.61E-49 6.01E-47 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	2718 1.53E-37 2.09E-35 2.11E-35
Time = 5 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3010 1.8E-30 1.72E-28 1.74E-28

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Time = 10 yrs

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Cumulative Emissions to Air	(g)	4018
Advective Mass Loading Rate to Groundwater	(g/day)	2.81E-16
Diffusive Mass Loading Rate to Groundwater	(g/day)	1.05E-14
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	1.07E-14
Time = 15 yrs		
Cumulative Emissions to Air	(g)	4628
Advective Mass Loading Rate to Groundwater	(g/day)	1.65E-11
Diffusive Mass Loading Rate to Groundwater	(g/day)	3.77E-10
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	3.93E-10
lime = 20 yrs ====================================		
Cumulative Emissions to Air	(g)	5045
Advective Mass Loading Rate to Groundwater	(g/day)	4.15E-09
Diffusive Mass Loading Rate to Groundwater	(g/day)	6.84E-08
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	7.25E-08
Time = 25 yrs		
Cumulative Emissions to Air	(g)	5352
Advective Mass Loading Rate to Groundwater	(g/day)	1.17E-07
Diffusive Mass Loading Rate to Groundwater	(g/day)	1.5E-06
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	1.62E-06
Time = 30 yrs		
Cumulative Emissions to Air	(g)	5590
Advective Mass Loading Rate to Groundwater	(g/day)	1.09E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	1.15E-05
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	1.26E-05
Time = 35 yrs ====================================		
Cumulative Emissions to Air	(g)	5780
Advective Mass Loading Rate to Groundwater	(g/day)	5.41E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	4.81E-05
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	5.35E-05
Time = 40 yrs		
Cumulative Emissions to Air	(g)	5937
Advective Mass Loading Rate to Groundwater	(g/day)	1.8E-05
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.000138
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.000156

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Cumulative Emissions to Air	(g)	6070
Advective Mass Loading Rate to Groundwater	(g/day)	4.55E-05
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.000306
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.000351
Time = 50 yrs		
Cumulative Emissions to Air	(g)	6183
Advective Mass Loading Rate to Groundwater	(g/day)	9.52E-05
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.000569
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.000664
Time = 55 yrs		
Cumulative Emissions to Air	(g)	6281
Advective Mass Loading Rate to Groundwater	(g/day)	0.000174
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.00093
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.001103
nme = 60 yrs ====================================		
Cumulative Emissions to Air	(g)	6367
Advective Mass Loading Rate to Groundwater	(g/day)	0.000285
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.001379
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.001664
Time = 65 yrs		
Cumulative Emissions to Air	(g)	6444
Advective Mass Loading Rate to Groundwater	(g/day)	0.00043
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.0019
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.00233
Time = 70 yrs		
Cumulative Emissions to Air	(g)	6512
Advective Mass Loading Rate to Groundwater	(g/day)	0.00061
Diffusive Mass Loading Rate to Groundwater	(g/day)	0.002469
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0.003079

### Chemical Specific Input Parameters for TPH-AL06-08

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/mg/L)] (cc/g) (1/day)	1 8640 0.864 2120 3980 0
Outputs for TPH-AL06-08		
Time = 1 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	7947 2.21E-05 0.4642 0.4642
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8449 4.19E-05 0.3684 0.3685
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	8676 4.05E-05 0.1892 0.1892
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8812 3.51E-05 0.0916 0.09164
Time = 5 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	8905 2.99E-05 0.04091 0.04094

Time = 10 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9136 0.000015 -0.01681 -0.01679
Time = 15 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 20 yrs	(g) (g/day) (g/day) (g/day)	9239 9.18E-06 -0.01793 -0.01792
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9301 6.33E-06 -0.01498 -0.01497
Time = 25 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9343 4.69E-06 -0.01228 -0.01227
Time = 30 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 35 yrs	(g) (g/day) (g/day) (g/day)	9374 3.65E-06 -0.01017 -0.01017
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9398 2.95E-06 -0.00856 -0.00855
Time = 40 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	9417 2.44E-06 -0.00731 -0.00731

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Time =	45 vrs
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Cumulative Emissions to Air	(g)	9434
Advective Mass Loading Rate to Groundwater	(g/day)	2.07E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00633
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00633
Time = 50 yrs		
Cumulative Emissions to Air	(g)	9447
Advective Mass Loading Rate to Groundwater	(g/day)	1.78E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00555
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00555
Time = 55 yrs		
Cumulative Emissions to Air	(g)	9459
Advective Mass Loading Rate to Groundwater	(g/day)	1.55E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00491
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00491
=======================================		
Cumulative Emissions to Air	(g)	9469
Advective Mass Loading Rate to Groundwater	(g/day)	1.37E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00438
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00438
Time = 65 yrs ====================================		
Cumulative Emissions to Air	(g)	9478
Advective Mass Loading Rate to Groundwater	(g/day)	1.22E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00394
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00394
Time = 70 yrs		
Cumulative Emissions to Air	(g)	9486
Advective Mass Loading Rate to Groundwater	(g/day)	1.1E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00357
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	-0.00357

## Chemical Specific Input Parameters for Xylene

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/mg/L)] (cc/g) (1/day)	1 6221 0.6739 0.315 240 0
Outputs for Xylene		
Time = 1 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	1572 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	2196 9.92E-58 3.28E-55 0
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	2661 .3254E-38 .4959E-36 .4991E-36
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3036 .6145E-29 .5898E-27 .5960E-27
Time = 5 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3349 .2317E-23 .1608E-21 .1631E-21

Time = 10 yrs

Cumulative Emissions to Air	(g)	4388
Advective Mass Loading Rate to Groundwater	(g/day)	.3718E-12
Diffusive Mass Loading Rate to Groundwater	(g/day)	.1061E-10
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	.1098E-10
Time = 15 yrs ====================================		
Cumulative Emissions to Air	(g)	4987
Advective Mass Loading Rate to Groundwater	(g/day)	.2196E-08
Diffusive Mass Loading Rate to Groundwater	(g/day)	.3920E-07
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	.4139E-07
Cumulative Emissions to Air	(g)	5386
Advective Mass Loading Rate to Groundwater	(g/day)	.1750E-06
Diffusive Mass Loading Rate to Groundwater	(g/day)	.2266E-05
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	.2441E-05
Time		
Cumulative Emissions to Air	(g)	5675
Advective Mass Loading Rate to Groundwater	(g/day)	.2455E-05
Diffusive Mass Loading Rate to Groundwater	(g/day)	.2488E-04
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	.2733E-04
Time ≈ 30 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 35 yrs	(g) (g/day) (g/day) (g/day)	5896 .1432E-04 .1187E-03 .1331E-03
Cumulative Emissions to Air	(g)	6072
Advective Mass Loading Rate to Groundwater	(g/day)	.5028E-04
Diffusive Mass Loading Rate to Groundwater	(g/day)	.3514E-03
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	.4017E-03
Time ≈ 40 yrs		
Cumulative Emissions to Air	(g)	6216
Advective Mass Loading Rate to Groundwater	(g/day)	.1281E-03
Diffusive Mass Loading Rate to Groundwater	(g/day)	.7707E-03
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	.8988E-03

Time = 45 yrs

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Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Grou	(g) (g/day) (g/day) Indwater (g/day)	6337 .2631E-03 .1384E-02 .1647E-02	
Time = 50 yrs	=====		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Grou Time = 55 yrs	(g) (g/day) (g/day) Indwater (g/day)	6440 .4641E-03 .2162E-02 .2626E-02	
***************************************			
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Grou	(g) (g/day) (g/day) indwater (g/day)	6529 .7329E-03 .3051E-02 .3784E-02	
Time = 60 yrs	=====		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Grou Time = 65 yrs	(g) (g/day) (g/day) Indwater (g/day)	6607 .1065E-02 .3993E-02 .5058E-02	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Grou	(g) (g/day) (g/day) Indwater (g/day)	6676 .1451E-02 .4932E-02 .6383E-02	
Time = 70 yrs			
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Grou	(g) (g/day) (g/day) undwater (g/day)	6737 .1879E-02 .5824E-02 .7704E-02	

AT123D Output File Analysis for Example Problem

1.

Chemicals in the analysis Benzene Ethylbenzene Toluene TPH-AL06-08 Xylene

Number of years simulated: 70

# GENERAL INPUT DATA

	1
NO. OF POINTS IN 7-DIRECTION	1
NO. OF POINTS IN 2-DIRECTION	10
NO. OF ROOTS: NO. OF SERIES TERMS	1000
NO. OF BEGINNING TIME STEPS	1
	70
INCLOSE INTERVALS FOR PRINTED OUT SOLUTION	1
SOURCE CONTROL - 0 FOR INSTANT SOURCE	70
INTERMITTENT OUTDUT CONTROL - 0 NO SUCH OUTDUT	1
CASE CONTROL = 1 THERMAL = 2 EOR CHEMICAL = 3 RAD	1
CASE CONTROL - T THERMAL, - 2 FOR CHEMICAL, - 3 RAD	2
X-COORDINATE OF RECEPTOR WELL (METERS)	1.53E+01
Y-COORDINATE OF RECEPTOR WELL (METERS)	1.83E+01
AQUIFER DEPTH. = 0.0 FOR INFINITE DEEP (METERS)	3.05E+00
AQUIFER WIDTH. = 0.0 FOR INFINITE WIDE (METERS)	0.00E+00
BEGIN POINT OF X-SOURCE LOCATION (METERS)	0.00E+00
END POINT OF X-SOURCE LOCATION (METERS)	3.05E+01
BEGIN POINT OF Y-SOURCE LOCATION (METERS)	0.00E+00
END POINT OF Y-SOURCE LOCATION (METERS)	3.66E+01
BEGIN POINT OF Z-SOURCE LOCATION (METERS)	0.00E+00
END POINT OF Z-SOURCE LOCATION (METERS)	0.00E+00
POROSITY	2.50E-01
HYDRAULIC CONDUCTIVITY (METER/YEAR)	3.15E+01
HYDRAULIC GRADIENT	2.00E-02
LONGITUDINAL DISPERSIVITY (METER)	0.00E+00
LATERAL DISPERSIVITY (METER)	0.00E+00
VERTICAL DISPERSIVITY (METER)	0.00E+00
BULK DENSITY OF THE SOIL (KG/M**3)	1.80E+03
TIME INTERVAL SIZE FOR THE DESIRED SOLUTION (YR)	1.00E+00
DISCHARGE TIME (YR)	7.00E+01

INPUT DATA/RESULTS FOR CHEMICAL: Benzene

INST. WAST	E RELEASE	E (KG) VALID FOR INST CASE ONLY	1.00E+00
DISTRIBUTI	ON COEFFI	CIENT, KD (M**3/KG)	1.66E-03
MOLECULAR	R DIFFUSIO	N COEFFICIENT (M**2/YR)	3.09E-02
DECAY CON	ISTANT ( 1/		0.00E+00
LIST OF TRA	ANSIENT SC		
.187E-41	.100E-20	.662E-14 .148E-10 .137E-08	
.258E-07	1965-06	.847E-06 .250E-05 .568E-05	
.106E-04	.171E-04	.247E-04 .327E-04 .404E-04	
.470E-04	.522E-04	.557E-04 .576E-04 .579E-04	
.3085-04	.5465-04	.515E-04 .479E-04 .439E-04	
.3988-04	.357 E-04	.317E-04 .279E-04 .244E-04	
.212E-04	9105 05	.157E-04 .154E-04 .114E-04	
.970E-05	.019E-05	.009E-00 .576E-00 .404E-00 270E 05 .232E 05 .102E-05	
158E-05	131E-05	108E-05 886E-06 728E-06	
598E-06	490E-06	402E-06 329E-06 269E-06	
220E-06	1795-06	1465-06 1195-06 9715-07	
.220E-00	6445.07	524E-07 426E-07 346E-07	
2815-07	228E-07	185E-07 151E-07	
			1 305+01
RETARDED	SEEDAGE		1.000+01
			9.55=-03
		NSPERSION COFFEICIENT (M**2/YR)	9.55E-03
RETARDED		DISPERSION COEFFICIENT (M**2/YR)	9.55E-03
	<b>TERMONE</b>		0.002 00
time [vr] =	1.00	avg. conc. [mg/l] = .000E+00	
time [yr] =	5.00	avg. conc. [mg/l] = .000E+00	
time [yr] =	10.0	avg. conc. [mg/l] = .526E-06	
time [yr] =	15.0	avg. conc. [mg/l] = .146E-04	
time [yr] =	20.0	avg. conc. [mg/l] = .448E-04	
time [yr] =	25.0	avg. conc. [mg/l] = .751E-04	
time [yr] =	30.0	avg. conc. [mg/l] = .890E-04	
time [yr] =	35.0	avg. conc. [mg/l] =949E-04	
time [yr] =	40.0	avg. conc. [mg/l] =953E-04	
time [yr] =	45.0	avg. conc. [mg/l] = .945E-04	
time [yr] =	50.0	avg. conc. [mg/l] = .932E-04	
time [yr] =	55.0	avg. conc. [mg/l] = .920E-04	
time [yr] =	60.0	avg. conc. [mg/I] = .911E-04	
time [yr] =	65.0	avg. conc. [mg/I] = .903E-04	
41 mm = 1 - 1	70.0		
time [yr] =	70.0	avg. conc. [mg/i] = .896⊑-04	

INPUT DATA/RESULTS FOR CHEMICAL: Ethylbenzene

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INST. WAST	E RELEASE	E (KG) VALID FOR INST CASE ONLY	1.00E+00
	ON COEFFI	N COFFEICIENT (M**2/YR)	2.20E-02 2.14E-02
DECAY CON	ISTANT ( 1/	YR)	0.00E+00
LIST OF TRA	NSIENT SC	DURCE RELEASE RATE	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.136E-45 .218E-42 .130E-39	
.349E-37	.483E-35	.387E-33 .195E-31 .663E-30	
.161E-28	.293E-27	.413E-26 .466E-25 .434E-24	
.340E-23	.228E-22	.134E-21 .694E-21 .322E-20	
.135E-19	.521E-19	.184E-18 .605E-18 .186E-17	
.535E-17	.146E-16	.375E-16 .922E-16 .217E-15	
.488E-15	.106E-14	.221E-14 .446E-14 .872E-14	
.166E-13	.307E-13	.552E-13 .971E-13 .167E-12	
.281E-12	.463E-12	.750E-12 .119E-11 .186E-11	
.286E-11	.433E-11	.647E-11 .952E-11 .138E-10	
.199E-10	.282E-10	.395E-10 .549E-10 .754E-10	
.103E-09	.138E-09	.185E-09 .245E-09	
RETARDATI	ON FACTOR	२	1.59E+02
RETARDED	SEEPAGE \	/ELOCITY (M/YR)	1.58E-02
RETARDED	LONGITUDI	NAL DISPERSION COEF. (M**2/YR)	5.38E-04
RETARDED	LATERAL D	ISPERSION COEFFICIENT (M**2/YR) .	5.38E-04
RETARDED	VERTICAL I	DISPERSION COEFFICIENT (M**2/YR).	5.38E-04
time [yr] =	1.00	avg. conc. [mg/l] = .000E+00	
time [yr] =	5.00	avg. conc. [mg/l] = .000E+00	
time [yr] =	10.0	avg. conc. [mg/I] = .000E+00	
time [yr] =	15.0	avg. conc. [mg/I] = .000E+00	
time [yr] =	20.0	avg. conc. [mg/I] = .000E+00	
	05.0		
time [yr] =	25.0	avg. conc. $[mg/I] = .000E+00$	
1			
time [yr] =	30.0	avg. conc. $[mg/I] = .000E+00$	
Alizza a Truel -	25.0		
time [yr] =	35.0	avg. conc. [mg/i] = .000E+00	
	40.0		
time [yr] =	40.0	avg. conc. [mg/I] = .000E+00	
Alizza en Travell en	45.0		
time [yr] =	45.0	avg. conc. [mg/i] – .000±+00	
time [vr] -	50.0	$a_{12} = a_{22} = a$	
une [yr] =	50.0		
time [vr] -	55.0	ava conc $\left[ ma/l \right] = 0.00 E \pm 0.0$	
шпе [ун] –	55.0		
time [vr] -	60.0	$a_{1} = 0000 = 00000 = 00000 = 00000 = 0000 = 0000 = 00000 = 00000 = 00000 = 00000 = 00000 = 00000 = 000000$	
anie [yi] –	00.0		
time [vr] =	65.0	ave conc $\left[ m \alpha / l \right] = 000 \text{E} + 00$	
[Ji] -	50.0		
time [vr] =	70.0	avg. conc. [mg/l] = .000E+00	

INPUT DATA/RESULTS FOR CHEMICAL: Toluene

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INST. WAST	E RELEASE	E (KG) VALID FOR INST CASE ONLY CIENT_KD (M**3/KG)	1.00E+00 6.00E-03
MOLECULAR		N COEFFICIENT (M**2/YR)	2.71E-02
DECAY CON	ISTANT ( 1/	YR )	0.00E+00
LIST OF TRA	ANSIENT SC	DURCE RELEASE RATE	
000E+00	000E+00	224F-46 769F-35 636F-28	
256 =- 23	495E-20	143E-17 117E-15 392E-14	
603E 13	7575 12	571E 11 322E 10 144E 09	
.0952-15	./5/E-12	.571E-11 .522E-10 .144E-05	
.531E-09	.168E-08	.467E-08 .116E-07 .205E-07	
.556E-07	.109E-06	.201E-06 .353E-06 .591E-06	
.951E-06	.147E-05	.221E-05 .323E-05 .459E-05	
.638E-05	.871E-05	.116E-04 .151E-04 .195E-04	
.248E-04	.310E-04	.384E-04 .469E-04 .568E-04	
.680E-04	.806E-04	.948E-04 .111E-03 .128E-03	
.147E-03	.168E-03	.191E-03 .216E-03 .242E-03	
.271E-03	.301E-03	.333E-03 .367E-03 .403E-03	
440E-03	479E-03	520F-03 563E-03 607E-03	
653=03	7005-03	749E-03 799E-03 851E-03	
003= 02	0575 02	101E 02 107E 02	
.9032-03	.957E-03	.101E-02 .107E-02	4.405.04
RETARDATI	ON FACTOR		4.42E+01
RETARDED	SEEPAGE	VELOCITY (M/YR)	5.70E-02
RETARDED	LONGITUD	INAL DISPERSION COEF. (M**2/YR)	2.45E-03
RETARDED	LATERAL D	ISPERSION COEFFICIENT (M**2/YR) .	2.45E-03
RETARDED	VERTICAL I	DISPERSION COEFFICIENT (M**2/YR).	2.45E-03
time [vr] =	1.00	avg, conc. [mg/l] = .000E+00	
time [vr] =	5.00	$a_{10} = 0.00 \text{ [mg/l]} = 0.00 \text{ E} + 0.00 \text{ E}$	
	5.00		
timo [ur] -	10.0	$a_{12} = a_{12} = a$	
une [yr] –	10.0		
time to t	45.0		
time [yr] =	15.0	avg. conc. $[mg/I] = .000E+00$	
time [yr] =	20.0	avg. conc. [mg/l] = .140E-08	
time [yr] =	25.0	avg. conc. [mg/l] = .637E-07	
time [vr] =	30.0	$av_0$ , conc. [mg/l] = .610E-06	
	0010		
time [vr] =	35.0	$a_{VG} conc [mg/l] = 384E_{-}05$	
unic [yi] –	55.0		
time funt -	40.0		
time [yr] =	40.0	avg. conc. [mg/l] = .127E-04	
time [yr] =	45.0	avg. conc. [mg/l] = .3/5E-04	
time [yr] =	50.0	avg. conc. [mg/l] = .784E-04	
time [vr] =	55.0	avg. conc. [mg/l] = .161E-03	
13 · 3			
time [vr] =	60.0	avg. conc. $[mg/l] = 264F-03$	
time [ur] -	65.0	ave cone $[ma/l] = 440 = 02$	
ame [Ai] -	00.0	avy. conc. [mg/i]440E-05	
time to 1	70.0		
ume vri =	/0.0		
INPUT DATA/RESULTS FOR CHEMICAL: TPH-AL06-08

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INST. WAST	E RELEASE	(KG) VALID FOR INST CASE ONLY	1.00E+00
		NCOEFEICIENT (M**2/YR)	7.90E-02
DECAY CON	ISTANT ( 1/Y	(M ZHY)	0.00E+00
LIST OF TRA	ANSIENT SO	URCE RELEASE RATE	0.002.00
.169E+00	.134E+00	.691E-01 .334E-01 .149E-01	
.504E-02	.000E+00	000E+00 000E+00 000E+00	
000E+00	000E+00	000E+00 000E+00 000E+00	
000E+00	000E+00	000E+00 000E+00 000E+00	
000E+00	00000000	000E+00 000E+00 000E+00	
0005+00	0000000	0005+00 0005+00 0005+00	
.000E+00	.000E+00	000000000000000000000000000000000000000	
.000E+00	.000E+00		
.0002+00	.000E+00		
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00	
RETARDATI	ON FACTOR		5.74E+02
RETARDED	SEEPAGE V	ELOCITY (M/YR)	4.39E-03
RETARDED	LONGITUDI	NAL DISPERSION COEF. (M**2/YR)	2.20E-04
RETARDED	LATERAL DI	SPERSION COEFFICIENT (M**2/YR) .	2.20E-04
RETARDED	VERTICAL D	ISPERSION COEFFICIENT (M**2/YR).	2.20E-04
time [yr] =	1.00	avg. conc. [mg/l] = .529E-04	
		5	
time [vr] =	5.00	avg. conc. $[mg/l] = .496E-02$	
	0.00		
time [vr] =	10.0	ava conc [mg/l] = .298E-02	
	10.0		
time [vr] =	15.0	$a_{VQ}$ conc [mg/l] = 230E-02	
	15.0		
time furt -	20.0	$n_{12} = 105 \pm 02$	
mue [yi] -	20.0		
tion of tours -	05.0		
time [yr] =	25.0	avg. conc. $[mg/l] = .172E-02$	
time [yr] =	30.0	avg. conc. [mg/l] = .157E-02	
time [yr] =	35.0	avg. conc. [mg/l] = .145E-02	
time [yr] =	40.0	avg. conc. [mg/l] = .137E-02	
time [yr] =	45.0	avg. conc. [mg/l] = .131E-02	
time [yr] =	50.0	avg. conc. [mg/l] = .126E-02	
		• • • • •	
time [vr] =	55.0	ava. conc. [mg/l] = .122E-02	
L7 - 1			
time [vr] =	60.0	avg_conc. $[mg/l] =119E-02$	
time (vr) -	65 0	$a_{VG}$ conc $I_{MG}/II = 116E_{-}02$	
and Dil~	00.0		
timo (ur) -	70.0	$a_{10}$ conc $Img/II = -111E$ 00	
ume [yr] ≃	70.0	avg. conc. [mg/i] − . i 14⊏-02	

INPUT DATA/RESULTS FOR CHEMICAL: Xylene

INST. WAST	E RELEASE	E (KG) VALID FOR INST CASE ONLY	1.00E+00
DISTRIBUTIO	ON COEFFI	CIENT, KD (M**3/KG)	4.80E-03
MOLECULAF	R DIFFUSIO	N COEFFICIENT (M**2/YR)	2.46E-02
DECAY CON	ISTANT ( 1/	YR )	0.00E+00
LIST OF TRA	NSIENT SC	DURCE RELEASE RATE	
.000E+00	.000E+00	.182E-36 .218E-27 .595E-22	
.247E-18	.941E-16	.804E-14 .254E-12 .401E-11	
.381E-10	.248E-09	.121E-08 .468E-08 .151E-07	
.420E-07	.103E-06	.230E-06 .470E-06 .891E-06	
.159E-05	.268E-05	.432E-05 .669E-05 .998E-05	
.144E-04	.202E-04	.277E-04 .371E-04 .486E-04	
.625E-04	.790E-04	.984E-04 .121E-03 .147E-03	
.176E-03	.208E-03	.245E-03 .284E-03 .328E-03	
.375E-03	.426E-03	.481E-03 .539E-03 .601E-03	
.666E-03	.735E-03	.807E-03 .881E-03 .958E-03	
.104E-02	.112E-02	.121E-02 .129E-02 .138E-02	
.147E-02	.156E-02	.166E-02 .175E-02 .185E-02	
.194E-02	.204E-02	.214E-02 .223E-02 .233E-02	
.243E-02	.252E-02	.262E-02 .272E-02	
RETARDATI		3	3.56E+01
RETARDED	SEEPAGE \		7 09E-02
RETARDED		NAL DISPERSION COFE (M**2/YR)	2 77E-03
RETARDED	LATERAL D	ISPERSION COEFFICIENT (M**2/YR)	2.77E-03
			2.77 E-03
	VENTIONE		2.111-00
time (vr) =	1 00	$a_{1}a_{2}a_{3}a_{4}a_{5}a_{6}a_{7}a_{7}a_{7}a_{7}a_{7}a_{7}a_{7}a_{7$	
une [yi] –	1.00		
time [vr] -	5.00	$a_{1}a_{2}a_{2}a_{3}a_{4}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5$	
une [yi] –	5.00		
timo [ur] -	10.0	$a_{12} = a_{22} = a$	
time [yi] –	10.0	avg. conc. [mg/i]000E+00	
time furl =	15.0	$a_{1/2} = a_{2/2} = a_{2$	
time [yr] =	15.0	avg. conc. $[mg/i] = .000E+00$	
	~~ ~		
time [yr] =	20.0	avg. conc. $[mg/I] = .739E-07$	
time [yr] =	25.0	avg. conc. [mg/l] = .158E-05	
_			
time [yr] =	30.0	avg. conc. [mg/l] = .945E-05	
time [yr] =	35.0	avg. conc. [mg/l] = .411E-04	
time [yr] =	40.0	avg. conc. [mg/l] = .106E-03	
time [yr] =	45.0	avg. conc. [mg/l] = .251E-03	
time [yr] =	50.0	avg. conc. [mg/l] = .449E-03	
		• • • • •	
time [yr] =	55.0	avg. conc. [mg/l] = .792E-03	
time [vr] =	60.0	ava. conc. [ma/l] = .117E-02	
time [vr] =	65.0	avg. conc. [mg/l] = .175E-02	
time [vr] =	70.0	$a_{VG}$ conc $[mg/l] = 231F-02$	
	70.0		

Jury Output File Analysis for Example Problem

## \*\*\* COMMON INPUT PARAMETERS \*\*\*

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PARAMETER NAME	UNITS	VALUE
Porosity	(cc/cc)	0.25
Bulk Density	(g/cc)	1.8
Water Content	(cc/cc)	0.1
Fractional Organic Carbon	(mg/mg)	1.00E-02
Incorporation Depth	(cm)	457
Clean Soil Thickness	(cm)	0
Simulation Time	(yrs)	70
Length of Soil Column	(cm)	2620
Infiltration Rate	(cm/day)	5.55E-02
Source Length	(m)	30.5
Source Width	(m)	36.6
Boundary Layer Thickness	(cm)	5

#### Chemical Specific Input Parameters for Chrysene

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 3905 0.8182 4.69E-05 2.00E+05 0
Outputs for Chrysene		
Time = 1 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	0.06434 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	0.1186 0 0 0
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	0.1674 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	0.212 0 0 0
Time = 5 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	0.2535 0 0 0

Time =	10 yrs		
=======			
Cumulative E Advective Ma Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	0.4273 0 0 0
Time = =========	15 yrs ====================================		
Cumulative E Advective Ma Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	0.5644 0 0 0
Time = ========	20 yrs		
Cumulative E Advective Ma Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	0.6776 0 0 0
Time = ========	25 yrs		
Cumulative E Advective Ma Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	0.7737 0 0 0
Time = =========	30 yrs		
Cumulative E Advective M Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	0.8567 0 0 0
Time = ========	35 yrs		
Cumulative B Advective M Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	0.9292 0 0 0
Time = ========	40 yrs		
Cumulative I Advective M Diffusive Ma Advective &	Emissions to Air ass Loading Rate to Groundwater ss Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	0.9932 0 0 0

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11me = 45 yrs		
Cumulative Emissions to Air	(g)	1.05
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 50 yrs		
Cumulative Emissions to Air	(g)	1.101
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 55 yrs		
Cumulative Emissions to Air	(g)	1.147
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 60 yrs		
Cumulative Emissions to Air	(g)	1.189
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 65 yrs		
Cumulative Emissions to Air	(g)	1.226
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 70 yrs		
Cumulative Emissions to Air	(g)	1.261
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0

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#### Chemical Specific Input Parameters for Naphthalene

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 5098 0.648 5.78E-02 1300 0
Outputs for Naphthalene		
Time = 1 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	262.2 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	366.9 0 0 0
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	445.3 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	510 0 0 0
Time = 5 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	566 0 0 0

Time = 10 yrs

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Cumulative Emissions to Air	(g)	777
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 15 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 20 yrs	(g) (g/day) (g/day) (g/day)	929.7 0 0 0
Cumulative Emissions to Air	(g)	1052
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 25 yrs ====================================		
Cumulative Emissions to Air	(g)	1156
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 30 yrs ====================================		
Cumulative Emissions to Air	(g)	1246
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 35 yrs ====================================		
Cumulative Emissions to Air	(g)	1326
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 40 yrs ====================================		
Cumulative Emissions to Air	(g)	1399
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0

Time = 45 y	/rs		
Cumulative Emis Advective Mass L Diffusive Mass Lo Advective & Diffu	sions to Air oading Rate to Groundwater oading Rate to Groundwater sive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1465 0 0 0
Cumulative Emis Advective Mass L Diffusive Mass Lo Advective & Diffu Time = 55 y	sions to Air Loading Rate to Groundwater bading Rate to Groundwater sive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1525 0 6.18E-76 0
Cumulative Emiss Advective Mass L Diffusive Mass Lo Advective & Diffu	sions to Air oading Rate to Groundwater oading Rate to Groundwater sive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1581 5.94E-71 4.94E-69 0
=======================================	ns ====================================		
Cumulative Emiss Advective Mass L Diffusive Mass Lo Advective & Diffu	sions to Air .oading Rate to Groundwater bading Rate to Groundwater sive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1633 4.48E-65 3E-63 0
Time = 65 y	/rs ====================================		
Cumulative Emis Advective Mass L Diffusive Mass Lo Advective & Diffu	sions to Air .oading Rate to Groundwater bading Rate to Groundwater sive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1682 4.22E-60 2.35E-58 0
Time = 70 y	/rs		
Cumulative Emis Advective Mass L Diffusive Mass Lo Advective & Diffu	sions to Air oading Rate to Groundwater oading Rate to Groundwater sive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1727 7.75E-56 3.66E-54 0

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## Chemical Specific Input Parameters for Phenanthrene

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PARAMETER NAME	UNITS	VALUE
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 4493 0.5124 7.11E-03 1.40E+04 0
Outputs for Phenanthrene		
Time = 1 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 yrs	(g) (g/day) (g/day) (g/day)	23.96 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	34.51 0 0 0
Time = 3 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	42.43 0 0 0
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	49 0 0 0
Time = 5 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	54.69 0 0 0

Time = 10 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater	(g) (g/dav)	76.22
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 15 yrs		
Cumulative Emissions to Air	(g)	91.88
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	U
Time = 20 yrs		
Cumulative Emissions to Air	(g)	104.5
Advective Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day) (g/day)	0
		-
Time ≈ 25 yrs ====================================		
Cumulative Emissions to Air	(g)	115.2
Advective Mass Loading Rate to Groundwater	(g/day) (g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 20 um		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater	(g) (g/day)	124.6
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time ≈ 35 vrs		
=======================================		
Cumulative Emissions to Air	(q)	132.9
Advective Mass Loading Rate to Groundwater	(g/day)	0
Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0
Time = 40 yrs		
Cumulative Emissions to Air	(g)	140.5
Advective Mass Loading Rate to Groundwater	(g/day)	0
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day) (g/dav)	0
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Time = 45 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	147.3 0 0 0
======================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	153.7 0 0 0
Time = 55 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	159.5 0 0 0
Time = 60 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	165 0 0 0
lime = 65 yrs		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	170.2 0 0 0
Time = 70 yrs		
***************************************		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	175 0 0 0

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#### Chemical Specific Input Parameters for Pyrene

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PARAMETER NAME	UNITS	VALUE	
Total Soil Concentration Diffusion Coeff. in Air Diffusion Coeff. in Water Henrys Constant Organic Carbon Part. Coeff. Lumped Chemical Decay Rate	(mg/kg) (cm^2/day) (cm^2/day) [(mg/L)/(mg/L)] (cc/g) (1/day)	1 4147 0.8726 2.28E-04 3.80E+04 0	
Outputs for Pyrene			
Time = 1 yrs ====================================			
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 2 vrs	(g) (g/day) (g/day) (g/day)	1.16 0 0 0	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	1.893 0 0 0	
Time ≈ 3 yrs ====================================			
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater Time = 4 yrs	(g) (g/day) (g/day) (g/day)	2.464 0 0 0	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	2.937 0 0 0	
Time = 5 yrs ====================================			
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwater	(g) (g/day) (g/day) (g/day)	3.343 0 0 0	

Time = 10 yrs ====================================		
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwa	(g) (g/day) (g/day) ter (g/day)	4.8 0 0 0
Time = 15 yrs ====================================	==	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwa	(g) (g/day) (g/day) ter (g/day)	5.752 0 0 0
Time = 20 yrs	:=	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwa	(g) (g/day) (g/day) ter (g/day)	6.444 0 0 0
Time = 25 yrs	=	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwa	(g) (g/day) (g/day) ter (g/day)	6.975 0 0 0
Time = 30 yrs ====================================	==	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwa	(g) (g/day) (g/day) ter (g/day)	7.396 0 0
Time = 35 yrs ====================================	=	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwa	(g) (g/day) (g/day) ter (g/day)	7.738 0 0 0
Time = 40 yrs ====================================	==	
Cumulative Emissions to Air Advective Mass Loading Rate to Groundwater Diffusive Mass Loading Rate to Groundwater Advective & Diffusive Mass Loading Rate to Groundwa	(g) (g/day) (g/day) ter (g/day)	8.021 0 0 0

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Time = 45 yrs					
Cumulative Emissions to Air	(g)	8.258			
Advective Mass Loading Rate to Groundwater	(g/day)	0.200			
Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Time = 50 yrs					
Cumulative Emissions to Air	(g)	8.459			
Advective Mass Loading Rate to Groundwater	(g/day)	0			
Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Time = 55 yrs					
***************************************					
Cumulative Emissions to Air	(g)	8.63			
Advective Mass Loading Rate to Groundwater	(g/day)	0			
Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Time = 60 yrs					
Ourself the Freinging to Ale		0 770			
Advective Mess Loging Bate to Croundwater	(g) (g/day)	0.778			
Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Time = 65 yrs					
Cumulative Emissions to Air	(g)	8.905			
Advective Mass Loading Rate to Groundwater	(g/day)	0			
Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Time = 70 yrs					
Cumulative Emissions to Air (g) 9.01					
Advective Mass Loading Rate to Groundwater (g/day)					
Diffusive Mass Loading Rate to Groundwater	(g/day)	0			
Advective & Diffusive Mass Loading Rate to Groundwater	(g/day)	0			

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AT123D Output File Analysis for Example Problem

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Chemicals in the analysis Chrysene Naphthalene Phenanthrene Pyrene

Number of years simulated: 70

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# GENERAL INPUT DATA

NO. OF POINTS IN X-DIRECTION NO. OF POINTS IN Y-DIRECTION NO. OF POINTS IN Z-DIRECTION NO. OF ROOTS: NO. OF SERIES TERMS NO. OF BEGINNING TIME STEPS NO. OF ENDING TIME STEP NO. OF ENDING TIME STEP NO. OF TIME INTERVALS FOR PRINTED OUT SOLUTION INSTANTANEOUS SOURCE CONTROL = 0 FOR INSTANT SOURCE	1 10 1000 1 70 1 1
SOURCE CONDITION CONTROL = 0 FOR STEADY SOURCE	70
INTERMITTENT OUTPUT CONTROL = 0 NO SUCH OUTPUT	1
CASE CONTROL =1 THERMAL, = 2 FOR CHEMICAL, = 3 RAD	2
X-COORDINATE OF RECEPTOR WELL (METERS) Y-COORDINATE OF RECEPTOR WELL (METERS) AQUIFER DEPTH, = 0.0 FOR INFINITE DEEP (METERS) AQUIFER WIDTH, = 0.0 FOR INFINITE WIDE (METERS) BEGIN POINT OF X-SOURCE LOCATION (METERS) END POINT OF X-SOURCE LOCATION (METERS) BEGIN POINT OF Y-SOURCE LOCATION (METERS) END POINT OF Y-SOURCE LOCATION (METERS) BEGIN POINT OF Y-SOURCE LOCATION (METERS) BEGIN POINT OF Z-SOURCE LOCATION (METERS) BEGIN POINT OF Z-SOURCE LOCATION (METERS)	1.53E+01 1.83E+01 3.05E+00 0.00E+00 3.05E+01 0.00E+00 3.66E+01 0.00E+00 0.00E+00
POROSITY	2.50E-01
HYDRAULIC CONDUCTIVITY (METER/YEAR)	3.15E+01
HYDRAULIC GRADIENT	2.00E-02
LONGITUDINAL DISPERSIVITY (METER)	0.00E+00
LATERAL DISPERSIVITY (METER)	0.00E+00
VERTICAL DISPERSIVITY (METER)	0.00E+00
BULK DENSITY OF THE SOIL (KG/M**3)	1.80E+03
TIME INTERVAL SIZE FOR THE DESIRED SOLUTION (YR)	1.00E+00
DISCHARGE TIME (YR)	7.00E+01

INPUT DATA/RESULTS FOR CHEMICAL: Chrysene

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INST. WAST	E RELEASE	(KG) VALID FOR INST CASE ONLY	1.00E+00
DISTRIBUTI	ON COEFFIC	CIENT, KD (M**3/KG)	4.00E+00
MOLECULA	R DIFFUSIO	N COEFFICIENT (M**2/YR)	2.99E-02
DECAY CON	ISTANT ( 1/Y	′R )	0.00E+00
LIST OF TRA	ANSIENT SO	URCE RELEASE RATE	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00	
RETARDATI	ON FACTOR		2.88E+04
RETARDED	SEEPAGE V	ELOCITY (M/YR)	8.75E-05
RETARDED	LONGITUDI	NAL DISPERSION COEF. (M**2/YR)	4.15E-06
RETARDED	LATERAL DI	SPERSION COEFFICIENT (M**2/YR) .	4.15E-06
RETARDED	VERTICAL D	DISPERSION COEFFICIENT (M**2/YR).	4.15E-06
	4.00		
time [yr] =	1.00	avg. conc. [mg/i] = .000E+00	
timo [vr] -	5.00	$a_{12} = a_{22} = a$	
time [yr] =	5.00	avg. conc. $[mg/I] = .000\pm000$	
timo Iuri -	10.0	$a_{12} = a_{22} = a$	
time [yi] –	10.0	avg. conc. $[mgn] = .000 \pm 00$	
timo [vr] -	15.0	$a_{12} = a_{22} = a$	
time [yi] –	15.0	avg. conc. [mg/]000E+00	
timo funt m	20.0		
une [yi] -	20.0	avg. conc. [mg/i] = .000E+00	
timo Iumi -	25.0		
nine [M] –	25.0	avg. conc. įmg/ij – .000≞+00	
time o fumi -	20.0		
time [yr] =	30.0	avg. conc. $[mgn] = .000E+00$	
time [un] -	25.0	$a_{1}a_{2}a_{2}a_{3}a_{4}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5$	
time [yr] =	35.0	avg. conc. [mg/i] = .000E+00	
time [un] -	40.0	$a_{1}a_{2}a_{2}a_{2}a_{3}a_{4}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5$	
time [yi] –	40.0	avg. conc. [mg/ŋ = .000⊵+00	
timo Ivrl -	45.0		
une [yi] -	45.0		
time furl -	50.0		
une [yi] –	50.0	avg. conc. [mg/i]000⊵+00	
timo [vr] -	<b>65 0</b>	$a_{12} = a_{22} = a$	
une [yi] –	55.0		
time furt -	60.0	and cone $\left[ma/l\right] = 000\pm00$	
ane [yi] -	00.0	avg. conc. [mg/i]000E+00	
time furt -	65.0	and conc $\left[ma/l\right] = 0.00 \pm 0.0$	
nue [yi] =	05.0	avg. conc. [mg/i] − .000∈+00	
time funt -	70.0		
une yri =	10.0	avg. conc. $ mg/l  = .000E+00$	

INPUT DATA/RESULTS FOR CHEMICAL: Naphthalene

INST. WAST	E RELEASE	(KG) VALID FOR INST CASE ONLY CIENT, KD (M**3/KG) N COEFFICIENT (M**2/XR)	1.00E+00 2.60E-02
			0.005+00
.000E+00	.000E+00		
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
000E+00	000E+00	000E+00 000E+00 000E+00	
0005+00	0005+00	000E+00 000E+00 000E+00	
.000E+00	.0002+00		
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
0005+00	000E+00	000E+00 000E+00 000E+00	
.00000000	00000000	000000000000000000000000000000000000000	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00	
RETARDATI	ON FACTOR	?	1.88E+02
RETARDED	SEEPAGE V	/ELOCITY (M/YR)	1.34E-02
RETARDED		NAL DISPERSION COFE (M**2/YR)	5 03E-04
	LATERAL DI		5.02 04
RETARDED			5.03E-04
RETARDED	VERTICAL L	DISPERSION COEFFICIENT (M <sup>**</sup> 2/YR).	5.03E-04
time [yr] =	1.00	avg. conc. [mg/l] = .000E+00	
time [vr] =	5.00	$a_{VQ} conc [mq/l] = 000E+00$	
anne [M] -	0.00		
4	10.0		
time [yr] =	10.0	avg. conc. $[mg/I] = .000E+00$	
time [yr] =	15.0	avg. conc. [mg/l] = .000E+00	
time (vrl =	20.0	$a_{VQ} c_{ODC} [mq/l] = 000E+00$	
une [yi] -	20.0		
time [yr] =	25.0	avg. conc. [mg/I] = .000E+00	
time [yr] =	30.0	avg. conc. [mg/l] = .000E+00	
		0 1 0 1	
time [vr] -	25.0	$a_{1}a_{2}a_{2}a_{3}a_{4}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5$	
unie [yi] –	35.0		
time [yr] =	40.0	avg. conc. [mg/l] = .000E+00	
time [vr] =	45.0	ava, conc. [mg/l] = .000E+00	
	10.0		
tion of trust or	<b>FO O</b>		
ume [yr] =	50.0	avg. conc. $[mg/n] = .000E+00$	
time [yr] =	55.0	avg. conc. [mg/l] = .000E+00	
time [vr] =	60.0	ava conc [ma/l] = 000F+00	
ano (91) -			
time [yr] =	65.0	avg. conc. [mg/I] = .000E+00	
time [yr] =	70.0	avg. conc. [mg/l] = .000E+00	

#### INPUT DATA/RESULTS FOR CHEMICAL: Phenanthrene

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INST. WAST DISTRIBUTIO MOLECULAF DECAY CON	E RELEASE ON COEFFIC R DIFFUSION ISTANT ( 1/Y	(KG) VALID FOR INST CASE ONLY CIENT, KD (M**3/KG) N COEFFICIENT (M**2/YR) (R )	1.00E+00 2.80E-01 1.87E-02 0.00E+00
LIST OF TRA	NSIENT SO	URCE RELEASE RATE	
	0005+00	000E+00 000E+00 000E+00	
000 - 000		0005+00 0005+00 0005+00	
.000E+00	.000E+00	.0002+00 .0002+00 .0002+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
000E+00	000E+00	0005+00 0005+00 0005+00	
.00000100		0005+00 0005+00 0005+00	
.000E+00	.00000000		
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
0005+00	0005+00	0005+00 0005+00 0005+00	
0000000			
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.0002+00	.000E+00	.000+00 .000+00 .000+00	
.000E+00	.000E+00	.000E+00 .000E+00	
RETARDATIO	ON FACTOR	)	2.02E+03
RETARDED	SEEPAGE V		1.25E-03
			3 71 = 05
RETARDED	LONGHODI	VAL DISPERSION COEP. (W Z/TR)	3.7 IE-05
RETARDED	LATERAL DI	SPERSION COEFFICIENT (M**2/YR) .	3.71E-05
RETARDED	VERTICAL D	SPERSION COEFFICIENT (M**2/YR).	3.71E-05
		····· · · · · · · · · · · · · · · · ·	
diana tantan	4 00		
time [yr] =	1.00	avg. conc. $[mg/i] = .000E+00$	
time [vr] =	5.00	$a_{VQ} conc [mq/l] = 000E+00$	
	0.00		
time [yr] =	10.0	avg. conc. [mg/I] = .000E+00	
time [vr] =	15.0	avg_conc. $[mg/l] = .000E+00$	
une []-]	10.0		
time [yr] =	20.0	avg. conc. [mg/l] = .000E+00	
time [vr] =	25.0	$a_{V_{0}}$ conc $[m_{0}/l] = 000E+00$	
une Dil –	20.0		
time [yr] =	30.0	avg. conc. [mg/l] = .000E+00	
time [vr] -	25.0	$a_{\rm M}a_{\rm conc}$ [mg/l] = 000E+00	
unie [yi] –	35.0		
time [yr] =	40.0	avg. conc. [mg/l] = .000E+00	
time [un] -	45.0	$a_{1/2} = a_{2/2} = a_{1/2} = 0.00 = \pm 0.0$	
ume [yr] =	45.0	avg. conc. [mg/i] = .000∈+00	
time [vr] =	50.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	55.0	avg. conc. [mg/I] = .000E+00	
time [vr] =	60.0	avg conc $[mg/l] = .000F+00$	
	00.0		
time [yr] =	65.0	avg. conc. [mg/l] = .000E+00	
time (vr) =	70.0	ave conc $\left[ m \alpha / l \right] = 000 \text{E} + 00$	
	10.0		

### INPUT DATA/RESULTS FOR CHEMICAL: Pyrene

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INST. WAST	E RELEASE	(KG) VALID FOR INST CASE ONLY	1.00E+00 7.60E-01
		N COEFEICIENT (M**2/YR)	3 19E-02
DECAY CON	ISTANT ( 1/Y		0.00E+00
LIST OF TRA	NSIENT SO	URCE RELEASE RATE	
000E+00	000F+00	000E+00 000E+00 000E+00	
000E+00	000E+00	000E+00 000E+00 000E+00	
00000-000	000=+00	000E+00 000E+00 000E+00	
	.0002+00	000=+00 000=+00 000=+00	
.000E+00	.000E+00		
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
.000E+00	.000E+00	.000E+00 .000E+00 .000E+00	
000E+00	000E+00	000E+00 000E+00 000E+00	
000=+00	0005+00	0005+00 0005+00	
			E 47E+02
RETARDATI			5.47E+03
RETARDED	SEEPAGE V		4.60E-04
RETARDED	LONGITUDI	NAL DISPERSION COEF. (M**2/YR)	2.33E-05
RETARDED	LATERAL DI	SPERSION COEFFICIENT (M**2/YR) .	2.33E-05
RETARDED	VERTICAL D	DISPERSION COEFFICIENT (M**2/YR).	2.33E-05
time [vr] =	1.00	avg. conc. $[mg/l] = .000E+00$	
time [vr] =	5 00	$a_{1}a_{2}a_{2}a_{3}a_{2}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3$	
uno Dri -	5.00		
time o fuel -	10.0		
ume [yr] =	10.0	avg. conc. [mg/i]000E+00	
time [yr] =	15.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	20.0	avg. conc. [mg/l] = .000E+00	
time [vr] =	25.0	ava, conc. [mo/l] = .000E+00	
time [vr] =	30.0	$a_{1}a_{2}a_{2}a_{3}a_{4}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5}a_{5$	
une [yi] –	50.0		
time of trul -	25.0		
time [yr] =	35.0	avg. conc. [mg/i] = .000E+00	
time [yr] =	40.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	45.0	avg. conc. [mg/l] = .000E+00	
		-	
time [vr] =	50.0	avg conc $[mg/l] = .000E+00$	
	00.0		
time [ur] -	55.0	$\alpha_{\rm M}$ conc $[ma/l] = 000E\pm00$	
time [yi] –	55.0		
	<b></b>		
time [yr] =	60.0	avg. conc. $[mg/I] = .000E+00$	
time [yr] =	65.0	avg. conc. [mg/l] = .000E+00	
time [yr] =	70.0	avg. conc. [mg/l] = .000E+00	