### Introduction to the Water Quality Analysis Modeling System

WASP Version 7.0 April, 2005





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### **Three Dimensional Transport Equation**



#### WASP Modeling Framework



# **Potential WASP Time Scales**

- Steady
- Seasonal
- Monthly
- Daily/Hourly







## WASP External Linkages





# Introduction to the WASP Interface





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### Introduction to WASP Interface

			Brêap II
Input File Run	V Input Data	Import	Output
Control Simulation	Specification	Network	Control





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### **Create New WASP Input File**







### **Open Existing WASP Input File**

😻 USEPA W	ASP				
File Project	Pre-processor N	1odel Post-Processor	Help		
				K <b>B</b>	
Open					? 🛛
Look in:	Toxi Test F	luns	•	+ 🗈 💣 📰 •	
My Recent Documents Desktop	Biotic Solids : Benthic Diffu Biotic Solids ( Solids ) CSTR Test.w Small River 1	2 Ision Test.wif CSTR2.wif CSTR.wif vif . KW volat.wif			
My Computer My Network My Network Places	File name: Files of type:	WASP Files		•	Open Cancel

 Browse and select an existing Wasp Input File
 WASP provides a listing of \*.wif in the current directory.





### WASP Input Data Categories

🤏 USEPA WASP	: (Unname	d WASP I	nput Data S	et, Eutrop	ohication)				
File Project Pre-	processor Mo	del Post-F	ro <mark>cessor Hel</mark> j	p					
	1966 - B	äg ≤t	<u>⊾ </u> @ (	K	K	<u>k  </u>	<b>₽</b>	=>	
C	- 46 - 50 - 50						717	441 567	16 - H.

- 1. Simulation Control
- 2. Time Step
- 3. Print Interval
- 4. Segment Properties
- 5. System Properties
- 6. Parameter Switches

- 7. Constants
- 8. Loadings
- 9. Kinetic Time Functions
- 10. Dispersive Exchanges
- **11. Advective Flows**
- 12. Boundary Concentrations



### **Simulation Control**

File Project Pre-processor Model Post-Processor Help	
Parameters 🛛 🕅	
Description Model Type Bestart Option	
CSTR Test Eutrophication   No Restart File	
Comments Eutrophication C Create Restart File	
Simple Class Example Non-Ionizing Toxicant Organic Toxicants Mercury Heat Test (Do Not Use)	
Time Range Non Point Source File Bed Volumes	4
Start Date Use NPS file Browse C Dupamic	
1/1/2005 Bed Compaction Time Step	
Start Time 0.00	
0:00 Pydrodynamics	
Gross Flows	
End Date C 1-D Network Kinematic wave V User Defined	
C Hydrodynamic Linkage	
End Time Hydrodynamic Linkage File Solution Options	T
Browse Hydro Skip Date	
Solution Technique 12/30/1899	
Euler Hudro Chin Tino	
TE-SO	
10.00	

- Description and Comments
- Model Type
- Simulation Start Date & Time
- Non Point Source Linkage
- Hydrodynamic Option and Linkage
- Restart Option
- Bed Volume Option
- Time Step Option
- Negative Solution
   Option





# **Segment Properties - Geometry**

	File	USEPA W Project	ASP: C:W Pre-process	/asp7\Tox or Model	i Test Run Post-Process 	IS VCSTR Te	est.wif (CSTR T	est , Simple	Toxicant ?⊐  ⊅¢			
Segme	ents	× 10		2 D. 1	- Ú							
Segment	Description	Volume	Velocity	Action Dissol	Depth	Depth	Segment	Bottom	Length	Width	Slope	Bottom
			Multiplier	Exponent	Multiplier	Exponent	Туре	Segment				Roughnes:
1	Wasp Segment	1E+4	0.0000	0.0000	1.0000	0.0000	Surface Wate 💌	None	0.0000	0.0000	0.0000	0.0000
<							Surface Water Subsurface Water Surface Benthic Subsurface Benth					>
Fill/	'Calc 🏻 📴 C	ору	隆 Paste		Volu	me Scale Fac 1.0000000	otor Volume	Conversion Fa 000000				
+ Inse	ert	Delete	<b>v</b> 0		🗙 Cancel							

### Segments Tab: Spatially-Variable Physical Properties





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### **Segment Properties - Parameters**

🐐 USEPA WAS	iP: C:\Wasp7\Toxi Test R	uns\CSTR Test.wif (CSTR	Test, Simple Toxicant)		Print, Street, Street, St
File Project Pre	e-processor Model Post-Proc	essor Help			a second
	🕂 🥻 🔤		•  ▶   →   ⊅   ⇒		1.1
* Segmente	<u> </u>				
Segments Paran	neters   Initial Concentrations   F	raction Dissolved			
Segment	Dissolved Organic Carbor	Partition Coefficient to Silt	Partition Coefficient to Sand	Partition Coefficient to Organic	Decay Rate Constant (per day)
1	0	0	0	0	0
Fill/Calc	🛱 Copy 🛛 🕅 Paste				
	- Delete	K Cancel			
Tinseit					

#### Parameters Tab:

Values for Spatially-Variable Environmental Properties or Model Coefficients

*Note* – to be used in a simulation, parameters must be enabled under the Parameter Control button



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## Segment Properties – Initial Concentrations

Image: Segment segm		WASP: C:\Wasp7\Toxi	Test Runs\CSTR Test.wif( Post-Processor Help	CSTR Test, Simple Tox	icant) 📃 🗖
Segments         Initial Concentrations       Fraction Dissolved         Segment       Toxicant (mg/L)       Silts and Fines (mg/L)       Sand (mg/L)       Organic Solids (mg/L)         1       1       10       0       0				K 🗾 🎼 🔶 🎘	
Segment     Toxicant (mg/L)     Silts and Fines (mg/L)     Sand (mg/L)     Organic Solids (mg/L)       1     1     1     0     0	egments ments   Param	neters Initial Concentration	s Fraction Dissolved		
1 1 0 0	Segment	Toxicant (mg/L)	Silts and Fines (mg/L)	Sand (mg/L)	Organic Solids (mg/L)
📑 Fill/Calc 🛛 🙀 Copy 🗖 🙀 Paste	1	1	<u>l</u> ių	0	0
	Fill/Calc	🛱 Сору 🔀 Раз	te		

#### Initial Concentrations Tab:



Concentrations of each state variable (system) at beginning of simulation

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## Segment Properties – Fraction Dissolved

USEPA V	WASP: C:\Wasp7\Toxi T	est Runs\CSTR Test.wif (CS	TR Test, Simple Toxic	ant) 🔤 🗖 🔀
File Project	Pre-processor Model Pos	t-Processor Help		
			<b>5 1</b> 1	
Segments				
Segments Param	neters   Initial Concentrations	Fraction Dissolved		
Segment	Toxicant (mg/L)	Silts and Fines (mg/L)	Sand (mg/L)	Organic Solids (mg/L)
1	1.0000	0.0000	0.0000	0.0000
Fill/Calc	Copy Copy			
+ Insert	- Delete	OK X Cancel		

#### Fraction Dissolved Tab:

 Fraction of total constituent concentration that is dissolved.



igodol

Dissolved fractions for solids <u>must</u> be set to 0. Dissolved fractions for toxicants do not need to be reset.

## **Systems**

34	SUSEPA WASP: C:V	Wasp7\To	xi Test Runs\	CSTR Te	st.wif (CS	TR Test	, Simple <sup>-</sup>	loxicant)	1			
3	File Project Pre-proces	sor Model	Post-Processor	Help								
			Ē		<b>k</b> ₅  K	<b>5</b>	<u> </u>	ت <mark>⊅ ¢</mark> ¶				
×é.	System Data											
	System	Option	Particulate	Mass	Dispersion	Flow	Density	Maximum	Boundary	Boundary	Loading	Loading
Î			Transport Field	Balance	Bypass	Bypass		Concentration	Scale Factor	Conversion Facto	Scale Factor	Conversion Facto
1	Toxicant (mg/L)	Simulated	Solids 1				1.0000	100.0000	1.0000	1.0000	1.0000	1.0000
2	Silts and Fines (mg/L)	Simulated	Solids 1				2.6500	2000000.000	1.0000	1.0000	1.0000	1.0000
3	/ Sand (mg/L)	Bypassed	Solids 2				2.6500	2000000.000	1.0000	1.0000	1.0000	1.0000
4	🕖 Organic Solids (mg/L)	Bypass 🔻	Solids 3				2.6500	2000000.000	1.0000	1.0000	1.0000	1.0000
<		Simulated Constant Bypassed										>
	🛱 Copy 🕅 🕅 Pa	iste _	Fill/Calc	<b>v</b> or	K 🔰	🕻 Cancel						

System (state variable) properties and controls:

- Switch to simulate or bypass state variables
- Switch to select particulate transport fields (for silt, sand, and organic solids)
- Solids particle densities (g/mL)
- Maximum allowable concentrations
- Boundary and loading scale factors





## **Parameter Control**

14	USEP/	A WASP: C:\Wasp7\Toxi Test Runs\CST	R Test.wi	f (CSTR Test , Sin	nple Toxicant)	_ 🗆 🛛
File	Proje	ct Pre-processor Model Post-Processor He	P			
D	2	🔡 🚿 🎘 🛆 🔛 🖾	K,	K <b>S</b>	÷ 😤 😽 🖕	
	ante a	brameter data				
		Parameter	Used	Scale Factor	_	
	1	Dissolved Organic Carbon (mg/L)		1.0000		
	2	Partition Coefficient to Silts and Fines (L/kg)	X	1.0000		
	3	Partition Coefficient to Sand (L/kg)		1.0000		
	4	Partition Coefficient to Organic Solids (L/kg)		1.0000		
	5	Decay Rate Constant (per day)		1.0000		
			and the state		-1	
	1		-	1		
		🛱 Copy 🔤 🧱 Paste 📗 Fill/Calc	🗸 ОК	X Cancel		
	2	Till/Calc	VUK	Lancel		

#### **Parameter Controls:**

- Switch to turn on parameters for the simulation
- Scale factors to adjust parameter values for all segments.



 Note: Parameter values are specified under Segments, but will not be used uppless selected here

### Constants

USEPA WASP: C:\Wasp7\Toxi Test Runs\	CSTR Te	st.wif (CSTR Te	est, Simple Toxic	ant) 📃 🗖
e Project Pre-processor Model Post-Processor	Help	$\sim$		
) 🗃 🛃 🚿 🧏 🗠 🔛 🖻		KK		
Constants Data				
stant Group				
xicant 📃				
ids	Used	Value	Minimum	Maximum
Log10 of Partition Coefficient to DOC (L/kg)		0	0.0000	7.0000
Partition Coefficient to Silts and Fines (L/kg)	X	1E+5	0.0000	0000000.0000
Partition Coefficient to Sands (L/kg)		0	0.0000	100000.0000
Partition Coefficient to Organic Solids (L/kg)		0	0.0000	0000000.0000
Volatilization loss rate constant, 1/day		0	0.0000	0.0000
Water column decay rate constant, 1/day	X	1E-1	0.0000	0.0000
Benthic decay rate constant, 1/day		0	0.0000	0.0000
🔹 🔹 🔹 🕞 🖹 🖹 🖹	🖌 ОК	X Cancel	1	>
	USEPA WASP: C: Wasp 7 Toxi Test Runs W Project Pre-processor Model Post-Processor Project Pre-processor Model Post-Processor Constants Data Stant Group vicant Log10 of Partition Coefficient to DOC (L/kg) Partition Coefficient to Silts and Fines (L/kg) Partition Coefficient to Sands (L/kg) Partition Coefficient to Organic Solids (L/kg) Partition Coefficient to Organic Solids (L/kg) Volatilization loss rate constant, 1/day Water column decay rate constant, 1/day Benthic decay rate constant, 1/day	USEPA WASP: C:\Wasp7\Toxi Test Runs\CSTR Te Project Pre-processor Model Post-Processor Help Project Pre-processor Model Post-Processor Help Postants Data Stant Group Vicant Stant Group Vicant Stant Group Vicant Partition Coefficient to DOC (L/kg) Partition Coefficient to Silts and Fines (L/kg) Partition Coefficient to Silts and Fines (L/kg) Partition Coefficient to Organic Solids (L/kg) Partition Coefficient to Organic Solids (L/kg) Volatilization loss rate constant, 1/day Water column decay rate constant, 1/day Benthic decay rate constant, 1/day Partitic Copy Paste Fill/Calc VCK	USEPA WASP: C:\Wasp7\Toxi Test Runs\CSTR Test.wif (CSTR To Project Pre-processor Model Post-Processor Help Project Poste Post-Processor Help Project Pre-processor Help Project Post-Processor Help Project Post-Processor Post-Processor Help Project Post-Post-Processor Help Project Post-Processor Help Project Post-Post-Processor Help Project Post-Post-Processor Help Project Post-Post-Processor Help Project Post-Post-Processor Help Project Post-Post-Post-Post-Post-Processor Help Project Post-Post-Post-Post-Post-Post-Post-Post-	USEPA WASP: C:Wasp7XToxi Test Runs\CSTR Test. wif (CSTR Test, Simple Toxic Project Pre-processor Model Post-Processor Help Project Pre-processor Model Post-Processor Help Constants Data stant Group sicant Used Value Minimum Log10 of Partition Coefficient to DDC (L/kg) 0 0.0000 Partition Coefficient to Silts and Fines (L/kg) 1E+5 0.0000 Partition Coefficient to Sands (L/kg) 0 0.0000 Partition Coefficient to Organic Solids (L/kg) 0 0.0000 Partition Coefficient to Organic Solids (L/kg) 0 0.0000 Valatilization loss rate constant, 1/day 0 0.0000 Water column decay rate constant, 1/day 0 0.0000 Benthic decay rate constant, 1/day 0 0.0000 Partitic



Environmental and system properties or model settings that are constant in time and space WASP 7 Course

## **Direct Loads**

	pads	[*] <sub>Uner</sub>   C		
Load	Is Scale and Convers	ion Factors		
E	₩asp Segm ••••••••••••••••••••••••••••••••••••	nent mg/L)		=
Time	Sand (mg/L)	mq/L) (Wasp Segment)	, Toxicant (mg/L)	×
Time	Sand (mg/L) Crqanic Solids (r functions for segment 1	mq/L) (Wasp Segment) Time	), Toxicant (mg/L) Value	~
Time	Sand (mg/L) Organic Solids (r functions for segment 1 Date 1/ 1/2005	mq/L) (Wasp Segment) <b>Time</b> 0:00	), Toxicant (mg4) Value 0	~
Time	Sand (mg/L) Crganic Solids (r functions for segment 1 Date 1/ 1/2005 2/ 1/2005	mq/L) (Wasp Segment) <b>Time</b> 0:00 0:00	I, Toxicant (mg/L) Value 0 0	~

External input of variable mass to segments.

Note: variables with concentration in mg/L require loading values in kg/day.





## **Dispersive Exchanges**

Exchanges     change Fields     Field   Used   Surface Water   1.000000   Pore Water     1.000000   0.0001000     Pore Water     1.000000   0.0001000     Immediation     Segment one	Project Pre-proce	essor Model	Post-Process		1 (0.				<b>800  </b>
Exchanges       Pore Water functions         change Fields       Pore Water functions         Surface Water       1.0000000         Pore Water       1.0000000         Pore Water       1.0000000         Pore Water       1.0000000         gment pairs for Pore Water, Benthic Exchange       Time/value pairs for Pore Water, Benthic Exchange         gment pairs for Pore Water, Benthic Exchange       Time/value pairs for Pore Water, Benthic Exchange         Segment one       Segment two       Area         Boundary       1: Wasp Segl 10000.00000       0.1000000         1/1/2005       0:00       1E-5         2/1/2005       0:00       1E-5	1		🛾 🗠 t 🔛		K	🔊 🛓 🧧	-   🎢 Þ	🤤 🚽	CEOD TEHP HH3
Exchanges         Ichange Fields       Pore Water functions         Surface Water       1.0000000       1.0000000         Pore Water       1.0000000       0.0001000         Pore Water       I.0000000       0.0001000         Image: Segment one Segment two Area Distance       Distance       Distance         Boundary       1: Wasp Segle       10000.00000       0.1000000         Image: Segment one Segment two Area Distance       Distance       Distance         Boundary       1: Wasp Segle       10000.00000       0.1000000         Image: Segment one Segment two Area Distance       Distance       Distance         Boundary       1: Wasp Segle       10000.00000       0.1000000         Image: Segment one Segment two Area       Distance       Distance       Distance         Image: Segment one Segment two Area       Distance       Distance       Distance         Image: Segment one Segment two Area       Distance       Distance       Distance         Image: Segment one Segment two Area       Distance       Distance       Distance         Image: Segment one Segment two Area       Distance       Distance       Distance         Image: Segment one Segment two Area       Distance       Distance       Distance	-						/		_
Field       Used       Scale       Conversion         Surface Water       1.000000       1.000000       Benthic Exchange         Pore Water       Image: Segment one Segment two       Area       Distance         Boundary       1: Wasp Segi €       10000.0000       0.1000000         Image: Segment one Segment two       Area       Distance       Distance         Boundary       1: Wasp Segi €       10000.0000       0.1000000         Image: Segment one Segment two       Area       Distance       1/1/1/2005       0:00         Image: Segment one Segment two       Area       Distance       1/1/1/2005       0:00       1E-5         Image: Segment one Segment two       Area       Distance       Image: Segment one       0:00       1E-5         Image: Segment one Segment two       Area       Distance       Image: Segment one       0:00       1E-5         Image: Segment one Segment two       Area       Distance       Image: Segment one       0:00       1E-5         Image: Segment one Segment two       Area       Distance       Image: Segment one       0:00       1E-5         Image: Segment one Segment two       Area       Image: Segment one       Image: Segment one       Image: Segmentone         Image: Segment	Exchanges								×
Field       Used       Scale       Conversion         Surface Water       1.000000       1.000000         Pore Water       I       1.000000       0.0001000         egment pairs for Pore Water, Benthic Exchange       Time/Value pairs for Pore Water, Benthic Exchange         Segment one       Segment two       Area       Distance         Boundary       1: Wasp Segiter       10000.0000       0.1000000         Image: Note the set of the	change Fields				Pore	Water functions		And a state of the	
Surface Water       I       1.0000000       1.0000000         Pore Water       I       1.0000000       0.0001000         agment pairs for Pore Water, Benthic Exchange       Time/value pairs for Pore Water, Benthic Exchange         Segment one       Segment two       Area       Distance         Boundary       1: Wasp Segi ≤ 10000.00000       0.1000000       1/1/2005       0:00         Insert       Delete       Image Delete       Image Segnent       Image Segnent	Field	Used	Scale	Conversion			Function		
Pore Water       I       1.000000       0.0001000         igment pairs for Pore Water, Benthic Exchange       Time/value pairs for Pore Water, Benthic Exchange         Segment one       Segment two       Area       Distance       Date       Time       Value         Boundary       1: Wasp Segi €       10000.00000       0.1000000       1/1/2005       0:00       1E-5         ▶       2/1/2005       0:00       1E-5       >       2/1/2005       0:00       1E-5	Surface Water		1.0000000	1.0000000	•	Benthic Exchang	e		
rgment pairs for Pore Water, Benthic Exchange Segment one Segment two Area Distance Boundary 1: Wasp Segi € 10000.00000 0.1000000 1/ 1/2005 0:00 1E-5 2/ 1/2005 0:00 1E-5 2/ 1/2005 0:00 1E-5	Pore Water	X	1.0000000	0.0001000					
► 2/1/2005 0:00 1E-5	Segment one Boundary	Segment	two Area	<b>Distance</b>		Date 1/ 1/2005	Time 0:00	Value 1E-5	
► 27 172005 0:00 1E25	Boundary	1: Wasp Se	gi 👱 10000.0i	0000 0.1000000	-	1/1/2005	0:00	1E-5	
Copy     Charte     Fill/Calc     Mainport									

Bulk dispersive exchange flows among model segments





## **Advective Flows**

		<u>868 %</u>	-			- Hutter		
	Flows				<u> </u>			
V	Field	Used	Scale	Conversion	Suna	ice water runctio	Function	
	Surface Water	X	1.0000000	0.0000116		CSTR Throughflo	w	
	Pore Water		1.0000000	1.0000000				
	Solids 1		1.0000000	1.0000000				
	Solids 2		1.0000000	1.0000000				
	Solids 3		1.0000000	1.0000000				
	Evaporation/Precipitatic		1.0000000	1.0000000				
ſ	nent pairs for Surface W	ater, CS1 To	R Throughflov Frac. o	N flo	_ Time	/value pairs for Si Date	urface Water, <b>Time</b>	CSTR Through
	Boundary 1: V	Vasp Se	gi 🛨 1.0000	000		1/ 1/2005	0:00	1E+3
	1: Wasp Segmer Bou	undary	1.0000	000		2/ 1/2005	0:00	1E+3

Movement of water and solids among model segments





## Boundaries

Bo	undaries				
ound	daries Scale and Cor	version Factors			
+	Sand (mg/L)				
t t me fu	* Sand (mg/L) 	mg/L) (Wasp Segment), To Time	oxicant (mg/L)	-	
t The fu	Sand (mg/L)  Sand (mg/L)  Crganic Solids (r  unctions for segment 1  Date  1/ 1/2005	mg/L) (Wasp Segment), To <b>Time</b> 0:00	oxicant (mg/L) Value 1E-2		
me fu	Sand (mg/L)     Organic Solids (r unctions for segment 1     Date     1/ 1/2005     2/ 1/2005	mg/L) (Wasp Segment), To <b>Time</b> 0:00 0:00	oxicant (mg/L) Value 1E-2 1E-2		

Concentration of each system in flows entering model network. BCs must be specified for upstream and downstream advective flows and dispersive exchanges.





### WASP Output Variable Selection

Selects variables that will be saved to the WASP output file (bmd), and variables that will be saved in a set of commadelimited files (\*.CSV)

USEPA WASP: C:\Wasp7\Toxi T	est Runs\CSTR Test.wif (CSTR Test, S	Simple Toxicant)			
Project Pre-processor Model Pos		<b>⇒¢</b> 🐬 🔶	⇒∎ (		
- vie	Output Control		[		×
	Description	Units	Output	CSV	^
1	Total Solids	mg/L	X	X	
2	Silts and Fines	mg/L	X		
3	Sand	mg/L	X		
4	Organic Solids	mg/L	X		
5	Segment Temperature	°C	X		
6	Velocity	m/sec	X		
7	Depth	m	X		
8	Advective Flow	m3/sec	X		
9	Total Concentration	ug/L	X	X	
10	Dissolved Concentration	ug/L	X		
11	DDC Sorbed Concentration	ug/L	X		
12	Total Sorbed Concentration	ug/L	X		
13	Total Sorbed Concentration (solids)	ug/kg	X		
14	Maximum DT	days	X		
16	Time Chan	daua			~





### **Execute Model Simulation -1**



WASP 7 Course



### **Execute Model Simulation - 2**

USEPA WASP: C:\Wasp7\Toxi Test Runs\CSTR Test.wif (CSTR Test, Simple Toxicant)											
File Project Pre-processor Model Post-Processor Help											
D 🗃 🖶 🖉 🕅 🔛 🖽 🕞 🔥 📥 📥 🖊 🔛 🔛											
Chemical Chemical Chemical Solids 1 Solids 2 Solids 3 Total Soli F	low Volume										
<b>1 95.425156</b> 0.000000 0.000000 3.014666 0.000000 0.000000 3.014666 0.0	11574 10000.0000										

US EPA	WASP Version 7.0	
Organic Chemical Mo	del Last Revised: 7/14/2004 2:52PM	
Getting Model Parame	terization Data	
🗊 Getting Dispersion Info	ormation	
🗊 Getting Segment Volu	mes Information	
🗊 Getting Flow Informatio	on	
🕼 Getting Time Variable	Boundary Information	
🗊 Getting Time Variable	Loadings	
🗊 Getting Segment Spec	ific Environmental Conditions	
🗊 Getting Kinetic Consta	nts	
🗊 Getting Environmental	Time Functions	
🗊 Getting Initial Condition	ns	
🗊 Euler Solution Technic	lue	
	aulation Charted	

- A table of calculated concentrations will be displayed throughout the simulation.
- Status and error messages will be displayed.
- Progress through the simulation is summarized along the bottom bar. A control slide can be used to speed up, slow down, or freeze the simulation.
- The simulation can be aborted by pressing the stop button (circled above).

Time remaining: 0:00:01





Simulation Time: 1/13/2005 0:00:01

### **Execute Model Simulation - 3**



US EPA -- WASP Version 7.0
Organic Chemical Model Last Revised: 7/14/2004 2:52PM
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- 🗊 Getting Model Parameterization Data
- CF Getting Dispersion Information
- Getting Segment Volumes Information
- Cetting Flow Information
- 🗊 Getting Time Variable Boundary Information
- 🗊 Getting Time Variable Loadings
- 🗊 Getting Segment Specific Environmental Conditions
- 🗊 Getting Kinetic Constants
- 10 Getting Environmental Time Functions
- C Getting Initial Conditions
- C Euler Solution Technique
- 🗊 Begin Time Loop -- Simulation Started
- Closing Simulation Result File
- 🗊 Result File Closed

When the result file is closed, simulated results can be viewed by launching the WASP postprocessor, or by opening the variable csv files that were created.





# WASP Output csv file

<b>N</b>	licrosoft Ex	xcel - TotC	hem1.csv					
:2	<u>F</u> ile <u>E</u> dit	<u>V</u> iew <u>I</u> nse	ert F <u>o</u> rmat	<u>T</u> ools <u>D</u>	ata <u>W</u> indov	w <u>H</u> elp		_ 8 ×
1	3 9 -	🙄 i 🚸	1 #2= #2=   ·	KE KE   <i>Q</i>	८   🚸   🛅	田間	a 🙆 📮 i	10 🝷 🛱
: 🐚	11 12 2	i 🗣 🖄 [	351	1 🖶 🖻	₩9 Reply with	h <u>⊂</u> hanges…	End Review.	
	A1	•	\land Output	Variable: 1	Fot Conc ug	/L Number	of Segment	:s 1
	A	В	С	D	E	F	G	۲
1	Output Va	riable: Tot I	Conc ug/L I	Number of 3	Segments	1		
2	0	1000						
3	1	817.9874						
4	2	669.2699						
5	3.1	536.9018						
6	4.1	439.6025						
7	5.1	360.1018						
8	6.1	295.144						
9	7.1	242.0688						
10	8.1	198.7025						
11	9.1	163.269						
12	10	136.9565						

Time, days

### Output variable by segment in columns



× N	licrosoft E	xcel - TotC	hem1.csv					
1	<u>E</u> ile <u>E</u> dit	⊻iew Inse	ert F <u>o</u> rmat	<u>T</u> ools [	<u>D</u> ata <u>W</u> indov	w <u>H</u> elp		- ð >
: 💕	9 -	2 : 🍫	影響	4 - C   A	2   🚸   🛅	日間	a 🙆 📘	10 🗸
: 65	( <b>†</b> 1 <b>†</b> 1 (2)	i 🕞 Xi 🗌	3810		Ve Reply with	h Changes	End Review	
-	A1		& Output	Variahle:	Tot Conc up	/L Number	of Segmen	is 1
	A	B	C	D	E	F	G	
1	Output Va	riable: Tot (	Conc ug/L I	Number of	Segments	1		^
2	0	1000						
3	1	817.9874						
4	2	669.2699						
5	3.1	536.9018						
6	4.1	439.6025						
7	5.1	360.1018						
8	6.1	295.144						
9	7.1	242.0688						
10	8.1	198.7025						
11	9.1	163.269						
12	10	136.9565						
13	11	112.818						
14	12	93.0952						
15	13	76.9802						
16	14	63.813						
17	15	53.0545						
18	16	44.2641						
19	17	37.0816						
20	18	31.213						
21	19	26.4179						
22	20	22.5						
23	21	19.2988						
24	22	16.6831						
25	23.0001	14.546						
26	24.0001	12.7998						
27	25.0001	11.373						
28	26.0001	10.2072						
29	27.0001	9.2546						
30	28.0001	8.4764						
31	29.0001	7.8404						
32	30.0001	7.3208						
33	31.1501	6.8963						
34								~
<b>H</b>   4		tChem1/			<			>
Read	ly					1	NUM	