

US EPA ARCHIVE DOCUMENT

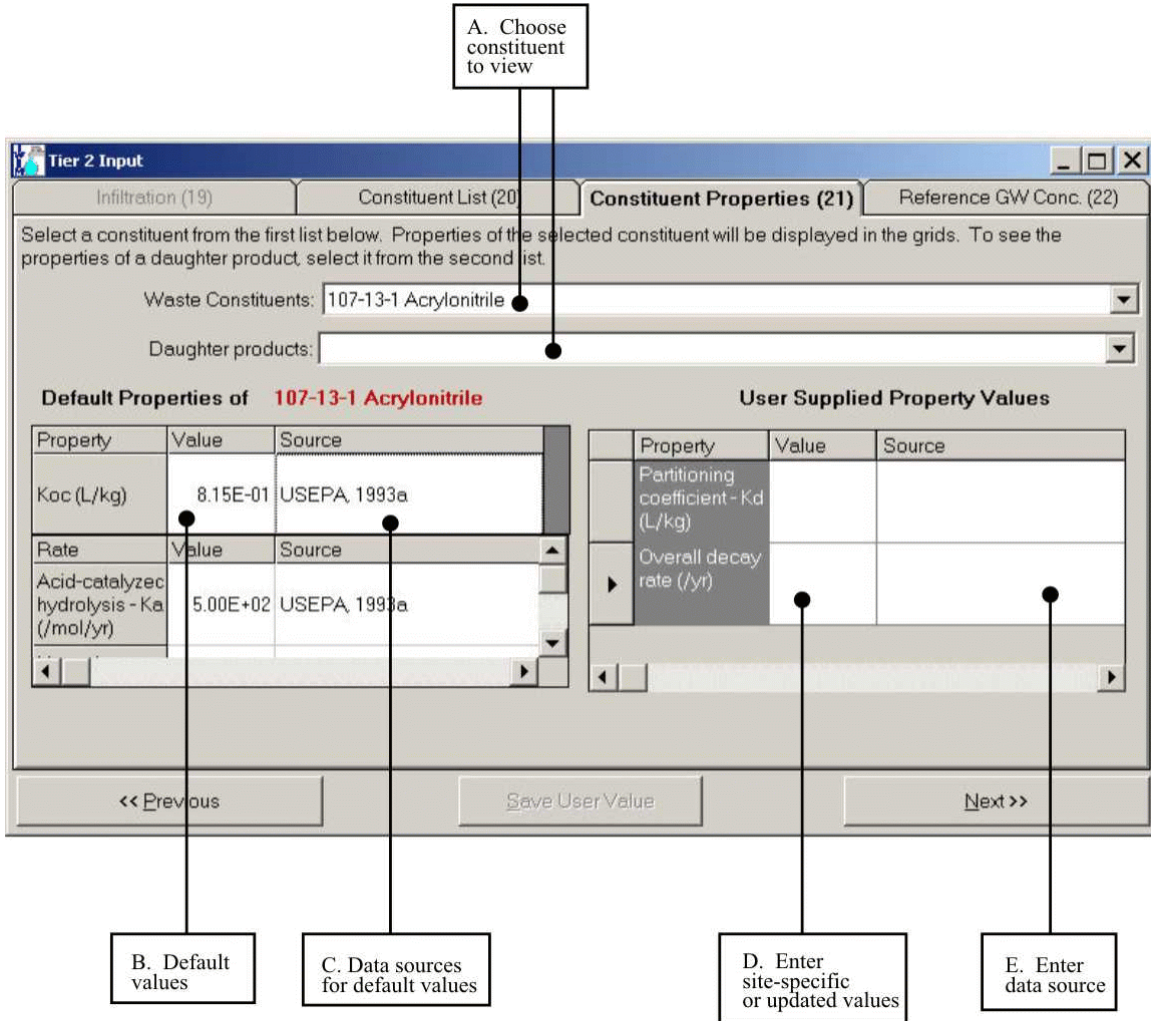




Figure 5.41 Tier 2 Input: Constituent Properties (21).

The features identified in Figure 5.41 are explained in more detail in the following paragraphs.

A. Choose Constituent to View

Select a constituent and/or daughter product from the drop-down lists at the top of the screen. To view the properties for a waste constituent, click on the drop-down list control  at the right edge of the |WASTE CONSTITUENTS| listbox. To view the constituent properties for a constituent that is produced by hydrolysis of one of your entered

constituents, click on the drop-down list control  at the right edge of the | DAUGHTER PRODUCTS | listbox. If the | DAUGHTER PRODUCTS | box is blank, it means that the currently displayed waste constituent has no hydrolysis daughter products. Then use the mouse or the | ARROW | keys to scroll through the list of constituents until the desired constituent is highlighted. Left click on the mouse or hit the | ENTER | key to make your selection.

B. Default Values

The constituent properties and their default values for the selected waste constituent are listed in the table on the left side of the screen.

C. Data Sources for Default Values

The data source for each default parameter value of the selected waste constituent is listed in the “Data Source” field.

D. Enter Site-Specific or Updated Values

For each constituent, IWEM assigns default values for K_{OC} (k_d for metals) and hydrolysis rate constants (for organics only) (see constituent list in Appendix A); however, you can enter and use site-specific values for k_d (organics and metals) and overall decay rate (organics only) if these data are available. To enter site-specific values, just type them into the table on the right side of the screen.

By default, IWEM accounts for degradation from constituent hydrolysis only. IWEM calculates the hydrolysis rate from constituent-specific values for the acid-catalyzed (k_a), neutral (k_n) and base-catalyzed (k_b) hydrolysis rate constants. Biodegradation can also be an important process. However, biodegradation rates can vary greatly from site to site. You should only increase the overall decay rate above the value corresponding to the hydrolysis rate constants if there is clear evidence of biodegradation occurring at a site. For organics, the calculation of the overall decay rate from the hydrolysis rate constants and the calculation of k_d from K_{oc} is given in Sections 4.2.4.1 and 4.2.4.3 of the *IWEM Technical Background Document* (U.S. EPA, 2002c).

E. Enter Data Source

For each Tier 2 input parameter for which you enter a site-specific value, remember to type in a brief explanation of this value. This information is required and will be included in the printed report.

Once your list of waste constituents and expected leachate concentrations is complete, click on the **|NEXT|** button to specify RGC values to be used in the Tier 2 evaluation.

5.5.1.8 Tier 2 Input: Reference Ground-Water Concentrations (22)

In screen 22, you select which RGC is to be used to evaluate each waste constituent in the Tier 2 analysis. You can select RGCs (MCLs and HBNs) that are in the IWEM database, or you can supply a user-defined RGC. The following options are available:

- Maximum Contaminant Level (MCL)
- Health-Based Number (HBN)
- User-defined standard (this can be any value and is generally determined by your state regulatory authority)
- Compare to all available standards

The features identified in Figure 5.42 are explained in more detail in the following paragraphs.

A. Select Constituent

On the row for the desired constituent, click in the cell on the far left of the table to display a small arrow indicating which constituent is selected. Once a constituent is selected, the available toxicity standards are displayed on the bottom half of this screen.

B. Select Standard(s) to Apply

Once a constituent listed at the top of the screen is selected, the available ground-water standards (and RGC values) are displayed at the bottom. Using the radio buttons, click on the appropriate standard to use in your Tier 2 analysis. If a constituent has more than one standard, you should consult with the appropriate state regulatory agency to determine which RGC should be used. If none of the default choices are appropriate for your analysis, you can enter a new RGC value and associated exposure duration (see items C and D, below). Additionally, if you choose the last option, **|COMPARE TO ALL AVAILABLE STANDARDS|**, then the IWEM model will use the most stringent standard to determine the Tier 2 liner recommendation.

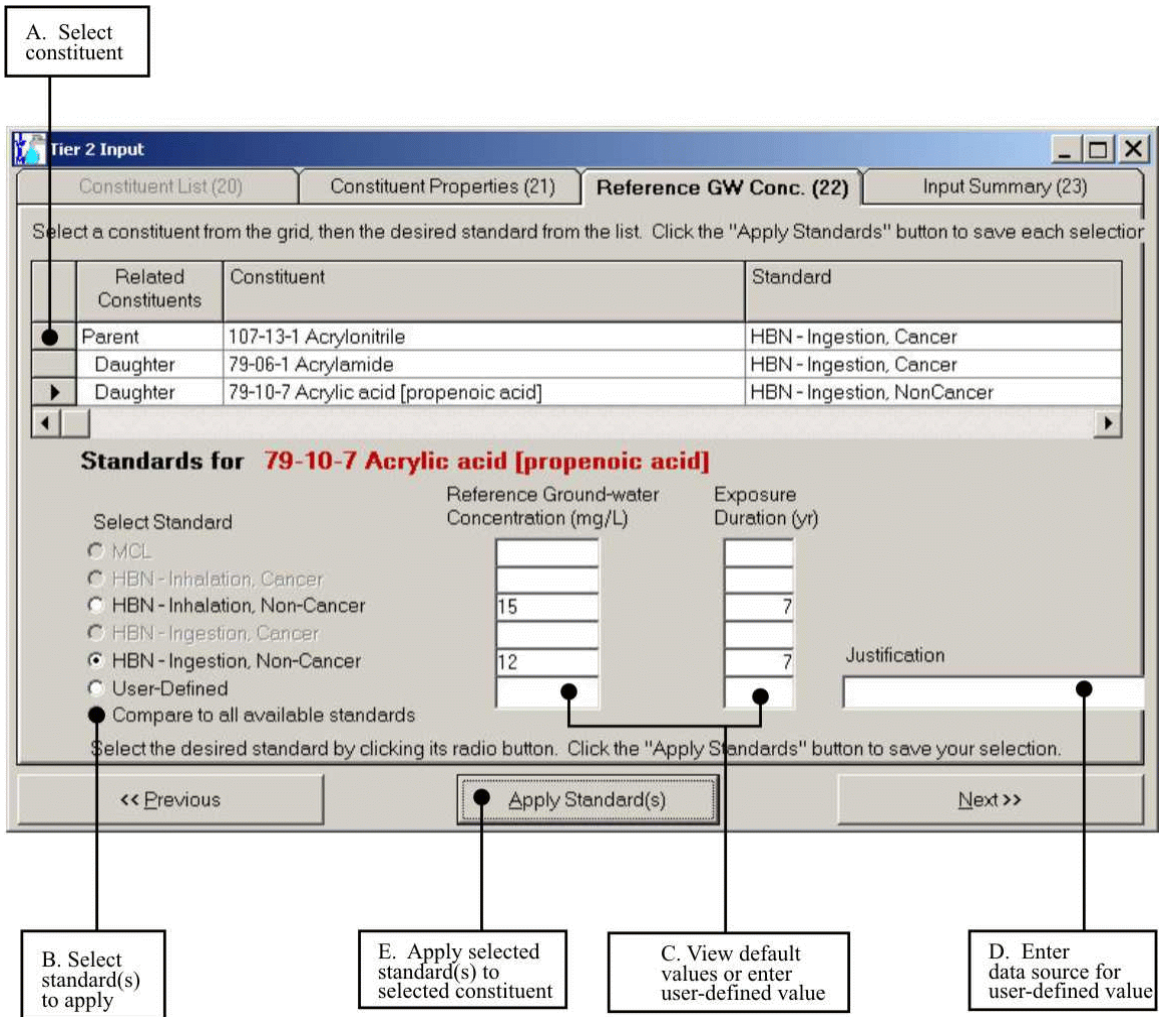


Figure 5.42 Tier 2 Input: Reference Ground-Water Concentrations (22).

C. View Default Values or Enter User-Defined Value

These textboxes display the RGC values in the IWEM database; and in the case of the user-defined RGC, this is where you enter the appropriate RGC value and its associated exposure duration. In the IWEM model, the exposure duration corresponds to the time interval over which the average ground-water concentration is calculated. Consult with the appropriate state regulatory agency for additional guidance on entering your own RGC value and exposure duration.

D. Enter Data Source for User-Defined Value

If you enter a user-specified RGC for any constituent, be sure to provide a brief explanation of this value in the |JUSTIFICATION| textbox.

E. Apply Selected Standard(s) to Selected Constituent

After you have chosen the appropriate standard(s) for the selected constituent, click on the |APPLY STANDARDS| button to input your choice. After you have done so, your selection will be displayed in the |STANDARD| column in the table at the top of the screen.

5.5.1.9 Tier 2 Input: Input Summary (23)

This screen displays a summary of the input data for your Tier 2 analysis. You cannot enter or edit data on the Input Summary screen; rather, its purpose is to consolidate into one place all the data you have already entered for the Tier 2 Evaluation. If you notice that you have entered any data incorrectly, use the |PREVIOUS| button or click on the desired screen tab to go back to the appropriate screen on the Tier 2 Input Screen.

The input summary screen has three sections containing data on: 1) constituent properties; 2) source and unsaturated zone; and 3) saturated zone. Each section has a scroll bar which can be used to view information that does not fit on the screen.

The features identified in Figure 5.43 are explained in more detail in the following paragraphs.

A. Identification of Constituent as Either a Parent or a Toxic Daughter

The first section contains a table of the selected waste constituents, listing their CAS number, name, expected leachate concentration, the type and value of the selected RGC, and fate parameters ($\log K_{OC}$, k_d , hydrolysis rate constants, and/or overall decay rate). The entry in the "Related Constituents" column on the left side of the screen indicates whether the constituent is present in the waste ("parent") or whether it is included because it is a daughter product of a waste constituent ("daughter"). In the latter case, the parent constituent is listed immediately above the daughter.

B. Summary of Constituent Properties

For your reference, the constituent-specific properties for each waste constituent in the Tier 2 analysis are displayed in the table at the top of the screen.

C. Verify Tier 2 Input Values

The bottom section of this screen consists of two tables that present the selected values for the WMU and subsurface parameters. To the left, the selected values for the WMU (source) and unsaturated zone parameters are displayed. To the right, the selected values for the saturated zone parameters are listed. Note that each table has a scroll bar on the right-hand side which can be used to view information which does not fit on the screen.

B. Summary of constituent properties

Related Constituents	CAS	Constituent Name	Leachate Concentration (mg/L)	Toxicity Standard	RGC (mg/L)	Log(Koc) (L/kg)	Ka (/mol/yr)	Kn (/yr)	Kb (/mol/yr)	Kd (L/kg)	Overall Decay Coefficient (/yr)
Parent	107-13-1	Acrylonitrile	0.1	HBN - Ingestion, Cancer	1.80E-04	-0.089	500	0.00E+00	5.20E+03		
Daughter	79-06-1	Acrylamide	0.134	HBN - Ingestion, Cancer	2.20E-05	-0.989	31.5	0.018	0.00E+00		
Daughter	79-10-7	Acrylic acid [propenoic acid]	0.1358	HBN - Ingestion, NonCancer	12	-1.84	0.00E+00	0.00E+00	0.00E+00		

Source and Unsaturated Zone		Saturated Zone	
Area (m ²):	12345	Aquifer thickness (m):	(not specified)
Depth of base of the LF below ground surface (m):	0	Regional hydraulic gradient:	(not specified)
WMU depth (m) [requires site specific value]:	6.5	Aquifer hydraulic conductivity (m/yr):	(not specified)
Depth to water table (m):	(not specified)	Distance to well (m):	150
Soil type:	SILT LOAM		
Infiltration:			
No Liner:	3256		
Single Liner:	.0362		
Composite Liner:	Monte Carlo		
Recharge Rate:	0.3256		

A. Identification of constituent as either a parent or a toxic daughter

C. Verify Tier 2 input values

Figure 5.43 Tier 2 Input: Input Summary (23).

5.5.2 Tier 2 Evaluation: Run Manager (24)

After you have verified that all Tier 2 inputs are correct, click the |NEXT| button on the Input Summary screen (23) to perform the Tier 2 evaluation. The Tier 2 Run Manager (Screen 24) will be displayed.

In a Tier 2 evaluation, after you click on the |START EPACMTP| button, the ground-water model is automatically executed for each waste constituent for each applicable liner scenario using the chosen waste constituent-specific and site-specific inputs. Any toxic daughter products produced by hydrolysis of the selected constituents are also evaluated. Each combination of constituent and liner scenario requires one probabilistic Monte Carlo modeling run consisting of 10,000 model realizations. Depending upon model inputs and the speed of your personal computer, each modeling run may take from several minutes to several hours. For this reason, we have developed a Run Manager dialog box which displays the current status of your modeling analysis; this way, you will know that the model is working and how much progress has been made at any given point in time.

The following sequence of screen images (Figures 5.44 through 5.46) demonstrate how the Tier 2 Run Manager and the EPACMTP dialog box help you track the progress of your Tier 2 modeling analysis.

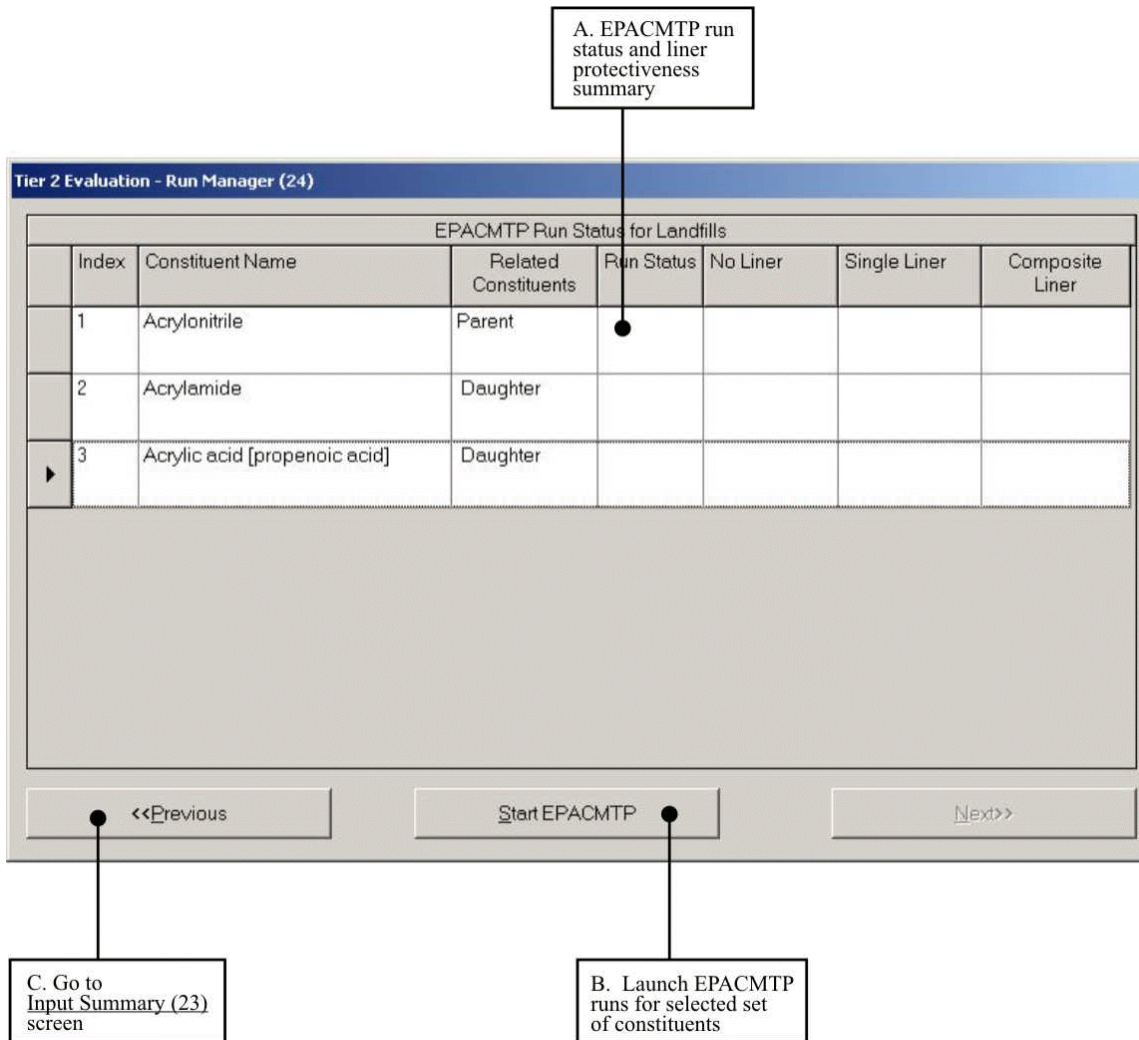


Figure 5.44 Tier 2 Evaluation: Run Manager (24) - Appearance Before Launching EPACMTP Runs.

The features identified in Figure 5.44 are explained in more detail in the following paragraphs.

Figure 5.44 shows a summary table listing all the constituents and liner scenarios in a typical Tier 2 analysis prior to launching the first EPACMTP run. During an EPACMTP run, a dialog box is displayed (Figure 5.45), allowing you to track the progress of the model's execution. The summary table shown in the background (Figure 5.46) keeps you informed of the overall progress of the Tier 2 analysis. The EPACMTP runs proceed from the first to the last selected constituent. For each constituent,

EPACMTP runs are sequentially launched for the no-liner, single clay-liner, and composite-liner scenarios until a protective scenario is found. That is, if the single clay-liner scenario is determined to be protective for a given constituent, the composite-liner scenario for that constituent is not modeled. For the LAU or user-defined liner/infiltration scenarios, only one scenario per constituent is evaluated. During EPACMTP model execution, the message "Running" appears in the table cell corresponding to the current constituent and liner scenario. After the completion of a run, the results are analyzed by IWEM to determine whether the liner scenario is protective for the current constituent. An up-to-date summary of the results is displayed in the summary table as shown in Figure 5.46.

A. EPACMTP Run Status and Liner Protectiveness Summary

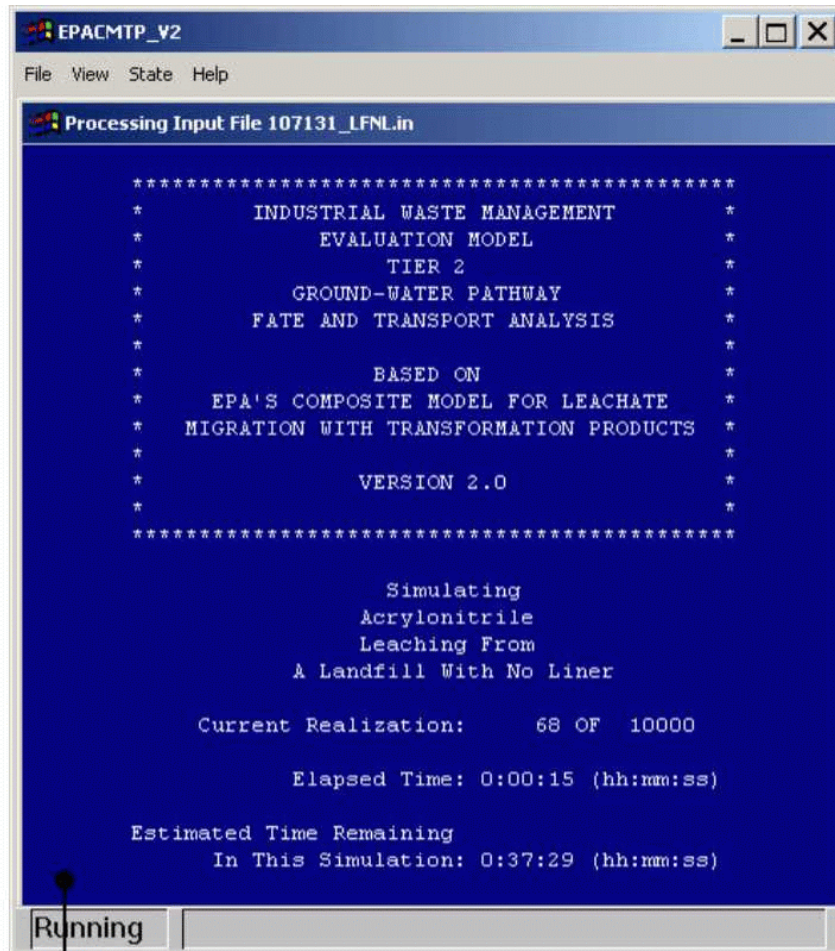
This summary table shows the current status of the analysis. For each waste constituent, you can see whether the required modeling is in progress or has been completed. In addition, this table will tell you whether or not each liner scenario is protective of ground water.

B. Launch EPACMTP Runs for Selected Set of Constituents

Click on the |START EPACMTP| button to launch the required EPACMTP runs for the selected set of waste constituents. During an EPACMTP model run, the dialog box shown below in Figure 5.45 appears on-screen and displays the status of the current model run, including estimated time to completion.

C. Go to Input Summary (23) screen

You can click the |PREVIOUS| button at the bottom left of the screen to go back to the Tier 2 Input Summary (23) screen.



A. Status of current EPACMTP run

Figure 5.45 Tier 2 Evaluation: Run Manager (24) - EPACMTP Dialog Box Displayed During Model Execution.