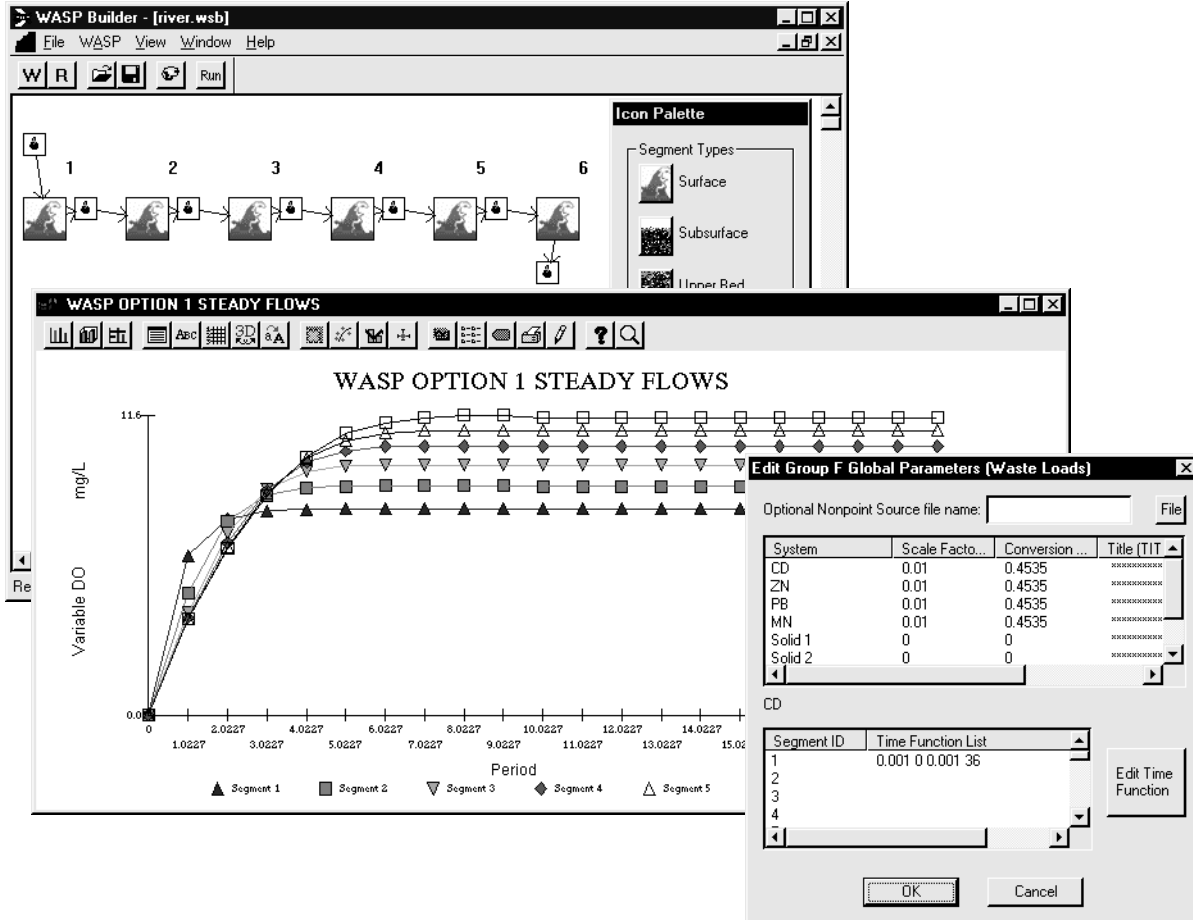


WASP Builder



User Manual -- Version 1.2

Developed by the Integrated Decision Support Group (IDS) for
the United States Bureau of Reclamation
and the Environmental Protection Agency (EPA).



U.S.
Environmental
Protection
Agency

WASP Builder User Manual, Version 1.2

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About This Document

This document is a user manual for WASP Builder software developed as an analysis aid for the Water Quality Analysis Simulation Program (WASP) Version 5.0. This user manual is parallel to the on-line documentation available from the software.

Participation

This project was sponsored and directed by the Department of Interior Bureau of Reclamation (Reclamation), the Environmental Protection Agency (EPA) Office of Science and Technology, and the Integrated Decision Support Group (IDS Group) at Colorado State University (CSU), Fort Collins, Colorado USA. Faculty, staff members, and graduate students from the IDS Group and the Department of Chemical and Bioresource Engineering at CSU served as the principal investigators. IDS is part of the Water Center at Colorado State University in Fort Collins, Colorado, USA.

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WASP Builder User Manual

1.0 Introduction

WASP 5.0 is used by government personnel and private users to model water quality parameters in streams. WASP 5.0 requires linking stream segments to groups of input data. Current methods for preparing input files for water quality models such as WASP 5.0 are cumbersome and often become the major task of a water quality modeling projects. WASP Builder been designed to receive standard input files from WASP or allows the user to build input files from scratch with data supplemented into the system using the Graphical Data Processor (GDP).

WASP Builder simplifies the task of building input files for WASP 5.0 by:

1. Illustrating river reach segments and exchanges between layers which are linked to parameter groups.
2. Connecting the parameter groups to this visual display.
3. Simplifying the creation and modification of WASP parameter groups.
4. Allowing the user to visualize WASP input data sets in a network display.
5. Simplifying the creation and modification of WASP parameter groups for simulating alternatives.

1.1 WASP Version 5.0

Water Quality Analysis Simulation Program (WASP) is a generalized framework for modeling water quality and contaminant fate and transport in surface waters. Based on a flexible compartment modeling approach, WASP can be applied in one, two, or three dimensions. WASP is designed to allow substitution of user-written routines into the program structure. Problems that have been studied using the WASP framework include biochemical oxygen demand and dissolved oxygen dynamics, nutrients and eutrophication, bacterial contamination, and organic chemical and heavy metal contamination (EPA, 1995).

WASP has been used to simulate the water quality and pollutant fate for a variety of aquatic systems. It is used primarily to investigate the water quality response to management actions, primarily point and non-point source load reduction. It is presently being distributed by EPA-Office of Research and Development/Center for Exposure Assessment Modeling Athens, GA (CEAM).

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Athens, GA 30605-2700

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2.0 Quick Start

2.1 Hardware Requirements for WASP Builder

WASP Builder has been designed to run in a Windows 95/98/NT environment with at least a 486 processor and 16 megabytes of RAM.

2.2 Installing WASP Builder

1. If you have a previous version of WASP Builder installed on your computer, uninstall the old version before you install the new version. You can do this by selecting the **Uninstall** option in the WASP Builder menu under the **Program** menu accessed from the **Start** option in Windows 95/98/NT, see *Figure 1*.

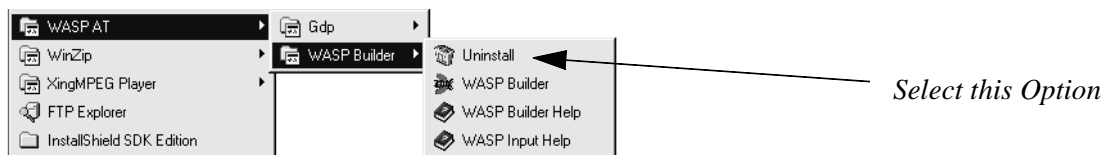


Figure 1: Uninstall Option

2. In a world wide web browser open the following page:
<http://www.ids.colostate.edu/projects/builder/download.html>
3. To download a zipped file containing the setup files for WASP Builder, click your mouse on the version of the file you desire from the software table:
 builder.zip
4. You may need winzip to read and uncompress the files, you can download it using the link below:
<http://www.winzip.com/winzip/download.htm>
5. After selecting the file in your browser, open the file and use the **Install** button in the *Winzip* program.
6. Follow the setup instructions.

2.3 Starting WASP Builder in Windows

1. Select the **Programs** option from the **Start** menu on the lower left corner of the screen (*Figure 2*).

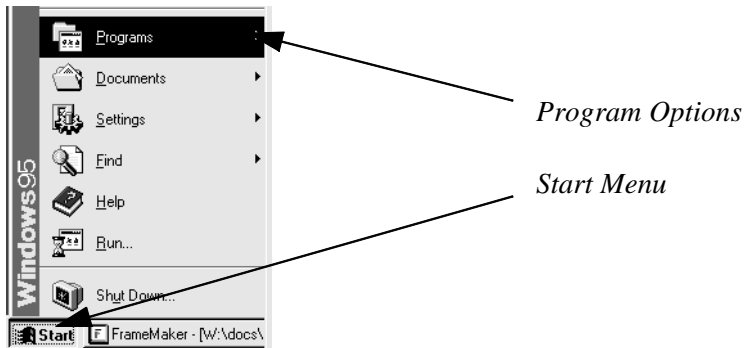


Figure 2: Programs Option in the Start Menu.

2. One of the menu options will be **WASP AT**. Select **WASP AT** in the program menu and open the **WASP Builder** menu. Select the second option in the menu, see *Figure 3*.



Figure 3: WASP Builder Option in the Program Menu.

3. The window shown in *Figure 4* will be displayed.

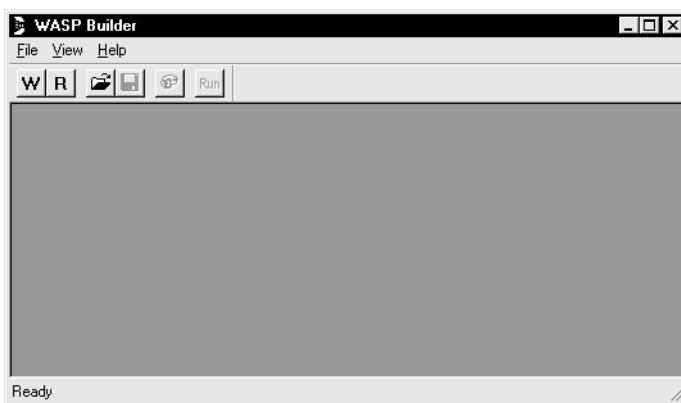


Figure 4: Main Display Window.

2.4 Opening WASP Builder Files

You will be working with two types of files. Files with the extension “*.inp” are WASP 5.0 data input files. Files with the extension “*.wsp” are WASP Builder files. This section will describe how to open a WASP Builder file. See “Section 2.5: Importing WASP 5.0 Data Input Files” to import WASP 5.0 data files.

1. Select **File > Open > Open**. The file selection window will open into the **Examples** directory.
2. There is an example file called **river.wsb**; select this file.

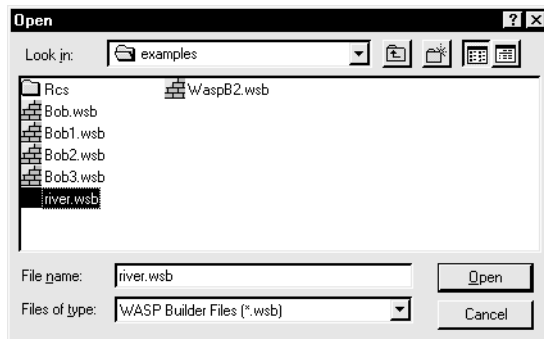


Figure 5: Open File Selection Window

3. Select the **Open** button and a simple river model will be displayed (*Figure 6*).

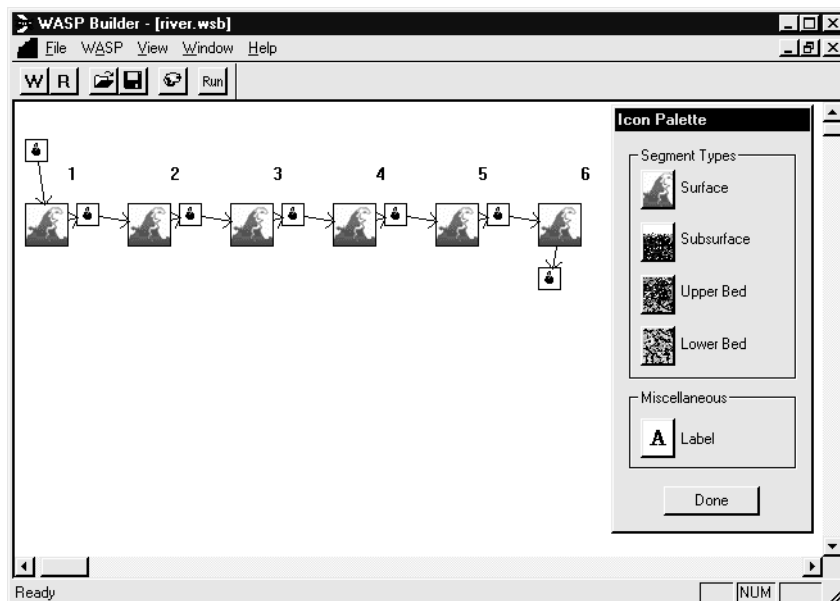


Figure 6: Example of River Network File

2.5 Importing WASP 5.0 Data Input Files

1. Select **File > New**. The main display window will be blank and the icon palette window will open (Figure 7).

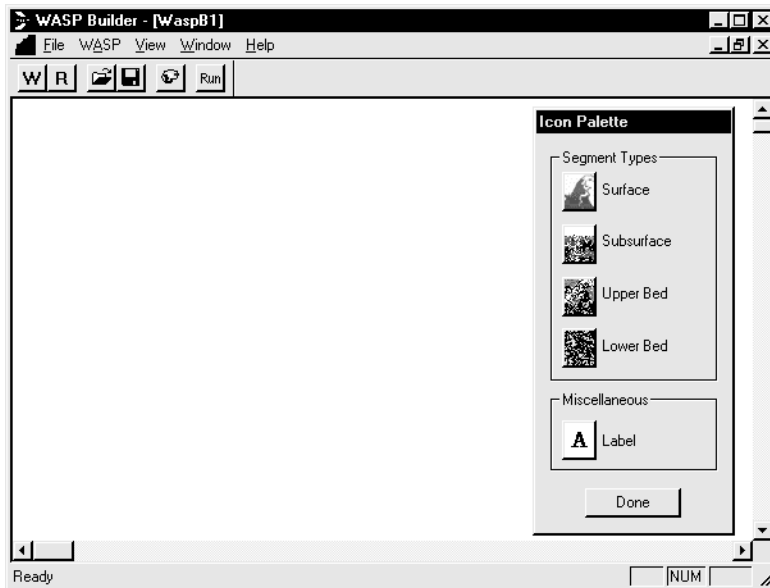


Figure 7: Building a New WASP Input File

Note: If you would like to use an example file, you can load one from the *Examples* directory (See Section 2.4 “Opening WASP Builder Files”). For a description of creating a WASP input file see “Section 5.0: Creating Your Own Project”.

Input files have a ***.inp** extension and are in the standard WASP 5.0 format. For a description of the data cards that make up a standard WASP input file see the **WASP 5.0 Input Dataset Help** document in the **Help** menu (See Section 3.5 “Help Pull-Down Menu”).

1. Select the **WASP > Read WASP Input Dataset** option to display the **Open** browse window.

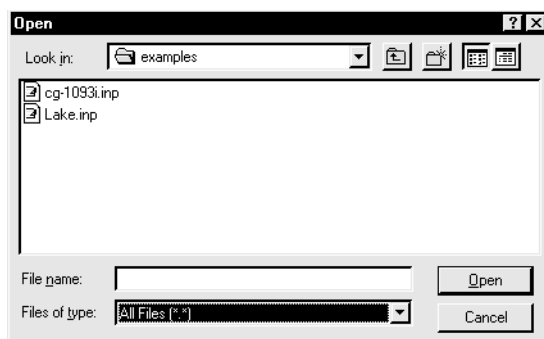


Figure 8: Opening an Input File from the Examples Directory.

2. Select the **Lake.inp** file in the **Open** window (Figure 8). A simple network will be displayed in the main window and the icon selection menu will be displayed, see Figure 9.

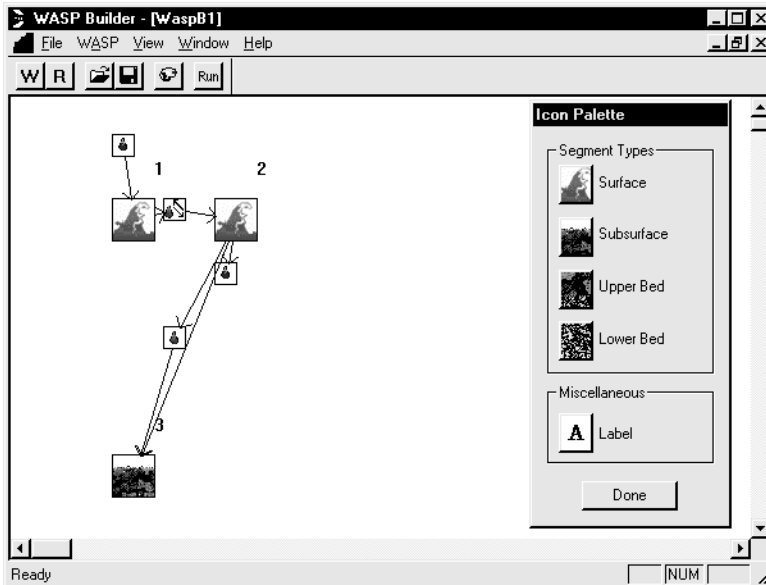


Figure 9: Lake Network from Examples Directory.

3. Right click on an icon segment to display options and properties. For information on each type of icon and the properties and options associated with it, see "Section 5.4: Editing Segments Individually".

2.6 Saving a Project

You have two save options: **Save**, or **Document Changes** (Figure 10).

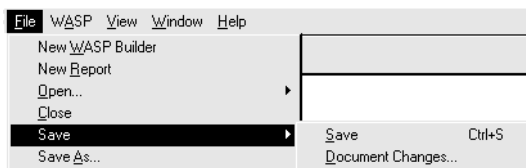


Figure 10: Save Options

1. **Save** - saves your project conventionally, overwriting the old file.
2. **Document changes** - allows you to document revisions and save these revisions separately.

Note: For more information about save options see "Section 3.1.5: Save Options".

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3.0 WASP Builder Pull-Down Menus

3.1 File Pull-Down Menu

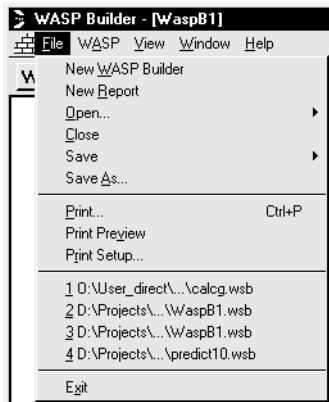


Figure 11: File Pull-Down Menu

3.1.1 New WASP Builder

This option opens a new blank WASP Builder screen. For a description of how to build a WASP input file from scratch, see “Section 5.0: Creating Your Own Project”.

3.1.2 New Report

This option opens a new report that can be used to document your project. For more information on how to create reports, see “Section 8.0: Generating Reports”.

3.1.3 Open Options

There are two options for opening projects. Use the **File > Open > Open** option to open *.wsb files (See Section 2.4 “Opening WASP Builder Files”). If you want to examine changes to a project, use the **File > Open > Review Changes** to review or open old versions.

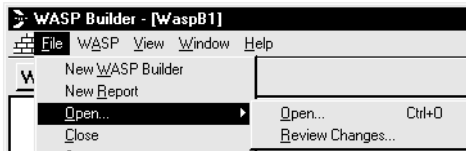


Figure 12: File > Open Options

1. **File > Open > Open** - This option opens WASP Builder files with a *.wsb extension.
2. **File > Open > Review Changes** - This option can be used to open old versions of a project that are stored in the RCS directory where the base file is located; see “Section 7.0: Documenting Project Versions”

Note: When you open a previous version of a project with the **Review Changes** option, it overwrites the original file. Therefore make sure to document the latest changes to the project before opening older versions.

3.1.4 Close

This option closes the current window and gives an option to save the changes in the currently opened file, see “Section 3.1.5: Save Options”.

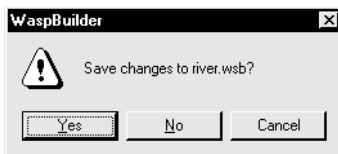


Figure 13: Close Warning Dialog Window.

3.1.5 Save Options

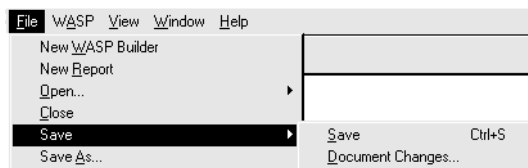


Figure 14: File > Save Options

1. **File > Save > Save** - This option saves the project to the current file, if one exists. Otherwise, the **Save As** dialog is invoked.
2. **File > Save > Document Changes** - This option creates a new version of the project and allows for the documentation of changes or updates made to the project since the last version. (See Section 7.0 “Documenting Project Versions”).
3. **File > Save As** - This option allows you to save the project to a new file name.

3.0 WASP Builder Pull-Down Menus

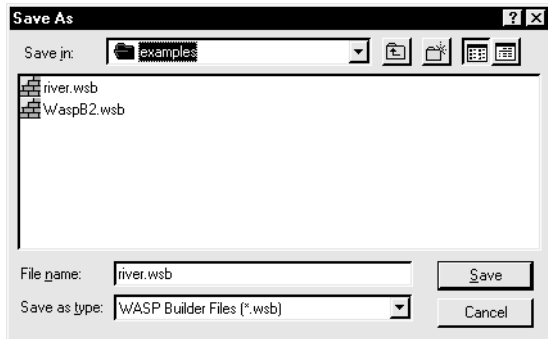


Figure 15: Save As Window

3.1.6 Print Options

The print options in WASP Builder can be used to print a copy of the network used to build the input file. Options for printing are not available for all the view options such as the Report Generator and the Simulation Editor.

3.1.7 Display of Recently Opened Files

The files in the list on the bottom of the **File** pull-down window can be opened by clicking on them with the mouse.

3.1.8 Exit

Exits WASP Builder with an option to save any modified projects.

3.2 WASP Pull-Down Menu

The **WASP** pull-down menu (*Figure 16*) contains options related to preparing, executing, and viewing the results of a WASP model.

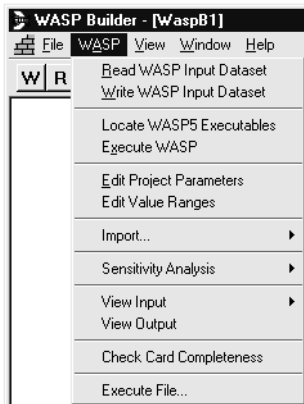


Figure 16: WASP Pull-Down Menu.

3.2.1 Read WASP Input

This function imports input data files for processing with WASP Builder.

1. Select **WASP > Read WASP Input Dataset**.
2. The **Open** window will appear. Select the file with the extension ***.inp** that you want. For information about starting a project from scratch (See Section 5.0 “Creating Your Own Project”).

3.2.2 Write WASP Input

This function saves changes that you have made to a WASP 5.0 input data set. It exports the input data files for use with the WASP 5.0 model with a ***.inp** extension.

1. Select **WASP > Write WASP Input Dataset**.
2. The **Save As** window will open. Save the input file with a new name, or overwrite the existing ***.inp** file.

3.2.3 Locate WASP 5.0 Executables

You may need to specify the path of the EUTRO5 and TOXI5 executables. The METALS executable is assumed to be in the WASP Builder program directory. You can install the EUTRO5 and TOXI5 executables during the installation process as one of the options. If you didn't select them during the WASP Builder installation process, you can reinstall it with these options (See Section 2.0 “Quick Start”).

1. Select **WASP > Locate WASP 5.0 Executables**.
2. Use the **Open** window to locate either **toxi5.exe** or **eutro5.exe**. The program assumes that both are located in the same directory.

3.2.4 Execute WASP

This function starts the WASP 5.0 model.

1. Select **WASP > Execute WASP**.
2. The **Save As** window will open. Type the name of the file that will be the input for the model run. The program will automatically add the **.inp** extension to the file.
3. The WASP 5.0 model will run. After the model run ends the **View Output** window will open. You can also view the results by selecting **WASP > View Output**.

Note: *The WASP 5.0 executables are maintained by the EPA, if you experience any problems running files you can download documentation on WASP 5.0 on the IDS Group web site (www.ids.colostate.edu/programs/wasp), but if you have any other questions you will need to contact EPA using the information in “Section 1.1: WASP Version 5.0”.*

3.2.5 Edit Project Parameters

This function opens the **Edit Project Parameters** window where users can select data groups to edit. For more information on this function (See Section 6.0 “Editing Project Parameters”).

3.2.6 Edit Value Ranges

This window allows you to input acceptable ranges for various types of data. Before entering data into Data Groups, you should complete this window.

1. You can type maximum and minimum values into this window, much like a spreadsheet. If you open the **Data Group** window and type a value outside this range, a warning will appear.

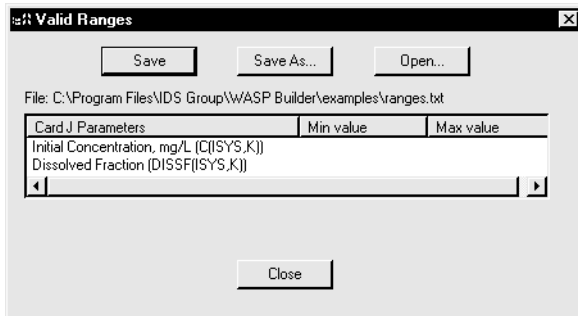


Figure 17: Edit Valid Ranges Window.

2. The buttons on the **Valid Ranges** window have the following functions:
 - **Save** - Saves the file as a text file.
 - **Save as** - Saves changes to an existing file in a new file with a new name.
 - **Open** - Opens an existing text file.
 - **Close** - Closes the **Valid Ranges** window without saving any changes.

3.2.7 Import

1. This function allows you to read data from a single WASP input card. In some cases, particularly for Data Group H: Constants, this may be easier than entering all the data for a card manually.
2. Select **WASP > Import > Group H Card**.
3. Select the ***.inp** file that contains the group you want to import. This group will overwrite your current group.

Note: *Most data groups depend, to varying extents, on the model network setup. If you import a group with a model network that differs from your current network, you may have to edit some parameters manually, or your input file can become unstable.*

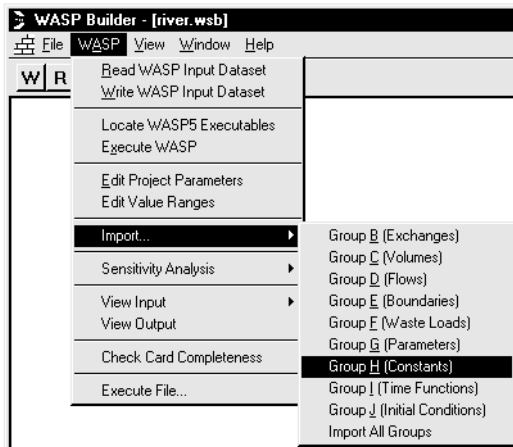


Figure 18: Import Window.

3.2.8 Sensitivity Analysis

The **Sensitivity Analysis** window allows you to repeatedly run the model using a range of values. Sensitivity analysis runs are generated by appending a number to the end of the base file name such that the *ith* analysis will have the file name (i.e. <basename>*i*.inp).

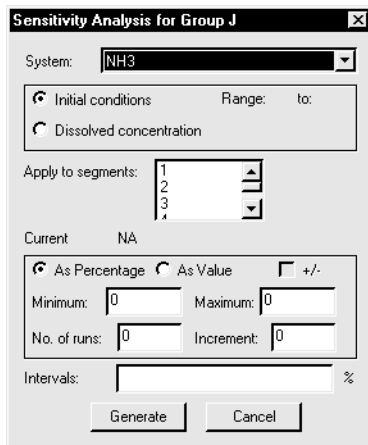


Figure 19: Sensitivity Analysis Window.

1. Select the data group you are interested in observing changes in. For example, use **WASP > Sensitivity Analysis > Group J** to open the **Sensitivity Analysis** window for Group J.
2. Select the system you are interested in observing changes in from the **System** pull-down menu.
3. Choose the **Initial Conditions** or the **Dissolved Concentration**.
4. **Apply to Segments** allows you to choose the segments you want to apply the analysis to.
5. You can perform the sensitivity analysis using percentages or value ranges. If you chose percentages, the minimum and maximum fields represents a percent of the current value.

3.0 WASP Builder Pull-Down Menus

6. The number of runs field indicates how many times the model will run. The increment field shows the value difference between each of the runs. You can also fill in the intervals field manually and leave the fields above empty, if you wish.
7. WASP Builder will fill in the **Intervals** field automatically, based on the data entered in the fields above.
8. Select **Generate** to perform the analysis. Name the file where the results will be stored. Select the **Cancel** button to stop the analysis. WASP Builder will generate the specified number of runs, changing the initial concentration of the selected variable for the selected segments.
9. You can add an optional title that will replace the simulation title string (TITLE1) for each generated run.

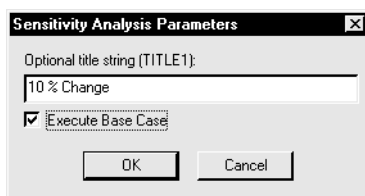


Figure 20: Sensitivity Analysis Parameters Window

10. Selecting the **Execute Base Case** option will run the initial input file as well. ***This option is highly recommended.***

3.2.9 View Input

The **View Input** option can be used to plot input from a WASP Builder or WASP 5.0 input file.

1. For example, with Card D using the **river.wsb** file, the **View Input** window displays the flows for the different nodes, see *Figure 21*.

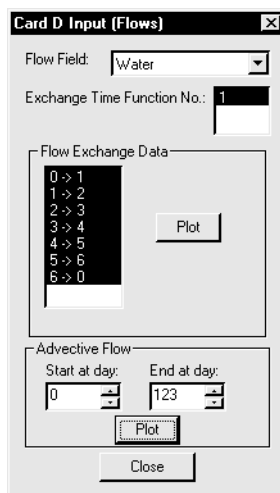


Figure 21: View Input for Group D

2. Two plots can be displayed from Card D, one for flow data and the other of the advective flow, see *Figure 22*.

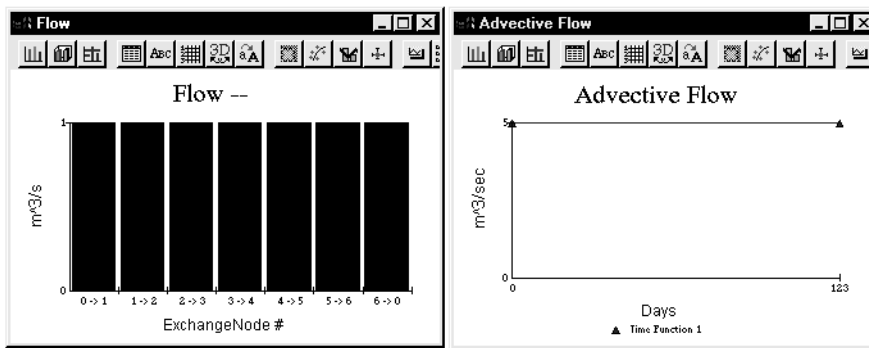


Figure 22: View Input Plots

3.2.10 View Output

After running the WASP 5.0 model, the **View Output** window will be displayed with your results. You can also select the **View Output** option from the **WASP** pull-down menu to view *.out files created with model runs ((See Section 3.2.4 “Execute WASP”). There are three additional output file types generated with the model run that are read when a *.out file is viewed:

- The model-specific output file (*.edf for Eutro, *.tdf for Toxi and none for Meta)
- The transport variables output (*.trn).
- The mass balance record (*.msb)

1. Select **WASP > View Output**. The window shown in *Figure 23* will appear.

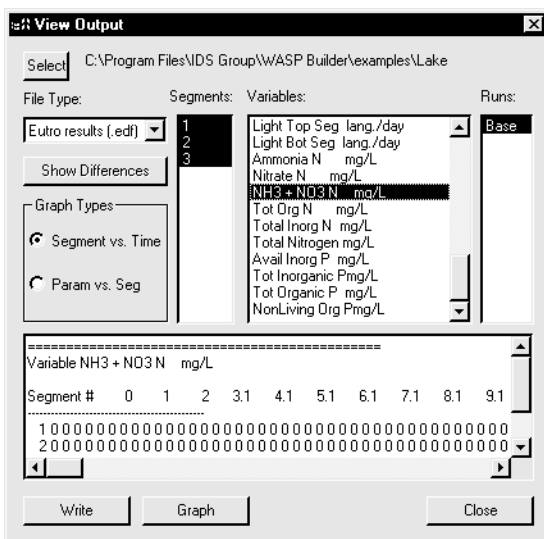


Figure 23: View Output Window.

2. Choose the base file you modeled with the **Select** function.

Note: The **base** file is the output of the model run using the original project data.

3.0 WASP Builder Pull-Down Menus

3. If you used **Sensitivity Analysis** options when you created the input file, see “Section : Viewing Sensitivity Analysis Output”.
4. Select the output type you want to view in the **File Type** pull-down. The options will vary depending on the type of model run you did (i.e. Eutro, Toxi, or Meta).
5. Select the segments that you want to view.
6. The data will appear in the field at the bottom of the output window. You can write this data to a text file by selecting the **Write** button.
7. You can graph your results by selecting the **Graph Type** and then the **Graph** button. Figure 24 illustrates parameters vs. time at each segment, by using the **Parameter vs. Time** option. Figure 25 shows parameters vs. segment for each time period, by using the **Parameter vs. Segment** option.

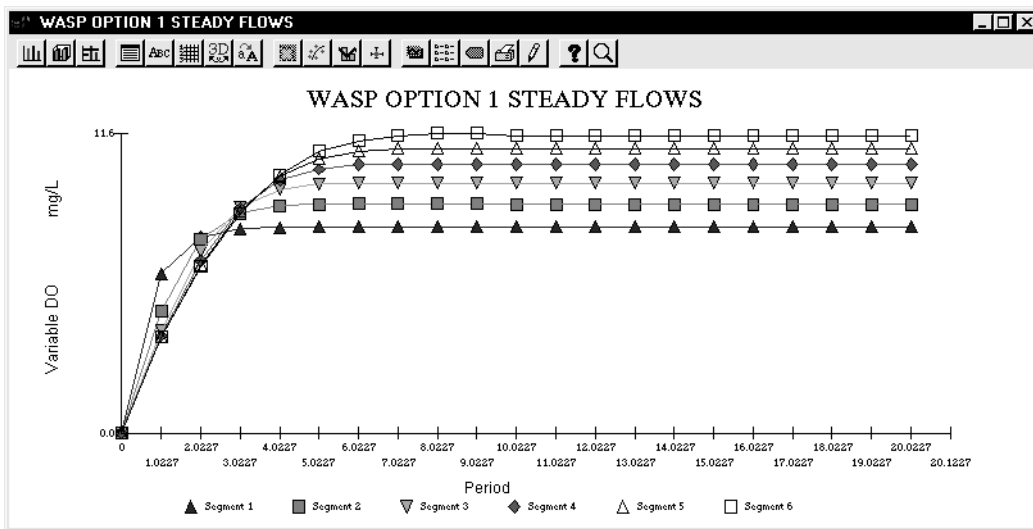


Figure 24: Parameter vs. Time Graph for Each Segment.

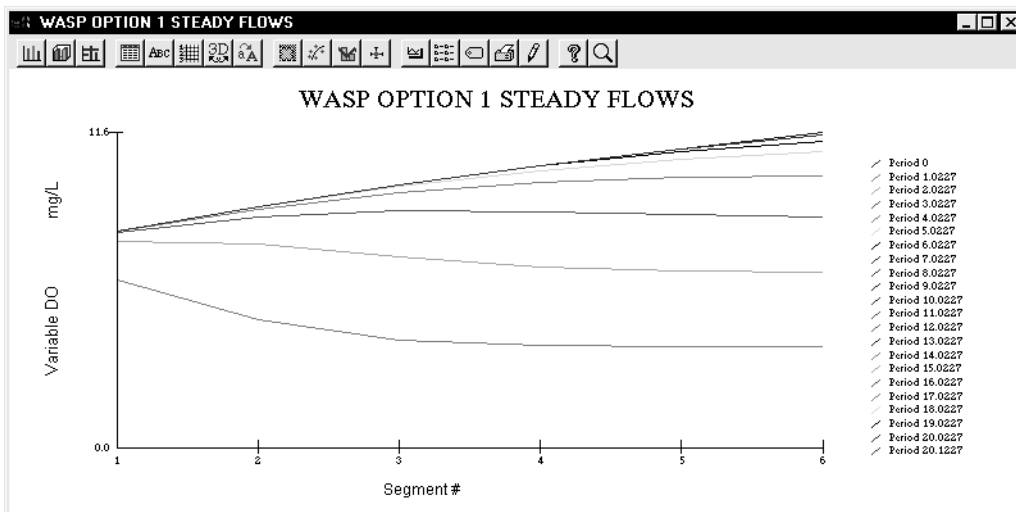


Figure 25: Parameter vs. Segment for Each Time Period.

Viewing Sensitivity Analysis Output

1. Select the base file for the sensitively analysis. The base file is the file with no integer value appended (i.e. if you had a base file named streams.out, the first run would be streams0.out, the next would be streams1.out, etc.).
2. Once the base file is selected, all the subsequent runs created with the analysis will be automatically added to the **View Output** window.
3. If you would like to view the output of just one of the sensitivity analysis runs, you can do so by selecting the particular sensitivity run using the **Select** button.
4. Select the run that you want to view. If you select two or more runs, the **Show Differences** button will appear.
5. The **Show Differences** button highlights the variables that have variations from the base file for at least one time period in the segment selected.

3.2.11 Check Card Completeness

The **Card Completeness Matrix** window helps you determine if anything is missing from your input data file. This function displays all data that are missing from a card, regardless of whether the information is necessary for the model to run.

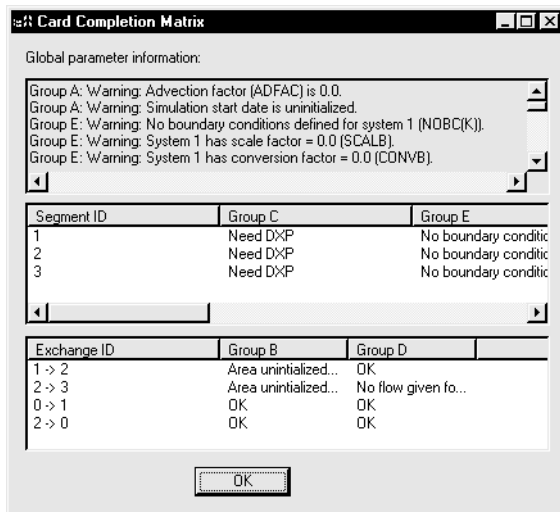


Figure 26: Check Card Completeness

3.3 View Pull-Down Menu

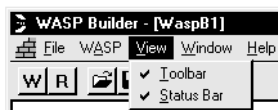


Figure 27: View Pull-Down Menu.

3.0 WASP Builder Pull-Down Menus

The **View** pull-down menu has two options, that are toggle switches to change the WASP Builder display:

1. **View > Toolbar** - This displays the tool bar with the following options:

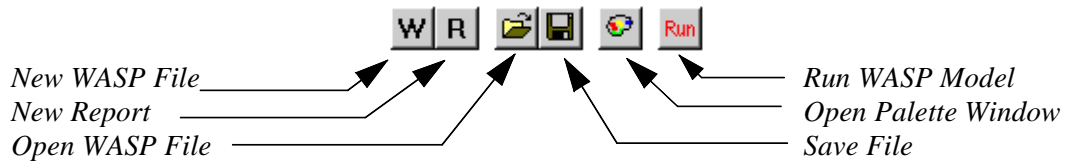


Figure 28: WASP Builder Toolbar

- **New WASP File** - Creates a new WASP Builder file; see “Section 5.0: Creating Your Own Project”.
 - **New Report** - Creates a new report session; see “Section 8.0: Generating Reports”.
 - **Open WASP File** - Opens an input file from disk; see “Section 3.1: File Pull-Down Menu”.
 - **Save File** - Saves the project to disk; see “Section 3.1: File Pull-Down Menu”.
 - **Open Palette Window** - Opens the Palette window; see “Section 4.1: Palette Window”.
 - **Run Model** - Executes the WASP Model; see “Section 3.2.4: Execute WASP”.
2. **View > Status Bar** - The status bar contains information about the workings of the program and can be displayed or not depending on the setting of the option. It is located in the lower left corner of the main window.



Figure 29: Status Bar

3.4 Window Pull-Down Menu

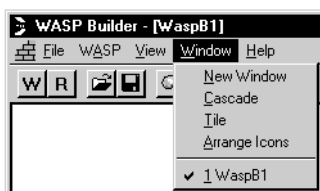



Figure 30: Window Pull-Down Menu.

Options for the **Window** pull-down menu:

1. **Window > New Window** - This option clones the current window.
2. **Window > Cascade** - If there are multiple windows open, this option will cascade the windows in the main window.
3. **Window > Tile** - If there are multiple windows open, this option will tile the windows in the main window.

4. **Window > Arrange Icons** - If there are multiple windows iconified, this option will arrange the icons in the main window.

Note: *Input file windows can be iconified, displayed in full-view, or closed using the buttons on the upper right of each window . The horizontal line iconifies a window, the square or double square displays the window in full or partial view, respectively and the “x” symbol closes the window.*

5. **Display of Windows Currently Open** - The list of windows on the bottom of the **Window** pull-down menu displays all the windows that are currently opened. A window can be brought to the front by clicking on the window in the list. The active window has a check mark next to it.

3.5 Help Pull-Down Menu



Figure 31: Help Pull-Down Menu.

3.5.1 WASP Builder Help

The WASP Builder help files contain the same information as this document.

3.5.2 WASP 5.0 Model Help

The WASP 5.0 Manual Part B has been converted to an online format.

3.5.3 About WASP Builder

About WASP Builder displays the version of WASP Builder.

4.0 Network Icons

The palette window opens when you begin WASP Builder or open a new project. The Palette window displays the layer icons that represent segments of a water system. As you place layers number labels will appear in sequential order.

4.1 Palette Window






You can close it by clicking on the **Done** button or by clicking on the palette icon  on the toolbar. “Section 5.0: Creating Your Own Project”, describes how to use the palette window to create an input file.



Figure 32: Palette Window.



The WASP 5.0 model documentation describes a WASP model as a set of segments, arranged to represent the physical configuration of the water body. The **Project** window displays this set of segments

and nodes. WASP models may contain up to four types of segment layers:




- Epilimnion layer (surface water) 
- Hypolimnion layer (subsurface) 
- Upper benthic layer 
- Lower benthic layer 

4.2 Exchanges and Flow Icons

Layers are connected by exchanges, flows or combinations of exchanges and flows. An **exchange** is the intersection between adjacent segments where transport rates of water and sediment are calculated.

- No exchange or flow data is represented by a question mark, indicating flow or exchange data should be specified .
- Exchanges within a vertical column are represented by a set of arrows and layered horizontal lines: .

A flow is the transport of a volume of water or sediment per unit time.

- Flows within a horizontal layer or a vertical column are represented by a drop: .
- The combination of exchanges and flows within a horizontal layer are represented by a drop, a set of arrows, and layered horizontal lines: .
- Exchanges and flows within a vertical column are represented by a drop and a set of arrows: .

5.0 Creating Your Own Project

To create your own project from scratch, you must follow these basic steps:

1. Determine the type of modeling you want to perform (TOXI, EUTRO, or METALS).
2. Divide the physical system into segments.
3. Determine the total number of segments, their locations, the types of segments, the volumes, and the number of each type of segment.
4. Determine which segments will be linked with exchanges and flows. Also determine which types of exchanges and flows you will need.
5. In a large system, you may want to number your segments so you can keep track of the connections between the segments.
6. Create the graphical representation of your system using layers and nodes (See Section 4.0 “Network Icons”).
7. Fill in the data for global Groups A through J (“Section 6.0: Editing Project Parameters”). Global groups must be completed before individual groups because data in individual segments depends on data in global groups. You must begin with Group A, because all other data depend on Group A.
8. Fill in the data for individual segments, exchanges, and flows (“Section 5.4: Editing Segments Individually” and “Section 5.5: Editing Exchanges Individually”).

Note: After you have built your WASP 5.0 model network, be sure to use the Check Card Completeness function (See Section 3.2.11 “Check Card Completeness”) before running WASP 5.0.

5.1 Segments, Exchanges, and Flows

WASP Builder allows you to edit segments and exchanges globally, using the **Edit Parameters** window (“Section 6.0: Editing Project Parameters”). Editing segments and exchanges globally applies the same values to all segments for any given parameter. However, you can also edit segments individually. The following section describes how to edit segments and exchanges individually.

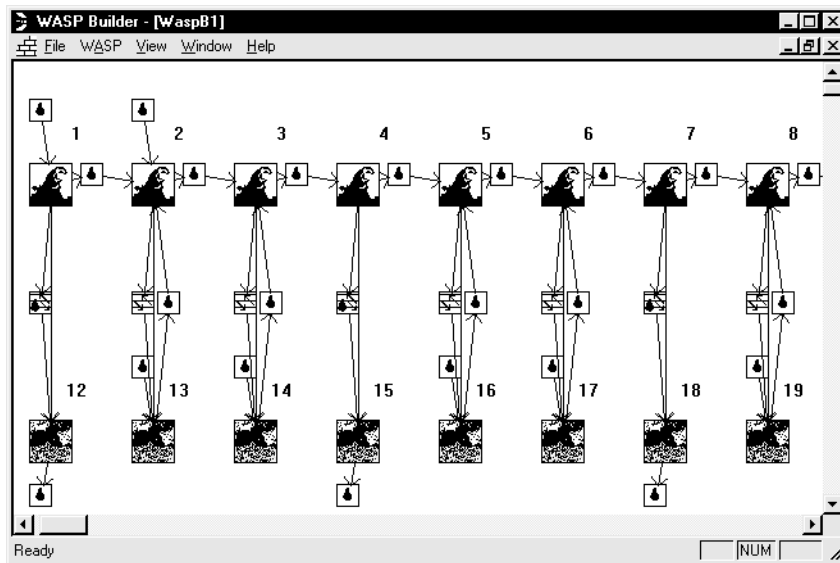


Figure 33: Project Window

5.2 Using the Palette Window

The **Palette Window** is the first tool you will use to create your input file (See Section 4.1 “Palette Window”). Use this tool to place segments onto the main window.


1. Open the **Palette Window** by clicking on the palette icon  on the toolbar. The **Palette Window** will open.
2. To place a surface segment on the main window, click with the left mouse button on the surface segment icon in the **Palette Window** and release the button. The cursor will look like a shadow of a segment.
3. Then move the cursor to the main window and click once on the left mouse button on the location where you want to place the segment. To place another segment, click again on the left mouse button. A single right click ends the placement.
4. To annotate the segments, click once with the left mouse button on the **Label** icon. Then click once with the left mouse button at the location where you want to place the label. A box will appear. Double click the with the left mouse button in the box. A dialog box will open. Type your label in the dialog box. Click on **Done** to close the box.



Figure 34: Palette Window.

5.3 Adding Exchanges and Flows

Segments must be linked together by exchanges and/or flows.

1. To add these links, click once with the left mouse button on an upstream segment to select it. Then click once with the right mouse button to open a menu containing segment and interface editing options (Figure 35).

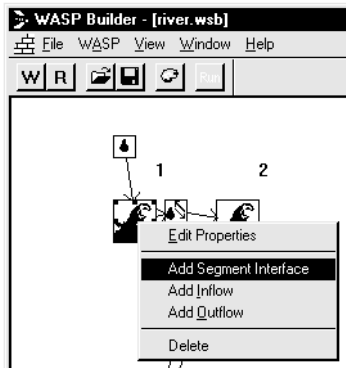


Figure 35: Adding Exchanges and Flows

2. Select **Add Segment Interface**.
3. Choose the segment that the upstream segment you chose in Step 1 will connect to.
4. Double click on the segment interface to specify the exchange and/or flow rate.

Note: You cannot input data for individual segments until you have input data into the global cards B and D.

The segment editing options are described below:

- **Edit Properties** - Edits data groups of individual segments (See Section 5.4 “Editing Segments Individually”).
- **Add Segment Interface** - Adds segment exchanges or flows between the currently active segment and another.
- **Add Inflow** - Represents water coming into the system from unmodeled upstream flows or from unmodeled tributaries.
- **Add Outflow** - Represents water being lost from the system or water leaving the last segment.
- **Delete** - Deletes the segment.

5.4 Editing Segments Individually

By selecting a segment and pressing the right mouse button the properties of segments can be changed, as shown in *Figure 36*.



Figure 36: Right Mouse Button Menu for Segments

WASP Builder allows you to edit Group C (Volumes), Group E (Boundary Concentrations), Group F (Waste Loads), and Group G (Parameters) within individual segments.

1. Double click on the segment that you want to edit.
2. The **Segment Parameters** window will appear. Select the group you want to edit. (Refer to the WASP 5.0 model online help for more information regarding groups.)

Note: See the WASP 5.0 manual for information about the data needed for these windows.

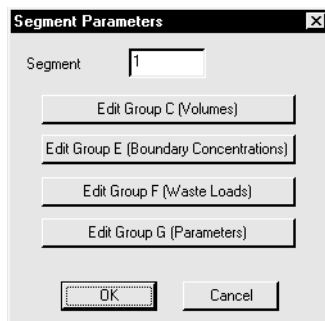


Figure 37: Editing Segments Individually.

You can edit the following groups of data for each segment:

- **Edit Group C** - This group can be used to edit volumes for the segment. For more information see “Section 6.5: Data Group C--Volumes” and the WASP 5.0 Manual.
- **Edit Group E** - This group can be used to edit boundary concentrations for the segment. For more information see “Section 6.7: Data Group E--Boundaries” and the WASP 5.0 Manual.
- **Edit Group F** - This group can be used to edit waste loads for the segment. For more information see “Section 6.8: Data Group F--Waste Loads” and the WASP 5.0 Manual.
- **Edit Group G** - This group can be used to edit the parameters for the segment. For more information see “Section 6.9: Data Group G--Parameters” and the WASP 5.0 Manual.

5.5 Editing Exchanges Individually

WASP Builder allows you to edit Group B (Exchanges) and Group D (Flows) within individual exchanges.

1. Double click on the exchange or flow that you want to edit, or right mouse click on the exchange or flow. Select **Edit Properties** from the window that appears (*Figure 38*).

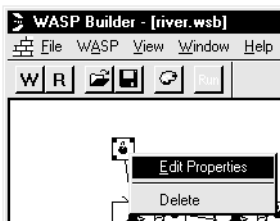


Figure 38: Editing Flows and Exchanges Individually

2. The **Segment Exchange Data** window will appear. Select the group you want to edit. (Refer to the WASP 5.0 manual for more information regarding groups).
3. If the upstream segment equals zero, the exchange is an inflow. If the downstream segment equals zero, the exchange is an outflow. If neither the upstream nor the downstream segments equal zero, the exchange is an inner exchange. For information on how to edit this data (See Section 4.2 “Exchanges and Flow Icons”)

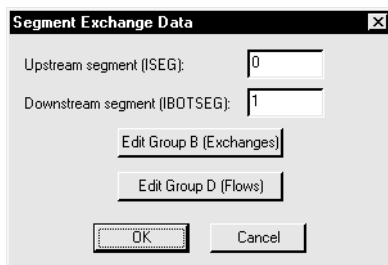


Figure 39: Editing Exchanges Individually

6.0 Editing Project Parameters

If you want to edit the file you have created or an existing data file, WASP Builder allows you to edit parameters individually or globally. You can edit groups individually by double clicking on the icon for that group in the display window. You can edit Data Groups A through J for all parameters using the **Edit Project Parameters** window (*Figure 40*). The following section will briefly describe each of the data groups and provide instruction for using each of the data group windows.

Descriptions of each data group are verbatim from the WASP 5.0 Reference Manual. For detailed descriptions of the data groups, refer to the WASP 5.0 Reference Manual.

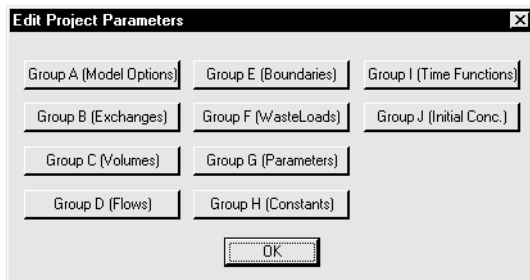


Figure 40: Edit Project Parameters Window

6.1 Selecting the Project Parameters Window

1. Select **WASP > Edit Project Parameters**.
2. Select the parameter group that you want to edit (*Figure 40*).

6.2 Editing Data in Group Windows

WASP Builder windows have several different types of data entry fields. These fields are described below.

6.2.1 Editing Data Fields Using Pull-Down Selections

Clicking on the down-pointing arrow at the right side of a field allows you to select field entries from a list of choices. If the field contains numerical data, you may type in the data or select it from the pull-down field.

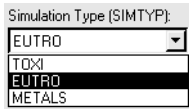


Figure 41: Selecting Entries from Pull-Down Fields

6.2.2 Editing Data Fields by Typing

Fields containing white fill can be edited by typing into them.



Figure 42: Fields that Allow Direct Editing

6.2.3 Fields that Cannot be Edited

Fields containing gray fill cannot be edited by typing.



Figure 43: Fields that Prohibit Editing

6.2.4 Editing Tables

Some data are arranged in tables. These tables contain cells that are similar to the cells in a spreadsheet. Using the mouse, place your cursor directly over the cell you want to edit and press the left mouse button. Then type your data directly into the cell. You can also move around within the table by using the left, right, up, and down arrows on your keyboard. *Figure 44* shows a cell that has been selected.

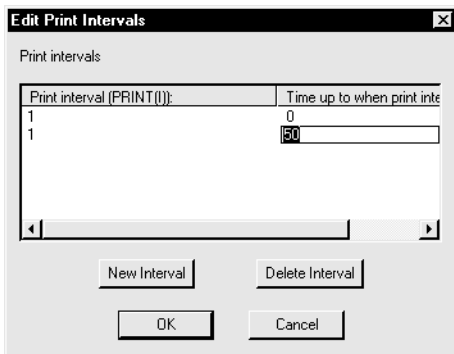


Figure 44: Editing Data in Tables

Note: For more information on the data requirements for each card see the WASP 5.0 User Manual.

6.3 Data Group A--Model Options

Data Group A is generally for model identification data and contains simulation control options. The user must also specify time steps, bypass options, and print intervals here.

6.0 Editing Project Parameters

Simulation Type (SIMTYP): METALS Simulation Title (TITLE1): INPUT FILE CALIFORNIA GULCH MODEL, META4 (12/4/94)
Description (TITLE2): INPUT FILE FOR SIMULATION OF OCTOBER 1993 DATA
Header (HEADER): NSEG NSYS ICRD MFLG IDMP NSLN INTY ADFC DD HHMM A:MODEL OPTIONS
Number of Segments (NSEG): 22 Number of Model Systems (NOSYS): 7
Restart File Control Flag (ICFL): (0) Ignore restart file (use input file)
Message Output (MFLAG): (1) Simulation time only printed
Mass Balance Analysis (JMASS): 1
Negative Solution Option (NEGSLN): (0) No negative solutions
Time Step Options (INTYP): (0) User inputs time step history
Advection Factor (ADFAC): 0
Start Day (ZDAY): 1 Start Hour (ZHR): 0 Start Minute (ZMIN): 0
Transport File (TFLG): (0) Generate file
Segments to display at runtime (ISEGOUT): 1 3 5 9 7 11
Model time steps (DTS(I), T(I)): 0.01 1
Print intervals (PRINT(I), TPRINT(I)): 0.5 10 0.2 36
System bypass options (SYSBY(K)): 0 0 0 1 1 1
OK Cancel

Figure 45: Data Group A. Model Options Window.

6.3.1 Edit Time Steps

This is the time step for the model.

Model Time Step Editor
Time steps
Timestep interval (DTS(I)) | Time up to when timestep
0.01 | 1
New Interval Delete Interval
OK Cancel

Figure 46: Model Time Step Editor

6.3.2 Edit Print Intervals

You can indicate how frequently the model writes the model output in the window below.

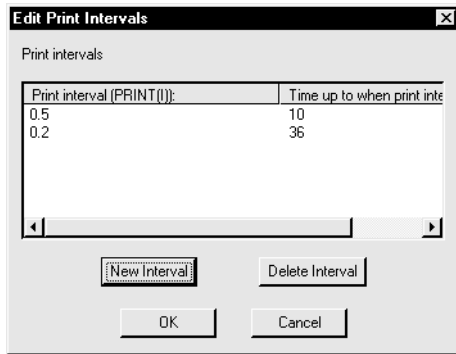


Figure 47: Edit Print Intervals

6.3.3 Edit Bypass Options

Data Groups A, B, and D also contain this function.

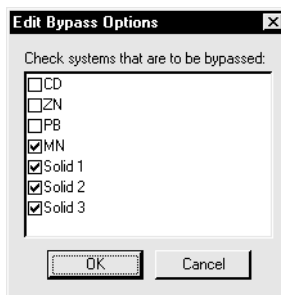


Figure 48: Edit Bypass Options

Note: Parameters marked with a check have a value of one and will **NOT** be modeled. Parameters without a check have a value of zero and **WILL** be modeled.

6.4 Data Group B--Exchanges

Data Group B contains dispersive exchange information. Dispersion occurs between segments (surface water and pore water) and along a characteristic length.

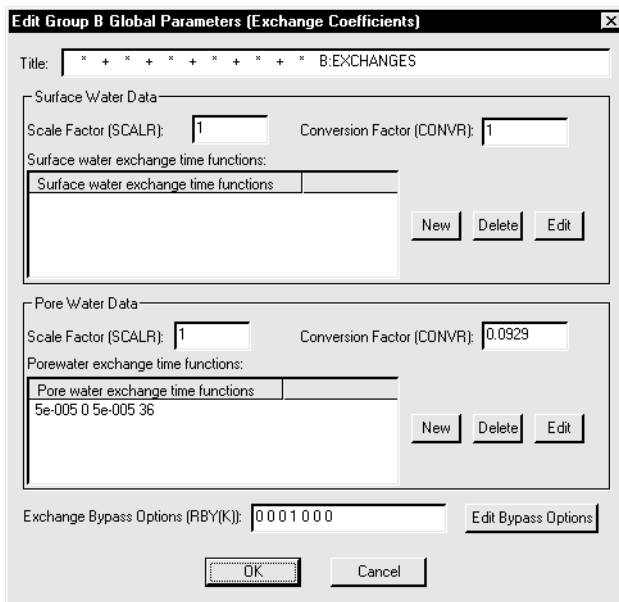


Figure 49: Data Group B. Exchange Coefficients Window

6.5 Data Group C--Volumes

Data Group C supplies volume adjusting techniques or methods.

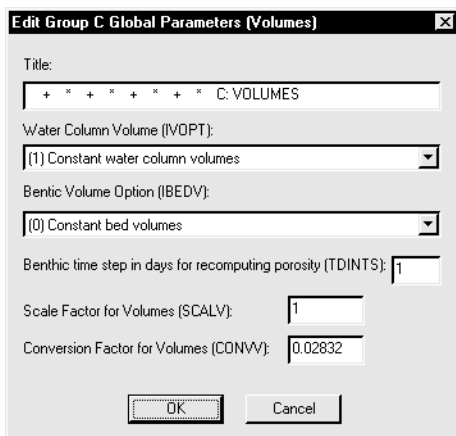


Figure 50: Data Group C. Volumes Window.

6.6 Data Group D--Flows

Data Group D supplies flow and sediment transport information between segments. Flows may be constant or variable.

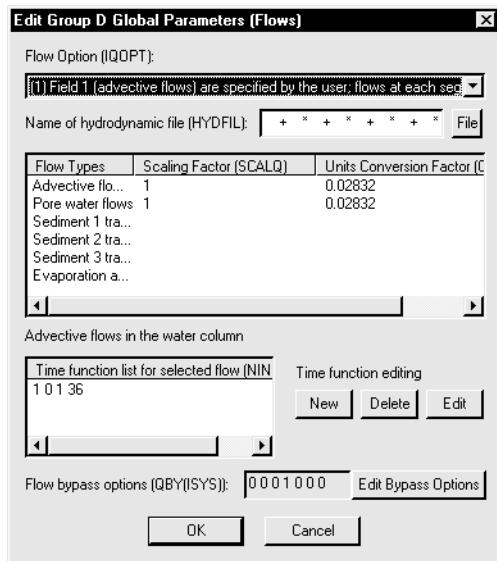


Figure 51: Data Group D. Flows Window.

6.7 Data Group E--Boundaries

Data Group E supplies concentrations for each system at the boundaries. All system concentrations must be supplied for each boundary.

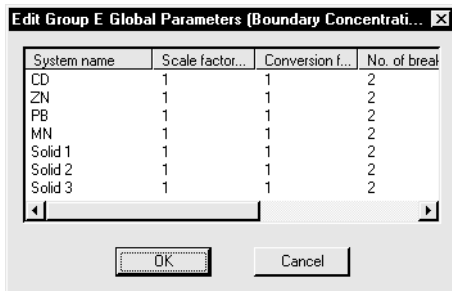


Figure 52: Data Group E. Boundary Concentrations Window.

6.8 Data Group F--Waste Loads

Data Group F defines the waste loads and segments that receive the waste loads for both point and diffuse sources.

1. Segments receiving waste loads from non-point sources can only be loaded from a file.
2. Data for segments receiving waste loads from point sources should be entered in the bottom field. A time function for these loads should be specified.

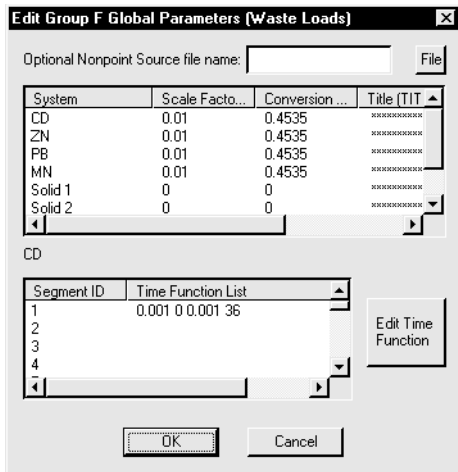


Figure 53: Data Group F. Waste Loads Window.

6.9 Data Group G--Parameters

Data Group G contains appropriate environmental characteristics of the water body. These parameters are spatially variable.

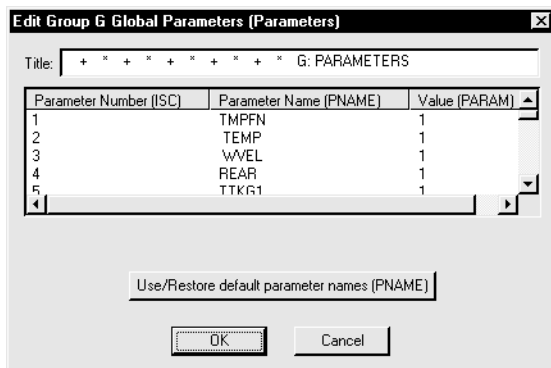


Figure 54: Data Group G. Parameters Window

6.10 Data Group H--Constants

Data Group H contains appropriate chemical characteristics or constants.

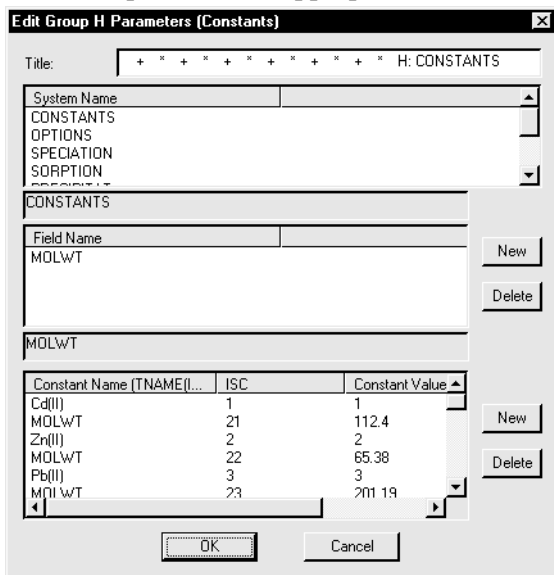


Figure 55: Data Group H. Constants Window.

6.11 Data Group I--Time Functions

Data Group I contains appropriate environmental or kinetic time functions.

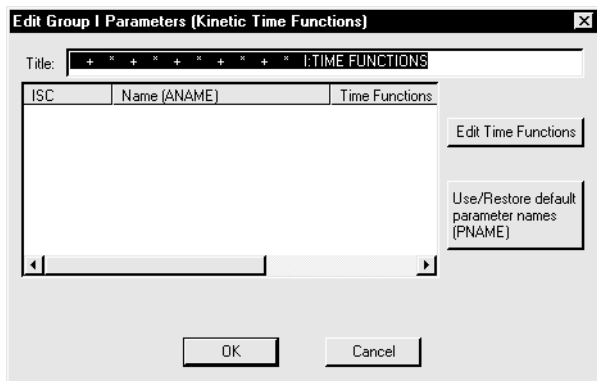


Figure 56: Data Group I. Time Functions Window.

6.12 Data Group J--Initial Concentrations

Data Group J contains initial concentrations for each segment and each system

6.0 Editing Project Parameters

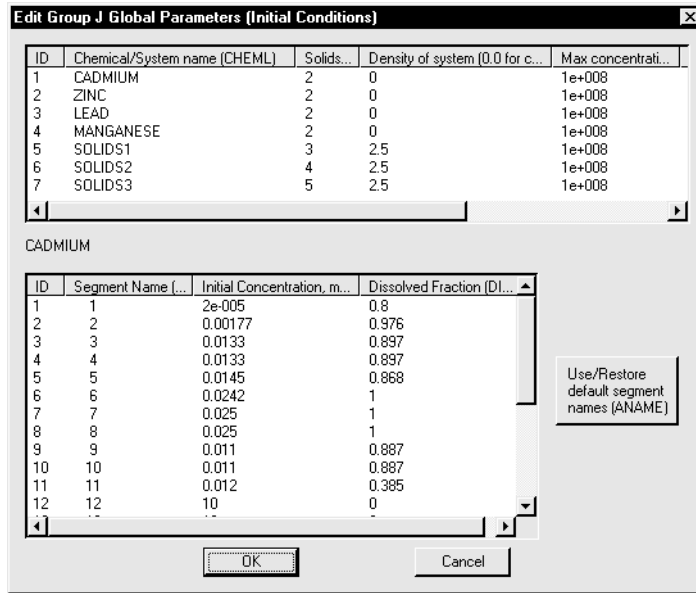


Figure 57: Data Group J. Initial Concentrations Window.

7.0 Documenting Project Versions

Under the **Save** and **Open** options in the **File** pull-down menu there are options for documenting project versions (See Section 3.1 “File Pull-Down Menu”). The documentation options give you the ability to save multiple versions of the same project and organize multiple model runs, by using the Revision Control System (RCS) to save incremental versions.

7.1 Saving and Documenting Project Versions

The **File > Save > Document Changes** option allows the documentation of versions of the same project. Using a group of programs called the Revision Control System (RCS), projects with different modifications can be saved with a name and description. When this option is selected the **Project Documentation - Save** window will be displayed, *Figure 58*.

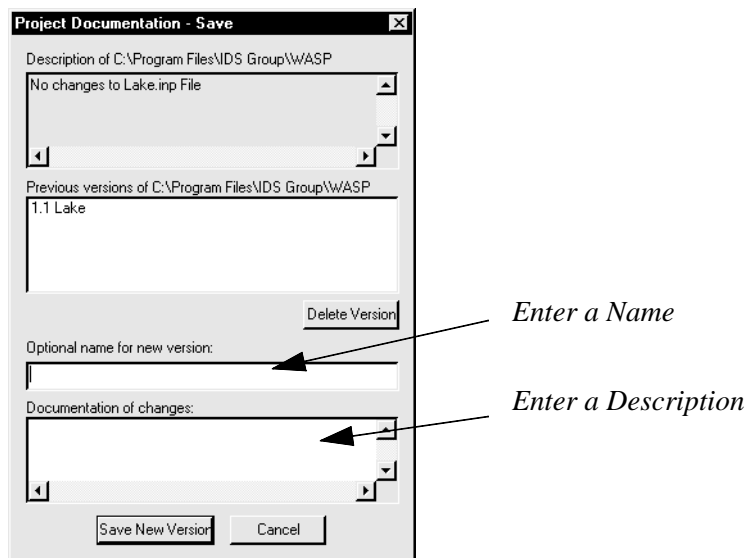


Figure 58: Project Documentation - Save Window

You can enter a name and a description of each project revision in the bottom two windows as shown in *Figure 58*. The name and description will be saved with the revision of the file. When the **Save New Version** button is selected the project will be saved along with the name and description.

7.2 Opening Project Versions

To go back to a previous version of a project, use the **File > Open > Review Changes** option. When this option is used, the existing project file will be overwritten. This is because when an older file version is opened, the changes stored in the **RCS** directory are reassembled and saved as the original file name. Therefore, make sure you document the current version of the project before prior versions are opened.

1. Select the **File > Open > Review Changes** option.
2. If a project is not loaded, select the project file (*.wsb) in the **Open** window; otherwise the active project will be assumed. If this project has revisions, they will be displayed in the **Project Documentation - Open** window. If the project has no revisions saved, the window will be blank.

Note: *Be careful not to overwrite or move the original project file, since it is the link to your revisions.*

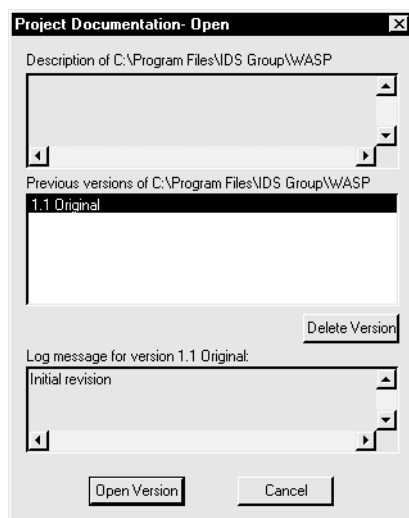


Figure 59: *Open Project Versions*

3. The revisions that have been saved will be displayed with the descriptions and titles. Double clicking on one of the versions or selecting one and the **Open Version** button, will check out the file and save it as the original name.

8.0 Generating Reports

WASP Builder can generate reports for WASP 5.0 Model runs. This tool is intended to aid in understanding several different model runs from identical project areas.

8.1 Input Files

1. Select the **File > New Report** option, see *Figure 60*.

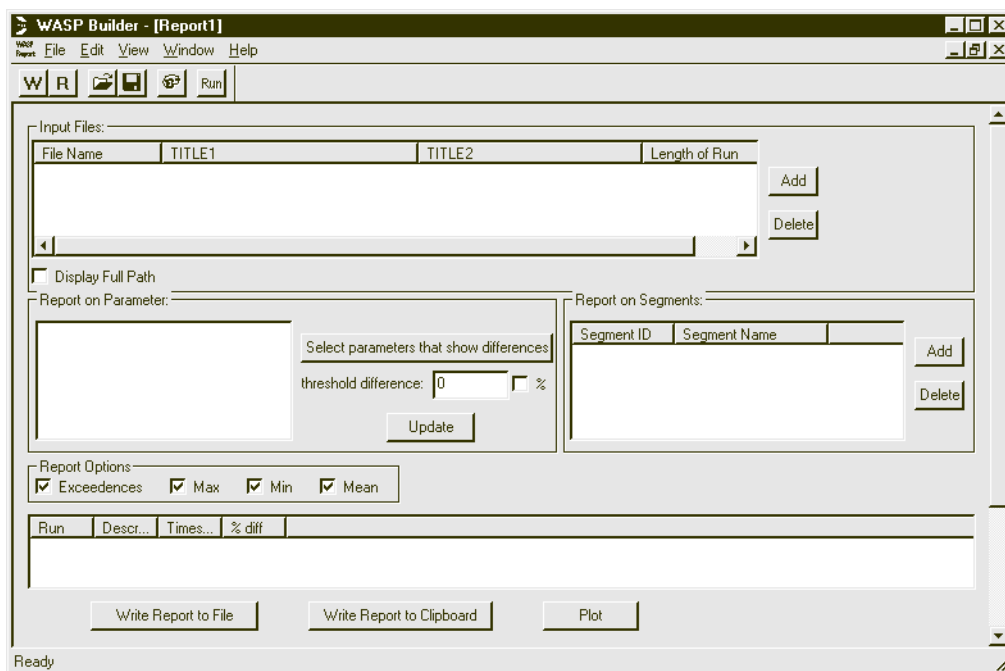


Figure 60: New Report Window

2. Select the **Add** button next to the **Input File** display box. The first file you select will be considered the base file. Successive files with the same number of segments and model type can be added (i.e. files created with the sensitivity analysis option (See Section 3.2.8 “Sensitivity Analysis”). It is not necessary that the output files have the same number of timesteps, but it is assumed that the *ith* timestep represents the same period of time in every run when comparisons are made.

- Using a file browser, select the project or projects you want to add to the report.

Note: Multiple files must have the same number of segments and have the same model type in order to be included in the same report.

8.2 Report on Parameters

- The parameters window will show the parameters that can be displayed in a report.
- To display only those parameters that exceed a given value for any of the segments listed in the node table at any time in any model run, enter the value in the **threshold difference** box and press **Select parameters that show differences**. The parameters that are selected in the **Parameter** list box are those parameters that exceed this value; see *Figure 61*.

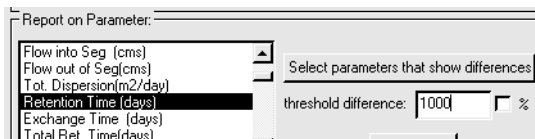


Figure 61: Threshold Values

- If you are interested in looking at a particular set of parameters but do not want to display parameters not exceeding a threshold, then select the parameters of interest from the **Parameter** list box, enter the threshold, and press **Update**. The parameters that are displayed will only be those that exceed the threshold for any model run. These will be displayed for any of the segments listed in the node table, even though additional parameters may be selected in the list box.
- Add the segments of interest for the report using the **Add** button next to the node display in the **Report on Parameters** display box.
- Use the **Delete** button to remove segments.

8.3 Report Options

- Exceedences** - This option reports the number of times the parameter for a given model run exceeded the threshold difference from the base model run. If the model run produced a value that was less than the base run and it is greater than the threshold, its value is reported as a **negative exceedence**. A **positive exceedence** occurs when the run produced a value that is larger than the base case and exceeds any threshold value entered.

Note: The base run is the first file listed in the **Input File** section.

- Max.** - Displays the **Maximum** value of the parameter in the particular model run for each segment.
- Min.** - Displays the **Minimum** value of the parameter in the particular model run for each segment.
- Mean** - Displays the **Mean** value of the parameter in the particular model run for each segment.

8.4 Plotting Options

The report tool can build graphs of the report data. An animation feature is available that can step through the time periods and show changes at each segment.

1. Select the parameters and segments that you are interested in and press the **Plot** button.
2. The **Graph Control** window will be displayed.

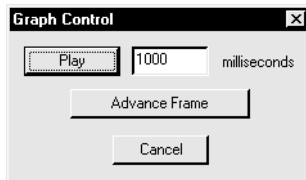


Figure 62: Graph Control Window

3. The **Play** button steps through each time step and updates every graph; *Figure 63*.
4. The **Advance Frame** option allows you to step through the times steps one by one.

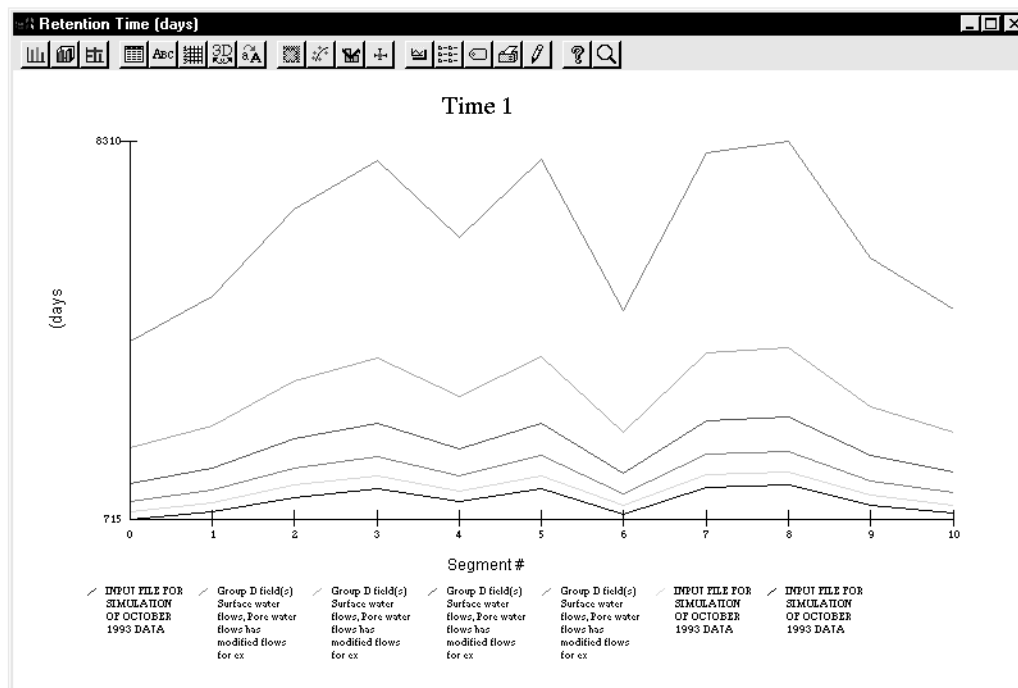


Figure 63: Report Graph

8.5 Saving Report Data

1. **Write Report to File** - This option saves the current data display as a text file with tabs delimiting the columns, so that it can be imported into a spreadsheet.
2. **Write Report to Clipboard** - This options save a copy of the data onto the computer clipboard that can be directly pasted into a spreadsheet.

9.0 Troubleshooting Guide

Problem #1: I can't enter values into any of the individual groups, segments, or exchanges.

- Fill in all the global cards before entering any data into the individual cards.
- Make sure no data are missing from the global group related to the individual group you are editing.

Problem #2: I can't type print intervals into the field.

- Click on "New Interval" and then type your data.

Problem #3: I can't import data groups into my new project.

- Don't try to import cards into systems that are not comparable (that don't have the same project layout).

10.0 References

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