

Site Specific Water Quality Index

Help Manual

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1 Introduction

1.1 Welcome to the WQI(SS)

Welcome to the world of water quality!

Water quality indexing is a means for one to start with raw data from the field to produce results which relate to you, in as much detail as you could desire. It will provide you with information on just how good your water is for a broad range of applications.

We have endeavoured to bring you all the information you require in order to get the most out of the WQI(SS) application through this help file. To navigate through the file you can use links contained within the file itself, the table of contents, the index, the keyword search and/or the browser navigation buttons ("Back", "<<" and ">>") of the help file.

For more information regarding the Water Quality Index, see the CCME Homepage or contact Kyla Brake at kbrake@gov.nl.ca

1.2 Using the WQI(SS)

The Site Specific Water Quality Index (WQI - SS) program is an interactive calculator which has been designed in Visual Basic for Applications around the platform of Microsoft Excel by the Water Resources Management Division of the Department of Environment and Conservation, Government of Newfoundland and Labrador.

In order to properly use the WQI (SS) you will need Excel 2000 SR-1 or later. Excel users should note that the security setting should be set to no stricter than Medium. To change your security setting simply open Excel and select "Tools>Options" from the menu. In the options window select the Security tab and alter the setting as desired.

With a medium security setting you will be prompted by Excel asking if you wish to Enable Macros each time you open a worksheet which contains source code. To use this model you will need to enable macros.

2 WQI(SS) Excel Components

2.1 Section Overview

Within this chapter you will find specialized information regarding all of the available pages you will see and interact with during your use of the WQI(SS) Calculator.

Simply select the page you wish to know more about and read on!

Jump to page:

Start Page

Criteria Page

Data Page

Report Page

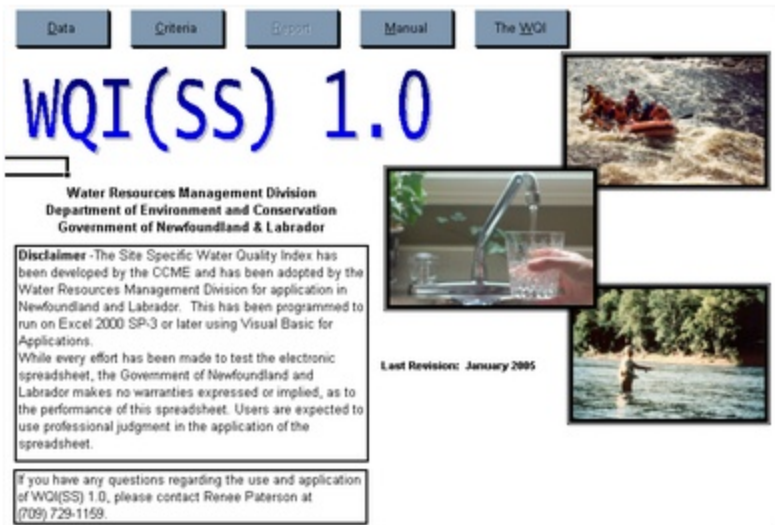
The Manual

The WQI

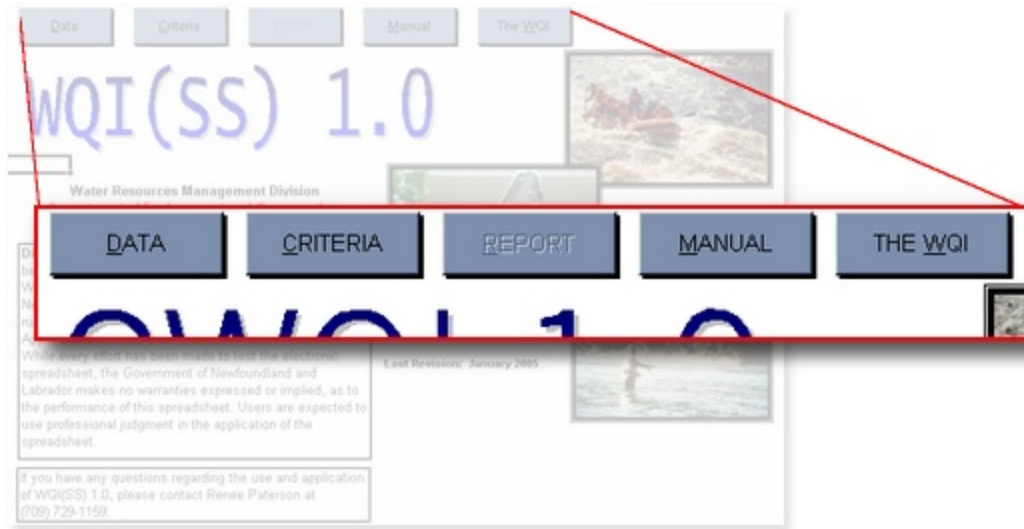
2.2 Page Descriptions

2.2.1 Start Page

When you first open the WQI(SS) this is what you will see:



This page provides you with a method to maneuver to all of the main pages of the application via the buttons located at the top of the page as you can see below. These buttons are present on most of the pages of the WQI(SS).



As you can see above the Report page is not accessible when the program is initially opened. This is because we have yet to run the calculator to generate results and access to the Report page is not available until there are results to report. Once you have computed WQI(SS) values for data you will be allowed to access the Report page from here as well as the other pages of the application.

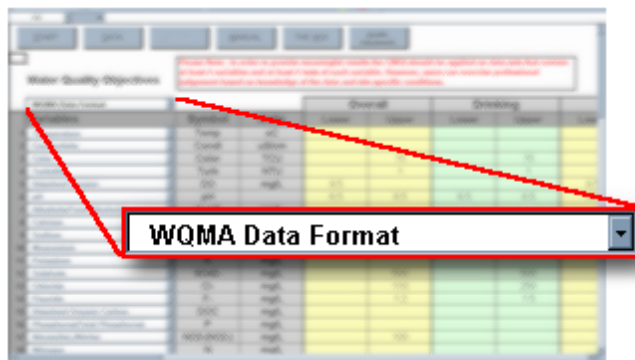
2.2.2 Criteria Page

The Criteria page is where you define the guidelines which will be used to evaluate the water quality for the data you supply on the Data page.

Variables	Symbol	Units	Overall		Drinking		Low
			Lower	Upper	Lower	Upper	
1 Temperature	Temp	°C					
2 Conductivity	Condi	uS/cm					
3 Color	Color	TCU		15		15	
4 Turbidity	Turb	NTU		1		1	
5 Dissolved Oxygen	DO	mg/L	6.5				9
6 pH	pH		6.5	8.5	6.5	8.5	9
7 Alkalinity (Total Alkalinity)	ALKT	mg/L					
8 Calcium	Ca	mg/L		1000			
9 Sodium	Na	mg/L		200		200	
10 Magnesium	Mg	mg/L		0.2			
11 Potassium	K	mg/L					
12 Sulfate	SO42-	mg/L		500		500	
13 Chloride	Cl-	mg/L		110		250	
14 Fluoride	F-	mg/L		1.2		1.5	
15 Dissolved Organic Carbon	DOC	mg/L					
16 Phosphorus (Total Phosphorus)	P	mg/L					
17 Nitrate (NO3-)	NO3-(NO2-)	mg/L		100			
18 Ammonia	N	mg/L					

Data Formats

You may have the option of choosing from a number of data type formats for your data. Simply select the appropriate type from the drop down list illustrated below.

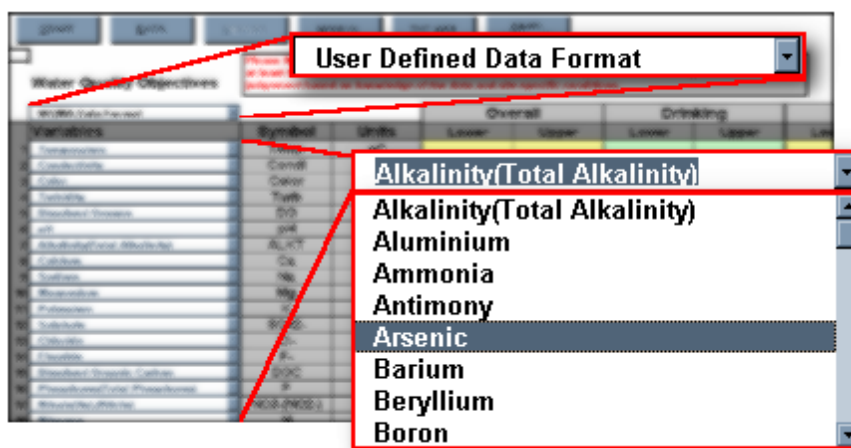


If your data is not stored in any of the available formats you can either:

1. Modify the order of your data so that it follows the order of an available predefined format, or
2. Modify the criteria table so that it follows the order of your data.

Parameters

The order of the parameters as listed on this page must match the order of your data if you wish to generate an accurate analysis of water quality (see Entering Data). Each of the available format types mentioned above will have its own particular parameter list order. If you wish, you may also be able to select a user defined data format which will allow you to modify your parameter list as you see fit. With this option you can select each parameter individually using the pull down selection boxes given.



Most of the available lines for parameters have one of these boxes which allow you to select from over 50 commonly used parameters. Simply scroll and/or select the item you desire for that particular parameter to lock it in place.

Once you have the desired parameter order set for your data you may want to alter the individual acceptable limits or criteria values. Each parameter has an available upper

and lower limit to its acceptable range as shown below.

Water Quality Objectives

Please Note: In order to provide meaningful results the WQI should be applied on data sets that contain at least 5 variables and at least 5 sets of each variable. However, users can exercise professional judgement based on knowledge of the data and site specific conditions.

Variables	Symbol	Units	Overall		Drinking	
			Lower	Upper	Lower	Upper
1 Temperature	Temp	°C				
2 Conductivity	Conduct	µmhos				
3 Color	Color				15	
4 Turbidity					1	
5 Dissolved Oxygen			9.5			
6 pH			6.5	8.5		

Here you can see an example of each of the four possible criteria states for a parameter:

- Temperature has no guideline given (note that an entry of zero (0) is the same as a blank entry)
- Color has a value which should not be exceeded by the test data (an upper guideline)
- Dissolved Oxygen has a value which test data should not be below (a lower guideline)
- pH has a value for both limits which indicate a range of acceptable measurements.

Each parameter which is present in the data file to be tested should have a corresponding entry in the criteria table. This table defines the values that indicate the difference between acceptable and unacceptable measurements (if applicable for that parameter). Also the order of appearance of the parameter list on the criteria table and that of the data file itself must match. For more information see Entering Data.

Rank

WQI(SS) scores are grouped into categories or rankings much the same as letter grades in school. Although there is a generally accepted range and number of these categories, you may alter the settings if desired. Below the criteria table you will see a rank table

Ranking Categories Minimum Values

Ranking Categories	Overall	Drinking	Aquatic	Recreation	Irrigation	Livestock		
Excellent	95	95	95	95	95	95		
Good	80	80	80	80	80	80		
Fair	65	65	65	65	65	65		
Marginal	45	45	45	45	45	45		
Poor	0	0	0	0	0	0	0	0

For each index of the criteria you can set your desired range for each rank and/or alter the number of available ranks for the WQI(SS) to fall into by altering the table as desired. The value listed for each rank defines the minimum score required (lower bound) for a result to fall into that category. Note that Poor is fixed as the worst possible ranking.

2.2.3 Data Page

The Data page is where you initiate all WQI(SS) calculations. Along the top of the page you can see that there are more navigation buttons to let us maneuver to other pages. Here is an example of what you will see when you view the Data page:

The screenshot displays the CWQI Calculation Options and Data Options interface. The interface includes navigation buttons (START, CRITERIA, REPORT, MANUAL), a 'File Used' field showing 'C:\WINDOWS\Desktop\testdata1.xls', and a data table with columns for Date, Group, Temp (°C), Cond (µS/cm), Color (TCU), and Turb (JTU). The data table shows 13 rows of sample data.

Date	Group	Temp (°C)	Cond (µS/cm)	Color (TCU)	Turb (JTU)
1	12/23/00	1	44.1	24	0.47
2	12/24/00	1	37.6	28	0.65
3	12/25/00	1	47.2	29	0.39
4	12/26/00	1	32	21	0.75
5	12/27/00	1	31	34	0.67
6	12/28/00	1	42.6	23	0.48
7	12/29/00	1	40.2	25	0.36
8	12/30/00	1	43.8	24	0.61
9	12/31/00	1	28	5	0.87
10	1/1/01	1	42.9	21	0.26
11	1/2/01	1	43.4	16	0.36
12	1/3/01	1	41.6	25	0.72
13	1/4/01	1	40.8	24	0.32

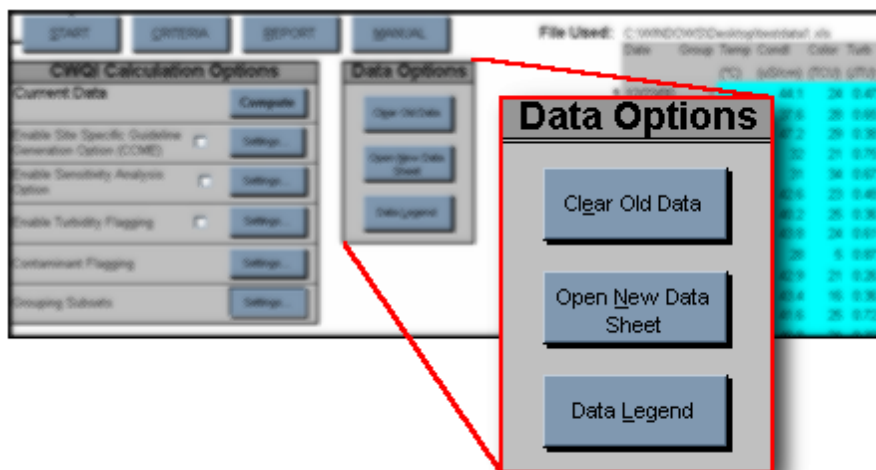
Data

On the right side of the screen you will see that there is some sample test data already entered into the calculator; here it is enlarged:

	Date	Group	Temp (°C)	Cond (uS/cm)	Color (TCU)
1	12/23/00	1	44.1	24	
2	12/24/00	1	37.6	28	
3	12/25/00	1	47.2	29	
4	12/26/00	1	32	21	
5	12/27/00	1	31	34	
6	12/28/00	1	42.6	23	
7	12/29/00	1	40.2	25	
8	12/30/00	1	43.8	24	

This is the general format of input data as it should exist in the calculator. The top two rows should be reserved for labels which describe the data. The first column of your data should contain the dates of each sample while the second column is unspecified. This column can be anything you want and it can be used in grouping (see Grouping Subsets) to help split your data into distinct groups such as season or site. These sections of the data which have a generally defined format are shaded grey whereas the data portion of the file is shaded in blue. This shading is done automatically when you enter a data file using the available command button and is done on the first calculation of the WQI(SS) when data is entered manually (see below).

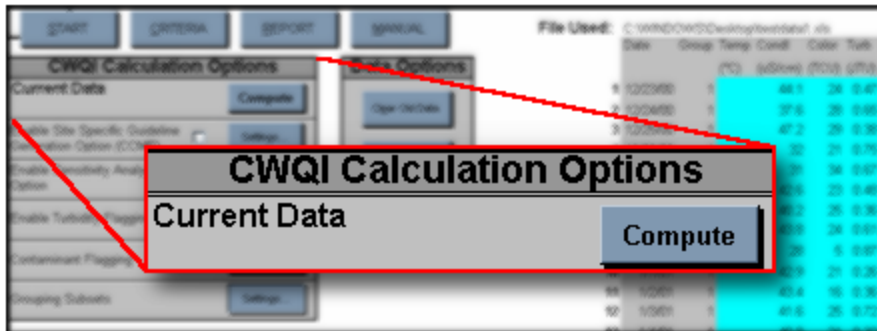
There are several ways to enter data into the data sheet. You can load in an existing Excel data sheet using the Open New Data Sheet button or you can type it in manually using the data option buttons available.



For more information on data entry see Entering Data.

Computing Data

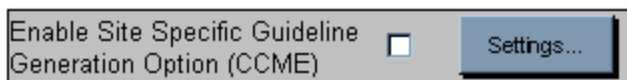
Once you have your data entered (see Data and Entering Data), correct guidelines set (see Criteria Page) and the options you wish to use selected (see below) you are ready to compute the WQI(SS). Simply press the Compute button at the top of the WQI(SS) Calculation Options section to compute your data and generate your results.



Site Specific Guidelines

Not all critical values for criteria are simple values. Some levels will be dependant upon the amount of other parameters present. For instance, varying the hardness of the water can also affect the acceptable amount of aluminum. For this reason several parameters can have dynamic guideline values which will vary depending upon measurements found within the test data file. Using this option allows the calculator to adjust the acceptable level of any selected parameters accordingly.

To enable this option simply ensure that the check box shown contains a check mark. Below is what you will see when the option is NOT enabled.



Clicking on the settings button for this option will display the following window.

Site Specific Aquatic Guideline Generation

Column Reference Values (Beginning with 1)

Aluminum	20	Lead	34
Cadmium	24	Magnesium	10
Calcium	8	Nickel	33
Copper	27	pH	6
DOC	15		

"Protection of Aquatic Life" Index Reference Value: 3

"Overall" Index Reference Value: 1

(Set both of the above entries to the same value if you do not have an overall index)

Apply AGG to the following parameters (foundation parameter list paraenthsized)

- Aluminum (pH, DOC)
- Cadmium (Hardness - Ca, Mg)
- Copper (Hardness - Ca, Mg)
- Lead (Hardness - Ca, Mg)
- Nickel (Hardness - Ca, Mg)

Select All

Current Data Format

WQMA DW

Other

OK

In the top right section of this window you can select on which combination of parameters you wish to use site specific guideline generation. The bottom right section of the window allows you to specify the format of your data. If your data is in WQMA or DW format then the Column reference values (left side of window) will be defined for you. If however your data is not in either of these format and you wish to use this option then you must specify for the application where your data is located for each parameter in the list. In the example picture above you can see that the value for pH is given as 6; this is because pH is the sixth parameter in the format of our data (WQMA). You must also specify your index values for Aquatic and Overall. In the above picture we can see that Overall was the first index to be tested while the third index for testing was Aquatic (this order is defined on the Criteria Page). If you wish to use this option and you do not have an Overall index simply set its reference value to the same value as Aquatic.

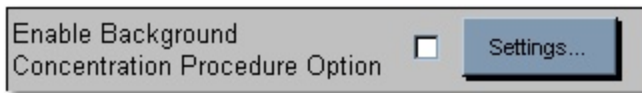
For more information about guidelines and their derivation please refer to the CCME Homepage.

Background Concentration

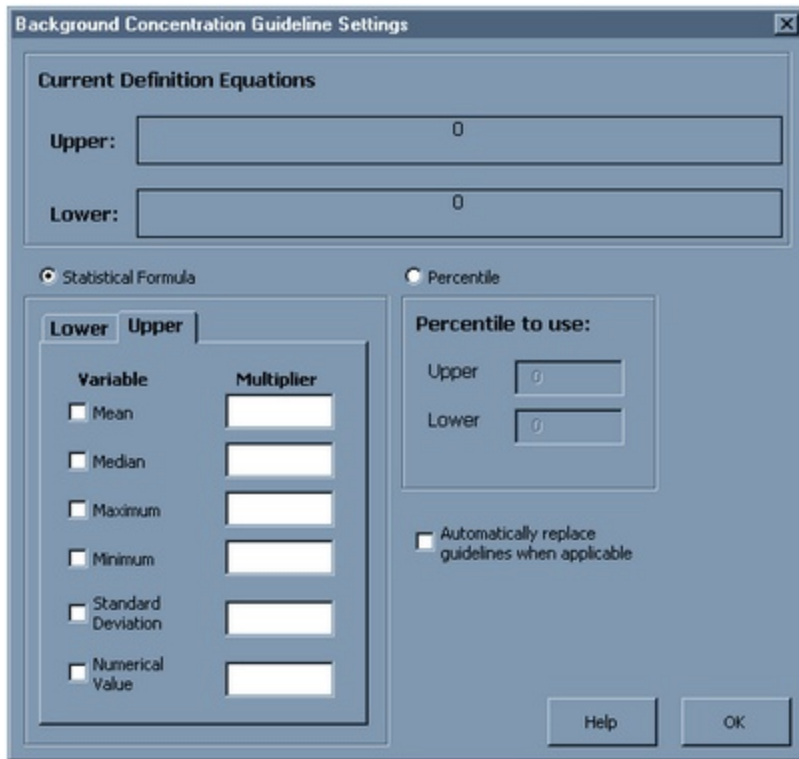
Due to the high natural background levels of particular parameters in water bodies throughout the country it is often necessary to use Site Specific Water Quality Guidelines (SS-WQGs) as opposed to generic national Water Quality Guidelines (WQGs) or provincial Water Quality Objectives (WQOs) to obtain truly representative rankings. A relatively new approach to calculating site specific water quality guidelines involves statistical analysis of the sample data itself to determine the natural background concentrations.

To enable this option, simply ensure that the check box shown contains a check mark.

Below is what you will see when the option is NOT enabled.



Clicking on the settings button for this option will display the following window.



This window allows you to define acceptable background concentration levels which can vary for different sets of data. You define a statistical measurement or formula which will specify if data is or is not at an acceptable level. You can choose either a percentile or a statistical formula definition for this level by selecting the appropriate option presented. When selecting a percentile range, simply enter the desired upper and lower (eg: 90, 10) percentile value to be applied. When selecting a statistical formula you choose from the listed statistical

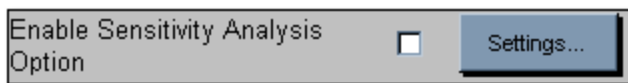
measurements using the corresponding check boxes, assigning a multiplier for each where desired (an empty multiplier entry is interpreted as one (1)). Be sure to select both an upper and a lower formula, your selection will be displayed for you as the Current Definition Equations at the top of the window. You also have the option of replacing all existing guidelines with any that are found to be less restrictive by selecting the "Automatically replace guidelines when applicable" option. If this option is not selected you will be prompted each time a new site specific guideline is found to be less restrictive than an existing guideline.

For more information on background concentration levels and site-specific guidelines please refer to the Advanced Topic Background Concentration.

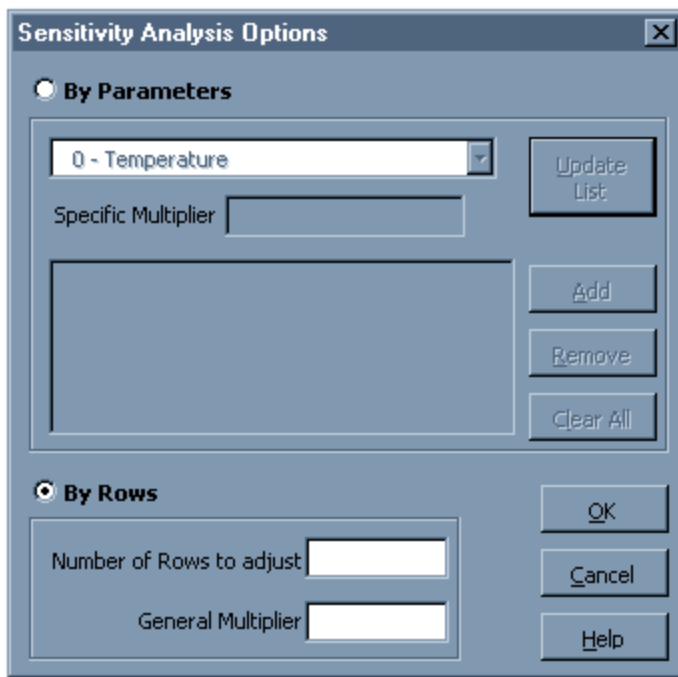
Sensitivity Analysis

Using the sensitivity option allows you to examine how your data would score if it was altered, without having to manually alter your original data.

To enable this option simply ensure that the check box shown contains a check mark. Below is what you will see when the option is NOT enabled.



Clicking on the settings button for this option will display the following window.



As you can see there are two options available for sensitivity adjustments; by parameter or by row. Above in our example "By Row" is the currently selected option as its "radio button" is selected, click on the "By Parameter" option to enable the feature.

By parameter adjustment allows you to specify a separate multiplier for each parameter. Simply select the parameter you wish to adjust from the pull down menu, enter the

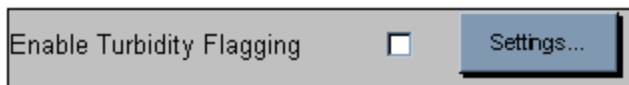
desired multiplier and click the "Add" button. Your selections will be visible when added which then will allow you to remove any unwanted entries by using the "Remove" and "Clear All" buttons.

By row adjustment lets you specify one multiplier which will be used for every parameter for the number of rows you specify. For example, enter a value of 10 to have the multiplier applied to the first 10 rows of data. If the number of rows entered is larger than the number of rows in your data file the application will simply apply the multiplier to all rows of data.

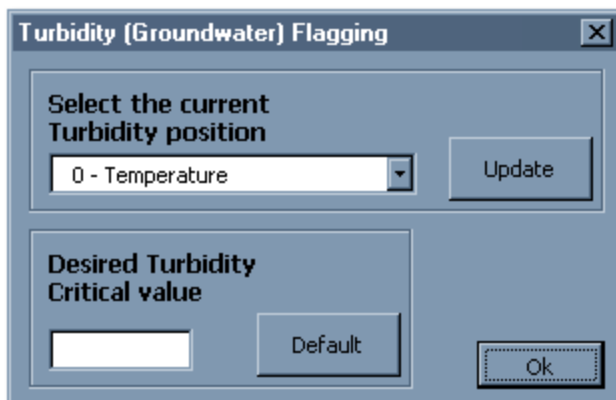
Turbidity Flagging

This option allows you to have a secondary check for the turbidity levels of your data. It can be helpful to alert you to a potential problem with your water supply which should be investigated or monitored.

To enable this option simply ensure that the check box shown contains a check mark. Below is what you will see when the option is NOT enabled.



Clicking on the settings button for this option will display the following window.

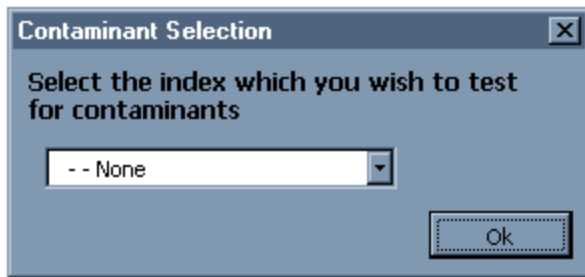


To use this option you must select turbidity from the pull down control in order to point the application to your turbidity values, then give the desired critical value which you do not wish levels to exceed without producing a warning. To ensure that the pull down control contains the most up to date version of your current data format you can click on the "Update" button.

Contaminant Flagging

Contaminants are substances that are known or suspected to cause adverse effects on the health of some people when present in concentrations greater than the established Maximum Acceptable Concentrations (MACs) or the Interim Maximum Acceptable Concentrations (IMACs) of the Guidelines for Canadian Drinking Water Quality, Sixth Edition (GCDWQ).

Clicking on the settings button for this option will display the following window.



To have the application check the last sample of your data for contaminants select one or all of the indices from the pull down control shown above. A contaminant check will only be performed using data which is tested for each index, i.e. if you have high levels of a contaminant but select the contaminant test on an index which does not use that parameter in its WQI(SS) calculations then you will not receive a warning.

Grouping Subsets

Grouping is a way for you to break your data up into smaller pieces in order to analyze small sections or to compare different groups of data within the same data file.

Clicking on the settings button for this option will display the following window.

The image shows a dialog box titled "Grouping Subset Options". It has a close button in the top right corner. The dialog is divided into three main sections, each with a dropdown menu and a "Compute" button:

- For Year(s):** The dropdown menu is set to "2000". The "Compute" button is highlighted with a dashed border.
- For Month(s):** The dropdown menu is set to "All". The "Compute" button is active.
- For Open Label(s):** The dropdown menu is set to "1". The "Compute" button is disabled (grayed out).

At the bottom of the dialog, there is a "Using Index" dropdown menu set to "Overall", an "Update All" button, and a "Cancel" button.

Clicking on the "Update All" button will read in all of the current information about your data and criteria settings.

To compute WQI(SS) values for a subset or multiple subsets of your data simply select the desired group from the options shown and click on the corresponding "Compute" button. If you wish to test on multiple subsets, as is shown in the months section above, select the "All" item and click on compute. You can also select a single subset of your data as can be seen above in the year section. If there is only one group present for a category of data, as can be seen in the above example for open labels, the options will be disabled as computing for this group would be the same as simply computing from the main data page so the option to group or subset your data is not valid.

If you are computing for multiple subsets ("All" selected) you will also want to specify which index you wish to use for testing. Performing calculations for multiple subsets of data is more complex therefore it will limit the generation of report options (see Grouping Reports). When you click on compute for this operation, you will be prompted to confirm your choices prior to any WQI(SS) calculations.

2.2.4 Report Page

The Report page is where you will be automatically directed whenever you compute the WQI(SS). Below is a sample of what you will see.

The screenshot shows the WQI(SS) Excel report interface. At the top, there are navigation buttons: START, DATA, CRITERIA, MANUAL, and THE WQI. Below these is a title bar for "Canadian Water Quality Index 1.0". The main content is a table with the following data:

Data Summary	Overall	Drinking	Aquatic	Recreation	Irrigation	Livestock
CWQI	66	85	58	100	95	88
Categorization	Fair	Good	Marginal	Excellent	Excellent	Good
F1 (Scope)	50	20	60	0	9	17
F2 (Frequency)	26	15	37	0	1	11
F3 (Amplitude)	19	4	29	0	0	6
Minimal Dataset Requirement of 4 Variables	Met	Met	Met	Not Met	Met	Met
Contaminant Analysis of Last Sample	Not Tested	Passed	Not Tested	Not Tested	Not Tested	Not Tested

Below the table, there are several options and a note:

- Turbidity Flagging Option: Not Used
- Site Specific Guideline Generation Option (CCME): Used
- Sensitivity Analysis Option: Not Used
- File Used: C:\wqi\source\test\data1.xls
- In-depth Report Options: Calculations Summary, WQI Output, Ignored Test Data, Data Outliers
- Please Note: In order to provide meaningful results the CWQI should be applied on data sets that contain at least 4 variables and at least 4 tests of each variable. However, users can exercise professional judgement based on knowledge of the data and site specific conditions.

As you can see, there is a lot of information available here which summarizes the results of your calculations. However, we have designed the report with the goal of allowing the user to easily extract as much or as little detail as they desire. Below is a summary of all of the information you will see.

WQI(SS) Values

The first line in the report table simply gives the WQI(SS) value (both the numeric value and its corresponding rank) of each index tested, as sampled below.

Data Summary	Overall	Drinking
CWQI	66	85
Categorization	Fair	Good

In this example you can see that our data scored a WQI(SS) value of 66 or Fair for the Overall index and 85 or Good in Drinking. For more information regarding WQI(SS) values, their ranking and interpretation, please refer to The WQI page of the WQI(SS) application or to the CCME Homepage.

WQI(SS) Factor Scores

The value which is assigned to represent the WQI(SS) is composed of three separate components or "Factors". Below is the result of our sample test for the index Overall.

F1 (Scope)	50
F2 (Frequency)	26
F3 (Amplitude)	19

Although these values can relate much about strengths and weaknesses of the data tested, the derivation of the individual factors of the WQI(SS) is beyond the scope of this help file. For more information regarding WQI(SS), its derivation and composition please refer to The WQI page of the WQI(SS) application or to the CCME Homepage.

Minimal Datasets

In order for our results to be meaningful, there is a condition enforced upon the calculations which demands that we test at least 4 separate parameters for each result. Our next line of results simply relates whether or not this condition was met.

Data Summary	Overall	Drinking	Aquatic	Recreation	Irrigation
CWQI	66	85	56	100	
Categorization	Fair	Good	Marginal	Excellent	
F1 (Scope)	50	20	60	0	
F2 (Frequency)	26	15	37	0	
F3 (Amplitude)	19	4	29	0	
Minimal Dataset Requirement of 4 Variables	Met	Met	Met	Not Met	
Contaminant Analysis	Passed	Passed	Not Tested	Not Tested	

As you can see, our test for the Recreation index failed to test at least four separate parameters, therefore we should realize that even though our results show this sample as scoring perfectly for Recreation, our testing was limited thus our result could have a high margin of error.

Contaminant Analysis

Another option for testing is to check water samples for contaminants. See the Contaminant Flagging section of the Data Page for more information on how to invoke contaminant tests.

Data Summary	Overall	Drinking	Aquatic
WQI	85	85	85
Category	Good	Good	Good
P1 Score	85	85	85
P2 Score	85	85	85
P3 Score	85	85	85
Score Based Requirement of 1 Variable	Met	Met	Met
Contaminant Analysis of Last Sample	Not Tested	Passed	Not Tested

As can be seen, we ran our sample test with the option of testing only the Drinking index for contaminants and none were found.

Computation Options Summary

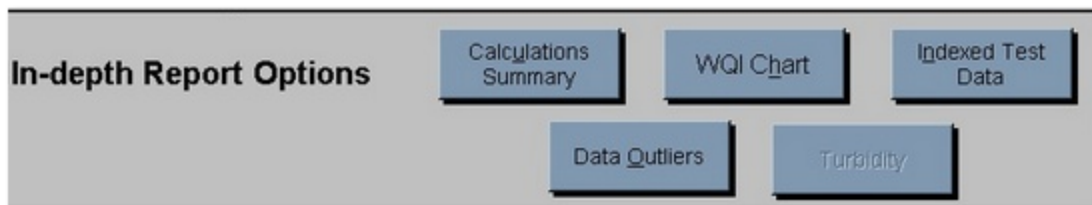
As can be reviewed in the Data Page section, there are several other options available for WQI(SS) calculations. The state of these options is reported in a separate table shown below.

Turbidity Flagging Option	Not Used
Site Specific Guideline Generation Option (CCME)	Used
Sensitivity Analysis Option	Not Used

This review is provided so that, at a glance, you can see what options were used to generate your results and also so that printing this page will capture not only the results but also the state of the calculator which produced these results.

Summary Details Buttons

At the bottom of the Report page you will notice that there are several buttons available as seen below.



These buttons provide navigation to more detailed results based on your calculations. As you can see, not all navigation options are available to us as access to these pages is dynamic in nature. You can see that we do not have access to the Turbidity In-depth

Report (its corresponding button is greyed out), this is because we did not invoke the turbidity option for our sample run, as you can see in the computation options summary.



Turbidity Flagging Option	Not Used
Site Specific Guideline Generation Option (CCME)	Used

For descriptions of these extra reports, please refer to the *In-Depth Reports* section.

2.2.5 The Manual

This page of the WQI(SS) application provides you with much of the same information which you will find in this help file. It can provide a quick reference to those who are unsure about a procedure without having to refer to this file. The Manual however does not provide any internal navigation features, a search nor pictorial guides.

2.2.6 The WQI

The WQI page of the application is a subset reference to facts about the WQI(SS) which are available from the CCME Homepage.

3 Advanced Topics

3.1 Entering Data

The correct format of data entry is very important to the proper functioning of the WQI(SS) application. Although much effort has been put into ensuring that the program is as forgiving as possible to the user, incorrectly entered data will cause the WQI(SS) to generate invalid results.

When you run the WQI(SS) application for the first time you will notice that there is a sample piece of data present in the Data page. This sample displays the general format which must exist for any data which is to be used for WQI(SS) calculations. For a snapshot of what this data looks like see the Data section of the Data Page.

One of the options available to you to enable entry of your own data is the "Clear Old Data" button of the data sheet. If you click this button you will see that the application will present you with a template for your own data entry as illustrated below:

File Used:

Label Row	Date	Column	Open Column	Param ₁
Units Row				Units ₁
Data Row ₁				

If you wish to enter your data into the application manually this should be your starting point. In the illustration above all of your entered information should be contained within either the grey or blue highlighted cells. The data itself belongs in the blue section while the grey section is reserved for column and row header values such as parameter name, parameter unit and sample date. The column labeled above as "Open Column" is unreserved and can be used for any label you wish, see the Data section of the Data Page for more information on this column.

If you wish to enter data from an existing MS Excel data sheet it must also follow this general format in order for the WQI(SS) to be allowed to function properly. If you wish to enter data using this option then your source data sheet should follow the format shown below:

	A	B	C	D	E	F	G	H
1	Date	Group	Temp (°C)	Condl (uS/cm)	Color (TCU)	Turb (JTU)	DO	PH
2								
3	12/23/00	1		44.1	24	0.47		6.38
4	12/24/00	1		37.6	28	0.65		6.36
5	12/25/00	1		47.2	29	0.38		6.27
6	12/26/00	1		32	21	0.75		6.45
7	12/27/00	1		31	34	0.67		6.12
8	12/28/00	1		42.6	23	0.48		5.98
9	12/29/00	1		40.2	25	0.36		6.31
10	12/30/00	1		43.8	24	0.61		5.99
11	12/31/00	1		28	5	0.87		5.85
12	1/1/01	1		42.9	21	0.26		6.24
13	1/2/01	1		43.4	16			6.3
14	1/3/01	1						
15	1/4/01	1						
16	1/5/01	1						

Having your test data available in this general format allows you to easily enter your data into the calculator by simply using the "Open New Data" button on the Data page. Following this process, the sample data file shown above in Excel is entered into the calculator to produce the following snapshot:

File Used:	C:\cwqi\source\testdata1.xls						
	Date	Group	Temp (°C)	Condl (uS/cm)	Color (TCU)	Turb (JTU)	DO
	1	12/23/00	1	44.1	24	0.47	6.38
	2	12/24/00	1	37.6	28	0.65	6.36
	3	12/25/00	1	47.2	29	0.38	6.27
	4	12/26/00	1	32	21	0.75	6.45
	5	12/27/00	1	31	34	0.67	6.12
	6	12/28/00	1	42.6	23	0.48	5.98
	7	12/29/00	1	40.2	25	0.36	6.31
	8	12/30/00	1	43.8	24	0.61	5.99

As can be seen, collecting your data into MS Excel spreadsheet(s) in the proper format prior to using the WQI(SS) is the easiest way to produce fast and accurate results, especially if you have a lot of data to analyze.

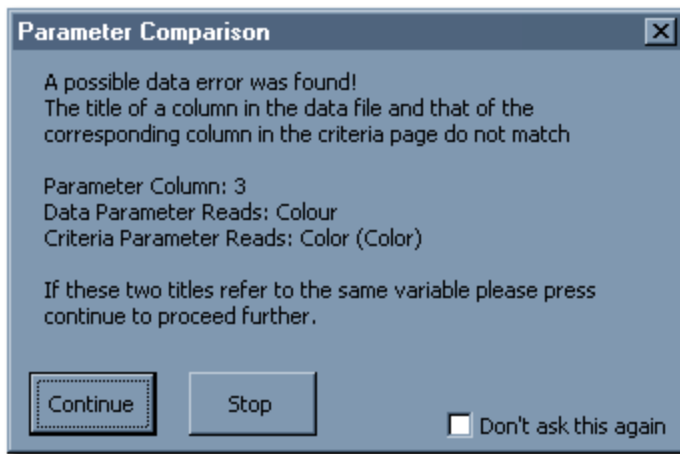
The last step in ensuring you get accurate results from the WQI(SS) is to ensure your

data format order matches the order of the criteria you supply to the application on the Criteria page.

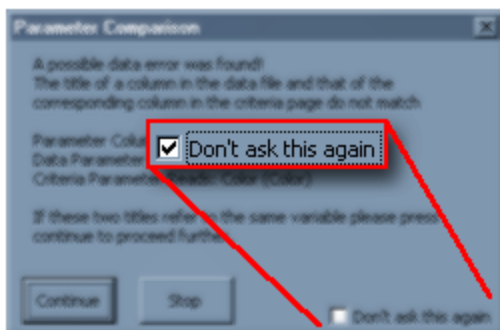
parameters are tested in the order they appear, from one to the next; there is no searching for matching parameters performed. When you compute your data to generate WQI(SS) results the

program will perform a simple analysis of the data versus the criteria list supplied. If the program finds any cases where it cannot resolve if the data parameter heading matches the criteria

listing, it will prompt you to determine if there is a match or not. Here is a sample of that prompt:

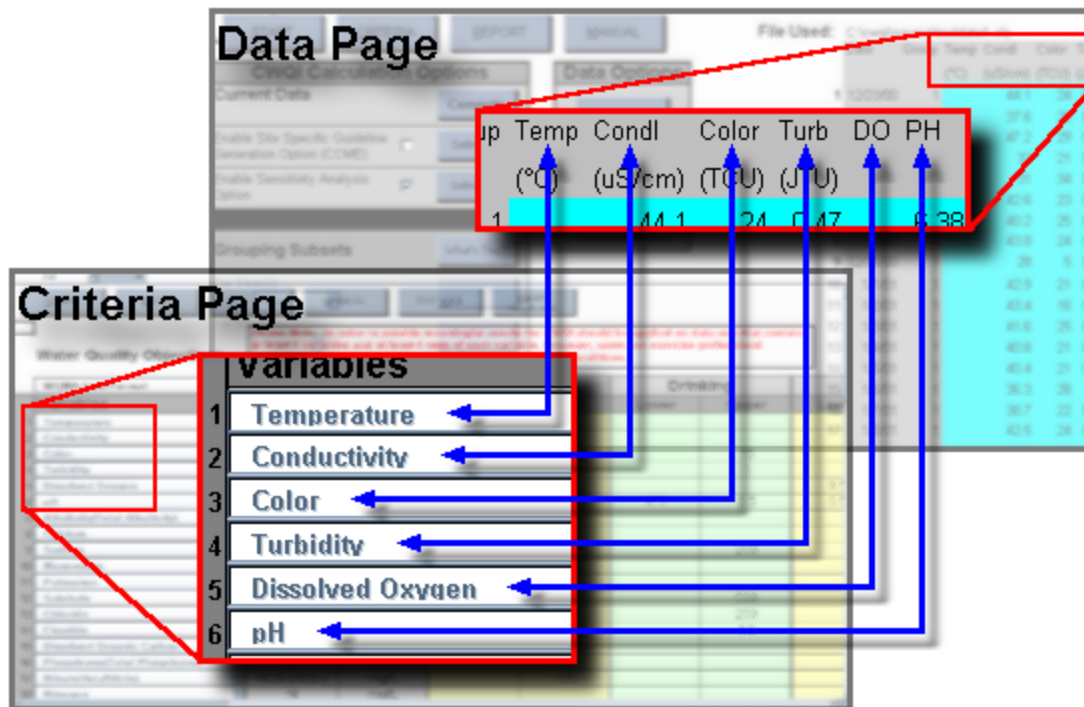


Here you see that the Data page parameter was listed as "Colour" (the British spelling) whereas the Criteria page parameter was listed as "Color" (the American spelling) for the third parameter. As the program cannot decipher whether or not these two items represent the same data, it will prompt the user for verification of either a data entry error or a valid match. If the two listed items are the same, you can click on the "Continue" button. If they represent two distinctly different parameters, you should click on "Stop", which will halt the current WQI(SS) calculation process. If you are sure that your data matches other than some textual difference(s), click on the check box on the bottom right corner of the window.



Checking this box will cause the application to stay all checks for dissimilar entries during the life of that particular instance of the program (closing and reopening the program will again enable the function), therefore it is best not to check this box unless you are certain that your data and your criteria match.

To illustrate what is meant by matching the order of your data and the criteria, consider the following picture:



Here you can see that we have a data set and a criteria list which are in agreement (at least for the first six parameters). Cutouts from the Data page and the Criteria page show that we have the same order of parameters in both sources of information, illustrated by the blue arrows. In order for the application to be able to produce valid results, it is crucial that this matching order exists throughout your data. If the given example were run there would be no prompt for parameter comparison confirmation, so the application does exercise some intelligence when it comes to this comparison.

3.2 In-Depth Reports

In-Depth Reports of your results are available through buttons located at the bottom of the Report page. They provide you with more detail about your data than can be viewed from the Report page itself.

Calculation Summary

This page is designed to provide much more detail about the WQI(SS) calculation results and to give a source for spotting the strengths and weakness of your data. Here is an example of what you will see:

Back

SITE SPECIFIC WATER QUALITY INDEX 1.0
C:\WINDOWS\Desktop\testdata1.xls

Summary of Results

	Overall	Drinking	Aquatic	Recreation	Irrigation
Number of variables tested	18	15	10	1	12
Number of variables that failed	8	3	6	0	1
Variables with most failed tests	pH	pH	pH	None	Chromium
Variables with highest nse	Copper	Color	Copper	None	Chromium

Variables that Failed the objectives	Temp	Cond	Color	Turb	DO	pH
Overall	N/A	N/A	Had Failure(s)	Had Failure(s)	No Failures	Had Failure(s)
Drinking	N/A	N/A	Had Failure(s)	Had Failure(s)	N/A	Had Failure(s)
Aquatic	N/A	N/A	N/A	N/A	No Failures	Had Failure(s)
Recreation	N/A	N/A	N/A	N/A	N/A	No Failures
Irrigation	N/A	N/A	N/A	N/A	N/A	N/A
Livestock	N/A	N/A	Had Failure(s)	N/A	N/A	N/A

Number of Tests (Number of Failures)	Temp	Cond	Color	Turb	DO	pH
Overall	N/A	N/A	19 (18)	19 (1)	No Data	19 (19)
Drinking	N/A	N/A	19 (18)	19 (1)	N/A	19 (19)
Aquatic	N/A	N/A	N/A	N/A	No Data	19 (19)
Recreation	N/A	N/A	N/A	N/A	N/A	19 (5)
Irrigation	N/A	N/A	N/A	N/A	N/A	N/A
Livestock	N/A	N/A	19 (18)	N/A	N/A	N/A

Tables entries above with less than 4 tests are highlighted in red

Statistical Summary of Data	Temp	Cond	Color	Turb	DO	pH
Minimum		26.0000	5.0000	0.0000		5.0000
Maximum		47.2000	34.0000			8.4500
Mean		39.9526	173.1679			8.1100
Median		40.0000				
Standard Deviation						

Site Specific Aquatic Guidelines

Aluminum

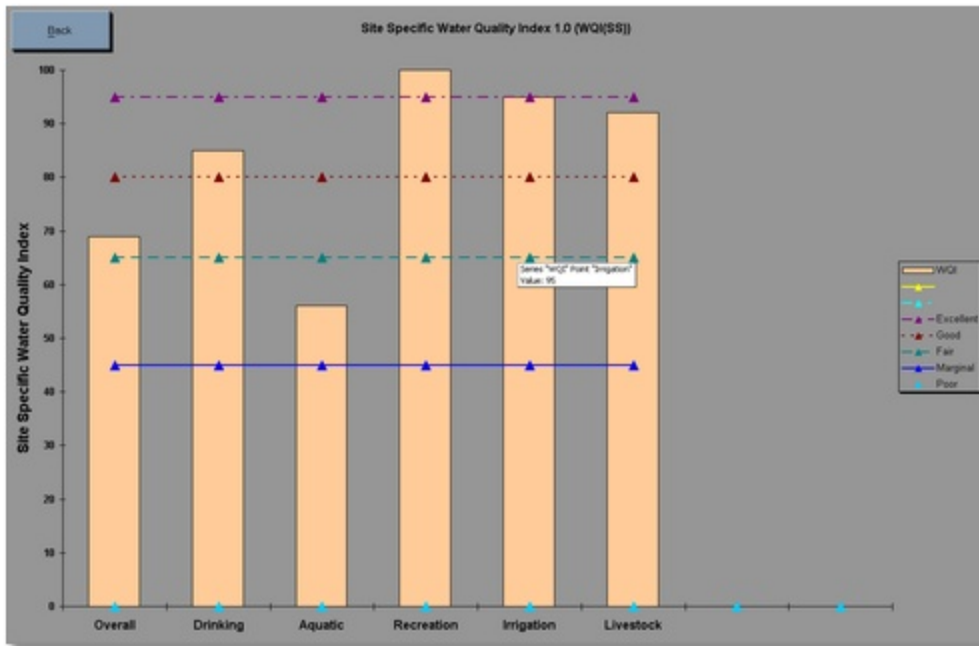
The tables provided within this page are as follows:

- **Summary of results**
This table presents the following information:
 1. Number of parameters (parameters) tested for each index - how many individual parameters were used in calculations to determine the WQI(SS),
 2. Number of parameters that failed for each index - how many individual parameters had at least one piece of data fail,
 3. parameter(s) with the most failed tests for each index - which parameter's data had failed the most total times,
 4. parameter(s) with the highest NSE (normalized sum of excursions) for each index - which parameter's data had failed by the largest normalized total amount.
- **Parameters that failed the objectives** - displays which parameters for each index had at least one failure.
- **Number of tests (number of failures)** - displays the number of tests performed and the number of failures encountered for each parameter for each index.
- **Statistical summary of data** - displays the minimum, maximum, mean, median and standard deviation for each parameter of the test data.

- Site specific aquatic guidelines - displays any guidelines which were calculated based on user requests, see the Site Specific Guidelines section of the Data Page

WQI Chart

This page provides you with a graphical representation of your results. Here is an example of the WQI Chart.



As you can see the WQ(SS) score of each index is displayed on an overlay of the given ranks.

Indexed Test Data

This page provides you with a copy of the input data which is highlighted showing each pass and fail of the data supplied for each index.

Overall

Date	Group	Temp (°C)	Cond (µS/cm)	Color (TCU)	Turb (NTU)	DO (mg/L)	PH	Alk (mg/L)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	K (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	DOC (mg/L)	P (mg/L)	Nitrate (mg/L)	N (mg/L)	Si (mg/L)	Al (mg/L)	As (mg/L)	Ba (mg/L)	Be (µg/L)	Cd (mg/L)	Co (mg/L)	
1 12/23/00	1	44.1	24	0.47	6.38	1.14	4.1	6.38	1.14	4.1	5.8		2	10.1	0.025	3.7	0.01										
2 12/24/00	1	37.6	28	0.65	6.36	1.11	4.1	6.36	1.11	4.1	5.7		3.2	6.9	0.02	0.04											
3 12/25/00	1	47.2	29	0.38	6.27	1.37	4.1	6.27	1.37	4.1	4.1		2.4	7	0.02	0.03											
4 12/26/00	1	32	21	0.75	6.45	0.73	4.1	6.45	0.73	4.1	5.7		2.4	6.8	0.03	0.01											
5 12/27/00	1	31	34	0.67	6.12	0.69	3.86	6.12	0.69	3.86	5.7		2.8	5.1	0.03	0.01											
6 12/28/00	1	42.6	23	0.48	5.98	0.96	5.7	5.98	0.96	5.7	5.7		2.1	9.6	0.03	3	0.01										
7 12/29/00	1	40.2	25	0.36	6.31	0.95	4.1	6.31	0.95	4.1	5.7		2.7	9.7	0.03	2	0.01										
8 12/30/00	1	43.8	24	0.61	5.99	0.65	5.5	5.99	0.65	5.5	5.5		2.8	9.6	0.03	3.2	0.01										
9 12/31/00	1	28	5	0.87	5.95	0.98	4.39	5.95	0.98	4.39	5.5		2.3	7.8	0.02	0.005											
10 1/1/01	1	42.9	21	0.26	6.24	0.8	5.9	6.24	0.8	5.9	5.7		2.5	9.9	0.025	2.8	0.01										
11 1/2/01	1	43.4	16	0.36	6.32	1.16	6.27	6.32	1.16	6.27	5.7		1.4	7.1	0.005	3.7	0.005										
12 1/3/01	1	41.6	25	0.72	5.83	0.89	5.5	5.83	0.89	5.5	5.7		2	9.9	0.025	3.5	0.005										
13 1/4/01	1	40.8	21	0.32	5.94	0.92	4.72	5.94	0.92	4.72	5.7		2	9.5	0.025	3.2	0.005										
14 1/5/01	1	40.4	21	0.38	6.09	0.87	5.11	6.09	0.87	5.11	5.7		1.5	9.3	0.025	3	0.005										
15 1/6/01	1	36.3	28	1.2	6.23	1.07	5.16	6.23	1.07	5.16	5.7		1.6	7.2	0.025	4.1	0.005										
16 1/7/01	1	38.7	22	0.73	6.07	0.84	4.4	6.07	0.84	4.4	5.7		1.8	7.3	0.025	2.5	0.005										
17 1/8/01	1	42.5	24	0.83	6.1	0.84	4.04	6.1	0.84	4.04	5.7		1.4	7.8	0.025	1.9	0.005										
18 1/9/01	1	45.2	20	0.35	6.29	0.48	5.31	6.29	0.48	5.31	5.7		1.5	8.5	0.005	3.4	0.005										
19 1/10/01	1	40.8	29	0.63	6.25	0.68	4.3	6.25	0.68	4.3	5.7		2.9	9	0.025	1.6	0.01										

Drinking

Date	Group	Temp (°C)	Cond (µS/cm)	Color (TCU)	Turb (NTU)	DO (mg/L)	PH	Alk (mg/L)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	K (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	DOC (mg/L)	P (mg/L)	Nitrate (mg/L)	N (mg/L)	Si (mg/L)	Al (mg/L)	As (mg/L)	Ba (mg/L)	Be (µg/L)	Cd (mg/L)	Co (mg/L)		
1 12/23/00	1	44.1	24	0.47	6.38	1.14	4.1	6.38	1.14	4.1	5.8		2	10.1	0.025	3.7	0.01											
2 12/24/00	1	37.6	28	0.65	6.36	1.11	4.1	6.36	1.11	4.1	5.7		3.2	6.9	0.02	0.04												
3 12/25/00	1	47.2	29	0.38	6.27	1.37	4.1	6.27	1.37	4.1	4.1		2.4	7	0.02	0.03												
4 12/26/00	1	32	21	0.75	6.45	0.73	4.1	6.45	0.73	4.1	5.7		2.4	6.8	0.03	0.01												

These displays can help you see if there are any patterns to the strength and weakness of your data.

Data Outliers

This page highlights for you data which is outside the "norm" using several different methods.

Normal Range: Mean Plus and/or Minus Two Standard Deviation

Date	Group	Temp (°C)	Cond (µS/cm)	Color (TCU)	Turb (NTU)	DO (mg/L)	PH	Alk (mg/L)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	K (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	DOC (mg/L)	P (mg/L)	Nitrate (mg/L)	N (mg/L)	Si (mg/L)	Al (mg/L)	As (mg/L)	Ba (mg/L)	Be (µg/L)	Cd (mg/L)	Co (mg/L)		
1 12/23/00	1	44.1	24	0.47	6.38	1.14	4.1	6.38	1.14	4.1	5.8		2	10.1	0.025	3.7	0.01											
2 12/24/00	1	37.6	28	0.65	6.36	1.11	4.1	6.36	1.11	4.1	5.7		3.2	6.9	0.02	0.04												
3 12/25/00	1	47.2	29	0.38	6.27	1.37	4.1	6.27	1.37	4.1	4.1		2.4	7	0.02	0.03												
4 12/26/00	1	32	21	0.75	6.45	0.73	4.1	6.45	0.73	4.1	5.7		2.4	6.8	0.03	0.01												
5 12/27/00	1	31	34	0.67	6.12	0.69	3.86	6.12	0.69	3.86	5.7		2.8	5.1	0.03	0.01												
6 12/28/00	1	42.6	23	0.48	5.98	0.96	5.7	5.98	0.96	5.7	5.7		2.1	9.6	0.03	3	0.01											
7 12/29/00	1	40.2	25	0.36	6.31	0.95	4.1	6.31	0.95	4.1	5.7		2.7	9.7	0.03	2	0.01											
8 12/30/00	1	43.8	24	0.61	5.99	0.65	5.5	5.99	0.65	5.5	5.5		2.8	9.6	0.03	3.2	0.01											
9 12/31/00	1	28	5	0.87	5.95	0.98	4.39	5.95	0.98	4.39	5.5		2.3	7.8	0.02	0.005												
10 1/1/01	1	42.9	21	0.26	6.24	0.8	5.9	6.24	0.8	5.9	5.7		2.5	9.9	0.025	2.8	0.01											
11 1/2/01	1	43.4	16	0.36	6.32	1.16	6.27	6.32	1.16	6.27	5.7		1.4	7.1	0.005	3.7	0.005											
12 1/3/01	1	41.6	25	0.72	5.83	0.89	5.5	5.83	0.89	5.5	5.7		2	9.9	0.025	3.5	0.005											
13 1/4/01	1	40.8	21	0.32	5.94	0.92	4.72	5.94	0.92	4.72	5.7		2	9.5	0.025	3.2	0.005											
14 1/5/01	1	40.4	21	0.38	6.09	0.87	5.11	6.09	0.87	5.11	5.7		1.5	9.3	0.025	3	0.005											
15 1/6/01	1	36.3	28	1.2	6.23	1.07	5.16	6.23	1.07	5.16	5.7		1.6	7.2	0.025	4.1	0.005											
16 1/7/01	1	38.7	22	0.73	6.07	0.84	4.4	6.07	0.84	4.4	5.7		1.8	7.3	0.025	2.5	0.005											
17 1/8/01	1	42.5	24	0.83	6.1	0.84	4.04	6.1	0.84	4.04	5.7		1.4	7.8	0.025	1.9	0.005											
18 1/9/01	1	45.2	20	0.35	6.29	0.48	5.31	6.29	0.48	5.31	5.7		1.5	8.5	0.005	3.4	0.005											
19 1/10/01	1	40.8	29	0.63	6.25	0.68	4.3	6.25	0.68	4.3	5.7		2.9	9	0.025	1.6	0.01											

Normal Range: 90th Percentile Data

Date	Group	Temp (°C)	Cond (µS/cm)	Color (TCU)	Turb (NTU)	DO (mg/L)	PH	Alk (mg/L)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	K (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	DOC (mg/L)	P (mg/L)	Nitrate (mg/L)	N (mg/L)	Si (mg/L)	Al (mg/L)	As (mg/L)	Ba (mg/L)	Be (µg/L)	Cd (mg/L)	Co (mg/L)		
1 12/23/00	1	44.1	24	0.47	6.38	1.14	4.1	6.38	1.14	4.1	5.8		2	10.1	0.025	3.7	0.01											

These tables are helpful in finding anomalies within your data without having to study each measurement.

Turbidity

This page will summarize the results of a turbidity test.

C:\WINDOWS\Desktop\testdata1.xls

	Date	Group	Temp (°C)	Condl (uS/cm)	Color (TCU)	Turb (JTU)	DO	PH	Alk (mg/l)	Ca (mg/l)	Na (mg/l)	Mg (mg/l)	K (mg/l)	Sulphate (mg/l)	Chloride (mg/l)
1	12/23/00	1	44.1	24	0.47	6.38	1.14	5.8							
2	12/24/00	1	37.6	28	0.65	6.36	1.11	4.1						3.2	
3	12/25/00	1	47.2	29	0.38	6.27	1.37	4.1						2.4	
4	12/26/00	1	32	21	0.75	6.45	0.73	4.1						2.4	
5	12/27/00	1	31	34	0.67	6.12	0.69	3.86						2.8	
6	12/28/00	1	42.6	23	0.48	5.98	0.56	5.7						2.1	
7	12/29/00	1	40.2	25	0.36	6.31	0.85	4.1						2.7	
8	12/30/00	1	43.8	24	0.61	5.99	0.65	5.5						2.8	
9	12/31/00	1	28	5	0.87	5.85	0.98	4.39						2.3	
10	1/1/01	1	42.9	21	0.26	6.24	0.8	5.9						2.5	
11	1/2/01	1	43.4	16	0.36	6.32	1.16	6.27						1.4	
12	1/3/01	1	41.6	25	0.72	5.83	0.89	5.5						2	
13	1/4/01	1	40.8	21	0.32	5.94	0.92	4.72						2	
14	1/5/01	1	40.4	21	0.38	6.09	0.87	5.11						1.5	
15	1/6/01	1	36.3	28	1.2	6.23	1.07	5.16						1.6	
16	1/7/01	1	38.7	22	0.73	6.07	0.84	4.4						1.8	
17	1/8/01	1	42.5	24	0.83	6.1	0.84	4.04						1.4	
18	1/9/01	1	45.2	20	0.35	6.29	0.48	5.31						1.5	
19	1/10/01	1	40.8	29	0.63	6.25	0.68	4.3						2.9	

Data which passed and failed the turbidity tests specified by the user will be highlighted within this table, letting you find failures at a glance. In the above example the calculator was run with the turbidity flagging option turned on and a value of 1.0 set as the critical value. For more information please refer to the Turbidity Flagging Option section of the Data Page.

3.3 Background Concentration

Due to the high natural background levels of particular parameters in water bodies throughout the country it is often necessary to use Site Specific Water Quality Guidelines (SS-WQGs) as opposed to generic national Water Quality Guidelines (WQGs) or provincial Water Quality Objectives (WQOs) to obtain truly representative rankings. A relatively new approach to calculating site specific water quality guidelines involves statistical analysis of the sample data itself to determine the natural background concentrations.

Input Settings

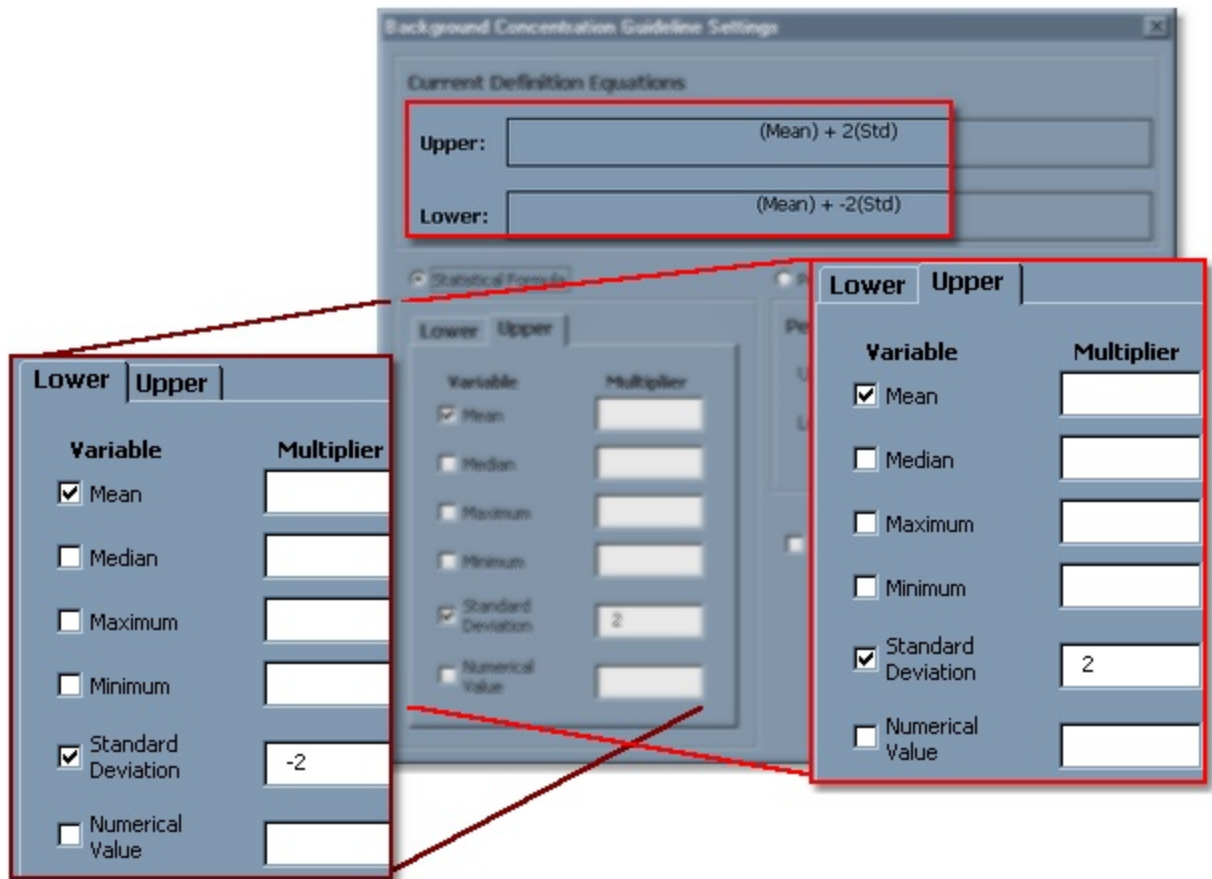
For an introduction to background concentration please refer to the Background Concentration section of the Data Page.

The first step needed to be performed when applying site-specific background concentration levels is to set the desired formulas. There are two options available. The first, shown below, is percentile values.

The image shows a software dialog box for setting background concentration levels. The interface is divided into several sections. At the top, there are two rows for defining the upper and lower limits. The first row is labeled 'Upper:' and has a text box containing '90th Percentile'. The second row is labeled 'Lower:' and has a text box containing '10th Percentile'. Below these, there are radio buttons for 'Statistical Formula' and 'Percentile'. The 'Percentile' option is selected. A sub-dialog box titled 'Percentile to use:' is open, showing two input fields: 'Upper' with the value '90' and 'Lower' with the value '10'. The background of the main dialog shows a list of variables with checkboxes, and buttons for 'Help' and 'OK' at the bottom right.

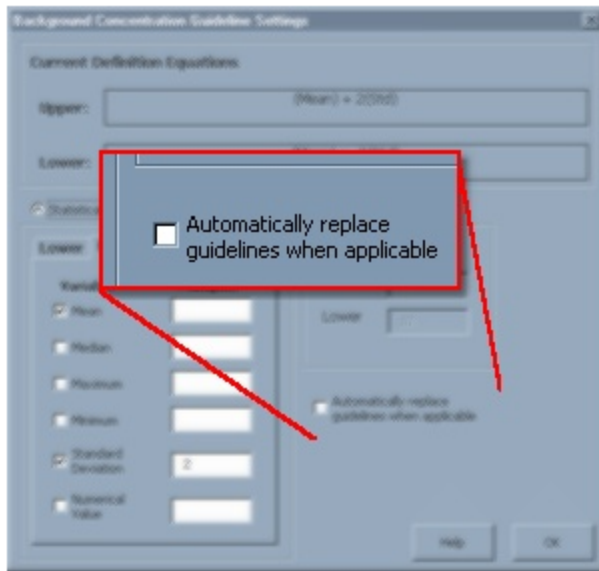
Here we can see that an upper limit of the 90th percentile has been entered, whereas a lower limit of the 10th percentile has been entered. Values are entered into the specified text boxes provided and are displayed in the Current Definition Equations so that you can verify your entries.

The second option available for background concentration levels is statistical formulas. An example of using this option is illustrated below.



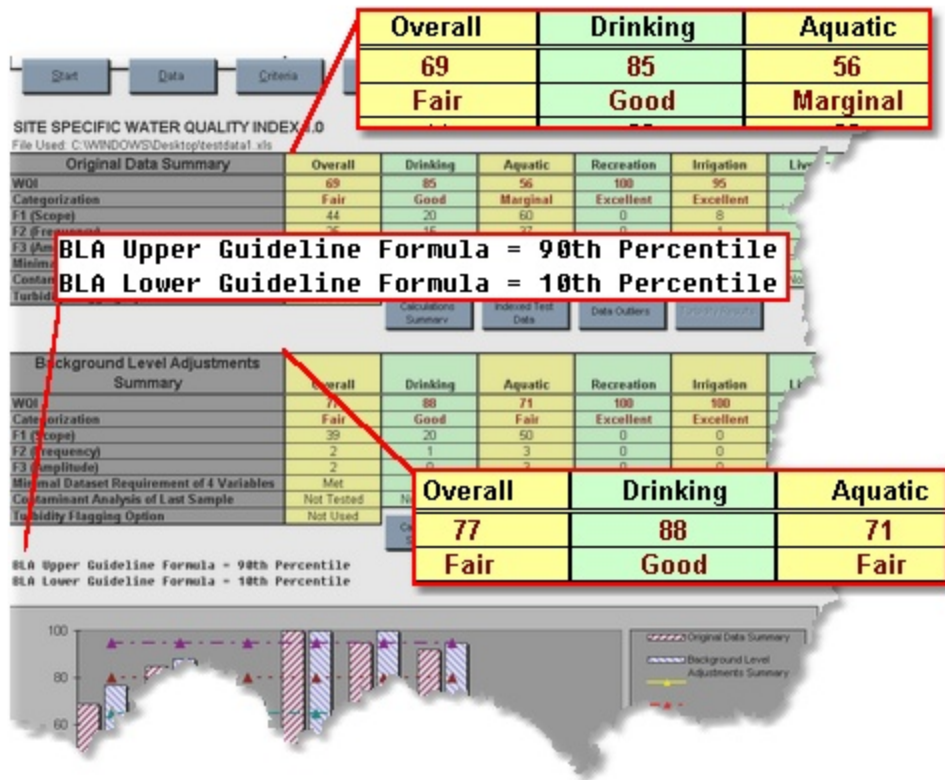
Here we see that a value of the mean plus two standard deviation units has been selected for the site-specific upper limit, whereas a value of the mean minus two standard deviation units will represent the lower. Note that clicking on the Upper and Lower tab will control which formula you are editing.

You also have control over which guidelines will be replaced and which will remain. If the calculator determines that the background concentration (based on your definition) is less restrictive than the current guideline for a particular parameter, you will be prompted with these values and asked if you wish to replace the existing guideline with the newly determined site-specific one. Each time the calculator finds such a parameter you will be prompted, making it possible to pick and choose which guidelines you replace due to naturally high background concentration and which you keep as is. If you wish to replace all of these parameters' guidelines whenever this state is encountered, simply select the option to Automatically replace guidelines when applicable, illustrated below. When this option is selected you will not be prompted for a decision to replace existing guidelines with site-specific ones, all possible replacements will be automatically made for you.

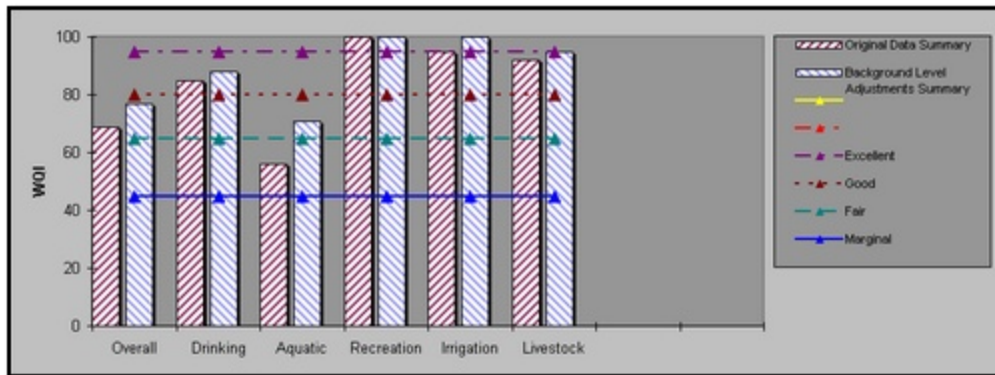


Interpreting Output

Once you run the calculator with any of these options enabled you can review what settings were applied from the reports generated. On the main report page you will see two tables and a graph which will illustrate the results of your calculations. The top table shows you your results using the guidelines from the Criteria Page whereas the second table gives you the results when background concentration formulas were applied. An example is illustrated below.



You can also find a graph which further illustrates these results. An example of which is given below.



This will illustrate for you, at a glance, how the background level adjustment scores rate versus the standard guideline results.

Once all reports are written you will find a table on the Calculation Summary page of the Background Level Adjustments which displays all guidelines which were used for calculations of WQI values. An excerpt of this table is given below.

Adjusted Guideline (Original Guideline)	
Color	pH
29.(15.)	5.85(6.5) / 8.5(8.5)
29.(15.)	5.85(6.5) / 8.5(8.5)
	5.85(6.5) / 9.(9.)
29.(15.)	

3.4 Sensitivity Reports

Enabling the sensitivity analysis option will produce a different set of reports than normal. If you are familiar with the general form of WQI(SS) reports, none of the results presented through sensitivity will be new to you. For more information on using the sensitivity option, see the Sensitivity Analysis section of the Data Page.

When you use sensitivity you will simply find that there will be two versions of each report feature; a pre-sensitivity set of results and a post-sensitivity set. Below is an example of what you will see when you use this option to generate results.

SITE SPECIFIC WATER QUALITY INDEX 1.0						
Original Data Summary						
	Overall	Drinking	Aquatic	Recreation	Irrigation	Livestock
WQI	69	85	56	100	95	92
Categorization	Fair	Good	Marginal	Excellent	Excellent	Good
F1 (Scope)	44	20	60	0	8	8
F2 (Frequency)	26	15	37	0	1	9
F3 (Amplitude)	19	4	29	0	0	5
Minimal Dataset Requirement of 4 Variables	Met	Met	Met	Not Met	Met	Met
Contaminant Analysis of Last Sample	Not Tested	Passed	Not Tested	Not Tested	Not Tested	Not Tested
Turbidity Flagging Option	Failed					
<div style="display: flex; justify-content: space-around;"> Calculations Summary Indexed Test Data Data Outliers Turbidity Results </div>						
Sensitivity Data Summary						
	Overall	Drinking	Aquatic	Recreation	Irrigation	Livestock
WQI	60	81	48	28	95	90
Categorization	Marginal	Good	Marginal	Poor	Excellent	Good
F1 (Scope)	56	27	70	100	8	8
F2 (Frequency)	29	17	37	74	1	9
F3 (Amplitude)	32	10	42	3	1	12
Minimal Dataset Requirement of 4 Variables	Met	Met	Met	Not Met	Met	Met
Contaminant Analysis of Last Sample	Not Tested	Passed	Not Tested	Not Tested	Not Tested	Not Tested
Turbidity Flagging Option	Failed					
<div style="display: flex; justify-content: space-around;"> Calculations Summary Indexed Test Data Data Outliers Turbidity Results Sensitivity Data </div>						

As you can see above, we have two separate tables displaying results, as well as two groups of buttons for in-depth reports; one for the original set of data and one for the sensitivity altered results. One thing that is not available unless you use sensitivity analysis, is the Sensitivity Data button. This button takes you to a page where your resultant sensitivity data is displayed, with data which has been altered through the

sensitivity process highlighted for you.

Another difference you may notice is contained within the Calculations Summary page.

Statistical Summary of Original Data		Temp	Cond
Minimum			28.0000
Maximum			
Mean			
Median			40.0000
Standard Deviation			4.9057

Sensitivity Analysis By Row		Input Values
Data Multiplier		2.000
Number of Data Rows Used in Analysis		20

Statistical Summary of Sensitivity Data		Temp	Cond
Minimum			56.0000
Maximum			
Mean			
Median			81.6000
Standard Deviation			9.8114
Multiplier			

Here you will now be able to find the settings that you used to generate this sensitivity analysis. If you used "By Row" sensitivity you will notice that a table in the Calculations Summary page contains your options as shown in the example below.

Sensitivity Analysis By Row	Input Values
Data Multiplier	2.000
Number of Data Rows Used in Analysis	20

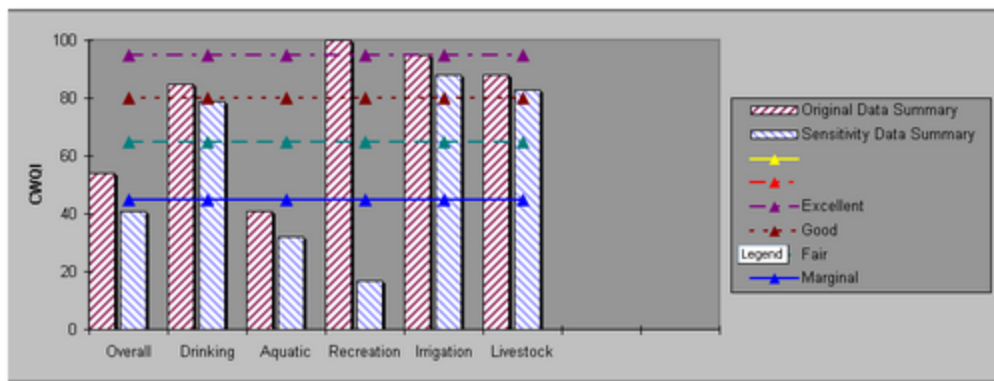
If you use "By Parameter" sensitivity however, you will find your settings contained within a second Statistical Summary of Data table located within the Calculations Summary page as shown below.

Statistical Summary of Sensitivity Data	Temp	Cond	Color	Turb
Minimum		30.8000	2.5000	0.1000
Maximum		51.9200	17.0000	0.2000
Mean		43.9479	11.5789	0.1500
Median		44.8800	12.0000	0.1500
Standard Deviation		5.3962	2.9302	0.1000
Multiplier	1.2000	1.1000	0.5000	0.7000

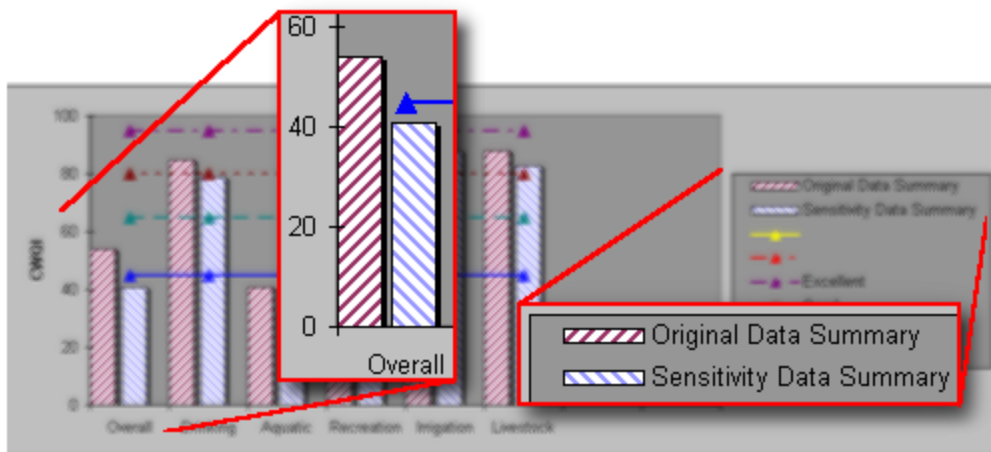
This second statistical summary table gives you the same information as the original one plus it shows you what the multiplier for each parameter was (if any) in order to generate the new set of test data.

You will also see that the WQI Chart looks different, not only is it contained within the Report page itself, but it also contains both pre- and post-sensitivity results as is shown

below.



As you can see, the same results are available here as are available during a calculation where sensitivity is not used, there's simply two versions of everything, one for the original data and one for the altered data.



3.5 Grouping Reports

Using the Grouping option can produce a different set of reports than normal. If you are familiar with the general form of WQI(SS) reports, none of the results presented through grouping will be new to you. For more information on using groups see the Grouping Subsets section of the Data Page.

Unless you wish to compare multiple subsets of your data, the reports generated will be the same as those presented without invoking the grouping options (see Report Page). If however you wish to compare multiple subsets of your data at the same time, your report will look like the illustration below.

Start	Data	Criteria	Manual	The WQI			
SITE SPECIFIC WATER QUALITY INDEX 1.0 WQI for Overall C:\WINDOWS\Desktop\testdata1.xls Site Specific Guideline Generation Option (CCME): Used							
<div style="border: 1px solid red; padding: 5px; color: red; font-size: small;"> Please Note: In order to provide meaningful results the WQI should be applied on data sets that contain at least 4 variables and at least 4 tests of each variable. However, users can exercise professional judgement based on knowledge of the data and site specific conditions. </div>							
Year	WQI	Category	F1(Scope)	F2(Frequency)	F3(Amplitude)	Min 4 Parameters	Min 4 Samples
2000	72	Fair	39	23	18	Met (18)	Met (9)
2001	71	Fair	39	26	20	Met (18)	Met (10)

As you can see there is much less resultant data available. This is due to the fact that the presentation of a full set of results, as you would get normally without grouping, would be too confusing to effectively display and analyze.