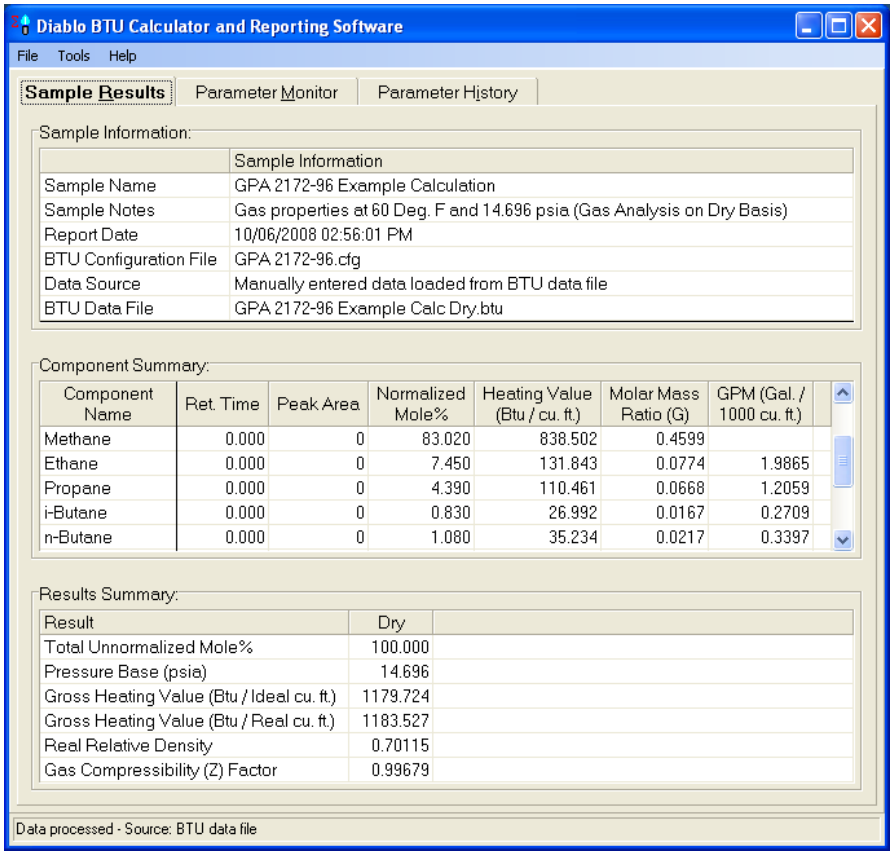
Diablo BTU Calculator and Reporting Software 3.0



Diablo Analytical BTU Calculator and Reporting Software 3.0

Reference Manual

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Manual Revision 20100224-0824

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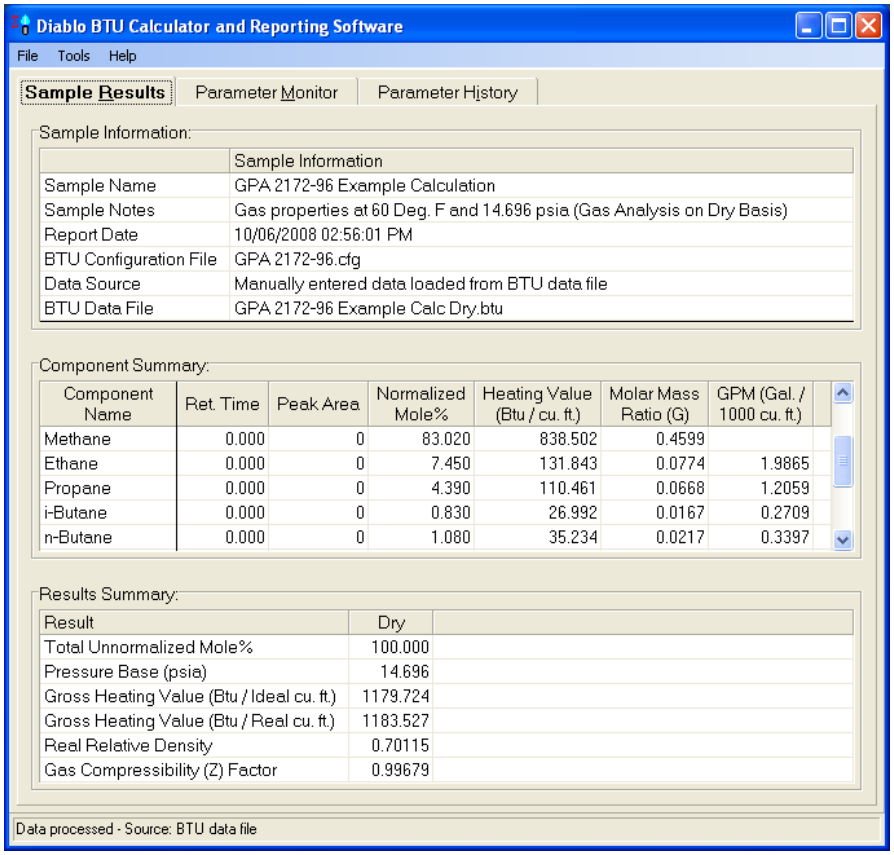
BTU Calculator and Reporting Software Overview



The Diablo Analytical BTU Calculator and Reporting Software

The Diablo BTU Calculator is a simple, easy-to-use, yet flexible BTU Calculating and Reporting Software solution. Here are a few of the key features of the software:

BTU Calculating and Reporting Features

- Calculates Dry/Saturated/Wet Gross Heating Value, Real Relative Density, Gas Compressibility factor and GPM value from un-

normalized component mole% values using GPA 2172-96 and ASTM D3588-98 (2003) standard calculations.

- The component list is completely customizable. Components can be added to or deleted from the component list, and calculation factors (Heating Value, Molar Mass Ratio, Summation Factor, and GPM Volume Factor) can be updated by the user as needed. Standard component physical property tables are provided for the GPA 2145-03 and GPA 2145-09 Standards, and the GPSA Engineering Data Book (12th Edition, 2004).
- The component list can be configured so that mole% results from other analyzers (e.g. water analyzer, H2S by Draeger Tube, etc.) can be entered manually for specified components and included in the calculations.
- Results can be exported to a text file for transfer to Laboratory Information Management System. The format of the text file can be easily customized using the BTU Calculator's flexible Export Templates.
- Allows completely automated post-run processing of data from the Agilent Technologies Cerity data system. The software can be configured to print a report and/or save the results to a comma-delimited text file automatically after processing the results from Cerity.
- Allows completely automated post-run processing of data from the Agilent Technologies EZChrom Elite or EZChrom SI data systems.

General Parameter Monitoring Features

- The BTU calculations can be disabled if you want to use the software only for general reporting, monitoring, and exporting of EZChrom and Cerity analysis results.
- You can set up both component and calculated results as monitored parameters that are displayed in a separate monitoring window. You can set both high and low alarm limits for those monitored parameters.
- You can plot the historical value of any of the monitored parameters. The trend plot can be printed, copied to the Windows clipboard, and the historical data can be exported to a comma-delimited text file.

System Requirements

The software is designed for operation under the Microsoft Windows 2000 and Windows XP Professional operating systems. Automated processing of results requires the Agilent Technologies Cerity data system (Version 4.0.5 or Version 4.0.7), or the Agilent Technologies EZChrom Elite or EZChrom SI data systems.

Installing the Software

To install the software, simply run the installation program that was downloaded from our web site or provided on the installation CD-ROM. Follow the directions presented by this installation program. Unless you have purchased a site license, the installation program will install the Diablo BTU Calculator in trial mode on new

systems, or will update registered systems to the latest version of the Software.

Important:

Important: Under Windows NT 4.0, Windows 2000, and Windows XP, you must be logged in with Administrator privileges in order to install the software.

Important: Any users who will be running the software under a non-administrator account must have full read/write permissions to the BTU Calculator directories and files. The installation program grants these rights to the "Everyone" user group. However, if the "Everyone" user group is disabled on the network, then you will have to grant these permissions manually.

If you will be using the BTU Calculator Software with the Agilent Technologies EZChrom Elite or EZChrom SI data systems, make sure to select the "Complete Setup" option when the installer displays the "Choose Setup Type" window (this is the default setup type).

Software License and Registration

Unless you have purchased a site license, this software is distributed as a fully functional 30-day evaluation application. The evaluation version has all of the features of the registered version, but you will be reminded that you are running the evaluation version with a "nag" screen each time you start the application. At the end of the 30-day evaluation period the application will no longer start unless you purchase a license or request an evaluation extension from Diablo Analytical.

Technical Support

The Diablo BTU Calculator software was written and is supported by:

Diablo Analytical, Inc.
5141 Lone Tree Way
Antioch, CA 94531

Phone: (925) 755-1005
Fax: (925) 755-1007

Phone

If you want to speak directly with technical support, call us at **(925) 755-1005**.

Fax

Fax a description of your problem or suggestion to us at **(925) 755-1007**.

Electronic Mail

Use our dedicated support address for e-mail based technical support:
support@diabloanalytical.com

World Wide Web

Use our web-based help desk to submit and track support requests:
http://www.diabloanalytical.com/support.htm

BTU Calculations

BTU calculations are based on the GPA 2172-96 Standard and the ASTM D3588-98(2003) Standard. The physical properties used in the calculations can be chosen and/or modified by the user. However, the software includes example configuration files and standard component tables from the GPA 2145-03 and GPA 2145-09 Standards.

Important:

Important: If you upgrade or re-install the BTU Calculator Software, all of the default configuration files will be overwritten with the current versions. Consequently, if you use any of the default configuration files as the basis for a custom configuration, make sure to save your configuration file with a different file name.

Disclaimer

Important:

Important: It is the customer's responsibility to ensure that the physical properties and other settings in the BTU Calculator configuration generate results that are correct for their application.

The choice of which physical property values to use is a business decision that can only be determined by you and your use of the data and results.

Please review the License Agreement and Limited Warranty displayed at the beginning of the printed manual for Diablo's limits on liability.

Pressure Base

All of the default configuration files use a Pressure Base of 14.696 or 14.73 psia. It is the customer's responsibility to determine the correct Pressure Base to use for their specific requirements. Note that the North American Energy Standards Board (NAESB) specifies a standard pressure base of 14.73 psia. Consequently many companies are adopting 14.73 as the standard pressure base for these calculations.

Rounding

Normalized mole percent values are rounded to the number of decimal places specified in the Data File Output Options setting of the configuration editor. If rounding causes the *total* normalized mole% not to sum to 100%, then a correction is made to the normalized mole% of the most concentrated component in the sample (usually methane) to force the total to 100%.

Water Calculations

If water exists as a component in the component list, then "Saturated" results will be calculated and reported along with the "Dry" results. If the mole% of water is greater than 0, then "Wet" results will also be calculated based on that mole% value.

See "Components" on page 16 for more information on setting up the component list to include water, and "Other Factors" on page 19 for information on setting up

water-related calculation factors.

Important:

Important: All calculations assume that the compositional analysis was performed on a *dry* basis. The component mole fractions from the dry analysis are corrected for the water mole fraction when performing the saturated and wet calculations.

Disabling BTU Calculations

The BTU calculations can be disabled if you want to use the software only for general reporting and exporting of EZChrom and Cerity analysis results. See "Report" on page 21 for more information.

Resources

Gas Processors Association

6526 East 60th Street

Tulsa, Oklahoma 74145

Phone: 918-493-3872

Web: www.gasprocessors.com

ASTM International

100 Barr Harbor Drive

PO Box C700

West Conshohocken, PA 19428-2959

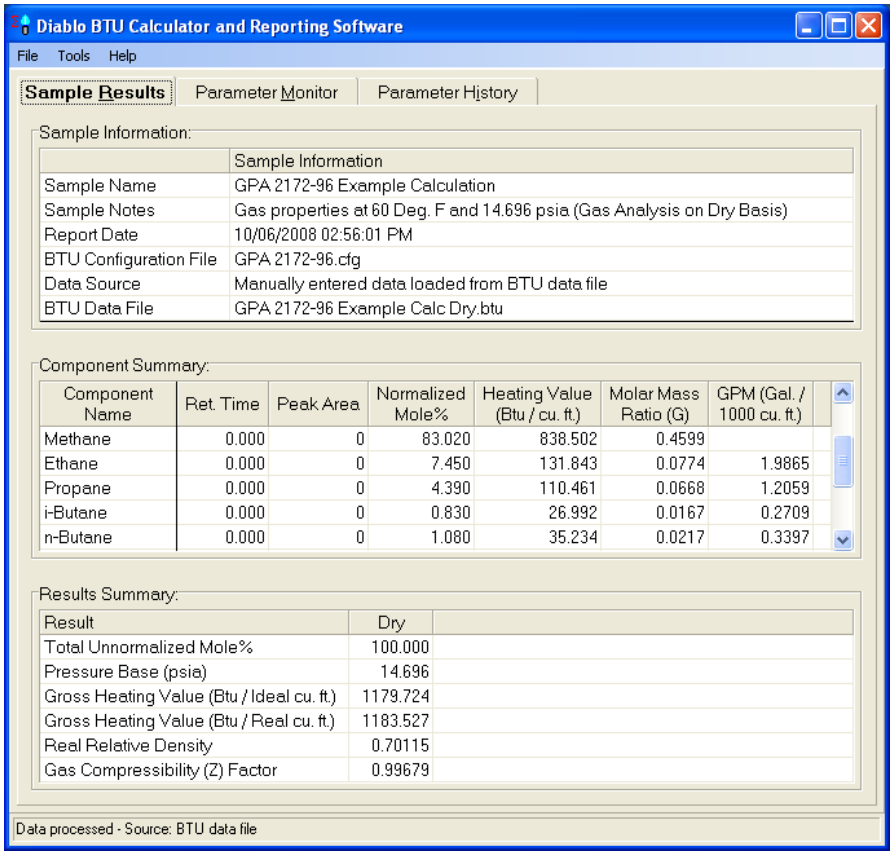
Phone: 610-832-9585

Web: www.astm.org

Getting Started

The Sample Results Window

After starting the software, the following window is displayed. This window shows the "Sample Results" tab containing the results of the last BTU analysis (but will be blank when the software is first started).



The "Sample Results" tab on the Main Screen of the Diablo BTU Calculator

Sample Information

This section of the main screen contains the sample information that was passed to the software from the chromatography data system, or was entered by the user during manual processing. You can also define custom sample information fields if you would like to include additional data in the report. See "Sample Info" on page 23 for more information on this capability.

Note: Blank sample information fields are *not* displayed in the sample Information table.

Component Summary

This section contains a summary of the individual component results as well as the total normalized mole% (should always be 100%), the total Gross Heating Value (BTU / ideal cu. Ft.), the total Molar Mass Ratio (Ideal Relative Density), and the GPM value (gallons / 1000 cu. ft.).

Results Summary

The calculation results are displayed in this section of the main screen. Results displayed include,

The Total Unnormalized Mole%

The Pressure Base used for the calculation

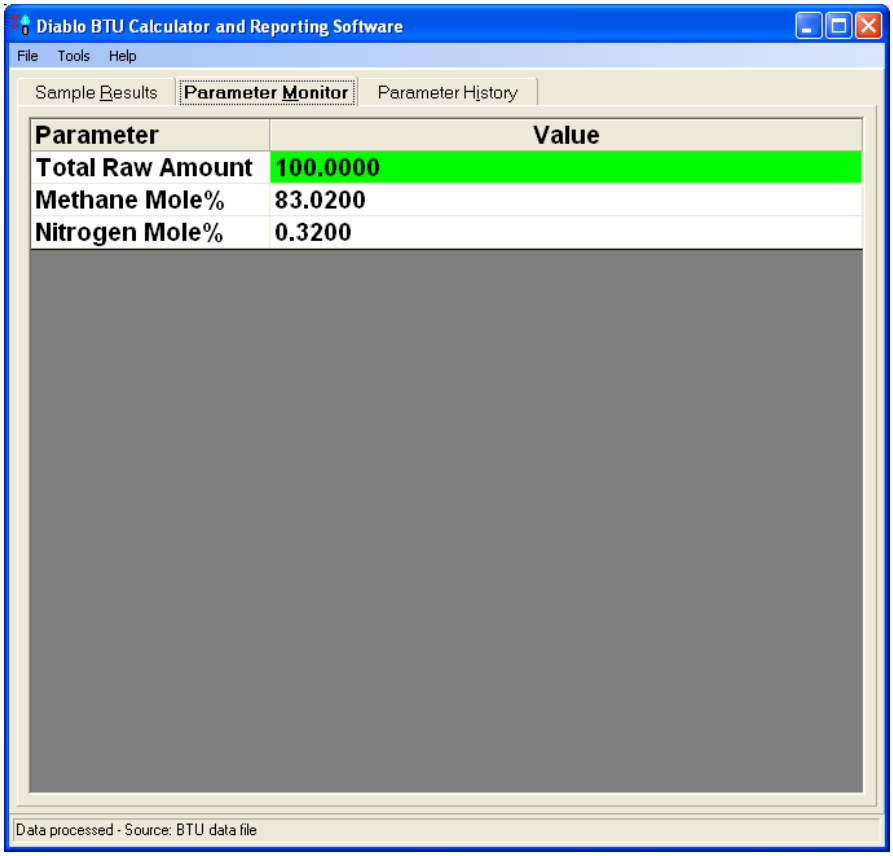
The Gross Heating Value (BTU / real cu. Ft.)

The Real Relative Density

The Gas Compressibility (Z) Factor

The Parameter Monitor Window

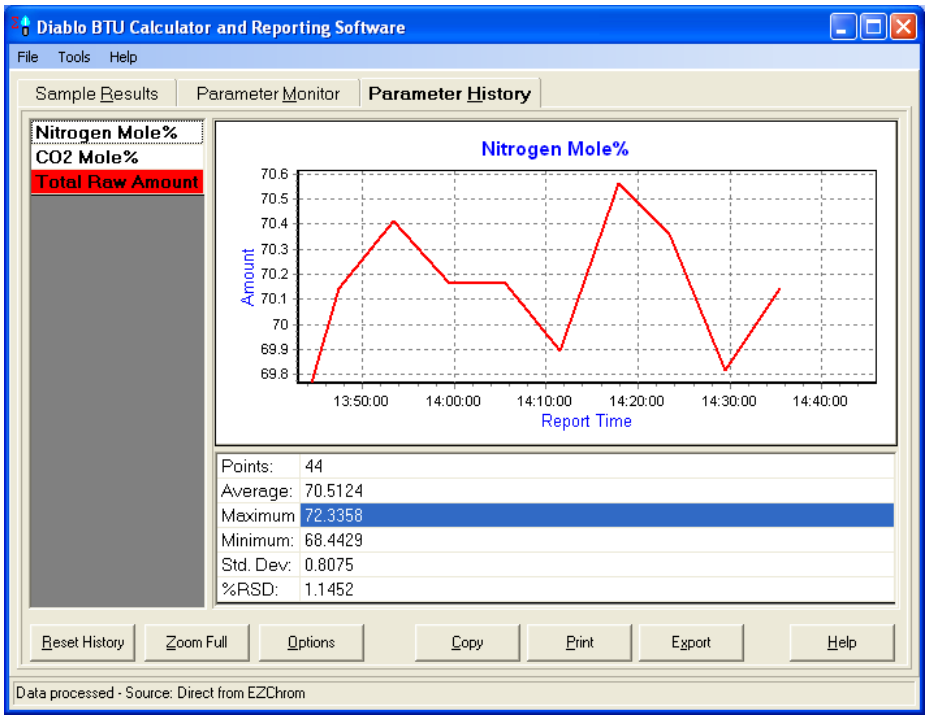
This window shows the Parameter "Monitor" tab that displays the results from the last analysis for any monitored parameters. High and low alarm limits can be set up for each monitored parameter. See "The Parameter Monitor" on page 31 for more information on this capability.



The "Parameter Monitor" tab on the main screen of the Diablo BTU Calculator

The Parameter History Window

This window shows the Parameter History tab that can be enabled to plot the historical values of any of the monitored parameters. See "Parameter History" on page 32 for more information on this capability.



The "Parameter History" tab on the main screen of the Diablo BTU Calculator

Quick Start Instructions

The following instructions describe the key steps that should be performed when using the software for the first time. You will find more detailed instructions in later sections of this manual.

Load and Edit the Configuration File

The first time you run the BTU Calculator you should configure the settings for your application. To open the configuration editor, select the "Edit Configuration.." option of the "Tools" menu. Additional information about configuring the software can be found in "Configuring the Software" on page 15. The default configuration files shipped with the software are listed in the following table.

Important

Important: If you upgrade or re-install the BTU Calculator Software, all of the default configuration files listed in this table will be overwritten with the current versions. Consequently, if you use any of these default configuration files as the basis for a custom configuration, make sure to save your configuration file with a different file name.

BTU Calculator Default Configuration Files	
File	**Description**
Default.cfg	Contains a set of common components with calculation factors taken from GPA Standards 2145-09 and 2172-96 (Hydrogen and Argon). The Pressure Base is set to 14.73 in this file. This is the settings file that will be loaded when you first start the software.
Hexanes plus.cfg	An alternate version of the default configuration file that contains the "hexanes+" component in place of hexane, heptane, and octane. The calculation factors used for the hexanes plus component are based on a 60:30:10 mixture of hexane, heptane, and octane. The GPA 2145-09 Standard was used to calculate the Hexanes+ calculation factors.
GPA 2172-96.cfg	Contains the components and factors used for the example calculations in the GPA 2172-96 standard. The Pressure Base is set to 14.696 in this file.
GPA 2172-96 Wet.cfg	Same as above but includes Water as a component for Saturated/Wet calculations.
GPA 2145-03.cfg	Contains the components and factors in the GPA 2145-03 Standard. The Pressure Base is set to 14.696 in this file.
GPA 2145-03 Wet.cfg	Same as above but includes Water as a component for Saturated/Wet calculations.
GPA 2145-09.cfg	Contains the components and factors in the GPA 2145-09 Standard. The Pressure Base is set to 14.696 in this file.
GPA 2145-09 Wet.cfg	Same as above but includes Water as a component for Saturated/Wet calculations.
ASTM D3588-98 (2003).cfg	Contains a sub-set of the components and factors in the ASTM D3588-98 (2003) standard. The Pressure Base is set to 14.696 in this file.
ASTM D3588-98 (2003) Wet.cfg	Same as above but includes Water as a component for Saturated/Wet calculations.

The software uses the settings file "Default.cfg" when first started. However, you can use the "Load" button to choose the settings file that contains the components and factors that most closely match your application. You can then add/delete components and adjust factors as needed.

Important:

Important: The order of the components in the component settings table is the order that they will be printed in the BTU report. You can easily rearrange the component order by first selecting a component's row in the table by ***left*** clicking on that row with the mouse. Next, while the cursor is still pointing to that row, click and hold the ***right*** mouse button and drag the component to a new location in the table. The row being moved will be highlighted in red. Release the right mouse button when the component is located at the desired position in the table.

Specify Other Calculation Parameters

Make sure to set the Pressure Base to the correct value for your location.

Set the Report Preferences

Modify the report titles as desired. In addition, check "Print report for automatically processed results" if you would like a report to be printed automatically when the software generates a BTU report upon receiving a request from the Agilent Cerity or EZChrom data system. The report will be printed to the default printer.

Set the Data File Preferences

Specify the directory into which you would like to save BTU data files – use the "Browse" button to select or create the desired directory.

Automatic file saving

Check this box if you would like to have a data file created in the default data directory during automatic processing of data from the Agilent Cerity or EZChrom data system. The data files are named using a date + time format:

YYYYMMDD-HHMMSS.BTU

Where YYYYMMDD is the current date and HHMMSS is the current time (e.g. 20050208-153423.BTU).

File Naming Options

Check this box if you would like to have the sample name added to the Date+Time formatted file name during automatic processing. If you enable this option, then you can also choose whether to add the sample name *before* (e.g. NGA Sample-20050208-153423.BTU) or *after* (e.g. 20050208-153423- NGA Sample.BTU) the file name.

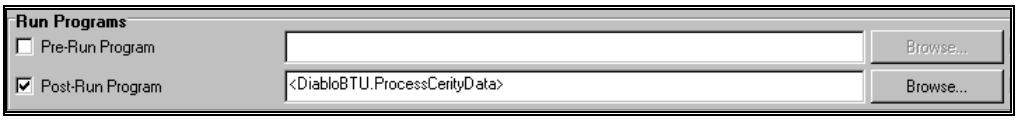
Automatic Processing from the Agilent Cerity Data System

Important:

Important: In order to process results from the Agilent Technologies Cerity data system, you must first make sure that the names in the component settings table ***exactly*** match the compound names in the Cerity calibration table. For example, if a compound is named "Hexane" in the Cerity calibration table, it must also be entered as "Hexane" in the BTU component settings table (not "n-Hexane", or "nC6").

In order to have a BTU report generated automatically from Cerity after a run, you must edit the Cerity method by checking the "Post-Run Program" box in the "Run Programs" section of the Cerity Method screen (see the screen shot below). You must then place the following command exactly as shown below in the associated text box:

<DiabloBTU.ProcessCerityData>



Screen shot of the Agilent Cerity Method screen configured to run the Diablo BTU Calculator automatically after each run.

If you have checked "Print report for automatically processed results" in the BTU Calculator settings, then a report will automatically be calculated and printed after each Cerity analysis using this Method. Similarly, if you have checked the "Save data file to default directory for automatically processed results" in the BTU Calculator settings, then a BTU data file will be saved automatically.

See "The Agilent Cerity Data System" on page 34 for more information about automatic processing and reprocessing of Cerity samples.

Automatic Processing from the Agilent EZChrom Data System

See "Agilent Technologies EZChrom Data System" on page 36 for information how to configure EZChrom and the BTU Calculator for automatic processing.

Running the Software

The Main Menu

The Diablo BTU Calculator is configured and controlled using the following menu options:

File Menu

New Data File

Select this option to create a new data file and manually enter mole percent data. See "Manual Data Processing and Reporting" on page 34 for more information.

Open Data File…

Select this option to open an existing BTU data file saved on disk.

Save Data File As…

Select this option to save the current data and results to a BTU data file.

Export Current Results

Select this option to export the current results to a text file using the settings specified in the Export section of the current configuration.

Load Configuration …

Select this option to load a configuration file from disk. This is a shortcut to opening the configuration editor and pressing the "Load" button.

Print

This menu option allows you to print either the results that are currently displayed in the main screen (Print > Report), or the current settings being used by the software (Print > Current Settings).

The “Print > Report” menu option allows you to send the report to either the printer (Print > Report > Send to Printer) or save it to an Adobe PDF file (Print > Report > “Save as PDF).

The “Print > Parameter History Plot…” menu option allows you to print the trend plot and summary statistics for the parameter currently selected in the Parameter History window.

Print Setup…

This option allows you to configure the printer.

Exit

This option immediately closes the software.

Tools Menu

Edit Configuration…

This option displays the BTU Configuration Dialog box. See "Configuring the Software" on page 15.

Edit Current Data Set…

This option allows you to re-edit manually entered data sets. It is not available when an automatically processed data set from the Cerity data system is loaded. See "Manual Data Processing and Reporting" on page 34.

Show Export Template Variables…

Displays a table of the “variables” that can be used in an export template file. See the Appendix for more information about Export Templates.

Help Menu

Help Contents…

Displays the contents page of the Diablo BTU Calculator help file.

View Release Notes

Opens the current release notes (readme.txt). The release notes document the latest changes and enhancements to the software that may not have made it into this document.

GPA 2145-09 Migration Help…

Displays a special help file that describes procedures you can use to convert your existing BTU Calculator configurations so that they are using the GPA Standard 2145-09 physical property constants.

License Status…

Displays the current license status of the Diablo BTU Calculator software. This menu option is not displayed in versions of the software that were purchased under a site license.

About Diablo BTU Calculator…

Displays support and version information about the Diablo BTU Calculator.

Configuring the Software

The software is configured using the "Diablo BTU Configuration" dialog box, which is displayed by selecting the "Edit Configuration.." option of the "Tools" menu. Note that this dialog box is resizable.

Managing Configuration Files

You can Load and Save configuration files using the "Load and "Save" buttons. The “Save As” button allows you to save the current configuration to a new file.

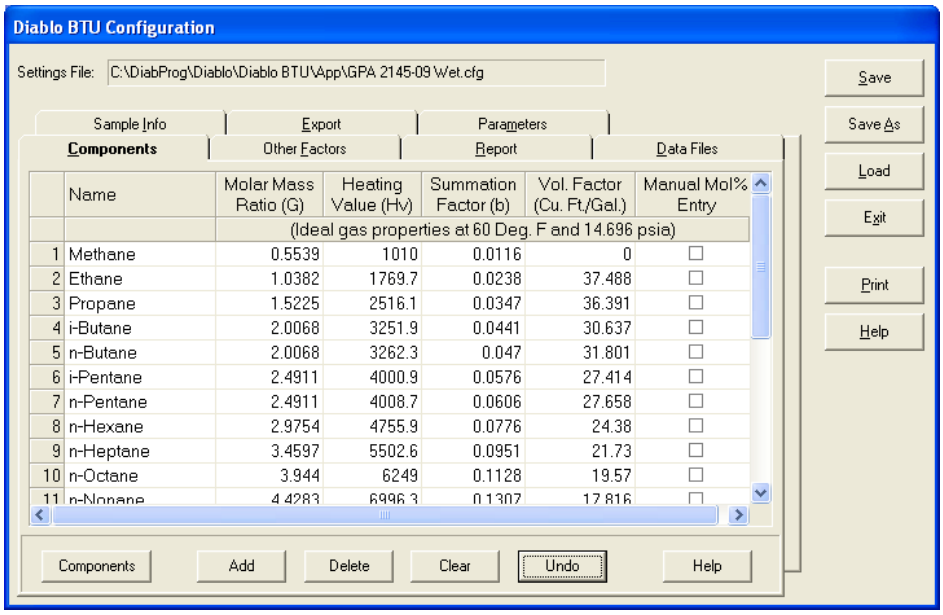
Configuration files are saved by default in the Diablo BTU Calculator installation directory. You can also print a settings report using the "Print" button.

Important

Important: If you upgrade or re-install the BTU Calculator Software, all of the default configuration files will be overwritten with the current versions. Consequently, if you use any of the default configuration files as the basis for a custom configuration, make sure to save your configuration file with a different file name.

Components

The components "tab" of the configuration dialog is used to manage the list of components that will be included in the calculations and report. You can either edit the component properties directly, or you can click the "Components" button to select from a list of standard components and their physical properties. See "Standard Component Physical Properties" on page 18 for more information.



The "Components" Tab of the Diablo BTU Configuration Screen

Component Name

The component names entered in the components table will be displayed in the component summary tables and BTU report.

Important:

Important: If you are going to be processing data from the Agilent Cerity data system or the Agilent EZChrom data system, then you must make sure that the names in the component table match the names in the Cerity or EZChrom calibration/report exactly. See "The Agilent Cerity Data System" on page 34 or "Agilent Technologies EZChrom Data System" on page 36.

Component physical properties

Enter the following physical properties for each component. Refer to published data sources such as GPA Standard 2145-03 or 2145-09.

Important:

Important: These physical properties should be ideal gas properties at 60 Degrees F and 14.696 psia. Entering physical properties determined at different temperatures or pressures will result in incorrect calculations.

Molar Mass Ratio (G, Relative Density)

Gross Heating Value (Hv, BTU /cu. ft.)

Summation Factor (b)

Volume Factor (cu. ft. ideal gas / gallon liquid)

Manual Mole% Entry

Check this box if you are using the software to generate BTU reports automatically from the Agilent Cerity or EZChrom data system, and you need to be able to enter the specified component mole percent based on the results of a separate analysis.

When the data from Cerity is processed, a dialog box will be displayed, allowing you to enter the component's unnormalized mole%, which will then be included in subsequent calculations.

Adding new components

Press the "Add" button to add a new row to the component table manually. The row will be added *below* the currently selected row. Enter the component name and calculation factors for the new component.

Deleting existing components

To delete a component from the component list, select the row containing the desired component and press the "Delete" button".

Changing the component order

The order of the components in the component settings table is the order that they will be printed in the BTU report. You can easily rearrange the component order by first selecting a component's row in the table by ***left*** clicking on that row with the mouse. Next, while the cursor is still pointing to that row, click and hold the ***right*** mouse button and drag the component to a new location in the table. The row being moved will be highlighted in red. Release the right mouse button when the component is located at the desired position in the table.

Clearing the table

Press the “Clear” button to delete all components from the component table.

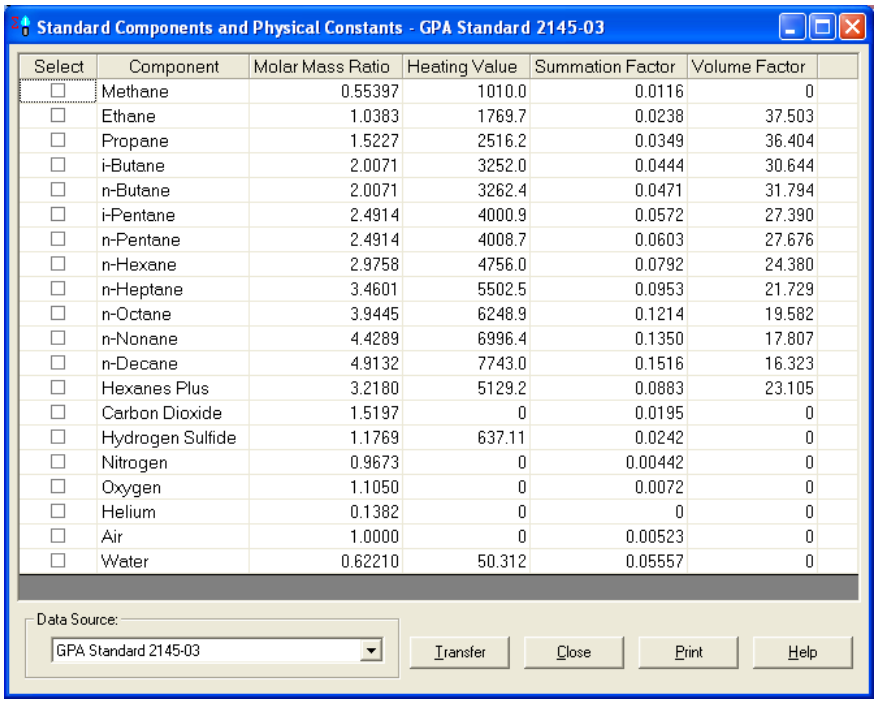
Undoing changes to the component list

Press the “Undo” button to return the component list to the last saved configuration.

Standard Component Physical Properties

Press the "Components" button on the Components tab of the configuration editor to display a table of standard components and their physical properties.

You can use the "Data Source" list box to display tables of standard physical properties from different data sources. These data sources currently include the GPA 2145-03 and 2145-09 Standards, and the extended component list from the GPSA Engineering Data Book (12 Edition, 2004).



Select	Component	Molar Mass Ratio	Heating Value	Summation Factor	Volume Factor
☐	Methane	0.55397	1010.0	0.0116	0
☐	Ethane	1.0383	1769.7	0.0238	37.503
☐	Propane	1.5227	2516.2	0.0349	36.404
☐	i-Butane	2.0071	3252.0	0.0444	30.644
☐	n-Butane	2.0071	3262.4	0.0471	31.794
☐	i-Pentane	2.4914	4000.9	0.0572	27.390
☐	n-Pentane	2.4914	4008.7	0.0603	27.676
☐	n-Hexane	2.9758	4756.0	0.0792	24.380
☐	n-Heptane	3.4601	5502.5	0.0953	21.729
☐	n-Octane	3.9445	6248.9	0.1214	19.582
☐	n-Nonane	4.4289	6996.4	0.1350	17.807
☐	n-Decane	4.9132	7743.0	0.1516	16.323
☐	Hexanes Plus	3.2180	5129.2	0.0883	23.105
☐	Carbon Dioxide	1.5197	0	0.0195	0
☐	Hydrogen Sulfide	1.1769	637.11	0.0242	0
☐	Nitrogen	0.9673	0	0.00442	0
☐	Oxygen	1.1050	0	0.0072	0
☐	Helium	0.1382	0	0	0
☐	Air	1.0000	0	0.00523	0
☐	Water	0.62210	50.312	0.05557	0

You can also double-click on any cell in the table to transfer that particular value to the Windows Clipboard. You can then paste that value into the component list.

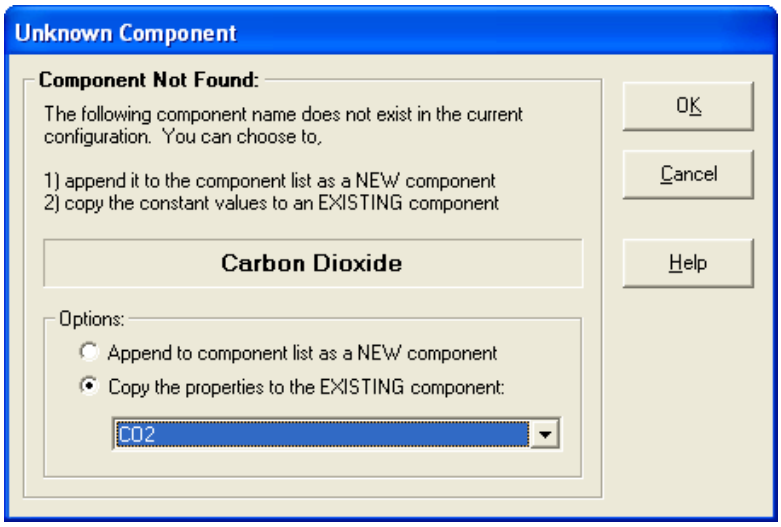
Important:

Important: Physical properties for "Hexanes Plus" are calculated assuming a 60:30:10 mixture of hexane, heptane, and octane.

After checking the components you want to add/update, click the "Transfer" button to transfer them to the component list. If a component with the same name already exists in the component list, its physical properties will be updated to those from the table. If there is no matching component with the same name, then the "Unknown Component" dialog box will be displayed.

Unknown Component Dialog Box

If you select a standard component whose name doesn't match one of the existing entries in your component list, the "Unknown Component" dialog box is displayed. This dialog box gives you the option to either append the selected standard component to the end of your component list, or to copy the physical properties for the standard component to an existing component in your component list. This allows you to update the physical properties for components that you may have named differently than the standard names ("CO2" vs. "Carbon Dioxide", for example)



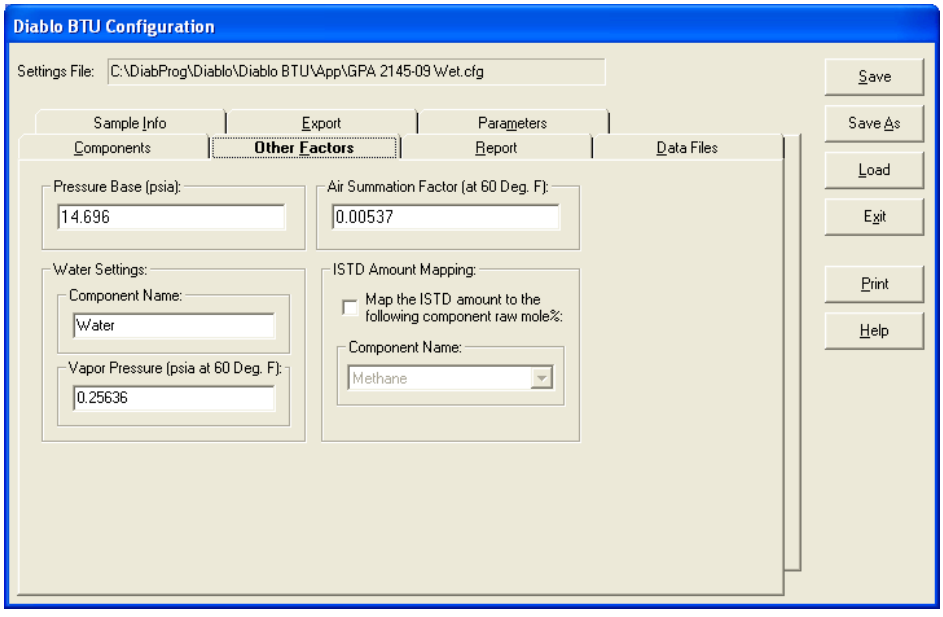
The "Unknown Components" dialog box.

To update the physical properties for an existing component, select "Copy the properties to an EXISTING component", and then choose the correct component name from the list box. Click "OK" to transfer the standard physical properties to the selected component in your configuration.

You will have to repeat this process for each unknown component in your configuration file.

Other Factors

The "Other Factors" tab of the configuration dialog allows you to specify additional calculation factors.



The "Other Factors" Tab of the Diablo BTU Configuration Screen

Pressure Base

Enter the pressure base in psia to use for the calculations into this text box. The calculated results will be corrected to reflect their values at the specified Pressure Base.

Note: All of the default configuration files that ship with the EZReporter software use a Pressure Base of either 14.696 or 14.73 psia (14.696 psia for the configuration files that derive from a GPA or ASTM standard, and 14.73 psia for "default.cfg" and "hexanes plus.cfg"). It is the customer's responsibility to determine the correct Pressure Base to use for their specific requirements. Note that the North American Energy Standards Board (NAESB) specifies a standard pressure base of 14.73 psia. Consequently many companies are adopting 14.73 as the standard pressure base for these calculations.

Air Summation Factor

The Air Summation Factor is used in the calculation of the real relative density. The current value of this property as specified in GPA Standard 2145-03 is **0.00523** and in GPA Standard 2145-09 is **0.00537**.

Water Settings for "Saturated" and "Wet" Calculations

These settings are used when calculating "Saturated" and "Wet" results when water is included in the component list.

Component Name: If a component with this name exists in the component list, then "Saturated" results will be reported along with the "Dry" results. If the mole% of this component in the analysis data is greater than 0, then "Wet" results will also be calculated based on that mole% value.

Important:

Important: The compound name in the component list must match this Water Component Name exactly.

Water Vapor Pressure: The vapor pressure of water at 60 Deg. F: **0.25636 psia**.

Internal Standard Amount Mapping

This is an *advanced* option that allows you to map the Internal Standard Amount from an EZChrom analysis to the raw mole% of one of the components. This means that you can enter a result from another analyzer (e.g. H2S from a Draeger tube) into the EZChrom sequence, and have it automatically applied to the specified component without requiring reprocessing or prompting.

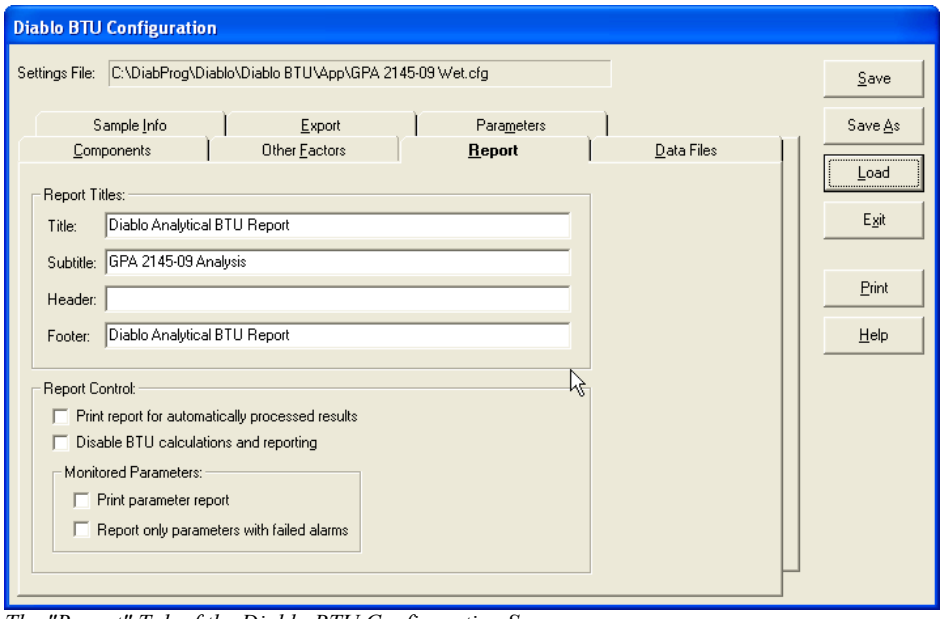
Important:

Note 1: EZChrom will switch the ISTD Amount from 0 or blank to 1 in the sequence table. Consequently, you must enter a very small non-zero number for 0 (for example 0.000001).

Note 2: In order to enable this capability, you must configure EZChrom's Advanced Method options to export a standard Sample Information Report file. See "Configure EZChrom for Data Export" on page 36 for more information.

Report

The "Report" tab of the configuration dialog allows you to customize the printed BTU report.



The "Report" Tab of the Diablo BTU Configuration Screen

Report Titles

You can customize the text that is printed on the BTU report – the title and subtitle as well as the header and footer.

Report Control

Check the “Print report for automatically processed results” box if you would like a report to be sent to the default printer when processing data automatically from the Agilent Cerity data system.

Disable BTU Calculations and Reporting

If you want to use the software for general reporting and exporting, you can disable BTU calculations by checking this check box under Report Control.

Important:

Important: The resulting report/results will not include any of the calculated BTU results – only the component retention time, peak area, raw (un-normalized) amount, and total raw (un-normalized) amount. All other features of the software including exporting and monitoring, still work as normal.

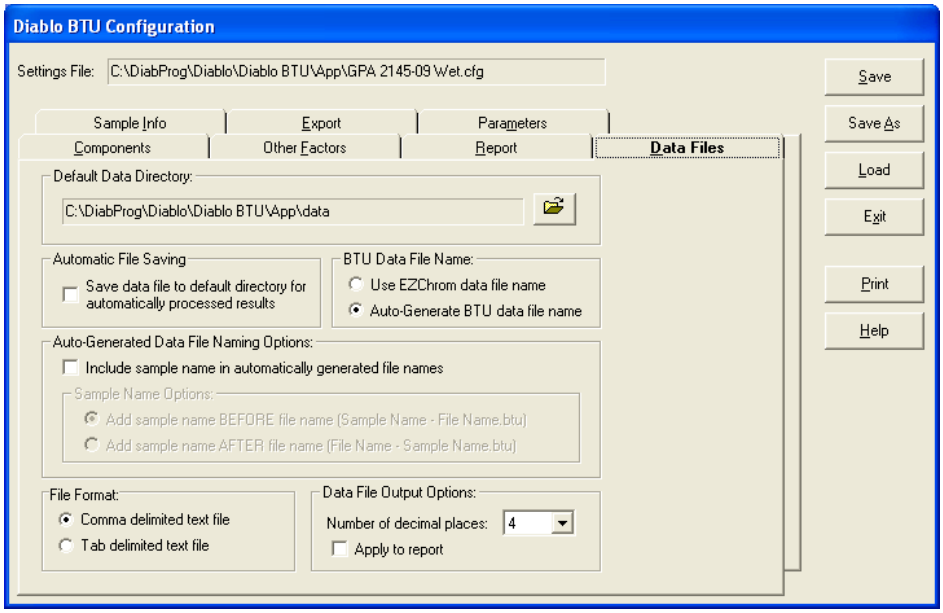
Monitored parameters

Check the “Print parameter report” option if you would like to have a monitored parameter report printed along with the standard results report. If you also check the “Report only parameters with failed alarms” option, then only those parameters

whose value has exceeded an enabled alarm limit will be included in the parameter report.

Data Files

The settings in the "Data Files" tab of the configuration dialog allow you to customize how BTU data files are handled.



The "Data Files" Tab of the Diablo BTU Configuration Screen

Default Data Directory

Specify the directory into which you would like to save BTU data files – use the "Browse" button to select or create the desired directory.

Automatic File Saving

Check this box if you would like to have a data file created in the default data directory during automatic processing of data from the Agilent Cerity or EZChrom data systems. There are two options available for naming the BTU data files

Use EZChrom Data File name

If you choose this option, the BTU data file will be named based on the source data file name generated by the EZChrom data system. The file will be named with the same base filename, but with the ".BTU" file extension instead of the ".DAT" file extension.

Auto-Generate BTU data file name

The data files are named using a Date + Time format:

YYYYMMDD-HHMMSS.BTU

Where YYYYMMDD is the current date and HHMMSS is the current time (e.g. 20050208-153423.BTU).

Auto-Generated Data File Naming Options

Check this box if you would like to have the sample name added to the Date+Time formatted file name during automatic processing (e.g. NGA Sample-20050208-153423.BTU).

Sample Name Options

This option allows you to set whether the sample name is added before or after the file name. Select "Before" (e.g. NGA Sample-20050208-153423.BTU) if you want the data files to sort alphabetically by sample name when you view the data file directory in Windows Explorer. Select "After" (e.g. 20050208-153423-NGA Sample.BTU) if you want the data files to sort by the Date/Time.

File Format

This option sets whether the BTU data files are saved using a Comma or a Tab as the delimiter character between fields in the file.

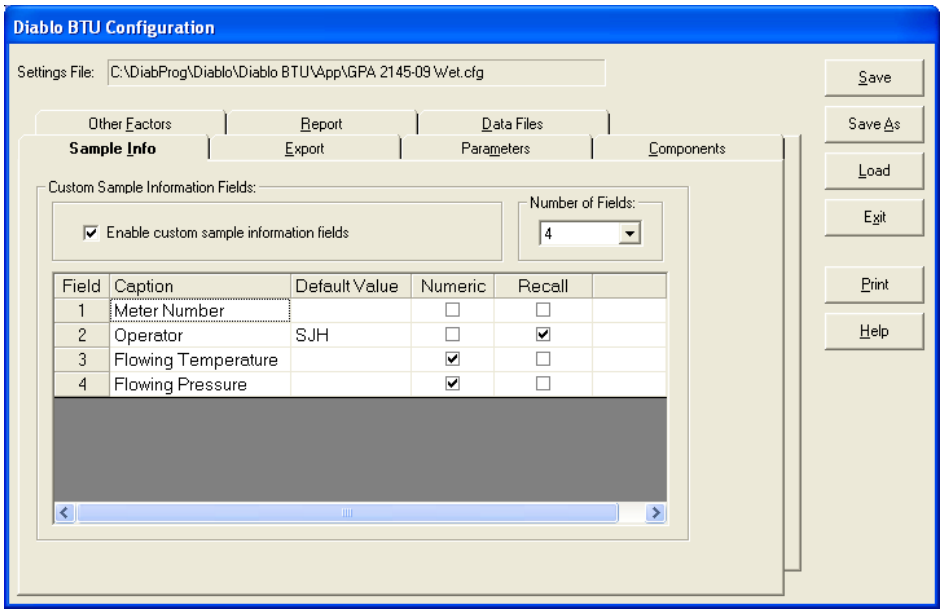
Data File Output Options

Use this option to set the number of decimal places that will be reported for numeric results. This setting is also used as the default number of decimal places for calculated numeric results in export files. If "Apply to report" is checked, then calculated numeric results displayed in the report window will also be rounded to the specified number of decimal places.

Important: **Important:** The normalized mole% values will be rounded to the number of decimal places specified in this setting before they are used in any calculations. In addition, if rounding causes the *total* normalized mole% not to sum to 100%, then a correction is made to the normalized mole% of the most concentrated component in the sample (usually methane) to force the total to 100%.

Sample Info

These options allow you to enable and configure custom sample information fields that can be used to report additional conditions like well number, pressure, temperature, etc. They are simply a way for the user to enter additional custom information during a BTU analysis, and have that information printed on reports and saved in the data and export files.



The "Sample Info" Tab of the Diablo BTU Configuration Screen

Check the “Enable custom sample information fields” checkbox to enable the custom sample information fields. Select the number of fields to display up to a maximum of 10, and then enter the captions for each of those fields. These are the captions that will be displayed in the printed report, and when you are prompted to enter the associated custom sample information. You can also specify whether the field is numeric.

Default Value

A default value can be specified for each of the custom sample information fields. The default value will be displayed automatically when the Sample Information dialog box is displayed. However, if the “Recall” option is set and a previous value exists for the field, then the previous value will be displayed instead of the default value.

Numeric Sample Information Fields

If a sample information field is numeric, special numeric formatting and scaling can be applied to the value in the export file. See “Data Export” on page 25 for more information.

Recall Last Value

Check the “Recall” check box if you would like the last value entered into this field to be recalled when the form is displayed.

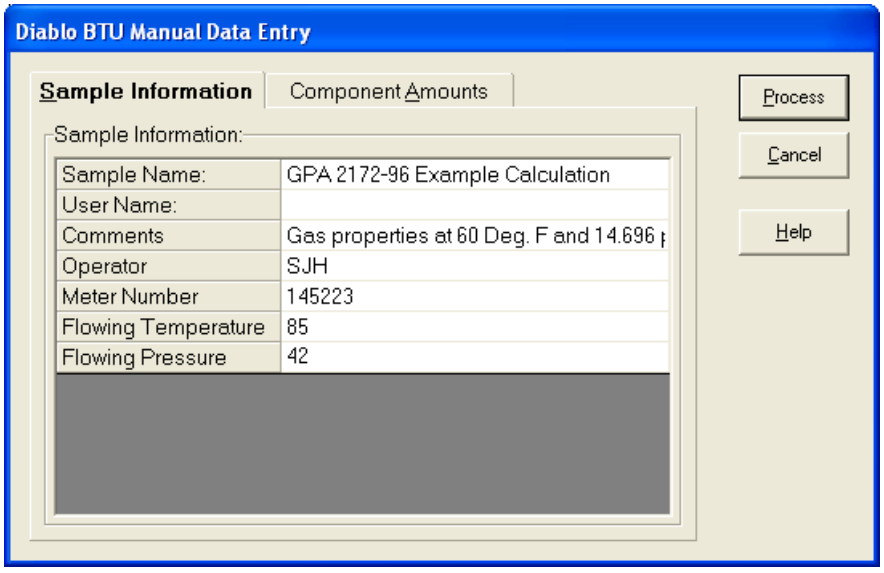
Changing the order of Sample Information Fields

The order of the fields in the sample information table is the order that they will be printed in the BTU report and displayed in the sample information prompt. You can easily rearrange the field order by first selecting a field's row in the table by ***left*** clicking on that row with the mouse. Next, while the cursor is still pointing to that

row, click and hold the ***right*** mouse button and drag the field to a new location in the table. The row being moved will be highlighted in red. Release the right mouse button when the field is located at the desired position in the table.

Entering custom sample information:

If you have enabled custom sample information fields, and if at least one of the fields contains a caption, then "Manual Data Entry" dialog box will be displayed when automatically processing the data from Cerity. This dialog box will display the caption(s) specified in the Sample Info configuration, and allow the associated custom sample information to be entered by the user. Alternatively, you can manually enter the sample information using the "Tools > Edit Current Data Set…" menu option.



The "Diablo BTU Manual Data Entry"dialog showing the custom sample information fields.

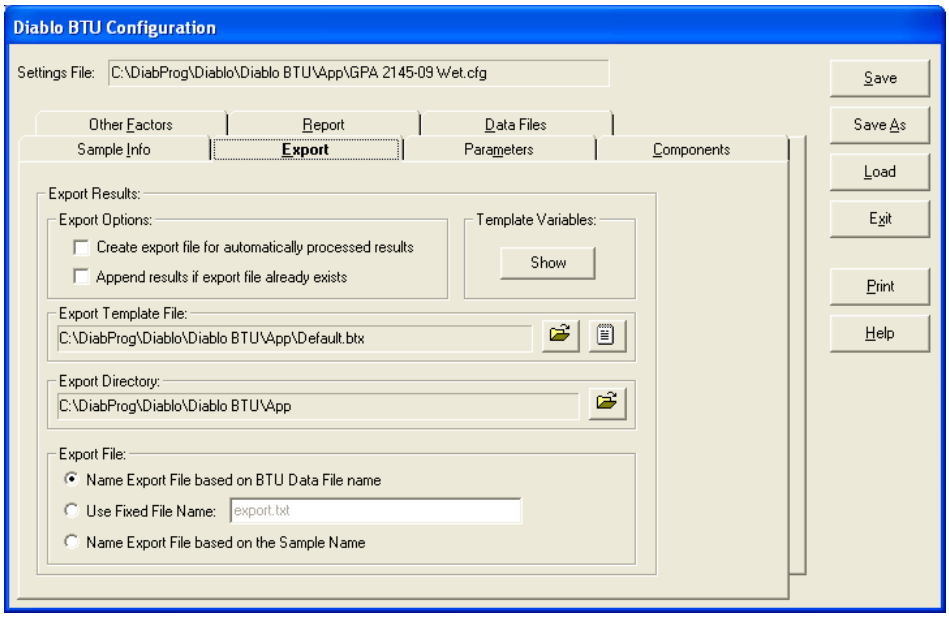
Data File Field Tags:

The following table lists the "tags" that are used to identify the custom sample information fields in the data file.

Field	Data File Tag
1	SampleInfo1
2	SampleInfo2
3	SampleInfo3
4	SampleInfo4
. . .	. . .
10	SampleInfo10

Data Export

The BTU Calculator software includes a flexible data export feature that allows you to create custom data export files in almost any format you might need. An export template file defines the format of the export file.



Export Configuration Panel

Export Options

Check “Create export file for automatically processed results” if you want the results from a Agilent Cerity or EZChrom analysis to be exported automatically when the data is processed by the BTU Calculator software.

Check “Append results if export file already exists” if you want the exported results to be appended to any results that already exist in the specified export file. If this option is unchecked, then existing results will be overwritten.

Export Template File

Click the “Open” button to specify the template file that will be used to create the export file. Click the “Notepad” button to open the selected export template file in Windows Notepad for editing. See “Export Template Format” in the Appendix on page 41 for information on creating and editing Export Template files. Note that several example template files are included with the software in the application installation directory.

Export Directory

Click the “Open” button to select the directory to which export files will be saved.

Export File

These options are used to specify the export file name. You can choose to name the export file based on the name of the BTU data file, or you can enter a “fixed” file name. If you choose the first option, the export file will have the same base file name as the BTU data file, but will have a “.TXT” file extension instead of the “.BTU” extension.

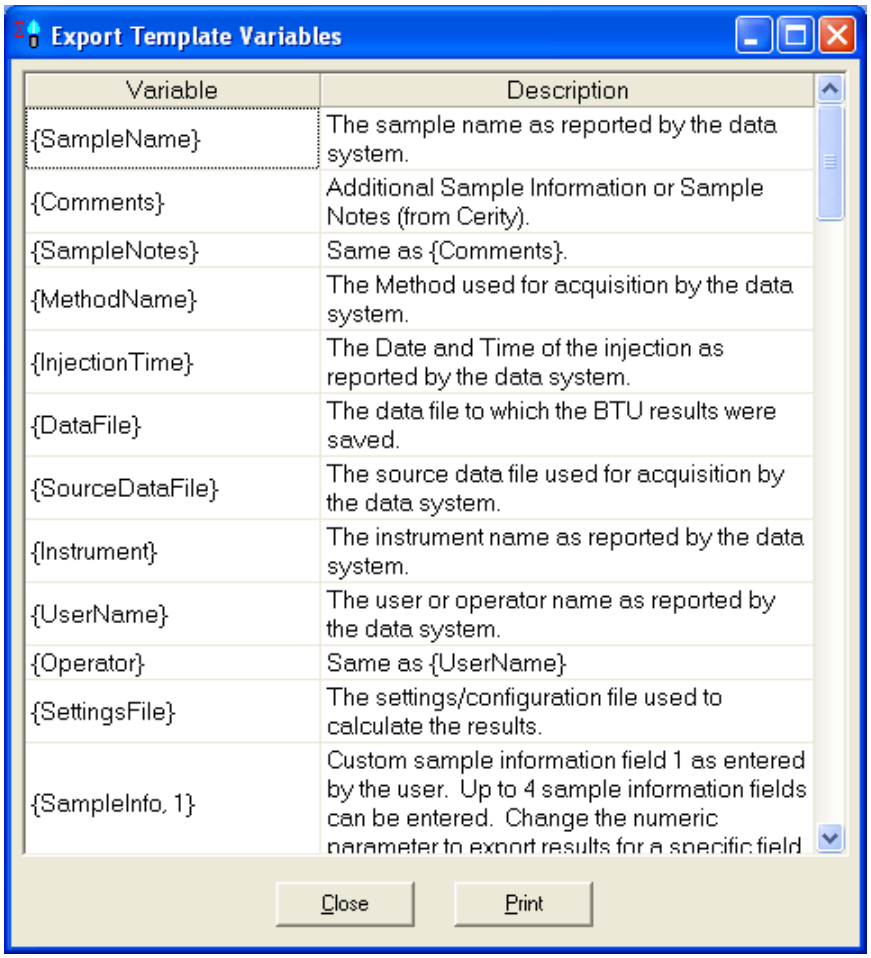
You can also have the export file named based on the sample name. This allows results from replicate runs of the same sample to be added appended to the same export file even though the data file names are different.

Show Template Variables

If you click this button, a table of supported template variables with descriptions will be displayed. You can print this list by pressing the "Print" button.

Hint:

Hint: If you double-click on a particular variable, it will be copied to the Windows clipboard so that you can paste it into a template file.

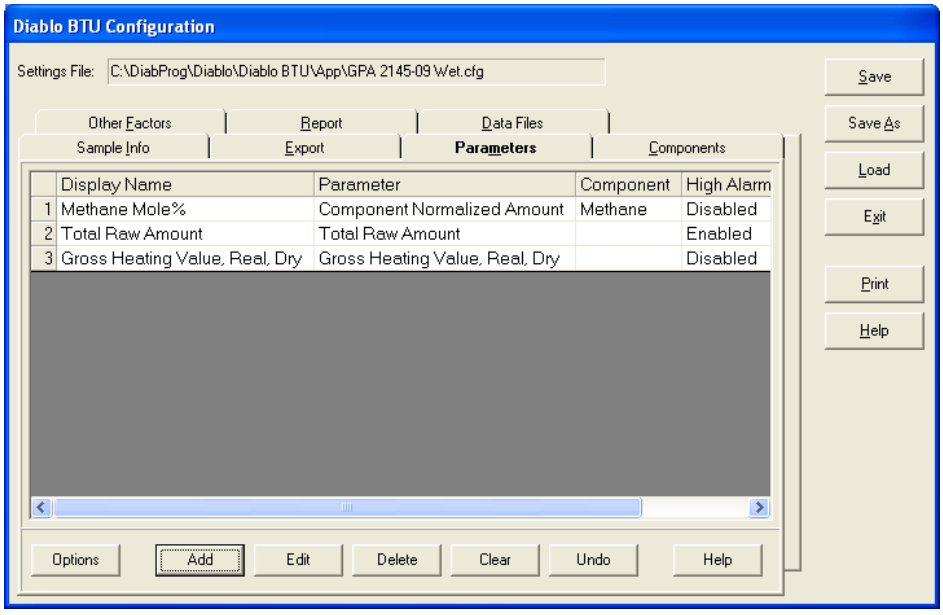


BTU Calculator Template Variable Table

Parameter Options

The "Parameters" tab allows you to configure a list of component or calculated results that will be displayed in the "Parameter Monitor" window of the main software screen. You can set both high and low alarm limits for these monitored parameters – if the parameter value exceeds either of these limits, the result will be

displayed with a red background in the parameter table to alert you.



The Monitoring configuration panel

Options: Clicking the "Option" button displays theMonitoring Options dialog box. See "Setting Monitored Parameter Options" below for more information.

Add: Clicking the "Add" button allows you to configure and add a new parameter to the monitored parameter table. See "Adding or Editing Monitored Parameters" below for more information.

Edit: Clicking the "Edit" button allows you to edit the options for the parameter that is currently selected the parameter table. You can also double-click the desired row in the table to edit a parameter's options. See "Adding or Editing Monitored Parameters" below for more information.

Delete: Clicking the "Delete" button will remove the selected parameter from the parameter table.

Clear: Clicking the "Clear" button will clear the parameter table.

Undo: Clicking the "Undo" button will restore the parameter table to the last saved configuration.

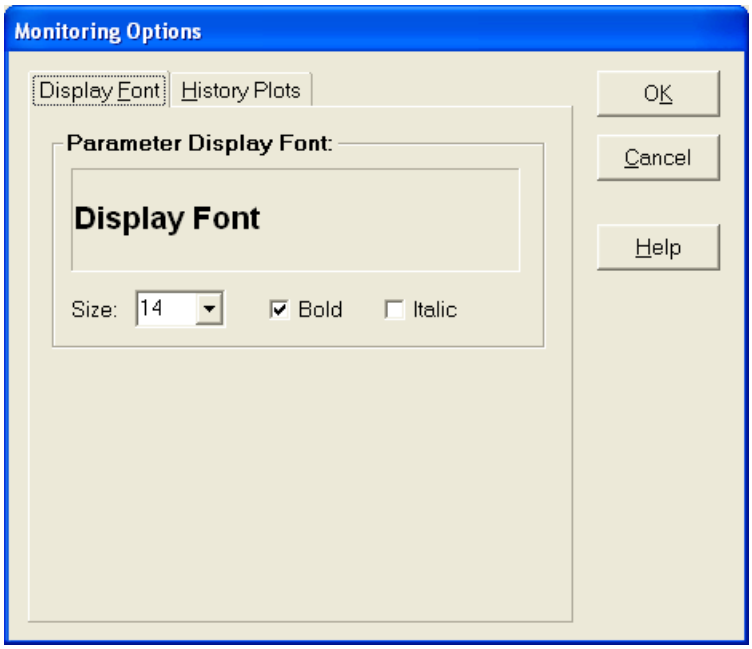
Help: Clicking the "Help" button displays context-sensitive help for this topic.

Setting Monitored Parameter Options

Click the "Options" button to set additional options for the Monitor. Currently the only additional option is the to set the size and bold/italics attributes of Monitor Display Font.

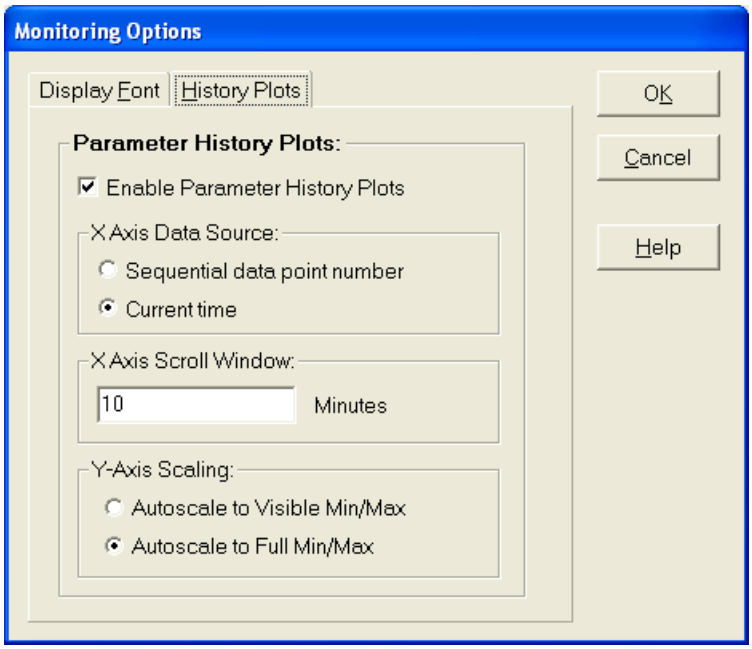
Display Font Tab

Use the "Size" list box and "Bold" and/or "Italic" check boxes to set the desired font for the Monitor Table. A preview of the font is displayed for you.



Parameter Monitor Options Dialog – Display Font Tab

History Plots Tab



Parameter Monitor Options Dialog – History Plots Tab

Enable Parameter History Plots: Check this box to enable history plots for the monitored parameters.

X-Axis Data Source: You can choose to plot the parameter values against a sequential data point/run number, or the current time when the report/results are generated.

X-Axis Scroll Window: The X-Axis will automatically zoom to this time (in minutes) or data point window. When new results are received, older data points outside this window will no longer be visible. However, the entire history plot can be displayed at any time by clicking the "Zoom Full" button, or double-clicking on the plot window.

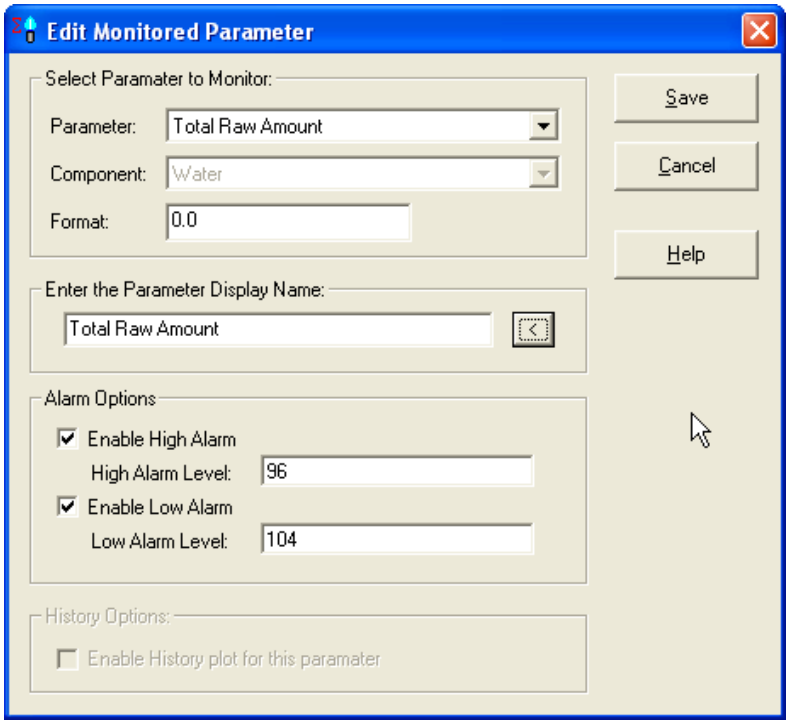
Y-Axis Scaling: You can choose to have the y-axis scale adjusted automatically so that the range includes only the data points that are visible in the current plot/window. Alternatively, you can choose to have the y-axis scale adjusted so that it represents the full range of parameter values, including those outside the current plot/window.

Important:

Important Note: If you have enabled either high or low alarm limits in the parameter configuration, then those limits will be displayed as red, dotted lines on the history plot. Those alarm limits are included when determining the Y-axis range.

Adding or Editing Monitored Parameters

Click the "**Add**" button to add a new monitored parameter or the "**Edit**" button to edit the monitored parameter currently selected in the parameter table (you can also double click the line in the table that you want to edit). You can also clear the current table by pressing the "**Clear**" button, or undo any changes you have made to the table by pressing the "**Undo**" button.



The Edit Monitored Parameter dialog

Display Name: The text entered into the "Display Name" text box will be displayed for this parameter in the Monitor Table. You can click the [<] button to copy text from the parameter and component (if appropriate) list boxes into the text box.

Parameter: Select the parameter that you want to monitor from this list box. If you select a parameter that is derived from a component result (component amount, for example), then you will also need to specify the corresponding component from the component list box.

Component: If you select a parameter that is derived from a component result (component amount, for example), then you will also need to specify the corresponding component from the component list box.

Format: You can set the numeric formatting for the displayed parameter value by entering a format string in this text box. Examples of common formatting strings are shown in the table below.

Format String	Result
0	Will display all digits to the left of the decimal point and no digits to the right: The value 10000.2324 will be displayed as 10000 The value 0.2324 will be displayed as 0
0.00	Will display all digits to the left of the decimal point and two digits to the right of the decimal place: The value 232.4012 will be displayed as 232.40 The value 232 will be displayed as 232.00
0.0###	Will display all digits to the left of the decimal place, and from 1 to 4 digits to the right of the decimal place: The value 232.4012 will be displayed as 232.4012 The value 232.4 will be displayed as 232.4 The value 232 will be displayed as 232.0

Common numeric formatting strings

Alarm Options: You can enable both high and low monitoring alarms by checking either one or both of these check boxes and filling in the desired alarm level/limit. If the alarm is enabled and the parameter value exceeds the specified limit, the result will be displayed with a red background in the Monitor Table to alert you. Conversely, if the alarm is enabled and the parameter value does *not* exceed the limit, the result is displayed with a green background.

Enable History Plot for this parameter: If you check this box, then the value of this monitored parameter will be plotted in the Parameter History display. Note that you must first enable Parameter History Plots. See Setting Monitored Parameter Options for more information.

Using Monitored Parameters and History Plots

The Parameter Monitor

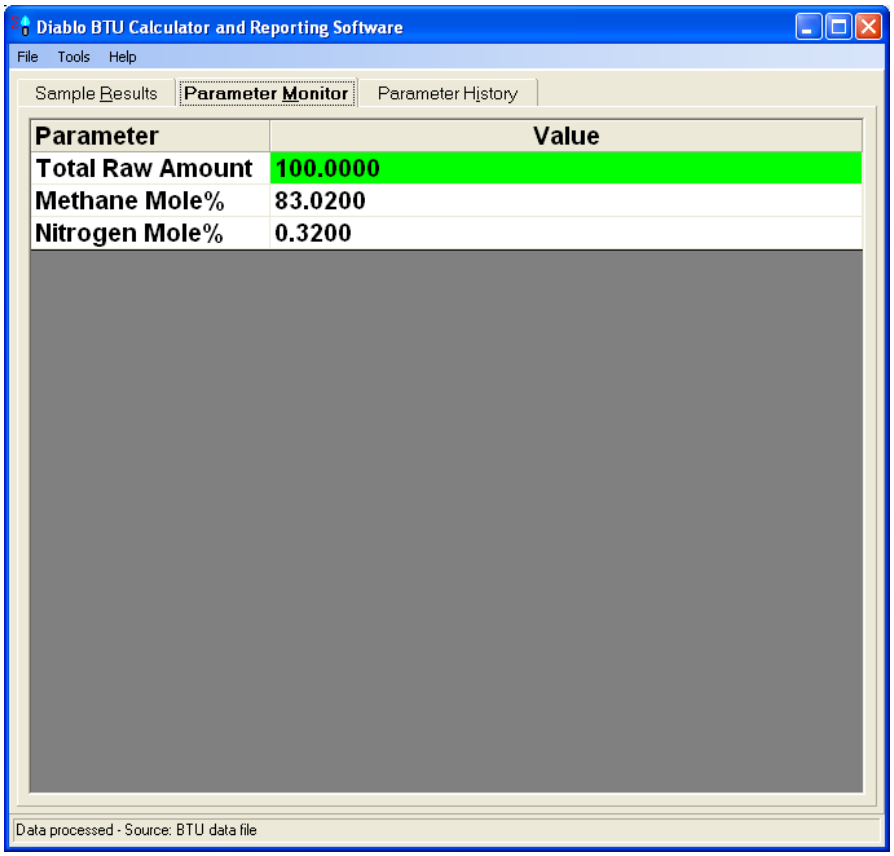
Monitored parameters are displayed in a table on the "Parameter Monitor" tab of the main software screen. The parameter table displays the results for monitored parameters from the last analysis or last data file loaded.

If either the high or low alarm is enabled for any of the monitored parameters, then the background color of the parameter value will be either red or green depending on

whether the actual value exceeds the enabled alarm limit.

Hint:

Hint: You can double click on the parameter table to quickly display the history plot of the selected parameter (if history plots are enabled for the parameter).



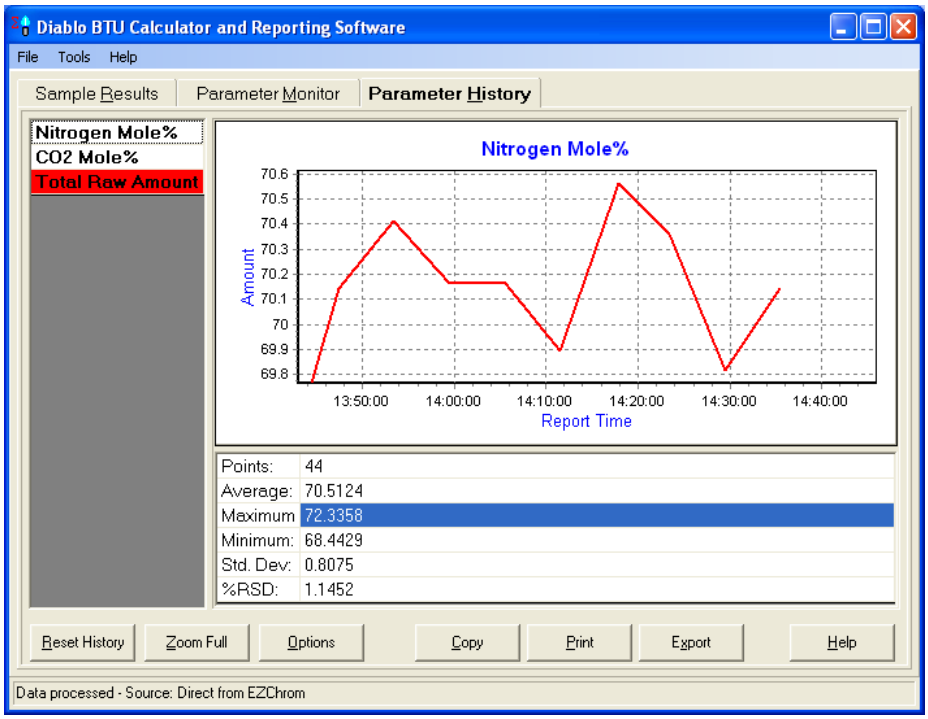
The BTU Calculator Parameter Monitor Window

Parameter History

Historical values of monitored parameters can be plotted in the Parameter History window.

In order to display the parameter history window, you must enable parameter history plots in the main parameter options dialog. In addition, you must also enable history plots for each individual parameter whose results you want to plot. See "Parameter Options" on page 27 for more information.

The individual parameter history plots and summary statistics are displayed by clicking on the desired parameter display name in the parameter list. If either high or low alarm limits have been enabled for a parameter, then the parameter name will be displayed with either a red or green background to indicate whether the current parameter value has exceeded an alarm limit (red background) or not (green background). In addition, the alarm limit is displayed a s red, dotted line on the history plot.

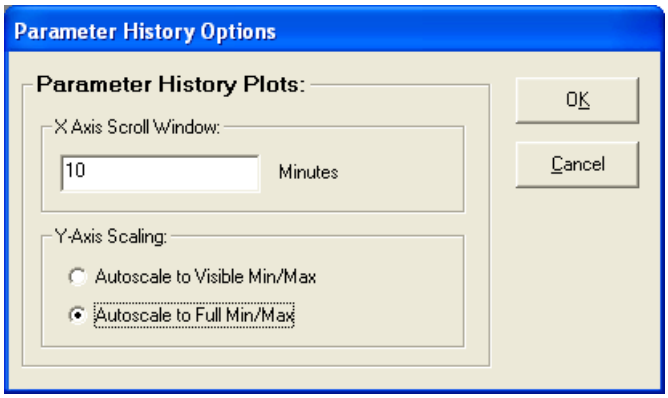


The "Parameter History" tab on the main screen of the Diablo BTU Calculator

Reset History: Click the "Reset History" button to clear and reset the history plot and summary statistics for all plotted parameters.

Zoom Full: Click the "Zoom Full" button to expand/contract the X and Y axes of the history plot to display the entire plot. Double-clicking in the history plot window performs the same function.

Options: Click the "Options" button to change the X-axis scroll window or Y-axis scaling mode:



Copy: Click the "Copy" button to copy the currently displayed trend plot to the Windows clipboard.

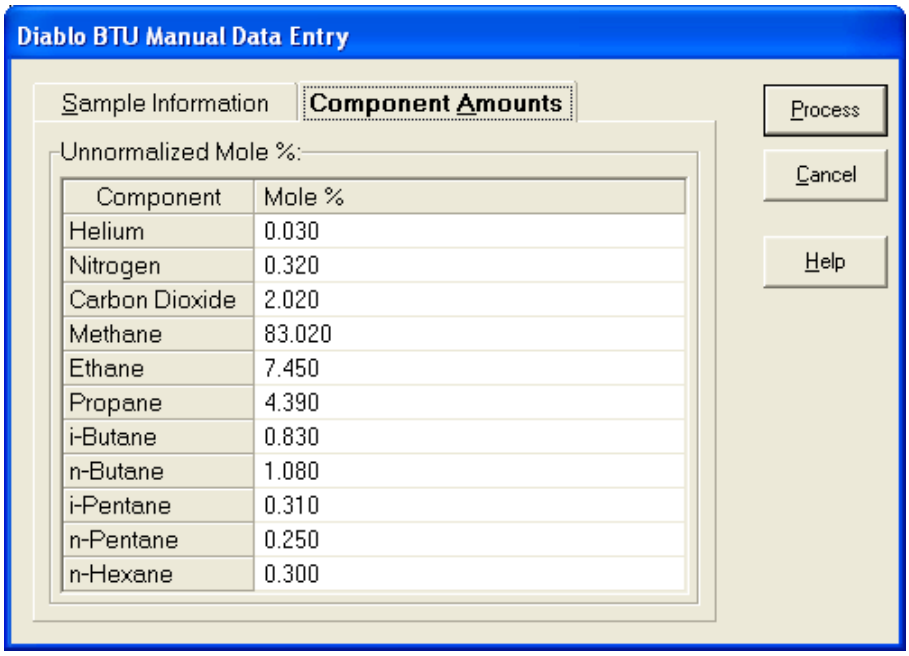
Print: Click the "Print button to print the currently displayed history plot and summary statistics.

Export: Click the "Export" button to export the history results for all components to a comma-delimited text file.

Help: Click the "Help" button to display context-sensitive help for this topic.

Manual Data Processing and Reporting

It is possible to enter component mole% values manually and calculate results based on those values. Select "New Data Set…" from the "file" menu. Any existing results will be cleared from the main screen, and you will be presented with the Manual Data Entry dialog. Enter the mole% values into the component table, and optionally a sample name, user name, and comments, and then press the "Process" button to perform the calculations.



Manual Data Entry Dialog Box

Important:

Important: Make sure to save these results to a BTU data file (select "Save Data Set As…" from the "File" menu) if you want to be able to recall the data at a later time. You can print a BTU report by selecting "Print > Report" from the "File" menu.

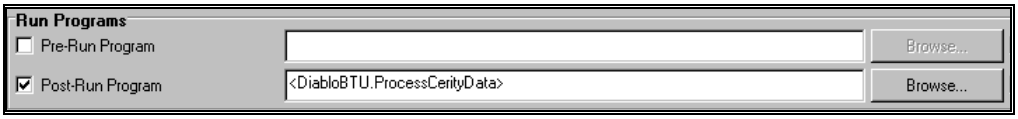
You can re-edit the data you entered manually by selecting "Edit Current Data Set…" from the "Tools" menu. Note however, that for purposes of data integrity, this option is disabled for data sets from the Agilent Cerity Data system that were automatically processed.

Automatic Data Processing and Reporting

The Agilent Cerity Data System

In order to have a BTU report generated automatically from Cerity after a run, you must edit the Cerity method by checking the "Post-Run Program" box in the "Run Programs" section of the Cerity Method screen (see the screen shot below). You must then place the following command exactly as shown below in the associated text box:

<DiabloBTU.ProcessCerityData>



Screen shot of the Agilent Cerity Method screen configured to run the Diablo BTU Calculator automatically after each run.

If you have checked "Print report for automatically processed results" in the BTU Calculator settings, then a report will automatically be calculated and printed after each Cerity analysis using this Method. Similarly, if you have checked the "Save data file to default directory for automatically processed results" in the BTU Calculator settings, then a BTU data file will be saved automatically.

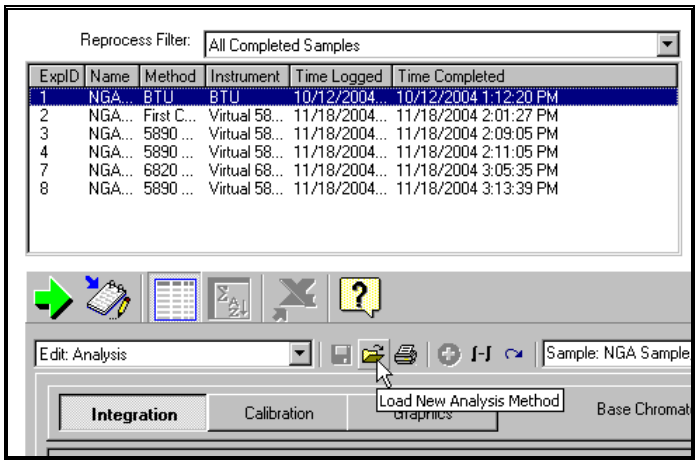
Important:

Important: In order to process results from the Agilent Technologies Cerity data system, you must first make sure that the names in the component settings table match the compound names in the Cerity calibration table. For example, if a compound is named "Hexane" in the Cerity calibration table, it must also be entered as "Hexane" in the BTU component settings table (not "n-Hexane", or "nC6").

Reprocessing Cerity Samples

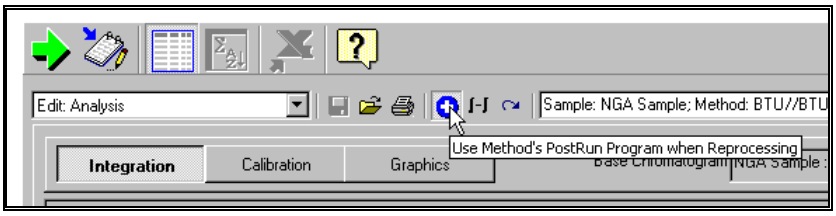
In order to reprocess an existing Cerity sample and have the results processed by the BTU Calculator, you must take the following steps:

1. Switch to the Cerity "Reprocess" tab, and select the desired sample from the sample list box.
2. Load the revision of the method that contains the Diablo BTU Calculator Post-Run Program that you set up above:



Note that the most recent (top most) method revision will usually be the correct version to load.

3. If you have loaded the correct method, then the "Use Method's PostRun Program when Reprocessing" toolbar button (the blue circle with the white cross) will be enabled (not grayed out). Click this toolbar button to enable the PostRun Program.



4. Press the green arrow button to reprocess the sample.

Important:

Important: You will have to repeat these steps each time you select a new sample to reprocess.

Agilent Technologies EZChrom Data System

The Diablo BTU Calculator software supports automated processing of mole% results generated by the Agilent Technologies EZChrom Elite or EZChrom SI data systems. This support is accomplished using the “Export” option of the EZChrom “Advanced Method Options”. This option will export the analysis results to a delimited text file that can then be read and processed by the BTU Calculator Software.

Important:

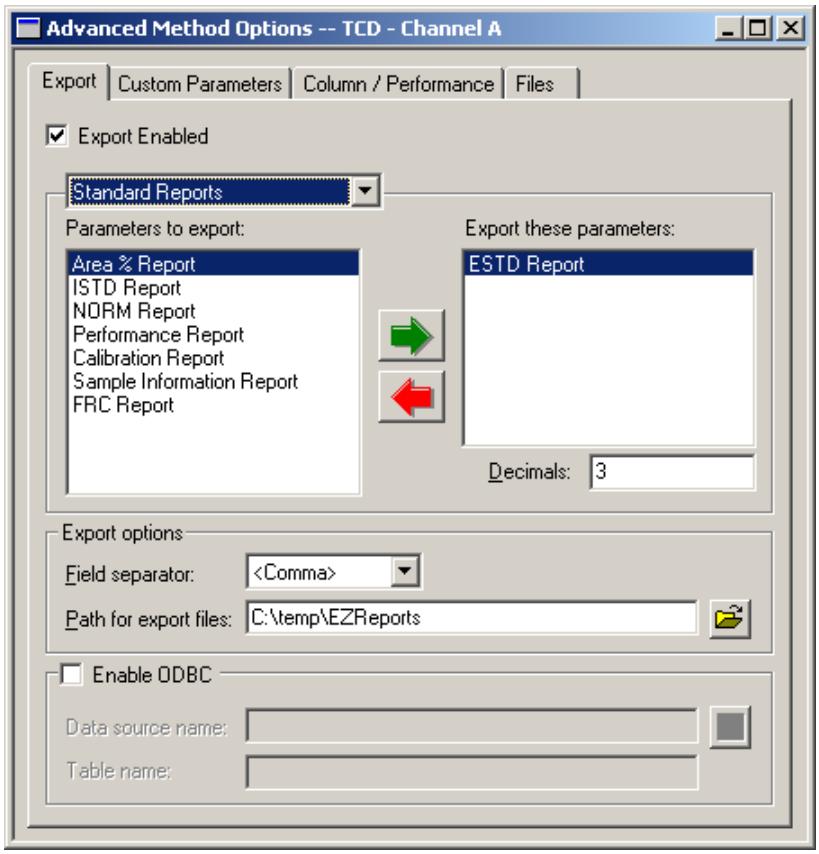
Important: In order to process results from the Agilent Technologies EZChrom data system, you must first make sure that the names in the component settings table match the compound names in the EZChrom calibration tables. For example, if a compound is named "Hexane" in the EZChrom calibration table, it must also be entered as "Hexane" in the BTU component settings table (not "n-Hexane", or "nC6").

Configure EZChrom for Data Export

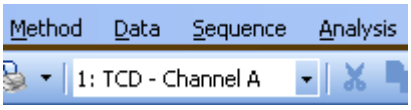
To configure EZChrom for data export to the BTU Calculator software, open the “Advanced Method Options” dialog box via the “Method > Advanced…” menu. Next, configure the “Export” tab as follows:

Important:

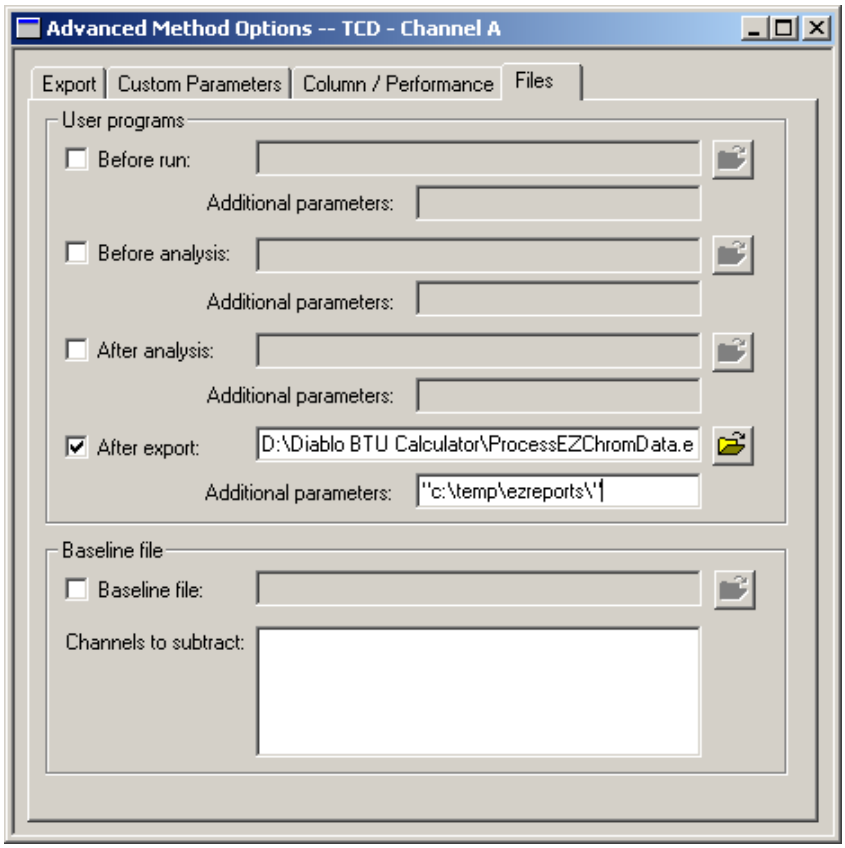
Important: Make sure to save the EZChrom method once you have made the following modifications.



1. Click the "Export Enabled" box so that is checked.
2. Select "Standard Reports" from the list box.
3. In the "Parameters to export:" list, select "ESTD Report" and click the right/green arrow button so that "ESTD Report" appears in the "Export these parameters list on the right.
4. If you want to use the ISTD Amount Mapping feature of the BTU Calculator, you must also export the "Sample Information Report". See "Internal Standard Amount Mapping" on page 20 for more information on this feature.
5. Under "Export options", select <comma> as the "Field separator", and enter path to the directory where the export files will be made available to the BTU Calculator software. This path must exist.
6. **Important:** You must repeat these steps for each detector channel present in the method. Use the detector channel list box located in the EZChrom toolbar to switch between channels:



After configuring the export parameters for each channel, switch to the "Files" tab of the Advanced Method Options, and configure it as follows:



1. Under "User programs" check the "After export" checkbox.
2. Use the "file open" button to the right to select the **ProcessEZChromData.exe** "helper" program as the user program.

   This program is located in the BTU Calculator software installation directory, which is usually "**C:\Program Files\Diablo BTU Calculator**".
3. In the "Additional parameters" text box, enter the export path that you entered for the export options above.

Important:

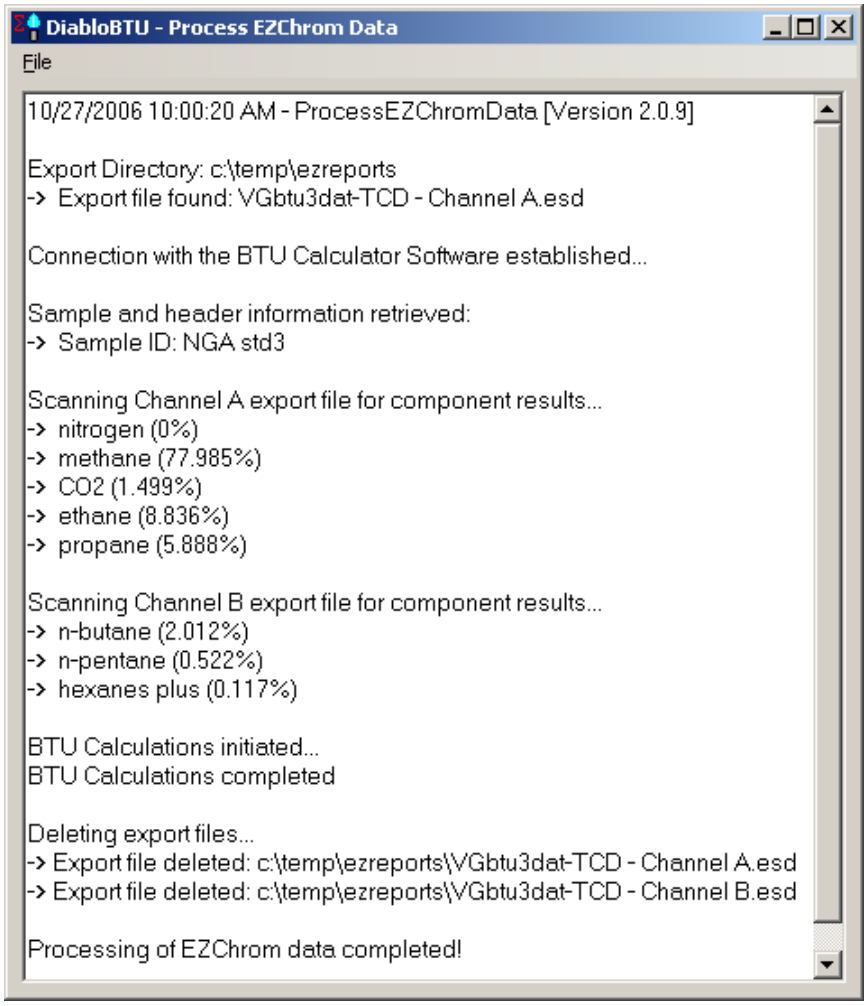
Important: If the export path contains any space characters, it must be enclosed in quotation marks. For example,

"**C:\Program Files\Diablo BTU Calculator\Export Files"**

Exporting and Processing EZChrom Data

Once you have configured EZChrom as described above, the external standard export file(s) will be created each time a sample is analyzed or-reanalyzed. After creating the export files, EZChrom will then run the "ProcessEZChromData.exe" program, passing it the path to containing the export directory.

The user program will check the export directory for any external standard (ESD) export files created by EZChrom. If any are found it will read the sample information and component data and pass it to the BTU Calculator software for processing.



The ProcessEZChromData status/log window

Important:

Important Additional Notes:

1. It is best to start the Diablo BTU Calculator software before exporting and processing data from EZChrom.
2. If the user program successfully retrieves the results from EZChrom and the BTU Calculator software runs successfully, then the user program will close automatically. However, if any errors occur, the user program will remain open to allow you to check the log window for information about the error.
3. If data processing is successful, any export files present in the export directory will be deleted automatically.

Appendix

BTU Data File Format

BTU data files are comma-delimited text files that can be imported into LIMS or process data systems. An example file is listed below.

Hint:

Hint: Although the BTU data files are text files that can be used directly to send results to other customers or databases, Export files are a much better, more flexible way to do this. See "Data Export" on page 25 for more information on Export Templates and Export Files.

```
SampleName,"GPA 2172-96 Example Calculation"

MethodName,""

UserName,""

Comments,"Gas properties at 60 Deg. F and 14.696 psia
(Gas Analysis on Dry Basis)"

InjectionTime,""

SettingsFile,"D:\Diabprog\Diablo\Diablo BTU\App\GPA
2172-96 Wet.cfg"

ProcessMode,3

DataSource,1

Instrument,""

SampleInfo1,"1456" (optional)

SampleInfo2,"82" (optional)

SampleInfo3,"" (optional)

SampleInfo4,"" (optional)

,,"Component","Ret.Time","Peak Area","Unnormalized
Mole%","Normalized Mole%","Gross Heating Value","Molar
Mass Ratio","Summation Factor"

Component,1,"Helium",0.000,0,0.03,0.03,0,0.00004146,0
```

```
Component,2,"Nitrogen",0.000,0,0.32,0.32,0,0.003095136,0
.00001408

Component,3,"Carbon
Dioxide",0.000,0,2.02,2.02,0,0.03069592,0.00039794

Component,4,"Methane",0.000,0,83.02,83.02,838.502,0.4598
64384,0.00963032

Component,5,"Ethane",0.000,0,7.45,7.45,131.84265,0.07734
59,0.00178055

Component,6,"Propane",0.000,0,4.39,4.39,110.45679,0.0668
4214,0.00151016

Component,7,"i-
Butane",0.000,0,0.83,0.83,26.99077,0.01665644,0.00038014

Component,8,"n-
Butane",0.000,0,1.08,1.08,35.23284,0.02167344,0.00051624

Component,9,"i-
Pentane",0.000,0,0.31,0.31,12.40279,0.00772272,0.0001801
1

Component,10,"n-
Pentane",0.000,0,0.25,0.25,10.02225,0.006228,0.00015775

Component,11,"n-
Hexane",0.000,0,0.3,0.3,14.2677,0.0089265,0.0002406

SumHV,1179.71779

SumMolarMass,0.69909204

SumZ,0.01480789

RawTotalMolePct,100

PressureBase,14.696

WaterMoleFractionSat,1.74442025040827E-02

GrossHeatingValueIdealDry,1179.71779

GrossHeatingValueRealDry,1183.53165556816

GrossHeatingValueIdealSat,1159.13855397357

GrossHeatingValueRealSat,1163.31848048984

RealRelativeDensityDry,0.701094431772844

RealRelativeDensitySat,0.700006424492229

GasCompressibilityFactorDry,0.996777555082519

GasCompressibilityFactorSat,0.996406894082425
```

Export Template Format

Export templates are plain-text files with a ".btx" file extension that are used to define how results will be saved to the text files created by the export feature of the BTU Calculator software. Any text editor like Windows Notepad can edit export

template files. However, make sure they are saved with the ".BTX" file extension (Notepad will sometimes append a ".TXT" file extension to the end of the ".BTX" extension.)

The export function will replace any "variables" it finds within the export template file with the current value of the variable. Variables are pre-defined names enclosed between braces: {VariableName}.

Note: The template examples shown below are included in the template file, "Example Export Template.btx".

Any other text that is present in the template file will be exported "as is" unless it is part of a comment or other special template section.

```
{StartComment}

Any text present between {StartComment} and
{EndComment} will not be saved to the export file.
Comments can be used to annotate the template file.

{EndComment}
```

The lines between StartHeader and EndHeader will only be saved to a new export file. They will not be saved when new results are appended to an existing export file. This can be used to create a column header for a summary list of results from multiple runs, for example.

```
{StartHeader}

Date, Name, Ret. Time, Area, Mole%

{EndHeader}
```

"DecimalPlaces" is a special variable used to set the number of decimal places to include for calculated results (4 places in this example). It affects the results that are exported after its place in the template. Note that the default value is the number of decimal places specified in the Data Files configuration.

Note: It is generally best to change the number of decimal places to report using the option in the Data Files section of the BTU Calculator configuration editor rather than the "Decimal Places" variable.

```
{DecimalPlaces,4}
```

To create a comma-delimited export file, simply include commas between the fields you wish to separate. In addition, if you want quotation marks to enclose text fields, simply include them in the template as shown below.

```
"CurrentDate", "{Now}"
```

```
"SampleName", "{SampleName}"
"UserName", "{UserName}"
```

To create a tab-delimited file, simply use the tab key on your keyboard, or include the special tab variable, "Tab", between the fields you wish to separate as shown below.

```
CurrentDate    {Now}
SampleName     {SampleName}
UserName {UserName}
```

or

```
MethodName{Tab}{MethodName}
SettingsFile{Tab}{SettingsFile}
InjectionTime{Tab}{InjectionTime}
```

You can use the special component loop to print the component-specific results (Name, Mole%, Area, etc.) for *all* of the components in the current configuration. The components are exported in the same order that they appear in the configuration editor.

```
{StartCompLoop}
{CompName},{CompRT},{CompArea},{CompNormMolePct}
{EndCompLoop}
```

If instead, you want to export the results for a specific component, simply include the component number in the variable as shown below. Components are numbered in the order they appear in the configuration editor, starting with 1 for the first component.

```
Component 1 Name:  {CompName,1}
Component 1 Mole%: {CompNormMolePct,1}
```

You can use the special line continuation variable, "_", to force the next line in the template to be appended to the current line instead of in a new line:

```
{CompName,1},{_}
{CompName,2},{_}
```

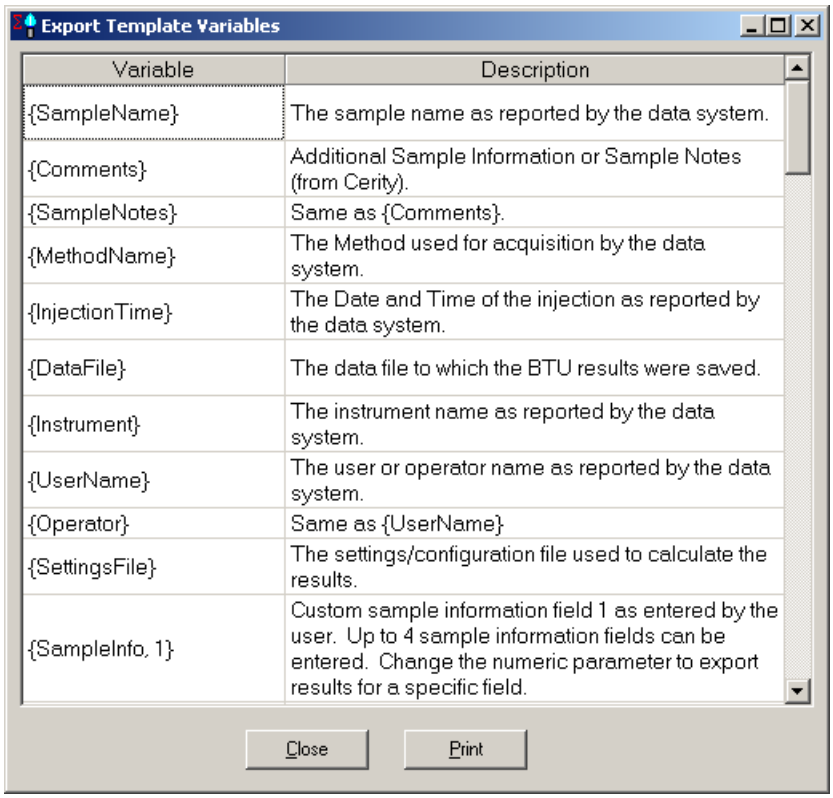
```
{CompName,3}
```

Line continuation is most useful in instances where you want all of the results to appear in a single line. For example, you would use the line continuation in a component loop to create a summary export file in which each line corresponds to a single run.

```
{StartCompLoop}
{CompName},{CompRT},{CompArea},{CompNormMolePct},{_}
{EndCompLoop}
```

Summary of Export Template Variables

You can view a list of the variables that are supported by Export Templates at any time by selecting either the "Tools > Show Export Template Variables…" menu option, or by clicking on the "Show" button in the Export section of the configuration editor.



BTU Calculator Template Variable Table

Hint:

Hint: If you double-click on a particular variable in the table, it will be copied to the Windows clipboard so that you can paste it into a template file.

Export Variable Format Strings and Scale Factors

Optional formatting strings and scaling factors can be specified for export variables to increase flexibility.

Important:

Important: The use of formatting strings and scaling factors is an advanced feature and should only be utilized when export file requirements dictate.

The export variable syntax is shown below:

```
{VariableName, [PARAMETER], [FORMAT], [SCALEFACTOR]}
```

VariableName: The name of the variable.

[PARAMETER]: An optional parameter value that is required for some variables.

[FORMAT]: A special format string that instructs the export engine on how to format the variable value before writing it to the export file.

[SCALEFACTOR]: If the variable is numeric, it will be multiplied by the specified scaling factor prior to formatting and writing the result to the export file.

The following table describes the special characters used to make up a format string.

Format Character	Description
Numeric Formatting	
0	Digit placeholder. Display a digit or a zero. If the variable has a digit in the position where the 0 appears in the format string, display it; otherwise, display a zero in that position.
#	Digit placeholder. Display a digit or nothing. If the variable has a digit in the position where the # appears in the format string, display it; otherwise, display nothing in that position.
.	Decimal placeholder. The decimal placeholder determines how many digits are displayed to the left and right of the decimal separator. If the format expression contains only number signs to the left of this symbol, numbers smaller than 1 begin with a decimal separator. To display a leading zero displayed with fractional numbers, use 0 as the first digit placeholder to the left of the decimal separator.
Text String Formatting	
@	Character placeholder. Display a character or a space. If the string has a character in the position where the "at" symbol (@) appears in the format string, display it; otherwise, display a space in that position.
&	Character placeholder. Display a character or nothing. If the string has a character in the position where the ampersand (&) appears, display it; otherwise, display nothing.
Date Formatting	
d	Display the day as a number without a leading zero (1 – 31).
dd	Display the day as a number with a leading zero (01 – 31).
m	Display the month as a number without a leading zero (1 – 12).
mm	Display the month as a number with a leading zero (01 – 12).
yy	Display the year as a 2-digit number (00 – 99).
yyyy	Display the year as a 4-digit number (100 – 9999).

Time Formatting	
h	Display the hour as a number without leading zeros (0 – 23).
Hh	Display the hour as a number with leading zeros (00 – 23).
N	Display the minute as a number without leading zeros (0 – 59).
Nn	Display the minute as a number with leading zeros (00 – 59).
S	Display the second as a number without leading zeros (0 – 59).
Ss	Display the second as a number with leading zeros (00 – 59).

The following table shows a few examples of format strings and scaling factors.

Variable	Variable Value	Value Exported
{CompRawMolePct,1,0.000}	1.523446	1.523
{CompRawMolePct,1,0.000}	85.67234	85.672
{CompRawMolePct,1,00000,1000}	85.67234	85672
{CompArea,2,00000000}	1234	00001234
{InjectionTime}	10/12/2004 1:08:13 PM	10/12/2004 1:08:13 PM
{InjectionTime,,mmddyyyy}	10/12/2004 1:08:13 PM	10122004
{InjectionTime,,HhNn}	10/12/2004 1:08:13 PM	2013
{SampleName,,@@@@@@@@}	Sample Name	Sample N
{SampleName,,@@@@@@@@}	RC1	RC1*****

* = a space character

Full List of Export Template Variables

The following table lists all of the variables that are support by the BTU Calculator's Export Templates.

Hint:

Hint: The most up to date list of export template variables can always be viewed and printed by clicking the "Tools > Show Export Template Variables…" menu option.

Variable	Description
Sample Information and Header Variables	
{SampleName}	The sample name as reported by the data system.
{Comments}	Additional Sample Information or Sample Notes (from Cerity).
{SampleNotes}	Same as {Comments}.
{MethodName}	The Method used for acquisition by the data system.
{InjectionTime}	The Date and Time of the injection as reported by the data system.
{DataFile}	The data file to which the BTU results were saved.

{SourceDataFilePath}	The full path of the source data file used for acquisition by the data system.
{SourceDataFileName}	The source data file used for acquisition by the data system.
{Instrument}	The instrument name as reported by the data system.
{UserName}	The user or operator name as reported by the data system.
{Operator}	Same as {UserName}
{SettingsFile}	The settings/configuration file used to calculate the results.
{SampleInfo, 1}	Custom sample information field 1 as entered by the user. Up to 10 sample information fields can be entered. Change the numeric parameter to export results for a specific field.
{SampleInfoCaption, 1}	The caption for custom sample information field 1 as set in the configuration file. Up to 4 custom sample information fields are supported. Change the numeric parameter to export results for a specific field.
Component Variables	
{CompNum}	The current component number being processed in a component loop.
{CompName}	The name of the current component being processed in a component loop.
{CompRawMolePct}	The raw mole% as reported by the data system for the current component in a component loop.
{CompNormMolePct}	The calculated normalized mole% for the current component in a component loop.
{CompRT}	The retention time as reported by the data system for the current component in a component loop.
{CompArea}	The peak area as reported by the data system for the current component in a component loop.
{CompHvFactor}	The heating value calculation factor (Hv) from the current configuration file for the current component in a component loop.
{CompMMRatio}	The molar mass ratio calculation factor (G) from the current configuration file for the current component in a component loop.
{CompSumFactor}	The summation calculation factor (b) from the current configuration file for the current component in a component loop.
{CompGPMVolFactor}	The volume property used to calculate the component GPM from the current configuration file for the current component in a component loop (cu. ft. ideal gas / gallon liquid).
{CompHeatingValue}	The calculated heating value (Xi * Hvi) for the current component in a component

	loop.
{CompRelDensity}	The calculated relative denisty (Xi * Gi) for the current component in a component loop.
{CompCompressibility}	The calculated compressibility (Xi * bi) for the current component in a component loop.
{CompGPM}	The calculated GPM (Gal. per 1000 cu. ft.) for the current component in the component loop.
Miscellaneous Calculation Factors	
{PressureBase}	The pressure base used for the calculation.
{WaterVaporPressure}	The water vapor pressure used for wet/sat calculations
{AirCompressibility}	The air compressibility factor used for the calculations
{AirSumFactor}	The air summation factor used for the calculations.
Calculated Results	
{TotalRawMolePct}	The calculated total raw mole%.
{TotalNormMolePct}	The calculated total normalized mole% (should be 100%)
{SumHeatingValue}	The calculated sum of component heating values (Sum Xi * Hvi).
{SumRelDensity}	The calculated sum of component relative density values (Sum Xi * Gi).
{SumCompressibility}	The calculated sum of component compressibility values (Sum Xi * bi).
{WaterMoleFractionSat}	The mole fraction of water under saturated conditions.
{WaterMoleFractionWet}	The mole fraction of water as entered by the user.
{GrossHvIdealDry}	"The gross heating value calculated under ideal, dry conditions."
{GrossHvIdealSat}	"The gross heating value calculated under ideal, saturated conditions."
{GrossHvIdealWet}	"The gross heating value calculated under ideal, wet conditions."
{GrossHvRealDry}	"The gross heating value calculated under real, dry conditions."
{GrossHvRealSat}	"The gross heating value calculated under real, saturated conditions."
{GrossHvRealWet}	"The gross heating value calculated under real, wet conditions."
{RealRelDensityDry}	The real relative density calculated under dry conditions.
{RealRelDensitySat}	The real relative density calculated under saturated conditions.
{RealRelDensityWet}	The real relative density calculated under wet conditions.

{GasCompressibilityDry}	The gas compressibility calculated under dry conditions.
{GasCompressibilitySat}	The gas compressibility calculated under saturated conditions.
{GasCompressibilityWet}	The gas compressibility calculated under wet conditions.
{GPMTotal}, {SumGPM}	The calculated sum of component GPM values.
Special Variables	
{Tab}	"The ASCII ""tab"" character."
{Now}	The current date and time as reported by the operating system.
{StartCompLoop}	Start a component processing loop. All template lines between {StartCompLoop} and {EndCompLoop} will be repeated once for each component in the configuration. Use the component loop to report component-specific results.
{EndCompLoop}	End a component processing loop (see {StartCompLoop}
{StartHeader}	All template lines between {StartHeader} and {EndHeader} will only be exported the first time an export file is written. The header lines will not be written when additional results are appended to an exisitng export file.
{EndHeader}	See {StartHeader}
{StartComment}	Any text between {StartComment} and {EndComment} will not be exported. Use to annotate your template file.
{EndComment}	See {StartComment}
{UCase}	Place on a line by itself to convert all subsequent export lines to upper case.
{LCase}	Place on a line by itself to convert all subsequent export lines to lower case.
{NoCase}	Place on a line by itself to report all subsequent export lines in their original case.
{DecimalPlaces,3}	Place on a line by itself to set the number of decimal places that will be reported for calculated numeric results. The default value is the number of decimal places specified in the Data Files configuration.
{_}	Line continuation variable placed at the end of a line to force the next line in the template to be appended to the current line instead of to a new line.

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