

GPA 2145-16 Upgrade Guide

Standard Component Physical Properties-GPA Standard 2145-16 (FPS)

Select	Name	Molar Mass Ratio (G)	Density of Ideal Gas (lbm/Cu. Ft.)	Gross Heating Value (BTU/Cu. Ft.)	Gross Heating Value (BTU/lbm)	Gross Value
<input type="checkbox"/>	methane	0.5539	0.04227	1010	23892	
<input type="checkbox"/>	ethane	1.0382	0.07924	1769.7	22334	
<input type="checkbox"/>	propane	1.5225	0.1162	2516.1	21654	
<input type="checkbox"/>	isobutane	2.0068	0.15316	3251.9	21232	
<input type="checkbox"/>	n-butane	2.0068	0.15316	3262.3	21300	
<input type="checkbox"/>	isopentane	2.4911	0.19012	4000.9	21044	
<input type="checkbox"/>	n-pentane	2.4911	0.19012	4008.7	21085	
<input type="checkbox"/>	Hexanes Plus	3.21755	0.24557	5129.22	20893.5	
<input type="checkbox"/>	n-hexane	2.9754	0.22709	4755.9	20943	
<input type="checkbox"/>	n-heptane	3.4597	0.26405	5502.6	20839	
<input type="checkbox"/>	n-octane	3.944	0.30101	6249	20760	
<input type="checkbox"/>	n-nonane	4.4283	0.33797	6996.3	20701	
<input type="checkbox"/>	n-decane	4.9126	0.37493	7742.9	20651	
<input type="checkbox"/>	ethylene	0.9686	0.07392	1599.7	21640	
<input type="checkbox"/>	propylene	1.4529	0.11089	2333	21040	
<input type="checkbox"/>	carbon dioxide	1.5195	0.11597			
<input type="checkbox"/>	hydrogen sulfide	1.1767	0.08981	637.1	7094	
<input type="checkbox"/>	nitrogen	0.9672	0.07382			
<input type="checkbox"/>	oxygen	1.1048	0.084322			
<input type="checkbox"/>	helium	0.1382	0.01055			

Data Source: GPA Standard 2145-16 (FPS) [Transfer] [Close] [Help]

Diablo EZReporter 4.0
GPA 2145-16 Upgrade Guide

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GPA 2145-16 Upgrade Guide

Introduction

This guide describes how to update existing EZReporter 4.0 Natural Gas Analysis (NGA) and Natural Gas Liquids/Extended Fraction Analysis (NGL) configurations with the GPA Standard 2145-16 component physical properties (physical constants).

Important Disclaimer

Diablo Analytical provides this update procedure and the physical property data sources as a courtesy to our customers. However, it is the customer's responsibility to ensure that the physical properties and other settings in their configuration are correct and that the results generated by the EZReporter software are correct and valid for their intended use.

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

About GPA Standard 2145-16

The GPA 2145-16 standard is published by the GPA Midstream Association and contains the component physical properties used to calculate other properties of natural gas as defined in standards such as GPA 2172, GPA 2186, GPA 2286, and others. The GPA 2145-16 standard was released in 2016 and becomes effective in January of 2017. It combines and updates component physical properties from GPA 2145, GPA TP-17, and the GPSA Engineering Data Book into one data source.

We highly recommend that you purchase a copy of this standard from the GPA Midstream Association. You can download it for free if you are a member of either the GPA Midstream Association or the Gas Processors Suppliers Association (GPSA).

GPA Midstream Association

For more information on GPA Standard 2145-16, you should contact the GPA Midstream Association:

Sixty Sixty American Plaza, Suite 700

Tulsa, OK 74135

Phone: (918) 493-3872

Web: <http://gpaglobal.org/>

Technical Support

Contact Diablo Analytical for EZReporter technical support:

Diablo Analytical, Inc.

5141 Lone Tree Way
Antioch, CA 94531

Phone: (925) 755-1005

Fax: (925) 755-1007

Electronic Mail

Use our dedicated support address for e-mail based technical support:

support@diabloanalytical.com

World Wide Web

Access online support resources on our web site:

<http://www.diabloanalytical.com/support.htm>

Upgrade EZReporter 4.0

You must upgrade to EZReporter Version 4.0.7.4 or later to access the GPA 2145-16 data source and new configuration templates.

Automatic Upgrade

If you are running version 4.0.4.1 or later, you can download and install the correct version of the software automatically using the “Check for Updates” option of the “Help” menu.

Manual Upgrade

If you are running an older version of EZReporter 4.0, simply download the installation program from the EZReporter download page:

<https://diabloanalytical.com/products/software/ezreporter/#downloads>

IMPORTANT: Make sure you download the installer that includes support for the chromatography data system you are using. Contact Diablo Analytical if you are using a chromatography data system that isn’t listed on the download page.

NOTE: The “web” version of the installer can be used to upgrade an existing installation even if the computer doesn’t have Internet access.

Your current version of EZReporter will be uninstalled and the new version installed automatically and your license status will be preserved.

Upgrade EZReporter 3.0 or Earlier Versions

If you are still running EZReporter 3.0 or any other earlier version, including the BTU Calculator software, you will need to upgrade your license to EZReporter 4.0 in order to take advantage of the enhancements and tools described in this upgrade guide. Please contact Diablo Analytical for information on upgrade pricing.

Physical Property Update Options

There are two options to update the component physical properties used in your NGA/NGL configurations to the GPA 2145-16 values:

Option 1: Create a new configuration file using one of the new GPA 2145-16 configuration templates and edit the configuration to meet your specific needs. This method is recommended for new EZReporter users, or current users who

have made only minimal modifications to their configuration. See “[EZReporter 4.0 Configuration Templates](#)” on page 3 for detailed instructions on this option.

Option 1 Quick Update Instructions

1. Click “File > New Configuration File...” from the main menu.
2. Select the desired configuration template from the list in the New Configuration File Wizard, or select the option to browse for and select another template.
3. Edit the new configuration to customize it for your application.

Option 2: Update your existing configuration files with the new GPA 2145-16 physical property values. This method is recommended for most users, particularly those users who have customized their configuration files to any significant extent. See “[Upgrading Existing Configurations](#)” on page 5 for detailed instructions on this option.

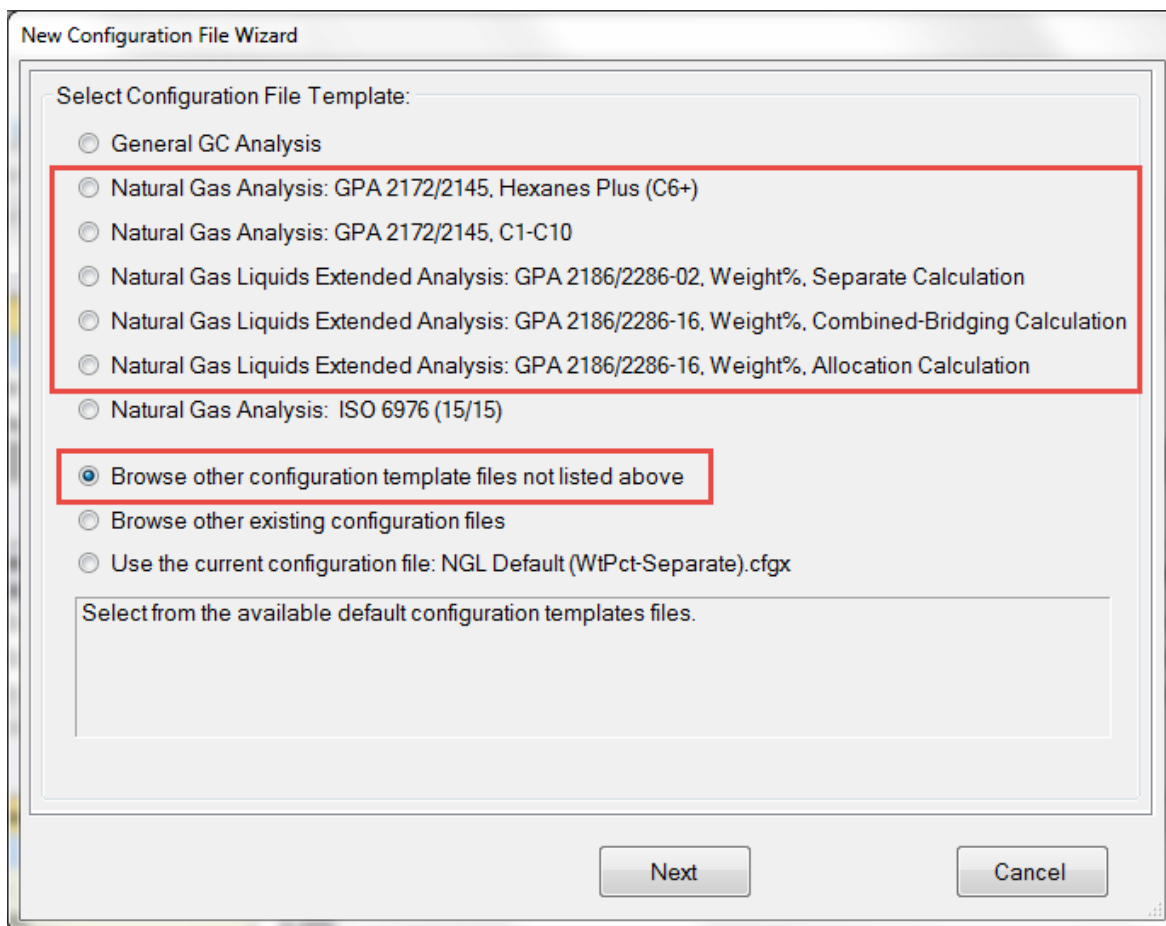
Option 2 Quick Update Instructions

1. Load the desired configuration file you want to update and click the “Edit Configuration” toolbar button.
2. Switch to the *Natural Gas Analysis > NGA Configuration* settings panel and click the “Edit” button for the NGA Base Data Source.
3. Select the “GPA Standard 2145-16 (FPS)” data source and click “OK”
4. Review the components selected in the standard component list and select (check) any additional components you want to add/update in your configuration. Then click the “Transfer” button.
5. Click the “Transfer” button to update your configuration with all physical properties.
6. If the “Component Not Found” window is displayed for any of the selected components, you can choose to either add/append them to the configuration or assign them to an existing component.
7. Review the transfer log. Check for any “Components Not Updated”.
8. Validate the component constants by selecting “Validate Component Constants” from the popup menu displayed when you right-click the component table in your configuration.

EZReporter 4.0 Configuration Templates

A new set of configuration templates using the GPA 2145-16 physical properties ships with EZReporter 4.0.7. To create a new configuration file based on one of these templates, click the “File > New Configuration File...” option from the main menu. The *New Configuration File Wizard* provides a list of common configuration templates, or you can browse for other templates that aren’t listed.

NOTE: The Natural Gas Analysis and Natural Gas Liquids Extended Analysis templates listed in the New Configuration File Wizard all use the GPA 2145-16 physical properties. If you select to browse for other templates, choose templates with “GPA 2145-16” in the file name. These templates are listed below.



List of GPA 2145-16 Configuration Templates

The following new NGA and NGL default configuration template files with the GPA 2145-16 physical properties ship with EZReporter version 4.0.7 or later.

- C6+ Default.GPA 2145-16.cfgt: Default configuration for GPA 2172 natural gas analysis applications with C1-C6+ components. Individual component physical constants are from GPA 2145-16. Hexanes Plus physical constants are based on a 60/30/10% mixture of the GPA 2145-16 nC6/nC7/nC8 constants.
- NGA Default.GPA 2145-16.cfgt: Default configuration for GPA 2172 natural gas analysis applications with C1-C10 components. Individual component physical constants are from GPA 2145-16.
- GPA 2145-16.cfgt: Configuration for natural gas analysis containing all of the components and physical properties present in GPA 2145-16.
- Refinery Gas.GPA 2145-16.cfgt: An example refinery gas analysis configuration using physical properties from GPA 2145-16.
- GPA 2177-C6+.GPA 2145-16.cfgt: An example GPA-2177 configuration with C6+. Individual component physical constants are from GPA 2145-16. Hexanes Plus physical constants are based on a 60/30/10% mixture of the GPA 2145-16 nC6/nC7/nC8 constants.
- NGL Default (WtPct-Allocation).GPA 2145-16.cfgt: Default configuration for GPA 2186/2286-14 natural gas liquids/extended applications using raw weight% component amounts and the allocation calculation of the extended fraction. Contains components from GPA 2145-16 with the corresponding physical constants.

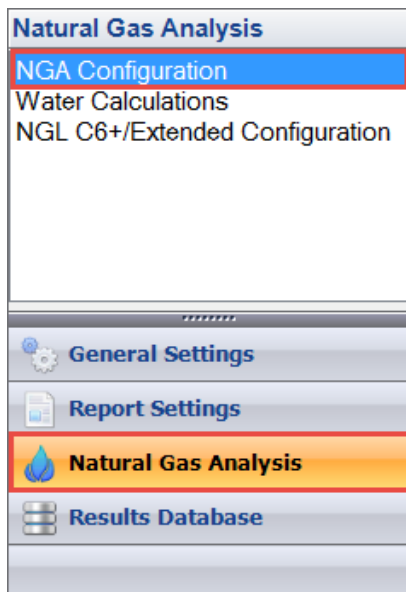
- [NGL Default \(WtPct-GPA 2186-14-Bridging\).GPA 2145-16.cfgt](#): Default configuration for GPA 2186/2286-14 natural gas liquids/extended applications using raw weight% component amounts and the combined calculation of extended fraction results with bridging. Contains components from GPA 2145-16 with the corresponding physical constants.
- [NGL Default \(WtPct-Separate\).GPA 2145-16.cfgt](#): Default configuration for GPA 2186/2286-02 natural gas liquids/extended applications using raw weight% component amounts and the separate calculation of extended fraction results. Contains components from GPA 2145-16 with the corresponding physical constants.
- [NGL Default \(WtPct-Combined\).GPA 2145-16.cfgt](#): Default configuration for GPA 2186/2286-02 natural gas liquids/extended applications using raw weight% component amounts and the combined calculation of extended fraction results without bridging. Contains components from GPA 2145-16 with the corresponding physical constants.
- [NGL Default \(WtPct-GPA 2186-02-Bridging\).GPA 2145-16.cfgt](#): Default configuration for GPA 2186/2286-02 natural gas liquids/extended applications using raw weight% component amounts and the combined calculation of extended fraction results with bridging. Contains components from GPA 2145-16 with the corresponding physical constants.

Upgrading Existing Configurations

If you have an existing EZReporter 4.0 configuration file used for NGA or NGL reporting, you can update the component physical properties to the values published in GPA 2145-16 as follows:

NOTE: If you have multiple configuration files for NGA or NGL reporting, you will have to repeat this procedure for each configuration.

- 1) Open the EZReporter Configuration Editor by clicking the “Edit Configuration toolbar button. Click “Natural Gas Analysis” on the navigation bar at the bottom left, and then select “NGA Configuration” from the list.



Click the “Edit” button to change the NGA Base Data Source:

NGA Configuration

NGA Calculation Factors

NGA Base Data Source:

GPA Standard 2145-09 (FPS) Edit

Factor	Units	Value
Base Temperature	F	60
Base Pressure	psia	14.696
Air Summation Factor		0.00537
Molar Mass of Air		28.9625
Molar Gas Constant	psia cu.ft. / lbmol R	10.7316
Cu. Ft. / lb-mol of Ideal Gas		379.48357
Water Vapor Pressure	psia	0.25640

Raw Component Amount Units:

Mole%
 Weight%
 Liquid Volume%

Other Settings:

Prompt for Flowing Temperature and Pressure

- 2) Select “**GPA 2145-16 (FPS)**” from the NGA Base Data Source list box, and then make sure that both the “Transfer NGA calculation factors” and “Transfer component physical constants” checkboxes are checked. Click the “OK” button to proceed with the upgrade:

Edit NGA Data Source

Select NGA Base Data Source:

GPA Standard 2145-16 (FPS)

Transfer Source Physical Property Data:

Transfer NGA calculation factors to current configuration
 Transfer component physical constants to current configuration

OK

Cancel

- 3) The GPA 2145-16 Data Source will be displayed and all standard components in the data source whose name (or alias) matches a component name in the configuration component table will be selected automatically. Review this list and check any standard components that you want to add to your component table, or that correspond to one of the components that already exist in your component table. Click the “Transfer” button once you have completed your review of the standard component table.

Standard Component Physical Properties-GPA Standard 2145-16 (FPS)

Select	Name	Molar Mass Ratio (G)	Density of Ideal Gas (lbm/Cu. Ft.)	Gross Heating Value (BTU/Cu. Ft.)	Gross Heating Value (BTU/lbm)	Gross Value (
<input checked="" type="checkbox"/>	methane	0.5539	0.04227	1010	23892	
<input checked="" type="checkbox"/>	ethane	1.0382	0.07924	1769.7	22334	
<input checked="" type="checkbox"/>	propane	1.5225	0.1162	2516.1	21654	
<input checked="" type="checkbox"/>	isobutane	2.0068	0.15316	3251.9	21232	
<input checked="" type="checkbox"/>	n-butane	2.0068	0.15316	3262.3	21300	
<input checked="" type="checkbox"/>	isopentane	2.4911	0.19012	4000.9	21044	
<input checked="" type="checkbox"/>	n-pentane	2.4911	0.19012	4008.7	21085	
<input checked="" type="checkbox"/>	Hexanes Plus	3.21755	0.24557	5129.22	20893.5	
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<input checked="" type="checkbox"/>	n-heptane	3.4597	0.26405	5502.6	20839	
<input checked="" type="checkbox"/>	n-octane	3.944	0.30101	6249	20760	
<input checked="" type="checkbox"/>	n-nonane	4.4283	0.33797	6996.3	20701	
<input checked="" type="checkbox"/>	n-decane	4.9126	0.37493	7742.9	20651	
<input type="checkbox"/>	ethylene	0.9686	0.07392	1599.7	21640	
<input type="checkbox"/>	propylene	1.4529	0.11089	2333	21040	
<input checked="" type="checkbox"/>	carbon dioxide	1.5195	0.11597			
<input checked="" type="checkbox"/>	hydrogen sulfide	1.1767	0.08981	637.1	7094	
<input checked="" type="checkbox"/>	nitrogen	0.9672	0.07382			
<input type="checkbox"/>	oxygen	1.1048	0.084322			

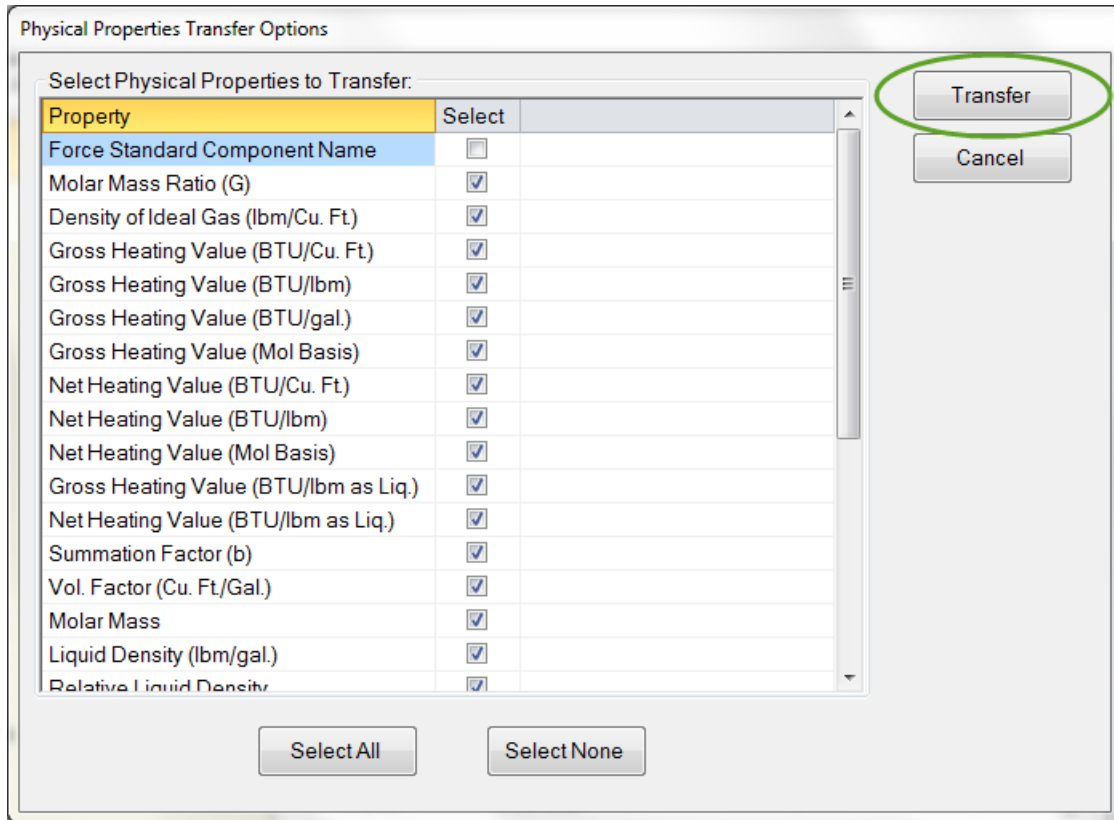
Data Source: GPA Standard 2145-16 (FPS) [Transfer] [Close] [Help]

Important: Several standard component names were changed in GPA 2145-16 from previous revisions of GPA 2145, TP-17, and the GPSA Engineering Data Book. EZReporter 4.0 has added an “Alias” functionality that allows you to define alias or synonym names for each of the standard components in a data source. This enables EZReporter to recognize components with different names in your configuration component table. See “[Standard Component Aliases](#)” on page 10 for details on how to define your own alias names.

- 4) After clicking the “Transfer” button, the “Physical Properties Transfer Options” window will be displayed, allowing you to choose which properties will be transferred to your configuration.

You will generally want to transfer all physical properties to your configuration with the exception of the component name. So, in most cases you can simply click the “Transfer” button. However, you can uncheck any of the physical properties if you don’t want to transfer them to the configuration for some reason.

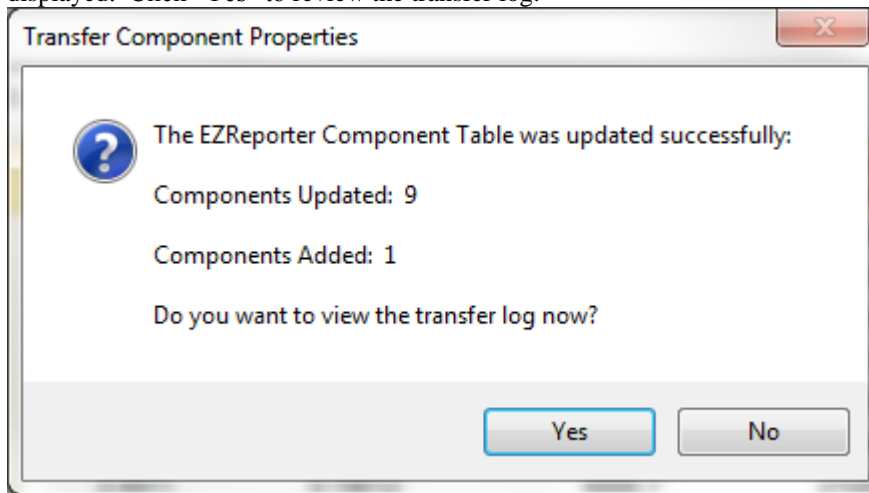
Important: Only check “Force Standard Component Name” if you need the names in your component table to match the standard names from the data source. Changing component names can interfere with the identification of the corresponding component results from your chromatography data system.



- 5) After clicking the “Transfer” button, the component table in your configuration file will be searched for each standard component you have selected and if a matching name or alias is found, the specified standard physical properties will be copied to the corresponding component in your configuration.

If any of the standard components you selected to transfer are not found in the component table of your configuration, the “Component Not Found” window will be displayed. See “[Component Not Found](#)” on page 9 for details.

If all of the standard components were found in your component table, the following confirmation will be displayed. Click “Yes” to review the transfer log:



The transfer log includes lists of the **Properties Selected to Transfer**, the **Properties NOT Selected to**

Transfer, and the **Standard Components Selected for Transfer** and the status of the update for each. At the bottom of the transfer log is a list of **Components NOT Updated** in your configuration because there was no standard component selected with a matching name or alias. For example:

Components NOT Updated

1,t-2,c-3-trimethyle
1,t-2,c-4-trimethylcyclohexane
1,c-2,t-3-trimethylcyclohexane
1-methy1,3-isopropylbenzene
1-methyl-t-2-(4-methylpentyl) cyclopentane

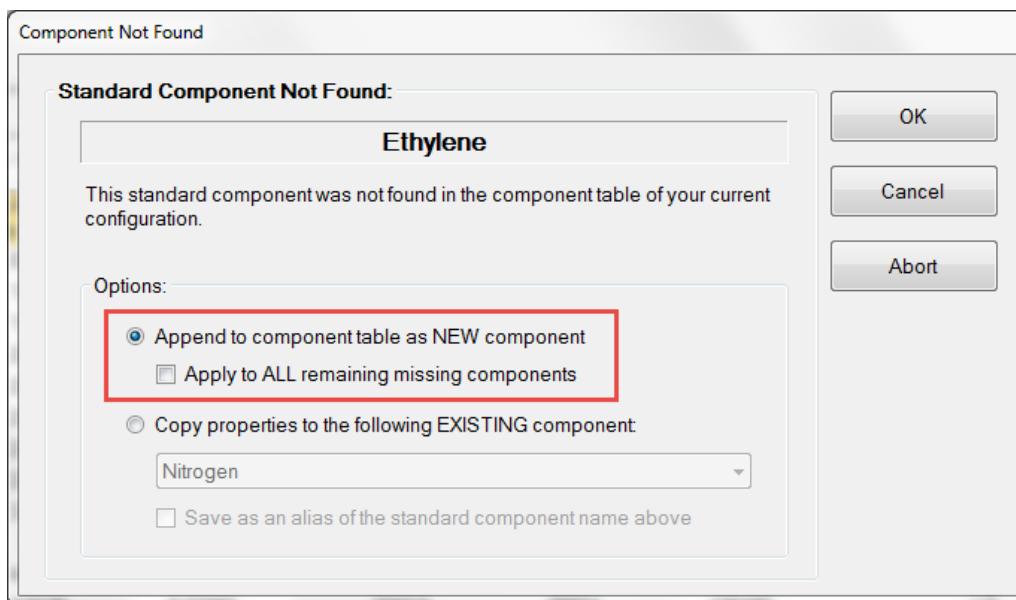
If you want these components to be updated, you will either have to add their names as an alias to the corresponding standard component (see “[Standard Component Aliases](#)” on page 10), or rename them in your component table to a standard component name or alias. You will then need to transfer the physical properties to your configuration again (see “[Transfer Physical Properties](#)” on page 13).

Component Not Found

If any of the standard components you selected to transfer were not found in the component table of your configuration, the “Component Not Found” window will be displayed for each:

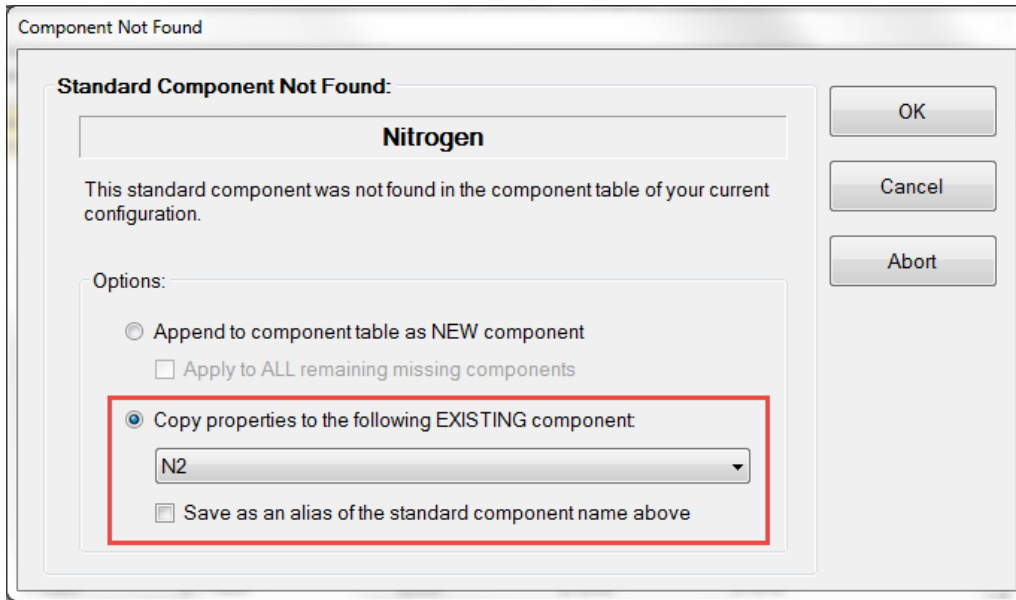
You can choose from the following options:

Option 1: Append the specified standard component to the component table in your configuration as a new component. If you choose this option, and you know that all of the remaining missing components should also be appended as new components, then you can check the “Apply to ALL remaining missing components” checkbox.



Option 2: Copy the physical properties from the standard component to one of the existing components in your configuration. If you choose this option, you can also choose to add the name of the existing component as an alias to the specified standard component.

IMPORTANT: Make sure that you choose the correct existing component from your component table. Otherwise, you will update the physical properties for the wrong component.

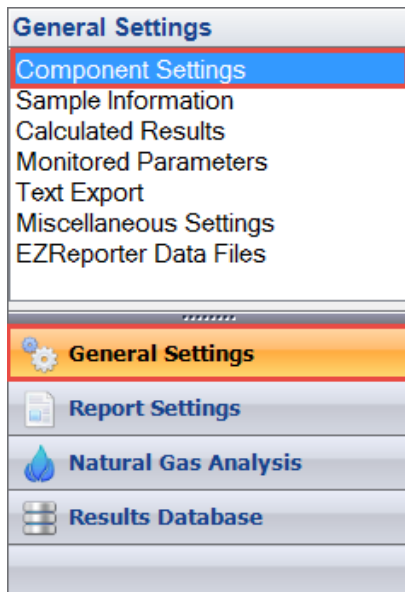


Clicking the “Cancel” button will skip the current standard component, and clicking “Abort” will skip all remaining unknown components.

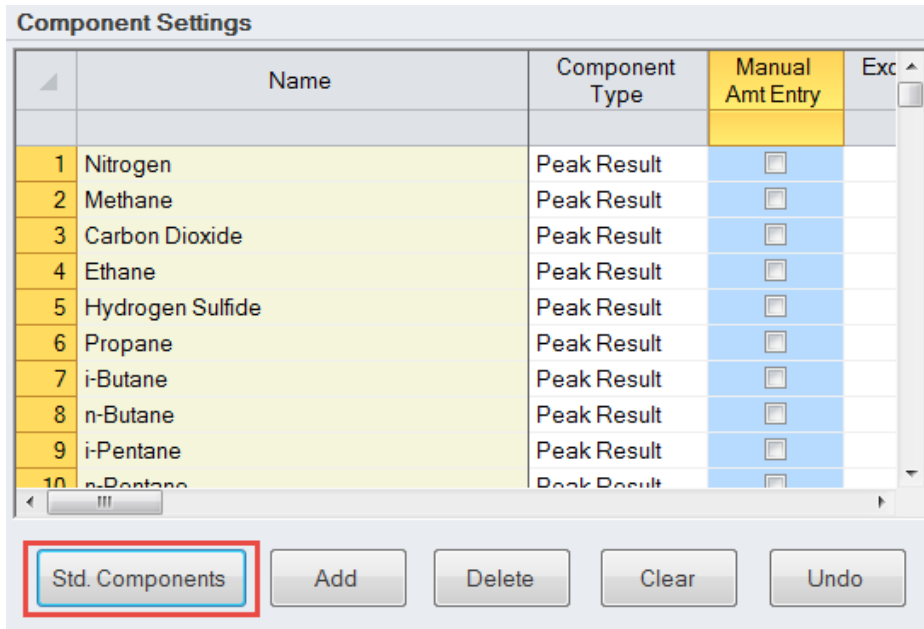
Standard Component Aliases

Several standard component names were changed in GPA 2145-16 from previous revisions of GPA 2145, TP-17, and the GPSA Engineering Data Book. EZReporter 4.0 has added an “Alias” functionality that allows you to define alias or synonym names for each of the standard components in a data source. This allows EZReporter to recognize components with alternate names in your configuration component table.

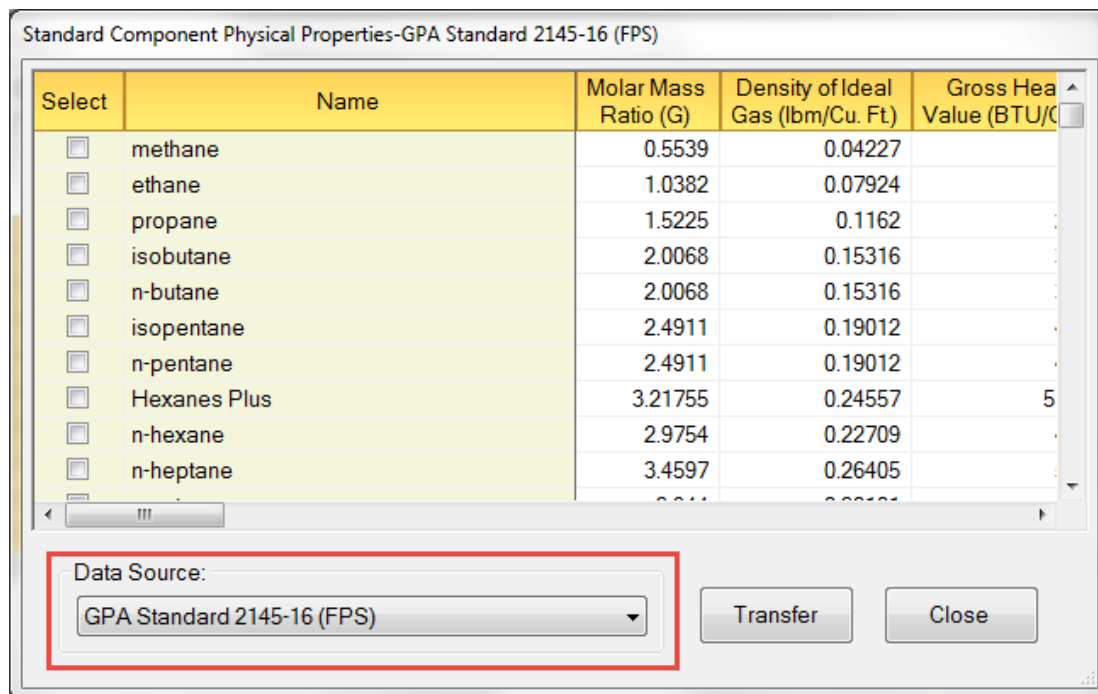
To add or edit the alias names for a data source, open the EZReporter Configuration Editor by clicking the “Edit Configuration toolbar button. Click “General Settings” on the navigation bar at the bottom left, and then select “Component Settings” from the list.



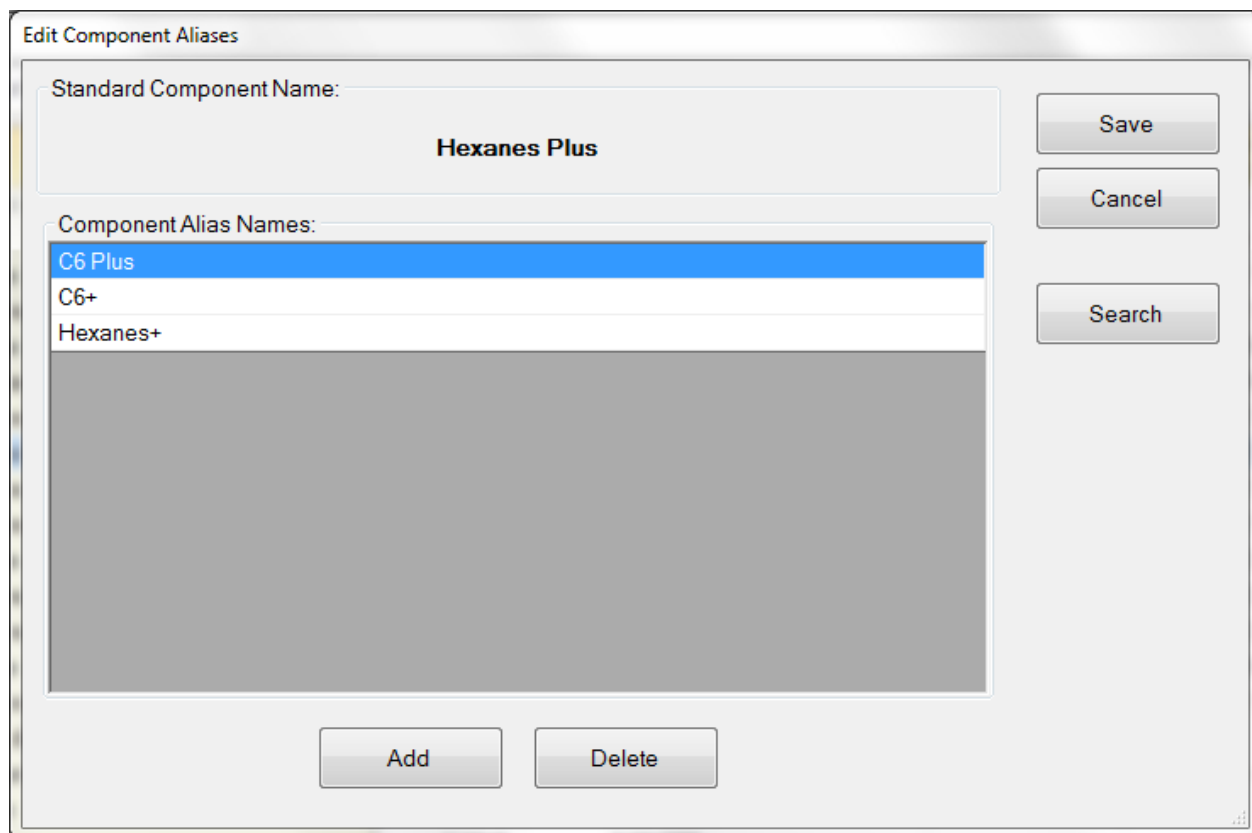
Click the “Std. Components” button at the bottom of the Component Settings panel to display the Standard Components window.



Select the desired Data Source, which should be “GPA 2145-16 (FPS)” in this case:



To add an alias name to one of the standard components in a data source, either right click the standard component in the table and select “Edit Component Aliases” from the popup menu, or select the component and enter “Ctrl+E” from the keyboard. The *Edit Component Aliases* window will be displayed:



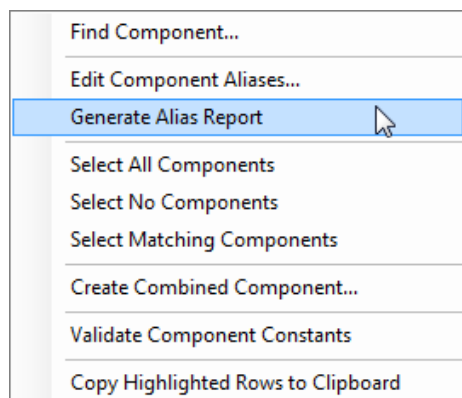
NOTE: EZReporter ships with alias names already defined for several of the standard components in the GPA 2145-16 (FPS) data source. You can modify these aliases or add your own by clicking the “Add” button and entering the desired alias. Alias names are not case sensitive, however, they must match the spelling (including any spaces) exactly.

IMPORTANT: A particular alias name can only be defined for one standard component in a particular data source.

If your computer has Internet access, you can click the “Search” button to look up the standard component name at the NIH PubChem Open Chemistry Database to help you identify appropriate synonyms.

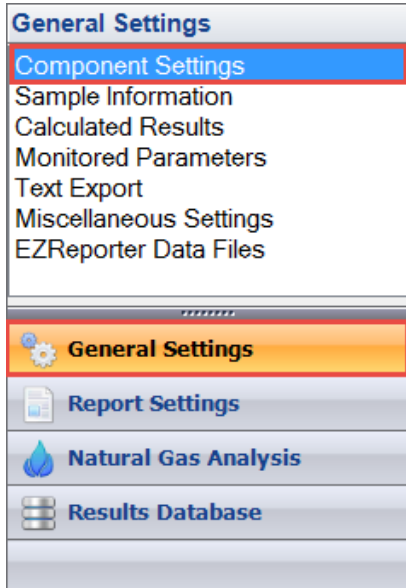
Generate Alias Report

You can generate a report containing a list of all the standard components in the selected data source (GPA 2145-16 in this case) and any alias/synonym names that have been defined by right-clicking the standard component table, and selecting “Generate Alias Report” from the popup menu.

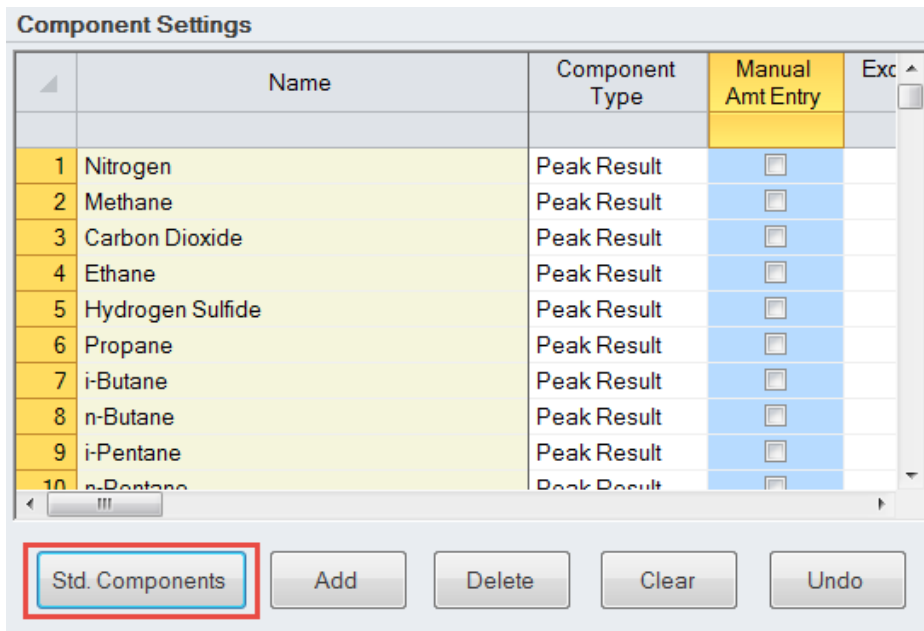


Transfer Physical Properties

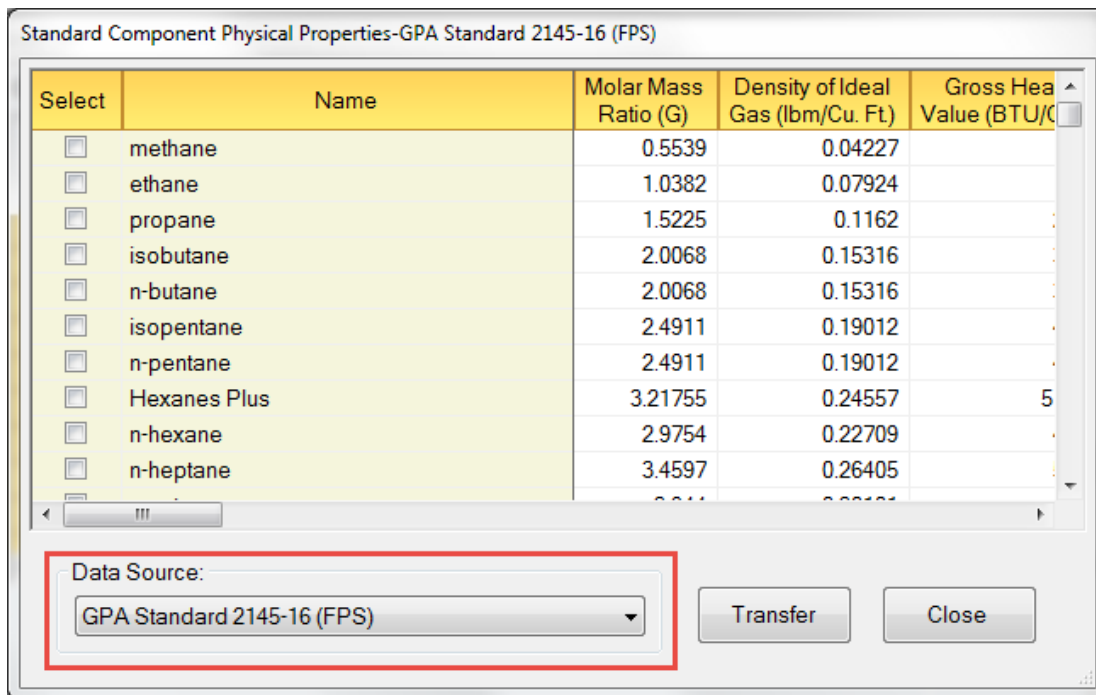
To transfer additional standard component physical properties to your configuration, open the EZReporter Configuration Editor by clicking the “Edit Configuration toolbar button. Click “General Settings” on the navigation bar at the bottom left, and then select “Component Settings” from the list.



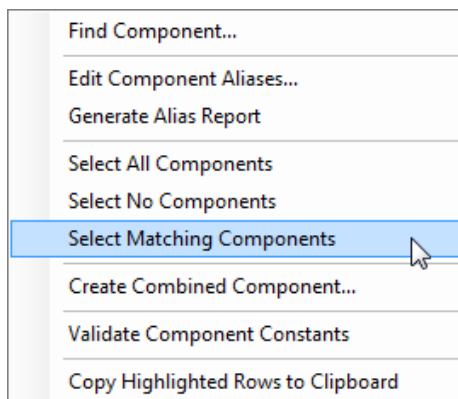
Click the “Std. Components” button at the bottom of the Component Settings panel to display the Standard Components window.



Select the desired Data Source, which should be “GPA 2145-16 (FPS) in this case:



After selecting the desired data source you can choose the components you want to transfer to your configuration by checking the box in the “Select” column. Additional options are available by right-clicking the component table and clicking one of the options in the popup menu:



Find Component: This option allows you to find a component in the table by its name or alias. The spelling must be exact, but capitalization doesn’t matter.

Select All Components: Checks all of the components in the current data source

Select No Components: Unchecks all of the components in the current data source

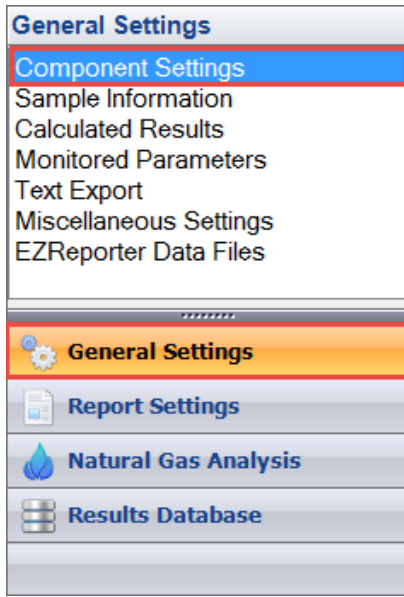
Select Matching Components: Checks those components in the data source whose name or alias matches a component name in your configuration.

Once you have selected all of the components you want to transfer to your configuration, click the “Transfer” button. The selected components will be transferred to the configuration as described in “[Upgrading Existing Configurations](#)” on page 5

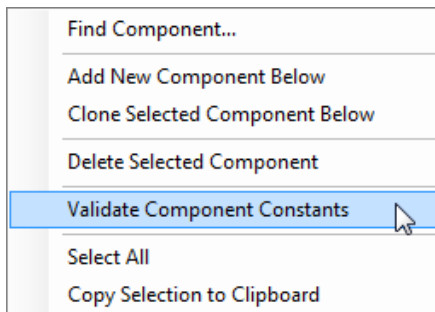
Validate Component Constants

After updating the configuration with the GPA 2145-16 component physical properties, you can perform a validation check, which compares the physical constants for each component in your configuration with the corresponding constants in the base NGA data source defined for the configuration.

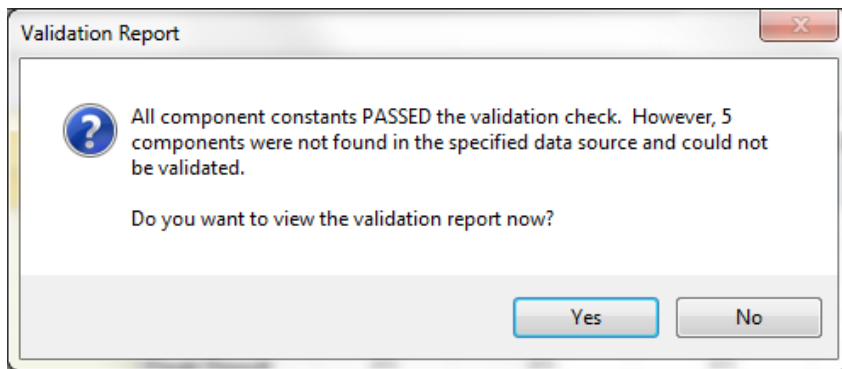
To generate a validation report, open the EZReporter Configuration Editor by clicking the “Edit Configuration” toolbar button. Click “General Settings” on the navigation bar at the bottom left, and then select “Component Settings” from the list.



Right click the component table and select “Validate Component Constants” from the popup menu:



Each component in the configuration component table will be compared to a component with the same name or matching alias name in the data source.



A validation report file is displayed showing the **Components Passing Validation** (all constants match), the **Components Failing Validation**, (one or more constants don't match - the constants that failed are listed for each component), and **Components Not Found in Data Source**. A detailed table of the comparison is also included. For components and parameters that failed the validation, the detail will display, “[20293 < 0]”, where the value on the left is from the configuration and the value on the right is the standard value from the data source.

NOTE: The report file is a tab-delimited text file, so it may be easiest to open it in Microsoft Excel to examine the detailed results.

Pressure Base and GPM

After upgrading the physical constants in a configuration file, the pressure base will be set to the standard value of 14.696 psia, and the component constants used to calculate GPM will have been set to the values listed in GPA 2145-16. If you want to report results at a different pressure base than 14.696, or if you want to calculate GPM using only ethane and heavier components, then you will need to make the following additional edits to the configuration.

Pressure Base

- 1) Open the EZReporter Configuration Editor by clicking the “Edit Configuration toolbar button. Click “Natural Gas Analysis” on the navigation bar at the bottom left, and then select “NGA Configuration” from the list.
- 2) Change the base pressure setting in the “NGA Calculation Factors” table to the desired pressure base in psia (14.73 psia, for example).

NGA Configuration

NGA Calculation Factors

NGA Base Data Source:

GPA Standard 2145-16 (FPS) Edit

Factor	Units	Value
Base Temperature	F	60
Base Pressure	psia	14.696
Air Summation Factor		0.00537
Molar Mass of Air		28.9625
Molar Gas Constant	psia cu.ft. / lbmol R	10.7316
Cu. Ft. / lb-mol of Ideal Gas		379.48357
Water Vapor Pressure	psia	0.25640

Raw Component Amount Units:

Mole%
 Weight%
 Liquid Volume%

Other Settings:

Prompt for Flowing Temperature and Pressure

GPM and Volume Factor Constants

Open the EZReporter Configuration Editor by clicking the “Edit Configuration toolbar button. Click “General Settings” on the navigation bar at the bottom left, and then select “Component Settings” from the list.

- 1) Scroll the component table to the right until you find the column labeled “Vol. Factor (Cu.Ft./Gal)”.
- 2) Set the “Vol. Factor” constant to 0 for Methane, CO2, Nitrogen, and any other component you want to exclude from the GPM calculation.

Component Settings

	Name	Vol. Factor (Cu. Ft./Gal.)	Molar Mass	Liquid Density (lbm/gal.)	Relative Liquid Density	Vapor Pre (psia)
(Ideal Gas Properties at 60 Degrees F and 14.696 psia)						
1	Helium	0	4.0026	1.0404	0.12479	
2	Hydrogen	0	2.0159	0.59126	0.070918	
3	Nitrogen	0	28.0134	6.7271	0.80687	
4	Oxygen	0	31.9988	9.5238	1.1423	
5	Methane	0	16.0425	2.5	0.3	
6	Carbon Dioxide	0	44.0095	6.8129	0.81716	
7	Ethane	37.488	30.069	2.9704	0.35628	
8	Propane	36.391	44.0956	4.2285	0.50719	
9	i-butane	30.637	58.1222	4.6925	0.56283	
10	n-Butane	31.801	58.1222	4.8706	0.5842	
11	i-pentane	27.414	72.1488	5.212	0.62514	
12	n-Pentane	27.658	72.1488	5.2584	0.63071	
13	C6Plus	23.104	93.18866	5.63228	0.67556	
14	Water	175.62	18.0153	8.3372	1	

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