Empower GPC Software

Getting Started Guide

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71500031303, Revision A

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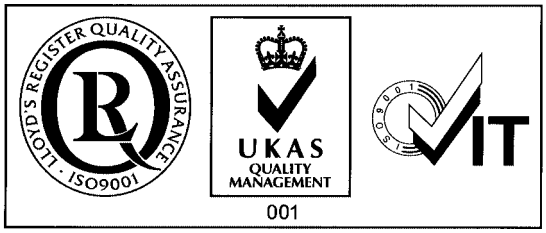

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Preface

The *Empower GPC Software Getting Started Guide* describes the basics of how to use Empower™ software. Using a standard set of data, this guide takes you through the steps of logging in, acquiring data, developing methods and method sets, reviewing processed data, and printing reports.

This guide is intended for a wide variety of users whose familiarity with computers and software ranges from novice to expert.

Organization

This guide contains the following:

Chapter 1 describes GPC software features, procedures for logging in to Empower software, and loading the GPC_Default project.

Chapter 2 describes procedures that you can use to calibrate your system with GPC narrow standards.

Chapter 3 describes procedures that you can use to process broad unknown GPC data.

Chapter 4 describes procedures that you can use to automate GPC processing.

Chapter 5 describes procedures that you can use to generate reports of your results and back up your GPC data, methods, and results.

Related Documentation

***Waters Licenses, Warranties, and Support*:** Provides software license and warranty information, describes training and extended support, and tells how Waters handles shipments, damages, claims, and returns.

Online Documentation

***Empower Help*:** Describes all Empower windows, menus, menu selections, and dialog boxes for the base software and software options. Also includes reference information and procedures for performing all tasks required to use Empower software. Included as part of the Empower software.

***Empower Read Me File*:** Describes product features and enhancements, helpful tips, installation and/or configuration considerations, and changes since the previous version.

***Empower LIMS Help*:** Describes how to use the Empower LIMS Interface to export results and import worklists.

***Empower Toolkit Professional Help*:** Describes how to use the common-object-model, message-based protocol to communicate with the Empower software from a third-party application.

Printed Documentation for Base Product

***Empower Software Getting Started Guide*:** Provides an introduction to the Empower software. Describes the basics of how to use Empower software to acquire data, develop a processing method, review results, and print a report. Also covers basic information for managing projects and configuring systems.

***Empower Software Data Acquisition and Processing Theory Guide*:** Provides theories pertaining to data acquisition, peak detection and integration, and quantitation of sample components.

***Empower System Installation and Configuration Guide*:** Describes Empower software installation, including the stand-alone Personal workstation, Workgroup configuration, and the Enterprise client/server system. Discusses how to configure the computer and chromatographic instruments as part of the Empower System. Also covers the installation, configuration, and use of acquisition servers such as the LAC/E^{32} module, the busLAC/E™ card, and interface cards used to communicate with serial instruments.

***Empower System Upgrade and Configuration Guide*:** Describes how to add hardware and upgrade the Empower software using an import-and-export upgrade method.

***Empower Software System Administrator's Guide*:** Describes how to administer the Empower Enterprise client/server system and Workgroup configuration.

***Empower Software Release Notes*:** Contains last-minute information about the product. Also provides supplementary information about specific Empower software releases.

Printed Documentation for Software Options

***Empower System Suitability Quick Reference Guide*:** Describes the basics of the Empower System Suitability option and describes the equations used by the System Suitability software.

***Empower PDA Software Getting Started Guide*:** Describes the basics of how to use the Empower PDA option to develop a PDA processing method and to review PDA results.

***Empower GC Software Getting Started Guide*:** Describes how to use the Empower GC option to develop a GC processing method and to review GC results.

***Empower GPC Software Getting Started Guide*:** Describes how to use the Empower GPC option to develop a GPC processing method and to review GPC results.

***Empower GPCV Software Getting Started Guide*:** Describes how to use the Empower GPCV option to develop a GPCV processing method and to review GPCV results.

***Empower Light Scattering Software Getting Started Guide*:** Describes how to use the Empower Light Scattering option to develop a light scattering processing method and to review light scattering results.

***Empower ZQ Mass Detector Software Getting Started Guide*:** Describes installation, configuration, calibration, and tuning methods, as well as how to operate the ZQ Mass Detector with Empower software.

***Empower Chromatographic Pattern Matching Software Getting Started Guide*:** Describes how to use the Chromatographic Pattern Matching option to develop a pattern matching processing method and to review pattern matching results.

***Empower Dissolution System Software Quick Start Guide*:** Describes how to operate the Alliance® Dissolution System using Empower software.

***Empower Toolkit Programmer's Reference Guide*:** Describes how to use the common-object-model, message-based protocol to communicate with Empower software from a third-party application.

***Waters Integrity System Getting Started Guide*:** Describes features of the Waters Integrity® System and provides step-by-step tutorials that guide a user through the use of the Empower Mass Spectrometry (MS) option.

***Empower AutoArchive Software Installation and Configuration Guide*:** Describes how to install and configure the Empower AutoArchive option.

Documentation on the Web

Related product information and documentation can be found on the World Wide Web. Our address is http://www.waters.com.

Related Adobe Acrobat Reader Documentation

For detailed information about using Adobe® Acrobat® Reader, see the *Adobe Acrobat Reader Online Guide*. This guide covers procedures such as viewing, navigating, and printing electronic documentation from Adobe Acrobat Reader.

Printing This Electronic Document

Adobe Acrobat Reader lets you easily print pages, page ranges, or the entire document by selecting **File > Print**. For optimum print quantity, Waters recommends that you specify a PostScript® printer driver for your printer. Ideally, use a printer that supports 600 dpi print resolution.

Documentation Conventions

The following conventions can be used in this guide:

Convention	Usage
Purple	Purple text indicates user action such as keys to press, menu selections, and commands. For example, “Click **Next** to go to the next page.”
Italic	Italic indicates information that you supply such as variables. It also indicates emphasis and document titles. For example, “Replace *file_name* with the actual name of your file.”
`Courier`	Courier indicates examples of source code and system output. For example, “The `SVRMGR>` prompt appears.”
`Courier Bold`	Courier bold indicates characters that you type or keys you press in examples of source code. For example, “At the `LSNRCTL>` prompt, enter **`set password oracle`** to access Oracle.”
Underlined Blue	Indicates hypertext cross-references to a specific chapter, section, subsection, or sidehead. Clicking this topic using the hand symbol brings you to this topic within the document. Right-clicking and selecting **Go Back** from the shortcut menu returns you to the originating topic. For example, “To check the calibration curve, follow the instructions in Section 2.5, Checking the Calibration Curve.”
Keys	The word *key* refers to a computer key on the keypad or keyboard. *Screen keys* refer to the keys on the instrument located immediately below the screen. For example, “The A/B screen key on the 2414 Detector displays the selected channel.”
…	Three periods indicate that more of the same type of item can optionally follow. For example, “You can store *filename1*, *filename2*, … in each folder.”
>	A right arrow between menu options indicates you should choose each option in sequence. For example, “Select **File > Exit**” means you should select **File** from the menu bar, then select **Exit** from the File menu.

Notes

Notes call out information that is helpful to the operator. For example:

Note: *Record your result before you proceed to the next step.*

Attentions

Attentions provide information about preventing damage to the system or equipment. For example:

Attention: *To avoid damaging the detector flow cell, do not touch the flow cell window.*

Cautions

Cautions provide information essential to the safety of the operator. For example:

Caution: *To avoid burns, turn off the lamp at least 30 minutes before removing it for replacement or adjustment.*

Caution: *To avoid electrical shock and injury, turn off the detector and unplug the power cord before performing maintenance procedures.*

Caution: *To avoid chemical or electrical hazards, observe safe laboratory practices when operating the system.*

Chapter 1
GPC Software Overview

This chapter defines GPC data, describes the basic features of the Empower™ GPC software, lists the tutorials included in this book, and explains how to load sample GPC data on your workstation. Once you have loaded the sample data, you can view and manipulate the data in a variety of ways, as described in subsequent chapters.

1.1 What Is GPC Data?

Gel Permeation Chromatography (GPC) data is collected from a system that has a column set which separates samples by the size of the molecules in solution and a detector that measures the relative concentration of the molecules as they elute from the columns.

1.2 What Is GPC Software?

The Empower GPC software enables you to use the Empower software to acquire and process GPC data.

GPC Software Features

Empower is a chromatography and results management system you can adapt to your individual requirements. It consists of:

- Empower computer in one of the following configurations:
  - Personal stand-alone workstation
  - Workgroup configuration
  - Enterprise client/server system
- Empower software
- Empower database

Empower GPC software is an integrated part of the Empower software. GPC data acquisition, processing, and reporting with the GPC software requires use of the base Empower software and database.

Features of the Base Empower Software

Empower software provides a graphical, icon-based user interface to acquire, process, and manage chromatographic data. All user actions are performed by pointing and clicking with the mouse (keyboard shortcuts are also supported).

Empower software supports operation in both Windows® 2000 Professional and Windows XP Professional environments, providing you with the ability to have multiple windows open at the same time.

You can view a real-time data acquisition run while simultaneously producing summary results of previously acquired data, or fine-tuning integration parameters for the last injection performed.

The base Empower software provides tools for:

- Creating projects
- Configuring chromatographic systems
- Developing instrument methods to control chromatographic systems
- Acquiring data from samples and standards
- Developing a processing method to perform integration, calibration, and quantitation
- Processing data and obtaining results
- Creating report methods to generate custom reports
- Viewing and printing reports
- Backing up, deleting, restoring, and copying the contents of an individual project

Empower Software Reference Information

You can perform additional procedures for data acquisition, processing, and report generation depending on the complexity of your application. Refer to the *Empower Help* for more information. For information on using the *Empower Help*, refer to the *Empower Software Getting Started Guide*.

GPC Software Functions

The Empower GPC software supports the following functions in Empower software:

- **Sample loading** – Defines narrow and broad standards and narrow and broad unknowns.
- **Component loading** – Defines the following parameters:
  - Molecular weights of narrow standards
  - Component names for System Suitability
  - Molecular weight averages of broad standards

  - Mark-Houwink (*K* and *alpha*) values for standards and unknowns
  - Cumulative percent – molecular weight pairs and named distributions for broad standards
  - Named distributions for broad standards
- **Calibration standard options** – Include the following options:
  - Narrow
  - Broad
  - Combined narrow and broad
- **Calibration techniques** – Include the following types:
  - Relative
  - Universal (Modified Universal)
- **Calibration curve fit types** – Includes the following fit types:
  - First-order
  - Second-order
  - Third-order
  - Fourth-order
  - Fifth-order
  - Bounded
  - Cubic-spline
  - Point to point
- **Review** – Displays GPC calibration curves and molecular weight distributions.
- **Compare** – Overlays distributions to compare molecular weight distributions from multiple analyses of the same or different polymers. Overlays GPC calibration curves to compare curves generated on different dates or under different conditions.
- **Reporting** – Includes custom report groups as well as the following plots and tables:
  - GPC Distribution plot
  - GPC General Distribution plot
  - GPC Distribution table
  - GPC Calibration plot
  - GPC Calibration table
- **Axial dispersion correction** – Corrects the spreading of broad standard and broad unknown peaks caused by large-particle size (20 micron) columns in the chromatographic system. Empower provides two types of axial dispersion correction:
  - Iterative Deconvolution
  - Peak Compression

1.3 Tutorial Overview

The tutorials in this book show you how to:

- Restore the GPC_Default project from the Empower CD-ROM. This project is used in all the examples in this guide.
- Determine the exclusion volume (V_0) and total volume (V_t) of the column set used in your GPC system.
- Develop a GPC processing method using the Processing Method Wizard.
- Process narrow standards.
- Check the calibration curves.
- Process broad unknowns.
- Save results.
- Automate processing procedures using background processing.
- Report GPC results.
- Back up your project data.

This guide does not explain how to acquire GPC data. The data acquisition tutorial is included in the *Empower Software Getting Started Guide* along with the other basic Empower tutorials.

Before You Begin

Note: *This guide uses the Empower Pro interface. If you do not have access to this interface, see your system administrator.*

Before you proceed with the tutorial, ensure that:

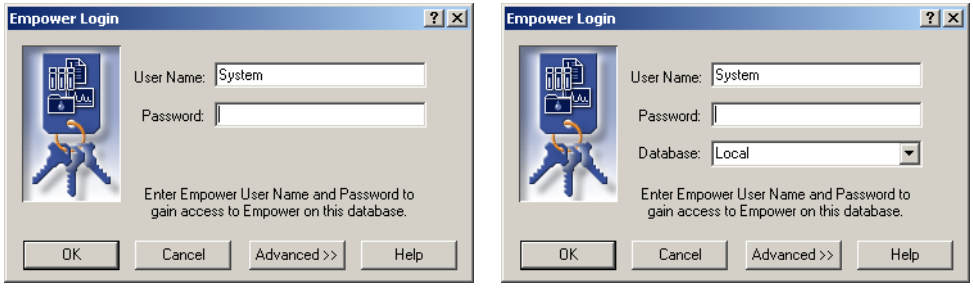
- You have installed Empower software as described in the *Empower System Installation and Configuration Guide*.
- You have installed the GPC software option as described in the *Empower System Installation and Configuration Guide*.
- You have reviewed and followed the basic operating procedures in the *Empower Software Getting Started Guide*.
- Your printer is properly configured in the Windows 2000 or Windows XP software as described in the appropriate Microsoft® documentation.

1.4 Restoring the GPC_Default Project

The GPC_Default project contains GPC example data used in all the tutorials in this guide. Before you can run the tutorials, you must restore the GPC_Default project to your workstation. Restoring the GPC_Default project will also copy the example GPC data to your workstation. The GPC_Default project is located on the Empower CD-ROM.

To restore the GPC_Default project:

1. To start Empower software, select **Start > Programs** (for Windows XP, **All Programs**) **> Empower > Empower Login**. The Empower Login dialog box appears (Figure 1-1).



Personal System

Workgroup or Enterprise System

Figure 1-1 Empower Login Dialog Box

2. Enter your user name and password. If you do not know your user name or password, see your system administrator.
3. If you are using an Empower Enterprise system, select the correct database from the Database list. This list appears only when connected to a client/server system.
4. Click **Advanced** and verify that the Requested Interface field is set to Pro. If you cannot select the Empower Pro interface, see your system administrator.
5. Click **OK**. The Empower Pro window appears.

6. Click **Configure System**. Configuration Manager appears (Figure 1-2).

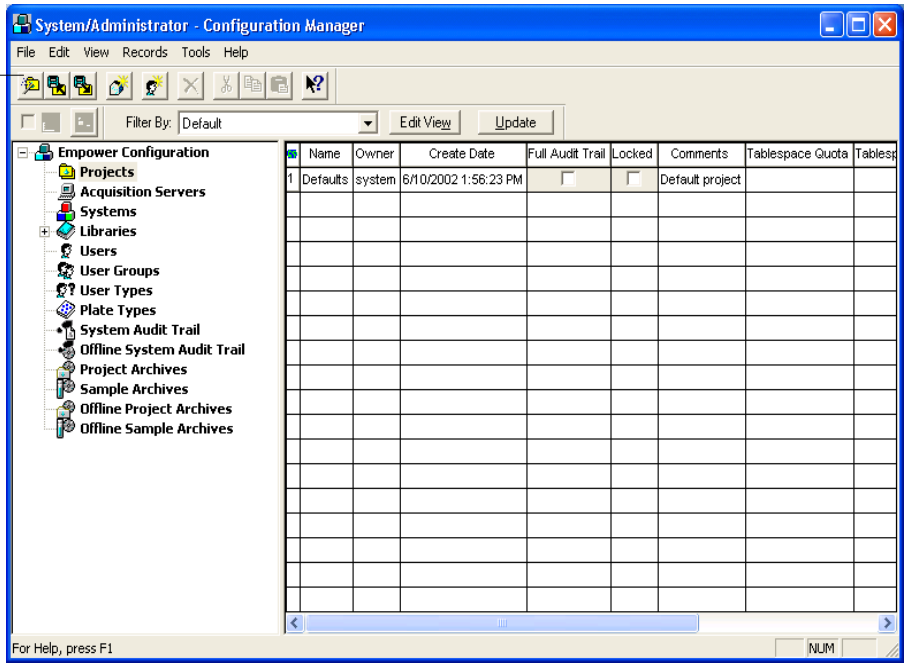


Figure 1-2 Configuration Manager

7. Click **Restore** to start the Restore Project(s) Wizard. Follow the instructions on each page of the wizard. Refer to the “Restoring a Project Using the Wizard” topic in the *Empower Help* Find tab for details.

Chapter 2
Calibrating Your System

This chapter provides step-by-step tutorials of the procedures required to calibrate your system for operation using narrow standards.

2.1 Tutorial Overview

The goal of this tutorial is to familiarize you with the Empower software tools and procedures used to calibrate your system from narrow standard data. The tutorial shows you how to:

- Determine the void (exclusion) volume (V_0) and total retention volume (V_t) of the column set for your GPC system
- Developing a processing method using the Processing Method Wizard
- Process narrow standards to produce a calibration curve
- Check the calibration curve
- Save the calibration curve
- Add your processing method to a method set

Figure 2-1 illustrates the steps used to calibrate your system using GPC narrow standards.

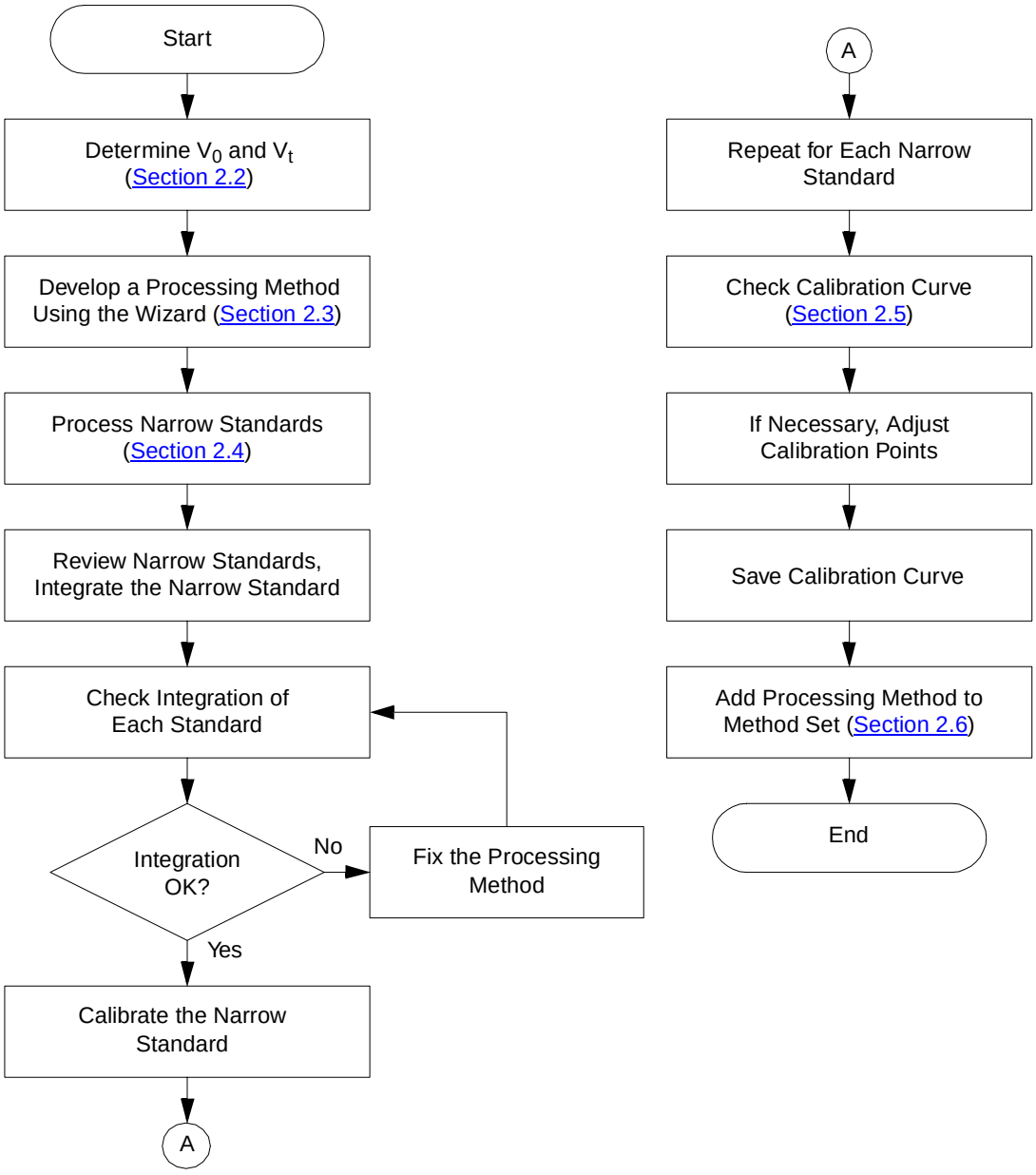


Figure 2-1 Steps in Calibrating Your System Using Narrow Standards

2.2 Determining V_0 and V_t

Empower GPC software uses values for void (exclusion) volume (V_0) and total retention volume (V_t) to extend the valid range of a calibration curve. For the GPC_Default project, use the following information to calculate V_0 and V_t:

- For a typical 300 mm x 7.8 mm column and flow rate of 1 mL/min, the value for V_0 is 5.5 to 6.0 mL per column. The GPC_Default data was collected using three columns, thus the range for V_0 should be 16.5 to 18.0 mL.
- The value of V_t is approximately double that of V_0. You can enter V_t based on the retention time of the last impurity peak that is detected in the chromatogram.

Ensure that the retention times of all points in your broad unknown sample peak are between the values set for V_0 and V_t. If the retention time of any point in the peak is outside the range of V_0 and V_t, slice molecular weight values are not calculated.

You can specify values for V_0 and V_t when you create a GPC processing method using the Processing Method Wizard (see the following section).

2.3 Developing a Processing Method Using the Wizard

The first step in analyzing GPC data is to develop a method to process your GPC data. The processing method is a stored data analysis routine that you:

- Create from calculated and fixed parameters
- Apply to each of your standards to create a calibration curve
- Apply to each of your broad unknowns to create molecular weight distribution curves
- Apply to each of your narrow unknowns to calculate component molecular weights

You can develop a new processing method in one of two ways:

- Interactively in the Processing Method window
- Using the Processing Method Wizard

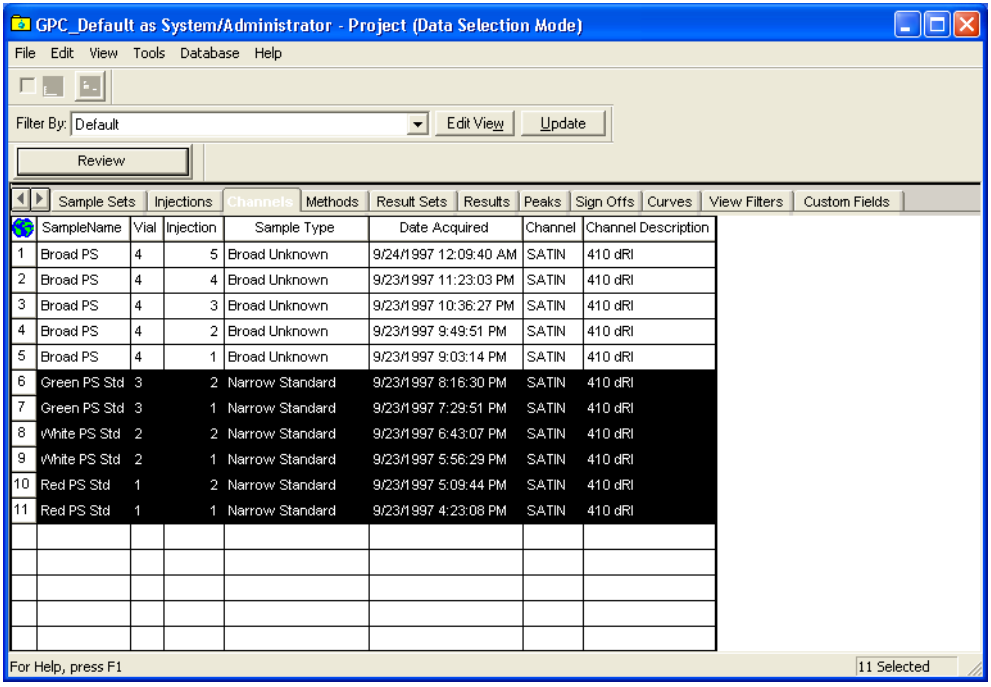
In this tutorial, you develop a processing method by using the Processing Method Wizard. The Processing Method Wizard steps you through:

- Setting up integration parameters
- Setting up calibration parameters
- Defining slicing table parameters
- Saving your new or modified processing method

Using the Processing Method Wizard

To create a new processing method using the Processing Method Wizard:

1. From the Empower Pro window, click **Review Data**. The Review Data dialog box appears.
2. Ensure that the **GPC_Default** project is selected.
3. Select **Review** and **Channels** to open the Project window in Review Data Selection mode.
4. Click **OK**.
5. From the Channels tab in the Project window, select the narrow standard channels in the GPC_Default Project (Figure 2-2).



	SampleName	Vial	Injection	Sample Type	Date Acquired	Channel	Channel Description
1	Broad PS	4	5	Broad Unknown	9/24/1997 12:09:40 AM	SATIN	410 dRI
2	Broad PS	4	4	Broad Unknown	9/23/1997 11:23:03 PM	SATIN	410 dRI
3	Broad PS	4	3	Broad Unknown	9/23/1997 10:36:27 PM	SATIN	410 dRI
4	Broad PS	4	2	Broad Unknown	9/23/1997 9:49:51 PM	SATIN	410 dRI
5	Broad PS	4	1	Broad Unknown	9/23/1997 9:03:14 PM	SATIN	410 dRI
6	Green PS Std	3	2	Narrow Standard	9/23/1997 8:16:30 PM	SATIN	410 dRI
7	Green PS Std	3	1	Narrow Standard	9/23/1997 7:29:51 PM	SATIN	410 dRI
8	White PS Std	2	2	Narrow Standard	9/23/1997 6:43:07 PM	SATIN	410 dRI
9	White PS Std	2	1	Narrow Standard	9/23/1997 5:56:29 PM	SATIN	410 dRI
10	Red PS Std	1	2	Narrow Standard	9/23/1997 5:09:44 PM	SATIN	410 dRI
11	Red PS Std	1	1	Narrow Standard	9/23/1997 4:23:08 PM	SATIN	410 dRI

Figure 2-2 Selecting the Narrow Standard Channels

6. Click **Review** to bring the selected channels into the Review Main window.
7. Click the **2D Channels** tab (Figure 2-3).

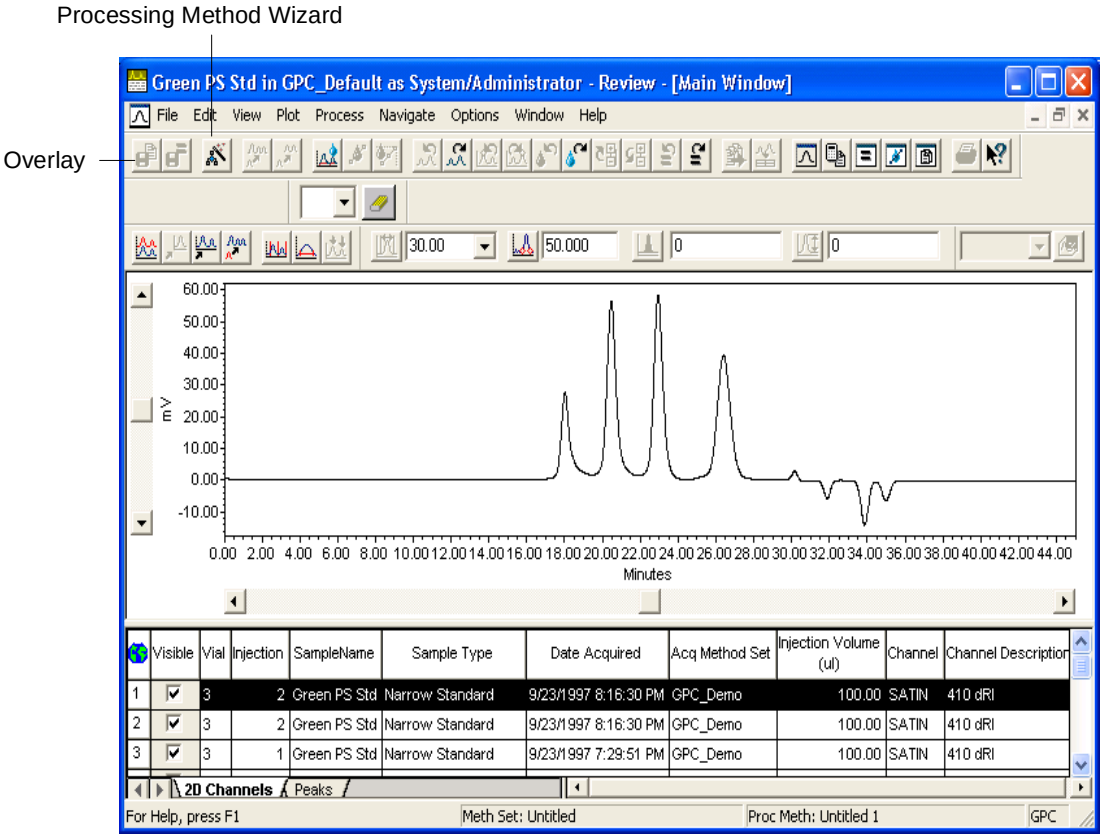


Figure 2-3 First Injection Displayed in the Review Main Window

8. Select the narrow standard with the highest molecular weight to start creating a processing method.

   Note: *To determine the narrow standard with the highest molecular weight, click* ***Overlay*** *(Figure 2-3) to overlay the standard chromatograms. Click the chromatogram with the earliest eluting standard peak, then click* ***Overlay*** *again to turn off the overlay function. The standard with the highest molecular weight (one of the Green PS standards for this data set) is selected in the 2D Channels table.*

9. Click **Processing Method Wizard** (Figure 2-3). The Processing Method Wizard dialog box appears (Figure 2-4).

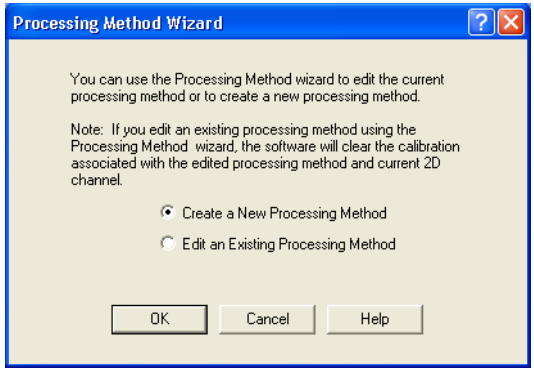


Figure 2-4 Processing Method Wizard Dialog Box

10. Click the **Create a New Processing Method** option button, then click **OK**. The New Processing Method dialog box appears (Figure 2-5).

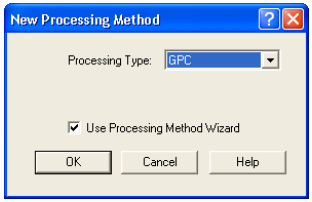


Figure 2-5 New Processing Method Dialog Box

11. Select **GPC** from the Processing Type list . Make sure the **Use Processing Method Wizard** check box is selected, then click **OK**. The Integration– Peak Detection 1 page of the GPC Processing Method Wizard appears (Figure 2-6). This page allows you to set the peak width value.

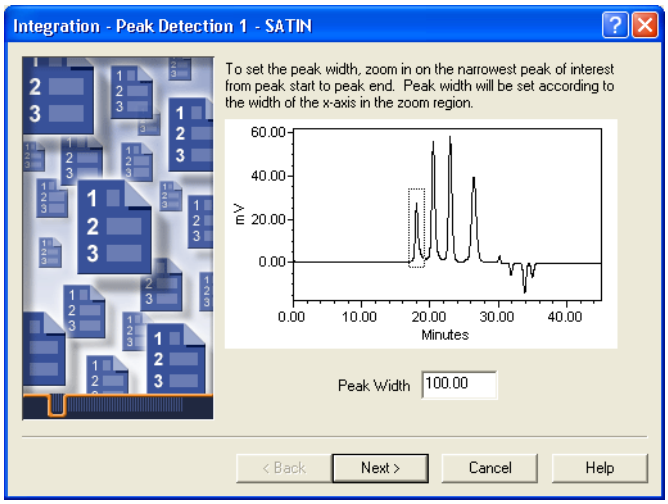


Figure 2-6 Setting the Peak Width

12. Click-drag the cursor to draw a box around the narrowest peak of interest to set the peak width (Figure 2-6). You can also type the peak width value instead of graphically selecting the peak width.

    The view zooms into the selected region. The software automatically determines appropriate peak width setting using the data contained within the region in which you have zoomed. The value is displayed in the text box. Check your integration region. If the desired peak is not selected, right-click in the chromatogram, select **Full View**, then redraw the box.

13. When you are satisfied with the integration region, click **Next** to go to the Integration–Peak Detection 2 page (Figure 2-7). This page allows you to set the threshold for peak detection.

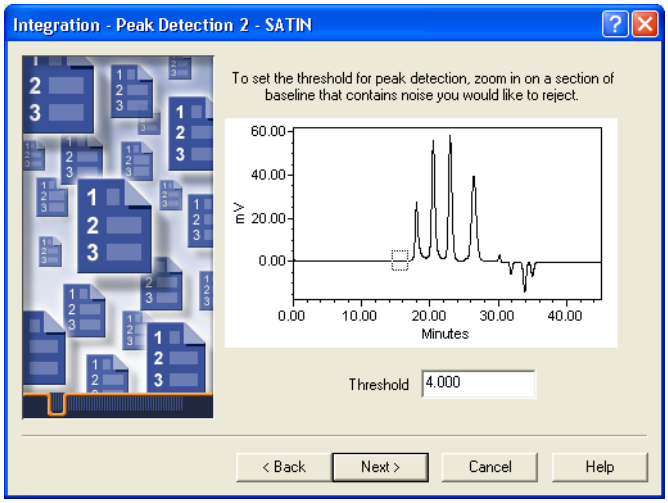


Figure 2-7 Setting the Peak Threshold

14. Click-drag the cursor to draw a box around a section of baseline that contains noise that you would like to reject.

    The view zooms into the selected region. The software automatically determines appropriate peak threshold setting using the data contained within the region in which you have zoomed. The value is displayed in the text box; for this example a value of approximately 4 is appropriate. If you want to change the selected region, right-click in the chromatogram, select **Full View**, then reselect or reenter the value.

15. Click **Next** to go to the Integration–Integration Region page (Figure 2-8). This page allows you to define the area where you would like to perform the integration.

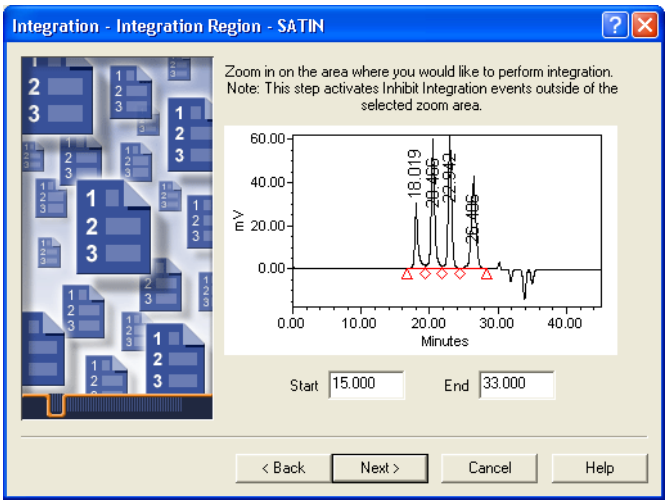


Figure 2-8 Setting the Integration Region

16. Click-drag the cursor to draw a box around the region where you want to perform integration (from 15 to 33 minutes is a good integration region for these narrow standards). You can also type the start and end times instead of graphically selecting the integration region.
17. When you are satisfied with the integration region, click **Next** to go to the Integration–Peak Rejection page (Figure 2-9). This page allows you to reject peaks based on area or height.

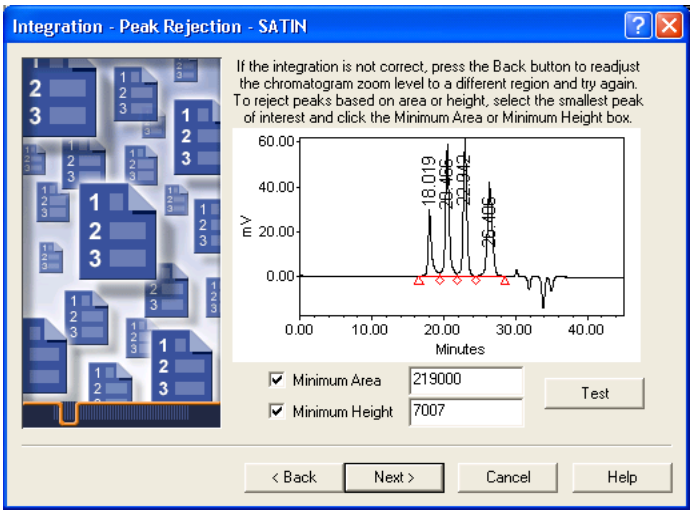


Figure 2-9 Setting Minimum Area and Height

18. If you want to enter values to set integration limits for Minimum Area and/or Minimum Height, enter them on this page. Enter **219000** for the Minimum Area and **7007** for Minimum Height to correctly integrate the narrow standards in the GPC_Default project.
19. Click **Next** to go to the GPC–Calibration page (Figure 2-10). This page allows you to select the parameters for calibration.

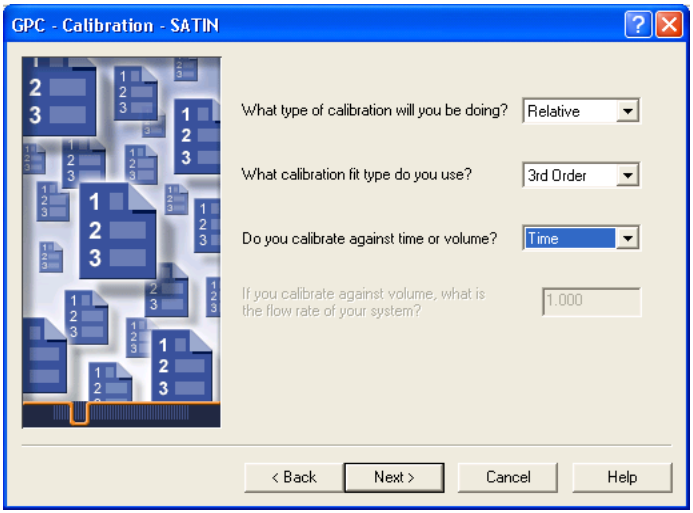


Figure 2-10 Setting GPC Calibration Parameters

20. Select the following values for the GPC Calibration parameters on this page:
    - **Type of calibration** – Relative
    - **Calibration fit type** – 3rd Order (based on the column set used to collect the data in this project)
    - **Calibrate against time or volume** – Time

    You do not need to enter a flow rate because you are calibrating against time so the last line on the screen is grayed out.
21. Click **Next** to go to the GPC–Column Set page (Figure 2-11). This page allows you to enter values for V_0 and V_t.

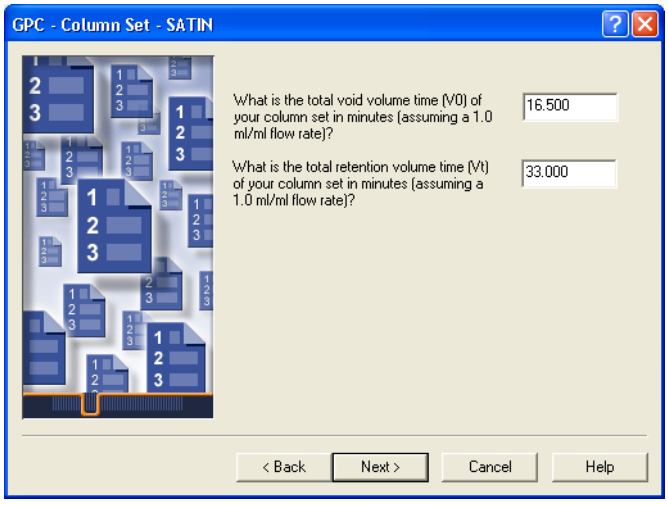


Figure 2-11 Setting V_0 and V_t Values

22. Enter the values that you calculated for void (exclusion) volume (V_0) and total retention volume (V_t). See Section 2.2, Determining V_0 and V_t. To process the data in the GPC_Default project, enter **16.500** for V_0 and **33.000** for V_t (values for the system used to collect this GPC data). If you do not enter values for V_0 and V_t, the retention time of the highest and lowest molecular weight standards will be used as V_0 and V_t.
23. Click **Next** to go to the Processing Method Name page (Figure 2-12). This page allows you to define a name to save your method.

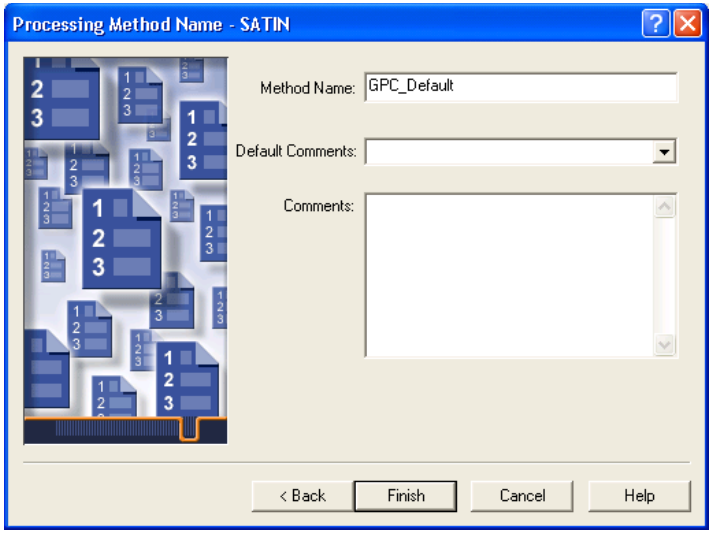


Figure 2-12 Naming the Processing Method

24. Enter **GPC_Default** in the Method Name text box to name the new processing method (Figure 2-12). Enter comments if you want to provide additional information about the processing method. Click **Finish** to complete the wizard, save your new processing method, and process the current narrow standard channel with the new processing method.

    The integrated and calibrated narrow standard appears in the chromatogram plot in the Review Main window (Figure 2-13).

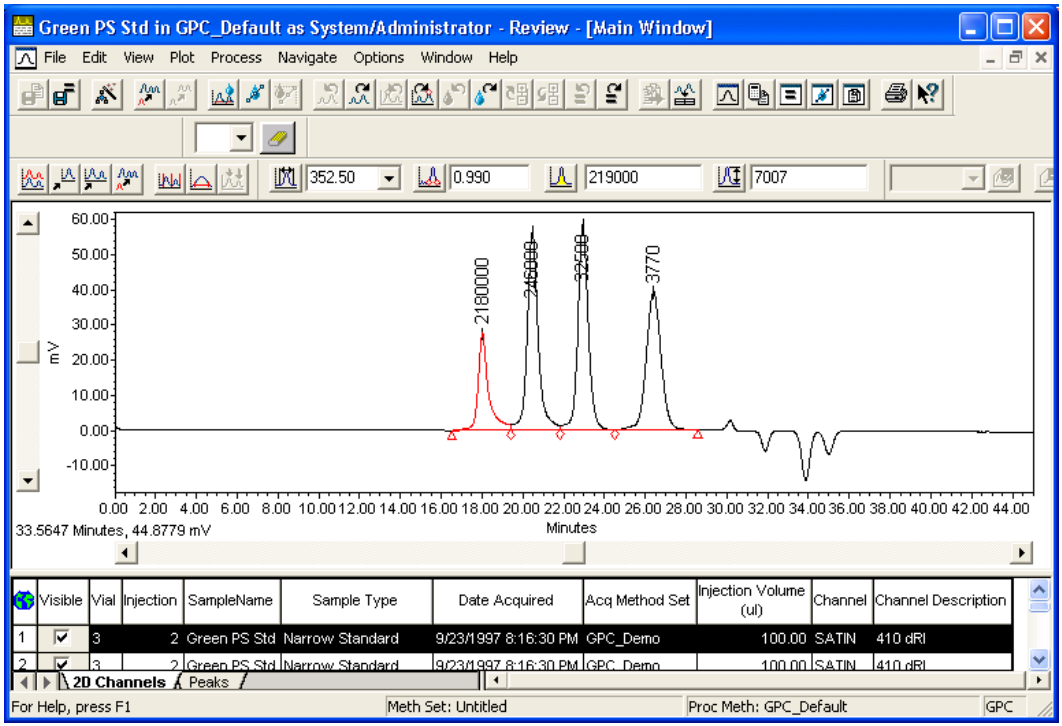


Figure 2-13 Integrated and Calibrated Narrow Standard

25. Select **Window > Processing Method** to view the new method's processing method parameters in the Processing Method window (Figure 2-14). Check the Integration, Calibration, and Slicing pages by clicking the corresponding tabs.

    Note: *Although it is not shown in this tutorial, you can view the Review Main window and the Processing Method window side by side by selecting* ***View > Processing Method Layout****.*

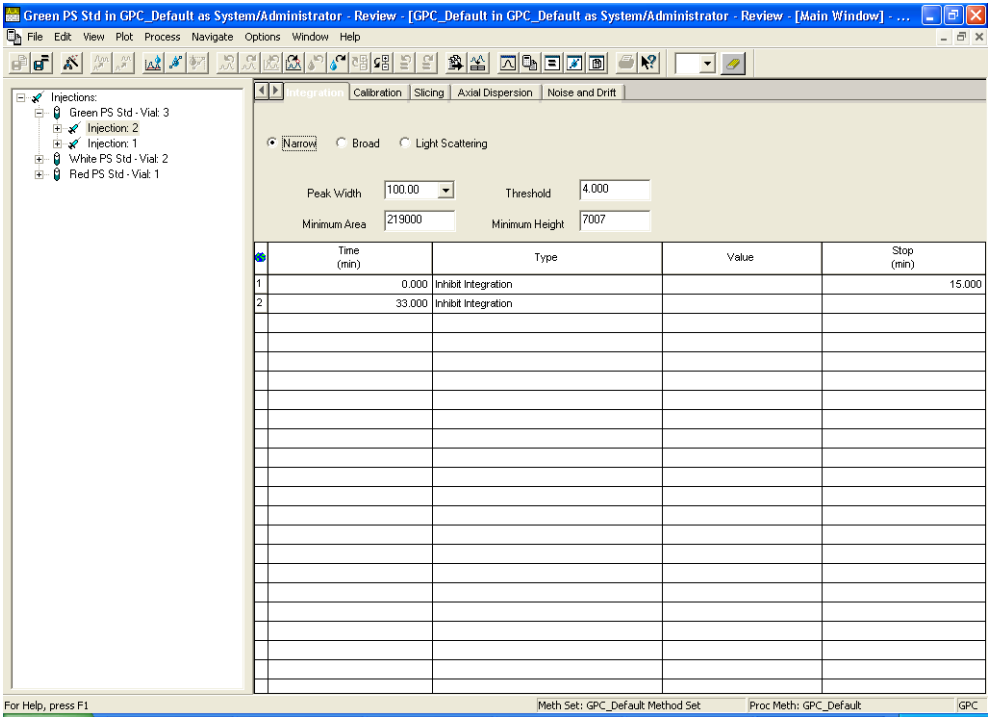


Figure 2-14 Processing Method Window (Integration Page)

26. On the Integration page, note the peak width and threshold values and the two inhibit integration events that have been added to both the narrow and broad integration parameters. You can switch between the narrow and broad integration parameters by clicking the corresponding option buttons on the Integration page.
27. Switch to the Calibration page by clicking the **Calibration** tab. Notice that the calibration parameters you entered in the wizard are visible (Figure 2-15).

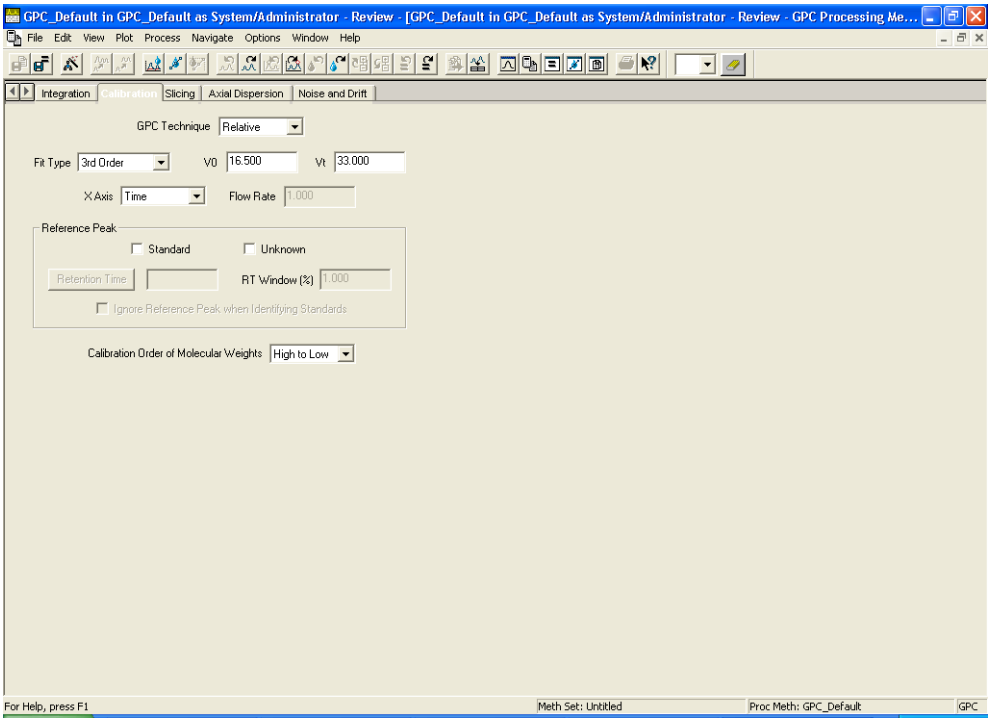


Figure 2-15 Processing Method Window (Calibration Page)

28. Switch to the Slicing table by clicking the **Slicing** tab. Notice that the table (on the Slicing page) contains a component named Broad with a peak match type set to greatest width to help you process a broad unknown peak (Figure 2-16).

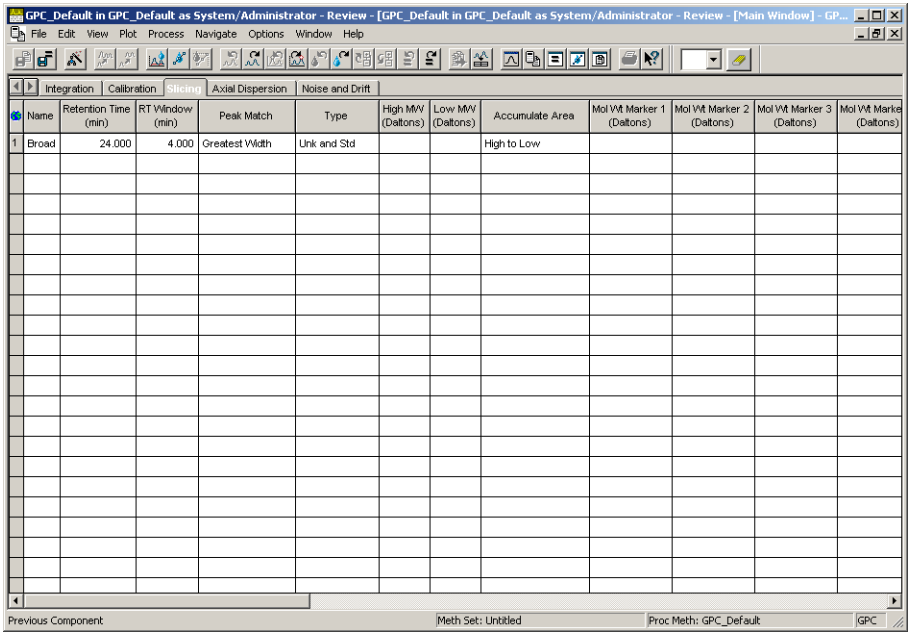


Figure 2-16 Processing Method Window (Slicing Page)

2.4 Processing the Narrow Standards

After you have developed your GPC processing method using the wizard, you can integrate the narrow standards, adjust the processing method to optimize the integration as needed, and then calibrate the narrow standards.

To process the narrow standards, you need to:

- Prepare to process the narrow standards
- Process the narrow standards

2.4.1 Preparing to Process the Narrow Standards

Preparing to process the narrow standards involves the following tasks:

- Bringing the narrow standards into Review
- Opening your processing method

If you just completed Section 2.3, Developing a Processing Method Using the Wizard, and have not closed the resulting windows, you can skip this section and go directly to Section 2.4.2, Processing the Narrow Standards.

To prepare to process the narrow standards:

1. Click **Review Data**, then select **Review > Channels** to display the Project window.
2. From the Channels tab of the Project window, select the six narrow standard channels in the Channels table (see Figure 2-2).
3. Click **Review** to bring the selected standards into Review. The first channel from the Green PS standard appears in the chromatogram plot and 2D Channels table of the Review Main window (see Figure 2-3). Notice that this channel contains data from the second injection of the narrow standard Green PS Std.
4. Select **File > Open > Processing Method**. The Open an Existing Processing Method dialog box appears. Select **GPC_Default**, then click **Open**. The processing method name and type appear at the bottom of the Review window (Figure 2-17).

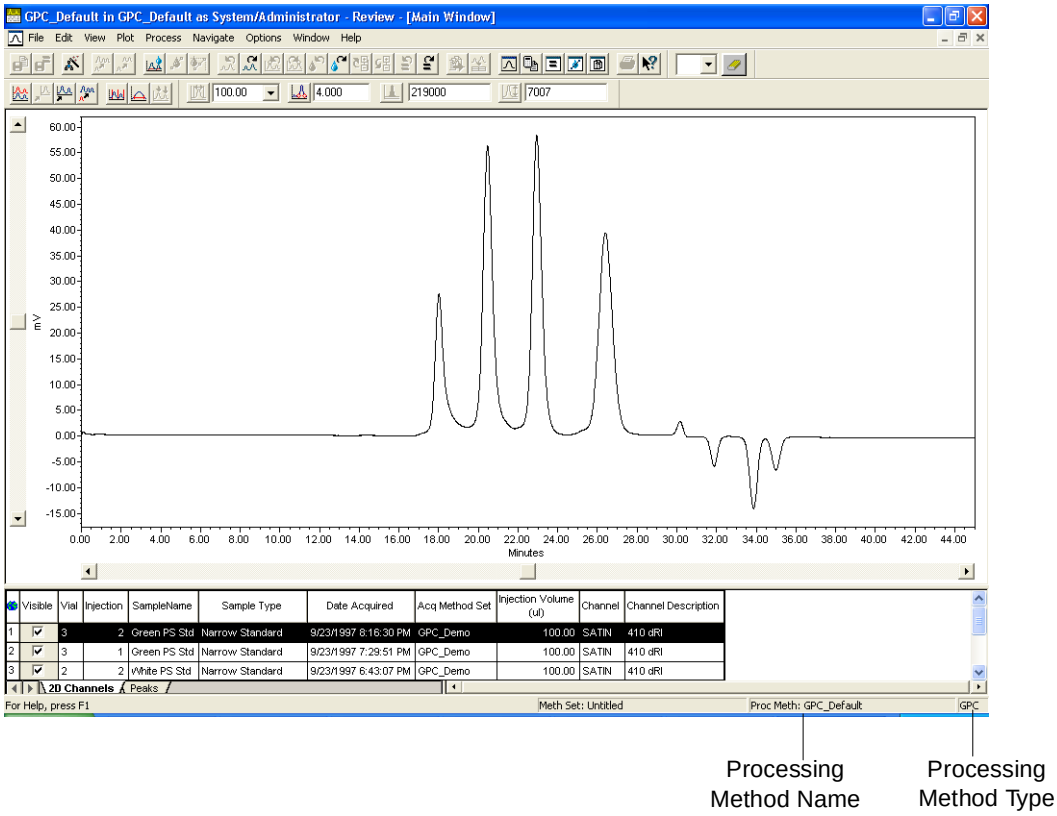


Figure 2-17 Preparing to Process Narrow Standards in Review

2.4.2 Processing the Narrow Standards

Processing the narrow standards involves the following tasks:

- Integrating the narrow standard

- Checking the integration
- Calibrating the narrow standard
- Repeating for each narrow standard
- Checking the calibration curve
- Saving the calibration

Integrating the Narrow Standard

To integrate the narrow standard:

1. From Review, click **Integrate**. The processing parameters stored with your processing method are applied to the first narrow standard channel. The integrated peaks appear on the chromatogram (Figure 2-18).

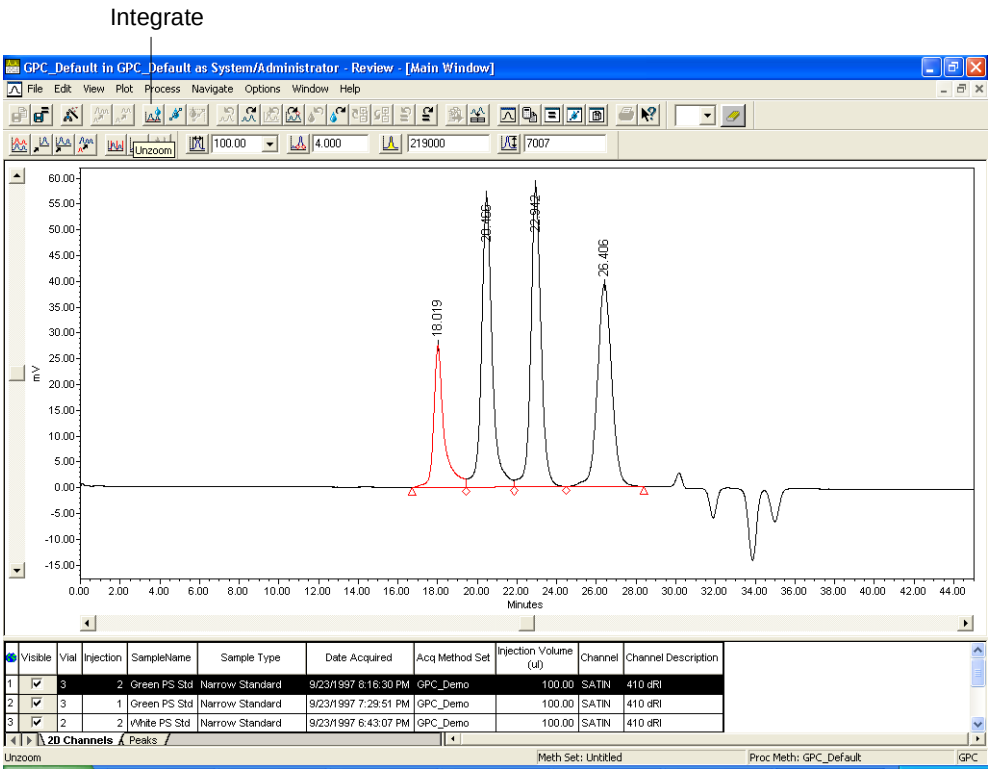


Figure 2-18 Processing Method Applied to First Narrow Standard

2. Check that only the standard peaks are integrated and that the peaks are properly integrated (Figure 2-18).

   If the peaks are not properly integrated, access the Processing Method window (select **Window > Processing Method**) and adjust the narrow integration parameters on the Integration page. Make sure that the **Narrow** option button is

selected because you are adjusting parameters for a narrow standard (see Figure 2-14). For details, refer to the “Optimizing Peak Integration” topic in the *Empower Help* Find tab.

3. Click the **Peaks** tab (at the bottom of the Review Main window) to display the Peaks table (Figure 2-19).
4. Click **Calibrate**. The chromatogram is calibrated with the existing peaks and the result appears in the Peaks table (Figure 2-19).

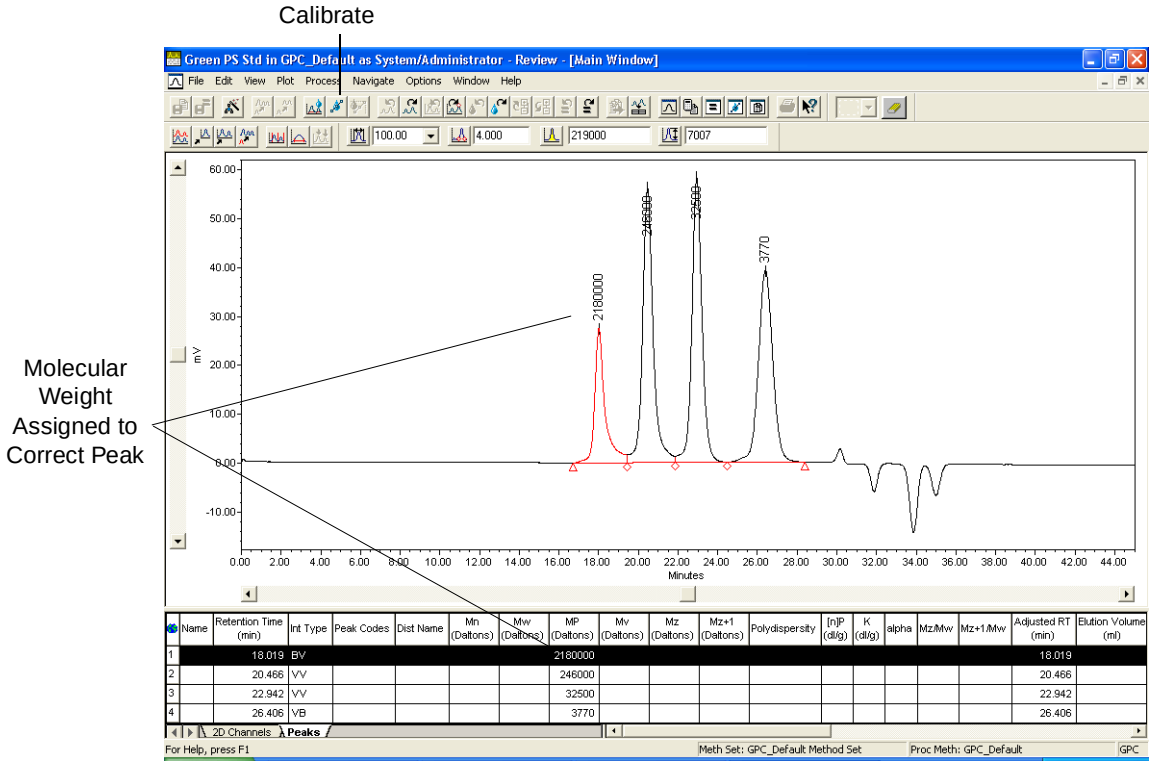


Figure 2-19 Checking Assigned Molecular Weight

The first molecular weight is assigned to the first integrated peak in the chromatogram, the second molecular weight is assigned to the second integrated peak, and so on.

5. If the molecular weight (MP) is assigned to the wrong peak, adjust your integration parameters so that only the standard peaks are integrated (see Figure 2-14). Try setting a minimum height or a minimum area or adjust the inhibit integration event times. For details, refer to the “Defining Integration Parameters and Events” topic in the *Empower Help* Find tab.

Repeating for Each Narrow Standard

6. Click **Next 2D Channel** (Figure 2-19). The next chromatogram appears in the Chromatogram plot.
7. Repeat steps 1 through 6 until each narrow standard channel is processed. If you adjusted the processing method, you need to reintegrate and recalibrate any standards that were processed before you modified the processing method.

   Note: *You must process all standards using the same processing method parameters.*

2.5 Checking the Calibration Curve

When you finish calibrating all the narrow standards, you need to check the calibration curve, which involves:

- Displaying the calibration curve
- Adjusting the calibration curve, if necessary
- Saving your calibration curve

2.5.1 Displaying the Calibration Curve

Note: *The steps in this procedure continue from the point at which the previous procedure concluded.*

To display the calibration curve for your standards:

1. Select **Window > Calibration** in Review to display the Calibration Curve window (Figure 2-20).
2. Maximize the window to display more of the Individual Points table.

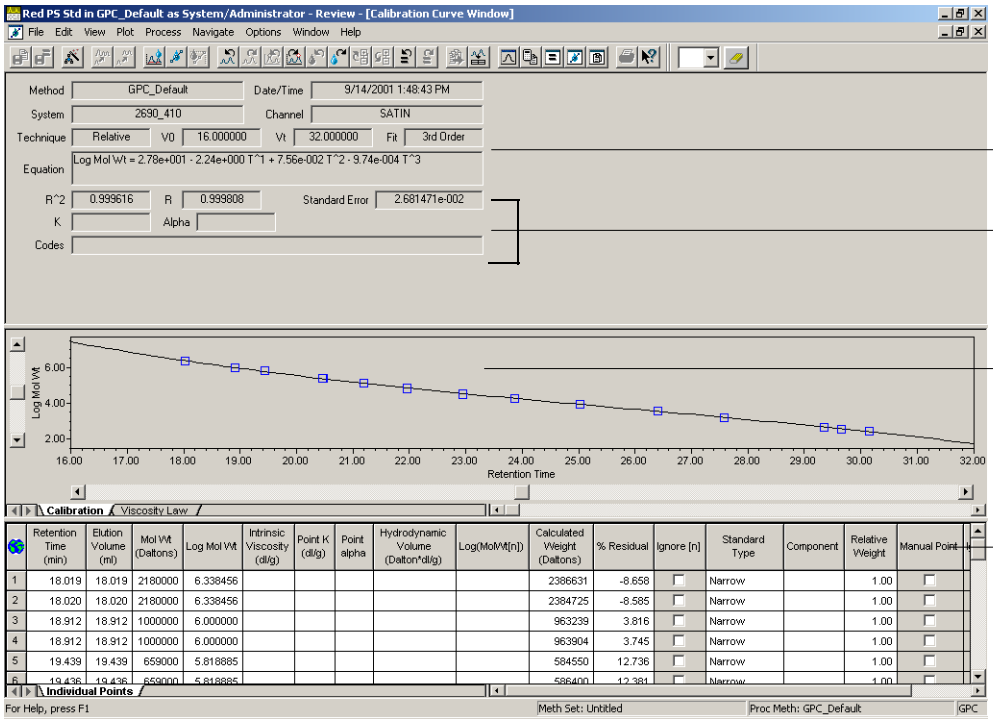


Figure 2-20 Calculated Calibration Curve

2.5.2 Checking the Calibration Curve

Checking the calibration curve involves:

- Verifying the calibration curve
- Making corrections to the calibration curve or its points

Verifying the Calibration Curve

You use the calibration curve window to perform the following verifications on the calibration curve:

1. Check the shape of the calibration curve and note whether an invalid curve message appears in the calibration status area (see Figure 2-20).
2. Examine the calibration points in the calibration curve to verify that each point falls along the curve.
3. Check the correlation coefficient (R) and standard error of the calibration curve in the calibration status area.

4. Check the Codes field in the calibration status area for any processing problems that occurred while the software was calculating the calibration curve.

Making Corrections

There are three ways to correct a calibration curve:

- Check the integration and molecular weight of the narrow standard that corresponds to the outlying calibration point, and reprocess the standard if necessary.
- Recalculate the calibration curve with a different fit type.
- Ignore a calibration point.

Use the following procedures to make corrections to the calibration curve.

Correcting the Outlying Points

Note the narrow standard result that corresponds to an outlying calibration point and check the following parameters to be sure that they are set correctly to process the narrow standard:

- **Sample Loading parameters** – Check the molecular weights of your standards, and ensure you entered correct *K* and *alpha* values in the Component Editor if you are performing universal calibration. For details, refer to the “Loading Components for GPC/V Standards and Unknowns” topic in the *Empower Help* Find tab.
- **Narrow Integration parameters** – For details, refer to the “Optimizing Peak Integration” topic in the *Empower Help* Find tab.

If you need to make corrections to sample parameters, restart Review with the corrected standards and reintegrate and recalibrate them.

If you change the integration parameters, you must reintegrate and recalibrate all the narrow standards.

Recalculating the Calibration Curve with a Different Fit Type

To change the fit type of the calibration curve:

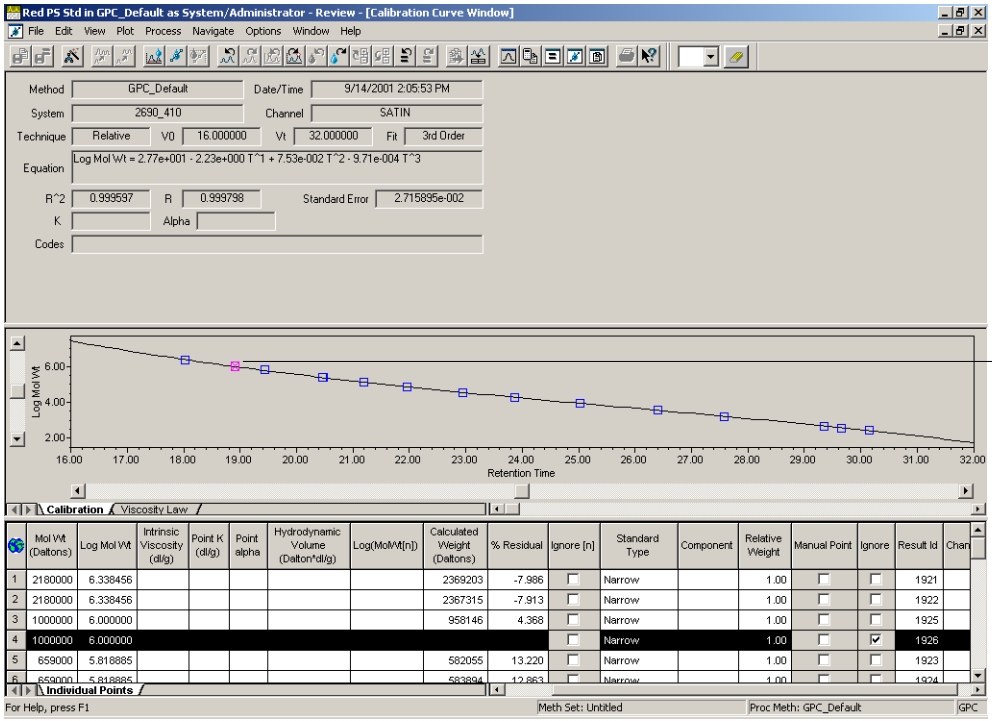
1. Select **Window > Processing Method**. The Processing Method window appears (see Figure 2-14).
2. Click the **Calibration** tab to locate and choose another fit type from the Fit Type drop-down list.
3. Select **Window > Calibration**. The Calibration Curve window appears.
4. Select **Process > Calculate Curve** to recalculate the curve with the new fit type.

Ignoring a Calibration Point

If you cannot correct the outlying point, you can ignore the calibration point so it is not used when the calibration curve is calculated.

To ignore a point in the calibration curve:

1. In the Calibration Curve window, click the point on the plot that you want to ignore. The row corresponding to that point is highlighted in the Individual Points table (Figure 2-21).
2. Scroll the table horizontally until the Ignore field appears.
3. Select the **Ignore** check box. The point appears with an “X” through it. The curve does not change until you recalculate the curve.
4. Select **Process > Calculate Curve**. The calibration curve reappears with the coefficients and the other statistics recalculated.



Selected Calibration Point

Figure 2-21 Selecting a Calibration Point to Ignore

2.5.3 Saving Your Calibration Curve

To save the adjustments to the calibration curve and the standard results associated with it:

1. From the Review - Calibration Curve window, select **File > Save > Calibration**.

   Note: *If you modified the processing method, a message indicating that all the standards were not processed with the same version of the processing method may appear. If this happens, you either:*

   - *Click **Save** to save the calibration curve with some or all of the calibration points marked as manual points indicating the standards were processed with an earlier version of the processing method.*

   - or-

   - *Click **Cancel**, reintegrate and recalibrate all your standards, then save the standards and the calibration curve.*

2. Select **File > Exit** to return to the Empower Pro window.

2.6 Adding Your Processing Method to a Method Set

Add the processing method you created in Section 2.3, Developing a Processing Method Using the Wizard, to a method set. Adding your processing method to a method set involves:

- Accessing the Method Set Editor
- Adding your processing method
- Saving the method set

Accessing the Method Set Editor

To access the Method Set Editor:

1. From the Project window, select **File > New Method > Method Set**.
2. You are prompted to use the wizard to create a new method set. Click **No**. The Method Set Editor appears (Figure 2-22).

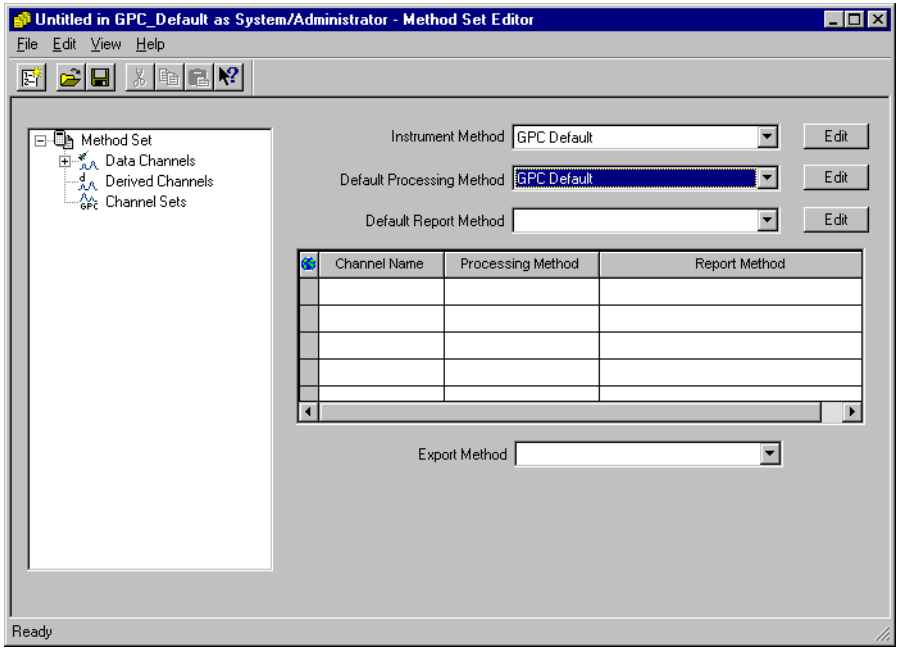


Figure 2-22 Method Set Editor

Adding Your Processing Method

3. Select **GPC Default** from the Instrument Method list.
4. Select **GPC_Default** or the name of the processing method you created (if different), from the Default Processing Method list.
5. Leave the Default Report Method and Export Method fields blank.

Saving the Method Set

6. Select **File > Save**. The Save Current Method Set dialog box appears.
7. Type **GPC_Default Method Set** in the Name field. Click **Save** to save the current method set.

Note: *You can also edit a method set in Review using the Method Set Editor. To open the Method Set Editor, select* ***File > New or Open > Method Set****. (If you selected* ***Open****, the Open an Existing Method Set dialog box appears. Select the desired method set and click* ***Open****.) Select* ***Window > Method Set*** *to access the Method Set Editor.*

2.7 Tutorial Summary

In this chapter, you have learned how to:

- Determine V_0 and V_t for your GPC system
- Develop a processing method using the Processing Method Wizard
- Process narrow standards
- Check the calibration curve and adjust, if necessary
- Save the calibration curve
- Add your processing method to the method set

Chapter 3
Processing Broad Unknowns

This chapter provides a step-by-step tutorial of the procedures required to process broad unknown samples with the processing method used to calibrate your narrow standard.

3.1 Tutorial Overview

The goal of this tutorial is to familiarize you with the Empower software tools and procedures used to process unknown samples. The tutorial shows you how to:

- Prepare to process unknown data samples
- Process broad unknown data samples using the GPC processing method and calibration curve created in the previous tutorials
- Check the molecular weight distribution plot for a processed broad unknown
- Make adjustments to a broad unknown result
- Save your unknown results

Figure 3-1 outlines the steps used to process unknowns.

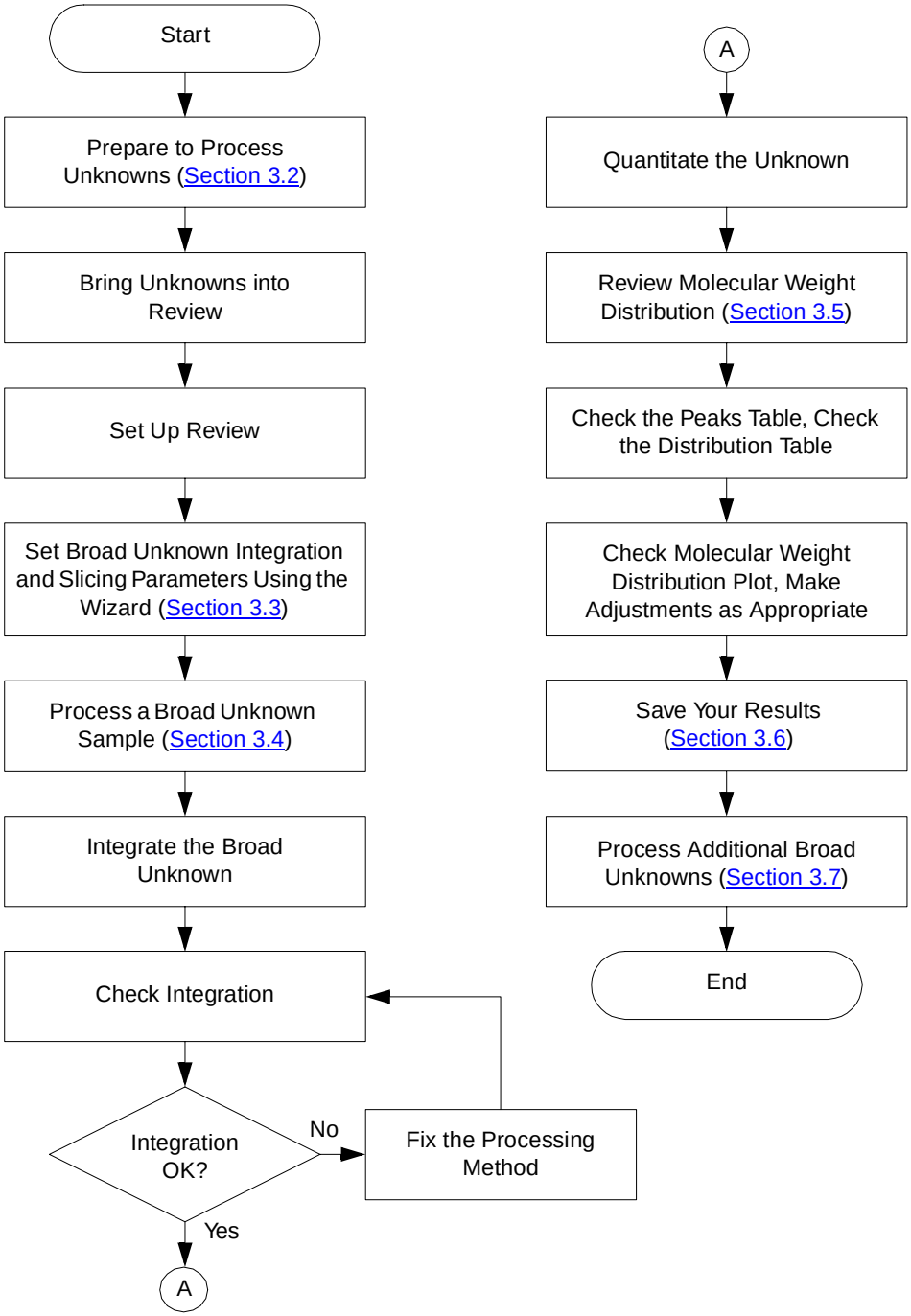


Figure 3-1 Steps in Processing Broad Unknowns

3.2 Preparing to Process Unknowns

Processing unknown data samples involves:

- Bringing the broad unknown channels into Review
- Opening the GPC processing method which you used to calibrate your standards

3.2.1 Bringing the Unknowns into Review

To bring broad unknown channels into Review for processing:

1. In the Empower Login dialog box, enter your user name and password, then click **OK**.
2. From the Empower Pro window, click **Review Data**. The Review Data dialog box appears.
3. Select **Review** and **Channels**.
4. Click **OK**. The Project window appears.
5. Select the five broad unknown channels from the Channels tab in the Project window (Figure 3-2).

Review

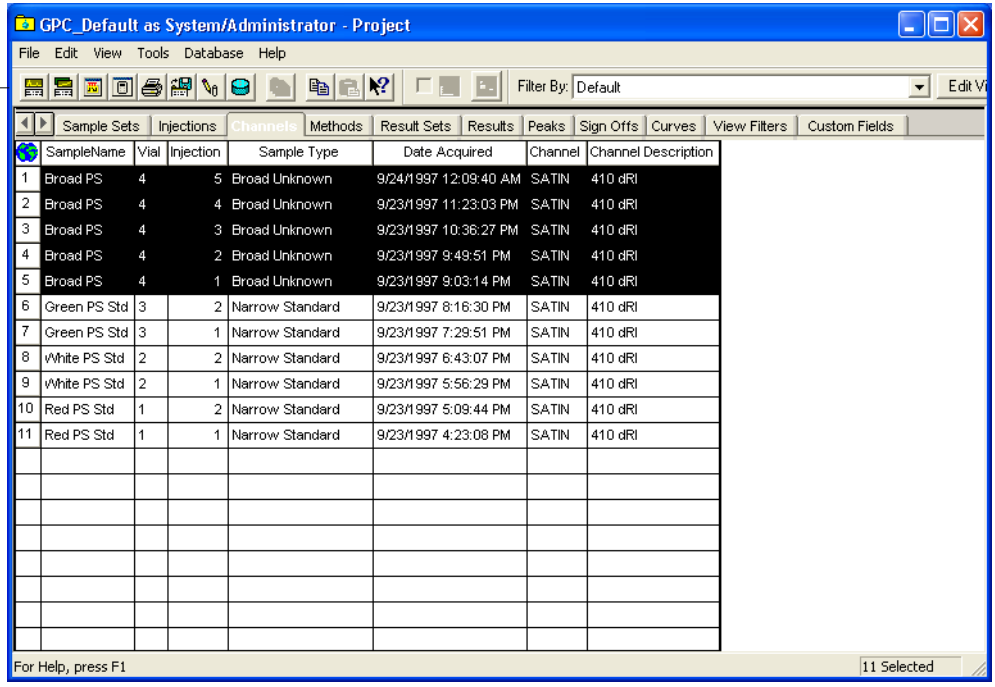


Figure 3-2 Selecting Broad Unknown Channels

6. Click **Review**. Review appears with the first broad unknown channel displayed (Figure 3-3).

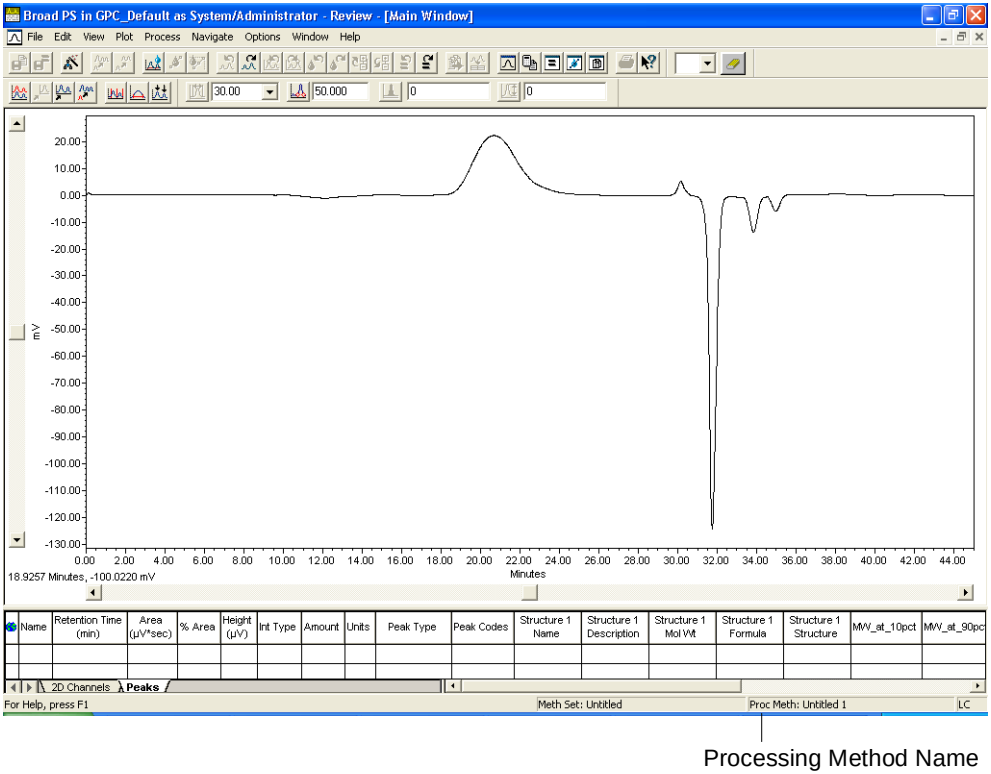


Figure 3-3 First Broad Unknown Displayed in Review

3.2.2 Opening the GPC Processing Method

To open the GPC Processing Method to process unknown samples:

1. Select **File > Open > Processing Method**. The Open an Existing Processing Method dialog box appears.
2. Select your processing method, **GPC_Default** (or the name of the processing method you are using), then click **Open**. The processing method name and type appear at the bottom of the window.
3. Click the **Peaks** tab to display the Peaks table (Figure 3-4).

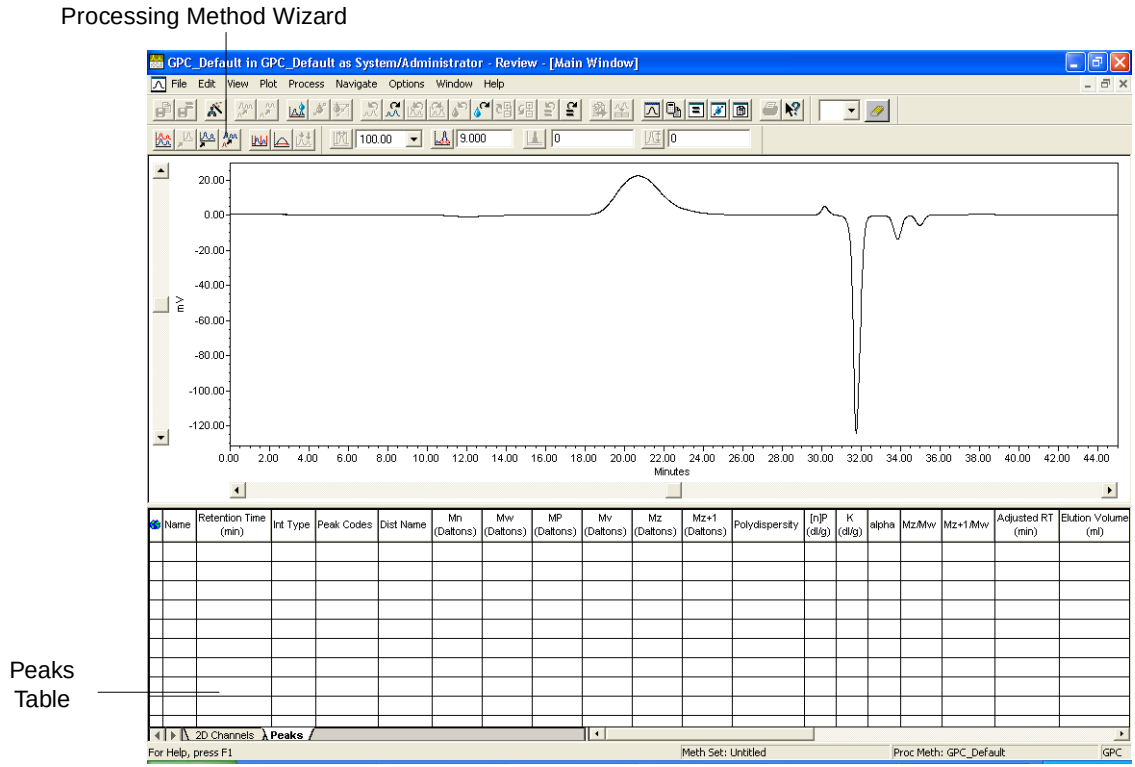


Figure 3-4 Review with GPC Processing Method Open

3.3 Setting Broad Unknown Integration Parameters

You use the Processing Method Wizard to set the integration parameters for the broad unknowns. This modifies the processing method you created in Section 2.3, Developing a Processing Method Using the Wizard, to include processing parameters for the broad unknowns.

To run the Processing Method Wizard to modify the method for the broad unknowns:

1. Click **Processing Method Wizard** in the Review Main window (Figure 3-4). The GPC Processing Method Wizard dialog box appears (Figure 3-5).

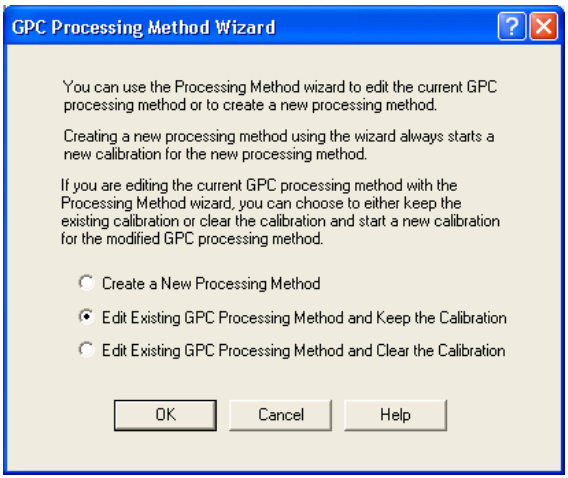


Figure 3-5 GPC Processing Method Wizard Dialog Box

2. Click the **Edit Existing GPC Processing Method and Keep the Calibration** option button, then click **OK**. The Integration–Integration Region page of the wizard appears since the integration region was set when you created the processing method.
3. Click **Back** twice to access the Integration–Peak Detection 1 page.

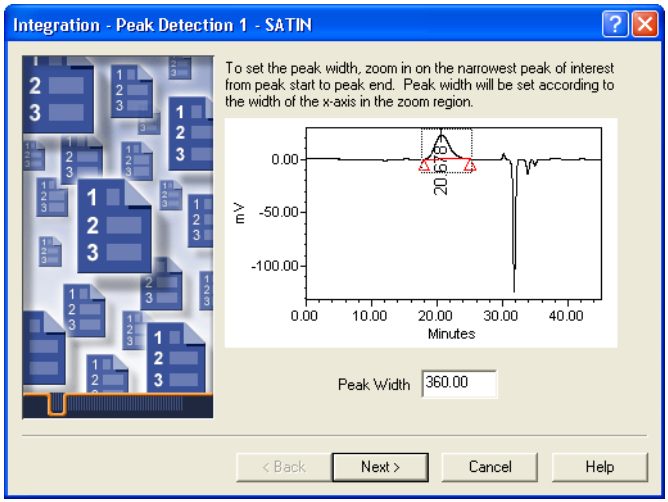


Figure 3-6 Setting Peak Width

Click-drag the cursor to draw a box around the narrowest peak of interest to set the peak width (Figure 3-6). You can also type the peak width value instead of graphically selecting the peak width. The view zooms into the selected region. The software automatically determines the appropriate peak width setting using the data contained within the region in which you have zoomed. The value is displayed in the text box. For this broad unknown a value of approximately 360 is appropriate. Check your integration region. If the desired peak is not selected, right-click in the chromatogram, select **Full View**, then redraw the box.

4. When you are satisfied with the integration region, click **Next** to go to the Integration–Peak Detection 2 page (Figure 3-7). This page allows you to set the threshold for peak detection.

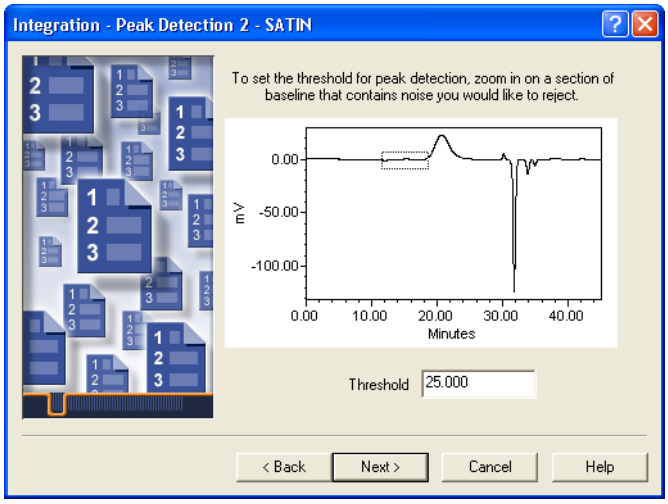


Figure 3-7 Setting Peak Threshold

5. Click-drag the cursor to draw a box around a section of baseline that contains noise that you would like to reject.

   The view zooms into the selected region. The software automatically determines the appropriate peak threshold setting using the data contained within the region in which you have zoomed. The value is displayed in the text box; for this example a value of approximately 25 is appropriate. If you want to change the selected region, right-click in the chromatogram, select **Full View**, then reselect or reenter the value.

6. Click **Next** to go to the Integration–Integration Region page (Figure 3-8). This page allows you to define the area where you want to perform the integration.

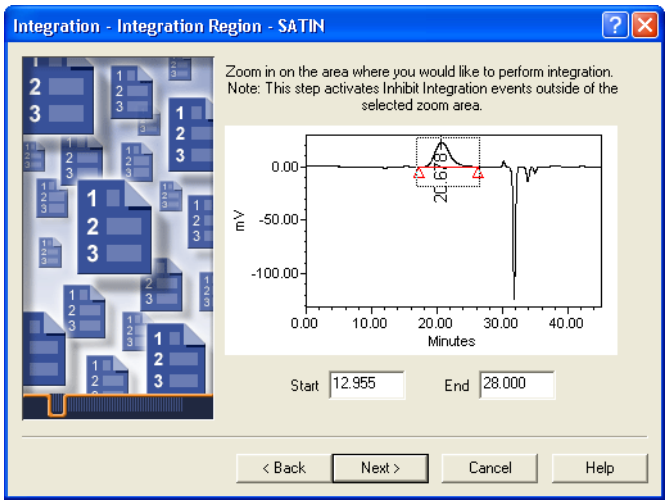


Figure 3-8 Setting the Integration Region

7. Enter the start and end times for the region where you want to perform integration. From 12.955 minutes to 28 minutes is a good integration region for these broad unknowns.
8. Click **Next** to go to the Integration–Peak Rejection page (Figure 3-9). Check your integration. If the integration is incorrect, click **Back**, then reenter start and end time values. If you want to enter values to set integration limits for Minimum Area and/or Minimum Height, enter them on this page. You can leave these values at 0, as they are not needed to correctly integrate the broad unknowns in the GPC_Default project.

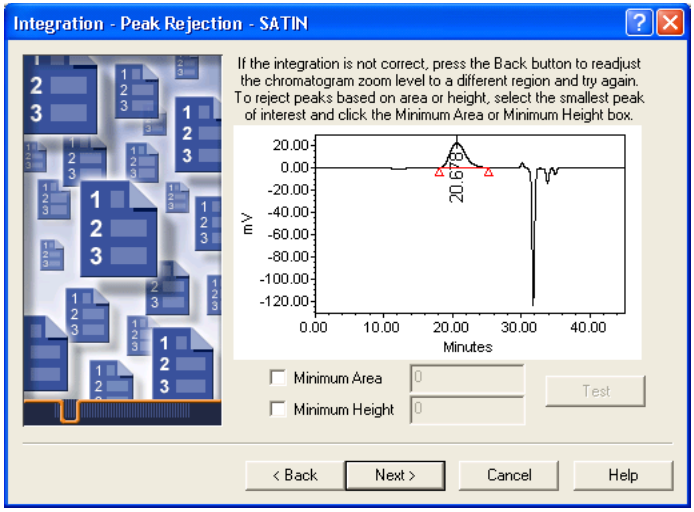


Figure 3-9 Setting Minimum Area and Height

9. Click **Next** to go to the GPC–Calibration page (Figure 3-10).

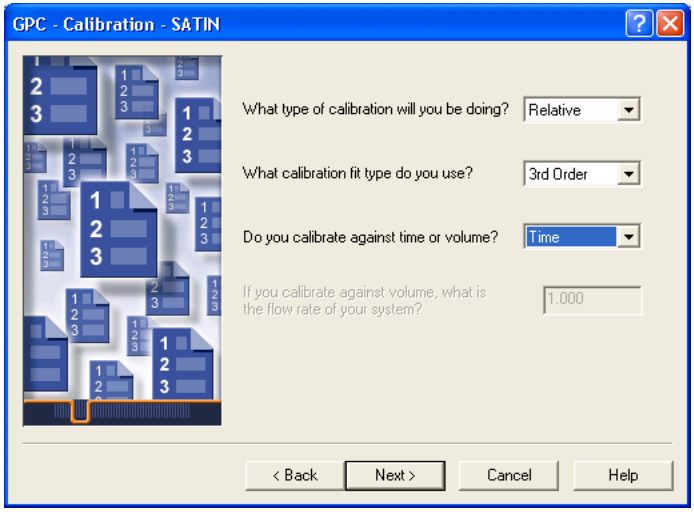


Figure 3-10 Setting GPC Calibration Parameters

10. Leave the GPC calibration parameters at their current settings (Figure 3-10).
11. Click **Next** to go to the GPC–Column Set page (Figure 3-11). This page allows you to enter values for V_0 and V_t.

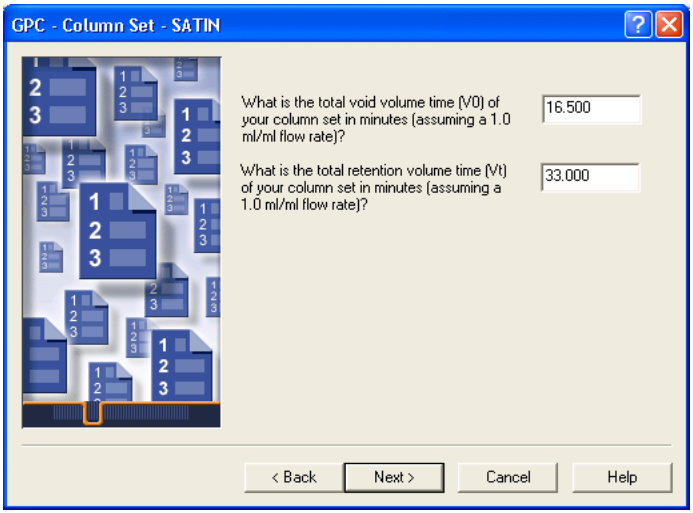


Figure 3-11 Setting V_0 and V_t Values

12. Leave the GPC column set parameters V_0 and V_t at their current settings.
13. Click **Next** to go to the GPC–Broad Unknowns and Standards page (Figure 3-12).

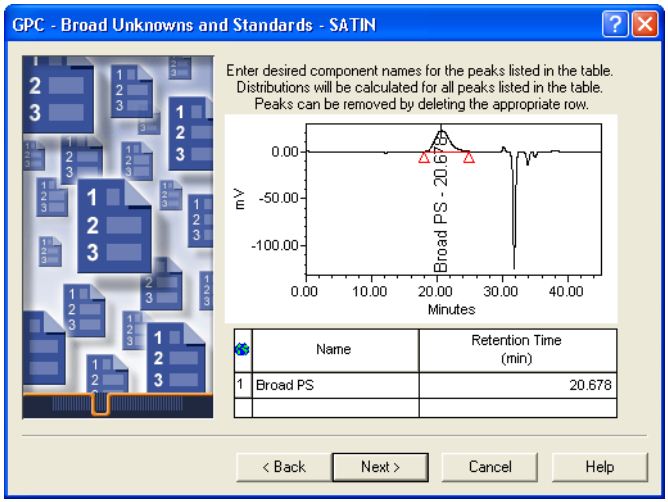


Figure 3-12 Setting GPC Broad Unknowns and Standards Parameters

14. Enter the component name, **Broad PS**, in the Name field (Figure 3-12). The component name is copied to the Slicing table in the Processing Method window (Figure 3-16).

Note: *If you entered a name for the component in the Component Editor, the name must match the name in the Slicing table in the Processing Method window in order for the distribution to be calculated. For details, refer to the "Component Editor" and "Slicing Tab" topics in the* Empower Help *Find tab.*

15. Click **Next** to go to the Processing Method Name page (Figure 3-13).

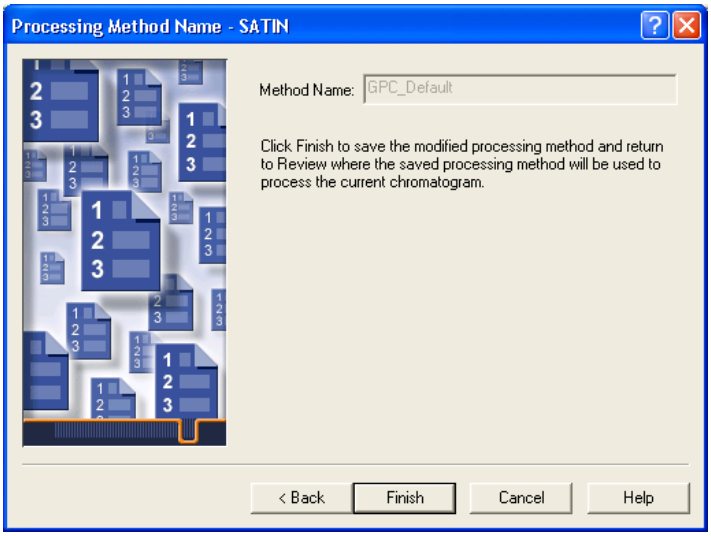


Figure 3-13 Finishing the Processing Method Wizard

16. Click **Finish** to finish the Processing Method Wizard, save the modified processing method and apply it to the current broad unknown, and return to the Review Main window.
17. The Saving Processing Method with Calibration Curves dialog box appears. Click **Copy Curves**.

18. View the integrated and quantitated broad unknown in the chromatogram plot of the Review Main window (Figure 3-14).

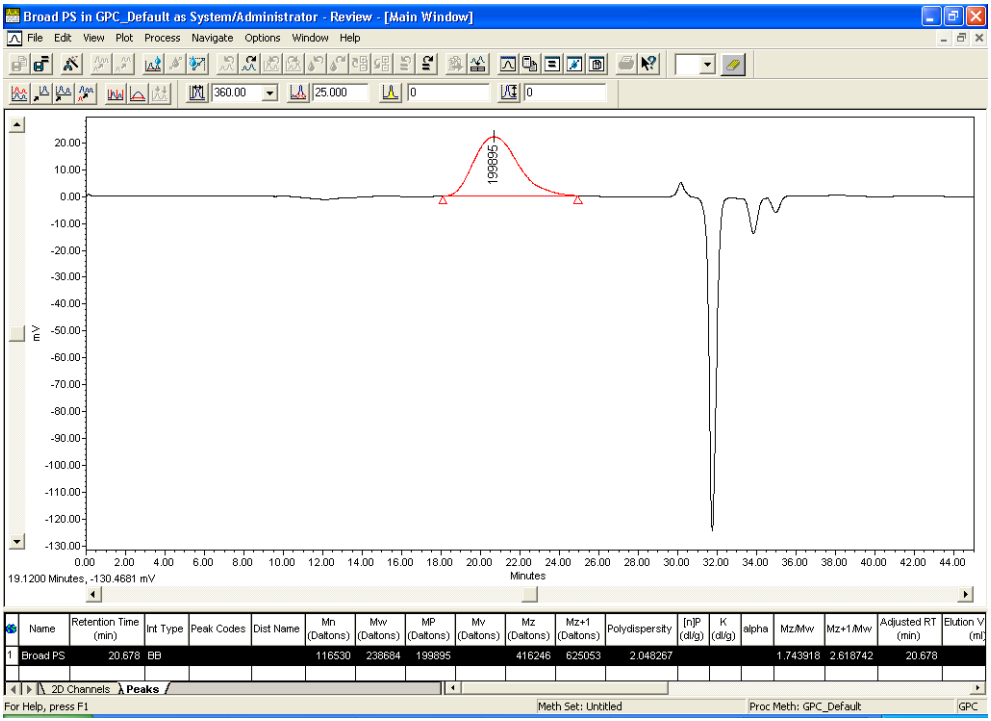


Figure 3-14 Integrated and Quantitated Broad Unknown

19. Select **Window > Processing Method** to view your new broad processing method parameters in the Processing Method window (Figure 3-15). Check the Integration and Slicing pages by clicking the corresponding tabs.

    Note the peak width and threshold values and inhibit integration events in the Broad Integration table corresponding to the start and end times you set in the Processing Method Wizard.

    Note: *Although it is not shown in this tutorial, you can view the Review Main window and the Processing Method window side by side by selecting* ***View > Processing Method Layout****.*

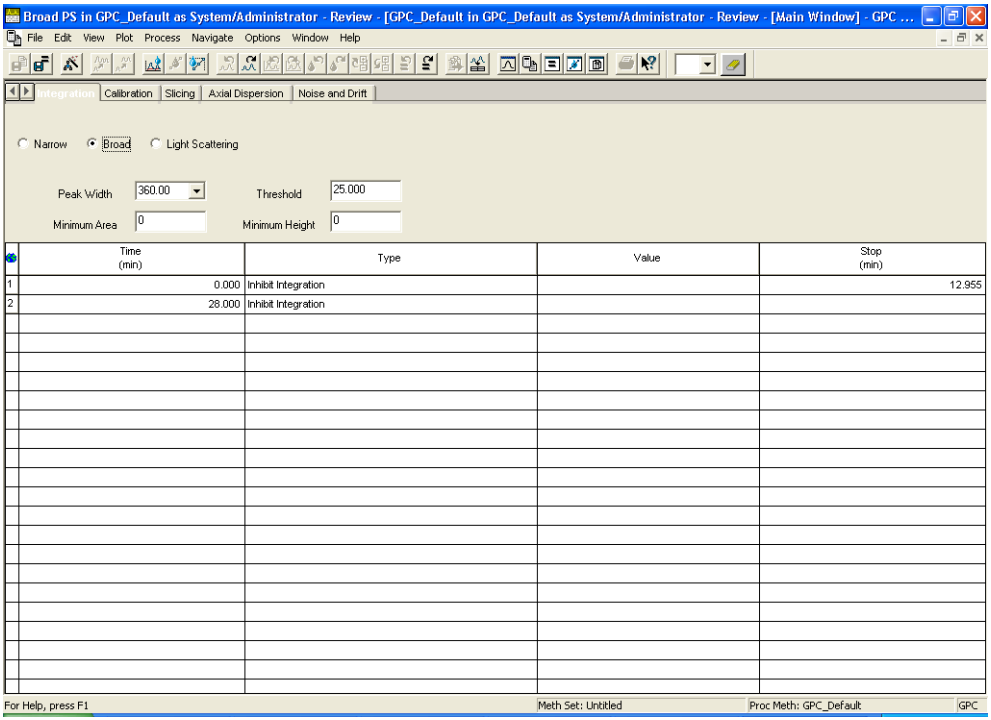


Figure 3-15 Processing Method Window (Broad Integration Page)

20. Click the **Slicing** tab to switch to the Slicing table (Figure 3-16). Note that the table contains the component name, Broad PS, that you entered using the Processing Method Wizard (Figure 3-12), and that the peak match is closest and the retention time is the same as the peak displayed in the Review Main window (Figure 3-14).

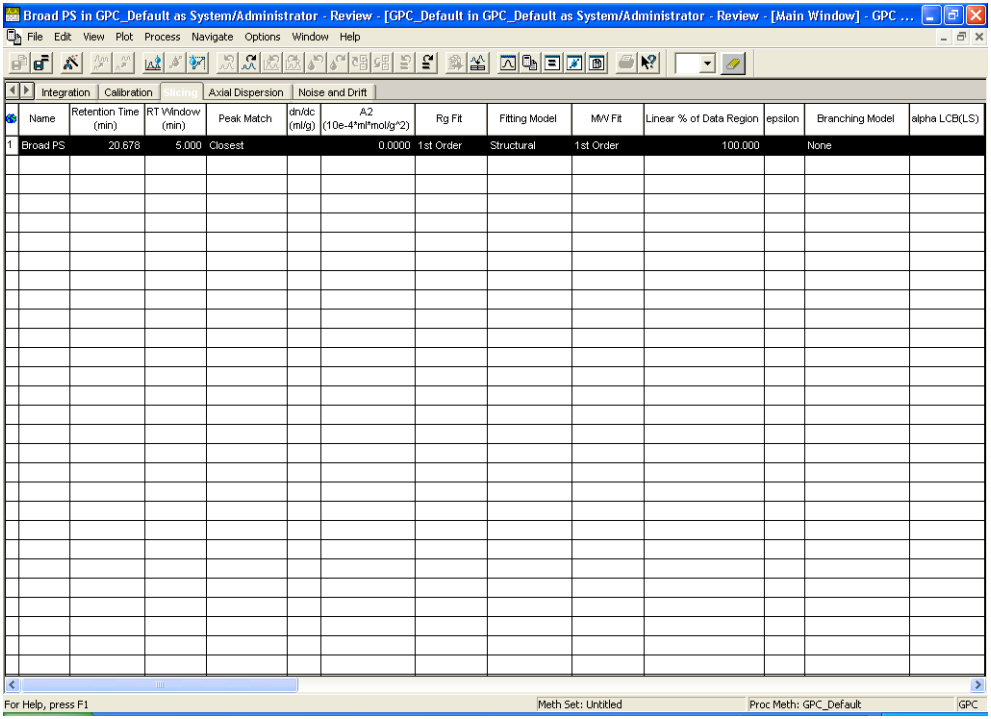


Figure 3-16 Processing Method Window (Slicing Page)

3.4 Processing a Broad Unknown Sample

Process each broad unknown sample using the calibrated processing method. Processing a broad unknown involves:

- Integrating the broad unknown
- Checking the peak integration
- Quantitating the broad unknown

Integrating the Broad Unknown

When you finished the Processing Method Wizard in the previous tutorial, the broad unknown was integrated and quantitated with the modified processing method. For the sake of the tutorial we are reintegrating and requantitating the broad unknown to show you the effects of clicking the Integrate and Quantitate buttons.

To integrate the broad unknown sample, click **Integrate**. The first broad unknown channel's integration results are displayed in the Chromatogram plot (Figure 3-17).

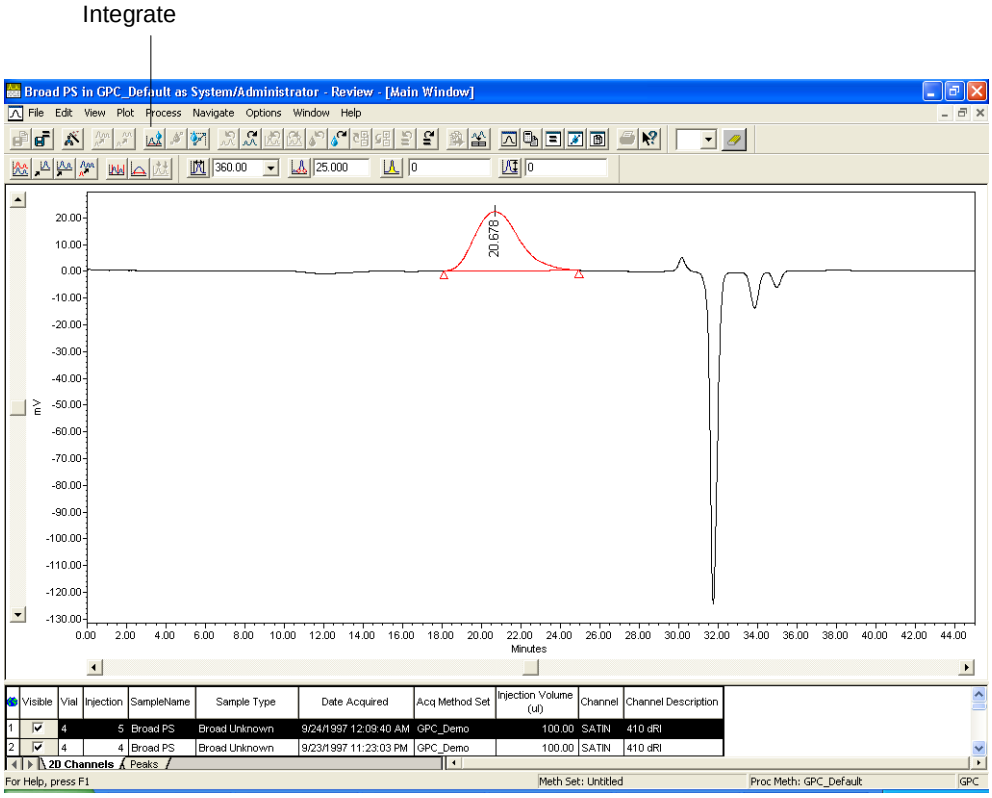


Figure 3-17 Integrating the Broad Unknown

Checking the Peak Integration

If the integration was not performed correctly, you need to modify the broad integration parameters and events in the Processing Method window (Figure 3-15).

Access the Processing Method window (select **Window > Processing Method**) and adjust the Broad Integration parameters on the Integration page. Make sure that the **Broad** option button is selected because you are adjusting parameters for a broad sample (Figure 3-15). For details, refer to the "Optimizing Peak Integration" topic in the *Empower Help* Find tab.

Quantitating the Broad Unknown

When you are satisfied with integration, click **Quantitate**. The Peak table displays the molecular weight averages for the integrated peak (Figure 3-18).

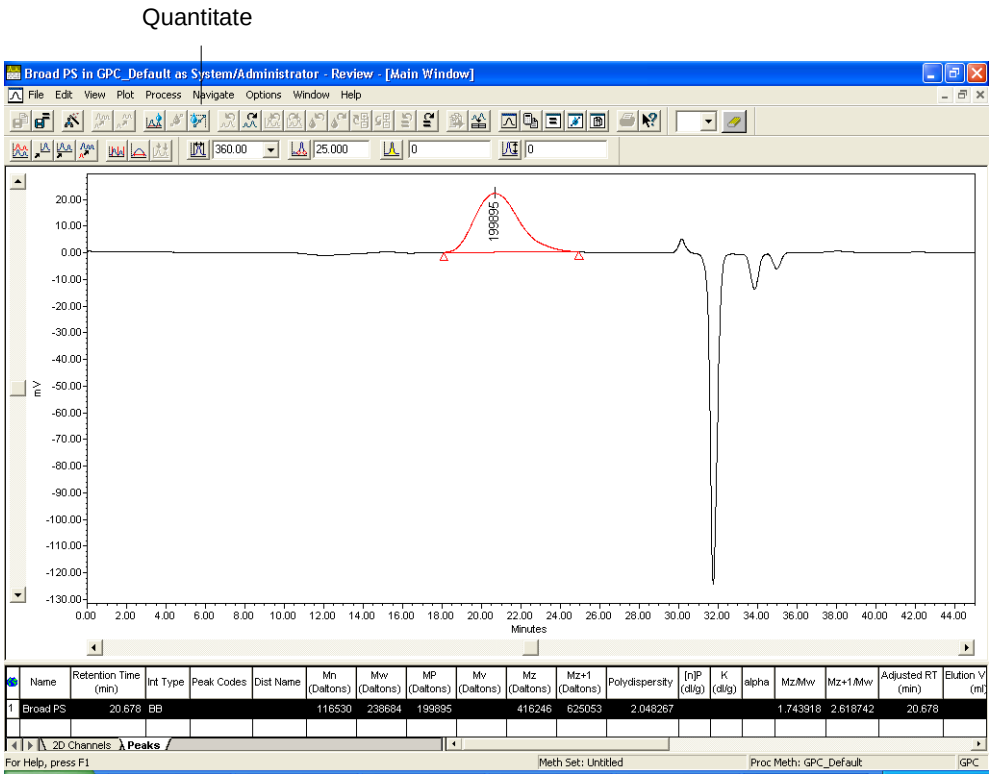


Figure 3-18 Quantitating the Broad Unknown

3.5 Reviewing the Molecular Weight Distribution

You can review and adjust the molecular weight distribution and molecular weight averages for each processed broad unknown sample peak. Adjusting the molecular weight distribution involves:

- Setting up the Result window to display the Molecular Weight Distribution plot
- Checking the molecular weight distribution and molecular weight averages
- Making integration adjustments, if necessary

3.5.1 Viewing the Molecular Weight Distribution

To view the molecular weight distribution curve and the molecular weight averages:

1. Select **Window > Results** from Review. The Results window appears (Figure 3-19).
2. Click the **Distribution Plot** tab at the bottom of the Results window, if it does not appear as the default tab.
3. Click the **Peaks** tab at the top of the Results window, if it does not appear as the default tab and make sure the peak with the distribution you want to view is selected in the Peaks table.

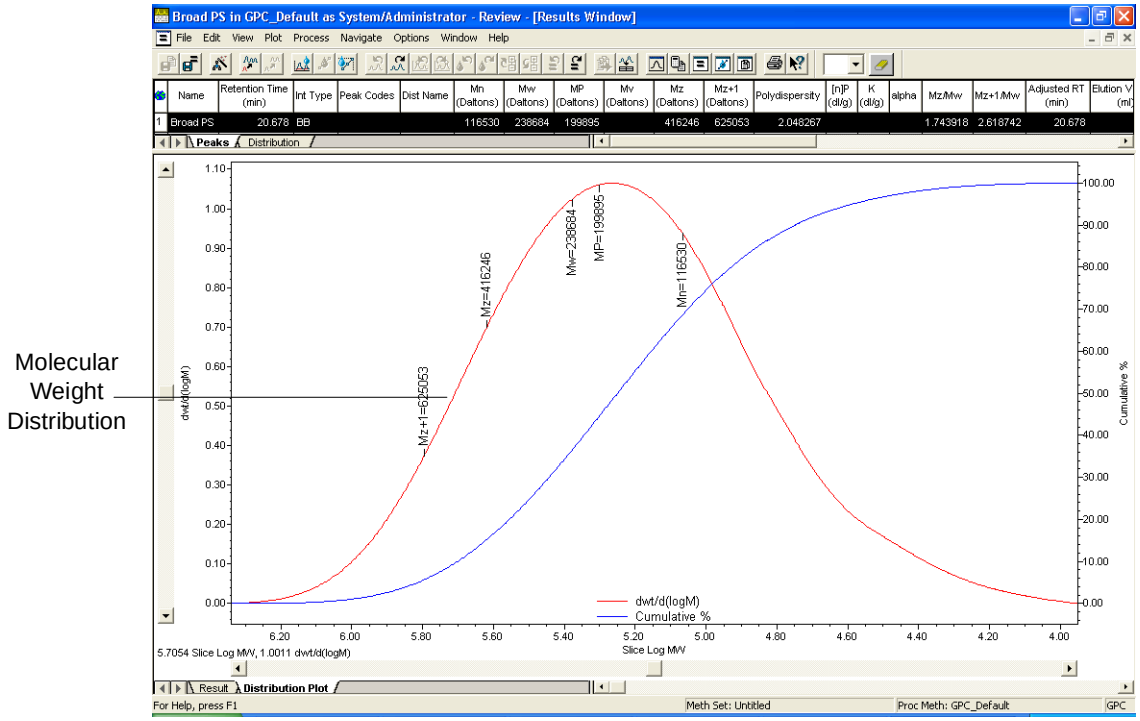


Figure 3-19 Molecular Weight Distribution Plot

Customizing the Molecular Weight Distribution Plot View

To customize your viewing preferences in the Molecular Weight Distribution plot:

1. Right-click the Molecular Weight Distribution plot, then select **Properties**. The Plot Properties dialog box appears (Figure 3-20).

2. Check the Axis Data section on the Distribution Plots tab. Verify that the following parameters have been selected:
   - MW Averages
   - MW Markers

   Note: *You can select additional parameters to customize the Molecular Weight Distribution plot. For details, refer to the "GPC Distribution Plots Tab" topic in the* Empower Help *Find tab.*

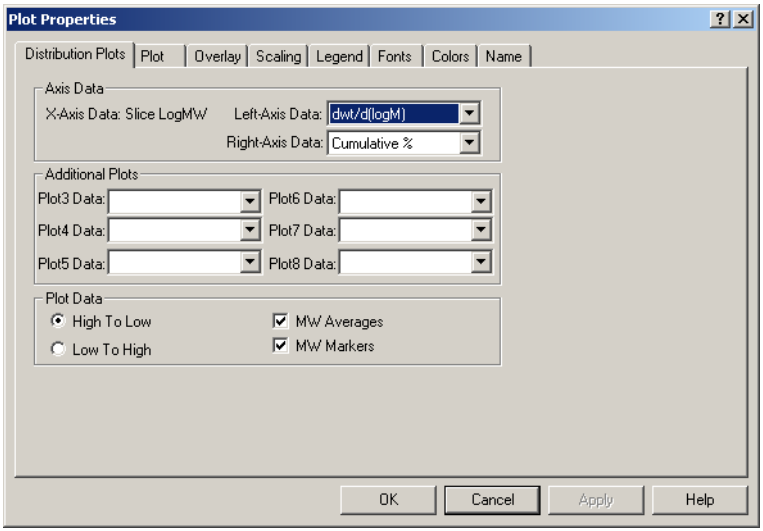


Figure 3-20 Customizing the Molecular Weight Distribution Plot

3.5.2 Checking the Molecular Weight Distribution

To check the molecular weight distribution:

1. Check the molecular weight averages in the Peaks table (Figure 3-19).
2. Check the shape of the Molecular Weight Distribution plot (Figure 3-19).
3. Check the values in the Molecular Weight Distribution table. Click the **Distribution** tab at the top of the Results window (Figure 3-19) to see the table.
4. Decide if you are satisfied with the molecular weight averages, distribution curve, and distribution table.
   - If you are satisfied with the molecular weight distribution, proceed to Section 3.6, Saving Your Unknown Results.
   - If you are not satisfied with the molecular weight distribution, proceed to Section 3.5.3, Making Adjustments.

3.5.3 Making Adjustments

You can make adjustments to the processed data if you are not satisfied with the molecular weight distribution results.

Adjusting your Molecular Weight Distribution plots involves all of the following:

- Adjusting the integration of the broad unknown chromatogram
- Checking and possibly adjusting the calibration curve
- Adjusting the slicing table parameters for the broad unknown peak

Adjusting the Integration of the Broad Unknown

To check, and, if necessary, adjust the integration of the broad unknown:

1. Select **Window > Main Window** to return to the Review Main window.
2. Check that the processing method is set correctly to integrate a broad unknown:
   - **Broad Integration parameters** – Refer to the “Optimizing Peak Integration” topic in the *Empower Help* Find tab.
   - **Integration Table events** – Refer to the “Integration Events” topic in the *Empower Help* Find tab.
3. If you make any changes to the processing method, click **Integrate** and then click **Quantitate**. The processed result for the broad unknown is updated.

Checking the Calibration Curve

To check the calibration curve, follow the instructions in Section 2.5, Checking the Calibration Curve.

Checking the Slicing Table Parameters

To check the Slicing table parameters:

1. Select **Window > Processing Method** from Review, then click the **Slicing** tab to access the Slicing table (Figure 3-16).
2. Check the peak name in the Name field. The name must match the name that you entered in the Component Editor (if you entered a component name) in order for the result to be generated. For details, refer to the “Component Editor” and “Slicing Tab” topics in the *Empower Help* Find tab.
3. Check other fields in the Slicing table, such as:
   - Retention Time
   - RT Window
   - Peak Match
   - Type

- High and Low MW
- Minimum Area

For details, refer to the “Slicing Tab” topic in the *Empower Help* Find tab.

4. If you make any changes to the slicing table parameters, click **Quantitate** to update the processed result for the broad unknown.

3.6 Saving Your Unknown Results

To save the GPC results for a broad unknown, select **File > Save > Result**.

Note: *If you are saving an unknown, File > Save > Result will not be enabled unless you have already saved the processing method and calibration. If the Save > Result selection is not available, select* ***File > Save > Calibration*** *to save the changes to the processing method and calibration. Then select* ***File > Save > Result*** *to save your result. Because you modified the processing method after processing the standards, you should reprocess the standards and unknowns with the final processing method using the Background Processing and Reporting function described in Chapter 4, Automating Your Processing Procedures.*

3.7 Processing Additional Broad Unknowns

To process additional broad unknowns, repeat the procedures in the following sections for each broad unknown sample:

- Section 3.4, Processing a Broad Unknown Sample
- Section 3.5, Reviewing the Molecular Weight Distribution
- Section 3.6, Saving Your Unknown Results

3.8 Tutorial Summary

In this chapter, you have learned how to:

- Prepare to process unknown data samples
- Process broad unknown samples
- Check the molecular weight distribution for a broad unknown peak
- Make adjustments to a broad unknown result
- Save your unknown results

Chapter 4
Automating Your Processing Procedures

The step-by-step procedures in this chapter lead you through procedures for automating the processing of your GPC data.

4.1 Tutorial Overview

The goal of this tutorial is to familiarize you with Empower software tools and procedures that you can use to streamline calibrating your system and processing your unknowns once you have optimized your processing method to process both standards and unknowns. The tutorial shows you how to:

- Use the Background Processing and Reporting function to automatically process a GPC sample set in the background
- Use the Preview function to examine and print the GPC results

4.2 Using Background Processing

To use the Background Processing and Reporting function:

1. From the Empower Pro window (see Figure 1-1), click **Process Data**. The Process Data dialog box appears.
2. Select **Sample Sets**, then click **OK**. The Project window appears (Figure 4-1).

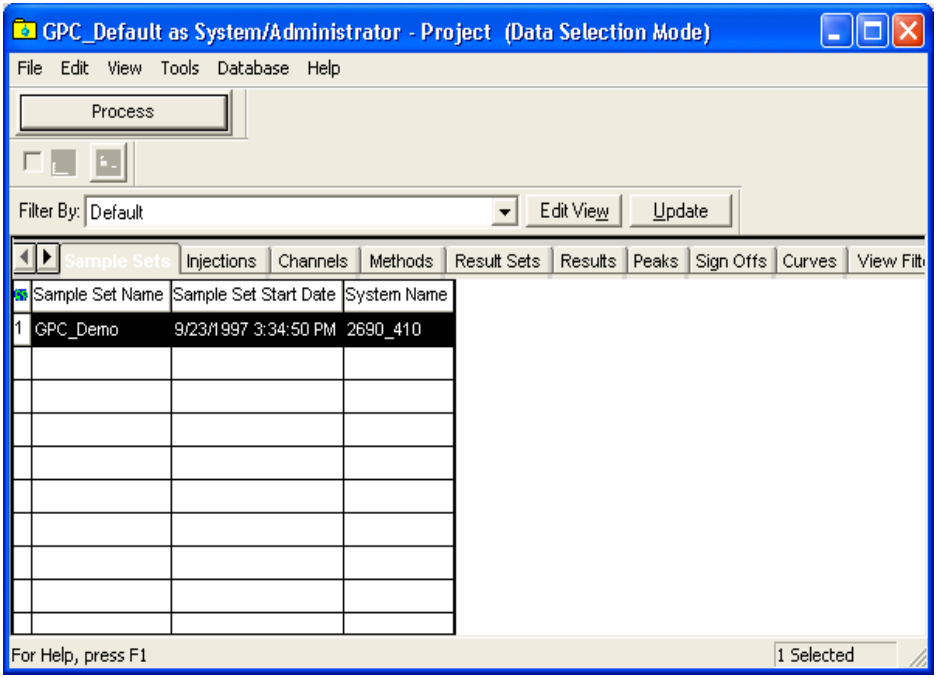


Figure 4-1 Sample Set View in the Project Window

3. Select the GPC_Demo sample set associated with the GPC_Default project.
4. Click **Process**. The Background Processing and Reporting dialog box appears (Figure 4-2).

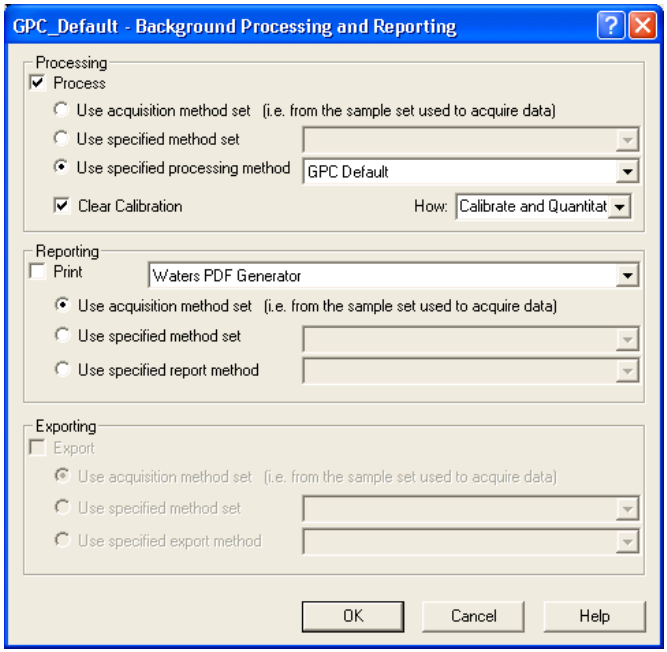


Figure 4-2 Background Processing and Reporting Dialog Box

5. Click **Use specified processing method** in the Processing section of the dialog box. Select **GPC_Default** from the list (Figure 4-2).

   Note: *You can also process the sample set using the method set you created in Section 2.6, Adding Your Processing Method to a Method Set, by clicking* ***Use specified method set*** *and selecting the method set from the drop-down list box.*

6. Select **Clear Calibration** (Figure 4-2). Ensure that **Calibrate and Quantitate** is selected in the How list.
7. Click **OK**. The following actions occur:
   a. A new calibration curve is created for the processing method.
   b. Each channel in the GPC_Default sample set is processed in the background with the parameters specified in the GPC_Default processing method. The channels are processed in the order in which they were collected (standards first, then unknowns).
   c. The processed results are stored as part of a result set with the current date.

8. When the processing is complete, maximize the Project window and click the **Result Sets** tab. The Result Sets View table appears (Figure 4-3).

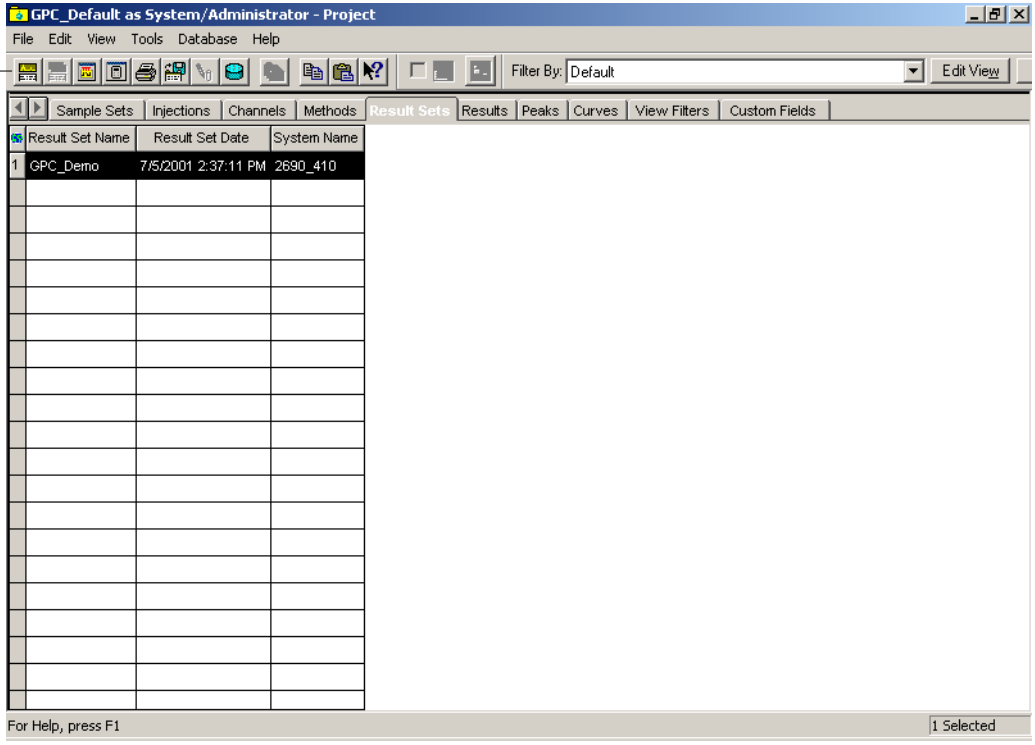


Figure 4-3 Results Sets View of the Project Window

9. Highlight the result set for the current (Result Set) date.
10. Click **Review**. The Results window appears (Figure 4-4).

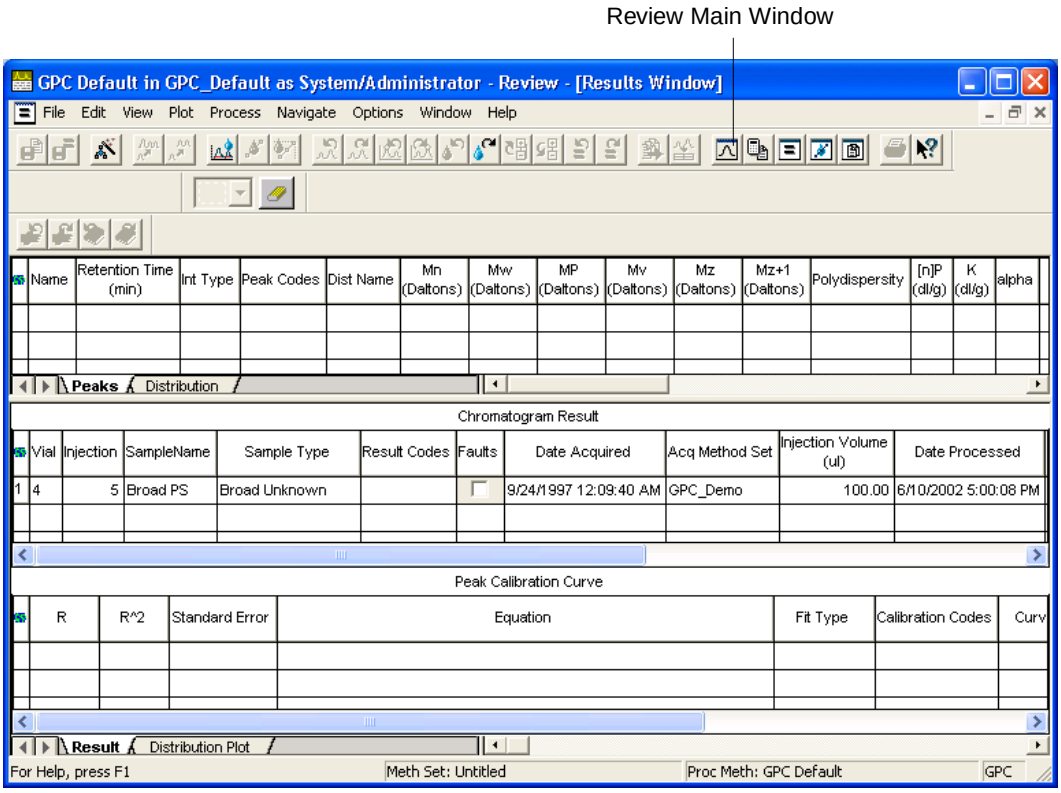


Figure 4-4 Results Window in Review

11. Click **Review Main Window**, if it is not already displayed. The first processed injection appears in the Review Main window (Figure 4-5).

    Use Review to check the:

    - Integration of standard and unknown peaks in the Main window
    - Calibration curve in the Calibration Curve window
    - Molecular weight distributions in the Results window

12. Use the tree view to sequence through the results in the result set, injection by injection.

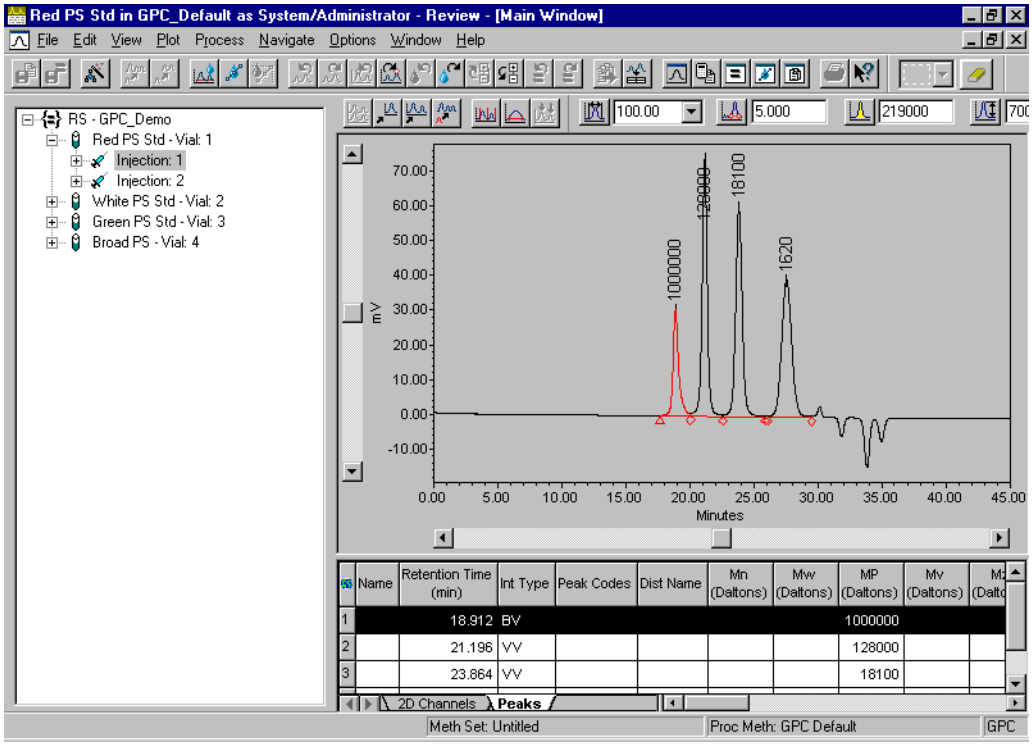


Figure 4-5 First Processed Injection in Review

Checking the Calibration Curve

13. Examine and, if necessary, adjust the calibration curve for the processed narrow standards (refer to Section 2.5, Checking the Calibration Curve).

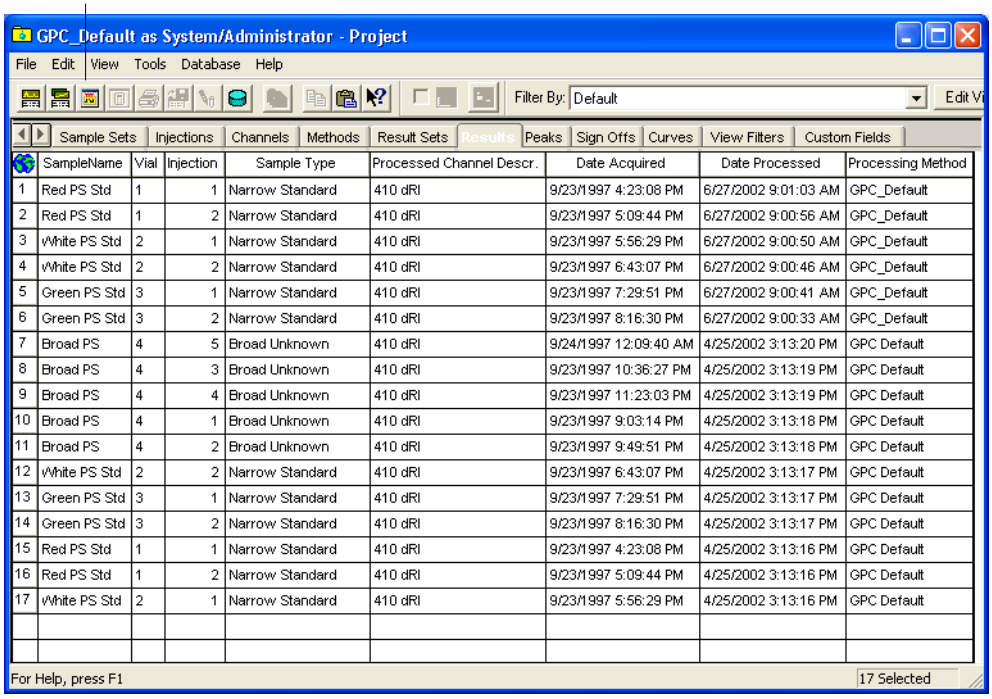
Checking the Broad Unknown Molecular Weight Distributions

14. Examine and, if necessary, adjust the molecular weight distributions for the broad unknown injections (refer to Section 3.5, Reviewing the Molecular Weight Distribution).

4.3 Examining and Printing Reports Using Preview

1. In the Project window, click the **Results** tab. A table of processed results appears (Figure 4-6).

Preview/Publisher



	SampleName	Vial	Injection	Sample Type	Processed Channel Descr.	Date Acquired	Date Processed	Processing Method
1	Red PS Std	1	1	Narrow Standard	410 dRI	9/23/1997 4:23:08 PM	6/27/2002 9:01:03 AM	GPC_Default
2	Red PS Std	1	2	Narrow Standard	410 dRI	9/23/1997 5:09:44 PM	6/27/2002 9:00:56 AM	GPC_Default
3	White PS Std	2	1	Narrow Standard	410 dRI	9/23/1997 5:56:29 PM	6/27/2002 9:00:50 AM	GPC_Default
4	White PS Std	2	2	Narrow Standard	410 dRI	9/23/1997 6:43:07 PM	6/27/2002 9:00:46 AM	GPC_Default
5	Green PS Std	3	1	Narrow Standard	410 dRI	9/23/1997 7:29:51 PM	6/27/2002 9:00:41 AM	GPC_Default
6	Green PS Std	3	2	Narrow Standard	410 dRI	9/23/1997 8:16:30 PM	6/27/2002 9:00:33 AM	GPC_Default
7	Broad PS	4	5	Broad Unknown	410 dRI	9/24/1997 12:09:40 AM	4/25/2002 3:13:20 PM	GPC Default
8	Broad PS	4	3	Broad Unknown	410 dRI	9/23/1997 10:36:27 PM	4/25/2002 3:13:19 PM	GPC Default
9	Broad PS	4	4	Broad Unknown	410 dRI	9/23/1997 11:23:03 PM	4/25/2002 3:13:19 PM	GPC Default
10	Broad PS	4	1	Broad Unknown	410 dRI	9/23/1997 9:03:14 PM	4/25/2002 3:13:18 PM	GPC Default
11	Broad PS	4	2	Broad Unknown	410 dRI	9/23/1997 9:49:51 PM	4/25/2002 3:13:18 PM	GPC Default
12	White PS Std	2	2	Narrow Standard	410 dRI	9/23/1997 6:43:07 PM	4/25/2002 3:13:17 PM	GPC Default
13	Green PS Std	3	1	Narrow Standard	410 dRI	9/23/1997 7:29:51 PM	4/25/2002 3:13:17 PM	GPC Default
14	Green PS Std	3	2	Narrow Standard	410 dRI	9/23/1997 8:16:30 PM	4/25/2002 3:13:17 PM	GPC Default
15	Red PS Std	1	1	Narrow Standard	410 dRI	9/23/1997 4:23:08 PM	4/25/2002 3:13:16 PM	GPC Default
16	Red PS Std	1	2	Narrow Standard	410 dRI	9/23/1997 5:09:44 PM	4/25/2002 3:13:16 PM	GPC Default
17	White PS Std	2	1	Narrow Standard	410 dRI	9/23/1997 5:56:29 PM	4/25/2002 3:13:16 PM	GPC Default

Figure 4-6 Results View of the Project Window

2. Select a **Broad PS** result, then click **Preview/Publisher**. The Open Report Method dialog box appears (Figure 4-7) and prompts you to specify a report type method to use when displaying a report.

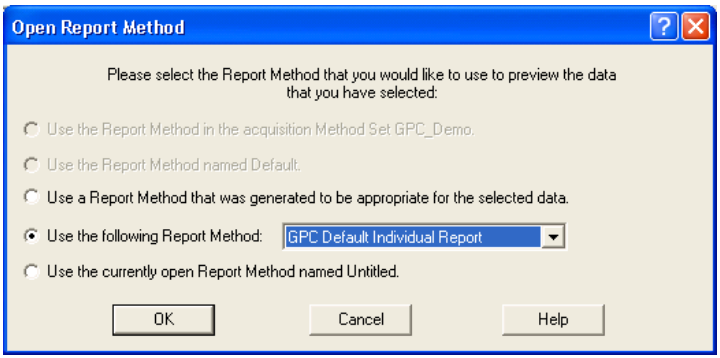


Figure 4-7 Specifying a Report Method

3. Click the **Use the following Report Method** option button.
4. Select **GPC Default Individual Report** from the drop-down list.
5. Click **OK**. Report Publisher appears with a report for the Broad PS result based on the GPC Default report method (Figure 4-8).

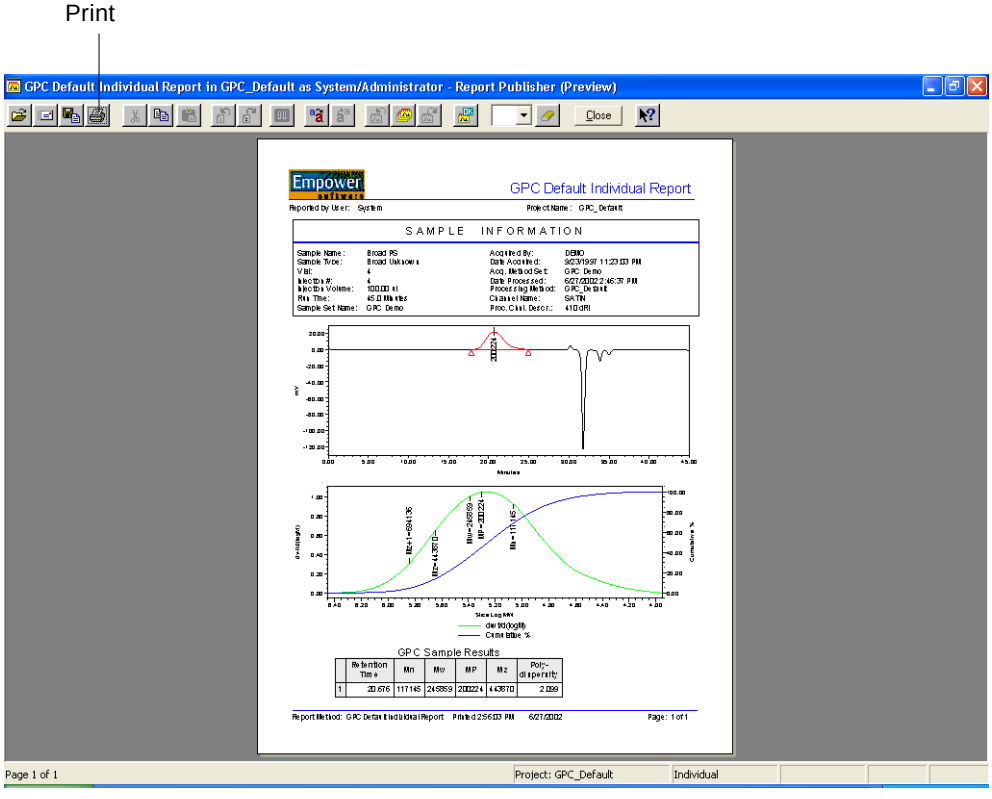


Figure 4-8 Result Shown in GPC Default

6. You can print the report displayed in Report Publisher by clicking **Print**.
7. Use Preview to examine and print reports for one or more results in the result set. For details about previewing a report method, refer to the “Previewing a Report from the Report Publisher” topic in the *Empower Help* Find tab. For information about changing a report method, refer to the “Modifying a Report Method” topic in the *Empower Help* Find tab.
8. When you complete previewing your report, click the **Close** button to close Preview, then select **File > Exit** to close Report Publisher and return to the Project window.

4.4 Tutorial Summary

In this chapter, you have learned how to:

- Use background processing
- Examine and print reports using Preview

Chapter 5
Reporting and Backing Up Project Data

This chapter provides procedures for reporting and backing up your project.

5.1 Tutorial Overview

The goal of this tutorial is to familiarize you with Empower software tools and procedures used to generate reports and back up your GPC data, methods, and results. The tutorial shows you how to:

- Generate printed reports of GPC results
- Back up your project to protect your data, methods, and results

5.2 Generating Reports

To generate printed reports of your GPC results for one or more samples:

1. From the Empower Pro window (Figure 1-1), double-click **Print Data**. The Print Data dialog box appears.
2. Select **Results**, then click **OK**. The Project window appears (Figure 5-1).

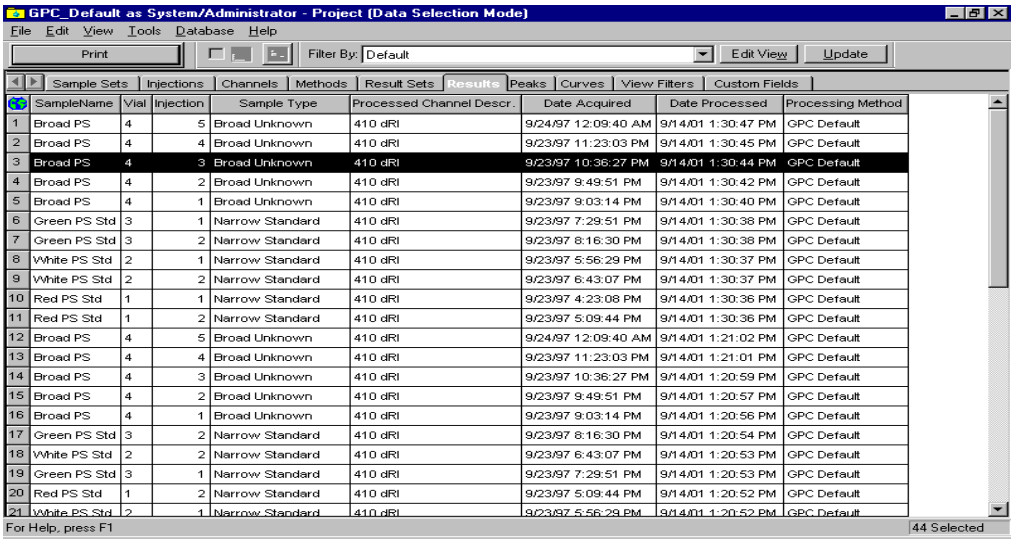


Figure 5-1 Results View of the Project Window

3. Select the results for which you want to generate reports.
4. Click **Print** (Figure 5-1). The Background Processing and Reporting dialog box appears (Figure 5-2).

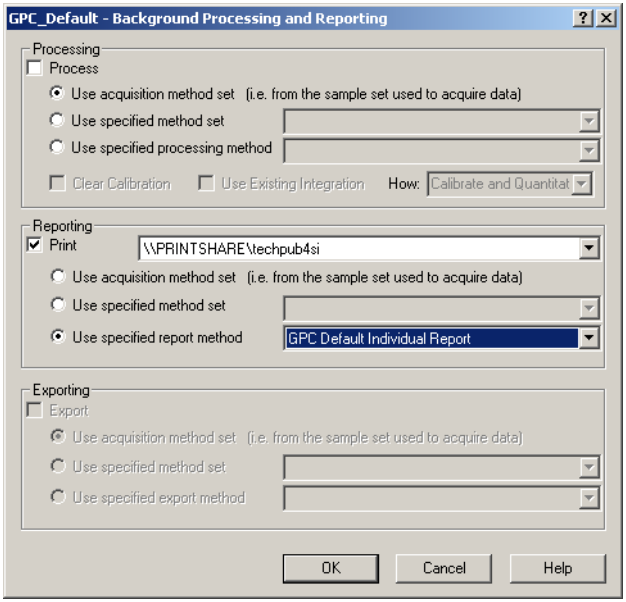


Figure 5-2 Background Processing and Reporting Dialog Box

5. Ensure that the **Print** check box in the Reporting section is selected and the desired printer is selected in the drop-down list.
6. Click **Use specified report method**, then select **GPC Default Individual Report** from the drop-down list of report methods.
7. Click **OK**. The software generates a report for each selected result based on the selected report method.

5.3 Backing Up Data

To protect your data, method, and results, always back up your GPC project whenever you change it.

To back up a project:

1. From the Empower Pro window, click **Configure System**.
2. Select **Projects** from the Configure System dialog box and click **OK**. Configuration Manager appears (Figure 5-3).
3. Select the project that you want to back up in the table of projects.

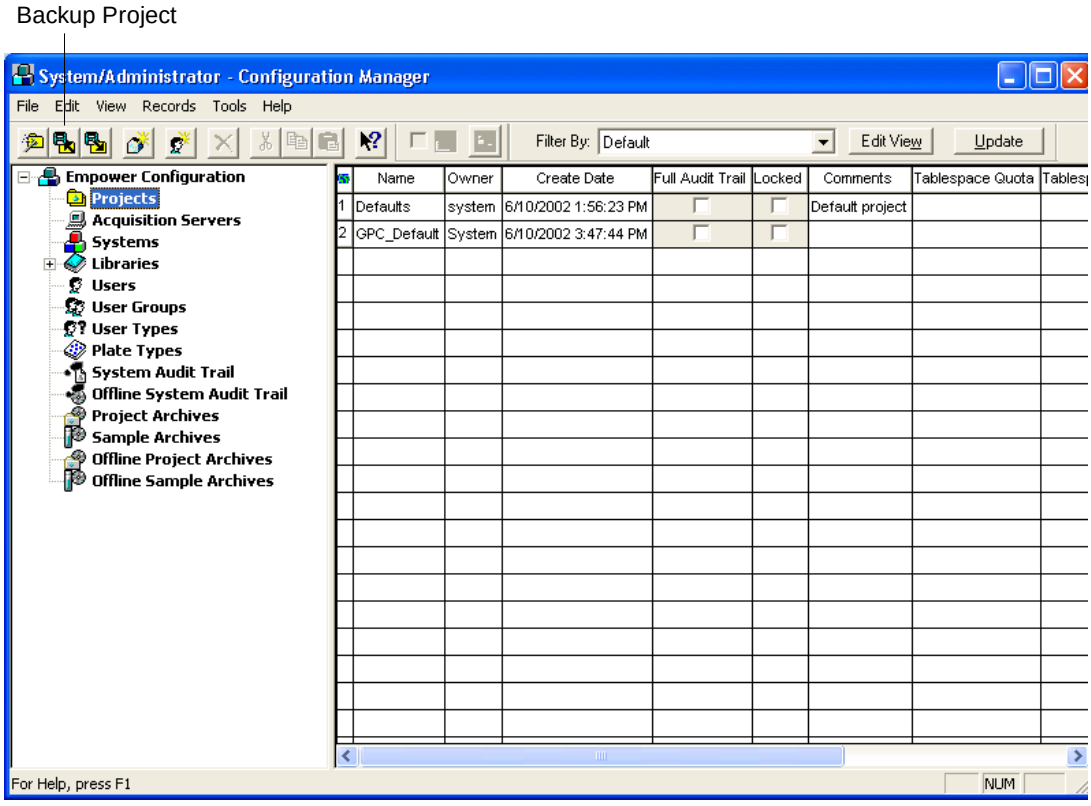


Figure 5-3 Configuration Manager

4. Click **Backup Project** to start the Backup Project Wizard. Follow the instructions on each page of the wizard. For details, refer to the *Empower Software Getting Started Guide*, Section 8.4.1, Project Backup.

5.4 Tutorial Summary

In this chapter, you have learned how to:

- Generate a report of GPC results
- Back up your project

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