



INTEGRATED ECONOMICS AND
DECLINE CURVE ANALYSIS

PHDWin Version 2.10

User Certification Course

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ABOUT THIS TRAINING PROGRAM

ABOUT THE TRAINING MANUAL

This manual was updated on September 20, 2016. The information and screens represented in this manual reflect the PHDWin Program Version 2.10. Slight modifications may have been made to previous builds, and additional builds in the future may also affect the procedures contained within this document.

To upgrade to the latest build of PHDWin, download the patch from our website at www.phdwin.com/updates.php

ABOUT THE EXERCISE FILES

Throughout the Training manual there are labs to help reinforce, and practice the skills and procedures discussed in each chapter. Many of the labs use example exercise files. These exercises use the file Puckett.PHD found in the Samples directory of your PHDWin folder.

WHO IS THIS TRAINING FOR?

This training program assumes a moderate knowledge of Decline Curve analysis, as well as basic computer skills. It assumes no prior knowledge of the PHDWin program.

CHAPTER 1 – GETTING STARTED AND SYSTEM SETUP

WHAT IS PHDWIN?

PHDWin is a fully integrated economics and decline curve analysis software program, written for a Microsoft™ Windows™ Operating System. It is a multi-threaded, object-oriented program, which gives users the ability to work with multiple windows inside PHDWin at any given time.

Windows inside the program have an intuitive structure with an ease of movement between editor windows and graphics. In addition, database portability has never been easier. Duplicating economics on different machines requires only two files, the PHDWin database (.phd) and the Models.tps / TRCModels.mod file. Users should concentrate on using the Main Menu and the icons displayed on the top toolbar when navigating inside PHDWin.

INSTALLING PHDWIN

PHDWin may be installed either from a CD, or by downloading the program from our website. If you do not have a recent CD, visit www.phdwin.com/updates.php and click on the link that relates to your computer's operating system.

If given the option to Save or Open the file, choose Save. Select any desired folder on the computer to place the install file, and click the Save button. Once the file download is complete, browse to the downloaded file, and double click the file to begin the installation. Follow the instructions in the installation wizard to complete the installation of PHDWin.

REGISTERING PHDWIN

Once you have installed the software, the program will operate for a 10 day trial period. During that 10 day period, users must register the software or the trial license will expire, and users will not be able to continue working in PHDWin.

To register the product:

1. Click Help – Registration from the main menu bar at the top of the window.
2. Fill in the information form.
3. Verify that the System ID Field is populated (this field is grayed out, but should have an alpha-numeric ID visible inside). If not, contact Technical Support.
4. If the System ID is present, click Request. This should open an email, ready to send to License@phdwin.com.

Verify that the information from the form, including the system ID, is present in the email, and click Send. If the data is missing or the email window does not open, copy the information into an email (including the system ID) and send it to license@phdwin.com.

You will receive a return email with an attached license file. Save the license file from the email into your installation directory (C:\Program Files\PHDWin).

 Note: Some email applications such as Hotmail and AOL have a tendency to change the name of the license file without notice. For these services, open the license file with Notepad, and copy the 32 character license code. Open the Registration screen of PHDWin, Click the Save As button, paste the license code into the License String field, and click OK.

CHAPTER 2 – PHDWIN PROJECTS

WHAT IS A PROJECT?

The term “Project” refers to a single database. A project will be made up of “Cases”, which, depending on how you use them, can represent wells, leases and other entities within the project.

You can only have one project open at a time in PHDWin, but each project may be made up of thousands of cases, or you may choose to limit the scope of the project to just cases in a certain field, area, or evaluation.

A single project will be made up of two files. The PHD file (the actual database file) and a MOD file which contains economic models.

PHDWIN FILE TYPES

Models File (XXX.mod/Models.tps) – Contains all pricing, operating cost, shrinkage, tax, and escalation/inflation models for a given PHDWin database. Models can be applied globally to individual cases or set on a case-by-case basis. The Models file is the only file that controls economics that is contained outside the PHD project. Users may have multiple models files.

PHD Project (XXX.phd) – A phd project is self-contained. All project properties are held within a single PHD file, including graph layouts and custom products. A PHDWin database contains a link to a Models.tps (or .mod) file, and must remain associated with that Models file in order to hold model associations.

Backup File (XXX.phb) – The backup files are used to preserve a copy of the database and models files that will allow the user to “restore” the database to the current state. Backup files are saved with a new file name each time so that they do not overwrite existing backups, allowing the user to choose how far they wish to go back.

Transfer File (XXX.phz) – Transfer files zip up the models file and the database file and compress them with a WinZip compression. This makes them easy to send via email, ftp or disk to another machine.

CREATING A NEW PROJECT

To create a new project, go to **Files – New** in the main menu bar. This will open your project properties window and allow you to set the project level settings for the new file.

SETTING UP THE FILE

On opening, the Project Properties window will display the **Files Tab**. This first tab is all about defining the PHDWin Project File itself.

Description – The description field allows the user to input a descriptive name for the project. This name will show up on reports, so it is best to use something descriptive, but generic enough to encompass anything that might be found in the project.

Database Location – Here the user can define exactly where the file will exist on the computer. Users can save the file to any folder on their computer or even to a network location by using the [...] browse button.

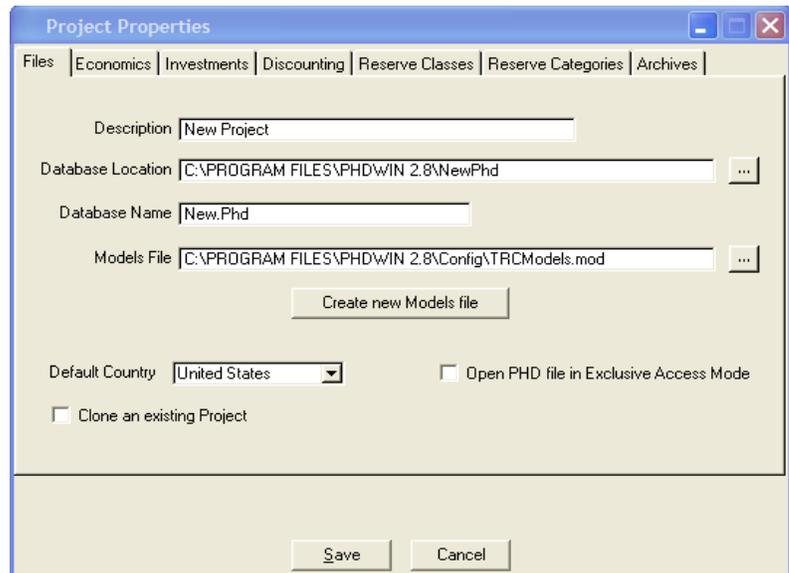
Database Name – This field allows the user to specify the name of the file as it will appear in Windows Explorer. This file name will have the extension .phd.

Models File- Here the user selects which models file should be associated with the project. This will be discussed in greater detail in the next section of this manual.

Default Country – This setting is used to specify what country settings should be assigned to cases on creation. PHDWin is capable of tracking multiple countries in the same project, so this option will be able to be set on a case by case basis, but this is the default value.

Open PHD File in Exclusive Access Mode –This opens the project in such a way that will not allow any other users to open the file while you are in it. Until you either close the file, or come back into this window and uncheck the option, you are the only user that will have access to the file. This can be useful for preventing conflicts between multi-users on mass edits.

Clone an Existing Project – This option allows you to select an existing project from your computer, and set this new project up with all of the same project level settings, ID Codes and more.



MODELS FILES EXPLAINED

WHAT IS A MODEL?

Models will be used later in this course to apply economics to cases. The idea behind a model is to create an economic model that can be applied to multiple cases in a project. If the user makes a change to the model, that change is automatically reflected on all the cases that are using that model.

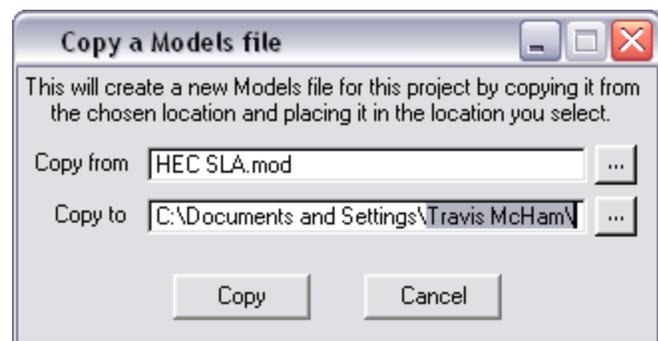
Models may be created for Pricing, Expenses, Escalations, Taxes, Depreciations, Inflation, Currencies and more.

WHAT IS A MODELS FILE?

A models file is simply an external file that contains all of the economic models created in a project. EVERY project will have a model file associated with it, and that association is defined on the Files Tab of the Project Properties window.

Models files are never created from scratch. They are always created as a copy of an existing models file. If Create New Models file is selected, a window will appear prompting the user to copy an existing models file to a new models file.

While it is true that every project will have a model file associated with it, that model file may not necessarily be limited to just that one project.



MODELS FILE RELATIONSHIP TYPES

The relationship between the economic models file and the database may be set up in several ways, depending on what works best for you and your company.

There are three basic theories on setting up the relationships between the models file and the PHDWin database file. This manual discusses the three variations, and some of the pros and cons associated with each, but it is up to you to decide what is best for your given situation.

ONE TO ONE

The one to one theory is simple. Each PHDWin database file will have a single, unique models file association.

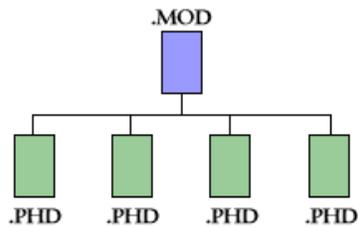


Pros: One to one eliminates the possibility of overwriting pricing in another file by changing them in the open database.

Cons: Maintaining models is much more manual. Models that exist in multiple files will have to be updated in each models file.

ONE TO MANY

This theory is made up of one models file that is attached to multiple database files. Usually in this set up, the models file exists on a shared drive on a network, and is usually maintained and updated by a single individual responsible for doing so.

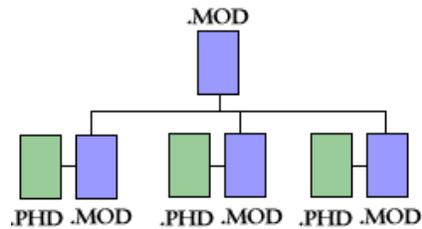


PROS: One to many provides easy maintenance. Changing a model in the models file automatically updates that model in all of the existing projects.

CONS: Engineers working the projects may find their pricing, expenses, and other economics changed unexpectedly. The change affects all the projects linked to that models file, which can cause problems when the individual working the project does not want that change applied at that time.

ONE TO ONE UPDATED

This theory is a combination of the previous two. This theory has the single models file on the network drive as described in the one to many relationship, but that model file is not linked to any of the individual project files. Instead that file is maintained so that the individuals working the projects may update one or more of their models from the network file at their leisure.



PROS: Individuals control updates at the individual project level. Individuals have easier maintenance than one to one.

CONS: Updates are more manual than one to many. Models files and updates will be discussed in greater detail later in this manual.

PROJECT ECONOMIC SETTINGS

Once you have set up the file, continue on to the Economics Tab to set up the project level economic options.

As Of Date- This is a very important setting for any file. The As Of Date is the date at which your reports will begin, as well as the date that all of your cash flows will be discounted to.

Max Number of Economic Years – Cases will only report as long as they are economic. However, when you have very long life cases, you may want to set a maximum number of years to consider them economic. By default, PHDWin will cutoff any cases that run longer than 50 years, but that number can be adjusted here.

International Economic Options – Some options on this window may not be visible on your screen. Options such as currency, economic calculation model and reporting style all have to do with modeling international projects which we will not delve into in this course.

Income Tax Consideration – PHDWin is capable of running “Before Tax” or “After Tax” economics. “After Tax” simply refers to the consideration of federal income taxes as a part of your economic evaluations. When selected, an additional tab will show up on the Project Properties window allowing the user to set the federal tax options.

Risk Tree Enabled – We will be covering risk analysis and probability of success later in this course. This option turns on the Risk Tree which is used in those evaluations.

Recompletions on 1st Day of the Month – Since PHDWin runs economics down to the day, our recompletions will begin the following day, whereas other economic systems will begin the next month. This option will force PHDWin to run recompletions starting the month after the base case goes non-economic. Recompletion Cases are covered in more detail later in this course.

Economic Basis – This option allows the user to set the economics to run either on a calendar (Jan – Dec) basis or on a fiscal basis. When Fiscal is selected, the reports will treat the month in your As Of Date as the start of a year. For instance, if your As Of Date was 6/1/2007, then your reports would run June – May as one year.

Escalations – This portion of the screen is used to set project level Escalations. These will be covered in greater detail later in this course.

PROJECT DISCOUNTING

One of the most important things to consider when you are creating your project is how you want to discount your cash flows. The options here have a significant impact on the value of your cases, and should be considered carefully.

The screenshot shows the 'Project Properties' dialog box with the 'Discounting' tab selected. The 'Annual Discount Rates (nominal)' section has a 'Primary (%)' field set to 15.00 and an unchecked 'Allow Individual Case Override' checkbox. Below this is the 'Present Worth Profile' section with a range of 0% to 200% and ten individual rate fields: PW (A) % 5, PW (B) % 8, PW (C) % 10, PW (D) % 12, PW (E) % 15, PW (F) % 20, PW (G) % 30, PW (H) % 40, PW (I) % 50, and PW (J) % 60. The 'Discounting: (Interest Compounded)' section has 'n times per Year' selected with 'n' set to 1, and 'Continuously' is unselected. The 'Cash Accrual Time' section has 'Mid-Month' selected and 'End-Month' unselected. 'Save' and 'Cancel' buttons are at the bottom.

Primary Discounting Rate – This is the percentage at which your project will be discounted annually. All of your discounted cash flow numbers will use this rate.

PW Profile – This allows the user to set up to 10 additional discounting rates that will show a variety of values under different discounting situations. This is essentially used as a “what if” evaluation tool on differing rates.

INTEREST COMPOUNDING

Another important consideration with regard to discounting is how the interest is compounded. You can set the interest to compound continuously, or to occur n times per year in which n is a variable. Setting n = 12 will compound the interest 12 times per year.

PHDWin uses a **Nominal Compounding Rate**. A nominal rate is the product of the period rate and then number of periods per year. In other words, as described above, if n is set to 12, then the primary rate of 15% will be divided into 12 equal periods for the year.

This is different than using the **Effective Rate**. This is the rate that would be equivalent to compounding just once per year, and is always a little higher than the Nominal rate.

Number of Compounding Periods (n)	Interest Per Period	Nominal Interest Rate	Effective Interest Rate
1	12%	12%	12%
2	6%	12%	12.36%
4	3%	12%	12.55%
12	1%	12%	12.6825%
365	.03288%	12%	12.7475%

Take a look at the table on the previous page. You can see that as the number of periods of compounding increase per year, the Effective rate increases.

It is the consistent nature of the Nominal effective rate that makes it more suitable for use in this application. But do understand that the number of periods you compound by does have a significant effect on the effective discounting, and therefore on your bottom line.

CASH ACCRUAL TIMING

PHDWin allows the user to specify whether to accrue the cash either at the midpoint of the month, or at the end of each month. Since PHDWin calculates economics to the day, this can affect the discounting by determining which discounting period the current moment in time falls into.

RESERVE CLASSES & CATEGORIES

Two other tabs in the Project Properties window allow the user to create new, and modify existing, classes and categories. By default, PHDWin will have the Proved, Probable and Possible classes, and Producing, Non-Producing, Shut-In, Behind-Pipe, Undeveloped and a few more categories.

You can create new classes and categories by clicking the Add button on the window. You cannot delete or modify the PHDWin default classes and categories.

Note: The order they appear in this window is the order they will be sorted by if you choose to sort your cases by class or category. You can change the order in this window using drag and drop.

The remaining Project Properties windows will be covered in more detail later in this course or in advanced levels.

MODIFYING PROJECT PROPERTIES

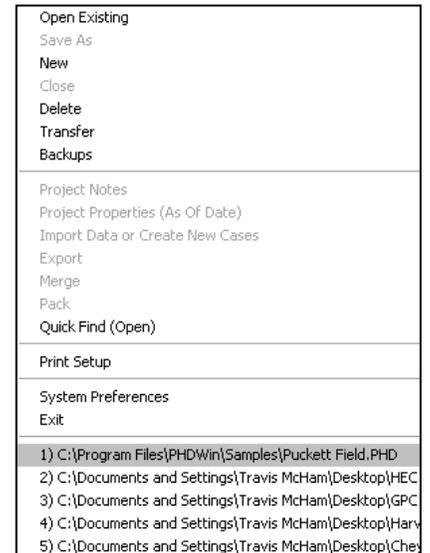
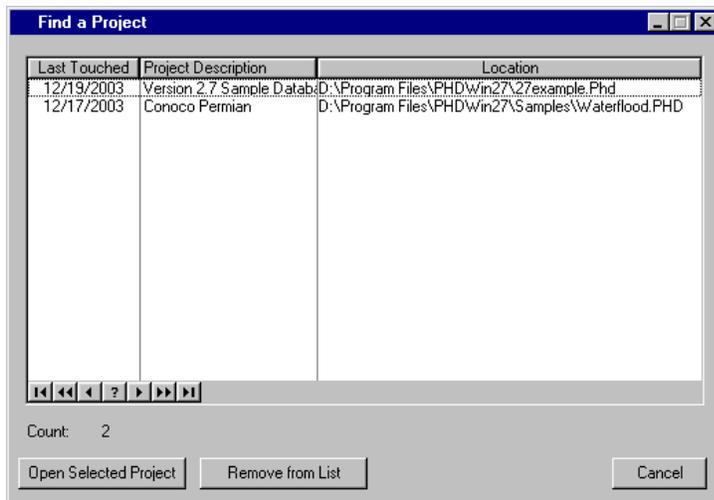
Once a file has been created, you can access the Project Properties window to modify your project level economic settings by going to **Files – Project Properties**.

OPENING PHDWIN FILES

There are a variety of ways to open PHDWin files for your convenience. The most basic way is to select **Files | Open** from the main menu bar at the top of the screen. This will open a browser window that will allow you to explore your computer in search of the file you wish to open.

Another convenient feature in PHDWin is the quick pick list located at the bottom of the File menu. The last few project files that were opened on this computer will be listed at the bottom of the menu and may be opened simply by selecting from the list. The number of files that are listed at the bottom of the file menu can be controlled through the Miscellaneous Tab of the System Preferences window.

Another feature for finding projects is the **Quick Find (Open)** feature listed in the File Menu. This window (pictured below) allows the user to select from all the projects that have been opened on this computer. Additionally, this window also gives more information about the file than the quick pick list does; it shows the file name, file description and the date the project file was last opened.



This window can be used to manage the list of projects as well. Removing a project from this list will not delete it from the computer, but simply remove the link to it from this window.

OPENING PHD VS. PHZ FILES

One important thing to note when opening files is the relationship between the PHZ transfer files and the PHD database file. If you are sent a PHZ file, remember that it is simply a zip file that contains the models (MOD) and PHD files inside.

When you open a PHZ file, it will extract the PHD file and MOD file into the same directory as the PHZ. The next time you open the file you should open the PHD file, NOT the PHZ, otherwise the PHZ file will overwrite any changes you made to the PHD file since you opened it because PHDWin is simply re-extracting the PHD file from the PHZ, and thus reverting back to the state the file was in when the PHZ was created.

CHAPTER 3 – NAVIGATION & ORGANIZATION

Now that we have a project open, let's get oriented to the working environment within PHDWin. PHDWin is designed to have more than one window open at one time. Different features and inputs are found in their own editors.

The main menu bar located at the top of the PHDWin window will give you access to all of the editors in the system, and allow you to manipulate the cases in a wide variety of ways.

PHDWIN MAIN TOOLBAR

The main toolbar is displayed in the top left-hand corner of the screen just below the menu options. The first two icons are for moving to the previous or next case. The third activates the Case List window, and the yellow finder icon opens a Quick Find feature to search for cases in a large database. The diskette icon will save the latest changes for the active case.



Previous Case – This icon will navigate you to the previous case in the list. The order of the cases is dependent on the current Sort Order being applied to the Case List.



Next Case – This icon will navigate you to the next case in the Case List.



Open Case List – This icon will open the Case List window which contains additional navigation options, as well as case selection, sorting and filtering options.



Quick Find (Case Finder) – This icon will open the Quick Find window, which will allow you to search for a case.



Save – This icon will save any changes that you have made to the current case.

Cases can be sorted, filtered and organized using the Case List within PHDWin. The Case List window can be accessed by pressing Ctrl + L or by selecting the Case List Icon off the main toolbar.

THE CASE LIST WINDOW

The  Case List button can be accessed from the main toolbar and will list all cases for the currently selected partner based on the sort and filter criteria setup by the user.

NAVIGATING USING THE CASE LIST

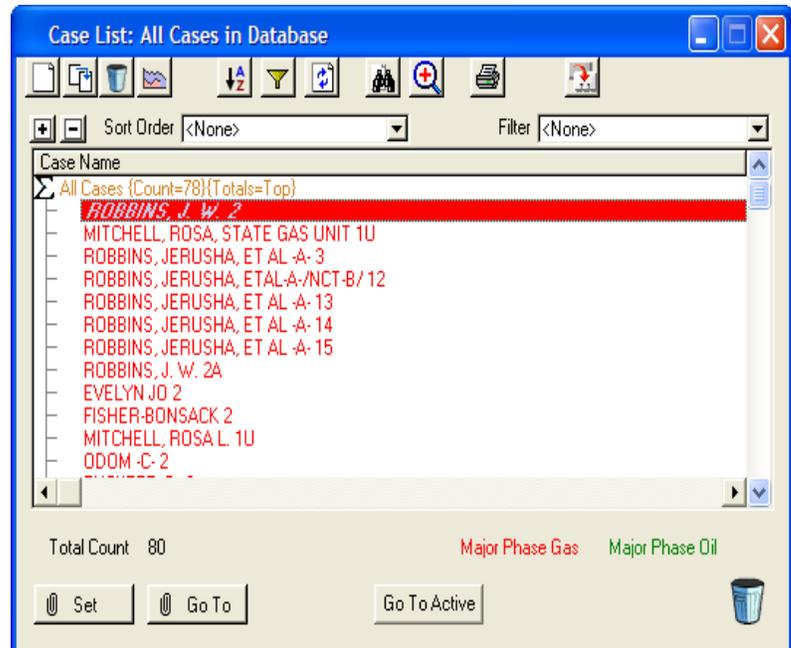
There can only be one “Active” case at a time in PHDWin. The Active Case is defined as the case on which the user is standing and currently able to edit. In other words, if a graph is opened the graph would display the active case, as would any other editor windows. In the Case List, the Active Case is displayed in bold italics and has a light gray background.

To move the active case using the case list, double click the desired case. The case will ***italicize*** to indicate that you have made it active.

The **Set** and **Go To** paperclip buttons located at the bottom of the Case List are used to bookmark cases. Setting the paperclip bookmarks the case, and the **Go To** button returns the user to the bookmarked case. Only one case can be bookmarked at a time.

The **Go To Active** button will move the user in the Case List to the currently active case.

Right clicking on any given case in the List will activate a menu, allowing the user to compile a case (useful for group cases) or open a window that contains header information and ID Codes for the case, as well as display the contents of the Memo Editor for the given case.



CASE LIST TOOLBAR

A new toolbar is located across the top of the Case List window. Much of the toolbar's functionality will display in a help bubble as the cursor is rolled across each button.



Activates the Data Wizard; imports data or creates new cases



Duplicates the highlighted case in the list



Deletes the highlighted case or group of cases in the database



Creates an incremental duplicate case for the highlighted case in the list



Views the sort criteria window to edit existing or create new sort orders



Views the filter criteria window to edit existing or create new filters



Refreshes the case list



Opens Quick Find to search the Case List



Mass selects a group of cases based on common characteristics



Prints the case list report



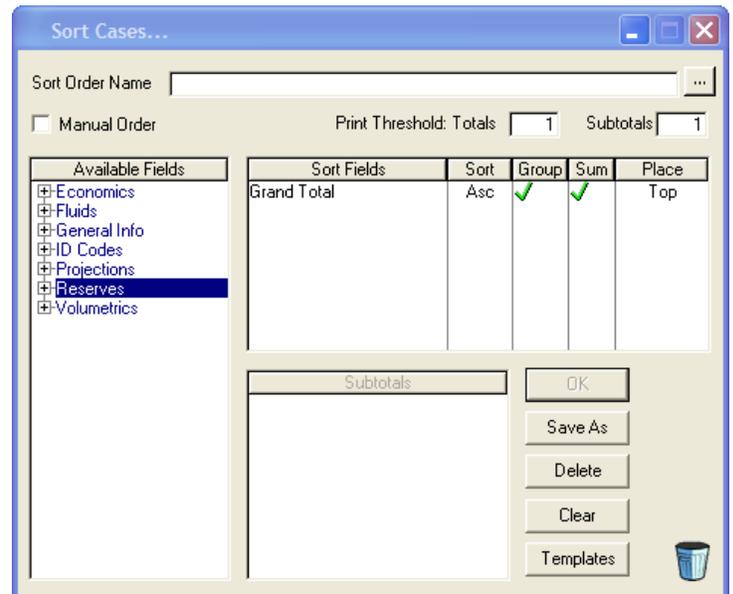
Inverts the case selection. If 5 cases of 30 total are currently highlighted in the Case List, clicking this button will highlight the other 25 instead.

SORTING CASES

Select the  button from the **Case List window**. When creating a new sort order, begin by typing a Sort Order Name into the top field. Sorting is defined by dragging the selected criteria from the Available Fields column to the first available line of the Sort Fields column. PHDWin can sort by up to ten different criteria.

The **Sort column** determines whether the cases are sorted in an ascending or descending order. Left click the field to get a drop down box that will allow users to change the selection.

The **Group column** specifies whether a sort criterion will create a break in the Case List with a green check mark.



SUMMARIES & SUBTOTALS

The **Sum column** specifies that a summary will be generated for the break indicated in the Group column, and the location of the summary during report runs (top/bottom) is defined in the **Place column**.

A **large Sigma** symbol inside the Case List (Σ) designates that a summary will be generated at that break. Once again, Top specifies that the Summary will be located before the individual case reports, and Bottom specifies that the Summary will be located after the individual case reports.

A **Subtotal** can be generated within each sort group. A subtotal will generate a summary page in the report, but will not affect the order that the cases are reported. This allows you, for instance, to generate summary pages for each operator while sorted by Reserve Class and Category.

A **small Sigma** symbol (Σ) designates a subtotal will be generated for the break indicated in the Group column. Subtotals can be created for each sort criteria: highlight a sort line, then drag and drop the selected subtotal criteria to the Subtotals portion of the window.

The **Print Threshold** for totals and subtotals gives the user control of how many cases must be part of a group in order for the total or subtotal to be generated; this prevents redundant creation of a one case (per page) sort total or subtotal report.

MANUAL SORT ORDERS

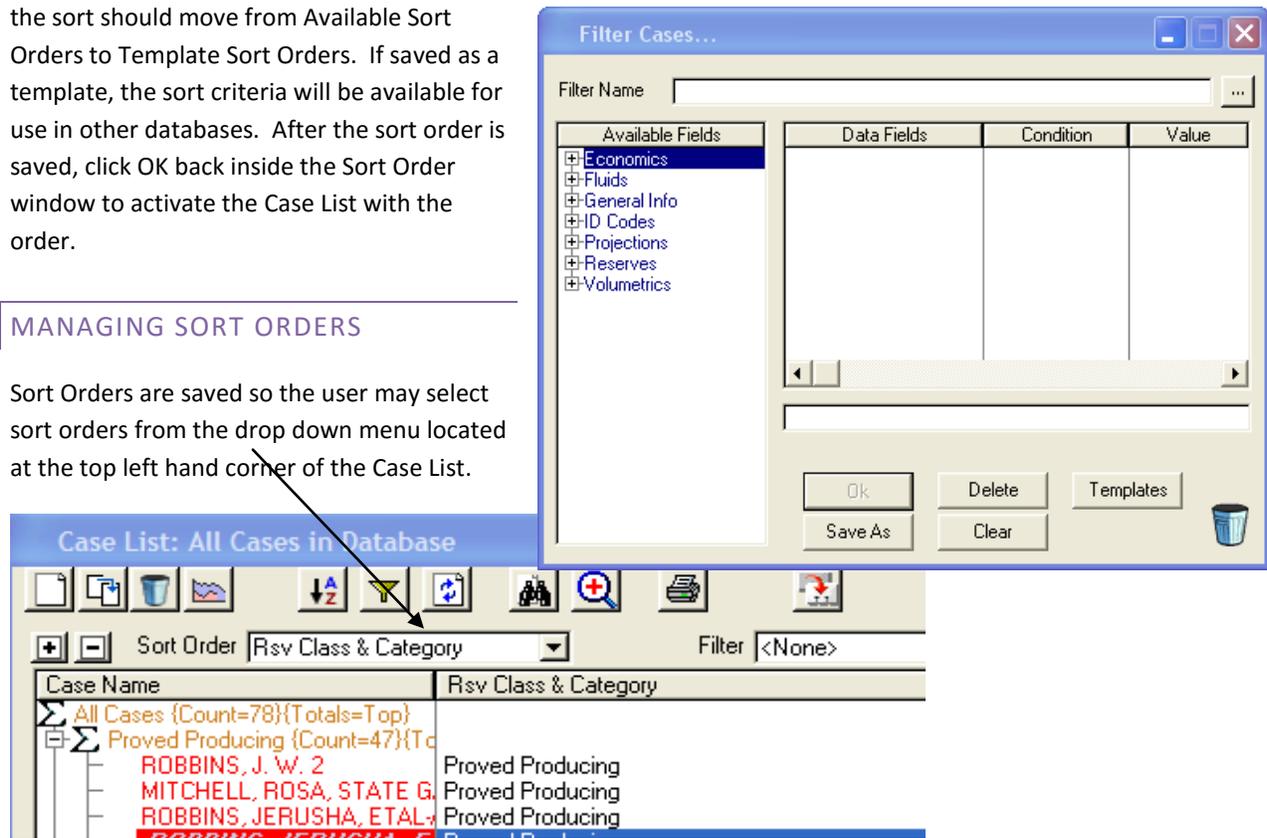
Another option now readily available to users is the ability to define a **Manual Order**. When the Manual Order box is checked in the top left corner and saved along with the Sort Order, users have the ability to drag and drop cases to a desired position in the list. Just drag the case name to a new position using the left mouse button and the black arrow that activates. Manual Order can be selected with or without other sort criteria.

Warning: Manual Orders are NOT dynamic and will have to be manually maintained by the user. Turning manual off will result in the resorting of cases according to the sort criteria.

When the sort has been defined, click the Save button to save the Sort Order and apply it to the Case List. Once saved, the user can store this sort order to a template in the Scheme.tps file by opening the sort window when the sort is selected, clicking the Templates button, clicking the sort name, and then clicking the arrow to indicate that the sort should move from Available Sort Orders to Template Sort Orders. If saved as a template, the sort criteria will be available for use in other databases. After the sort order is saved, click OK back inside the Sort Order window to activate the Case List with the order.

MANAGING SORT ORDERS

Sort Orders are saved so the user may select sort orders from the drop down menu located at the top left hand corner of the Case List.



This drop down allows users to create a wide variety of sorts that can be turned on and off quickly without having to recreate them each time.

You can delete a sort order from the file by clicking the  button and then clicking the Delete button on the sort window.

USE THE CASE LIST TO FILTER CASES

The Case List can be used to filter out certain cases from view within the Case List. A filter does NOT delete any cases from the database; it simply allows the user to control which cases are shown in the Case List. Those cases that have been filtered out are protected from being edited by the user, including Global Edits and Edit Data in Excel.

To build a filter, click the filter button  to open the Filter Cases window and define filter criteria.

Filter criteria are defined by dragging criteria tokens from the Available Fields column over to the Data Fields column. Next, the user should define the condition and value that PHDWin uses for filtering cases in the Case List. Once complete, the filter defined here will define which cases will be displayed. To reiterate, the filter defined does not specify which cases should be taken out, but which cases should be displayed.

Once a new filter is defined, click Save; the Case List will display and show cases that meet the selected filter criteria. After the sort filter is saved, click OK back inside the Sort filter window to activate the Case List with the order. Once multiple filters have been defined, the user can switch between them by using the drop down menu list in the top right hand corner of the Case List.

MULTI-CONDITION FILTERS

Filters may be created with more than one condition. In doing so, you will need to determine whether the condition is additive (all of the conditions must be true), or alternative (any one of the conditions can be met).

When you drag a second condition into the Data fields table, PHDWin™ will prompt you to choose either the AND operator or the OR operator.

AND – Choose this option if **BOTH** conditions must be true for a case to show.

OR – Choose this option if you want the case to show if it matches **EITHER** of the conditions.

NAVIGATING IN PHDWIN

PHDWin is a multi-threaded program, meaning that the program is designed to have multiple windows open at once. This section of the manual covers the basics for moving through those windows to navigate through the application efficiently.

NAVIGATING CASE TO CASE

There are three main ways in which to change the Active case in PHDWin. The first two icons on the main toolbar, located at the top of the window, are used to navigate one case at a time. The Previous Case icon (left arrow) moves up the Case List, one case at a time. Next Case moves down the list.

Another way to set the active case is to use the Case List itself. Double Clicking any case in the list will set it as active. This allows the user to “pick” any case in the project quickly and easily.

Both of those methods will prompt the user to save any changes made to the case they are leaving. While this gives the user ultimate control over the saving of changes made to cases, the prompts can slow down navigation, and some users may find this cumbersome.

The third option for navigating is to use the **[PgUp]** and **[PgDn]** keys on the keyboard. Page Up will move to the previous case, but will also automatically save the changes made to the case the user is leaving. Page Down moves to the next case, also automatically saving any changes that were made.

Page Up and **Page Down** are useful when the user is working in windows such as graphs or the Case Editor, when they might not have the Case List open for navigation. These keys function differently in the Case List; pressing Page Up or Down in the Case List will scroll through a full window of cases and display the window of cases, much like the functionality of these buttons in Word.



CASE FINDER WINDOW

Click the  button on the PHDWin Toolbar to activate the Find Cases window that allows you to search for an individual case or multiple cases based on fields visible in the case list (e.g.: case name).

TIP: The Find Cases... window will remain on your screen until you click the Close button. For extended searches, position the windows so that you can move easily back and forth.

To move through the case file and view each case matching the search criteria, click the **Find Next** button.

When all of the cases matching the search criteria have been viewed in the PHDWin window, a message will be displayed: **“No Cases found.”**

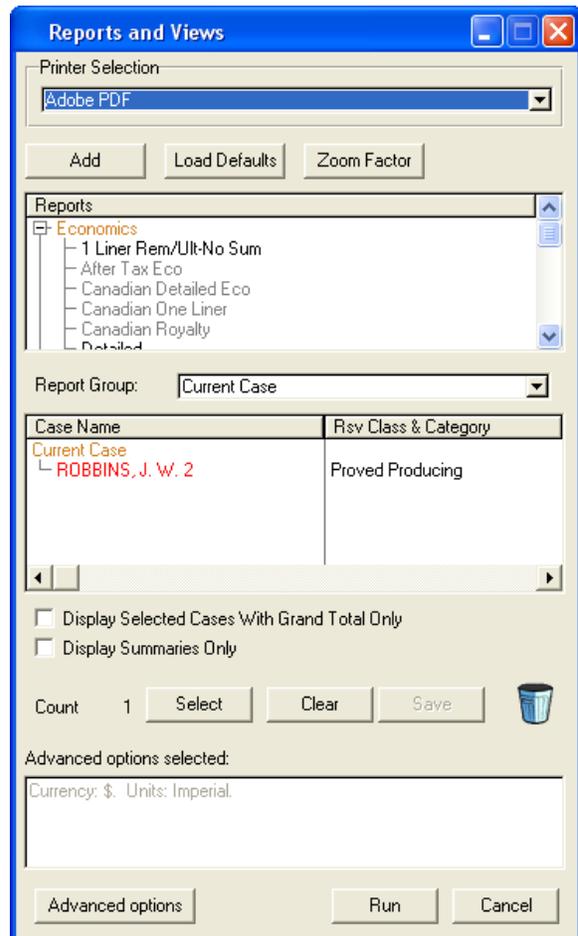
CHAPTER 4 - REPORTING FROM PHDWIN

PHDWin allows the user to run many different types of reports, including Excel and Access style outputs as well as Histograms and Pie Charts. Users may choose between pre-defined reports listed in the Reports and Views window, providing flexibility to the look and data presentation of output reports.

REPORTS WINDOW

Select **Reports and Views** | **Select and Run** from the main menu.

- The list of all available reports is displayed in the Reports portion of the window. Reports can be added to the list of available reports by clicking **Add**. Select the desired report to run by clicking the title.
- The Case Name area displays cases included in the report. Users run pre-defined report groups (Current Case, All Cases, Any Group Case created from the Data Wizard, any saved report group) by choosing from the **Report Group** drop down menu.
- The Case Name area can be populated by a **Custom** selection. A custom selection is defined from dragging a selected group of cases from the Case List and dropping them into the available space in the Reports and Views window. Click the **Select** button to activate the Case List for drag and drop.
- **Clear All** clears the current case selection and allows the custom case selection to be re-built.
- When the report format and group of cases have been selected, the user may click **Save As** or **Run**.
- **Save As** will open a report group properties window where the user can create a report group, which will then appear in the Pre-defined list. A purchase investment for the group of cases can be created inside the properties window.
- **Run** will report the selected cases using the selected report style without saving as a pre-defined report group.



- The top of this window allows the user to **Load Defaults**. This will unload all reports and load all of the default PHDWin reports as setup in PHDWin Standard Reports.mdb in the PHDWin installation directory.
- **Zoom Factor** gives the user control of the initial magnification factor of the report. Selections include Full Size, Fit Width, Fit Width and Length, and Custom Magnification.

RUNNING REPORTS

To run a report in PHDWin:

1. Open Reports and Views | Select and Run from the main menu.
2. Select the report format to run.
3. Select the case(s) to report.
4. Click the **Run** button to run the report.

SINGLE & MULTI-CASE REPORT RUNS

When reporting a single case, the report window will open and display results for the case.

When reporting multiple cases, a few extras will display in the report.

Grand Totals are always generated for report runs that contain multiple cases. This means that you do not have to create composite cases every time you want to combine cases; simply run a report on the desired cases.

The navigation pane will also show up. This pane allows users to navigate between the different pages in the report. Clicking a case name will display that case's detailed report page.

Reports [Multiple Leases]: Custom Set

Date : 10/27/2008 12:19:04PM
Partner : All Cases

Est. Cum. Oil (Mbb l) : 10.97
Est. Cum. Gas (MM cf) : 38,894.78
Est. Cum. Water (Mbb l) : 8.68

Year	Oil Gross (Mbb l)	Gas Gross (MM cf)	Oil Net (Mbb l)	Gas Net (MM cf)
2003	0.11	651.69	0.08	48
2004	0.11	626.60	0.08	48
2005	0.10	599.28	0.08	48
2006	0.10	574.85	0.07	48
2007	0.09	551.49	0.07	48
2008	0.09	530.57	0.07	38
2009	0.08	507.73	0.06	38
2010	0.08	487.28	0.06	38
2011	0.08	467.71	0.06	38
2012	0.07	450.19	0.05	38
2013	0.07	430.99	0.05	38
2014	0.07	413.81	0.05	38
2015	0.06	397.35	0.05	28
2016	0.06	382.81	0.04	28

SORTS AND REPORT RUNS

The report will generate the cases in the order that they appear in the Case List. Sorting the Case List can also generate additional summary pages in the report.

In any sort order, users have the option of Group and Sum for each sort criteria. If the Sum option is checked, then PHDWin will automatically generate a summary page based on all of the cases with that criterion in common.

This is common for generating reports with summaries based on Reserve Class/Category and State/ County/Field.

REPORTING MONTHLY ECONOMICS

Most of the reports in PHDWin are designed to report annual numbers. There are occasions, however, when the user would like to see a case’s monthly detail.

ENABLE DRILL DOWNS

One way to acquire monthly numbers in a report is to enable the “drill-down” feature by selecting **Reports and Views | Enable Drill Downs** from the main menu. There will be a check mark next to the option in the reports menu to confirm that drill downs are enabled.

With drill downs enabled, run the Standard Eco Report. At first glance, it looks like nothing has changed on the report. However, hovering the mouse over any of the years changes the cursor into a magnifying glass. **Double click** on the year to “drill down” to a monthly report for that year.

Click the Preview tab to return to the original annual view of the report.

The screenshot shows the PHDWin interface with a report titled "Reports: ROBBINS, J. W. 2". The report is currently in a "Preview" view, indicated by a "Preview 3.00" tab. A callout box explains: "Each drill down will get its own tab. The number represents the number of years from the As Of Date. In this example, this is the third year of the report." Another callout box points to the "Preview" tab: "The Preview Tab will return you to the annual view of the report." The main data table is titled "ROBBINS, J. W. 2 TITAN RESOURCES I, INC." and shows monthly production data from 1/1/2005 to 12/1/2005, with a total for 2005. The columns are Mon., Oil Gross (MbbD), Gas Gross (MMcf), and Oil Net (MbbD).

Mon.	Oil Gross (MbbD)	Gas Gross (MMcf)	Oil Net (MbbD)
1/1/2005	0.00	33.09	0.00
2/1/2005	0.00	29.77	0.00
3/1/2005	0.00	32.82	0.00
4/1/2005	0.00	31.63	0.00
5/1/2005	0.00	32.55	0.00
6/1/2005	0.00	31.36	0.00
7/1/2005	0.00	32.27	0.00
8/1/2005	0.00	32.13	0.00
9/1/2005	0.00	30.96	0.00
10/1/2005	0.00	31.86	0.00
11/1/2005	0.00	30.70	0.00
12/1/2005	0.00	31.59	0.00
2005	0.05	380.76	0.04

REPORT GROUPS

A Report Group is a predefined list of cases that can be used to generate reports. By default, PHDWin allows the user to select the options “All Cases” or “Current Case.” Often times, however, there is a group of wells that should be reported together. Users may create a report group to quickly report these cases.

Creating Report Groups

Users can create a report group by selecting Reports and Views | Select and Run from the main menu. Once inside, choose <Custom/Add New...> from the Report Group drop down menu. Click Select in the Reports and Views window to activate the Case List. From the Case List, drag and drop the group of cases to include in the group. Click Save As, and a Report Group Properties window will spawn, allowing the user to name the group and assign a group investment (optional). Once the report is given a name, the user will have the ability to select the group from the Report Group drop down menu.

Tip: Other one-time group expenses can be entered as a “Purchase Price.” Investments entered in this way will be applied at the AsOf Date, and only on Group Summary reports. One-time group expenses will not be considered for group or individual reversions.

Tip: Another attribute of this tab is the ability to include **loan payments**. **These loan payments will be applied to the summary cash flow only.** Enter the loan installment amount (net to summary cash flow), the total number of installments to service the entire debt, the number of installments per calendar year, and the date of the first installment. Loan payments will not be considered for group or individual reversions.

Note: Loan payments are separate from the purchase price investment.

EDITING A REPORT GROUP

To edit a report group: Select Reports and Views | Select and Run from the main menu. Choose the desired report group from the Report Group drop down menu. Users may add selected cases to the group by dragging to the list from the Case List (click **Select** to open the Case List.) Second, the user can clear the selection by clicking the **Clear** button, and start fresh by dragging and dropping from the Case List.

To edit the actual report group name, purchase price etc., double click the report group name at the top of the selection of cases for that group (in the white space, not the drop down menu.)

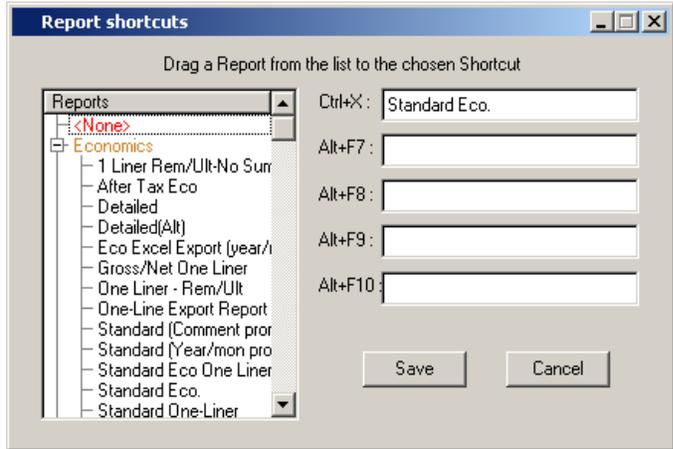
Specific cases can always be deleted from a group by dragging and dropping the case to the trashcan at the bottom right hand corner of the window. Once any changes like this are made, it is important to click the **Save** button afterwards.

REPORT SHORTCUTS

Users may map up to five keyboard report shortcuts in the system. These are simply keyboard commands for quickly running reports on the current case.

To Map a shortcut:

1. Select **Reports and Views | Report Shortcuts | Map Shortcuts** from the main menu.
2. Choose the report to assign to the keyboard shortcuts by dragging the report name to the slot next to the shortcut on the right.



Once a shortcut has been mapped, users can launch that report from any window in PHDWin by pressing the assigned keyboard shortcut.

Daily 100% WI Values on Max Run Date			
Last Day of positive cash flow: 6/18/2010		NRI 0.75000000	
		Ecl # 14	
Gas Shrink %	0	Oil Shrink %	0
100% Gas Vol (Mcf)	22.110	100% Oil Vol (bb)	0.014
NRI Gas Vol (Mcf)	16.583	NRI Oil Vol (bb)	0.010
Gas Price (\$/Mcf)	3.25	Oil Price (\$/bb)	21.00
Ownership in Effect	WI=0.50000000	RI=0.37500000	
First Projection	01/01/1970	Case Kill Date	n/a
Last Projection	06/21/2036	Group Extend Date	n/a
Fixed Cost (\$)	26.28	Group ECL Date	n/a
Well Cost (\$)	0.00	Calc ECL after	As Of Date
Op Cost (\$)	0.00	No Exp Before	n/a
Transport Cost (\$)	0.00	Allocations (N/A)	
Other Cost (\$)	0.00	N/A	
Well Count	1	Revenue (\$)	0.00
Total Rev (\$)	54.11	Taxes (\$)	0.00
Total Roy (\$)	0.00	Fixed Cost (\$)	0.00
Total Tax (\$)	0.00	Well Cost (\$)	0.00
Total Cost (\$)	26.28	OpCost (\$)	0.00
Daily OpCash (\$)	27.83	Other Cost (\$)	0.00
		Trans Cost (\$)	0.00

Warning: State Taxes do not affect ECL

Done

CASE ERROR CHECK

Select **Reports and Views | Case Error Check** to run this feature from the main menu. This feature checks recently run economics for the current case and provides warnings about the case. Warnings may or may not be errors. An example window appears below.

Note: The Warnings are very useful in determining problems with cases.

CHAPTER 5 – MODIFYING CASE INFORMATION

In this chapter we will discuss how to edit the basic case header information on the cases in your project.

THE CASE EDITOR

The case editor is a very important window. It will give you access to many of the properties of your individual cases allowing you to make edits on a single case. This editor is designed to affect only the active case. However, as you will see in the next chapter, everything we can do to a single case, we can also do to many, or even all, of our cases through our mass editing tools.

The Case Editor is opened by selecting **Editor | Cases** from the Main Menu.

The PHDWin Case Editor window contains tabs that group related informational fields into an edit window. The Case Editor allows users to set up a single case with all information except future production from inside a single edit window. Think of the Case Editor as the most basic window inside PHDWin, where all production, test, and economic input parameters can be entered. Future (forecast) volumes will be discussed in the Graphs chapter.

The screenshot shows the 'Edit: ROBBINS, J. W. 2' window with the following fields and values:

Ownership	Taxes	Eco Options / Report Exclusions	Cut-offs
Gen Info	ID Codes	Monthly History	Production Tests
Prices	Expense	Investment	
Case Name: ROBBINS, J. W. 2			
Well:	Latitude: 0.00000000	Longitude: 0.00000000	
Operator: TITAN RESOURCES I, INC.	Location: Onshore	Location: ~A-1893 GC&SF RR~25~	
Field: PUCKETT	Major Phase: Gas	Well Type: Unknown	
Reservoir: DEVONIAN	Reserve Class: Proved		
County: PECOS	State: TX	Reserve Category: Producing	
Country: United States	Spacing: 0 Ac	Total Depth: 10853	ft
Production Type: <input type="checkbox"/> Shale <input type="checkbox"/> Coalbed Methane <input type="checkbox"/> Hydrates <input type="checkbox"/> Low Permeability			

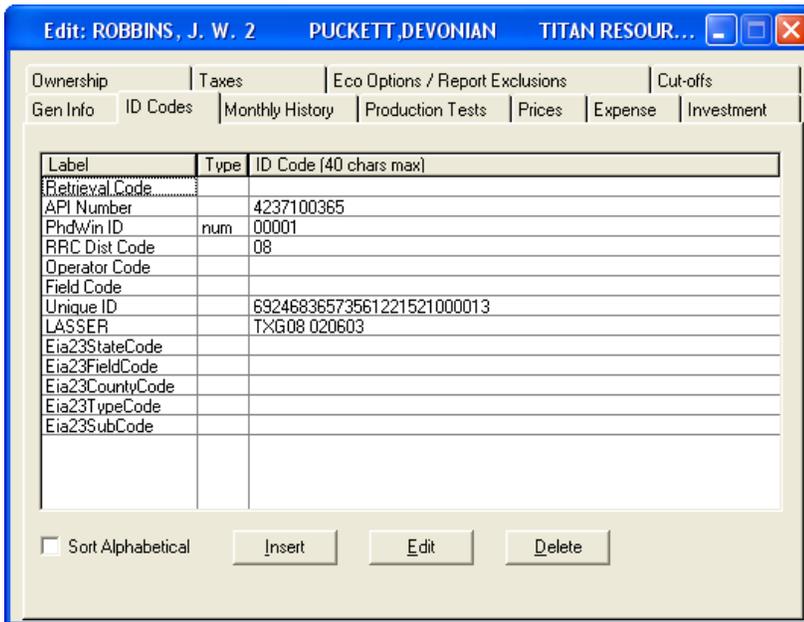
CASE EDITOR– GENERAL INFORMATION TAB

This window contains common information that identifies a case, including the name of the case, well number, operator, state, county, field, major phase latitude and longitude, locations and class and category information.

This is a very simple editor in which you simply input the values you desire for each field. Often times this information is filled in for you if the case is created through an import.

ID CODES

ID Codes can be an incredibly useful tool in PHDWin. They allow the user to create their own fields to contain data values, or case information that does not have a standard input field in PHDWin.



These are literally limitless in the sense that the user can create them to contain any kind of information, and there is no limit to the number of ID codes that a user can create.

Certain ID Codes are automatically built-in to PHDWin when a case is created or imported. Retrieval Code, API Number, PHDWin ID, RRC Dist Code, Operator Code, and Field Code are usually imported with the production data from commercial vendors. The **PHDWin ID** is an internal reference ID that PHDWin assigns and cannot be edited.

PHDWin populates a new **Unique ID** for every case in the database. The Unique ID is not editable, but can be cleared or

renewed using the Global Editor. This ID will help cases keep a unique identifier in PHDWin while merging and extracting databases.

CREATING NEW ID CODES

To create a new ID Code, click the **Insert** button located at the bottom of this screen. Adding a new ID code to a single case **automatically adds it to ALL cases** in the project. Assigning a value to the id code in this window, however, is specific to the active case.

Once the codes are created, the user will be able to select and sort by the ID Code values as well as select the ID as a title for graphical display.

Note: Users may control the order of the ID Codes by dragging and dropping the rows within this window.

WORKSTAMP ID CODES

Workstamps are a way of identifying when and by whom a case was last edited. The first time users apply a workstamp in a project, a new ID Code will be created. You may also be prompted to enter your name (if you have not already registered the program.)

To Apply a Workstamp:

1. Ensure the active case is the case you wish to stamp.
2. Select **Miscellaneous | Workstamp** from the main menu of the PHDWin Window.

WORKSTAMP ONLY VS. WORKSTAMP ADVANCE

Workstamp Only will update the ID Code for the Active case with the appropriate date, time and user stamp, and will remain on the current case. Workstamp/Advance will stamp the active case, and then move to the next case in the Case List.

CHAPTER 6 - MASS EDITING CASES

Editing the information on a single case is great, but what if you have a lot of editing to do... wouldn't it be nice if there were some way to make those same edits on a mass scale?! There are actually two mass editors in PHDWin, each with its own strengths.

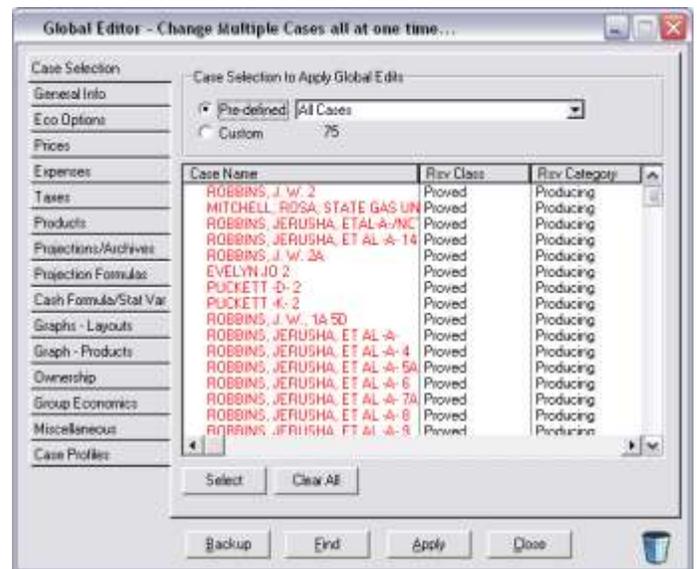
1. The Global Editor – This is a great tool for when you are trying to change a setting on all cases to be the SAME.
2. Edit Data in Excel – The powerful editing capabilities of Excel are great for those instances where you are may be editing a lot of cases, but the values may be unique for each case.

THE GLOBAL EDITOR

The **PHDWin Global Editor** allows users to change case information for multiple cases as a single operation.

To access the Global Editor, select **Editor | Global Editor** from the main menu.

Note: It may be a wise decision to click the **Backup** button PRIOR to applying your global edit. This will create a backup of your database in case the global edit does not do what you intended, you can always go back!



SELECTING CASES FOR EDITING

Do not let the name fool you. While “Global” may imply that the changes will automatically affect ALL of the cases in the project, this is not necessarily true.

The user can actually limit the effect of the Global Editor by either applying a filter to the Case List, as discussed in an earlier chapter, or by selecting the cases to be edited on the Case Selection Tab of the Global Editor itself.

There are two ways to select cases for editing.

1. Select from the list of **pre-defined** groups that exist in the current database
2. Build a **custom** selection.

CUSTOM CASE SELECTIONS

To change properties that are not defined in the pre-defined selection, you can create a custom selection.

Click the **Clear All** button at the bottom of the window to begin a new custom selection. The total case count will always be displayed next to the Custom radio button.

The **Select** button will activate the Case List beside the Global Editor. A custom group of cases is **dragged from the Case List and dropped inside the custom selection window.**

You can drag multiple cases from the Case List by highlighting multiple cases using Shift + Click or Ctrl + Click. You can also shortcut things by dragging the grouping nodes created by a sort to drag in all of the cases within that grouping.

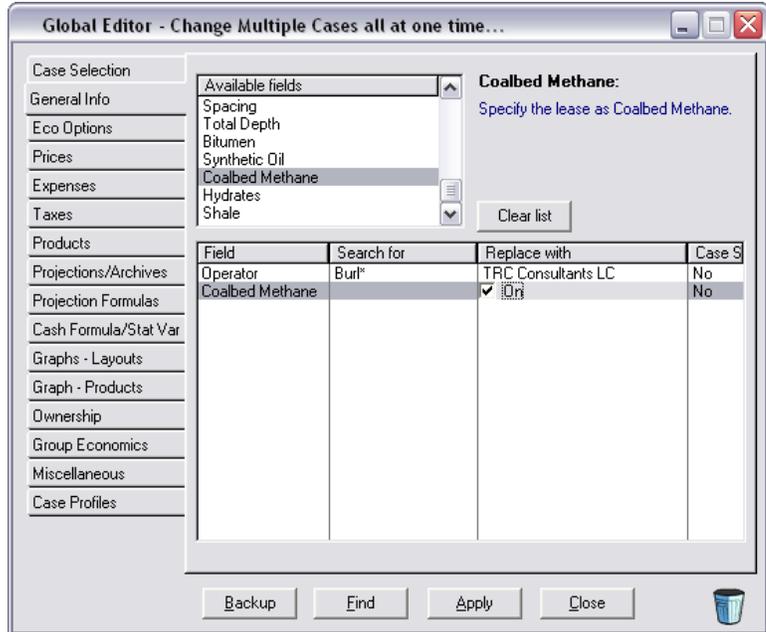
EDITING HEADER INFORMATION IN THE GLOBAL EDITOR

With a few exceptions, most of the tabs in the Global Editor have an identical workflow. In general, the following steps are taken to make changes using the Global Editor.

Once you have selected the cases to be edited, select the General Info tab of the Global Editor to be presented with the list of options for editing header information.

The list of available fields will show you everything in this category (General Info) that can be edited here.

When you click on an item in this list, a description of the option will appear in blue in the upper right corner of the window. Read these carefully, because you want to ensure that the option you select is going to do what you intend it to... there is NO UNDO from a global edit.



Once you find the action you want to perform, drag it to the lower portion of this window, known as the **Stage**. Once on the stage, the option may have additional inputs for you to fill out. Some options may present you with drop downs, others checkboxes, and still others will simply have an input field for you to type your desired values into.

USE OF ASTERISKS IN SEARCH/REPLACE

Many of the options in the General Info tab will give you the option to search for certain values to replace. Asterisks can be used as wildcards when searching and replacing data, often a function of the General Info tab of the Global Editor. The Asterisk can be used in the search field in several different ways as a wildcard:

Asterisks on either side of text - *PUCKETT* - This will search for the text “Puckett”; for the cases where “Puckett” is found, PHDWin will replace the **ENTIRE** field with the replacement text specified.

Example: There are cases in my project with the field name “W PUCKETT”, “PUCKETT, WEST”, “N. PUCKETT”. I want to make them all just “PUCKETT”. I would select Field, type “*PUCKETT*” in the search box, and replace with “PUCKETT”.

Asterisk preceding text - *PUCKETT - This will search for the text “Puckett,” and anything **BEFORE AND INCLUDING** “Puckett” will be replaced with the text specified in the replacement box.

Example: There are cases in my project with names “W. PUCKETT UNIT 1”, “WEST PUCKETT UNIT 2”, etc. I want to make them consistent, whether it is “W” or “WEST”. To do this, select the Case Name field, type *PUCKETT in the search box, and replace with the text “WEST PUCKETT.” This will make the W. PUCKETT be WEST PUCKETT, leaving everything after the text “PUCKETT” intact; the “WEST PUCKETT UNIT 2” case name does not change at all. The result is “WEST PUCKETT UNIT 1”, “WEST PUCKETT UNIT 2”, etc.

Asterisk AFTER text - PUCKETT* - This will search for the text “Puckett”, and any text before “Puckett” stays intact, but “Puckett” and everything **AFTER** it will be replaced with the text specified.

Example: There are cases in my project with operator names that are not consistent – meaning, some are McCoy Pet Corp, McCoy Petroleum Corp., McCoy, or McCoy Petroleum. I want to make them all “MCCOY PETROLEUM CORP”. Select the Operator field, type in MCCOY* in the search box, and replace with MCCOY PETROLEUM CORP.

No asterisk at all – PUCKETT - This will search for the text “Puckett” and replace **ONLY** the text “Puckett” with the text specified, leaving everything else alone.

Example: There are cases in my project with STAR somewhere in the case name—North Star # 1, Star #1-2, Bright Star, etc. I want to make all “STAR” text be “STARR,” but leave every other part of the case name as is. To do this, select the Case Name field, search for “STAR,” and replace with the text “STARR” – no asterisks. Result – North Starr # 1, Starr #1-2, Bright Starr.

Asterisk Only - * - This will search for **ANY** text and replace it **ENTIRELY** with the text specified.

Example: Select the Reservoir field, search for "*" in Reservoir, and replace with “MORROW”. This will replace any and all text in the Reservoir data field with MORROW.

BLANK - This will search for any specified field that is blank and **FILL IN** with the replacement text specified.

Example: I want to put “UNKNOWN” in any Location data fields that are blank, but leave the cases that have locations as is. Select the Location field, leave the search box blank, and replace with “UNKNOWN.”

EDITING DATA IN EXCEL

Perhaps one of the most powerful tools in our system is the Edit Data in Excel feature. This allows users to harness the tools, functionality, and editing capabilities of Excel for editing data within their project.

SETTING EXCEL PERMISSIONS

Before using the external editor in Excel, it may be necessary to change some security settings in Excel. This will only have to be done per computer.

EXCEL 2003 & PRIOR

1. Open Excel.
2. Select **Tools | Macro | Security** from the main menu.
3. Set the Security Level to Medium.
4. Select the Trusted Sources Tab.
5. Check ANY and ALL checkboxes on this screen. (Excel 2000 or earlier will only have one checkbox; XP and later will have two.)

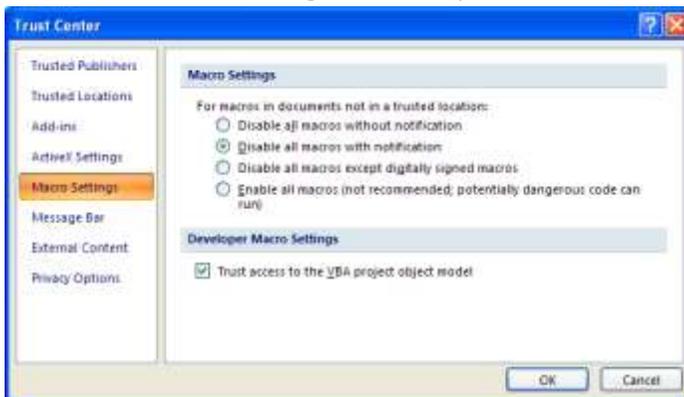
EXCEL 2007



1. Go to the  icon in the upper left corner of Excel.
2. At the bottom of the drop down menu click on the “Excel Options” button.
3. This opens the Excel Options window pictured below:

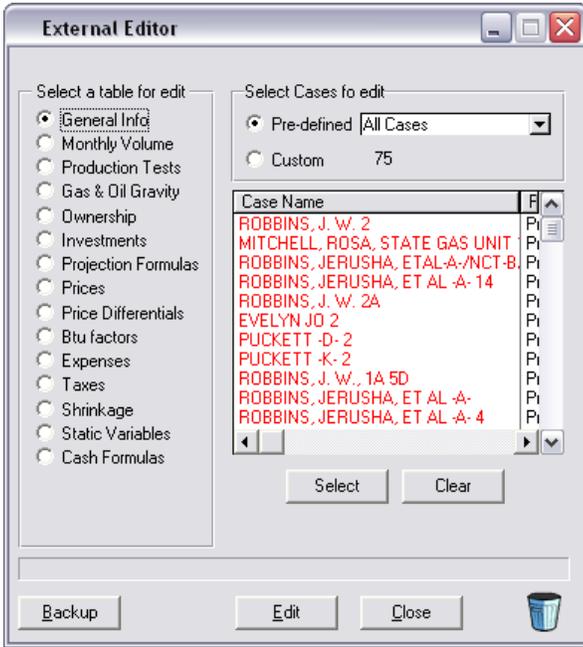


4. Select the Trust Center option in the list on the left.
5. Click the Trust Center Settings Button to open the Trust Center Settings Window pictured below.



6. Click the Macro Settings option on the left.
7. Under the Developer Macro Settings header, check the box that says “Trust Access to the VBA project object model”
8. Click OK to return to Excel Options
9. Click OK to return to Excel
10. Close ALL instances of Excel to save the settings.

OPENING THE EXTERNAL EDITOR THROUGH EXCEL



From the main toolbar, select **Editor | Edit Data in Excel**.

The External Editor allows the user the ability to make changes to any of the items listed on the left in Excel and import the data back into PHDWin.

Users determine the group of cases exported out to Excel by choosing a Pre-defined group or a custom selection from the Case List.

For a custom selection, click **Select** to activate the Case List. Once activated, drag and drop cases desired from the list into the External Editor.

Clear will always be available to start the custom selection over.

EXCEL COLOR CODES

The External Editor is one of the most powerful tools for editing multiple cases in PHDWin. There are some rules, however, that must be followed for the editor to function properly. Color codes are among these rules. Color codes specify what the user can and cannot do with data, and are listed below. The following information is also available on the ReadMe sheet of the External Editor.

PHDWin External Editor Color Coding:

Brown - Reference Data - NO CHANGES will be reflected when data is loaded back into PHDWin.

Red - Key Field - Leave blank when adding new record - New Leases can only be created from the General Information Editor.

Blue - Key Field - Must be populated with proper data in order to load data into PHDWin.

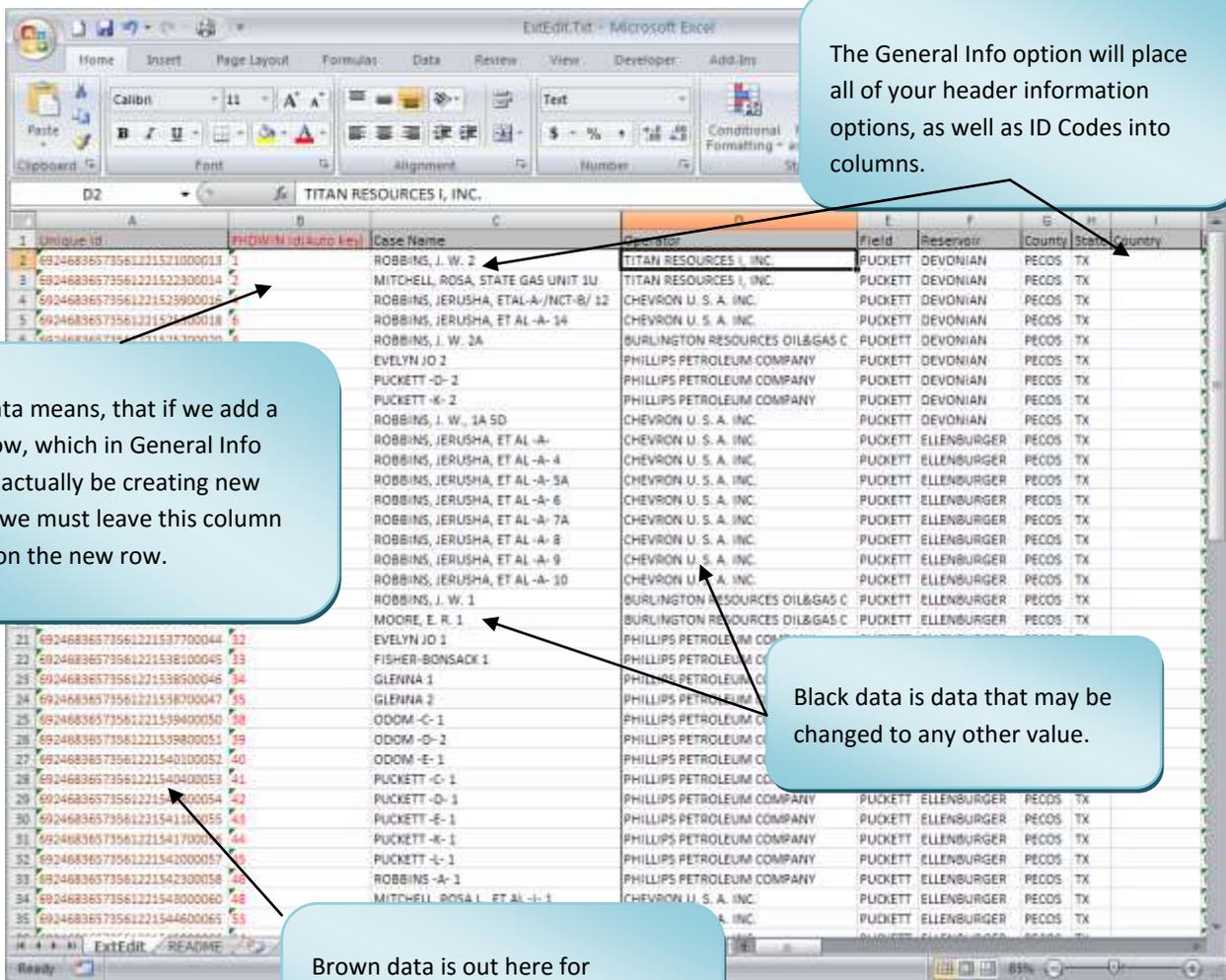
Black - Any data represented here will be loaded into PHDWin.

Note: You will see examples of all of these color codes at work throughout this course.

EDITING GENERAL INFO

Select the cases you wish to edit, as described above, then select the General Info radio option. Click Edit at the bottom of the window to begin the edit in Excel.

Upon opening, Excel will display a Read Me page with instructions and information about the use of the External Editor. To edit actual data, the user will select the **ExtEdit** tab located at the bottom of the Excel window. Data on this page may be manipulated using almost any function in Excel including formulas, functions, sorts, filters, copy, paste and more.



BRINGING BACK CHANGED DATA

To bring changes back to PHDWin, close Excel by either clicking the X in the upper right corner, or by selecting **Files | Exit** from the main menu.



PHDWin will then spawn a window that asks users to confirm whether to bring the changes into PHDWin. Answering **NO** will cancel all changes made in Excel, and those changes will be lost. **YES** will bring the changes into PHDWin and update the information in the project file.

CHAPTER 7 – EDITING PRODUCTION HISTORY AND TEST DATA

Monthly historical production and daily test data make up a good portion of the data that is stored on cases. This chapter will discuss the variety of ways in which you can edit production data on a single case. The next chapter will discuss how to use the mass editors, as well as imports to do more mass editing of production history.

THE CASE EDITOR – MONTHLY HISTORY TAB

This window contains monthly product volumes and data for each case. Here, monthly historical information can be viewed, created, and edited.

This window shows production data in 5 columns. On a case-by-case basis, the user can change the columns of data presented by dragging and dropping the product from the Others area to one of the column headers.

All data remains in the database – this is strictly a presentation feature.

Start Date & End Date are two important dates specified here. By default, PHDWin will use historical production volumes for Cum and Economic calculations up to the End of Production Date. Then, PHDWin will switch to the projection for volumes. This setting can be changed in the Product Streams Editor Behavior tab for a product in the Product Tree.

Month	Products - Monthly Volume				
	Gas	Oil	Water	Well Count	User5
Pre 87	0	3,331,000	0		
01/87	0	43,250	0	0	0
02/87	0	43,250	0	0	0
03/87	0	43,250	0	0	0
04/87	0	43,250	0	0	0
05/87	0	43,250	0	0	0
06/87	0	43,250	0	0	0
07/87	0	43,250	0	0	0
08/87	0	43,250	0	0	0
09/87	0	43,250	0	0	0
10/87	0	43,250	0	0	0
11/87	0	43,250	0	0	0
12/87	0	43,250	0	0	0
Annual ToDate	0	519,000	0	0	0
		3,850,000	0		

Note: Zeros are honored as zeros in the monthly history. A common error on cases is setting the end date too far into the future and having a series of zero months at the end of this data. Since history is honored over projections, this can often cause cases to become non-economic before their time.

EDITING PRODUCTION

You can make edits to the data in this window by highlighting the cell and clicking the **Edit Months** button, or by double clicking the table and navigating to the cell you wish to change.

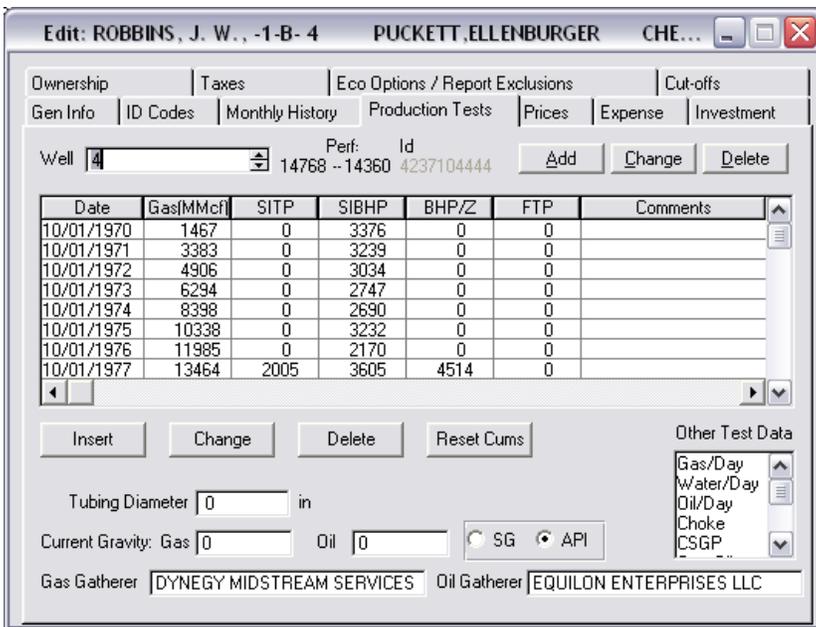
If you want to add production to the table, click the **Add Month** button. This will extend the End Date by one month, and allow you to input values in that new month. While doable, this is hardly the most efficient or effective way to add multiple lines of production.

EXCEL PASTE

If you happen to have the production you want to add to the case in Excel, you can copy the data in Excel, and then click the **Excel Paste** button on this window. In order for this to work properly, you will need to pay attention to a few details:

1. Make sure the columns in Excel are in the same order as they appear in PHDWin.
2. The paste is limited to the 5 visible columns in PHDWin.
3. Make sure the production date in Excel is the next month. You can paste more than one year at a time, but remember that PHDWin will only accept continuous dates in monthly history, so no skipped months.

THE CASE EDITOR – PRODUCTION TESTS TAB



Due to the complexity of the information that must be displayed in such a restricted area, this tab is perhaps the most complex in the case editor.

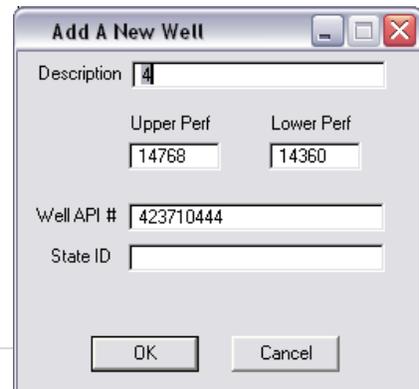
This window, like the Monthly History tab, shows a limit of 5 products at one time. The visible products may be adjusted by drag and drop from the Other Test Data window in the lower right portion of the tab.

Another complexity to this window is that production test data is tracked on a well level. A case is capable of tracking multiple wells, each with their own set of test data values.

ADDING WELLS

Clicking the Add button in the upper right corner will allow you to create a new well on the case.

Once a well has been created, the user can then insert production test data under that well name.



INSERTING TEST POINTS

Clicking the Insert button at the bottom of this window will allow you to insert a single test data point.

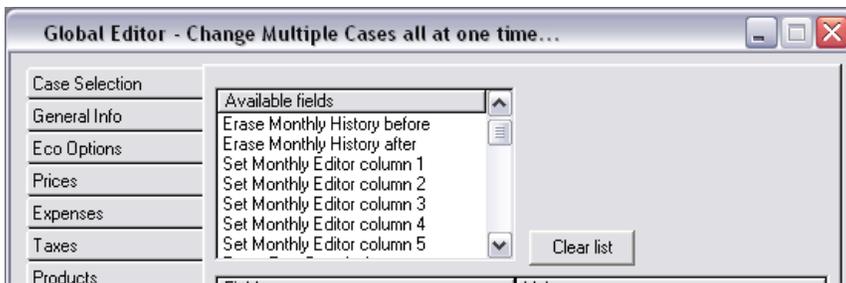
The window to the right will open, allowing you to insert the various information about the test point.

As you can see, this might work well when you have one or two data points to add, but is not terribly friendly for mass editing. So let's take a look at our mass editing options for historical production and test data.

MASS EDITING PRODUCTION HISTORY

Like we did with General Information, we have two viable options for mass editing production information using the Global Editor or Edit Data in Excel.

THE GLOBAL EDITOR OPTIONS



There is no “Monthly History” or “Production Test” tab in the global editor. This is primarily because there are very few edits to production that you would want to set to be all the same value. Remember that the Global Editor is all about setting one value across multiple cases.

The few options that do pertain to historical production and test data all exist under the Miscellaneous tab.

Erase Monthly History – There are two options in the global editor that will allow you to remove historical data from the file. One erases history that occurs after a date you specify, the other deletes history before the date you specify.

Setting the columns on the Monthly History tab- As mentioned, the monthly history tab can only show 5 products at a time. If you want to globally set which products show up in each of those columns you can find the options to do so here.

These same options exist on this tab for Production Test data as well.

EDITING PRODUCTION DATA IN EXCEL

The Edit Data in Excel window allows users to take out Monthly Volumes (Production History) or Production Tests (Daily Test Data), for editing in Excel.

Case Name	State	County	Field	Unique Id	PHDWIN Id(Key)	Date(Key)	Production(DAYS)	Production(GAS)	Production(OIL)	Production(WATER)
2157 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Oct-98	0	3098	0	28
2158 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Nov-98	0	2998	0	28
2159 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Dec-98	0	2669	0	34
2160 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Jan-99	0	2556	1	22
2161 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Feb-99	0	3067	0	0
2162 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Mar-99	0	3180	0	0
2163 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Apr-99	0	2717	0	0
2164 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	May-99	0	2613	0	0
2165 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Jun-99	0	2910	0	0
2166 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Jul-99	0	2583	0	0
2167 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Aug-99	0	3079	0	0
2168 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Sep-99	0	2764	0	0
2169 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Oct-99	0	2918	0	0
2170 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Nov-99	0	2736	0	0
2171 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Dec-99	0	3223	0	0
2172 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Jan-00	0	3161	0	0
2173 EVELYN JO 2	TX	PECOS	PUCKETT	69246836573561221526100021	9	Feb-00	0	3031	0	0

Basic case information will be placed on the sheet in Brown. This data is there for your reference only, and therefore any changes made to the data will be ignored when brought back to PHDWin.

Notice that there are two Blue columns, Date and PHDWin Id. This indicates that, if we were to add a new row to this spreadsheet, we would be required to populate a value in each of those columns in the new row. This makes sense if you think about it... If we are adding a new row, then we are adding a new month of production, but that would not do us any good unless we specify what case the production belongs to (PHDWin Id), and when that production occurred (date).

All of the remaining data is black, and this indicates that it is editable data. So the External Editor in Excel is a great tool for adding production to cases because of the user friendly editing environment Excel provides, along with all of the tools that can help make the job easier.

Note: Excel is limited to 65,536 rows of data, so it is not inconceivable that it would not be able to handle all of your production history at once. But even if you are not going over Excel's limit, it may be a good idea to take just a few cases out at a time to keep the spreadsheet down to a manageable size.

IMPORTING PRODUCTION DATA

While data entry can be great fun... the easiest way to add or update production is to import the data in from some external source. In this chapter we will see how to import data from the major data providers, as well as how to import production from a spreadsheet.

IMPORTING FROM DATA PROVIDERS

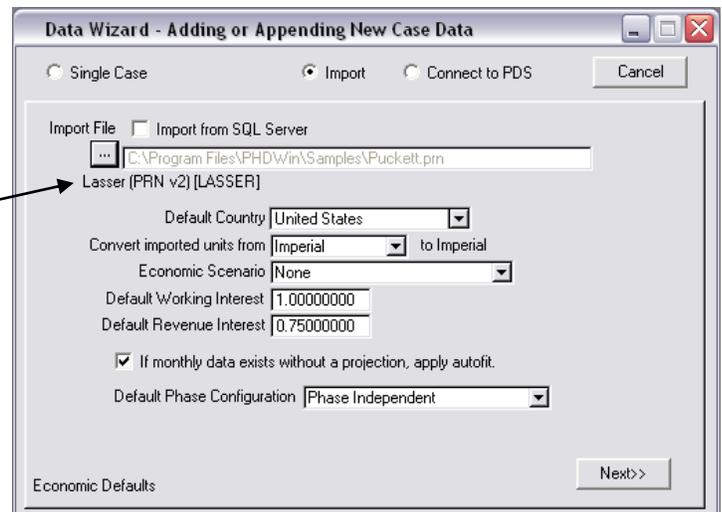
There are several companies out there who provide historical production data in easy to import formats. The major data providers that PHDWin can import data from are:

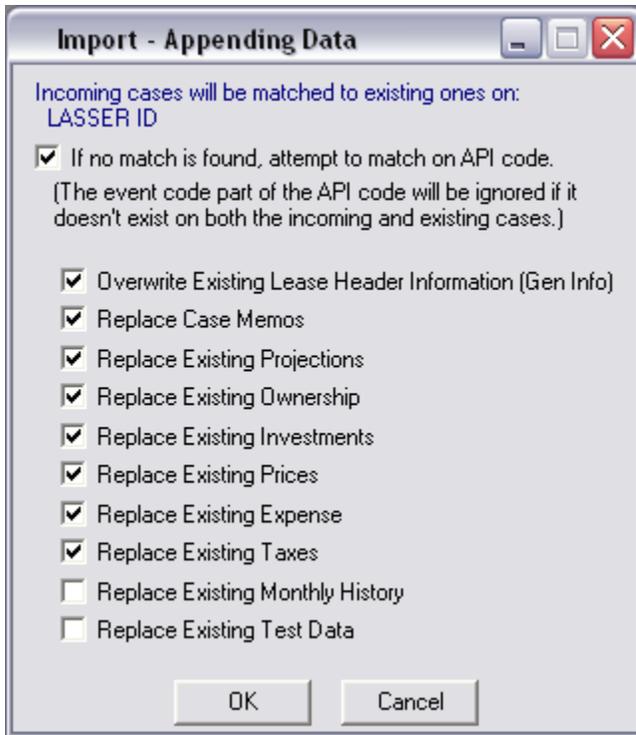
Data Provider	File Type
IHS (Dwight's)	.98c (98 Comma Delimited Version 2)
Drilling Info	.DRI (Website says "for PHDWin")
Lasser	.PRN

Importing data from any of these sources is an identical process, the only difference is the file extension you are browsing for.

To import the data:

1. Open Files | Import Data or Create New Cases from the main menu.
2. Select the **Import** option button.
3. Select the file to be imported by clicking the **Browse [...]** button and browsing for the desire file.
4. The Type field should be populated upon selecting a file.
5. Select the options to apply to the case on import including the country, unit conventions, scenarios, and ownership values, and select whether or not the case is to have a projection applied to it on import.
6. Click **Finish** or **Next** to continue the import.





If you import data into a blank database, PHDWin will create all the cases for you automatically.

Whenever you import data into a file that already has cases in it, however, you will be prompted with the window shown here.

This window is used to determine how to handle conflicting data between the import file and existing data in PHDWin.

The user has the option to match on API number if the matching ID provided by the data provider is not found in the file.

The remaining checkboxes are used to specify which data wins if there is a conflict. Those categories that are checked will use the data that is in the import file, while those unchecked will leave the data in PHDWin unchanged.

NOTE: ALL NEW DATA will be appended, these checkboxes only affect those situations where you have two different values for the same exact field or data point.

IMPORTING PRODUCTION FROM A CSV FILE

PHDWin can import from both Microsoft Excel, and from Comma Delimited (CSV) files. Many times those CSV files are created through Excel.

This chapter is going to explore the differences between the file formats, and the advantages and disadvantages of both types.

CSV FILE SETUP

Comma separated files are a simple file format that offers a few advantages for the cautious. Because of the fact that CSV files are text based, and do not carry any formatting, their data types are easily recognizable, and what you see is what you get.

This is an advantage over Excel files in one respect. Excel files often have complex formatting rules associated with the cells, and the actual data value is sometimes very different than what is being displayed on the screen. Date formats are a common example of this.

There are, however, some limitations to CSV, and some rules we must follow when creating the import file itself.

When importing a CSV file into PHDWin it is important to have the proper structure to the document. The following must be true for the CSV file to import properly:

- The data must start in cell A1
- Row 1 must contain header data (titles) for the columns
- Column A must contain the unique identifier that will be used to determine duplicates in PHDWin
- There cannot be any skipped columns or rows in the data
- The data must exist on one sheet (no multi-sheet workbooks)

	A	B	C	D	E	F
1	Lease_ID	Production Month	Gas Volume	Oil Volume	Water Volume	
2	TXG02 032829	1/15/1997	1800	30	300	
3	TXG02 032829	2/15/1997	1750	40	86	
4	TXG02 032829	3/15/1997	2205	45	200	
5	TX003 018838	1/15/1997	2100	2200	1111	
6	TXG02 032829	1/16/1997	1995	2200	1111	
7	TXG02 032829	1/17/1997	1890	2200	1111	
8	TXG02 032829	1/18/1997	1785	2200	1111	
9	TXG02 032829	1/19/1997	1680	2200	1111	
10	TXG02 032829	1/20/1997	1575	2200	1111	
11	TXG02 032829	1/21/1997	1470	2200	1111	
12	TXG02 032829	1/22/1997	1365	2200	1111	
13	TXG02 032829	1/23/1997	1260	2200	1111	
14	TXG02 032829	1/24/1997	1155	2200	1111	
15	TXG02 032829	1/25/1997	1050	2200	1111	
16	TXG02 032829	1/26/1997	945	2200	1111	
17	TXG02 032829	1/27/1997	840	2200	1111	
18	TXG02 032829	1/28/1997	735	2200	1111	

Good Layout

	A	B	C	D	E	F
1	Production Data					
2	Production Month	Lease_ID	Gas Volume	Oil Volume	Water Volume	
3						
4	1/15/1997	TXG02 032829	1800	30	300	
5	2/15/1997	TXG02 032829	1750	40	86	
6	3/15/1997	TXG02 032829	2205	45	200	
7						
8						
9	1/15/1997	TX003 018838		2100	2200	1111
10	1/16/1997	TXG02 032829		1995	2200	1111
11	1/17/1997	TXG02 032829		1890	2200	1111
12	1/18/1997	TXG02 032829		1785	2200	1111
13	1/19/1997	TXG02 032829		1680	2200	1111
14	1/20/1997	TXG02 032829		1575	2200	1111
15	1/21/1997	TXG02 032829		1470	2200	1111
16	1/22/1997	TXG02 032829		1365	2200	1111
17	1/23/1997	TXG02 032829		1260	2200	1111
18	1/24/1997	TXG02 032829		1155	2200	1111
19	1/25/1997	TXG02 032829		1050	2200	1111
20	1/26/1997	TXG02 032829		945	2200	1111

Bad Layout

To save a file as a CSV file in Excel:

1. Open the file in Excel
2. Go to Files -> Save As...
3. Select CSV (Comma Delimited) from the Save as Type drop down at the bottom of the save window.
4. Click save.

You may see several warnings given to you by Excel. Essentially the warnings are telling you that none of the formatting (bold, borders, font size etc) will be preserved, and also that CSV files do not support multiple sheets, so just the active sheet will be saved into the CSV file.

IMPORTING THE CSV FILE

Once the CSV file has been given the proper layout, and saved into the CSV format, it is ready to bring into PHDWin.

1. Go to Files – Import Data Create New Cases
2. Click the Import option at the top of the window.
3. Click the [...] browse button to browse for the file to be imported.
4. Fill in any of the optional settings on this page to apply a scenario, etc. and click Next.
5. In the Import Appending Data window that pops up, select the ID code that cases should be matched on and select what information should be replaced by the import. Note: if there are no cases in the current database, you will not get this screen. Click OK to continue to the custom import window.

The next step is to create an import layout for this CSV File. Once created, import layouts get saved to your machine, allowing you to import another file with the same layout without having to map data and define master tables.

Clicking the **New** button will create a new layout, and prompt you to name the new import layout. Once you have given the import layout a name, the next step is to define the file type that is being imported by selecting the appropriate option in the File Types section of this window.

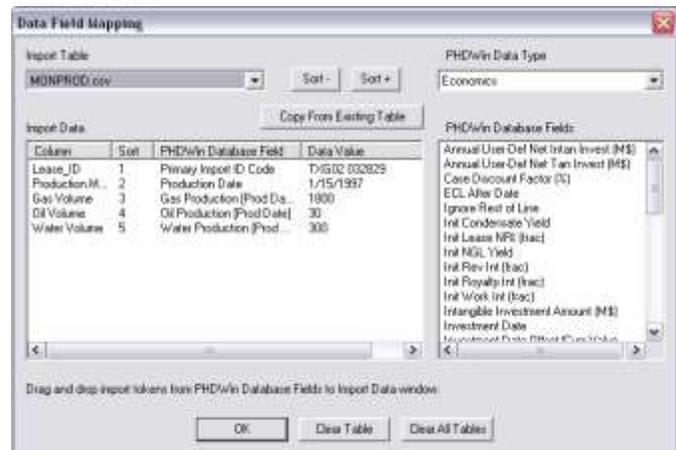
When importing a CSV File the only options that will activate are Master Table, and Data Fields. The rules that had to be followed when creating the CSV, as far as layout, make these file types somewhat predictable.

The Master Table will already be defined as the CSV file, and the master column will be column A from the CSV file. In the Data Fields window, you will also notice that the first column (the unique identifier) will already be mapped for you.

Clicking the Data Fields button will open this window, allowing you to “map” all of the fields in your CSV file.

To map a field, find the desired destination for the data in the list of PHDWin Database Fields on the right.

Note that the PHDWin fields are organized by category, you can switch categories by using the drop down menu in the upper right corner.



CHAPTER 8 – MODIFYING CASE ECONOMICS

There's not a lot of advantage to creating cases and adding production if we don't apply economics to those cases too. In this chapter we will discuss how to add pricing, expenses, taxes, escalations, differentials and investments to our cases.

Economics are a crucial part of the evaluation of properties, and there is a host of options in PHDWin.

PRICING

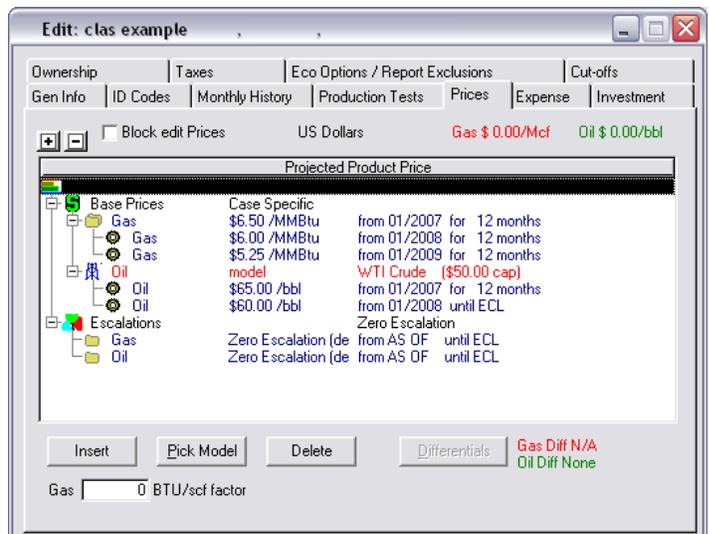
Let's start off talking about the good stuff... income. The **Prices Tab** of the **Case Editor** is used to enter prices, price escalations, and price differentials to the case. These prices and escalations may be created as either **Case Specific**, or by linking the case to a **Price Model**.

THE PRICES TAB

Price Calculation – All commodity prices are unit based. The revenue for each product for any period is calculated by multiplying the product's volume by its adjusted commodity price. The commodity's adjusted price is calculated by:

1. Determining the appropriate base price for the commodity (case specific or model).
2. Adjusting the model base price by the case's appropriate differential (models only)
3. Adjusting the price by the BTU/SCF value if the product is GAS.
4. Adjusting the price by the appropriate escalation.

The prices located in **red (gas)** and **green (oil)** in the upper right corner of the Prices Tab are the prices in effect at the AsOf Date of the project. This takes into consideration the base price and how it is scheduled along with any BTU adjustment and/or price differential applied.



Block Edit Prices - PHDWin offers the ability to guard against unwanted Global changes to case prices. If the check box to the left of the text "Block Edit Prices" is checked, then no prices can be changed in the individual case prices. If your Prices tab is **RED**, then the Block Edit Prices option has been checked and you will not be able to make ANY modifications to your prices while inside this case. However, prices will reflect changes made to models that are attached to cases.

CASE SPECIFIC VS. MODEL PRICING

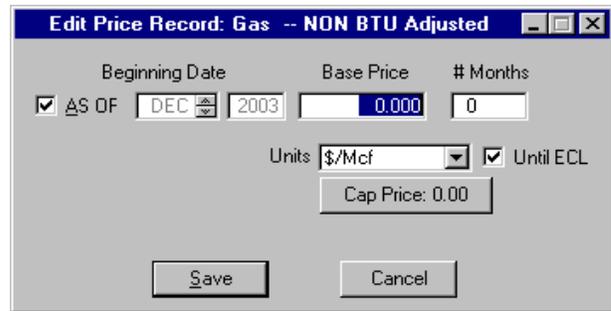
Case specific pricing means that the user has entered prices and escalations on each case in the project separately. While this gives the user ultimate control over the prices being used on each case, it may be cumbersome to edit prices in the future, as users would have to edit cases one by one.



Price Models make the job of updating pricing simple. By setting up a price model and linking cases to that model, the user only has one price to maintain. Differentials and BTU factors may be used to adjust individual cases as needed.

CHANGING CASE SPECIFIC PRICES

1. Access the Case Editor by selecting **Editor | Cases** from the PHDWin main menu bar. Then, click the **Prices** tab at the top of the window.
2. Expand the tree by clicking on the plus sign next to **Base Prices**.
3. Double click the product whose price you wish to change. The following window appears.



4. Enter the date for the price to start (It can be linked to the AsOf Date of the project by checking the AsOf box, or set to a specific date). Enter the product price and the number of months to hold the base price at this value, or check the **ECL** box to use this base price until the economic limit of the case. Click **Save**.
5. Click **Insert** to create a price change after the previous price segment ends. Repeat these steps for each product price or each price segment you wish to edit. The last segment of any price strip should have the

Until ECL box checked—this prevents the case from becoming non-economical due to a zero price as opposed to becoming non-economical because of actual economic factors.

THE GOLDEN RULES OF PRICING

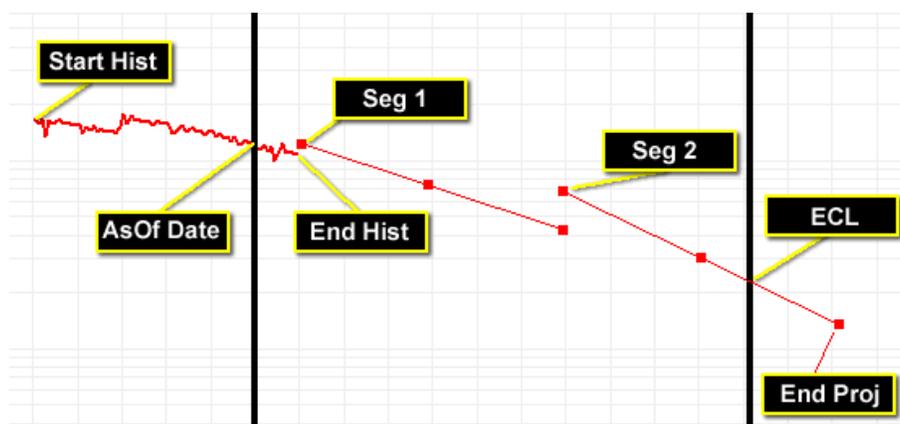
Whenever you are creating a price strip, and this goes for both case specific pricing, and model pricing... there are two key rules to keep in mind:

1. Unless the price is a single segment (unchanging over time) you should not link the start of the first segment to the As Of Date, but rather hard code the start date. This prevents your pricing strips from shifting in time if you change the project's As Of Date in the future.
2. Regardless of how many segments there are, the last segment should ALWAYS run until ECL. If your price strip ends, then your price will drop to 0, and your case will go non-economic too early.

LINKED DATES

Another important concept to understand in PHDWin is the concept of linked dates. The idea behind this is that you can link certain items, such as investments, to occur when a certain event occurs rather than specifying an exact date. The available dates to link to are:

- Seg1{MAJ} – The start date of the first major phase projection segment
- Seg2{MAJ} – The start date of the second major phase projection segment
- Seg1{MIN} – The start date of the first minor phase projection segment
- Seg1{Product Name} – The start date of the first named product projection segment
- AsOf – The AsOf Date specified for the project
- StartHist – The start date of historical production
- EndHist – The end date of historical production
- EndPrj{MAJ} – The end of the major phase projection



By linking investments to an event rather than a date, you make it easier to maintain the timing on the case. For instance, you might link the Abandonment investment to the ECL with an offset of 60 days. Now PHDWin will

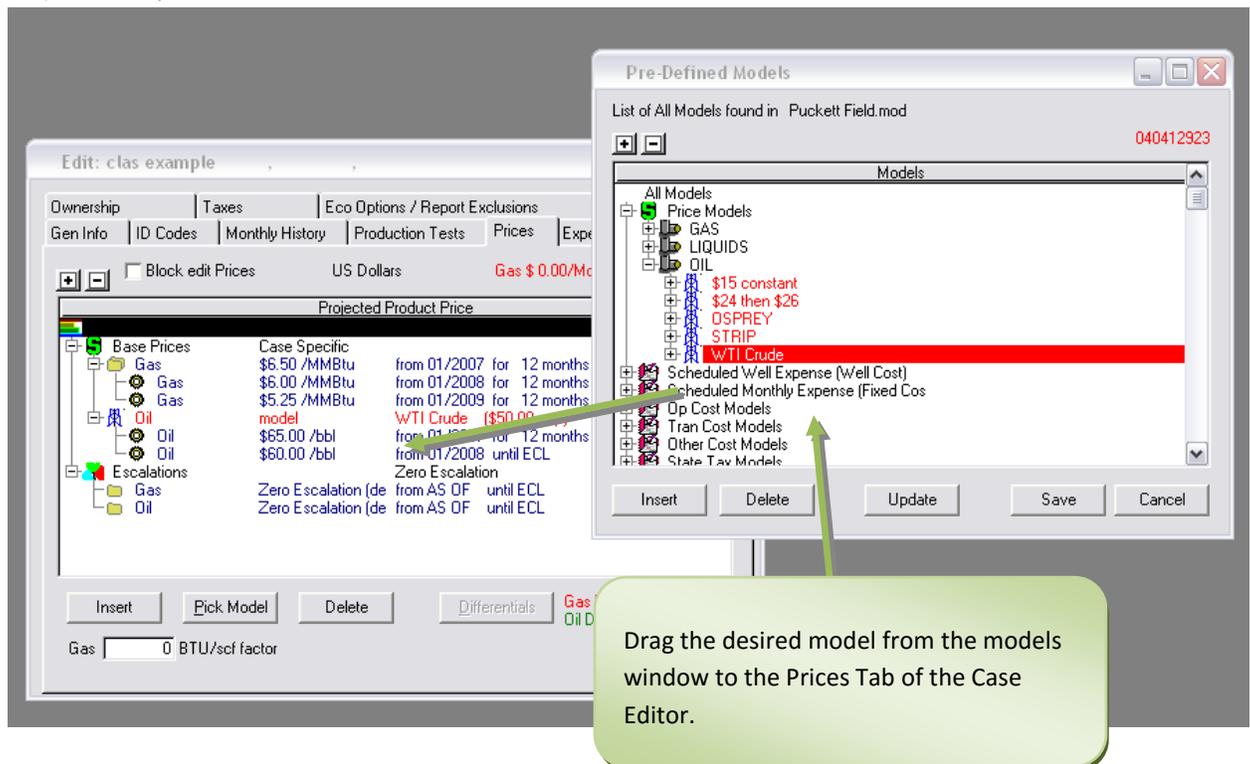
automatically make the investment occur 60 days after the case goes non-economic, regardless of what changes are made to the economics on the case.

PRICE MODELS

APPLYING A PRICE MODEL TO A SINGLE CASE

Price models are discussed in depth in the next chapter. To apply a price model to a single case, go to the Prices tab of the Case Editor.

1. Click the **Pick Model** button, and the Models window will open.
2. Find the price model to apply by searching through the tree structure, and drag the model name from the Models window into the appropriate line in the Prices tab of the Case Editor window. The model name (in red) and new prices will now show in the Case Editor.



CREATING PRICE MODELS

Price Models are created almost identically to case specific pricing. The only major difference is that you create them in the Models window.

1. Go to **Editor | Models**.
2. Highlight the Product Folder for the product you wish to create the new price model.
3. Click Insert & give the new model a name.
4. Double Click the initial price line to edit it.
5. Click insert to add additional lines to the model.

PRICING DIFFERENTIALS

Differentials are used to adjust a price model by either a fixed amount or a percentage. Differentials can only be applied when a product (oil, gas, etc) is using a price model; case specific pricing does not allow the user to input differentials.

Double click the product line whose price model should have a differential, and insert the change into the Price Differentials window. The differential will apply to the price for the life of a well.



Price Differenti...

Price Differential (%) -5

Price Differential (\$C/bbl) 0

Save Cancel

It is important to remember that % differentials are entered as the differential amount, not as a multiplier. In other words, if your price is 5% below the model, enter a -5 in the % differential field, NOT a 95. Entering 95% would increase the price by 95%!

ESCALATING PRICES

Each product may have both a price and an escalation applied to them. The price defines the base price for the product, while the escalation defines some change in the base price over time. These are applied separately and will be honored at the date specified.

If the pricing is case specific, the first segment of a price strip will also have a button allowing the user to specify the cap price for the product. The cap price is the highest price that can be applied to the product during an economic run. A model cap price is entered into the red text title line of the model in the Model Editor. Cap prices will only be honored after an escalation begins. Therefore, if an initial base price is greater than the cap price, the cap price will not be honored until an escalation on that price begins.

***For Example:** Take a price strip that runs \$6 from Jan 2000 for 12 months, then \$4 from Jan 2001 for 12 months, and then jumps back to \$6 from Jan 2002 to the ECL. Now assume that there has been a cap price of \$5 applied to this price strip.*

If no escalation is applied to this product: The price strip will ignore the cap price and run exactly as defined. \$6 - \$4 - \$6.

If an escalation begins Jan 2000: The product price will never go above \$5. Meaning the first year the price will hold flat at \$5, then 2001 will drop to \$4 and be escalated as defined in the escalation, once the price reaches \$5 (either due to the escalation or when the price jumps in 2002) the price will remain flat at \$5 once again. \$5 - \$4 - \$5.

If an escalation begins Jan 2001: Since the escalation is not in effect in 2000, the price will be allowed to hold flat at \$6. The year 2001 the price will drop to \$4 and the escalation will begin. In the year 2001, the price will be at \$5, because the Cap Price has taken effect due to the escalation. \$6 - \$4 - \$5.

A price strip may contain unlimited segments. The prices in the strip will be escalated according to any escalations applied to the current case, and each new segment restarts price escalations. Also, prices are further adjusted by price differentials.

Note: Differentials affect both base and cap prices, though the cap is adjusted by an amount determined by change to the base price. If there is a \$6.00 base price for gas, a \$7.00 cap price for gas, and a 10% differential, the base price will adjust to \$6.60, and the cap will adjust to \$7.60. This is an example that is only encountered when using price models, as differentials only apply when using models.

CASE SPECIFIC ESCALATIONS

Escalations allow the user to increase prices and/or expenses by either a percentage or by a dollar amount over time. Escalation strips are built in much the same way that pricing strips are built.

To build an escalation strip:

1. Highlight the product folder whose escalation you wish to edit (i.e. Gas, Oil etc.)
2. Double click the folder.
3. Select an escalation beginning date. Users have the option of selecting either the AsOf Date or entering a specific month and year.
4. Enter the escalation for the product. Users have the option of selecting a percentage escalation, or a specific dollar amount.
5. Enter the number of months that this escalation is applied. If this is the last segment in the strip, check the “until ECL” option to ensure the escalation remains in effect (repeats annually) until the case goes non-economical. If the user desires to escalate until a certain date and keep the escalation intact but not further escalate, set the final number of months in the last segment instead of checking “until ECL.”
6. If a change in Escalation is to occur at some time in the future, click the **Insert** button at the bottom to gain a new segment. The new segment may be edited by double clicking the segment.

FIXED VS CONTINUOUS ESCALATIONS

PHDWin offers two escalation types: fixed and continuous. A fixed escalation will behave in a stair-step manner, while a continuous escalation will be a straight line.

A **fixed escalation** will apply the escalation at the beginning of the segment and then hold the value constant along the extent of the segment. If the escalation is set to run until ECL, it will repeat every 12 months until the economic limit is reached.

A **continuous escalation** will escalate throughout the course of the year. The escalation value or percent is divided by 12, and then multiplied by the number of months to get the escalation for that time. That escalation value or percent is applied to the base price to determine the escalated price. The escalation will follow a straight line from the base price to the escalated price at the end of the year.



The above figure illustrates the concept of fixed vs. continuous escalation. With no escalation, the price will remain at the base price of \$5.00. When a 3% fixed escalation is applied, the price increases 3% in the first year, then an additional 3% of the base price is added to increase the price to \$5.30. The continuous escalation is shown as a straight line. The price will increase gradually, but at the end of 12 months, it will always be the same value as that of a fixed escalation.

If a cap price is set, the escalation will automatically stop when the cap is reached, and the price will hold constant. Note: if the “until major phase cap” is checked, both oil and gas prices will stop increasing when the major phase reaches its cap price.

FIXED ESCALATION EXAMPLES

Sometimes, a more complicated escalation schedule is required. PHDWin will separate different escalations into segments, which can be applied for any length of time in months. For segments with a finite length, the escalation will remain constant throughout the segment. Segments set to run “until ECL” will repeat the escalation annually until the economic limit is reached. An escalation segment with a fixed time period WILL NOT repeat annually as a segment that runs until the ECL would do.

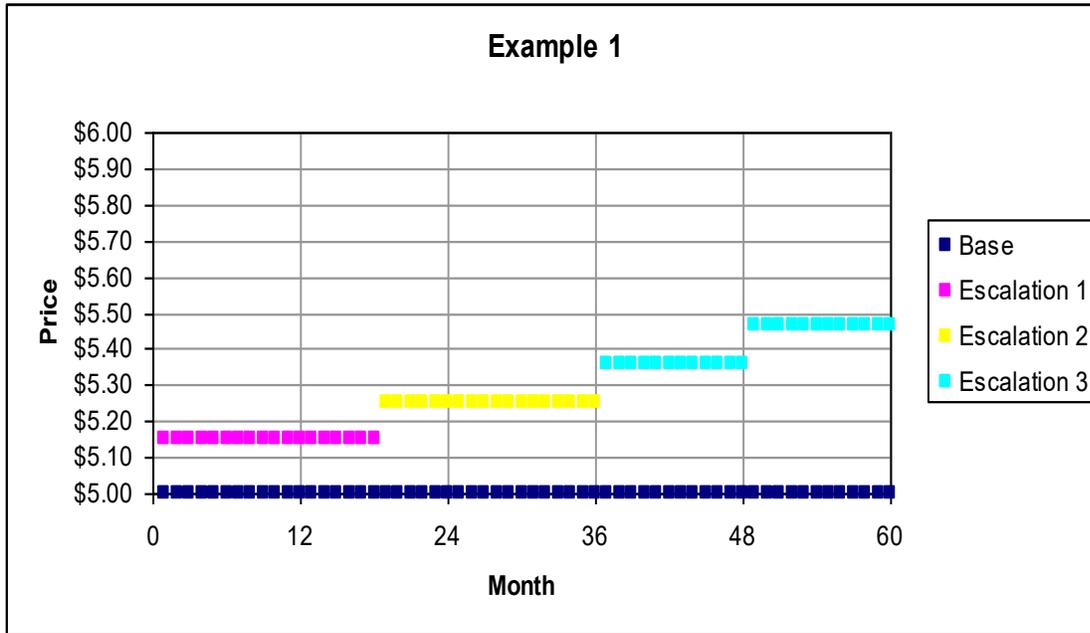
EXAMPLE 1:

Price: \$5.00 until ECL

Escalation: 3% for 18 months (fixed)

2% for 18 months

2% until ECL

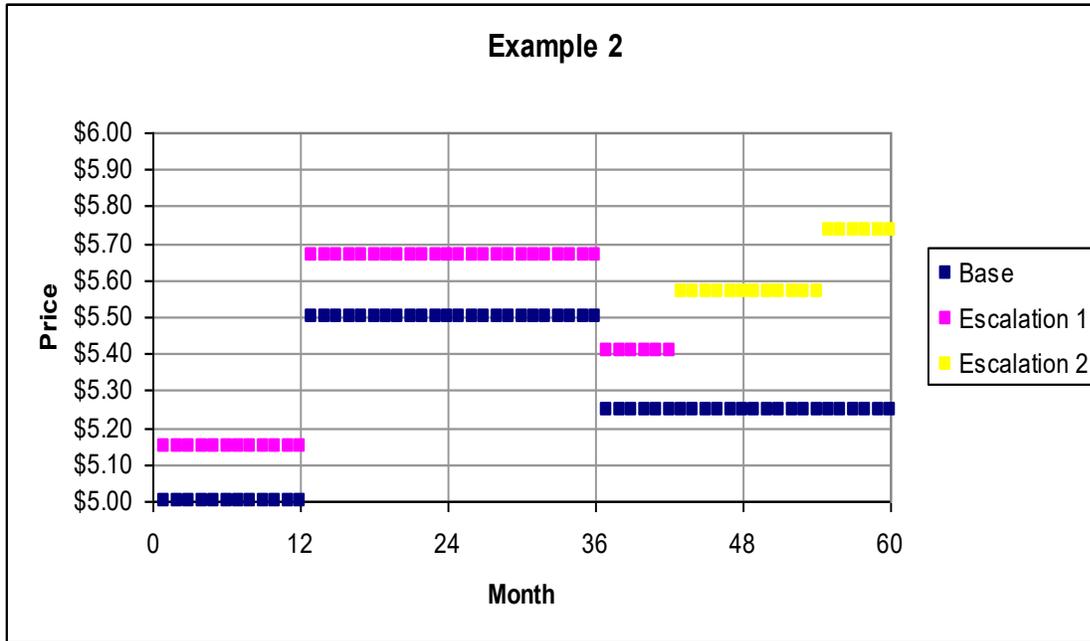


Example 1 illustrates the concept of escalation segments. The base price remains constant, and the escalation runs at 3% for 18 months, 2% for another 18 months, and then 2% until the economic limit.

Notice that the escalated price remains constant throughout the entire length of each of the first two segments. The price only begins to escalate annually once it reaches month 36 and begins the third escalation segment that runs until ECL.

EXAMPLE 2:

Price: \$5.00 for 12 months
 \$5.50 for 24 months
 \$5.25 until ECL
 Escalation: 3% for 42 months (fixed)
 3% until ECL

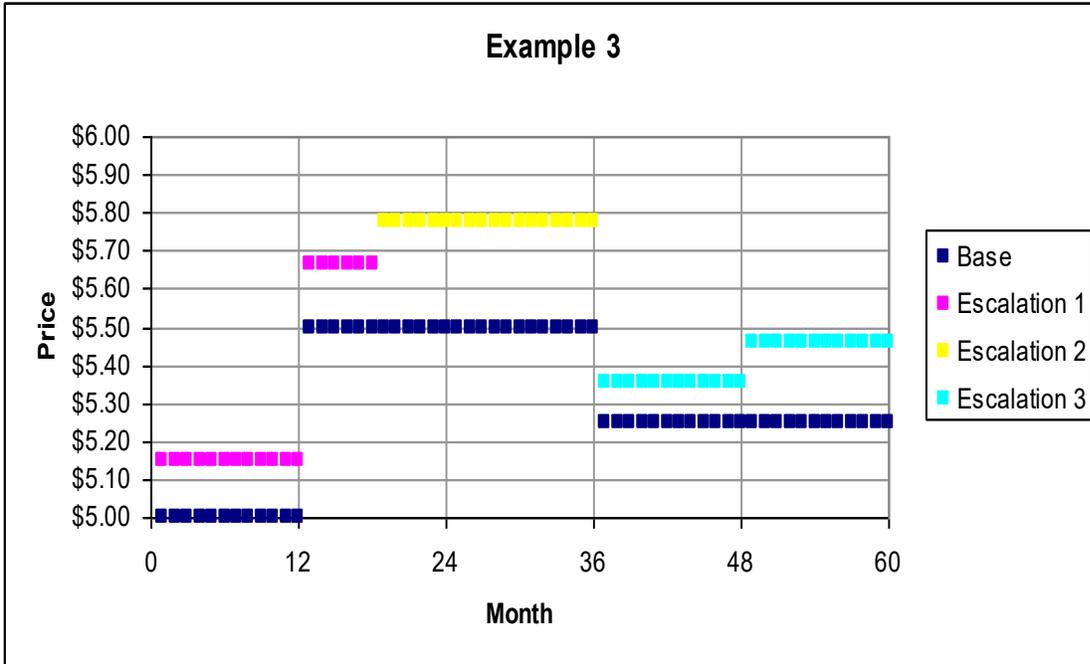


Example 2 shows what happens when the escalation remains constant while the base price is shifting. Here, the base price increases from \$5.00 to \$5.50 after one year, and then, two years later, drops back to \$5.25 for the remaining life of the well.

Until month 42, the escalated price is constant, 3% greater than its corresponding base price. When the escalation is changed in the second segment to until ECL, it begins to increase an additional 3% each year until the economic limit or cap price is reached.

EXAMPLE 3:

Price: \$5.00 for 12 months
 \$5.50 for 24 months
 \$5.25 until ECL
 Escalation: 3% for 18 months (fixed)
 2% for 18 months
 2% until ECL



Example 3 is a combination of the previous 2 examples. It shows the same price escalation segments as those in example 1, and the same base price changes as those in example 2.

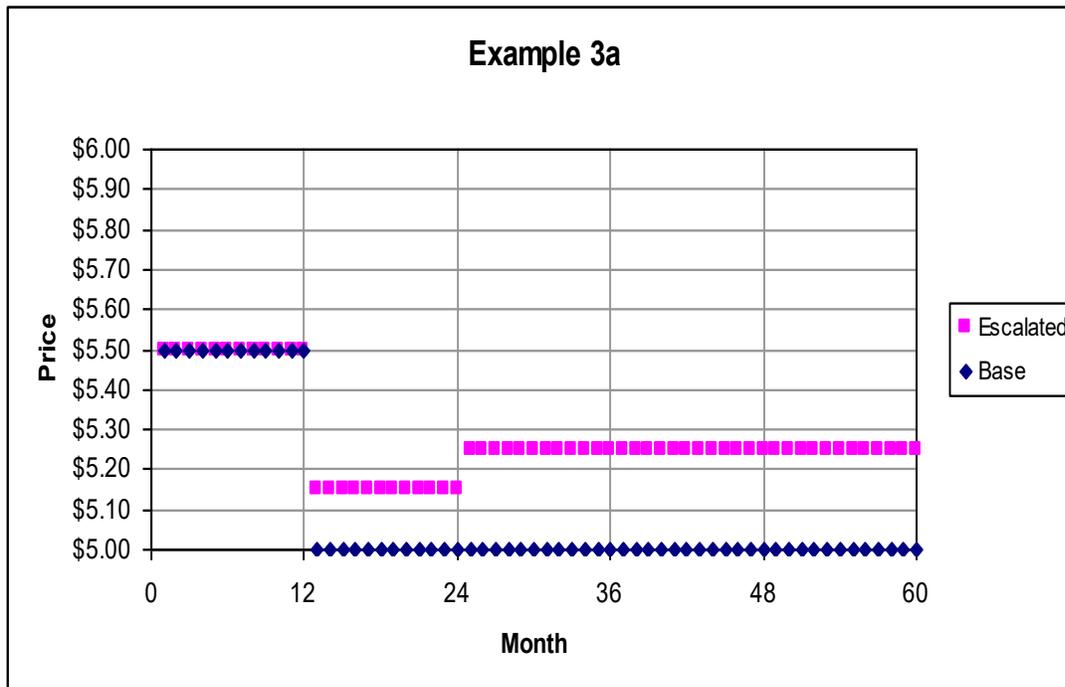
For the first 12 months, the escalated price matches the price in example 1. Then, when the base price is shifted, the escalations shift up as well. Notice the similarity of the sections between 12 and 36 months on examples 1 and 3. Once the base price falls to \$5.25, the escalations reset, starting again from the new base price. Since escalation 3 is set to run until ECL, it begins to increase 2% each year until the economic limit or the cap price is reached.

EXAMPLE 3a:

Price: \$5.50 for 12 months
\$5.00 until ECL

Cap Price: \$5.25

Escalation: No escalation for 12 months (fixed)
3% until ECL



With a cap price set, like in example 3a above, the escalation will cease at the cap price, and the price will remain constant.

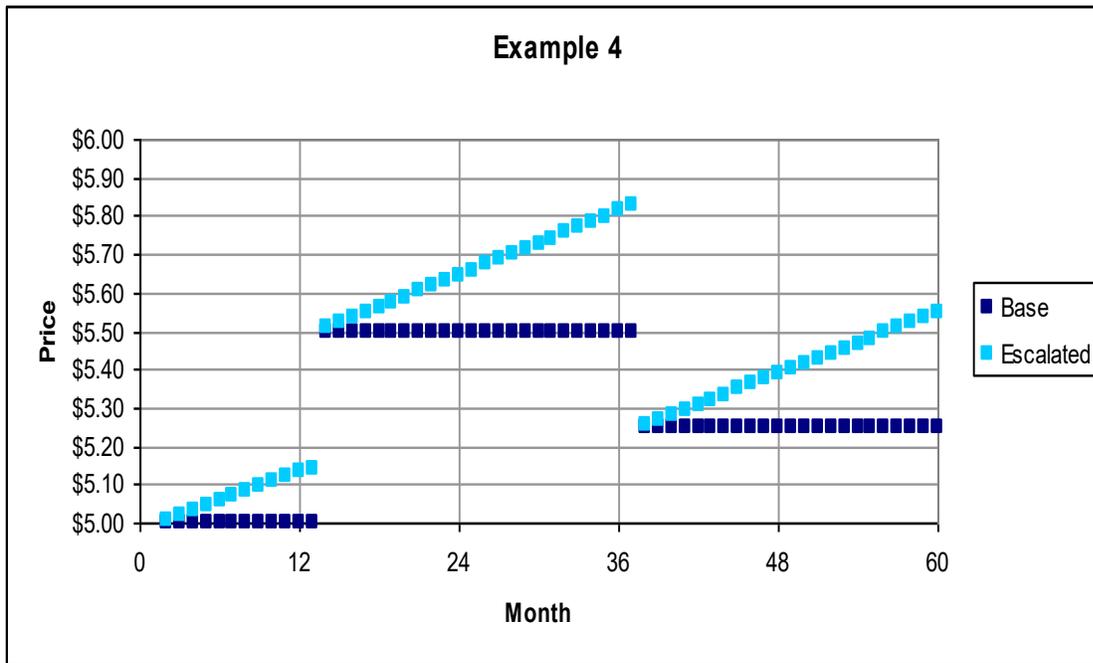
Note: PHDWin differentiates non-escalation from zero escalation. Zero escalation honors the prices cap; non-escalation does not. If an escalation is set to actually run at zero (dollar or percent) for any given point in time, the cap price will be honored during that time. Users may see the difference between non and zero escalation in the Prices tab of the Case Editor; PHDWin states “Non-Escalated” if all escalation has been cleared, and “Zero Escalation” if a zero value escalation has been applied. If an escalation is set to begin running at some point after the AsOf Date as in example 3a, the time period from the AsOf Date until the beginning of an escalation is considered non-escalation.

CONTINUOUS ESCALATION EXAMPLES

Continuous escalations will increase the price each month. Escalation segments will still have the same effect here as they did with fixed escalations. The following examples show the difference between a continuous escalation until ECL and one that is a three year segment.

EXAMPLE 4:
Price: \$5.00 for 12 months
 \$5.50 for 24 months
 \$5.25 until ECL

Escalation: 3% until ECL (continuous)

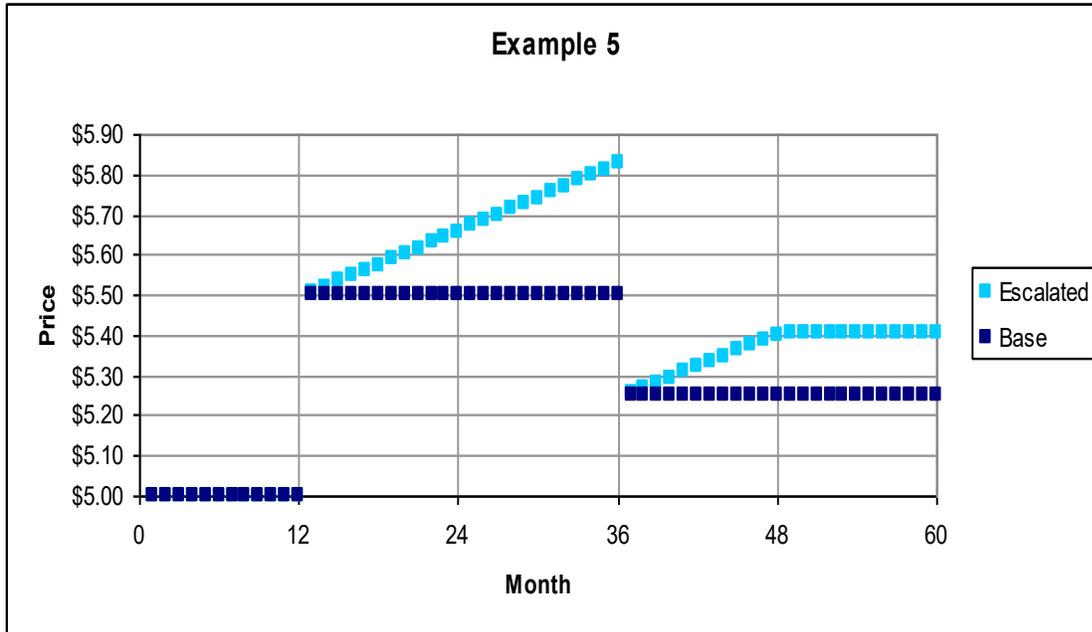


Example 4 is a situation where the base price is changing (the same as examples 2 and 3), but the escalation remains a constant value of 3% throughout. Each time the base price changes, the escalated price starts increasing from the new base price.

EXAMPLE 5:

Price: \$5.00 for 12 months
 \$5.50 for 24 months
 \$5.25 until ECL

Escalation: No escalation for 12 months
 3% for 36 months (continuous)



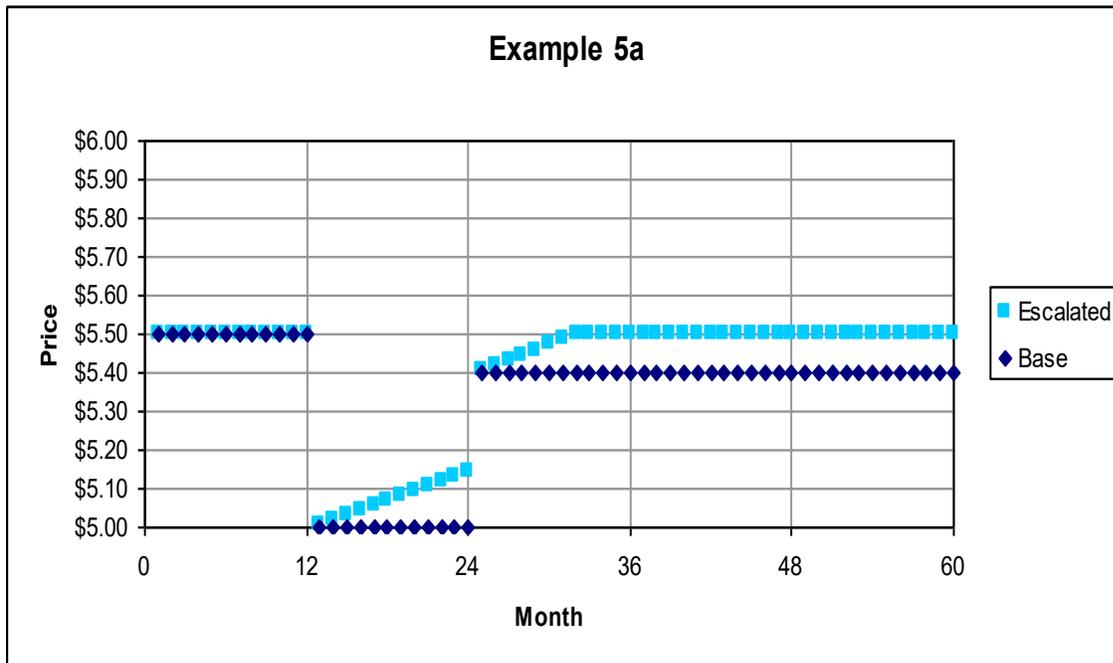
Example 5 illustrates a finite segment of continuous price escalation. The escalated price changes each month and continues throughout the entire length of the escalation segment. At the end of the segment, the escalated price remains constant at its current value as shown above.

EXAMPLE 5a:

Price: \$5.50 for 12 months
 \$5.00 for 12 months
 \$5.40 until ECL

Cap Price: \$5.50

Escalation: No escalation for 12 months
 3% until ECL (continuous)



Introducing a cap price to a continuous escalation affects price in the same way it would affect a fixed escalation. The escalation starts at 12 months, and continues through month 32 at which point the escalated price equals \$5.50, the cap price. From that point in time, the price will remain \$5.50.

ESCALATIONS & DIFFERENTIALS

We've now talked about differentials, and escalations, but have yet to discuss the effect they have on one another.

By default, PHDWin takes the base price, escalates it by your escalation, then applies the differential. However, you can change this in your Project Properties window on the Economics tab.

By selecting the "Escalate Price Differentials" option in the lower right, you change the mathematical order of operations so that PHDWin will apply the differential to the base, then escalate that total.

In the case of % differentials this will have no impact on your numbers because:

The screenshot shows the 'Project Properties' dialog box with the 'Economics' tab selected. The 'Escalate Price Differentials' checkbox is checked. Other visible settings include: As of Date: 01/01/2003, Max Number Eco Years: 50, Currency: US Dollars, Economic Calculation Model: USA, Revenue in Reports and Graph Titles: \$, Income Tax Consideration: Before Tax, Reporting Style: Individually Controlled, and Economic Basis: Calendar Year.

$$\text{Price} * \text{Escalation} * \text{Differential} = \text{Price} * \text{Differential} * \text{Escalation}$$

However, it WILL affect those cases that are using \$ differentials because:

$$(\text{Price} * \text{Escalation}) + \text{Differential} \neq (\text{Price} + \text{Differential}) * \text{Escalation}$$

EXPENSES

Unfortunately... money isn't free... and these cases are going to have some costs associated with them. That is where the Expenses tab of the Case Editor comes in.

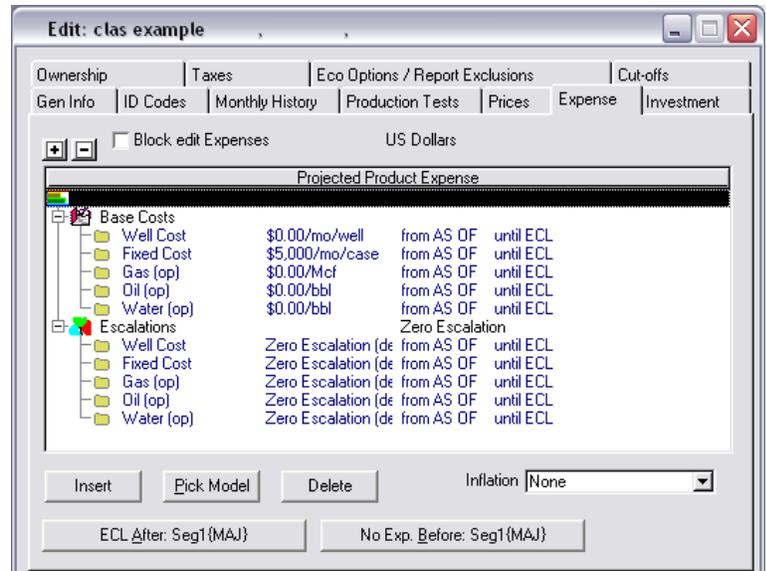
THE EXPENSES TAB

The Expenses Tab is going to work almost identically to the prices tab discussed earlier.

As with prices, expenses can be entered on a case as case specific, or as models. There tends to be less consistency with regard to costs, so the likelihood of entering case specific values for costs is higher than for prices.

Escalation models can be recycled, and used for prices or expenses, and even as inflation.

Block Edit Expenses – Like the prices tab, this checkbox allows the user to prevent edits from being made on this tab, or through the global edit.



CASE SPECIFIC EXPENSES

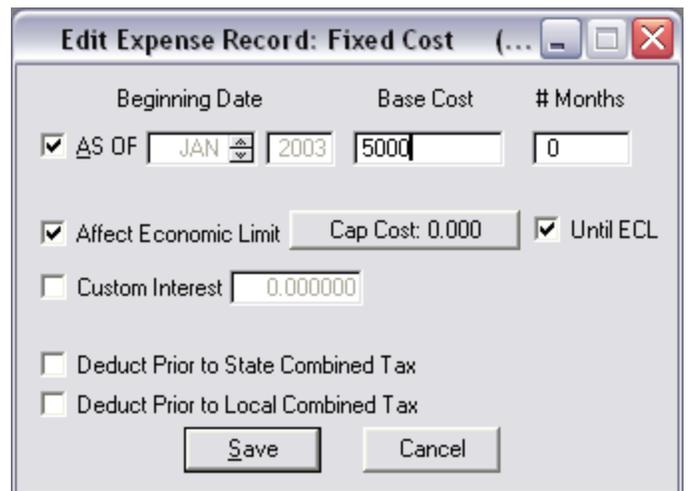
To add an expense to a case, double click the expense that you wish to change, or click Insert to add new segments to an expense strip.

The first segment of an expense strip has quite a few options that allow the user quite a bit of flexibility on the expense.

Beginning Date – You can link the start of the investment to the As Of Date, or specify a month and year the expense is to begin.

Base Cost – This is the \$ amount of the expense every month (or per unit volume if applied to a product).

of Months – The duration, in months, of this segment of the expense.



Affect Economic Limit – By default, PHDWin will calculate the economic limit when the revenues on the case are no longer able to support the expenses. However, you can specify that an expense is not to be considered as part of that equation. This is one of the few ways in which PHDWin will report negative values.

Cap Cost- The maximum allowable cost if the expense is escalated. This works identically to the way escalations and caps work for pricing.

Custom Interest – PHDWin will take your costs from this tab, and multiply them by your Working Interest on the case to determine the net cost. This field allows you to overwrite the Working Interest on the case, and apply a different value toward this one cost for the calculation of net values.

Deduct Prior to State & Local Taxes – If these costs are deductible from either your state or local taxes, or both, you can select these options here.

TYPES OF COSTS

PHDWin recognizes five standard expense categories, and users have the ability to create other categories. Classifying these expenses is important for correctly applying expenses to cases. Each expense is unit-based; it is multiplied by a given unit to calculate the applied cost.

--Fixed Cost: A monthly expense; *not dependent* on number of wells or volumes; allocated by working interest. What you see is what you get with fixed cost. If you enter \$5,000 then the gross monthly cost would be \$5,000.

--Well Cost: A monthly expense; is dependent upon and multiplied by well count units; allocated by working interest.

--Operating (op) Cost: A monthly expense, dependent upon and multiplied by volume units. Net costs for this type are calculated based on Working Interest.

--Other Cost (oth): A monthly, volume-based expense that may be in addition to Operating Costs. Net costs for this type are calculated based on Working Interest.

--Transportation (trn) Cost: A monthly expense, dependent upon and multiplied by volume units. Net costs for this type are calculated based on Revenue Interest which makes it a very unique cost.



ADDING COST STREAMS

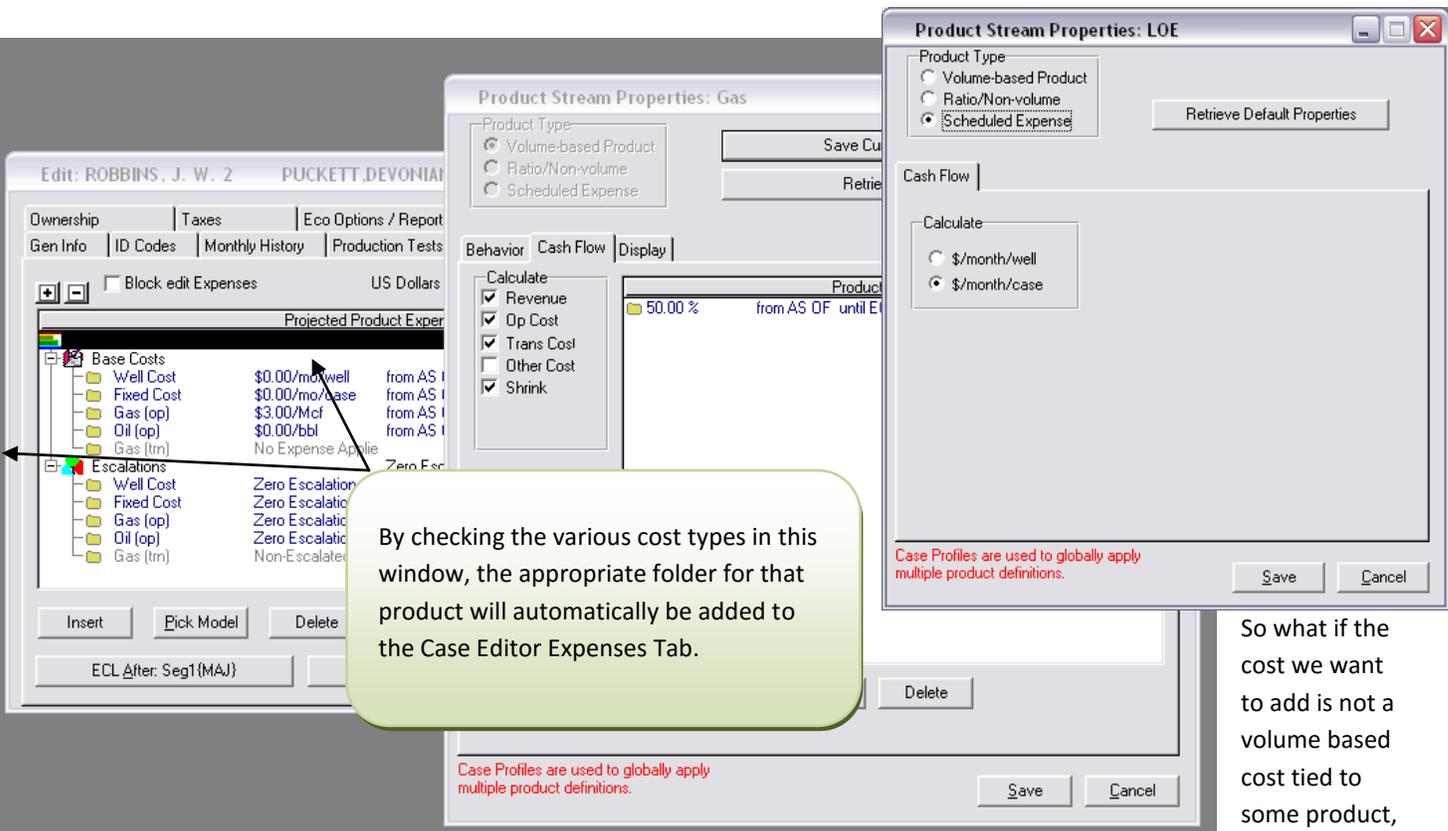
Now that we have seen the five types of costs that can be applied to a case, let's discuss how we can add more streams, allowing us to add new costs to the case if necessary.

Operating, Other and Transportation costs are all volume based costs, and are therefore tied directly to the products. Since cases can have an unlimited number of user defined products, most of which you will not want or need to

apply costs to, we do not automatically give the user folders on the Expenses tab for every cost that can be applied. The window would simply be too full with useless folders.

Instead, we give the user the ability to turn those cost folder on, by specifying within the product definitions that they wish to be able to apply certain types of costs to the product. To edit product definitions, open the **Products Tree** window found under the Editor Menu.

Once opened, you can double click the product you wish to change in this list to open the Product Streams Editor. Click on the Cash Flow tab to view the available cost streams for the product.



By checking the various cost types in this window, the appropriate folder for that product will automatically be added to the Case Editor Expenses Tab.

So what if the cost we want to add is not a volume based cost tied to some product, but just

another LOE type cost?

Well for that we need to add a new “Product” by clicking the Add button at the bottom of the Products Tree. Give the new cost a name, and when the product streams editor opens, select the Scheduled Expense option at the very top.

Once you do so, you will have only one more option for the cost. \$/month/well, meaning the cost will multiply by your well count as Well Cost does, or \$/month/case, meaning a flat \$/month like Fixed Cost.

Like adding a volume-based cost, once you save this new product, a new folder will appear on the Case Editor Expenses Tab allowing you to enter a value for this cost.

EXPENSE MODELS

Expense models are created just as Price models are.

1. Open the Models Editor
2. Highlight the Expense Type you wish to add the model to.
3. Click Insert and name the new model.
4. Use Insert and Edit to create the necessary segments for the expense model.
5. Save the Models Editor window.

Expense models are applied to individual cases by dragging them from the Models Editor window to the Expenses tab of the Case Editor.

ESCALATIONS AND INFLATION

Escalation models that have been built can be applied to expenses just as they are applied to prices. You can drag and drop the models from the models window to the case editor and drop the escalation on the expense stream you wish to escalate. Escalations are specific to the expense stream you apply them to.

Escalation models may also be used as **Inflation**. Inflation is defined as the decrease in the value of a dollar over time, whereas escalations represent the rise in costs over time. Inflation is set in the drop down at the bottom of the expenses window, and applies to ALL costs on the case.

INVESTMENTS

While expenses recur monthly, investments are those one-time expenses such as Drilling Cost, Completion Costs, Capital and Abandonment costs.

The **Investment Tab** is used to enter one time investment expenses on the cases. Multiple investments may be entered on a case, and each investment may be assigned to a category and given a date at which the investment occurred.

ENTERING AN INVESTMENT

1. Click the **Insert** or **Change** button as appropriate to open the following window.
2. Type a description for your investment. You are allowed 34 spaces in the description in this Investment Editor window, but only 11 characters will display in the Investment tab of the Case Editor.
3. Select a category for the investment. If none of the existing categories are appropriate, the user may create a new category by clicking the **Add Category** button.
4. **Input a Date for the New Investment.** PHDWin defaults to the current date, but users can enter a specific date or choose a linked date (see the next section)
5. Under the **Cost** section, click the appropriate radio button to set the investment entered to be a **Gross** or **Net** cost. (PHDWin defaults to Gross.)
6. If the investment should be risked, enter the risk factor.
7. Enter the **Investment Amount**. The investment amount is split into tangible and intangible investments.
8. Check the box to include the investment in the calculations of the economic indicators that appear on the economic reports. (ROR, ROI, etc.)
9. Click **Save**.

The screenshot shows the 'Investment Editor' dialog box with the following fields and options:

- Description:** Capital
- Category:** Capital (with an 'Add Category' button)
- Depreciation class:** None
- Investment Date:** Date: 01/01/2007
- Risk Tree:**
 - Inherited Risk
 - Compounded Risk
- Cost:**
 - Net
 - Gross (w/ will be applied)
- Risk Multiplier:** 0.00
- Amounts:**
 - Tangible (M\$): 1,000,000
 - Intangible (M\$): 0.000
 - Include these amounts in Economic Indicators (Payout, ROI)
- After Tax Treatment of Tangible Investment:**
 - Treat As Expense
 - Depreciation
 - In Service (Days Offset from Investment Date): 0
 - Exempt from 50 % rule
 - Add to Depletion Basis
 - Note: Intangible always expensed.

Buttons at the bottom: Save, Cancel

INVESTMENT CATEGORIES

All investments entered in PHDWin will be assigned a category. The available categories are listed in a drop down menu found just under the description field when entering a new investment. A master list of the categories may be found on the **Investments Tab** of the **Project Properties** window.

Categories are used mainly for organizational purposes. There are several investment reports that will organize your capital expenditures by investment category.

They are also used, in After Tax economic calculations, to assign depreciation models to your investments. This helps to ensure that all of your investments of a certain type are being depreciated the same on every case.

You can create new categories by clicking the Add button on the Investments tab of the Project Properties window, or by clicking the Add Category button next to the category drop down menu on the Add Investment window on the case. Either way will add the new investment category to the library making it available through the drop down menu for all investments added to this project in the future.

THE SPECIAL CATEGORIES

There are two special categories in PHDWin.

- **Abandonment**
- **Salvage**

These two categories have one thing in common... they both occur at the end of the life of a well. Assigning an investment to one of these categories on a PDP case is the **ONLY** way to get the investment to show on the report if it occurs beyond the economic limit.

Investments not assigned to these categories will not be reported beyond the economic limit because it is assumed that if the case goes non-economic before that money is spent, you will not spend it. Abandonment and salvage, of course, are the exceptions to that rule.

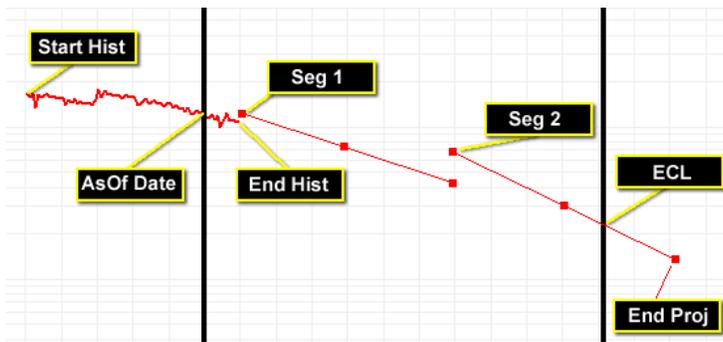
SUSPENDING ECONOMIC LIMIT CALCULATIONS

There are certain economic situations that you will model that will require you to have more control over when PHDWin calculates the economic limit. By default, PHDWin looks for the first time the costs of the well outweigh the revenues generated by the well.

THE ECL AFTER BUTTON

The ECL (Economic Limit) After button, found at the bottom of your expenses window, is used to handle these types of situations. The purpose of this button is to suspend the ECL calculation in PHDWin until some date or event. By default, the ECL After button is linked to the Seg1{Maj}. This, as we learned in the previous section, means the start date of the first projection segment of our major phase product.

Looking at the graph (left), you can see that there would be no difference between choosing AsOf or StartHist,

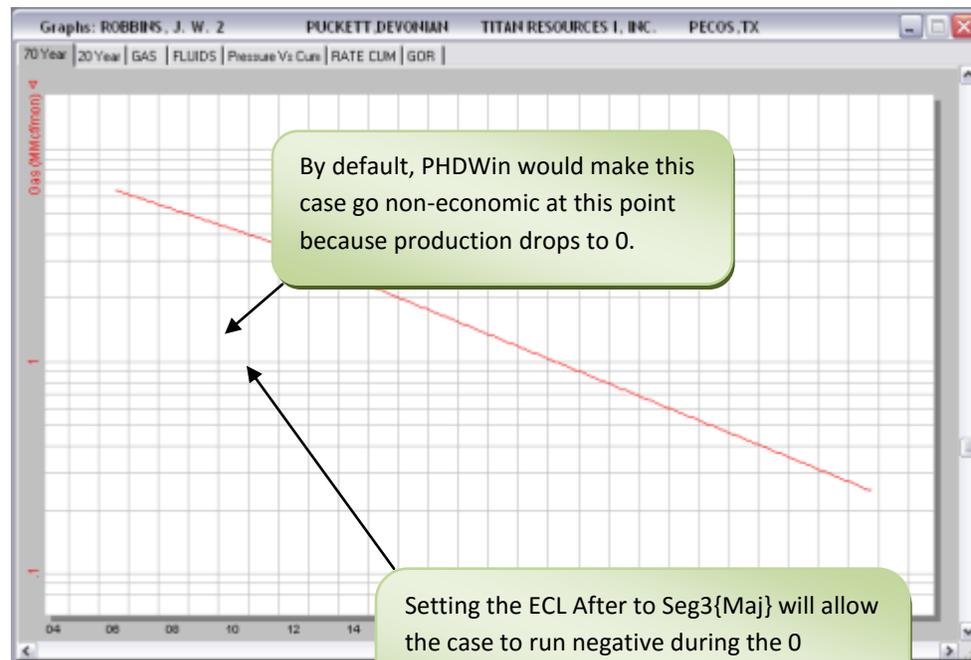


since PHDWin never looks for an ECL before the AsOf Date. We make an assumption that if there was historical production, then that production was economic. If that assumption is true, there is no difference between choosing AsOf, Seg1 or EndHist since PHDWin SHOULD find that all of those are economic at least to the end of history.

So why Seg1 instead of EndHist? To answer that question, consider a prospect case that does not yet have history. If the production is available

only from a projection, and that projection starts after the AsOf Date, then we must suspend the economic calculations until that segment starts, otherwise the case would be non-economic from the start.

You can use the ECL After button to suspend the calculation of economics to allow the case to run negative as well. This works for expense cases, but can also be used to handle a brief shut in period as modeled here.



CHAPTER 9 – MASS EDITING ECONOMICS

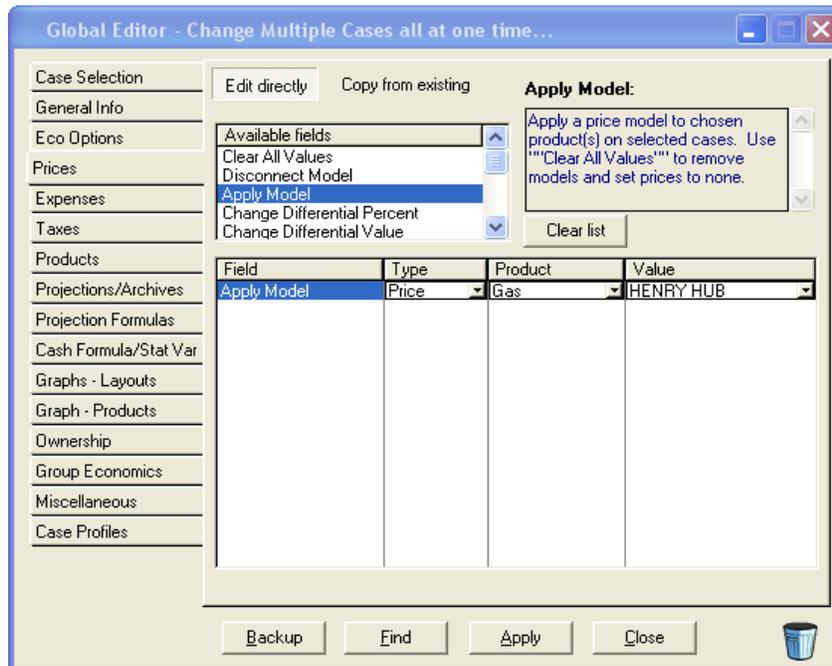
Now that we have a good understanding of what kinds of economic parameters can be applied to a case, and how to apply them to a single case, let's take a look at how to edit economic parameters on a mass scale. In this chapter we will discuss how to apply economic parameters through the global editor and how to edit them through Edit Data in Excel. We will also introduce you to another tool called Economic Scenarios.

EDITING ECONOMICS WITH THE GLOBAL EDITOR

The first step of ANY global edit is, of course, to check the Case Selection tab to ensure that you are affecting the cases you want to, and not affecting any you don't.

THE PRICES TAB

The prices tab of the Global Editor will allow you to do nearly all of the things you could do on the Prices Tab of your case editor.



Here you can globally apply price or price escalation models, force price or expense values (case specific) for a product, add percent or dollar differentials and more.

As with any global edit, the idea is to find the action you are looking to perform in the list of available fields, then drag that action to the stage and fill out any additional options it gives you

PRICES TAB ACTIONS

- **Clear All Values** – Deletes both case specific prices and models from the selected product.
- **Disconnect Model** – Removes the link to the model file, but leaves the numbers intact. This essentially makes case specific pricing out of models.
- **Apply Model** – Links this case to a model, just as dragging the model from the models editor to the prices tab would do.
- **Change Differential Percent** – Allows the user to change or add a % differential to the cases.
- **Change Differential Value** – Changes the \$ differential on the cases.
- **Back-Calculate Differential** – This works when applying a model. It will take the difference in price between the current price and the model being applied, and enter that difference as a differential.

- **As of to Date** – Takes any price whose first segment is linked to the AsOf Date and converts it to a hard coded date.
- **Date to As Of** – Does the inverse of the above option.
- **Force Value** – Allows you to type in a value to force as a price or price escalation.
- **Adjust Value by %** - Adjusts your prices up or down by a given percentage.
- **Adjust by \$** - Adjusts prices up or down by a fixed dollar amount.
- **Cap Price** - Changes the cap price.
- **Escalation Units** – Switches between % escalation and \$ escalation.
- **Gas Energy Factor (BTU)** – Changes the BTU factor for Gas.
- **Block Edits** – Turns block edits on or off.

COPY FROM EXISTING

Several tabs in your global editor, this being one of them, allow you to switch to another editing mode called “Copy From Existing”. The name says it all... this mode allows you to copy the pricing set up you have on an existing case, and use that as a template of sorts to apply globally.

The screenshot shows the 'Global Editor - Change Multiple Cases all at one time...' window. The 'Prices' tab is active, and the 'Copy from existing' button is highlighted. A callout box points to this button with the text: "Switch to Copy From Existing mode using the button at the top of the Prices Tab."

The 'Price Schedule from Case (PhdWin Id=1)' is displayed, showing a tree structure of pricing data:

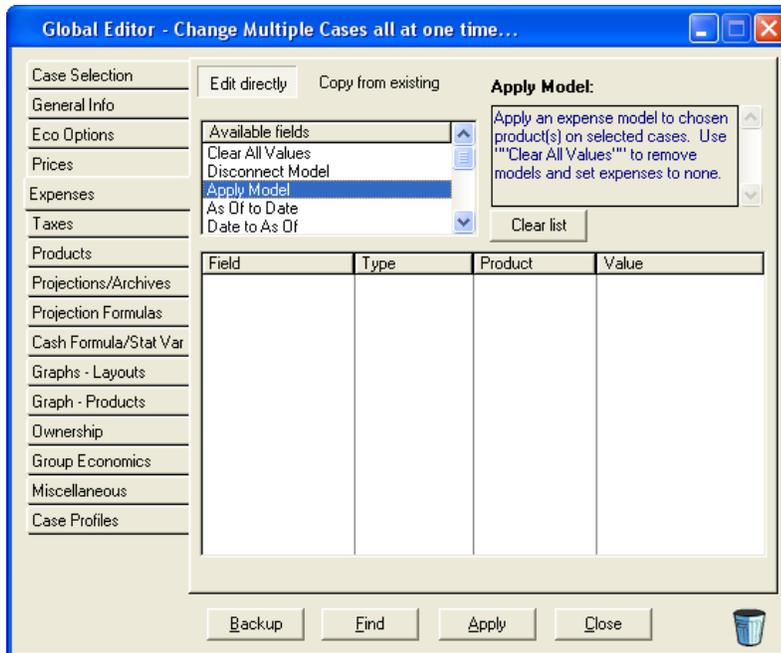
- Base Prices
 - Gas \$15.00 /MMBtu from AS OF for 24 months
 - \$204 /MMBtu from 01/2005 until ECL
 - Oil model WTI Crude (\$50.00 cap)
 - \$65.00 /bbl from 01/2007 for 12 months
 - \$60.00 /bbl from 01/2008 until ECL
- Escalations
 - Gas Zero Escalation from AS OF until ECL
 - Oil Zero Escalation from AS OF until ECL

The 'Edit: ROBBINS, J. W. 2' window shows the 'Projected Product Price' table with the following data:

Product	Case Specific	Escalation	Start Date	End Date	Cap
Gas	\$15.00 /MMBtu	Zero Escalation	from AS OF	for 24 months	(\$10.00 cap)
Gas	\$204 /MMBtu	Zero Escalation	from 01/2005	until ECL	
Oil	model WTI Crude (\$50.00 cap)	Zero Escalation	from 01/2007	for 12 months	
Oil	\$65.00 /bbl	Zero Escalation	from 01/2007	until ECL	
Oil	\$60.00 /bbl	Zero Escalation	from 01/2008	until ECL	

A callout box points to the price schedule in the Global Editor with the text: "Drag and drop the entire price schedule, or limit it to just prices or escalations, or even a specific product! Just drag from the desired level and drop it into the Global Editor."

THE EXPENSES TAB



The expenses tab of the global editor is very similar to the prices, but the actions found here will be specific to affecting the expenses.

- **Clear All Values** – Deletes both case specific expenses and models from the selected product.
- **Disconnect Model** – Removes the link to the model file, but leaves the numbers intact. This essentially makes case specific expenses out of models.
- **Apply Model** – Links this case to a model, just as dragging the model from the models editor to the expenses tab would do.
- **As of to Date** – Takes any expense

whose first segment is linked to the As Of Date and converts it to a hard coded date.

- **Date to As Of** – Does the inverse of the above option.
- **Force Value** – Allows you to type in a value to force as an expense or expense escalation.
- **Adjust Value by %** - Adjusts your expenses up or down by a given percentage.
- **Adjust by \$** - Adjusts expenses up or down by a fixed dollar amount.
- **Cap Cost** – Sets a value for the cap cost.
- **Affect Economic Limit** - Toggles the Affect Economic Limit checkbox on or off.
- **Custom Interest** – Enters a value for the custom working interest for a specific expense.
- **Deduct Prior to Tax** – Sets the Deduct Prior to State or Local Tax checkbox to on or off.
- **Escalation Units** – Switches between % escalation and \$ escalation.
- **Cost Inflation** – Sets an escalation model as the inflation for the costs on the case.
- **ECL After** – Changes the ECL After date.
- **No Expense Before** – Changes the No Expense Before Date
- **Block Edits** – Turns block edits on or off.

EDITING ECONOMIC DATA IN EXCEL

As mentioned before, the Global Editor is a great tool when you are trying to set multiple cases to have the same setting or value for a field. With prices, expenses and especially inputs like differentials, it is often the case that you do not want the SAME value for every case, but would like to be able to edit the various values quickly. This is where Excel comes in.

EDITING PRICES & EXPENSES IN EXCEL

Existing models may be applied, and case specific prices and expenses may be edited, through Excel.

F	G	H	I	J	K	L
PHDWIN Id(Key)	Type(Key)	Product(Key)	Date(Key)	Model	Price	
1	Price	GAS	ASOF		15	
1	Price	GAS	Jan-05		203.5	
1	Price	OIL	ASOF	WTI Crude	0	
1	Price Esc	GAS	ASOF		0	
1	Price Esc	OIL	ASOF		0	
2	Price	GAS	ASOF	HENRY HUB	0	
2	Price	OIL	ASOF	WTI Crude	0	
2	Price Esc	GAS	ASOF		0	
2	Price Esc	OIL	ASOF		0	

The ExtEdit tab for the prices and expenses options in the Edit Data in Excel feature are almost identical. The prices output is pictured here.

As you can see, the prices are listed, as well as price escalations. The case specific price (the first two lines) is editable, whereas those controlled by models simply have a model

name in column J. You can change the model name here to link a new model to the case, or you could delete the model name to make it case specific pricing.

DIFFERENTIALS IN EXCEL

Excel is perhaps the best place in the system for entering price differentials. Excel's sorting, filtering, and copying capabilities make it ideal for entering values that are unique to each case, or by state, county, field or some other grouping characteristic.

Differentials may be entered as a % or \$ amount for both Gas and Oil, as well as any other products that have the revenue box checked on the Cash Flow tab of the Product Streams Editor.

F	G	H	I	J
PHDWIN Id(Key)	Diff % [GAS]	Diff % [OIL]	Diff Value [GAS]	Diff Value [OIL]
1	-5	0	0	2
2	-5	0	0	2
4	-5	0	0	2
6	-5	0	0	2
8	-5	0	0	2
9	-5	0	0	2
13	-5	0	0	2
14	-5	0	0	2
19	-5	0	0	2

INVESTMENTS IN EXCEL

F	G	H	I	J	K	L	M	N	O
PHDWIN Id(Key)	Original Partnership(Key)	No(Auto key)	Description	Category	Initial Date	Cost	Include Amounts	Tangible	Intangible
1	1	1	testing	Abandonment	AsOf (+60)	G		300	0
2	1	1	testing	Abandonment	AsOf (+60)	G		300	0
2	1	2	Testing	Abandonment	AsOf (+90)	G		500	0
4	1	0	Sample	Capital		G		0	0
6	1	0	Sample	Capital		G		0	0

When you select the Investments category to edit in Excel, you can use Excel to edit existing investments, or to add new investments to a case.

The Blue, required, fields are the **PHDWIN ID**, to identify which case the investment belongs to, and the **Original Partnership** field. We will be covering Partnerships later in this course, so for now you can assume this number will be 1 for all cases and all investments.

The **No(Auto Key)** field is red. This number represents the order in which the investments occur in time on the case, and therefore, as you add new investments PHDWIN must solve this number for itself, so you will need to LEAVE IT BLANK if you add a new row to the spreadsheet.

Notice in the image above that there are several lines with the description “Sample”. **Sample** rows are entered automatically for any case that does not already have an investment on it. This is so you will have a line with the PHDWIN ID already populated for every case you included in the case selection, making it easier to use this editor to add new investments to cases.

The **Description** field can be any value you wish. The **Category** field is used to populate the Investment Category. If you enter a value in this field that is not already part of the investment category library, the new value will be added as a new category in the project.

The **Cost** field will contain a G for Gross, or N for Net.

Include Amounts refers to the checkbox for including this investment in ROI and Payout calculations. N means “No” and Y means “Yes”.

Tangible and **Intangible** are where you put the amounts. Remember that the amounts for investments are always entered as M\$.

ECONOMIC SCENARIOS

With a solid understanding of economic models, we can now introduce another tool in PHDWin called an Economic Scenario. Essentially a scenario is a collection of models that you can apply to a case easily. Scenarios can contain prices, escalations, expenses, taxes depreciation, shrinkage, and inflation models.

Scenarios are used for two primary purposes:

1. To apply a base set of economics to a newly created case.
2. To run sensitivities by allowing users to quickly switch back and forth between two or more completely different sets of economics.

SCENARIOS ARE NOT DYNAMIC

Scenarios are a vessel for applying models. We have discussed that, when you change a model it will automatically update all the cases the model has been applied to. This is NOT the case with scenarios. If you create a scenario and apply it to your cases, then change the scenario by adding a new model, removing a model, or replacing a model with a different one, that change to the scenario will NOT affect the cases unless you reapply the scenario.

The models that the scenario applies are still dynamic, but the scenario itself is not.

THE SURGICAL NATURE OF SCENARIOS

Scenarios are classified as “surgical” edits, meaning they are precise, and only change what they are specified to change. Take a look at the matrix below for an example.

	Case Prior to Scenario	Scenario	Case after Scenario
Oil Price	\$35.00	WTI Crude	WTI Crude
Gas Price	\$6.00	Henry Hub	Henry Hub
Fixed Cost	\$1,500	--	\$1,500
Fixed Cost Escalation	--	2%	2%

Notice that in every instance in which there is a conflict between existing economics and the scenario, the scenario takes precedence. However, if the scenario has not expressed a value for any item (i.e. Fixed Cost in this example), the existing value is preserved.

This is especially important to note when switching between scenarios to run sensitivities. It is important that the two scenarios have all the same items defined, even if it is a zero value, to prevent contamination from other scenarios. The following tables will demonstrate this point by showing a problem case and a corrected version.

SCENARIOS GONE WRONG:

Take the following two scenarios. We are going to apply them to the same case, switching back and forth between them.

Scenario A		Scenario B	
Oil	WTI Crude	Oil	Strip Oil
Gas	Henry Hub	Gas	Strip Gas
Fixed Cost	--	Fixed Cost	\$5000 / mo.

Case after Scenario A is applied the first time:

Oil – WTI Crude
 Gas – Henry Hub
 Fixed Cost – \$0

The results are as expected, and the case is run with the economics defined in scenario A.

Case after Scenario B is applied:

Oil – Strip Oil
 Gas – Strip Gas
 Fixed Cost: \$5000

The case runs with the new scenario applied. There are no problems.

Case after Scenario A is applied again:

Oil – WTI Crude
 Gas – Henry Hub
 Fixed Cost - \$5000

The case is now using a combination of scenarios A and B because A did not have a fixed cost defined, and scenarios are “surgical.” The case is now running a contaminated version of scenario A.

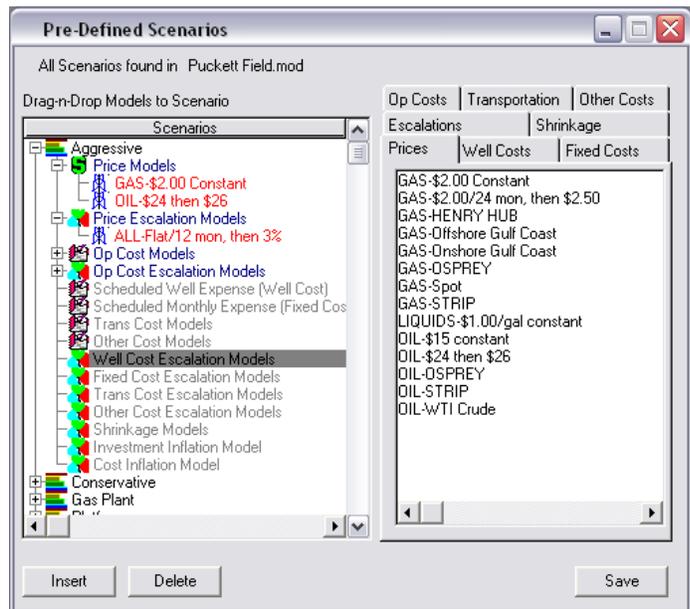
If scenarios are defined for the purpose of running sensitivities, and those scenarios are going to be applied back and forth, then the matrix should ensure that there will be no contamination in doing so. The easiest way to prevent contamination is to set up a table like the one below before building the scenarios.

Scenario A		Scenario B	
Oil	WTI Crude	Oil	Strip Oil
Gas	Henry Hub	Gas	Strip Gas
Fixed Cost	\$0 / mo.	Fixed Cost	\$5000 / mo.

By creating a \$0 model for Fixed Cost, and including it in the scenario A, the risk of contamination has been eliminated.

CREATING NEW SCENARIOS

- 1) Open the Scenario Editor by selecting Editor | Scenarios from the main menu.
- 2) Click the **Insert** button at the bottom of the window.
- 3) Type in a name for the scenario and click **OK**.
- 4) Add models to the scenario by selecting the desired model type from the tabs on the right, and dragging and dropping models in the scenario on the left. The available price models for all products are listed in the Price Tab, operational expense models in the Op Costs tab, and so on.
- 5) Click **Save** to save your new scenario and exit the Scenario Editor.



NOTE: Users are not required to place a model in each area. Only drag and drop the desired models to the appropriate sections of the scenario. For instance, to run constant prices and costs with no escalations, either leave the escalation portions blank OR drag and drop an escalation model that has a Zero Escalation segment.

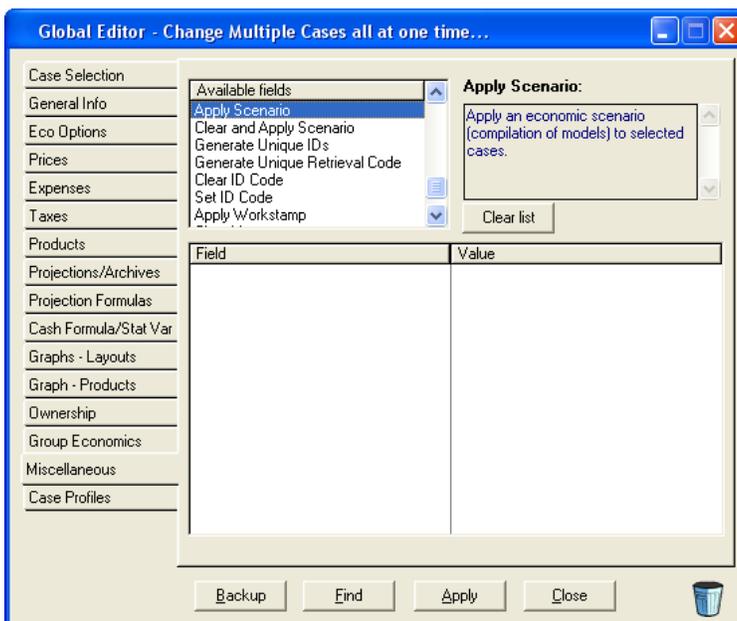
APPLYING SCENARIOS

Scenarios can only be applied in one of two ways:

1. To new cases on creation
2. To existing cases through the global editor.

APPLYING TO EXISTING CASES

There are two options for applying scenarios to existing case through the global editor. Both are found on the Miscellaneous tab of the global editor. They are located here because scenarios do not really fall into any one category.



The first option is to Apply Scenario. Selecting this option simply applies the chosen scenario to the selected cases, honoring the surgical nature of the scenario tool.

The second option is to Clear and Apply Scenario. This option removes ALL economic properties from the cases before applying the scenario.

Be cautious here, and understand all the implications of that option before using it.

Clearing ALL economic parameters includes not only prices and expenses, but taxes, escalations, inflation etc. So only use this if the scenario you are applying accounts for that.

NOTE: You will learn more about applying scenarios to newly created cases later in this course.

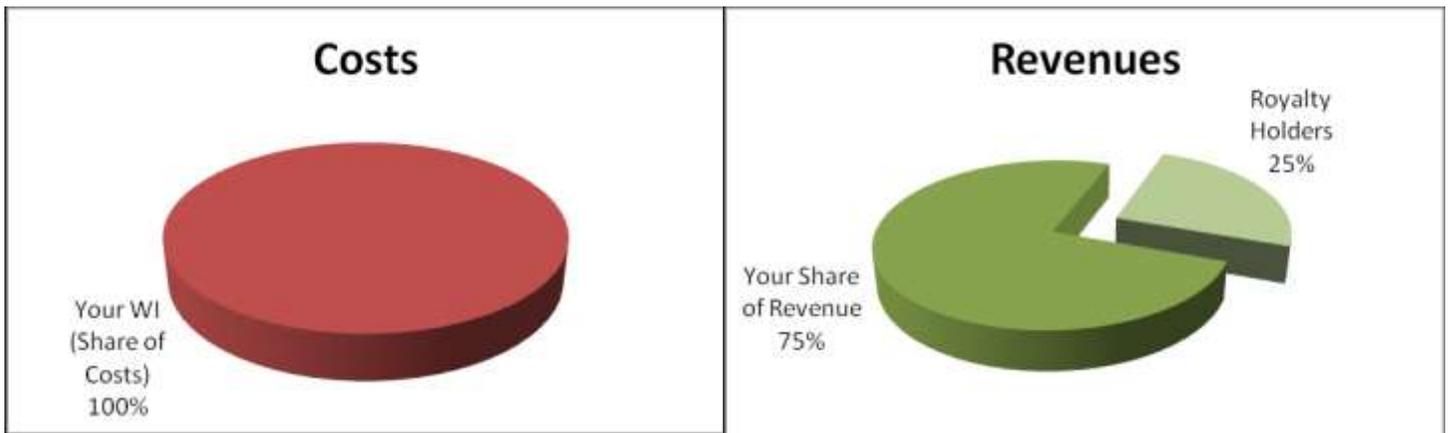
CHAPTER 10 - OWNERSHIPS & REVERSIONS

OWNERSHIP VALUES IN A NUTSHELL

In order to understand the inputs in PHDWin, it is important to understand the relationship between the numbers, and how exactly those numbers impact the economics of the case.

Working Interest is the % of the total expenses on the well that you are obligated to pay according to your ownership in the well.

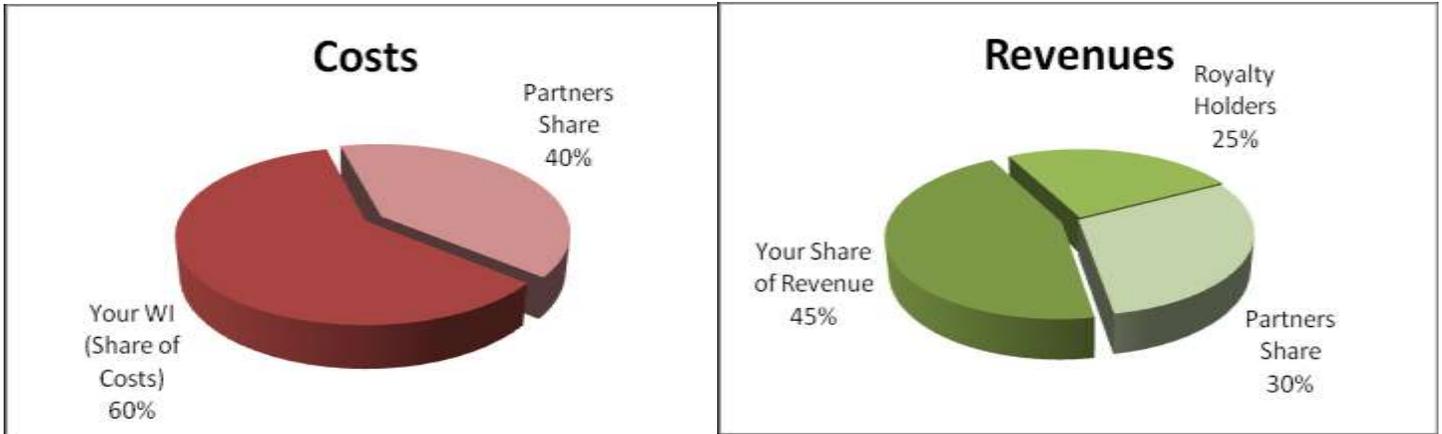
Revenue Interest is the % of the revenues that you are entitled to.



In the example above, you are the only working interest holder in the well. That means that you are obligated to pay 100% of the costs associated with the well. While you would think this entitles you to 100% of the revenues, that is not the case.

A portion of your revenues will be paid out as royalties, which usually include the land owner(s). In the past, it was common to promise $1/8^{\text{th}}$ of the revenue to the landowner, and thus was born the term “**eight-eighths**”. This term today is generally used to imply the 100% working interest case, as shown in the example above, but the term is sometimes used more generically to refer to gross values, and rarely are they ever actually referring to anything divided into eighths.

Unfortunately different people use it to mean different things, and therefore it’s usually a good idea to get clarification on what they mean by it. As you can see in the example above, even though you are paying 100% of the costs on the well, you are only entitled to 75% of the revenue. What this also means is that when 75% of the revenues produced by the well cannot support 100% of the cost, the case becomes non-economic.



In this example, you found a partner to help you with the costs of the well. You have a WI of 60%, and your partner takes on the other 40%. Since you are taking on a higher share of the burden, it is only fair that you get a proportionately higher share of the revenues.

60% of the cost does NOT entitle you to 60% of the revenues, though, since we still have to consider the royalty portion being paid out. So your 60% entitles you to 60% of the remaining 75% of revenues, thus you get a 45% RI, and your partner gets 30%.

The amount of available revenue, in this case 75%, is known as the **Lease Net Revenue Interest (LNRI)**. The LNRI is defined as the Revenue Interest at the 100% Working Interest Case, which, in English, simply means the percent of revenues you would get if you were the only owner of the well.

Assuming no overrides, there is a mathematical relationship between the WI, RI and LNRI numbers.

$$RI = WI * LNRI$$

We have already seen the above equation in action... remember that in the second ownership example we discovered that your 60% working interest entitled you to 60% of the available 75%, and thus your revenue interest on the case was 45%!

$$60\% * 75\% = 45\%$$

So why do we care what the LNRI is on the case? Aren't we just interested in our share? Well, yes and no. We care about the LNRI because it serves 1 very important purpose... **it calculates the economic limit on the case!**

CALCULATING THE ECONOMIC LIMIT WITH LNRI

PHDWin always uses 100% of the costs applied to a case, and compares them against the revenues on the case multiplied by the LNRI entered on the ownership tab. When the reduced revenues can no longer support the costs, the case is considered to have reached its economic limit.

Take a look at the example cash flow below:

Date	Gross Revenue	LNRI Revenue	Gross Cost	Gross Profit	LNRI Profit
1/1/2008	\$ 65,512.12	\$ 49,134.09	\$ 15,000.00	\$ 50,512.12	\$ 34,134.09
2/1/2008	\$ 52,409.70	\$ 39,307.27	\$ 15,000.00	\$ 37,409.70	\$ 24,307.27
3/1/2008	\$ 41,927.76	\$ 31,445.82	\$ 15,000.00	\$ 26,927.76	\$ 16,445.82
4/1/2008	\$ 33,542.21	\$ 25,156.65	\$ 15,000.00	\$ 18,542.21	\$ 10,156.65
5/1/2008	\$ 26,833.76	\$ 20,125.32	\$ 15,000.00	\$ 11,833.76	\$ 5,125.32
6/1/2008	\$ 21,467.01	\$ 16,100.26	\$ 15,000.00	\$ 6,467.01	\$ 1,100.26
7/1/2008	\$ 17,173.61	\$ 12,880.21	\$ 15,000.00	\$ 2,173.61	\$ (2,119.79)
8/1/2008	\$ 13,738.89	\$ 10,304.17	\$ 15,000.00	\$ (1,261.11)	\$ (4,695.83)

You can see that if we were to look for an economic limit based on gross revenues and gross costs, this case would go non-economic in August of 2008. However, remember that we are not getting 100% of the revenues. At most we are getting the 75% LNRI, which, according to the chart, dictates that the case would be non-economic for us in July of 2008.

Gross Economics

Date	Gross Revenue	Gross Cost	Gross Cashflow
1/1/2008	\$ 65,512.12	\$ 15,000.00	\$ 50,512.12
2/1/2008	\$ 53,719.94	\$ 15,000.00	\$ 38,719.94
3/1/2008	\$ 44,050.35	\$ 15,000.00	\$ 29,050.35
4/1/2008	\$ 36,121.29	\$ 15,000.00	\$ 21,121.29
5/1/2008	\$ 29,619.45	\$ 15,000.00	\$ 14,619.45
6/1/2008	\$ 24,287.95	\$ 15,000.00	\$ 9,287.95
7/1/2008	\$ 19,916.12	\$ 15,000.00	\$ 4,916.12
8/1/2008	\$ 16,331.22	\$ 15,000.00	\$ 1,331.22
9/1/2008	\$ 13,391.60	\$ 15,000.00	\$ (1,608.40)
10/1/2008	\$ 10,981.11	\$ 15,000.00	\$ (4,018.89)
11/1/2008	\$ 9,004.51	\$ 15,000.00	\$ (5,995.49)
12/1/2008	\$ 7,383.70	\$ 15,000.00	\$ (7,616.30)

If we were to look only at gross numbers, the case would go non-economic in September of 2008.

This is when the gross revenues can no longer support the gross costs.

100% WI and 75% LNRI

Date	LNRI Revenue	Gross Cost	LNRI Cashflow
1/1/2008	\$ 49,134.09	\$ 15,000.00	\$ 34,134.09
2/1/2008	\$ 40,289.95	\$ 15,000.00	\$ 25,289.95
3/1/2008	\$ 33,037.76	\$ 15,000.00	\$ 18,037.76
4/1/2008	\$ 27,090.96	\$ 15,000.00	\$ 12,090.96
5/1/2008	\$ 22,214.59	\$ 15,000.00	\$ 7,214.59
6/1/2008	\$ 18,215.96	\$ 15,000.00	\$ 3,215.96
7/1/2008	\$ 14,937.09	\$ 15,000.00	\$ (62.91)
8/1/2008	\$ 12,248.41	\$ 15,000.00	\$ (2,751.59)
9/1/2008	\$ 10,043.70	\$ 15,000.00	\$ (4,956.30)
10/1/2008	\$ 8,235.83	\$ 15,000.00	\$ (6,764.17)
11/1/2008	\$ 6,753.38	\$ 15,000.00	\$ (8,246.62)
12/1/2008	\$ 5,537.77	\$ 15,000.00	\$ (9,462.23)

This is the way PHDWin would run the case, however.

PHDWin uses 100% of the cost, but multiplies your revenues by the LNRI (75%). Here you can see that the case goes non-economic in July.

60% WI and 45% RI Ownership

Date	Net Revenues	Net Costs	Net Cashflow
1/1/2008	\$ 29,480.45	\$ 9,000.00	\$ 20,480.45
2/1/2008	\$ 24,173.97	\$ 9,000.00	\$ 15,173.97
3/1/2008	\$ 19,822.66	\$ 9,000.00	\$ 10,822.66
4/1/2008	\$ 16,254.58	\$ 9,000.00	\$ 7,254.58
5/1/2008	\$ 13,328.75	\$ 9,000.00	\$ 4,328.75
6/1/2008	\$ 10,929.58	\$ 9,000.00	\$ 1,929.58
7/1/2008	\$ 8,962.25	\$ 9,000.00	\$ (37.75)
8/1/2008	\$ 7,349.05	\$ 9,000.00	\$ (1,650.95)
9/1/2008	\$ 6,026.22	\$ 9,000.00	\$ (2,973.78)
10/1/2008	\$ 4,941.50	\$ 9,000.00	\$ (4,058.50)
11/1/2008	\$ 4,052.03	\$ 9,000.00	\$ (4,947.97)
12/1/2008	\$ 3,322.66	\$ 9,000.00	\$ (5,677.34)

Here are the numbers if we looked strictly at the net values. Costs have been multiplied by WI and revenues by RI.

When there are no overrides, this method will reach the same economic limit date as the method above.

SPECIAL CIRCUMSTANCES

2% Royalty Holder

Date	Royalty Revenue	Royalty Costs	Royalty Cashflow
1/1/2008	\$ 1,310.24	\$ -	\$ 1,310.24
2/1/2008	\$ 1,074.40	\$ -	\$ 1,074.40
3/1/2008	\$ 881.01	\$ -	\$ 881.01
4/1/2008	\$ 722.43	\$ -	\$ 722.43
5/1/2008	\$ 592.39	\$ -	\$ 592.39
6/1/2008	\$ 485.76	\$ -	\$ 485.76
7/1/2008	\$ 398.32	\$ -	\$ 398.32
8/1/2008	\$ 326.62	\$ -	\$ 326.62
9/1/2008	\$ 267.83	\$ -	\$ 267.83
10/1/2008	\$ 219.62	\$ -	\$ 219.62
11/1/2008	\$ 180.09	\$ -	\$ 180.09
12/1/2008	\$ 147.67	\$ -	\$ 147.67

60% WI 50% RI (5% Override Case)

Date	Net Revenue	Net Costs	Net Cashflow
1/1/2008	\$ 32,756.06	\$ 9,000.00	\$ 23,756.06
2/1/2008	\$ 26,859.97	\$ 9,000.00	\$ 17,859.97
3/1/2008	\$ 22,025.17	\$ 9,000.00	\$ 13,025.17
4/1/2008	\$ 18,060.64	\$ 9,000.00	\$ 9,060.64
5/1/2008	\$ 14,809.73	\$ 9,000.00	\$ 5,809.73
6/1/2008	\$ 12,143.98	\$ 9,000.00	\$ 3,143.98
7/1/2008	\$ 9,958.06	\$ 9,000.00	\$ 958.06
8/1/2008	\$ 8,165.61	\$ 9,000.00	\$ (834.39)
9/1/2008	\$ 6,695.80	\$ 9,000.00	\$ (2,304.20)
10/1/2008	\$ 5,490.56	\$ 9,000.00	\$ (3,509.44)
11/1/2008	\$ 4,502.26	\$ 9,000.00	\$ (4,497.74)
12/1/2008	\$ 3,691.85	\$ 9,000.00	\$ (5,308.15)

Here is the problem with relying on WI and RI only to calculate economic limits.

What if you are modeling a royalty case? As you can see, royalty holders have a 0% WI and therefore no costs.

No costs means the case NEVER goes non-economic if we rely on WI and RI.

40% WI 25% RI (5% Burden Case)

Net Revenue	Net Costs	Net Cashflow
\$ 16,378.03	\$ 6,000.00	\$ 10,378.03
\$ 13,429.98	\$ 6,000.00	\$ 7,429.98
\$ 11,012.59	\$ 6,000.00	\$ 5,012.59
\$ 9,030.32	\$ 6,000.00	\$ 3,030.32
\$ 7,404.86	\$ 6,000.00	\$ 1,404.86
\$ 6,071.99	\$ 6,000.00	\$ 71.99
\$ 4,979.03	\$ 6,000.00	\$ (1,020.97)
\$ 4,082.80	\$ 6,000.00	\$ (1,917.20)
\$ 3,347.90	\$ 6,000.00	\$ (2,652.10)
\$ 2,745.28	\$ 6,000.00	\$ (3,254.72)
\$ 2,251.13	\$ 6,000.00	\$ (3,748.87)
\$ 1,845.92	\$ 6,000.00	\$ (4,154.08)

THE CASE EDITOR – OWNERSHIP TAB

In PHDWin, the Case Editor Ownership Tab is where you go to input the working interest, revenue interest and LNRI on an individual case.

ENTER/ CHANGE OWNERSHIP

The first ownership line is the initial ownership for the case. Initial ownership may be edited by double clicking on the line and following the instructions below. The instructions are also used for adding additional lines to the ownership records. Each line after the initial line is an **ownership reversion**.

To Enter a Reversion

- 1) Open the Case Editor by selecting **Editor | Cases** from the main menu.
- 2) Open the **Ownership** tab.
- 3) Click the **Insert** button after highlighting the ownership line that the inserted line will follow.
- 4) Choose the Reversion Type from the drop down at the top of this window.
- 5) Enter the value at which the reversion will trigger.
- 6) Input the WI and tab to the RI field if using the same NRI.

NOTE: The calculator button can be used to determine any field based on the other two. For example, if the user enters a value for WI and a value for LNRI, clicking the calculator next to RI will enter the appropriate calculated value.

OVERRIDES & BURDENS

PHDWin tracks three ownership records as discussed above. The WI indicates expenses, the RI indicates revenues, and the LNRI is the revenue interest at 100% WI. This value is often called the eight-eighths number, and is used to calculate the economic limit for the case.

By definition, the WI multiplied by the LNRI should equal the RI. An **override** occurs when this owner has a higher revenue interest than that defined by the equation.

To model an override, the user adds the override amount to the existing RI, but does not adjust the other two values. The LNRI value displays in green as a visual indicator of the override.

A **burden** is the opposite situation. When the owner has a higher WI than that defined by the equation, the Lease NRI will display in red. This is not an error, but a visual indicator that the case is burdened by someone else's override.

Adjusted Revenue Interest by Product – Every product can have its own RI; this includes user-defined products that have revenues associated with them.

1. To adjust each product individually, double click the product in the Ownership tree structure.
2. Enter the adjusted amount.
3. Click Done.

Note: Every product defined that has revenue associated has the ability to have an adjusted RI.

DIFFERENT TYPES OF REVERSION TRIGGERS/TYPES

Reversion Type – This refers to the method or type of criteria used to trigger a change in ownership interest percentages.

Initial Initial ownership interests are the beginning interests applied at the AsOf Date. Reversions apply to these interests. There is no reversion criteria considered for the start of this interest.

Net M\$ An established dollar amount must be reached to initiate the change in ownership interests (in other words, net cash flow excluding investments). When the net cash flow not including investments reaches the amount entered, ownership changes.

Net M\$ w/Inv An established dollar amount must be reached to initiate the change in ownership interest (in other words, net cash flow including investments). When the net cash flow including investments reaches the amount entered, the change in ownership occurs.

Time Ownership interests change after a specified time period. This time period begins at the **AsOf Date**, is measured in YEARS and/or fractions of years.

Payout - Payout, or recovery of investment through profits (after production taxes but not including investments), must occur to initiate the change in ownership interests. The payout is net to 100% of the WI. For an 80% case (LNRI = 80%), the reversion occurs when 80% of the revenue minus the expenses and taxes equals the amount entered.

Payout w/Inv Payout, or recovery of investment through profits (after production taxes and investments), must occur to initiate the change in ownership interests. The payout is net to 100% of the WI. For an 80% case (LNRI = 80%), the reversion occurs when 80% of the revenue minus expenses, taxes, and investments equals the amount entered.

Date The ownership interests change at the specified date. This date is entered in the MM/DD/YYYY format and is entered in the Trigger field of the appropriate reversion.

Cum Gas When an established cumulative gas volume (including all historical) is reached, the ownership interests will change. This volume is measured in Gross **MMcf** and is entered in the Trigger field of the appropriate reversion in the Ownership tab of the Case Editor.

Cum Oil When an established cumulative oil volume (including all historical) is reached, the ownership interests will change. This amount is measured in Gross **Mbbls** and is entered in the Trigger field of the appropriate reversion in the Ownership tab of the Case Editor

AddWrkInt/MultWrkInt These two options allows the user to link the reversion to a date, then adjust the working interest either by adding to the existing working interest or by multiplying the existing working interest by a factor.

AddRoyInt/MultRoyInt These two options allows the user to link the reversion to a date, then adjust the revenue interest either by adding to the existing revenue interest or by multiplying the existing revenue interest by a factor.

PAYOUT VS. PAYOUT W/ INV

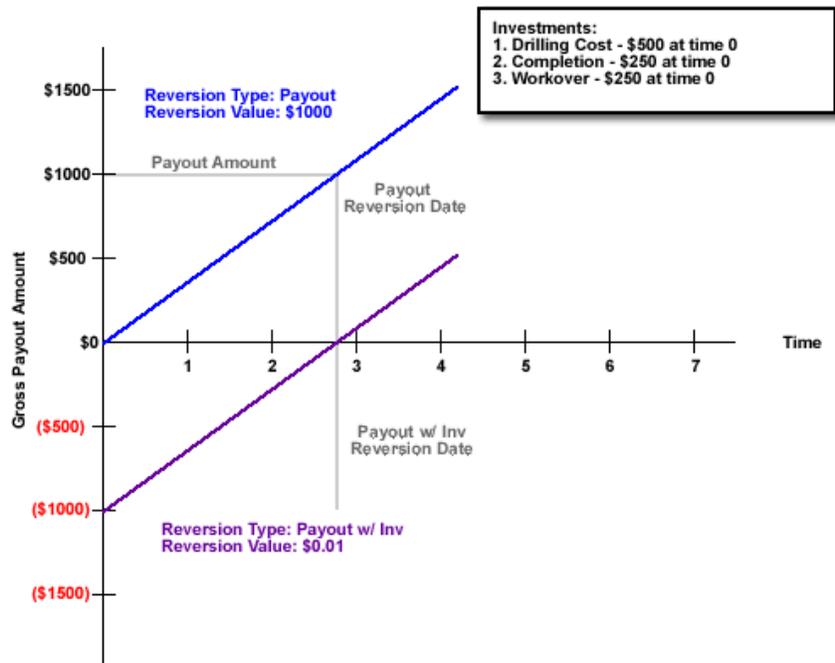
There may be some confusion between these two commonly used reversion types. The difference is essentially between whether or not PHDWin will automatically sum the investments on the case, or if it is necessary to manually add the investments together to enter the payout amount that will trigger the ownership change.

Because many are not accustomed to these two options, users' first instinct may be to choose the Payout reversion type, which will automatically revert when all of my investments payout... **but this is not true.**

For the Payout reversion type, users **MUST** enter the dollar amount (in M\$) at which PHDWin will change ownership interests.

The Payout with Investments option takes any investments that have occurred on the case into account when calculating the Payout amount. Look at the graph on the next page:

Payout Vs. Payout w/ Investments



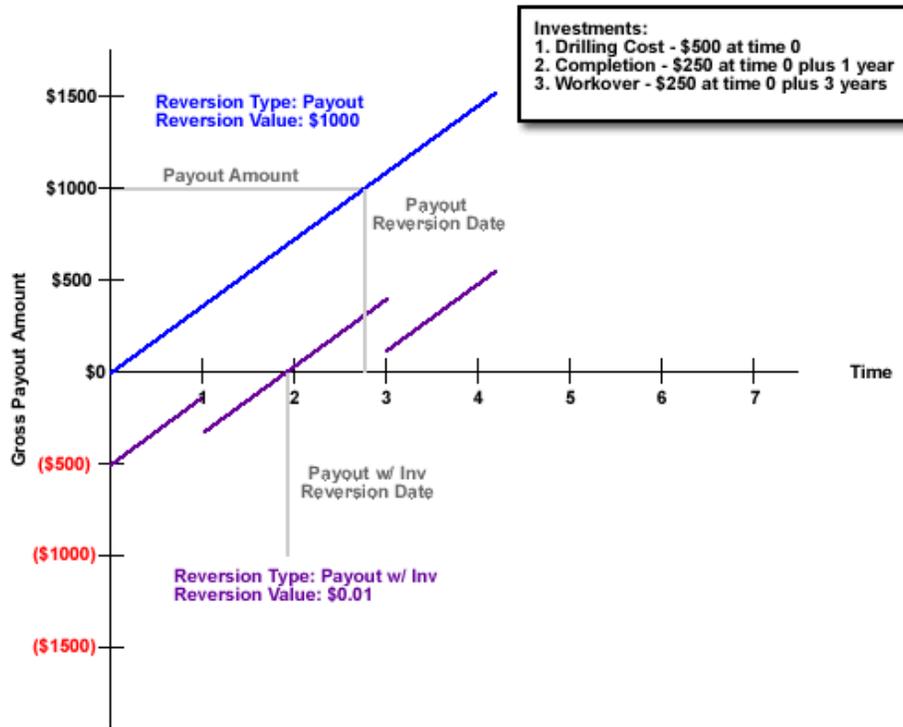
In the example above, the two reversion types have been set up. The blue line represents a Payout reversion. Because the intention of this example is to change ownership interests when the investments are paid out, the investments were manually summed and entered into the reversion value field.

The purple line represents a Payout with Investment reversion. Notice that, since all of the investments have occurred at time 0, PHDWin starts the calculation of Payout at $-\$1,000$, (the combined amount of the investments). The reversion value entered on this reversion is $\$0.01$, which calculates the first positive cash flow. (A reversion value of $\$0$ is not allowed in the system.)

In the above example, the results of the two separate reversions would be identical, and the case would revert on the same day with either type.

However, one major condition that to consider when selecting between the two reversions is time. Look at the graph below.

Payout Vs. Payout w/ Investments



The blue line indicates PHDWin's calculation for the Payout option. The investments on the case total \$1000, and the user entered this value into the system. Starting at time 0 and \$0, PHDWin changes the ownership interests when the gross payout amount reaches the specified \$1000.

The purple line indicates PHDWin's calculation for the Payout with Investments option. The investments on the case total \$1000, and the user entered a reversion value of \$0.01. At time 0, PHDWin starts calculating from -\$500 because only the drilling investment has occurred. PHDWin drops the value down again at year 1 because the completion costs occur.

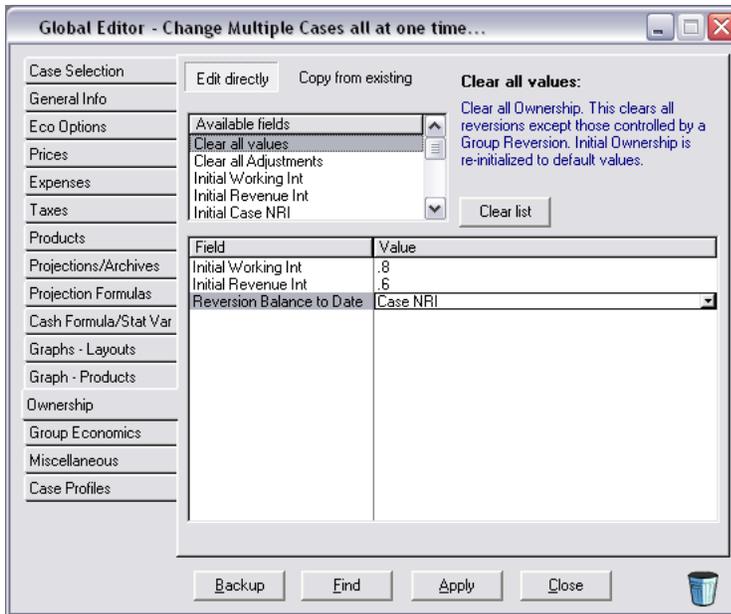
Notice that the case reverts much earlier in this example because the case earns the \$750 that is the combination of the first two investments BEFORE the third investment occurs. Thus, time and the investment schedule play a big role in determining the reversion date when using the Payout with Investment type.

CHAPTER 11 – MASS EDITING OWNERSHIP

Ownership values can be edited on multiple cases both through the Global Editor and through Edit Data in Excel.

THE GLOBAL EDITOR AND OWNERSHIP

The ownership tab of the Global Editor provides a variety of actions that can be performed on the ownership values.



Clear All Values – Erases all ownership information on the case.

Clear All Adjustments – Clears all adjusted revenue interest values (on the products).

Initial WI – Allows you to enter a value for the initial working interest.

Initial RI – Allows you to enter a value for the initial revenue interest on the case.

Initial Case NRI – Allows you to enter a value for the initial LNRI.

Initial Net Profits – Allows you to input the initial Net Profits interest on the cases.

Auto-Calculate – Allows you to select a value (WI, RI or LNRI) to back calculate based on the value of the other two fields using the $RI=WI*LNRI$ equation.

Reversion Balance to Date – Changes all reversions that were based on an amount to a date reversion that occurs where that balance is reached under the current economics on the case.

Copy Ownership – Allows you to copy the ownership from the current partner to another. Partners are discussed in the next chapter.

Adjust Net Reserve Volumes – On cases with net profits, this allows those net profits to adjust the volumes on the case.

The Ownership tab, like prices and expenses, also allows you to switch to the Copy from Existing mode.

In this mode you can drag and drop the ownership from an existing case into the global editor to use as a template for applying ownership to all the cases selected in the Case Selection tab.

EDITING OWNERSHIP IN EXCEL

Ownership is another value that lends itself to the Edit Data in Excel feature. Because ownership is so often case specific, and entering a lot of ownership data on multiple cases through the case editor is cumbersome, Excel becomes a great option for this kind of data entry.

F	G	H	I	J	K	L	M
PHDWin Id(Key)	Number(Auto key)	Reversion type	Reversion Value	Wrk Int.	Rev Int.	Lease NRI	Net Profits
1	1	Initial	0	1	0.75	0.75	0
1	2	Payout	1,000.00	0.5	0.375	0.75	0
2	1	Initial	0	1	0.75	0.75	0
4	1	Initial	0	1	0.75	0.75	0
6	1	Initial	0	1	0.75	0.75	0
8	1	Initial	0	1	0.75	0.75	0
9	1	Initial	0	1	0.75	0.75	0

When editing ownership the only required data is the PHDWin ID. This is used to identify what case the ownership record belongs to.

The Number Auto Key field is an internal number in PHDWin that specifies what order the reversions will happen in. Since this is dynamically determined by PHDWin, the field is red indicating that if we add new rows we are to LEAVE IT BLANK.

The reversion type should be entered just as it appears in the drop down menu on the ownership editor on the Case Editor. Since this field uses key words, it is often helpful to set one case to use the reversion type before coming to Excel so that you have an example to copy from.

The remaining fields are all editable, and allow you to adjust the RI, WI, LNRI and Net Profits on the case.

Remember that it is okay to use formulas and functions in the external editor. It may be useful to set one of the three values as an equation so that you can let Excel solve the value for you, and not have to enter it yourself. This cuts data entry down by 1/3!

CHAPTER 12 – PARTNERSHIPS – TRACKING MULTIPLE OWNERS

Partners provide a way for users to store additional ownership interests for each case in a project. These interests are grouped by partner and can be selected from the list of partners. When an ownership group is selected, only those cases that have interests represented by that owner will be presented. **An ownership group is a subgroup of the All Cases group (default group) with unique ownerships, reversions, and investments.**

To select, create, edit, or delete an ownership group, open **Partners | Selection** from the main menu.

THE {MAIN} PARTNERSHIP

Every project in PHDWin will have a {Main} partnership. This partner is called *All Cases* by default, but users may rename this ownership group by editing the group. Regardless of this group's name, it will always be referenced as {Main} in the partner list.

The screenshot shows a dialog box titled "Editing Partner Group Properties: All Cases". It contains the following elements:

- Partner Description:** A text field containing "All Cases".
- Optional Purchase Price Investment (m\$):** A numeric field containing "0".
- Default Ownership:** A field showing "100" followed by "% of" and a dropdown menu.
- Default Gross (100%) Investments from Default partnership
- Reconcile Ownership to Sum of all Other Partners
- Note:** Reconcile Ownership sums the initial Wk and Rev INT for all other partners. It does not take into account Adjusted ownership or reversions.
- MAIN** (text label)
- Save** (button)

SHOWING ALL CASES IN THE PROJECT

There are several key features that set the {Main} Partnership apart from other partners in a project.

First, the {Main} partnership will always contain all cases in a project. When creating partners in PHDWin, users can designate the cases in the project to include in that partnership. Users will notice, however, that the {Main} partner does not have a Case Selection tab. This is because the tab is unnecessary; all cases created in the project will automatically be included in the {Main} partnership.

In this way, users can depend on the Case List to show every available case in the database when the {Main} partnership is active.

RECONCILING TO SUM OF OTHER PARTNERS

The second key feature of the {Main} partnership is its ability to act as a composite of the other partners in the project. By checking the box that says “Reconcile Ownership to Sum of all Other Partners,” users can adjust the ownership information on the {Main} partner by allowing PHDWin to auto-calculate the sum of the ownerships from the other partners in the project.

Note: This is NOT dynamic. It is necessary to check this box any time ownership information is changed for the {Main} Partner to recalculate it’s summed ownership.

INVESTMENTS & PARTNERSHIPS

Investments & Partnerships – When creating a partner, users have the option to link investments to those in the {Main} partner. When checked, any investments created at the {Main} level will automatically be applied to the partners as well. Creating an investment on the individual partner, however, is still partner specific and will not roll back to the {Main} level.

Net VS Gross – If the user enters an investment at the {Main} level as gross, the value will roll down to the individual cases and be multiplied by the WI when a report is run. If the investment is entered as net, all partners will report the whole amount entered when a report is run. For example – a \$100m gross investment rolled down to a partner with 50% working interest will report a \$50m investment expense. On the other hand, a \$100m net investment rolled to another partner would report all \$100m.

Linked investments are all or nothing. ANY AND ALL investments on the {Main} partner will be present on sub partners that have the linked investment option selected. Linked investments cannot be changed in the External Editor when standing on a partner; they will be visible, but changes will not be brought back into PHDWin. This works the same way for allocated investments.

CREATING A NEW PARTNER

From the main menu, choose **Partner | Selection**.

To create a new Partner, click the **Insert** button. Type a name for the new partner in the Properties tab.

The screenshot shows a dialog box titled "Creating a New Partner Group" with a "Properties" tab selected. The "Case Selection" tab is also visible. The "Partner Description" field contains "New Partner: 002". The "Optional Purchase Price Investment (m\$)" field is set to "0". The "Default Ownership" is set to "100" % of "All Cases". There are two checkboxes: "Default Gross (100%) Investments from Default partnership" is checked, and "Link investments from main (All Cases) partnership" is unchecked. A note box states: "Note: Default Ownership and Investments are only applied when a case is FIRST added to a partnership." A "Create" button is located at the bottom left of the dialog.

If this new partner's ownership is a certain percentage of an existing partner, users can type the percentage in the Default Ownership % box and choose the target partner from the drop down menu. PHDWin will calculate new interests and make the changes for the user after creating the new partner. Otherwise, leave this value at 100% so that when a new partner is created, PHDWin will copy ownership values from the designated partner to this new partner. Users can then edit ownership values in the partner as desired.

Check the **Default Gross (100%) Investments from Default Partnership** box to populate the investments for the new partner to pull over all **GROSS** investments from the designated partnership and multiply it by the **Default Ownership %** entered. ***** NET Investments will not be pulled over. ***** Open the **Case Selection** tab to select cases to include in this ownership group.

Case Selection - Partners can be comprised of a select number of cases in the project. Use the Case Selection tab to select cases to include in this partner.

HOW TO SELECT A NEW PARTNER (OWNERSHIP)

To enter the partner window, choose **Partner | Selection** from the main menu. To **select** an existing **Partner**, highlight the partner name, and click the **Select** button. Now the case selection, ownerships, reversions, and investments for this partner are applied to the project. All reports run will be for this ownership group.

RUNNING REPORTS ON PARTNERS

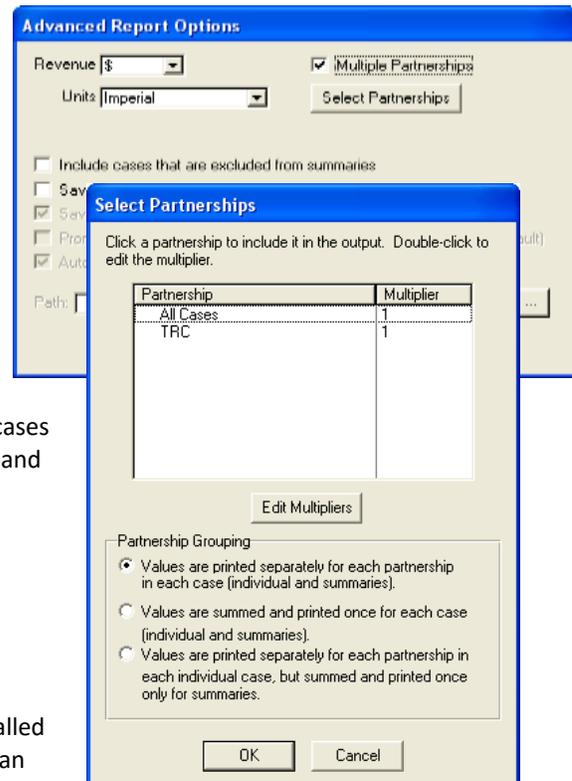
Users may run reports for multiple partnerships from the advanced options found in the Reports and Views window (opened by choosing Reports and Views | Select and Run from the main menu.)

By checking the Multiple Partnerships checkbox and then clicking the Select Partnerships button, multiple partners can be included in a report run.

The partners can be handled by the reports in one of three ways:

1. Values are printed separately for each partnership in each case. This option saves the time of turning each partner on before making a run. No partners are combined.
2. Values are summed and printed once for each case. This option adds all of the ownership up from the selected partners and runs the report once on the combination of the ownerships.
3. Values are printed separately for each partnership in each individual case. This option treats individual cases in the report as if they had been run under option 1, and summary pages as if they were under option 2.

There is also an option in the Partnerships window called Edit Multipliers. After clicking this button, the user can set a factor for selected partners, and values that are summed across partnerships will be multiplied by this factor.



CHAPTER 13 - GRAPHS – STANDARD MODE & GRAPH PROPERTIES

There are three graphing modes in PHDWin. When the graph is initially opened, the user is viewing **Standard Mode**. This mode is used for viewing and printing the graph, so all of the options available to the user in this mode edit the graphical display.

STANDARD MODE TOOLBAR BUTTONS

Once the graph is displayed, the following toolbar will aid the user in maneuvering while in standard mode. The buttons on the toolbar are defined below.



This icon toggles forecast mode on/off, which allows projection segments to be edited on the graph.



This icon changes the graph layout, which includes editing graph properties such as axis, products, titles, archives, and other miscellaneous information. This same function can be performed from **Graphs | Change Layout** or by double clicking the graph itself.



This icon retrieves pre-defined graph layouts. The icon allows the user to apply a different graph template to the current case. This can be a user-defined layout or one defined by PHDWin.



This icon stores the current graph layout for later retrieval as part of the pre-defined list of layouts.



This icon switches graph titles viewing on/off.



This icon creates a note/message to be posted on the graph. Notes can be attached to specific products and appear on the current graph in the same color as the product it describes.



This icon creates or retrieves graph still shots - The still shot option opens a window that allows users to capture the image currently displayed in the graph window or display previously captured graph images. The image in the still shot cannot be edited, but can be displayed while viewing another graph. This allows for the presentation of two different graphical presentations at the same time.



This icon copies the current graph to the Windows clipboard and allows the user to paste the graph image into other applications such as MS Word and Excel.

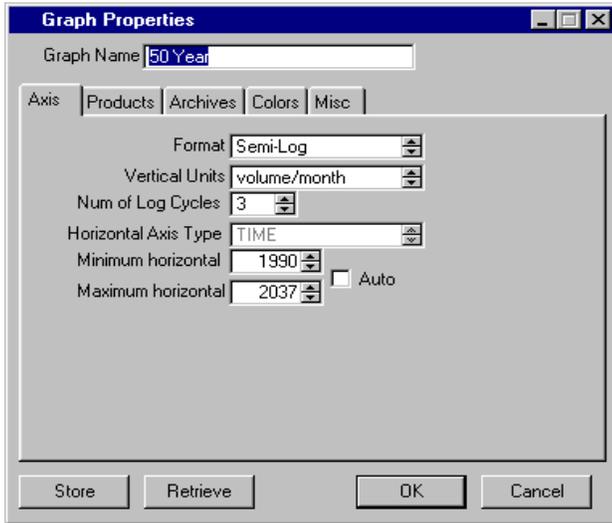


This icon prints the graph to a selected printer.

GRAPH PROPERTIES WINDOW

From the main toolbar, select **Graphs | Change Layout** or **double click the graph** to activate the window shown below.

CONTROLLING THE X AXIS & GRAPH FORMAT



The Axis tab of the Graph Properties window allows the user to define parameters on the graph such as the number of log cycles displayed, the format (Semi-Log, Log-Log, or Cartesian), volume per month or volume per day, and the start and end date on the graph.

On all rate-time graphs, the Minimum and Maximum horizontal fields refer to years; rate-cum graphs refer to cumulative amounts of whatever product has been chosen in the Horizontal Axis Type field.

Checking Auto will allow PHDWin to determine minimum and maximums based on production history and projections that have been applied to the case.

PLOTTING PRODUCTS ON THE GRAPH

The Products tab allows the user to specify up to 6 products to plot on the graph. The top three fields will show the product scales on the left axis of the graph, the bottom three on the right. To add a product to the graph, locate that product in the list, and drag the product to one of the six slots.

Dragging a product to a field that already has another product in it will replace the product in the field with the one that was dragged. To remove a product from the graph, locate the None option in the list and drag it to the slot that contains the product to remove.

CHANGING THE COLORS ON THE GRAPH

This tab allows the user to adjust colors and images on the graphs. The tab does not control product colors because those are a property of the products themselves, but will give users control over properties such as graph background color, plot area, and grid lines.

The user may also choose to use images in the background of the graph and/or plot area. The most important thing to consider when working with the colors on the graph is that whatever colors are used, they do not distract, or make the graph more difficult to read.

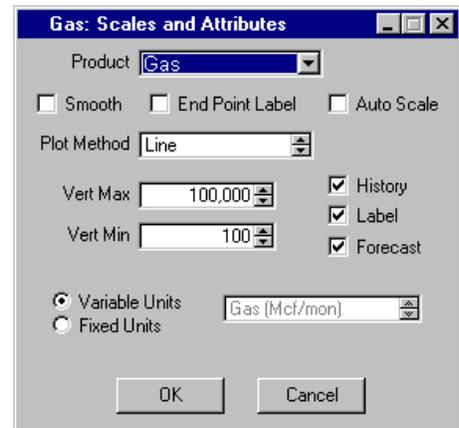
THE MISCELLANEOUS TAB

This tab sets miscellaneous options such as font size for graph notes, size of plot points (if a product is set to the Points plot method), legend display, and also gives the option to block edits. The block edits option grays out all of the options in the Graph Properties window, preventing anyone from changing graph properties until block edits is turned off.

THE SCALES & ATTRIBUTES WINDOW

The Scales and Attributes window is used to define graph properties that are specific to a product. It can be found by selecting **Graphs | Change Scales** from the main toolbar. Items such as plot method, vertical scaling, smoothing, and end point labels are set here.

Click the spin box arrows to change either the vertical minimum or maximum and the other will be adjusted to match grid format criteria, or select Auto Scale, and PHDWin will set the scale.



Activate or deactivate option check boxes, where a checked box means:

End Point Label	Place product name at the last non-zero point on the graph.
Smooth	Calculate and display a running seven-month production average for the selected product rather than actual individual data points.
Auto Scale	Allows PHDWin to determine the Vertical Max and Min values.
History	Display the producing history for the selected product.
Label	Display a product label on the graph.
Forecast	Display the selected product forecast, if available.
Variable vs Fixed units	Selecting variable units allows PHDWin to determine the units to use based on the scale of the graph. Fixing units forces the units defined by the user to be displayed.

USING GRAPH TEMPLATES

A graph template is a way of storing the properties defined in the Graph Properties and Scales and Attributes windows for the purpose of applying to other cases in the database.

Since changing graph properties is case specific, it is important to be able to store and use graph templates to create a consistent look for the graphs in a project without having to change those properties on each and every case.

WHAT GETS STORED IN A GRAPH TEMPLATE?

It is important to understand what properties get stored in a graph template and what properties do not.

Graph Templates Store	
Format	Semi-Log, Log-Log, or Cartesian
Vertical Units	Volume /Month or Volume / Day
Number of Log Cycles	1-10
Horizontal Axis Type	Only valid for rate-cum graphs – uses cum of a selected product
Minimum Horizontal *	Start year on rate-time graphs, minimum cum on rate-cum graphs
Maximum Horizontal *	End year on rate-time graphs, maximum cum on rate-cum graphs
Visible Products	The products that are plotted on the graph
Visible Archives	The projection archives that have been set as visible on the graph
Background Color	The color surrounding the graph area (default to light grey)
Graph Color	The color of the graph background itself (default to white)
Grid Color	The color of the grid lines on the graph (default to black)
Background Bitmap	The image set to display in the background area surrounding the graph
Graph Bitmap	The image set to display in the background of the graph area
Graph Note Sizes	The size (%) that the graph notes display on the graph or get printed

Product Point Size	The size of the points used when a product is plotted in the Points method
Smoothing	Determines whether the product curve is smoothed or not
End Point Label	The visibility of the end point label that specifies the product and archive name
Plot Method	Points, Line, Points plus Line etc, the method in which the product is plotted.
Vert Max *	The maximum product volume visible on the Y axis.
Vert Min *	The minimum product volume visible on the Y axis.
Variable/ Fixed Units	Determines whether the graph will use variable units as the Y axis is scaled or to fix the units to the user defined value.

* Only when Fixed Y Axis is selected.

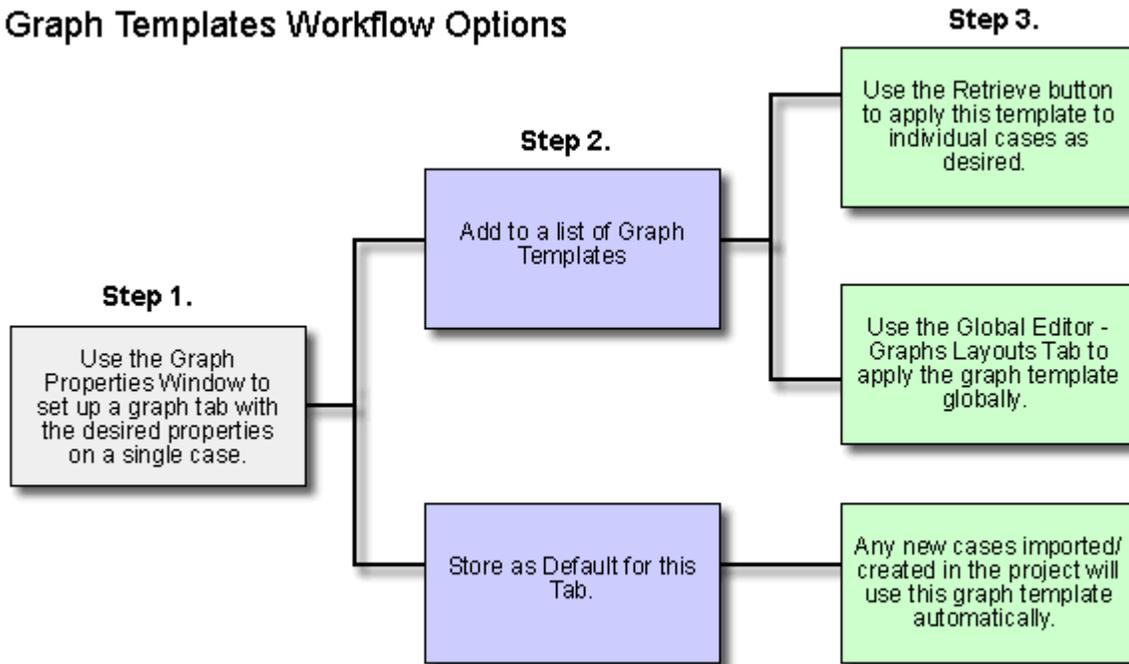
Graph Templates DO NOT Store

Phase Configuration	Relationship between products such as Gas, Oil and Yield	Controlled through the graph menu; can be applied globally
Product Behavior	Gas as a formula, projection types, etc	Controlled through the Product Streams editor; these get stored with product defaults
Product Units	The units in which the products are stored (not displayed on the graph).	Controlled through the Product Streams editor; this is stored in the product definition
Product Colors	The display color of a product	Controlled through the Product Streams window; this is stored in the product definition
Product Symbols	The symbol that represents each product	Controlled through the Product Streams window; this is stored in the product definition
Active Archive	The projection that is currently used to calculate economics	This is controlled on the individual graph through the ARPs window or globally

GRAPH TEMPLATES WORKFLOW

Graph templates may be used in a variety of ways as shown in the diagram below:

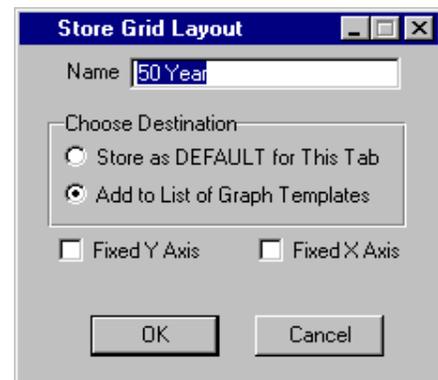
Graph Templates Workflow Options



Note: Nothing changes on any case in the database until one of the options under step 3 is performed.

STORING A GRAPH TEMPLATE

1. Double-click the graph.
2. This opens the Graph Layouts window (could accomplish the same thing through Graph | Change Layout).
3. **Click the Store option**
 - a. **Store as DEFAULT for This Tab** – This option will store the template name as the default for the edited tab. For example, if the layout name is Gas Wells after editing Tab 1, then all newly created cases will set up utilizing Gas Wells for Tab 1.
 - b. **Add to List of Graph Templates** – Adds the layout name, which can be used from the Global Editor to apply to existing cases, or retrieved and applied on a single case.



Fixed X – This stores the time increment displayed on the graph. For example, if the graph is set to display 30 years from 1995 – 2024, and this option is checked, any future graphs will display 30 years. This DOES NOT mean the starting date will always be 1995. PHDWin will determine the best starting date based upon the data presented. To FIX the starting and ending dates to be common amongst all graphs for a single tab, use the global editor. See below.

Fixed Y – This controls the number of log cycles to be plotted on the Y Axis. It does not control the starting and ending values for the log cycle values for each product plotted; it sets that every graph to display 5 log cycles instead of varying.

Note that there is a difference between the functionality of the two options on the store window. If the user selects **Add to List of Graph Templates**, then the graph properties will be stored under the name defined by the user, and that template may be applied to any other case in the database.

Stored templates DO NOT automatically apply to other cases.

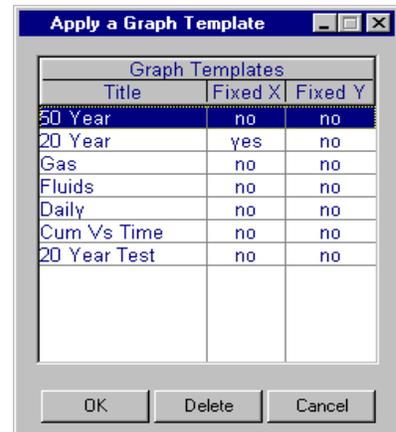
If the user selects the **Store as DEFAULT for This Tab** option, then the graph properties will automatically be applied to any newly created cases. This DOES NOT affect cases that are already in the database.

So, in order to apply the properties to all the cases in the project AND have any newly created cases use these properties automatically, the user must choose BOTH of these options (which will require them to complete the store routine twice).

RETRIEVE A GRAPH LAYOUT

To retrieve a graph layout:

- 1) Select **Graphs | Display** from the main menu, and click a tab to select a graph layout.
- 2) To retrieve a pre-defined graph layout, select **Graph | Change Layout | Retrieve**, or double click the graph, and then click **Retrieve**.
- 3) Make a selection from the grid list and click **OK**.
- 4) Click **OK** when asked to apply to the current graph, or choose **Cancel** to ignore the selection.

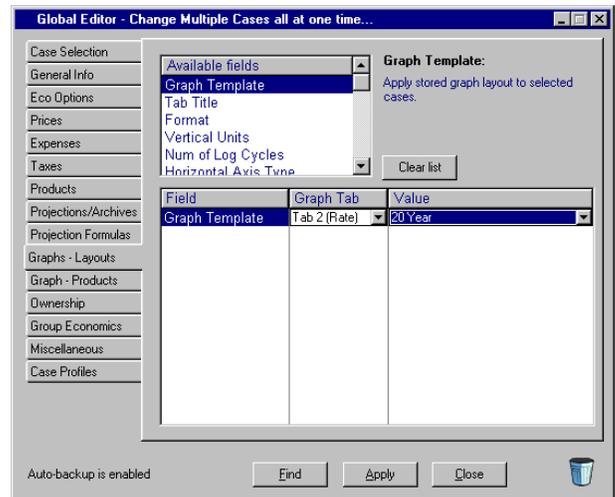


GLOBALLY APPLY GRAPH PROPERTIES

Graph properties and/or graph templates can easily be applied to multiple cases using the Global Editor.

GLOBALLY APPLY GRAPH TEMPLATES

1. Once a template has been stored, open the Global Editor.
2. Open the Graphs – Layouts Tab.
3. Select the Graph Template field and drag-drop it to the Field column below.
4. Select the tab and template to apply.
5. Click the **Apply** button.



GLOBALLY APPLY PROPERTIES WITHOUT GRAPH TEMPLATES

Some users do not use graph templates. They prefer to apply graph properties through the Global Editor, and then store off the template as a default for new cases.

The first step after opening the Global Editor is to select the case(s) to change in the Case Selection tab. The Graph Properties are broken down into two categories in the Global Editor.

Graphs – Layouts allows the user to change the look and feel of the graph itself, including the application of a graph template.

Graphs – Products allows the user to adjust the visual properties of products that are plotted on the graph.

Between these two tabs of the Global Editor, it is possible to make all the changes to the graph that may be done through the Graph Properties and Graph Scales/Attributes windows.

The advantage to not using graph templates is that it is a quick and easy, one step process. The disadvantage relates to newly created cases. Without storing the template for applying, the maintenance of keeping graph properties consistent as new cases are created becomes very manual.

COMMON EDITS TO GRAPH PROPERTIES

To globally change the color of products displayed on graphs:

1. Select the **Editor | Global Editor** menu.
2. Select cases to modify on the **Case Selection** tab.
3. Open the **Graphs - Products** tab.
4. Find the Color field and drag and drop it in the Field column below.
5. Select the product to modify and the color to use.
6. Users may drag more than one option down below and modify more than one product at a time.
7. Click **Apply**.
8. Note the other product items which can be controlled globally like vertical max and min, which is product specific and not template specific.

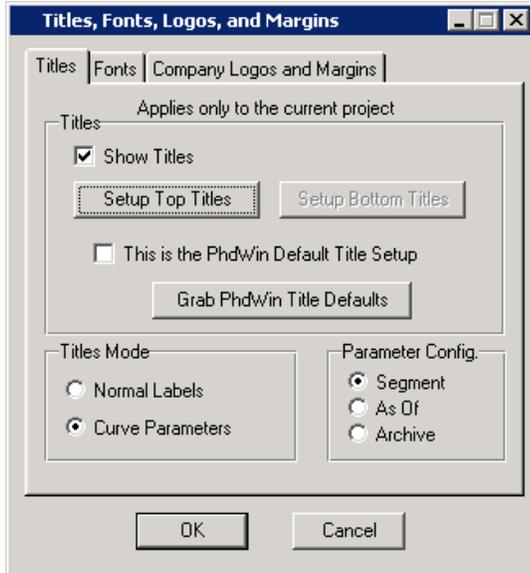
To change product color for a single product on a single case:

1. Select the case to change from the Case List.
2. Open the **Editor | Products Tree** menu.
3. Double Click the product name to open the Product Stream Properties window
4. On the **Display** tab, click the color button to open the color palette.
5. Select a new color and click **OK**.
6. Save the Product Streams Properties window.
7. *To change this color for all future cases created with this product...*
8. Double click again on the product name in the Products Tree.
9. The Product Streams Properties window opens again.
10. In the top, right corner, click **Save Current Settings as Default**.
Note: For certain standard products, such as oil and gas, you cannot save current settings as default
11. Click **OK** and exit the Product Streams Properties window.
12. This has set the product color for any cases created in the future. This will not have any affect on existing products in existing cases.

To globally set graph tabs to display a common starting and ending date:

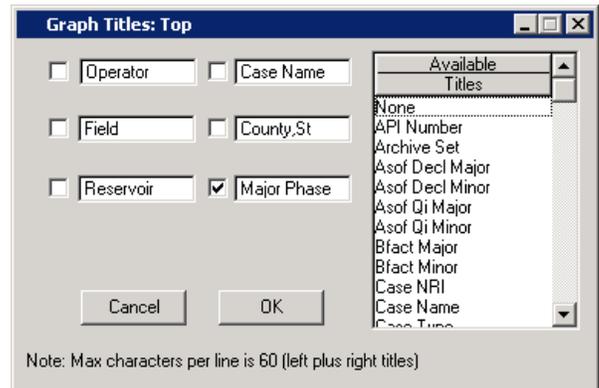
1. Select the **Editor | Global Editor** menu.
2. Select the cases to modify on the **Case Selection** tab.
3. Open the **Graphs - Layouts** tab.
4. Highlight the Starting Year field.
5. Drag and drop below – Uncheck the Auto option.
6. Populate a year in the Force Starting Year field in the format yyyy.
7. Highlight the Number of Years field, and drag it below.
 - a. **Note:** This field can and should be used in conjunction with the starting year field to set a common beginning and ending date for the selected cases globally.
8. Uncheck the Auto option.
9. Input the number of years to plot.

EDIT GRAPH TITLES



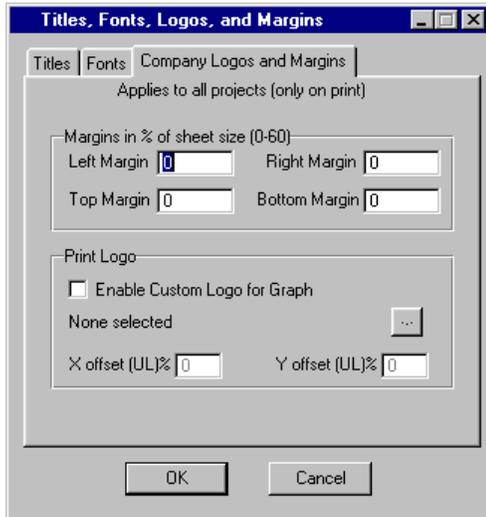
To activate and change graph titles located at the top and bottom of a graph:

- 1) Select **Graphs | Display** from the main menu.
 - 2) Select **Graphs | Titles, Fonts, and Logos**.
 - 3) To activate titles, check the **Show Titles** box OR press the **Titles** button on the graph toolbar (before going into the Graph Properties window), and descriptive titles such as Case Name, Field, Operator, etc. will now appear at the top and bottom of the graph.
 - 4) To change titles, select the **Setup Top Titles** button and/or **Setup Bottom Titles** button from the **Titles** tab of the Titles, Fonts, Logos, and Margins window.
- 5) From the Available Titles box, drag and drop titles to the appropriate boxes on the left.
 - 6) Placing a check mark beside a graph title places a title description on the graph; it does not enable or disable particular titles. This is useful when users have several titles with numerical values and need to easily differentiate between them.
 - 7) The Titles Mode can be either Normal Labels or Curve Parameters. When Curve Parameters is selected, the bottom titles will no longer appear (the option is grayed out), and projection parameters for displayed graph products will appear on the bottom portion of the graph window.
 - 8) Curve parameters are configured to display in one of three ways:
 - Segment*: Displays parameters for the first project segment that correspond to the ARPs window.
 - As Of*: Displays segment parameters at the AsOf Date and ECL and provides the life of the lease.
 - Archive*: Displays segment parameters at the AsOf Date and ECL.
 - 9) The user is given the option to define any graph title setup as the default by checking **This is the PHDWin Default Title Setup**.



PRINTING A GRAPH AND SETTING PRINT OPTIONS

The print options for the graph can be set on the **Company Logos and Margins** tab of the Graph Properties window.



The **Company Logos and Margins** tab allows the user to specify margins to be used on the four sides of the graph. It also enables the user to specify a logo for printed graphs and the logo's print location.

PHDWin gives the user many graph output options. The user can send the graph to the printer by clicking the **Print** button located at the top of the screen while a graph is displayed, or by choosing **Graphs | Print | Printer**.

The user can also “print” the graph into other file formats including JPG, WMF, and BMP or even place it on the computer's clipboard for pasting into other applications. These options are all located under the **Graphs | Print** menu option.

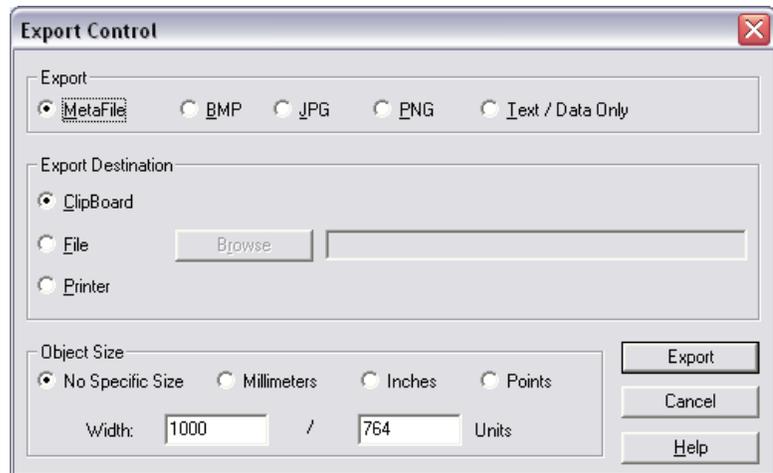
ADVANCED PRINT OPTIONS

Perhaps one of PHDWin's best kept secrets is the advanced print options window on the graph. This window is accessed by typing the x key on your keyboard while the graph is in focus.

This window allows you to save as a variety of file types including Meta Files, and to send the image to the clipboard, a new file, or directly to the printer.

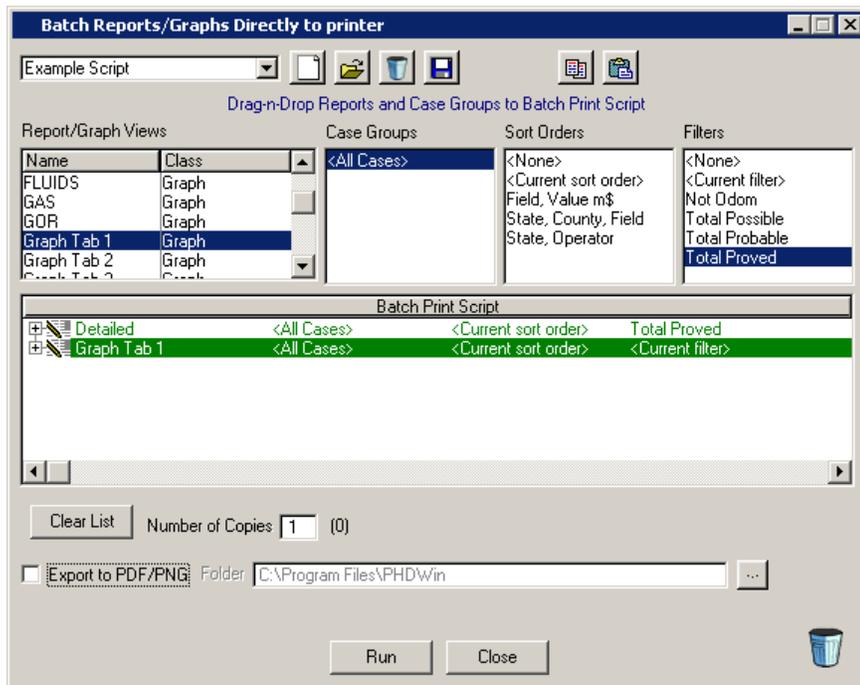
The advantage to this window is that it allows you to print the colors and background images that you placed on the graph from the colors tab of the Graph Properties window.

You can also specify exactly how big you want the graph to print out on the page. This can be useful when printing on larger paper, or when wanting to scale the printed graph up or down for presentations.



CHAPTER 14 – BATCH PRINTING

Batch printing allows the user to send multiple print jobs of graphs and/or reports to multiple printers or a single printer as one print job. Select **Reports and Views | Batch Print (Reports and Graphs)** from the main menu.



To begin batch reporting, insert a new report script by clicking the  icon to the right of the pull down on the left-hand side of the window.

To configure a batch print run, the user must define a report script in the lower half of the window. There are four columns across the upper part of the window.

The first is the list of the available reports and graphs that can be printed; the second is the list of the report groups in the current PHDWin database that are available; the third is the list of sort orders, and last is the list of filters.

The basic idea is to drag and drop an item from each column down to the

same line in the report script section of the batch print window. This will setup a report or graph to run with the selected group based on the sort and filter criteria defined.

EDITING/ADDING ENTRIES WITHIN THE SCRIPT

The user selects from the four lists in the top half of the window and drags an item from each to the lower window. The lists contain available Report/Graph, report groups, sort orders, and filters from left to right respectively.

To change any selected report, group, sort, or filter, carefully drag and drop the desired entry over an existing entry. Users must drop desired items exactly in place for the desired change to take effect. The order of the entries in the script can be changed by a) dragging and dropping an entry to a new position within the lower window, or b) using the + key or - key to shift a particular entry up or down within the script.

SCRIPT ENTRY PROPERTIES

(Archive Projection Set, Ownership, Directed Printer)

- 1) To choose the **ARCHIVE PROJECTION SET** for the script entry, open the tree structure (by clicking the "+" sign at the left of the window. The second record contains the designated archive projection set. The default for this is "Set by Case," which means use the projections as set for each case by the user while in forecast mode in the graphs. Users can change this option by selecting an Archive Projection set (Right-mouse click or highlight and press Enter on the keyboard.) This action will temporarily load the indicated set for the purposes of this print job only, and then revert back to the original state.
- 2) To set the **OWNER** setting for the script entry, open the tree structure. The third record contains the designated ownership set (partnership) to use. The default for this is "Current," which means use the ownership values (as well as included cases) as set by the user in Partners | Selection in the main menu. Users can change this option using the method described in ARCHIVE PROJECTION SET above.
- 3) To choose the **PRINTER** for the script entry, open the tree structure. The fourth record contains the designated printer to use. The default for this is "System Default," which is designated in the Windows Control Panel. Users can choose a different printer using the method described in ARCHIVE PROJECTION SET.

EXPORTING TO PDF/PNG

Users may choose to export print results to file instead of creating actual printouts. The **Export to PDF/PNG** option gives users the ability to create file outputs for both reports and graphs in the batch print screen.

When the export box is checked, users may use the browse button to select a destination folder for the export output. Reports will create a single PDF document that contains each report page; graphs will create a series of PNG (image) files that are all saved into the same destination directory.

Users that desire to create a PDF of graphs cannot use this export feature. Instead, users must use a PDF printer driver to create the PDF output. PDF printer drivers come as part of the standard installation of the full version of Adobe Acrobat (not to be confused with Adobe Reader.) Additionally, many free versions of PDF printer drivers exist and can be found throughout the Internet. Contact technical support for PDF printer driver recommendations. Once users have the correct driver, select the PDF printer from the printer selection as described in #3 of the Script Entry Properties described above.

SAVING A REPORT SCRIPT AS THE DEFAULT TEMPLATE

Any report script (with all entries) can be saved to a default table for use on other projects. This table exists in the PHDWin installation directory as "REPORTQ.TPS." This database IS NOT SHAREABLE with other users - printer names specific to each workstation are stored within these tables. Because multiple workstations on a network may or may not see the same printers, and the printers may have different network names pertinent to a specific workstation, it is not possible to share report script templates between multiple users. Use the buttons in the upper right-hand corner of the window to copy a template into your current project or save the current report script into the table for other projects.

COPYING A TEMPLATE INTO THE CURRENT PROJECT

An attempt will be made to match archive projection sets, owner groups, and graph or report names. If any of these objects are not found in the current project, users will see a printer icon with a slash through it. This means that the current record is not printable. Furthermore, the offending objects (archive, owner, or report file name) will be annotated with the "@" symbol. Changing the offending object to something that is valid for the current project will enable users to print as normal.

Once a template is copied into a script and saved it to the current PHDWin project, any non-printable record will be saved with default values.

CHAPTER 15 – FORECASTING PRODUCTION

GRAPH PROJECTIONS WINDOW

Forecast Mode -  Enter forecast mode by clicking the toggle at the left end of the graphic toolbar. A different forecast toolbar appears over the graphic toolbar that performs the functions of forecast mode.

ARPS PROJECTION WINDOW BUTTONS

 **Undo** The undo button takes the user back to the last graph SAVED for the present case. It does not actually undo the last task performed, but does an undo on all tasks performed since the last save.

 **Vertical Segment Lock** The segment on the graph becomes only capable of vertical movement; this allows the start and end date to stay constant with changing flow rates and volumes.

 **Horizontal Segment Lock** The segment on the graph becomes only capable of horizontal movement; this keeps the flow rates constant with changing dates.

 **Segment Endpoint Lock** When two segments are present for a single product, the connecting endpoints are locked together by this button.

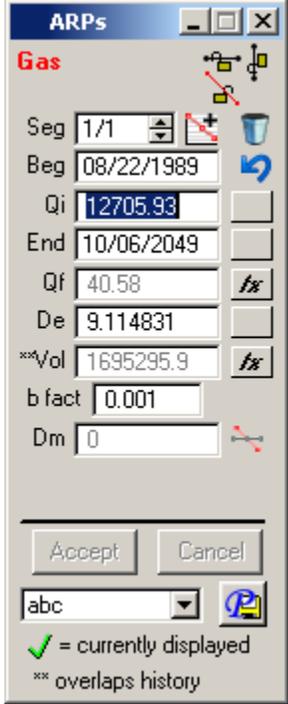
 **Insert Segment** This button inserts a new projection segment on the graph for the given product. Segments can be inserted before or after the current segment.

 **Delete Segment** This button deletes the current segment from the graph.

 **Segment Null Projection** Pressing this button causes a 0 or Null projection to be input for the 1st decline segment. This is useful in large databases for noting whether cases have been evaluated or not.

 **Save As Primary Archive** The currently active archive is saved as the project's defined primary archive.

 **Active Archive Drop Down** Select the active archive from a list of all available archives by choosing it in this list.



ARPs

Gas

Seg 1/1

Beg 08/22/1989

Qi 12705.93

End 10/06/2049

Qf 40.58

De 9.114831

**Vol 1695295.9

b fact 0.001

Dm 0

Accept Cancel

abc

✓ = currently displayed
** overlaps history

EDIT PRODUCTION DECLINE CURVES

In forecast mode, the graphical presentation changes to allow adjustment of decline curves. Decline curves can be edited in one of two ways. The ARPs window (see previous page) supports direct entry of decline curve parameters. Drag and drop decline adjustment is supported directly on the graph in forecast mode.

Change between products in forecast mode by clicking on that product's values on the y-axis (your cursor turns into a hand symbol) OR by selecting it from the drop down list on the toolbar as seen to the right.



EDIT DECLINE CURVES - DIRECT ENTRY - HOW TO

Decline parameters can be directly entered for up to 10 curve segments for each product. New values can be entered directly into the ARPs window. After each value is entered, press the **Tab** key (keyboard) or left click to move to the next field. Data entered in a field will not be posted to the program until **after** the **Tab** key has been pressed or another field has been selected with a left mouse click. Press **Enter** or click the **Accept** button to make PHDWin calculate the remainder of the values including reserves.

EDIT DECLINE CURVES - DRAG AND DROP ADJUSTMENT

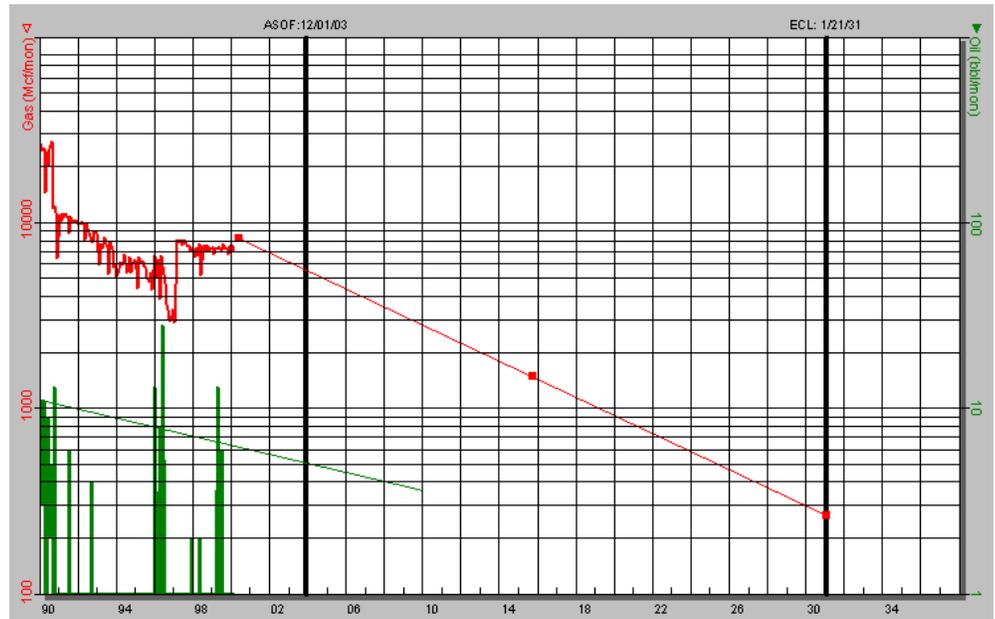
Users may edit projection forecasts directly on the graph. While in forecast mode, the active (editable) product's forecast is shown with three small pivot handles, one on each end and one in the middle. Drag and drop these pivot handles to change start rate, ending rate and decline.

The **left handle (Red box)** will adjust a curve segment's initial flow rate (Q_i) and start date. The end date and final flow rate (Q_f) will remain unchanged, and all other values (including decline rate) will be adjusted automatically.

The **right handle (Red box)** will adjust a curve segment's final flow rate (Q_f) and end date. The start date and initial flow rate (Q_i) will remain unchanged, and all other values (including decline rate) will be adjusted automatically.

The **center handle (Red box)** will adjust a curve segment's initial flow rate (Q_i), final flow rate (Q_f), start date, and end date. Curve duration, decline rate, and b-factor will remain constant.

To add segments to a projection, simply click the  button and choose to add the segment before or after the previous segment. Each product can have up to **ten** curve segments. Only products on the graph are available for presentation. To adjust a projection for a curve not listed, add that product to the graph by double clicking on the graph.



FORECAST MODE TOOLBAR BUTTONS

When in forecast mode, the toolbar at the top of the PHDWin window will have the following options.



Exit Forecast Mode - This button exits forecast mode and returns to the original graphic screen. The ARPs window disappears along with the AsOf Date and ECL lines.



Walk Mode - This button allows the user to walk down a curve in daily, monthly, or yearly increments.

 **Case Profiles Button (Ctrl + T)** – This button loads the case profile window. Case profiles allow the user to apply all product definitions and projections (optionally), including phase configuration, to selected cases. This is also available globally.

 **Archives** – This button selects or deselects viewable archives for the displayed graph. The active archive set can be defined by selecting this icon.

 **Biggie Size (Ctrl + B)** – This button expands the x and y axes of the graph to include all production and economic data specific to the current case.



– This feature controls the active product displayed in the ARPs projection window and volumes shown on the toolbar. The drop down list includes products that are currently displayed on the graph. The browse button to the right (with three dots) opens the Products Tree with the current product selected.

As Of Cum
12,734,910.08 – As Of Cum is the cumulative production volume of the current product up to the AsOf Date. If historical production does not extend to the AsOf Date, then the projected volumes are used to fill the gap.

Rem
305,872.36 – Rem is the remaining reserves that can be produced up to the estimated ultimate recovery (EUR).

EUR
13,040,782.44 – EUR is the estimated ultimate recovery; it is the cumulative amount of historical and projected production summed to the last segment's end date. Note that this cumulative amount is not affected by the Economic Limit.

AUTO FITTING PROJECTIONS

There are five types of auto-fits in PHDWin.



Blind Auto Fit – PHDWin determines what historical data to use when making the projection. PHDWin will not necessarily use all of the historical points when performing this type of fit. There is a built-in logic in the system that allows PHDWin to determine any abnormalities in a curve, and the program attempts to use the last piece of consistent decline to create a projection.



Autofit w/ Qi and Start Date (hyperbolic) – Allows PHDwin to autofit an existing projection using the projection's existing start date and Qi value as well as all monthly history that falls after that start date. This autofit requires a preexisting decline curve whose start date is some time before the end of the monthly history. This tool creates hyperbolic (or exponential) curves that honor the parameters listed in the Autofit Options.



Autofit w/ Qi and Start Date (exponential) – Allows PHDwin to autofit an existing projection using the projection's existing start date and Qi value as well as all monthly history that falls after that start date. This autofit requires a preexisting decline curve whose start date is some time before the end of the monthly history. This tool creates only exponential curves that honor the parameters listed in the Autofit Options.



Cull Data for Auto Fit – Users draw a polygon around historical data points that PHDWin will use to fit a projection. PHDWin will cull the data outside the polygon, and fit only using data inside the polygon. Right click to execute the fit after creating the polygon.



Multi-point Fit – Users specified data points for PHDWin to use for a projection, regardless of history. This option essentially allows users to “draw” the desired curve. Right click executes the fit.

AUTO FIT OPTIONS

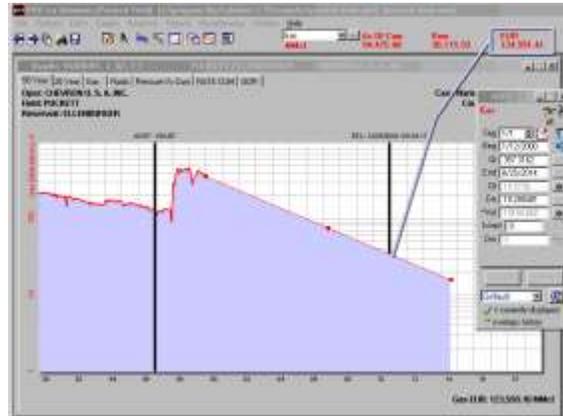
The Autofit Options window gives users greater control over the results of any of the five auto-fits mentioned above. This window can be opened by going to **Graphs | Autofit Options**. This window allows users to force the date at which the resulting auto fit projection will begin, force the projection to begin at the end of historical production, or force the projection to be either exponential, or use a specific hyperbolic b factor.

The options in the window must be selected **BEFORE** applying the auto fit.

THE CASE OF THE 3 EURS

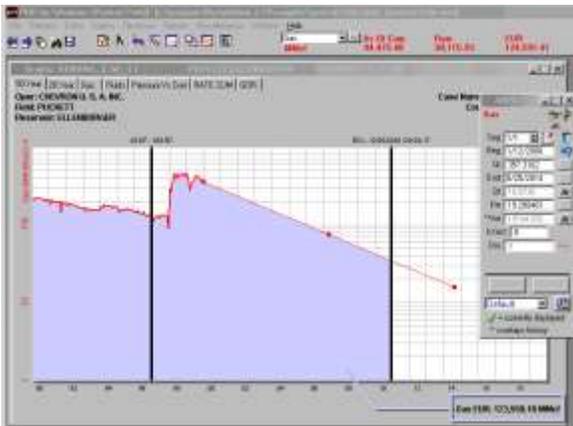
When viewing a graph in projection mode, EUR may be listed in the graph titles, the ARPs window, and the toolbar, so it is possible to see three different variations on EUR at once.

The EUR listed in the toolbar (top of graph window) is termed the **Technical EUR**. The technical EUR is the entire volume under the curve, both history and projection, to the end of the projection itself.

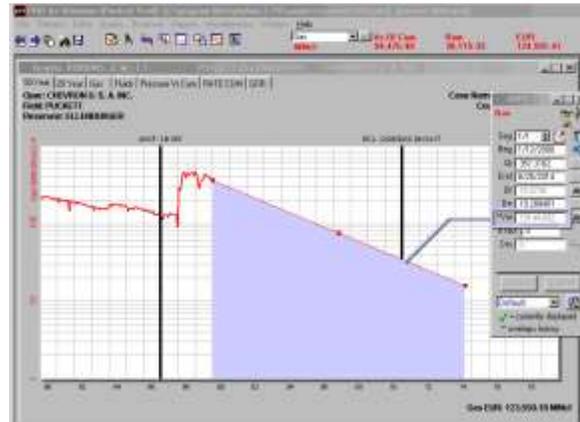


Graph Titles display the **Economic EUR**, or the area under the curve, both history and projection, up to the Economic Limit of the case.

This is the value that will match the ultimate recovery in the report.



The **Volume** in the ARPs window represents the area under the current projection segment only. Volume includes all volumes under the projection regardless of economics.

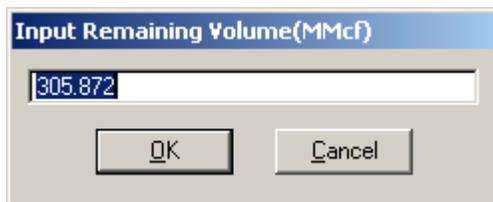


FORCING ULTIMATE RECOVERY

The ultimate recovery for any projected product can be forced to a certain value/volume. Remaining reserves from the AsOf Date can also be forced. When the cursor is rolled over these values at the top right hand side of the graphics toolbar in Forecast Mode, notice that they become buttons that users can click.



The user is prompted to decide if the reserve value should be forced by solving for either the abandonment rate or the decline rate. PHDWin will force the value by solving for a new end date and the rate selected. Once one of these is chosen, a box appears for the user to manually enter the Total Product EUR, or Remaining Reserves for the well.



Remember that the Technical EUR is being forced here. It is not possible to force an Economic EUR.

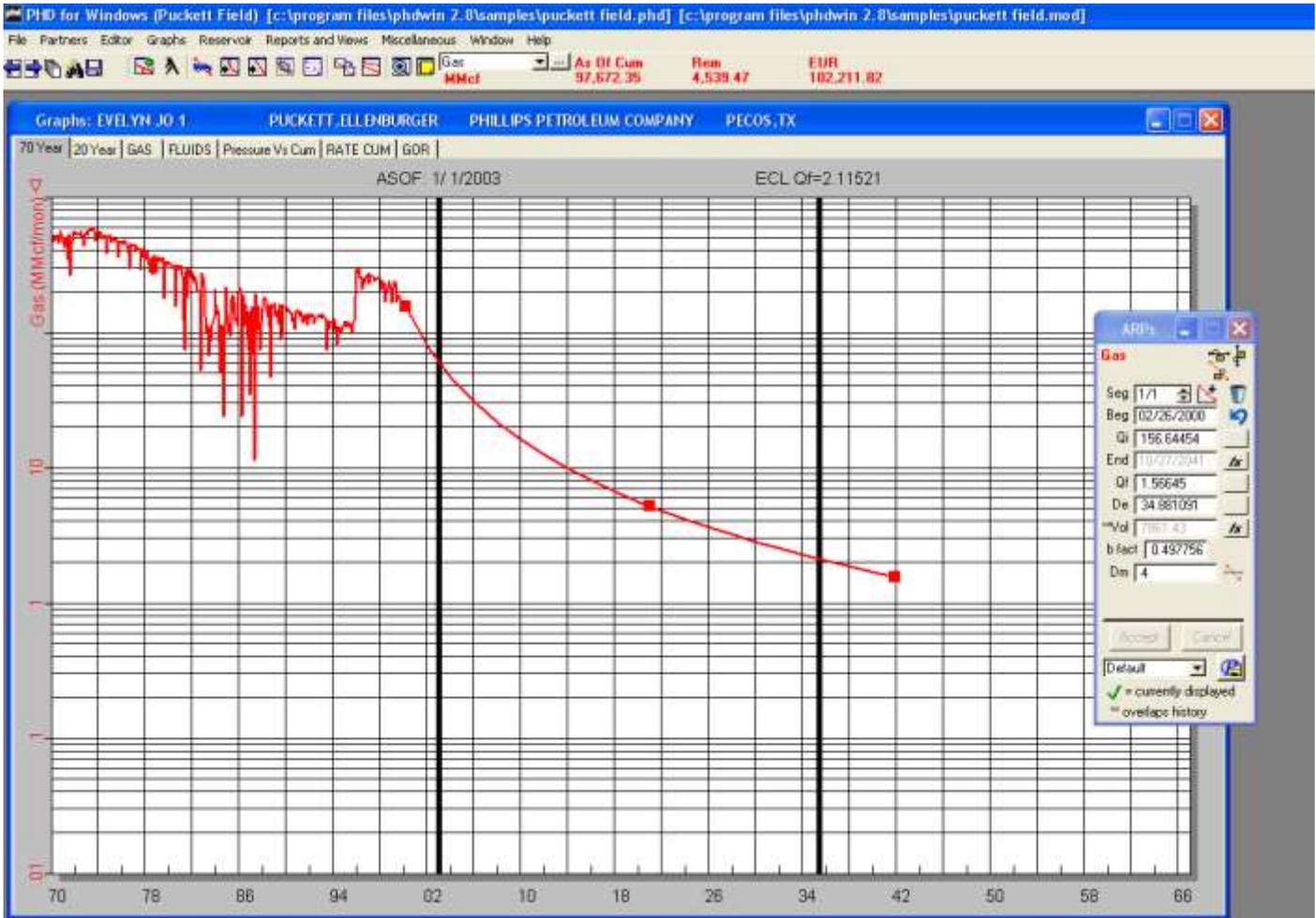
RATE TIME & RATE CUM GRAPHS

There are two types of graphs in PHDWin. The first four graph tabs at the top are all rate time graphs, meaning the products are plotted on the vertical axis, and time (in years) is plotted along the bottom of the graph.

Rate cum graphs (the last three tabs) will plot products on the vertical axis against the cum of a specified product on the horizontal axis. These graphs are generally used to perform material balance projections on a case.

EXAMPLE – PROJECTING BHPZ TO CALCULATE THE GAS EUR

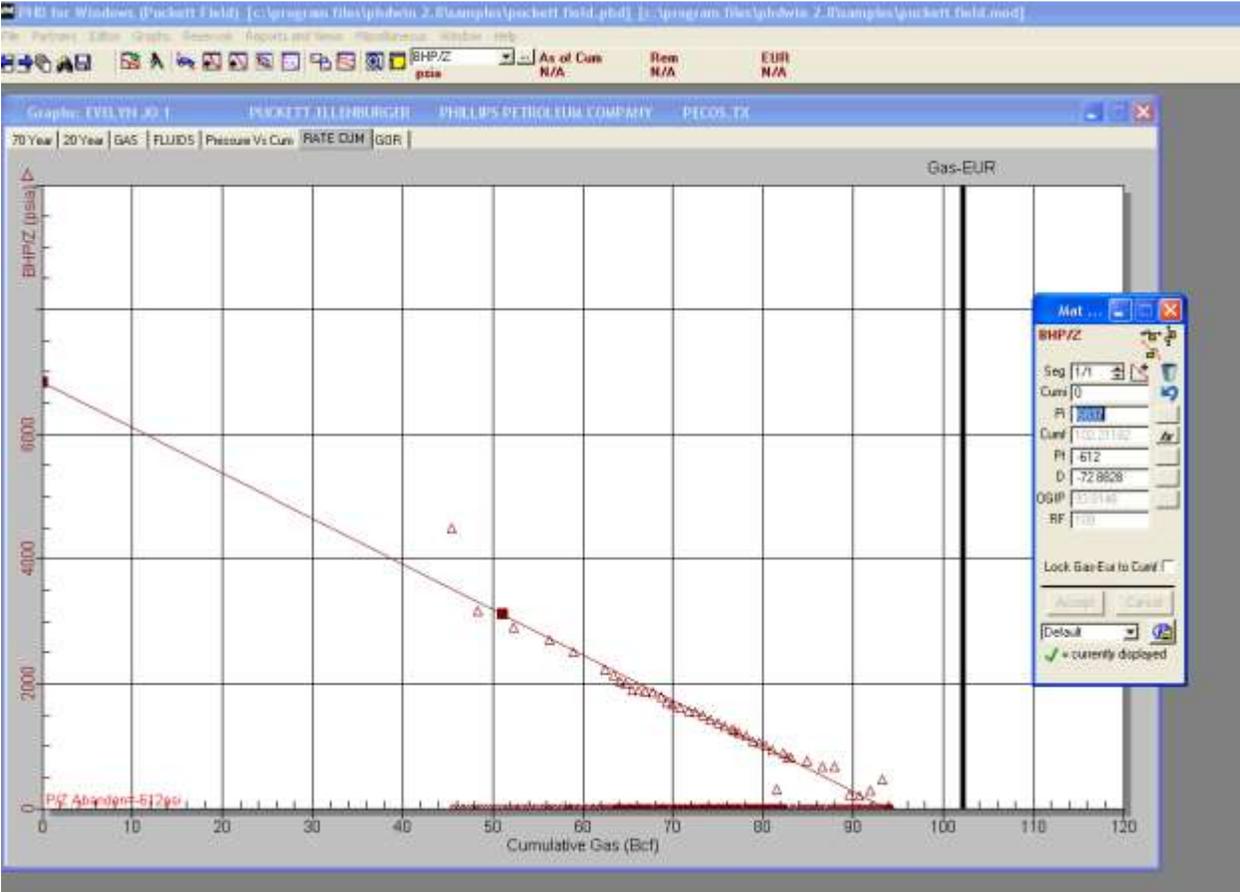
It is possible to use the rate cum graph to affect the projections that were made on the rate time graphs. Look at the rate time graph below:



The Technical EUR on the case is 102,211.82 MMcf. The projection information is as follows:

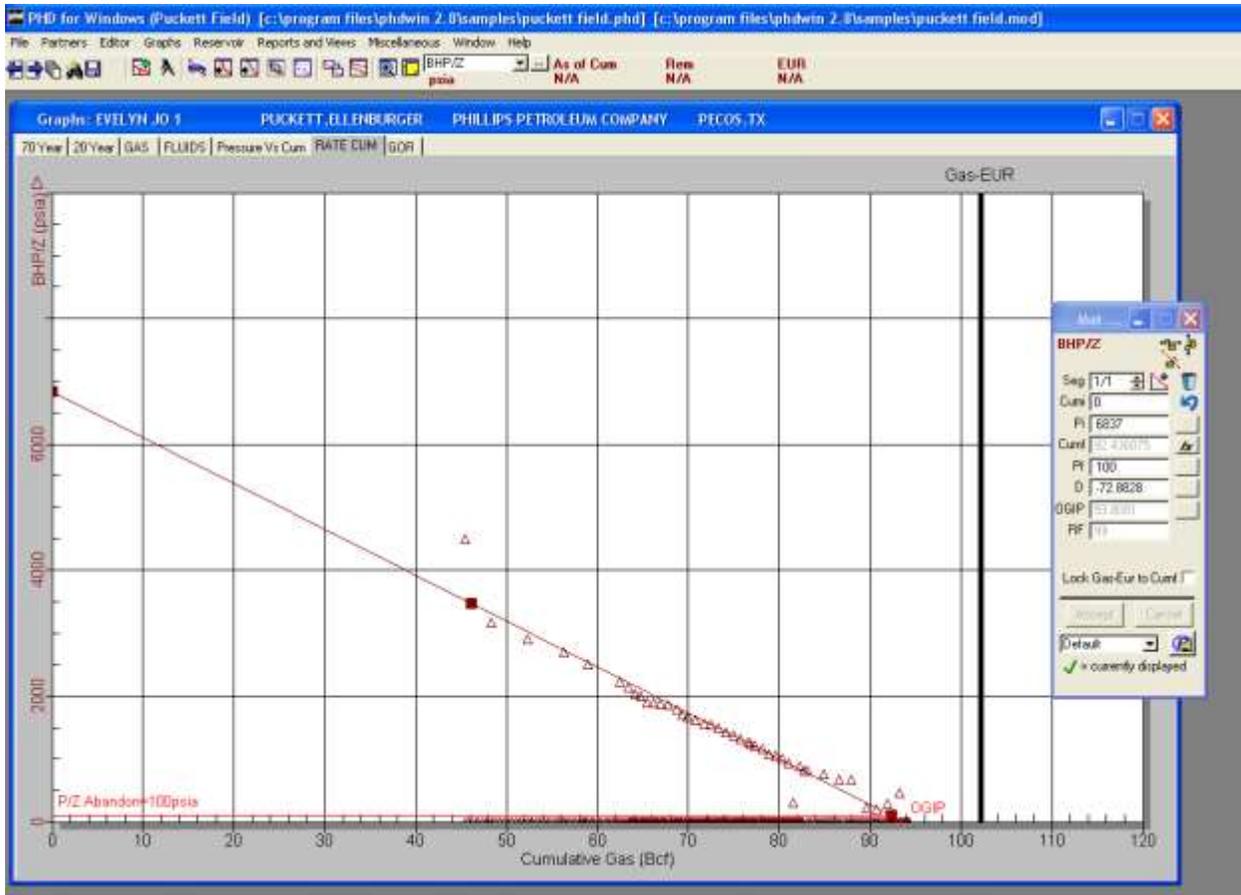
- Start Date:** 2/26/2000
- Qi:** 156.64454 MMcf/mo
- End Date:** 10/27/2041
- Decline Rate:** 34.881091
- B factor:** .497756

Now look at the rate cum graph:



To reach the EUR as predicted by the rate time graph, the final bottom hole pressure would have to reach negative 612 psia, which is completely unreasonable.

Let's assume production continues until the BHP reaches 100 psia. Entering that value into the Pf field gives the following result.



To force our rate time projection to honor this BHPz projection, we can click the “Lock Gas-EUR to Cumf” checkbox, which spawns the following prompt:

Adjust the rate time graph by either changing the decline rate, or changing the final flow rate of the projection.

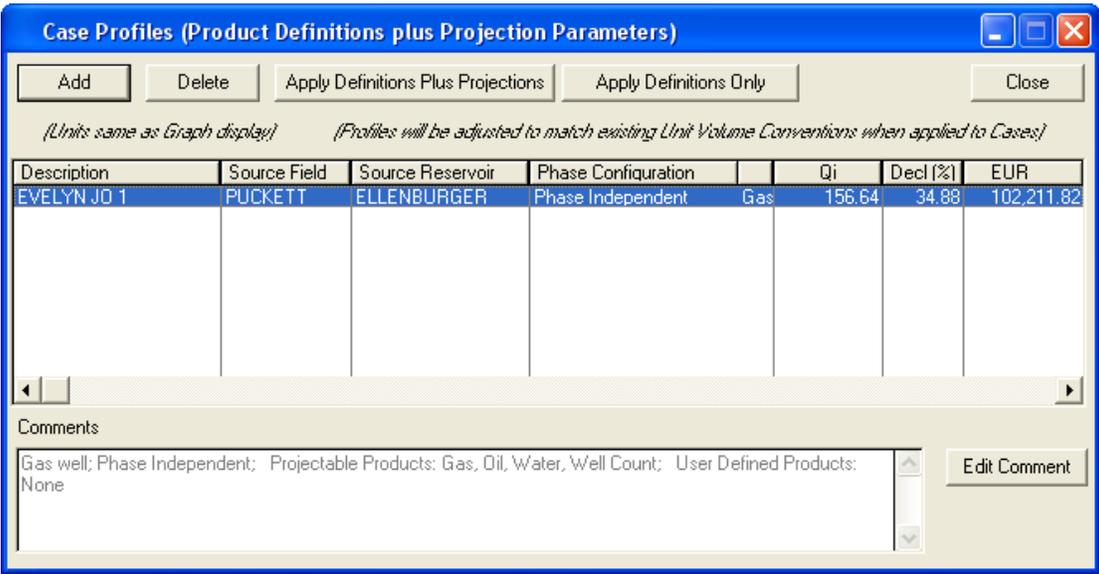
Once this box has been checked, changing the rate time projection will automatically change the pressure projection to match the EUR. You will not be able to adjust the pressure projection again until this option is unchecked.

USING CASE PROFILES AS TYPE CURVES

A case profile is a tool in PHDWin that allows users to quickly apply product definitions and projections to a case. Before a type curve can be applied to cases, it must first be created on an individual case, and this example curve may then be stored in a case profile.

Step 1: Create the desired projection on a case. This case can be a dummy case or a real active case in the project, but the projections must exist on a case before they can be saved as a type curve.

Step 2: To save a case profile, click the () Case Profiles button in the graph projection mode toolbar. Once the Case Profiles window opens, click the **Add** button to save the current case as a case profile.



Once the case profile has been saved, apply the curve to any other case in the project by moving to the desired case, clicking the  Case Profiles button again, and select the option "Apply Definitions Plus Projections".

Case Profiles may also be applied through the Global Editor, or they might be applied to newly created cases through the Add/Import Wizard discussed later in this training class.

CHAPTER 16 – PROJECTION ARCHIVES

Projection Archives store multiple projections for the same product on one case. Archives allow users to preserve old projections, maintain a different projection for different engineers who work the case, or even to track aggressive versus conservative projections.

While archives in PHDWin are similar to projection qualifiers in ARIES, there are important differences that require the user to be conscious of the implications of working with archives.

ARCHIVE BASICS

A good way to think about archives is that they are folders that **can** contain projection information for each case. Creating an archive **does not** create a new projection on each case, but it does provide the ability to create a new projection on that case without affecting the original.

It may be helpful to break archives down into two concepts:

Creating the archive is a project level change that makes that archive available for use on every case automatically.

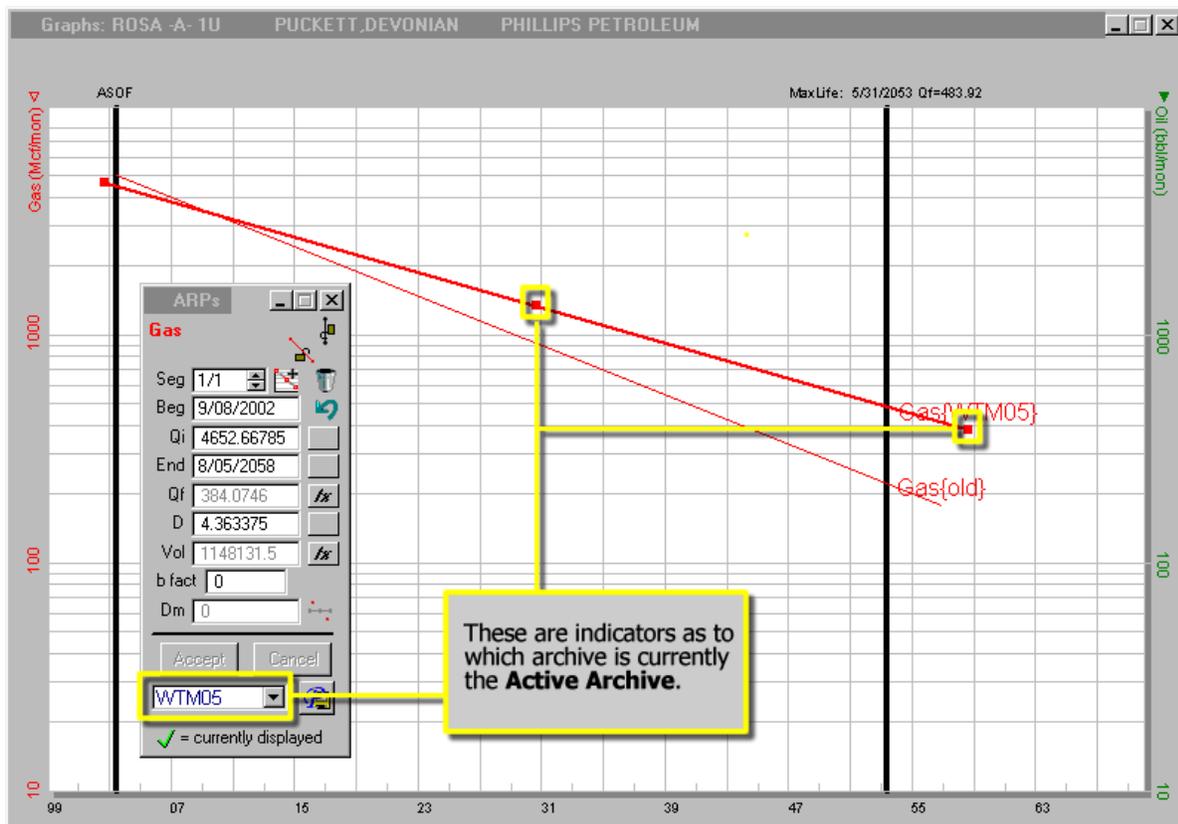
Populating the Archive (or saving a projection as that Archive) is a case-by-case change.

This concept works similar to ID codes; creating an ID code places that ID code field on every case in a database, but it does not automatically generate a value for the code. When an archive is created, that archive folder (or field, however you prefer to think of it) now exists for every case, but users must input data into the individual case's archive.

ACTIVE ARCHIVE

The active archive is the archive that is currently being used to calculate the economics for a case. The active archive controls the ECL on the graph, any numbers displayed in the graph titles, and the numbers listed in economic reports.

There are several indicators that tell the user which archive is active in a case. When in projection mode, the active archive is displayed in the drop down menu at the bottom of the ARPs window. If more than one projection archive is visible on a graph, the active archive will be the one with the projection handles; the user may only edit the active archive.



The archive name will also be displayed at the top of most report formats run in PHDWin.

It is very important to note that the active archive is a case-specific setting; each case in a project may be running a different archive if set to do so. While this gives the user ultimate control over the use of varying projections, it is imperative that the user understand which archives are being run to generate the reports.

The active archive may be set through the Global Editor or through the Project Properties window to ensure that all the cases are running the same projection archive if desired.

CREATING ARCHIVES

Archives may be created in a variety of ways in PHDWin. No matter which method is used, the creation of the archive folder is a global addition.

Graph – When a graph is open, the user may choose to save the current projection in a new archive. To do so, select **Graphs | Archives ► Save As** from the main menu. Once this option has been selected, the user may choose to save the currently active projection under an existing archive name, or a new one by selecting the Create New Archive option.

Global Editor – The Global Editor is another place in which the user may choose to save the active archive under a new name. Note that because the active archive is case specific, this does not necessarily copy one archive into another, but may result in a mixture of existing archives being saved under the new name.

Project Properties – The Project Properties window has an Archives tab, which allows the user to control archives at the project level. Creating an archive here does not save any existing projections as the new archive, but rather, creates a blank archive that is accessible on each case. The Project Properties window also allows the user to delete archives from the database.

POPULATING ARCHIVES

Populating an archive means saving a projection under that archive name on a given case. The user has the option of populating an archive from scratch on the graph or saving an existing projection under the archive name.

The save as method is case-by-case, but active projections across multiple cases can all be saved to an archive simultaneously using the Global Editor. When performing a save as, the user may create a new archive as well.

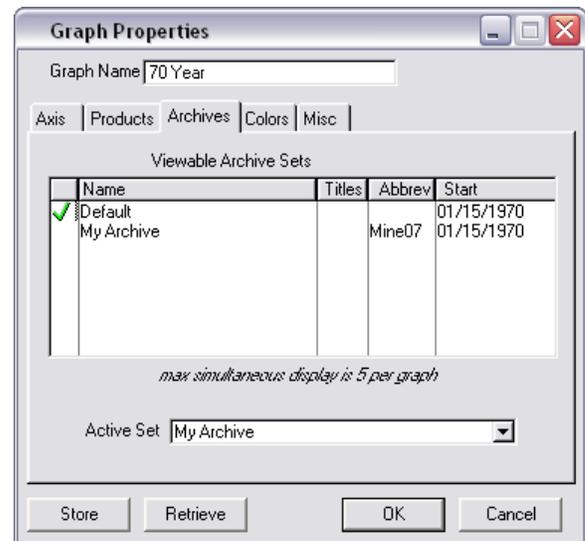
SETTING ARCHIVE VISIBILITY

Once an archive has been created, it can be set as visible on the graph. You can have multiple archives visible on the graph for a visual comparison between projections.

Only ONE can be the Active archive, and it is automatically visible, and cannot be hidden from the graph.

To turn on the visibility of non-active archives open the Graphs Properties window and click on the Archives Tab.

Double click the archive you want to set as visible and a green check mark will appear, indicating that it will be seen on the graph.



THE PRIMARY ARCHIVE

The primary archive is an archive that has been specified by the user and set to use certain keyboard shortcuts for the purpose of saving to that archive. Essentially, a primary archive is nothing more than a keyboard shortcut to save the active projection as the primary archive.

The primary archive is defined on the Archives tab of the Project Properties window. The user highlights the archive to be designated as primary, and clicks the **Set Primary** button. This sets the chosen archive to use the following keyboard shortcuts:

[F3] – Save as Primary – This is a shortcut for the function of **Graphs | Archives ►Save As**. It saves time when moving from graph to graph and saving changes made to the active archive under the new archive that has been designated as the primary archive.

[F4] – Save as Primary and Move Next – This function does the same thing as [F3], except after saving the projection in the primary archive, it moves the user to the next graph in the database.

[F5] – Save as Primary and Move to Next Unworked – This works similar to the [F4] function, except instead of moving to the next graph in the database, it moves the user to the next graph in the database that still has a null projection in the primary archive.

TWO METHODS OF WORKING WITH ARCHIVES

There are two major methods of working with archives in PHDWin. One method uses the primary archive, and the other does not.

USING THE PRIMARY ARCHIVE

In this method, the user creates a new archive and designates it as the primary archive. Users then move through the database using keyboard shortcuts to save the active projection in their primary archive. If a change is made to that case, the change is reflected on the primary archive only.

Advantages:

- Users can distinguish which cases have been affected by seeing which cases have a projection in the primary archive.
- Users can choose from multiple archives for copying.

Disadvantages:

- It is possible to have a mixture of archive names on reports.
- It is more susceptible to human error; users may forget to save an archive before making changes.

USING THE GLOBAL EDITOR

The second method does not depend on the primary archive. This method globally saves the active projections into a new archive and then globally sets the new archive active.

1. Select **Editor | Global Editor** from the main menu.
2. Open the **Projections/Archives** tab.
3. Find Save to Archive in the list, and drag it to the Field column below.
4. Select the archive name (or Create New Archive) in the Value column.
5. Click **Apply**.
6. Find Set Active Archive in the list and drag it to the bottom.
7. Select the new archive name in the Value column.
8. Click **Apply**.

Note: Users must click apply twice; both items may not be dragged to the bottom section at the same time because one of the edits is dependent on the other.

Advantages:

- Consistent naming – The archive name is globally changed, and thus the same on every page in the report.
- Less chance of human error – Because archives are already copied, the user is not responsible for changing every case.

Disadvantages:

- Users may duplicate projections and forget to change them.

ARCHIVES AND CASE PROFILES

When storing product definitions and curves to a case profile, only the active archive for each product is stored into the profile. Cases that have multiple projections stored in different archives can only store one of those archived projection sets in a case profile. If users want to apply multiple projections to a case, it is necessary to store as many case profiles as projections. Also, when applying a case profile to an archive if multiple archives are being used, ensure that the correct archive is active on the case before applying the case profile.

CHAPTER 17 – GRAPH WALK MODE

Walk mode is used to “walk” the historical and projected production curve to gather specific information about the data on a specified date. To enter walk mode, click on **Graphs | Display**, then click on this button: .

WALK MODE TOOLBAR



Walk Mode Off -- This function turns walk mode off and returns to forecast mode.

01/01/2003  

Walk Mode Date -- This is the date, to the day, when walk mode is measuring flow rates, declines, and volumes. Placing a cursor in this window in day, month, or year displayed and pressing the + or – key will allow you to walk down the curve in the selected increment.

Q act 0 

Actual Flow Rate -- This is the actual flow rate at the walk date during historical production.

Q prj 60.282 

Projected Flow Rate -- This is the projected flow rate at the walk date along the decline curve projection.

D prj 23.40

Projected Decline Rate -- This is the projected decline rate at the walk date along the decline curve projection.

Cum
97,672.35

Cumulative Production -- This is the cumulative production up to the walk date. Historical volumes and projected volumes are summed to this date. If the walk date falls after historical production data ceases, then PHDWin uses the curve projection to complete the calculation.

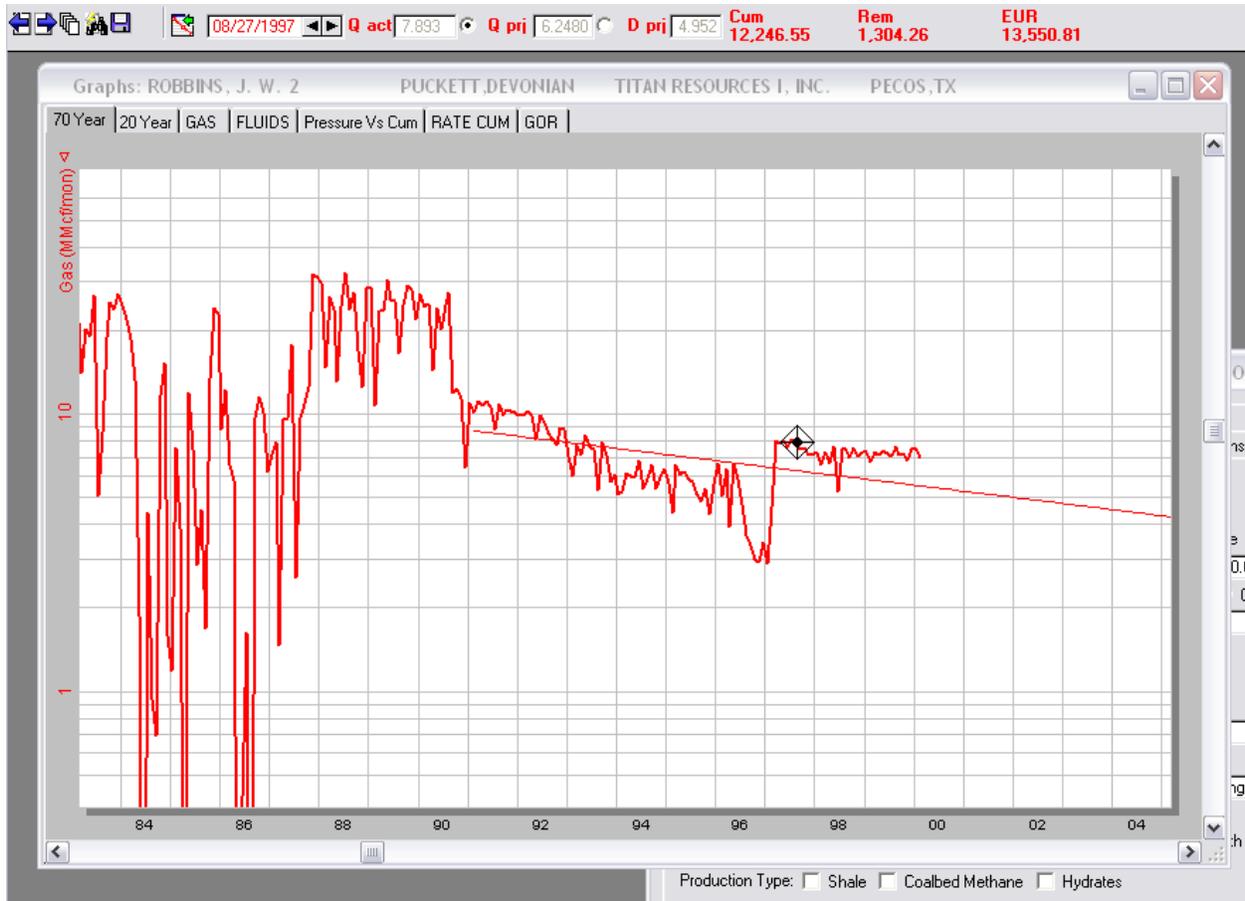
Rem
4,539.47

Remaining Reserves -- This is the volume of reserves that remain to be produced after the walk date. Remaining reserves are dependent upon the end date of the decline segment.

EUR
102,211.82

Estimated Ultimate Recovery -- This is the sum of the cumulative production and the remaining reserves. Estimated ultimate recovery (technical) is the cumulative volume of historical and projected production. The value is summed to production at the end date of the decline segment.

WALKING THE CURVE



You can “walk” the curve using one of three methods:

1. **Drag and drop**- use your mouse to drag the diamond target along the curve to the desired point in time.
2. **Date Arrows** – You can click on the right and left arrows beside the date field to jump an increment equal to $1/10^{\text{th}}$ the visible years.
3. **Date +/-** - You can click in the date field and use the + or – key on the 10-key portion of your keyboard to move in increments equal to the portion of the date field the cursor is in. This allows you to walk by year, month or even day by day.

SLICING PROJECTIONS IN WALK MODE

For the most part, walk mode is strictly an informational mode of graphics. It is designed to give you information about the curve, and not to allow you to do any manipulation to the curve.

However, you can use walk mode to “slice” projections. By clicking the **Insert Segment** button  on the ARPs window you are telling PHDWin to take the existing projection and break it into two segments at the exact point that your walk mode diamond is on.

This allows you to walk to a very specific point in time, and then break the segment to model a change in the production profile, be it a stimulation, increase or decrease in decline, a work over, or any number of other items.

CHAPTER 18 – PRODUCTS

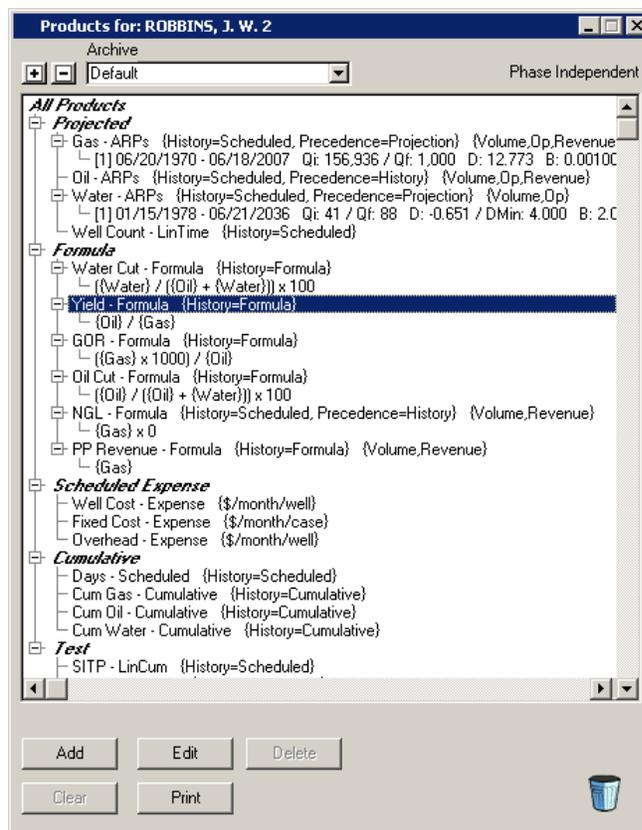
PRODUCTS TREE

The Products Tree lists all of the products associated with the current case as well as their attributes.

NOTE: Double clicking on any product in the tree will open the Product Streams Editor.

USING THE PRODUCTS TREE WITH GRAPHS

1. Dragging a Product from the Products Tree to the Graph window will plot that product on the graph.
2. Open the Products Tree by going to **Editors | Products Tree**.
3. Open a graph by going to **Graphs | Display**.
4. Find the product you want plotted on the graph in the Products Tree.
5. Click and drag the product to either the left- or right-hand margin of the graph, depending on which side you wish to see the product scale.



PRINTING THE PRODUCTS TREE

Clicking the print icon at the bottom of the Products Tree will print the information listed in the tree for the current case.

ADDING PRODUCTS TO A CASE

1. Select **Editor | Products Tree** from the main menu.
2. Click the **Add** button at the bottom of the Products Tree window.
3. Select the product name from the list, or choose create new product. Give the product a name.
4. Click **OK**.

DELETING PRODUCTS FROM A CASE

1. Highlight the product to delete.
2. Click the **Delete** button.
3. Confirm the delete.

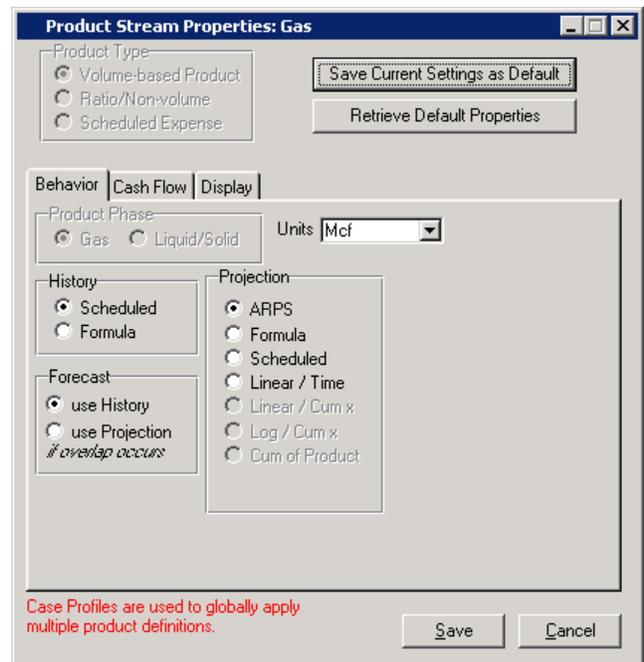
OR

1. Drag the unwanted product to the trash can in the lower right corner of the window.
2. Confirm the delete.

PRODUCT STREAMS EDITOR

The PHDWin Product Streams Editor allows the user to create and/or edit product streams' properties. PHDWin provides several default product streams with the properties already defined. These can be edited or used as is.

- **Behavior Tab** – This defines the behavior of historical and projection production. It also distinguishes history or projection for volume calculations when overlap occurs.
- **Cash Flow Tab** – This defines what is calculated for the product - volume, revenue, op cost, trans cost, shrinkage.
 - Shrinkage – This can be case specific or use a model.
- **Display Tab** – This defines the physical properties of the product – volume units, line style, color, symbols. **Symbols on History** and **Symbols on Projection** apply annual average symbols to the production.
- **Save Properties as Default Button** – This saves any changes made to the product definition as the default for the product. This is not an option for certain standard products, such as oil and gas.
- **Retrieve Default Properties Button** – This retrieves default product properties and applies them to the current case.



- **Product Type** – The user may categorize the product as one of the following types:
 - **Volume Based Product** – This product type is what one might consider a standard product type such as gas or oil. These products have volumes and can have prices, expenses, and shrink applied.
 - **Ratio/Non-Volume** – This product type is for those products that are defined as a ratio of two or more other products. Common ratio/non-volume products include yield and GOR. These products will not have volumes associated with them, so they cannot have costs or revenues assigned to them either.
 - **Scheduled Expense** – This type only has a Cash Flow tab and is nothing more than a new category of LOE. The expense can be tied to the case level or multiplied out by well count.

CHANGING PRODUCT PROPERTIES

Open the Product Streams Editor by double clicking a product in the Products Tree.

- 1) Open the Behavior tab, and select how the historical and projected information should function. Historical data can be scheduled or based on a formula; projected data options are the following: Arps, Formula, Scheduled, Linear/Time, Linear/Cum X, and Cum of Product.
 - a. **ARPS Equation**– Independent projection.
 - b. **Formula** – Calculated projection based on a user-defined formula (like in the historical above).
 - c. **Scheduled** – Non-projectable via equation – Only used for scheduling discrete volumes in the Monthly History tab of the Case Editor.
 - d. **Linear / Time** – Independent projection based on $\text{Rate} = (\text{Decline} \times \text{time}) + \text{offset}$. Y-axis is monthly rate, X-axis is time, Decline is annual decline rate.
 - e. **Linear/Cum X** - Independent projection based on Cum Volume of Product X.
 - f. **Cum of Product** – Calculated projection using the cumulative volume of the scheduled product stream. (Oil, Water, Gas)
- 2) Open the Cash Flow tab, and choose whether there will be volume, operating costs, revenue, transportation costs, or shrinkage associated with this product.

APPLYING SHRINKAGE TO CASES

Case specific **shrinkage** can be entered here in the **Cash Flow** tab of the **Product Streams Editor**. Users can create/apply a shrink model in the Model Editor or enter case specific shrinkage by double-clicking the grayed out “None” line. Enter the data as seen in the window below.

Shrink can be either percent volume or fixed volume format. The amount entered will be the amount shrunk. Shrink is applied on gross reserves and then netted down by the RI.

APPLYING DEFAULT PRODUCT SETUPS TO AN ENTIRE FILE

To globally apply the Default Product Property Setup to a group of cases:

- 1) Open the Global Editor. (Editor | Global Editor from the main menu)
- 2) Define the group of properties to change by choosing either a Pre-defined Selection or a Custom Selection of properties in the Case Selection tab.
- 3) Open the **Products** tab.
- 4) Drag **Apply Default Product Setup** from the Available Fields list to the bottom Field column below. Use the drop downs to identify which product's defaults to apply.
- 5) Click **Apply** to apply the changes.

After PHDWin is finished applying the changes, it will then give a case count of the properties that were changed.

PHASE CONFIGURATION/PROJECTING MINOR PHASE AS RATIO

Many users project a single major phase product and calculate the minor phase product as the result of a known ratio. PHDWin configures these ratio calculations using product definitions, and there are several major setups that PHDWin will automatically configure for the user. When viewing the graph, users may choose one of these setups by selecting **Graphs | Phase Configuration**.



Phase Configuration is simply the term used in PHDWin for describing the relationship between the minor and major phases of a case. The different types of relationships are described below.

Phase Independent – Cases are set as phase independent by default. Both gas and oil are independently projected using Arp's Equation.

Minor Phase Variable Ratio - This will set the case to have the major phase and corresponding ratio independently projected, while the minor phase is calculated from the major phase and corresponding ratio. **Gas wells**, for example, show Gas as the independent projectable phase, Yield (the ratio) is projectable, and Oil is a calculated product of Yield and Gas. For **oil wells**, Oil will be an independent projection, GOR (the ratio) is projectable, and Gas is a calculated product of Oil and GOR $\{(GOR/1000) \times Oil\}$. PHDWin knows a case's major phase (it is defined in the Gen Info tab of the Case Editor) and will setup product definitions accordingly.

Minor Phase Flat Ratio - This setup is different than minor phase variable ratio. Instead of calculating the minor phase by the major phase and ratio projections, the minor phase projection will be based solely on the major phase projection and a constant, entered value for the ratio. In a major phase gas example, Oil is based on a formula, such as Gas X 0.02. The value for Yield will be flat, but defined by the standard formula $\{Oil/Gas\}$.

CASE PROFILES & PRODUCT DEFINITIONS

Case profiles were used earlier in this course for the purpose of applying a type curve. Because projection types, formulas, and product relationships are all stored under product definitions, the product definitions are stored as part of the case profile. As a result, case profiles store both projections (for type curves) and the product definitions necessary to recreate those projections. While users cannot apply projections without the necessary definitions, it is possible to apply product definitions to a case without applying projections from a case profile.

In this instance, case profiles are used to apply definitions, including the addition of new products, to a case all at once. Think of it as a scenario for products, except that case profiles are not surgical. While this is a very powerful way to quickly add new products, remember that case profiles apply changes to ALL of the products on a case, so use caution.

CHAPTER 19 – CREATING CASES

CREATING A SINGLE CASE USING THE WIZARD

The **Single Case** selection of the PHDWin **Add/Import Data Wizard** is used for creating a new single case by direct entry. This method creates one case at a time and requires the user to type in data for the new case.

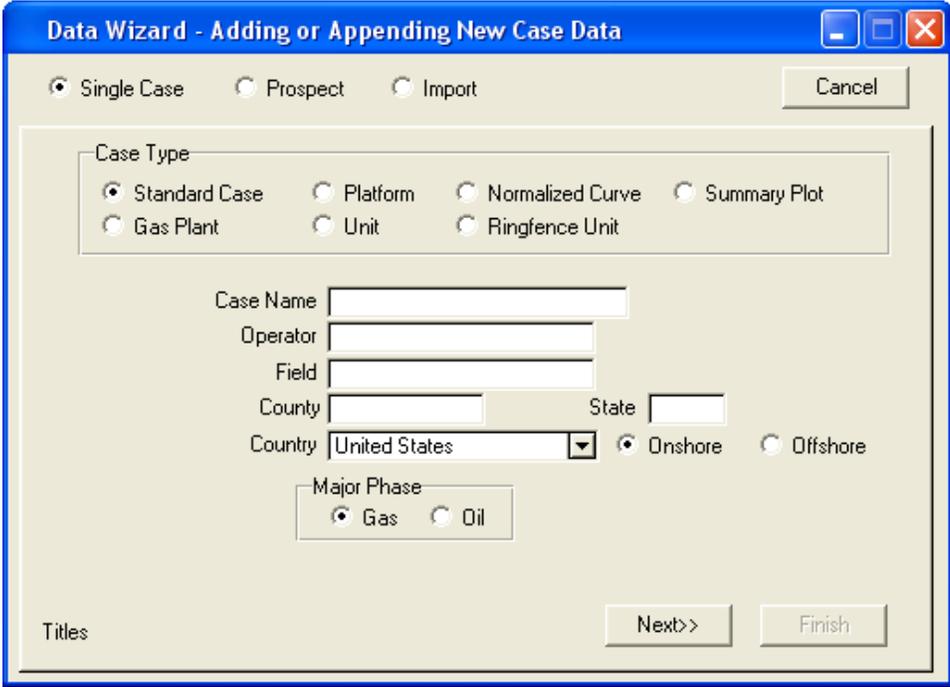
TO CREATE A NEW CASE

- 1) Select **Files | Import Data or Create New Cases** from the main menu.

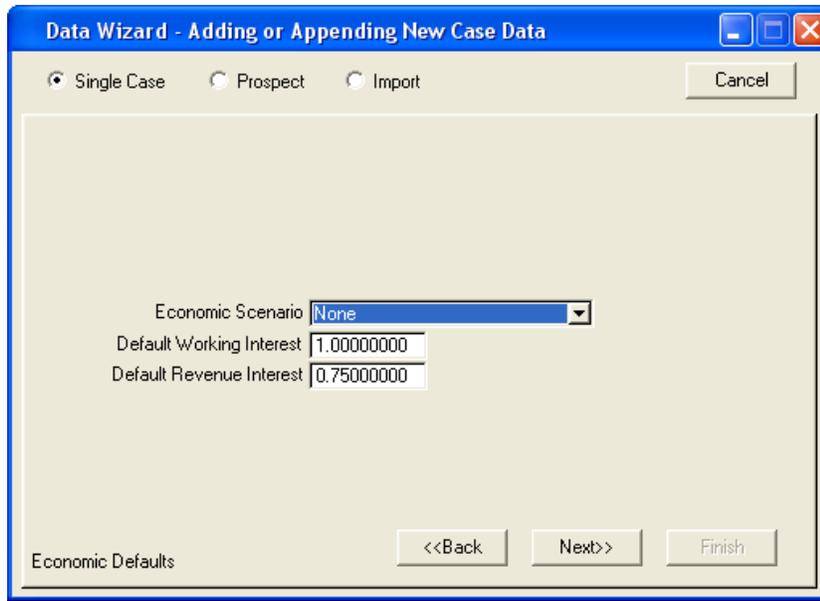
OR

Click the **Add/Import** icon  from the Case List (.

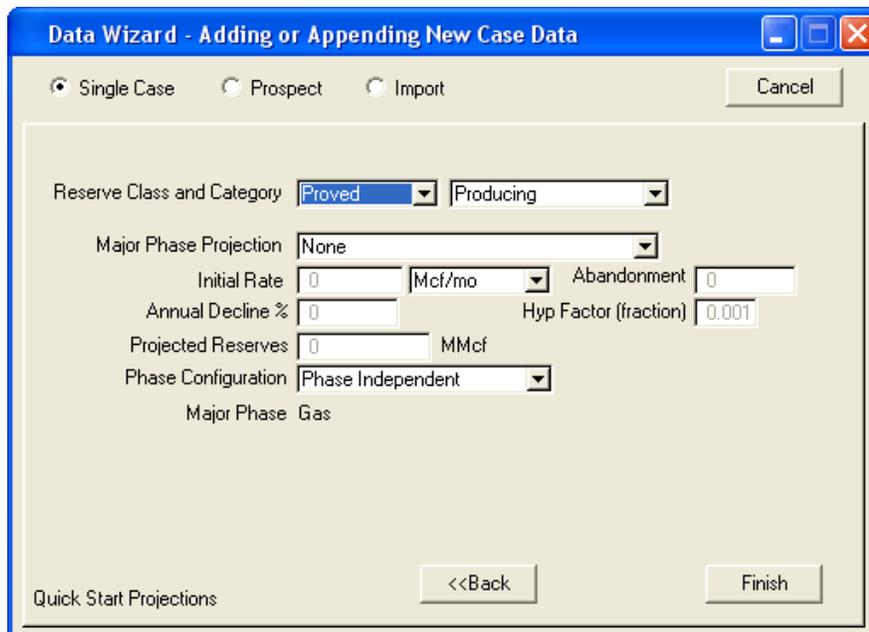
- 2) Select the **Single Case** button at the top of the window and the Standard Case option below. Fill in the information for the case, and click **Next**.



- 3) Select an economic scenario to apply to the case as well as default ownership values. Click **Next**.



- 4) Here the user may specify the Reserve Class and Category for the case, apply a Case Profile (type curve), or manually project the major phase.



CREATING A PROSPECT DRILLING SCHEDULE

Users may create a series of cases that will be drilled on a specific drilling schedule.

To create a prospect, select **File | Import Data or Create New Cases** from the main menu. Choose the Prospect option at the top of the window. The first step in the wizard is to name the prospect. The name you enter here should be generic, as the Prospect builder will use the generic title and append a well number to create each case's name.

The screenshot shows the 'Data Wizard - Adding or Appending New Case Data' dialog box. At the top, there are three radio buttons: 'Single Case', 'Prospect' (which is selected), and 'Import'. A 'Cancel' button is located in the top right corner. The main area contains several input fields: 'Prospect' (text box with 'Prospect: Test Res'), 'Operator' (text box), 'Field' (text box), 'County' (text box), 'State' (text box), and 'Country' (dropdown menu with 'United States' selected). Below these are two radio buttons for 'Onshore' (selected) and 'Offshore'. A 'Major Phase' section has two radio buttons: 'Gas' (selected) and 'Oil'. At the bottom left is the label 'Titles', and at the bottom right are 'Next>>' and 'Finish' buttons.

Apply an economics scenario (if desired), and enter the ownership values for the cases. All of the prospect cases will have these options applied, but each may be configured individually if desired once creation is complete.

The screenshot shows the same 'Data Wizard' dialog box, but now on the 'Economic Defaults' step. The 'Prospect' radio button remains selected. The main area contains three input fields: 'Economic Scenario' (dropdown menu with 'Conservative' selected), 'Default Working Interest' (text box with '1.00000000'), and 'Default Revenue Interest' (text box with '0.75000000'). At the bottom left is the label 'Economic Defaults', and at the bottom right are '<<Back', 'Next>>', and 'Finish' buttons.

The next step in the process is to specify a drilling schedule and investments for the prospect.

Total Wells to Be Drilled – This is the total number of cases that will be a part of this drilling prospect.

Dry Holes – One way to “risk” the prospect is by entering a suspected number of dry hole cases. PHDWin will space out the dry holes evenly in the drilling schedule.

First Well to be Drilled on – Enter the beginning drill date for the first well.

Drill a New Well Every – Enter the number of months (partial months may be entered as decimals) between each new drill date.

Drilling Costs – This amount will display as a Drilling investment on all prospect cases. The investment date will be linked to the start date of the first major phase projection minus the number of months specified in the Time from Drill to Completion field.

Completion Costs – This amount will display as a Completion investment and will only show up on non-dry hole cases. The investment date will be linked to the start date of the first major phase projection.

Plugging Costs – This amount will show up as an Abandonment investment on all prospect cases. The investment date will be linked to the ECL of the case.

Time from Drill to Completion – Additional spacing time between projections, this time period (in months) is the time from the end of drilling to the completion of the well.

The final step in the creation of a prospect is the configuration of phases and projections.

Once Reserve Class and Category is set, users have three Major Phase Projection options.

None – No projections are applied to any cases. Users should avoid this option, as it defeats the purpose of the prospect builder.

Manual Projection – Users enter an initial rate, annual decline rate, and hyperbolic b factor to generate a basic projection on the cases.

Case Profile – A preexisting case profile may be used at this point as a type curve for the prospect cases. Using a case profile offers

many advantages including projections for multiple products, addition of products and product definitions, and more complex projections (multiple segments).

Click **Finish**, and PHDWin will construct all of the cases in the prospect, spacing the projections as specified.

MANAGING PROSPECTS

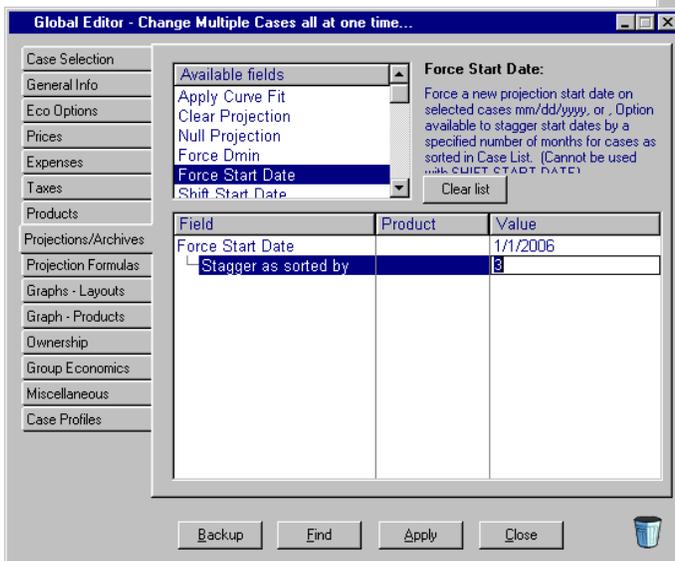
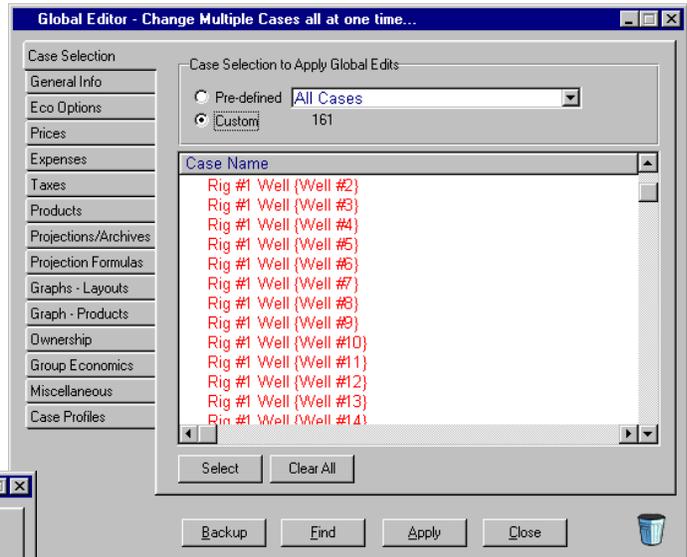
Once the Prospect Builder creates the drilling schedule, the resulting cases are completely independent entities; they are treated in the system as any other case would be. Users may adjust any part of the cases individually or as a group via the Global Editor. The cases are NOT dynamically linked in any way, and it is important to understand that fact when adjusting prospect cases.

CHANGING THE DRILLING SCHEDULE (ADJUSTING SPACING OF PROJECTIONS)

In order to readjust the spacing between cases that were created by the prospect builder, we need to use a specific tool in the Global Editor.

Step 1: Ensure the cases are sorted in the right order in the Case List; the Global Editor tool requires it. The easiest way to do this is to simply remove any sort orders that have been applied to the Case List. When the Case List is not sorted, it will list the cases in the order of creation, putting prospects in the correct order.

Step 2: Drag the prospect cases into the **Case Selection** tab of the **Global Editor**. This edit will only apply to those cases that are part of the prospect.



Step 3: Go to the **Projections/ Archives** tab and drag the **Force Start Date** option to the Field column below. This will allow you to enter the start date of the first well.

Hitting apply now would align all of the cases to the same start date, but since we want to space them out, we will enter a month value in the **Stagger as sorted by** field on the second line. This will space out the projections by the entered number of months in the order the cases are sorted in the **Case Selection** tab. Click **Apply**.

Note: The start date entered here will be the first date of production, NOT the drill date.

CHAPTER 20 - BASIC GROUP CASE TYPES

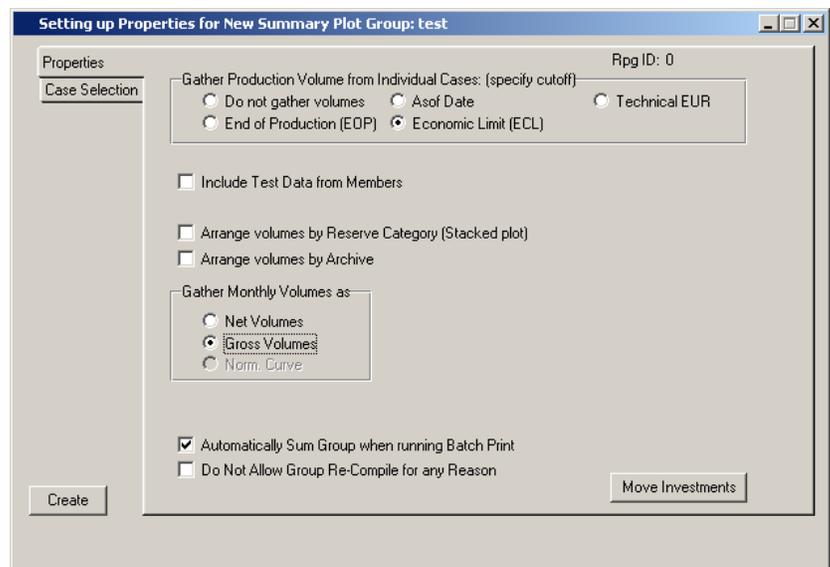
SUMMARY PLOT CASE

Summary Plot Case – This is a separate case in the project that gathers the historical and/or projected oil, gas, and water production volumes from the cases which contribute to it, known as its children. The summary plot case is a way to look at a total summary graph of a group of properties. By default, test data is not included when creating the summary case. To include test data, the option must be selected in the properties window. To create a summary plot, select Single Case in the Add/Import Data Wizard, then choose Summary Plot under Case Type.



One of the first options presented in the properties window is the cutoff for gathering production from child cases. Cutoff options are:

- **Do not gather volumes** – The sum plot does not roll up any volumes from the child cases. In the case of a sum plot or normalized curve case, this option does not make sense to choose.
- **AsOf Date** – The sum plot gathers the volumes, historical or projected, that occur before the AsOf Date of the project.
- **End of Production** – The sum plot gathers only historical volumes from the child cases.
- **Economic Limit** – The sum plot gathers historical or projected volumes until the economic limit of each individual case.
- **Technical EUR** – The sum plot gathers historical or projected volumes out to the very end of each projection on the individual cases regardless of economics.



The volumes gathered can be **gross or net volumes**. A **net sum plot** is the sum of the net production, based on the initial NRI, of all the selected cases. Each month's net production (initial NRI * that month's production) from each of the source cases is combined into a new case. A **gross sum plot** is the gross monthly sum of the production of all the selected cases. Each month's production from each of the source cases is combined into monthly production for a new case. A gross sum plot considers 100% of production from all product types from all selected cases.

STACKED SUMMARY PLOTS

Users can choose to make a “**Stacked**” Sum Plot, which arranges the volumes by reserve class/category and “stacks” the projections.

Stacked plots will result in the following products for Oil, Gas, Water, and Well Count for each reserve class/category being built for graphing.

- 1) **PDP** - Makes a pass gathering all cases that are PROVED DEVEVELOPED PRODUCING.
- 2) **PUD** - Makes a pass gathering all cases that are PROVED UNDEVELOPED or PROVED BEHIND PIPE.
- 3) **Prob** - Makes a pass gathering all cases in the PROBABLE class.
- 4) **Poss** - Makes a pass gathering all cases in the POSSIBLE class.
- 5) **Proved** - Makes a pass gathering all cases in the PROVED class.
- 6) **P+P** - Makes a pass gathering all cases in the PROVED or PROBABLE classes. (This product gives a total of PROVED + PROBABLE.)
- 7) **P+P+P** - Makes a pass gathering all cases that are PROVED or PROBABLE or POSSIBLE. (This product gives a total of PROVED + PROBABLE + POSSIBLE.)
- 8) **PDP + PDNP** - Makes a pass gathering all cases that are PROVED DEVELOPED PRODUCING, PROVED BEHIND PIPE or PROVED DEVELOPED NONPRODUCING. (This product gives a total of PDP and PDNP.)

STACKED PLOT BY ARCHIVE

The Arrange Volumes by Archive option displays the graph with different summary lines for each projection archive that exists in the project. This can be a useful view for comparing one set of projections against another at the group level.

NORMALIZED CURVE CASES

A normalized curve is similar to a summary plot case in that it rolls up volumes from the individual child cases to create a composite curve. Like the sum plot, the normalized curve cannot have economics applied to it; it is designed to be a reference case only. To create a normalized curve, select Single Case in the Add/Import Data Wizard, then choose Normalized Curve under Case Type.

A normalized curve case is distinguished from the sum plot by its effect on production dates and listed volumes. Though the normalized curve case rolls up volumes, the curve case sets each child case back to time zero (1/1/1900) before summing volumes. Additionally, **the curve case divides total production by well count** in order to produce an average curve.

When selecting the cutoff for gathering volumes on a normalized curve case, some argue it best to select the EOP option because, when creating a type curve, users probably do not want projections to bias the type curve—the curve should be based solely on actual production.

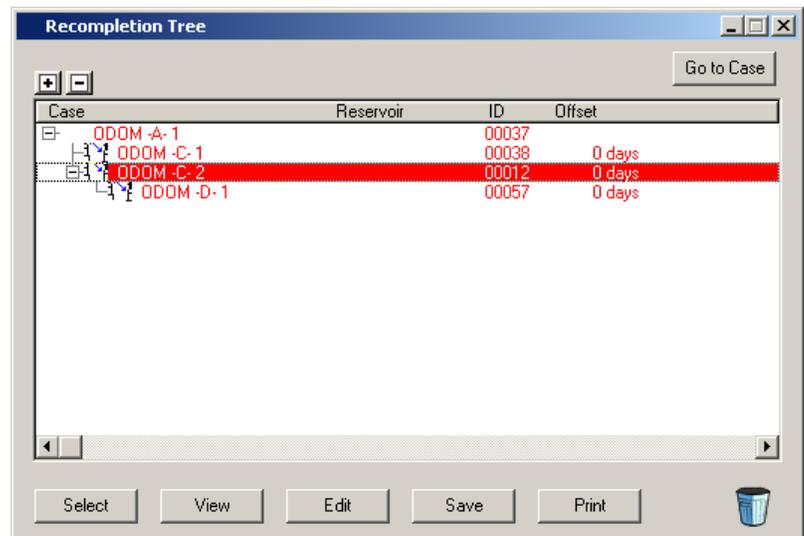
CHAPTER 21 – RECOMPLETION CASES

A recompletion case is set to begin when another case in the project goes non-economic. PHDWin allows users to dynamically link cases as recompletions so that any changes made to the base case will automatically update the start date of the recompletion case.

RECOMPLETION TREE

The Recompletion Tree is the window in which those dynamic links are created. Open the recompletion tree by selecting **Editor | Recompletion Tree** from the main menu.

The tree is set up in a hierarchy; the initial producing well is listed first, and all of its recompletions are listed underneath. The offset of days is listed to the right of the recompletion. The recompletion is linked to the abandonment of the case listed above it plus or minus the offset of days.



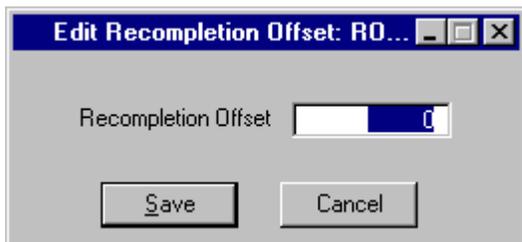
LINKING RECOMPLETION CASES

1. Select **Editor | Recompletion Tree** from the main menu.
2. Open your **Case List**  and drag and drop cases to link into the Recompletion Tree window that you opened in step one.
3. Drag the recompletion (dependent) case **on top of** the base case in the recompletion window. The cursor will turn to a large black arrow pointing down, indicating that if the mouse button is released the cases will be linked.
4. The recompletion will be indented below the base case and display the  icon next to the case, confirming creation of the recompletion link.

SETTING AN OFFSET FOR A RECOMPLETION

Users have the ability to edit or add the number of days for an offset if the recompletion case does not start immediately.

1. Open the Recompletion Tree window if necessary.
2. Double click the recompletion case to offset.
3. Enter the number of days to offset the recompletion in the window as seen below.



REMOVING A CASE FROM THE RECOMPLETION TREE

To remove a case from the tree, drag the unwanted case to the trashcan in the lower right corner of the Recompletion Tree window.

CHAPTER 22 - INCREMENTAL CASES

An incremental case is a dynamic link between two cases used to calculate the incremental difference between the two cases.

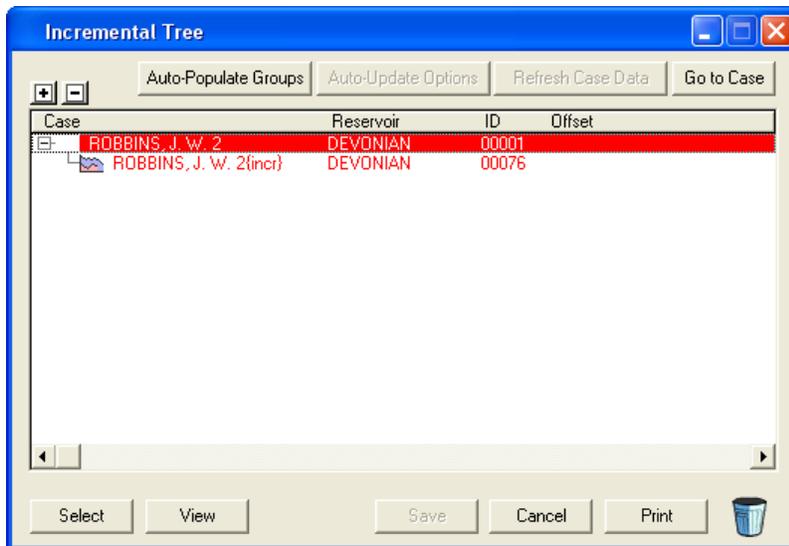
While an incremental link may be created between any two cases in the project, they are typically created by two cases that are representing the same well under different conditions.

The base case is the case linked to the incremental. The base acts as a normal case; when run, it will output normal economics. The incremental case, however, will report its own economics and production minus the economics and production from the base case.

THE INCREMENTAL TREE

The Incremental Tree is found in the same location as the Recompletion Tree. From the Main Menu, select **Editor | Incremental Tree**.

Once again, the window is configured as a tree structure that displays base and incremental cases. The base cases are listed as normal, and the incrementals are indented with the incremental symbol.



CREATING INCREMENTAL CASES USING THE INCREMENTAL TREE

1. Select **Editor | Incremental Tree** from the main menu.
2. Open your **Case List**  and drag and drop cases to link into the Incremental Tree window that you opened in step one.
3. Drag the incremental case **on top of** the base case in the incremental window. The cursor will become a large black arrow pointing down, indicating that if the mouse button is released, the cases will be linked.
4. The incremental will be indented below the base case and display the  icon next to the case, confirming that it is an incremental case, and the link has been created.

CREATING INCREMENTAL CASES USING THE CASE LIST

In addition to the Incremental Tree, incremental cases can be created and linked through the Case List. Choose the base case, and click the  button. The program will prompt the user, indicating that a new case will be created as an increment to the currently selected case.

This new case will be listed in the Case List with an  icon next to it and will also show up in the Incremental Tree window as an increment to the base case.

Note: Creating Incremental cases through the Case List actually does create a new case. To link two existing cases, use the Incremental Tree window.

VIEWING INCREMENTAL CASES ON THE GRAPH

Once an incremental case has been defined, PHDWin displays both the incremental and the base case on the incremental graph for comparison. After creating an incremental case:

1. Double click the incremental case in the Case List to set it as the active case. (The incremental will be indicated by the  icon.)
2. Select **Graphs | Display** from the main menu.
3. Projections from both cases will be shown and labeled on the graph.

CHAPTER 23 – RISK ANALYSIS AND PROBABILITY OF SUCCESS

PHDWin allows the user several methods for assessing case risk.

MULTIPLIERS

There are two types of multipliers that can be added to a case to represent risk. Fields for Case and Volume Multipliers can both be found in the Eco Options tab of the Case Editor.

The **Case Multiplier** is the most conservative method of risking a case. Here users enter a multiplication factor that will be applied to the entire case. The case is run under normal conditions, and then all of the reported numbers are multiplied by this factor for output. This method of risking affects all aspects of the case, including volumes, revenues, expenses and investments.

The **Volume Multiplier** is slightly more aggressive. When a Volume Multiplier is added, PHDWin multiplies the volumes of the case by this factor BEFORE running economics on the case. This method of risk affects mostly revenues and volumes, and only those expenses that are tied to production volumes; fixed expenses, well expenses, and investments are unaffected by the Volume Multiplier.

RISK TREE

The Risk Tree is the most aggressive and accurate method of risking. This tree allows users to specify a risk factor that will be applied to the case, applies an inherited risk factor, and finally produces a final risk value for the case. This method allows users to risk your dry hole costs by the probability of drilling the well, and completion costs, revenues and volumes are multiplied by the probability of success.

There are three terms that are used in this tree:

- **Incremental Risk** – This is the probability of success on the individual case.
- **Inherited Risk** – This is the probability that this case will be drilled, based on its dependency on the success of another case.

- **Compounded Risk** – This is a value that is calculated by multiplying Incremental Risk by Inherited Risk. This is the actual probability of success of the case taking into consideration any dependencies on the success of other cases.

The only number users enter into the system is incremental risk. The other factors will be calculated based on the relationships established between the cases in the project.

The compounded risk factor will be applied to all reserves, revenues and expenses because those will only occur if the case is successful.

RISK TREE AND INVESTMENTS

The only economic factors that may need to use one risk factor or another are investments.

Inherited risk should be applied to those investments that are considered dry hole costs, such as drilling and abandonment investments.

Compounded risk should be used for all of those investments that will only occur if a case is successful, such as completion costs, compressors, workovers, etc.

ACTIVATING THE RISK TREE

In order for the Risk Tree structure to affect the economics of cases in the tree, the Risk Tree must be active.

Activate the Risk Tree through the Economics tab of the Project Properties window. This allows the user to turn Risk Mode on and off without having to recreate the risk relationships each time.

USING THE RISK TREE

PHDWin allows users to graphically create risk cases through the use of the Risk Tree, which can be accessed by going to **Editor | Risk Tree**. Cases can be added to the Risk Tree by dragging and dropping them from the Case List window. When Case A is dragged directly on top of another case in the Risk Tree window, Case A becomes a child of the other case.

The **Probability of Success Factors** are calculated based on the incremental and inherited risk multipliers. In the example shown at right, the EXPLORATION WELL case has been given a 50% probability of success (denoted by the 0.500 value under Incremental.) Because it is the first well, it has an inherited risk of 1, leaving the compounded risk as 50%.

The LIKELY HILL well, however, has a 95% probability of success, but is dependent on the success of the EXPLORATION WELL. To determine the compounded risk of LIKELY HILL, 95% is multiplied by 50%, resulting in a 47.5% chance of success.

Lease	Incremental	Inherited	Compounded	Value M\$
EXPLORATION WELL	0.500	× 1.000	= 0.500	82.58 M\$
LIKELY HILL	0.950	× 0.500	= 0.475	82.58 M\$
LUCKY STRIKE	0.300	× 0.500	= 0.150	82.58 M\$

CHANGING INCREMENTAL RISK FACTORS

To change a well's incremental probability multiplier, **double click** the desired well, and type in the multiplier.

Note: Inherited and compounded risk cannot be changed on any case; these values are calculated by PHDWin.

REMOVING CASES FROM THE RISK TREE

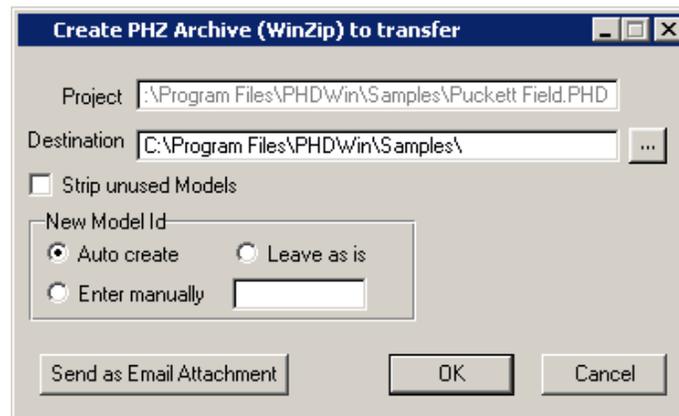
To remove a case from the Risk Tree, drag the unwanted case to the trashcan in the lower right corner of the Risk Tree window. Verify that the trashcan is in the Risk Tree window so that you are just removing the case from the Risk Tree. Dragging to the trashcan in the Case List will remove the case from the database entirely.

CHAPTER 24 – EXPORTING CASES

Once you have worked the file in PHDWin, there may be a need to send the file to other people. In this chapter we will show you how to use transfer files to send your project to other PHDWin users, as well as how to use the export window to create ARIES files.

PHZ TRANSFER FILES

Transfer files are used to send/receive files (usually via email) between co-workers, clients, TRC technical support, or other PHDWin users. This feature will allow a user to zip (compress) the PHDWin database and attached models in one PHZ file ready for email or other file transfer. To begin, select **File | Transfer** from the main menu.



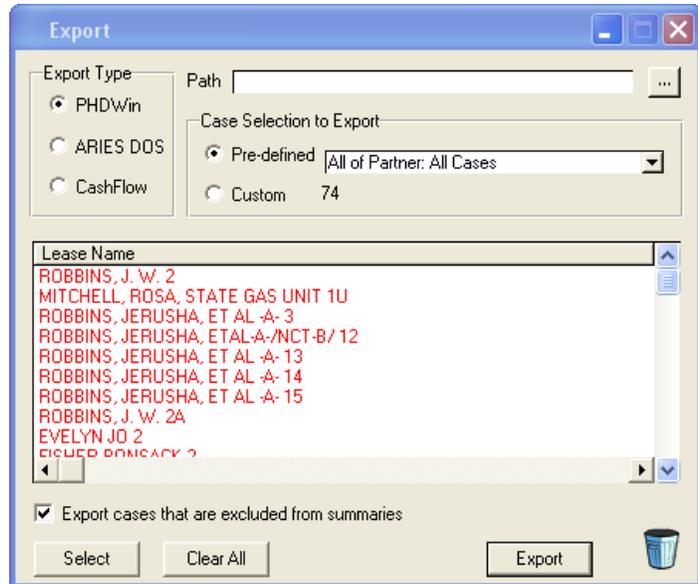
Send as Email Attachment – This option will create the PHZ File and open the default mail program (Outlook, Eudora, Thunderbird, etc.) and create a new message with the PHZ file already attached. Users need only address the email, create any desired message body, and click Send. Note that if the default program is not running when the email is sent, users should check the Outbox to ensure the email is delivered.

THE EXPORT WINDOW

PHDWin supports exports to several formats. Select **Files | Export** from the main menu to open the following window.

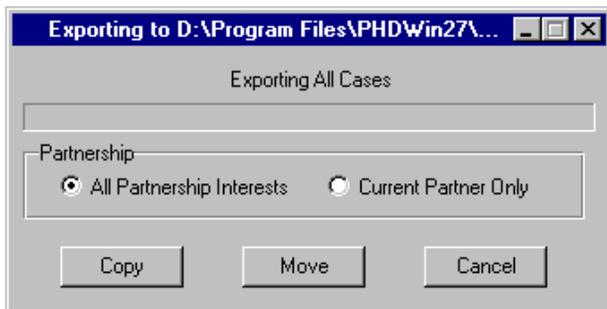
Once inside this window, select the Export Type found in the top left hand corner of this window. The case selection process for those cases to export first requires a pre-defined group selection or a custom selection. Pre-defined groups will be any group already created in the database.

For a custom selection, click the Custom radio button, and then click Select to activate the Case List. Drag and drop the appropriate cases from the Case List into the Export window. Users will always have the ability to clear the selection as well as view a total count next to the Custom radio button.



PHD EXPORT

To extract cases into a new PHDWin database, choose **Files | Export** from the main menu. Select PHD in the Export Type section, and map to a destination path for the PHD file export. Once the case selection is specified, click **Export**. The following window will appear.



Options are available to move or copy the selected group of cases. Selecting the copy button will leave the original PHD file unchanged, and the new file will receive only the selected cases. Selecting the move button will DELETE the selected properties from the original file and move them to the new PHD file. Other selections included are to move All Partnership Interests or Current Partner Only.

Moving Groups - If an entire group is moved from the existing project, the grouping is also moved to the new file; however, if only a part of a group is moved, that grouping is no longer valid and is removed.

ARIES DOS EXPORT

This option creates all ARIES DOS .dbf tables and .dbs files in a folder that PHDWin will create labeled ARIES.

To access the Aries Dos export, open **Files | Export** from the main menu.

1. Select the Aries Dos option button.
2. Specify the location and file name for the export, and select the cases to be included in the export.
3. Click **Export** to begin the export.

NOTE: There is no direct export to ARIES Windows, but you can convert ARIES DOS Files to ARIES Windows within ARIES.

TRAINING CLASS OUTLINE

1. *Managing Projects*
2. *Importing Cases (data provider)*
3. *Using the Case List*
4. *Graphing Production Forecasts*
5. *Using the Case Editor*
6. *Reporting a Project*
7. *Troubleshooting Cases*
8. *Using the Global Editor*
9. *Using Edit Data in Excel*
10. *Models: Economic Sensitivities*
11. *Partners: Ownership and Investment Sensitivities*
12. *Products: Decline / Projection Sensitivities*
13. *Custom Imports*
14. *Adding New Cases (Basic)*
15. *Exporting and Merging Projects*
16. *Managing PHDWin*

TRAINING ACTIVITIES

MODULE 2 ACTIVITIES

1. Import the Puckett_Update.dri file located in the Training Files.zip file on your computer.

MODULE 3 ACTIVITIES

1. Create a sort order by Reservoir and then by Case Name. Construct the sort such that summaries are generated by Reservoir, and even groups of one case generate summaries.
2. Create a filter so that only cases in the Devonian reservoir are displayed. Ensure the filter is named appropriately.

MODULE 4 ACTIVITIES

1. Make the Moore, E.R. 1 case active. (To help you find it, it's DRI Code is 182579.)
2. Open the case's graph tab 1. Display only gas on the graph.
3. Show data from 1965 until 2030. Change the grid line color to grey.
4. Forecast production into the future using any autofit except the blind autofit (car). Use all production from January, 2000 going forward for the autofit. Then, manually edit the curve until a technical EUR of approximately 68,931 MMcf is found. (Advice: use an exponential decline; do not try to fit hyperbolic.)

MODULE 5 ACTIVITIES

1. Create a duplicate of Robbins, J. W. 2. Copy all information. Then, change prices on the case to (Gas) \$6.50/MMBtu and (Oil) \$60/Bbl.

MODULE 6 ACTIVITIES

1. Run each of the reports listed in the table below for Robbins, J. W. 2. As you run each report, fill in the table below with responses for each report.

	Standard Eco	Detailed	Standard (yr/mo)	Detailed NGL	Std One-Liner	Gross/Net One-Liner
1. Is the report portrait or landscape?						
2. Can the report provide monthly output?		NO				
3. Does the report provide GROSS output?				NO		
4. Does the report provide economic indicators?						

MODULE 8 ACTIVITIES

1. Using the global editor, set the grid line color on all cases for only graph tab 1 to be light grey.

MODULE 9 ACTIVITIES

1. Use Edit Data in Excel to edit the BTU factor for all cases to be 1000 instead of 0.

MODULE 10 ACTIVITIES

1. Create an oil price model called "WTI Cushing Spot" using the bloomberg website (link is listed below). Delete the existing "WTI Crude" model as well. Then, apply the "WTI Cushing Spot" model to all cases.
2. Create a new PHDWin project (close the current one first) called "Dummy Price Project.phd" as the file name. Link the new project to a new model file called "dummy model file.mod" that is a copy of the model file being used for the standard training file.
3. Record your answer below to the following question: What model file relationship is being used by each of the phd and mod files you now have? Is it one-to-one, one-to-many, or hybrid? Why?

MODULE 10.3 ANSWER

MODULE 11 ACTIVITIES

1. Set ownership on all cases in the All Cases {main} partnership to 100% WI, 80% RI, and 80% LNRI.
2. Create a new partner called "My Company" where WI is 25%, LNRI is still 80%, but the company also has a 2% ORRI (meaning their RI is 22%). Ensure investments are linked to All Cases {main}. Case Selection should be all cases in the All Cases partner.
3. Make the All Cases {main} partner active again before proceeding to next module.

MODULE 12 ACTIVITIES

1. Open the Robbins, J. W. 1A 5 case. (DRI Code is 421036.)
2. Make "default" the active archive.
3. Forecast Gas and Oil using Phase Independent.
4. Copy the forecast output to YE08.
5. Switch phase configuration to YE08 to Minor Phase Variable Ratio.
6. Record your answer below to the following question: When using Minor Phase Variable Ratio, the minor phase (Oil) should be calculated as a result of a formula, and the ratio (Yield) should have a decline curve. Since Yield has no curve yet, why is Oil still visible on the graph?
7. Use Minor Phase Variable Ratio to forecast Yield on the GOR tab in order to ultimately forecast Oil.

MODULE 12.6 ANSWER

MODULE 13 ACTIVITIES

1. Create and import the second (test data) table listed in Visual Aides VA7: Custom Imports.

MODULE 14 ACTIVITIES

1. Create a NET summary plot for all cases in the project. Call the sum plot "PUCKETT NET SUMMARY." Gather net volumes until ECL.

MODULE 15 ACTIVITIES

1. Complete the following procedure to understand how merging archives works.
 - a. In the training project, set the default archive as active on all cases.
 - b. In the training project, only export Robbins, J.W. 2 to a temp phd file called "merge.phd." Put the "merge.phd" file on your desktop.
 - c. Open the "merge.phd" file, and copy the active archive to a new archive called "NEW." Be sure to copy archive contents (projections), too.
 - d. Delete the projection contents of the default archive.
 - e. Change the ownership on the case to be 0% WI, 2% RI, and 80% LNRI.
 - f. Close "merge.phd," and open the training project again. Merge the "merge.phd" file. Choose to merge projection sets and archives only.
 - g. Complete the merge. View the contents of the default and NEW archives for Robbins, J. W. 2 as well as ownership on the case. What do the contents look like? Is this what you would expect? Write your answer below.

MODULE 15.1.G ANSWER

TRAINING VISUAL AIDES

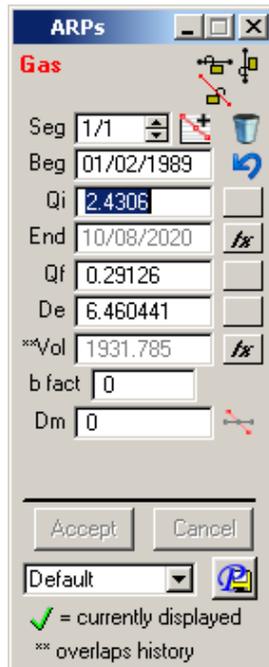
VA1: IMPORT TYPES

<u>Import From</u>	<u>File Type</u>	<u>ID Generated</u>
Drilling Info	.dri	DRI
IHS	.98c	PID
Lasser	.prn	LASSER
Divestco	.pds	PDS
CSV	.csv	Retrieval Code*
Excel	.xls	Retrieval Code*
Access	.mdb	Retrieval Code*

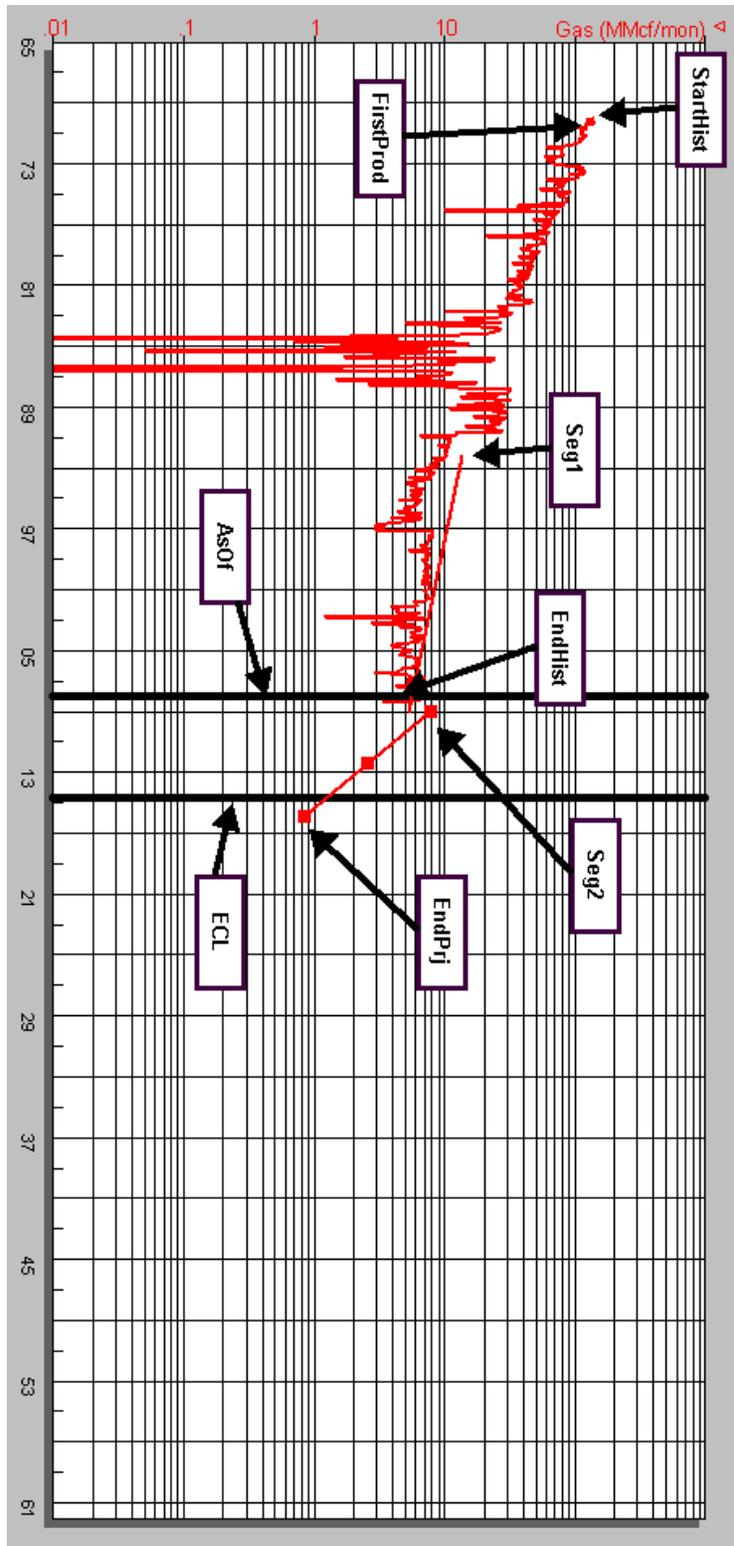
* Custom imports generally require an ID column, which generates values for an ID in PHDWin called Retrieval Code.

VA2: ARPS VALUES

Parameter	Graphs Like	Description
Seg	line segment	Lists the segment number; a single forecast can have 10 segments
Beg	x_1	Starting date of forecast
Qi	y_1	Starting production rate of forecast
End	x_2	Ending date of forecast
Qf	y_2	Ending production rate of forecast
De	slope	Calculates steepness of decline curve on semi-log graph.
Vol	area under the line	Definite integrated volume under the decline curve.
b fact	curves the line	Hyperbolic factor. b values of 0 or .001 means exponential (straight).
Dm	point where curved line stops curving	Minimum decline percentage allowed when hyperbolic.



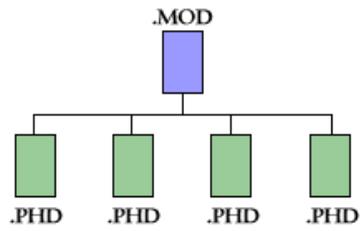
VA3: LINKED DATES



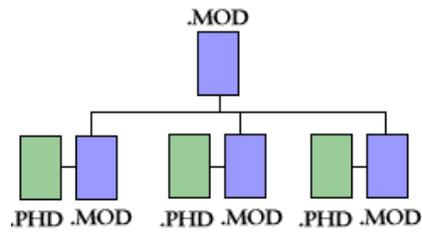
VA4: MODELS



One phd file to one mod file



Several phd files to one mod file



One phd file to one mod file and one master mod file

VA5: PARTNERS

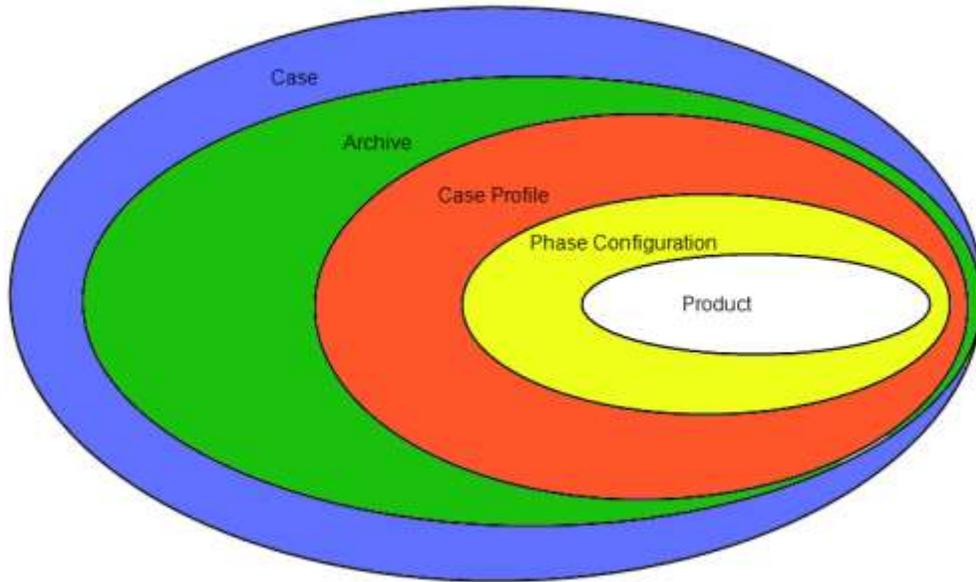
	All Cases	Partner A	Partner B
Case 1	100%	50%	30%
Case 2	100%	30%	70%
Case 3*	100%	40%	40%
Case 4	100%	80%	20%
Case 5	100%	100%	INVISIBLE (0%)
Case 6	100%	INVISIBLE (0%)	100%
Case 7	100%	INVISIBLE (0%)	INVISIBLE (0%)

*Case 3 demonstrates that the total working interest in the two partners is not required to add up to 100% in PHDWin.

	All Cases	Purchase Option 1	Purchase Option 2
Case 1	100%	50%	0% (1% royalty)
Case 2	100%	50%	0% (1% royalty)
Case 3*	100%	50%	100%

*Case 3 demonstrates that the total working interest of the two partners can add up to more than 100% in PHDWin.

VA6: PRODUCTS



	Phase Independent	Minor Phase Flat Ratio	Minor Phase Variable Ratio
Major Phase (ex. Gas)	Decline Curve Projection	Decline Curve Projection	Decline Curve Projection
Minor Phase (ex. Oil)	Decline Curve Projection	Formula Gas * <u>USER INPUT</u>	Formula Gas * Yield
Ratio (ex. Yield)	Formula Oil / Gas	Formula Oil / Gas	Decline Curve Projection

* USER INPUT is the flat ratio factor. Type this factor into the formula inside the Product Stream Properties window. This window is opened by selecting Editor | Products Tree from the Main Menu. Then, double-click the appropriate line in the Products Tree. (In this case, the appropriate line is the Oil line.)

VA7: CUSTOM IMPORTS

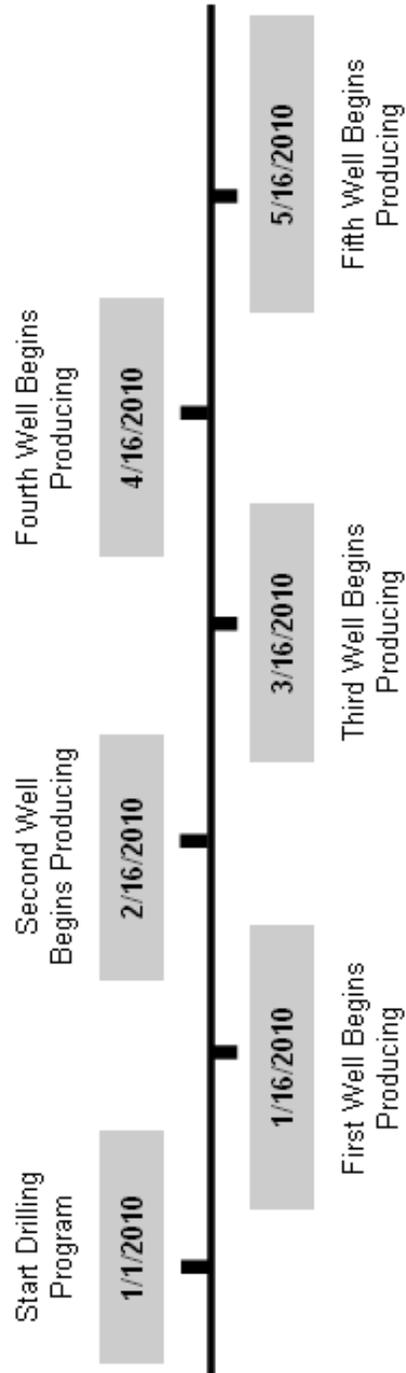
Production and Header Information

DRI Code	Case Name	Field	Prod Date	Gas	Oil
182560	ROBBINS, J. W. 2	Puckett	8/1/2008	5200	0
182560	ROBBINS, J. W. 2	Puckett	9/1/2008	5200	0
182560	ROBBINS, J. W. 2	Puckett	10/1/2008	5100	0
MATCHING ID	CASE NAME	FIELD	PRODUCTION DATE	GAS PRODUCTION (PROD DATE)	OIL PRODUCTION (PROD DATE)

Test Data

DRI Code	Case Name	Well Num	Test Date	Gas	Oil	FTP
182560	ROBBINS, J. W. 2	42-371-00365	1/1/2008	208	0	124
182560	ROBBINS, J. W. 2	42-371-00365	1/2/2008	207	0	124
MATCHING ID	CASE NAME	WELL NUM – START TEST – NO APPEND	TEST DATE	TEST GAS (VOL/DAY)	TEST OIL (VOL/DAY)	FTP

VA8: DRILLING PROGRAM



VA9: MERGE OPTIONS (1/3)



Merge File

Case 1

- Archive A
- Archive B
- Unique ID x

Case 2

- Unique ID y
- Retrieval Code abc

Open File

Case 1

- *Archive A*
-
- *Archive C*
- *Unique ID x*

Case 2

- *Unique ID z*
- *Retrieval Code abc*



Merge File

Case 1

- Archive A
- Archive B
- Unique ID x

Case 2

- Unique ID y
- Retrieval Code abc

Open File

Case 1

- **Archive A**
- **Archive B**
- *Unique ID x*

Case 2

- **Unique ID y**
- *Retrieval Code abc*



Merge Option 1: All Data. Font differences in Merge File and Open File indicate replacement.

VA9: MERGE OPTIONS (2/3)



Merge Option 2: Archives and Projections Only. Font differences in Merge File and Open File indicate replacement.

VA9: MERGE OPTIONS (3/3)



Merge Option 3: Unique IDs Only. Font differences in Merge File and Open File indicate replacement.

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APPENDIX B - KEYBOARD SHORTCUTS

Keyboard shortcuts can be a great way to increase speed and efficiency in the software. This appendix lists all of the keyboard shortcuts in the system. It is organized by “thread” meaning by which window you have open at the time you press the keys.

ALL THREADS

The following table lists Hot Keys that work no matter what window is active in PHDWin.

Hot Key	Action	Comment
PgUp	Save and backup to previous case in current sort	
PgDn	Save and advance to next case in current sort	
Ctrl + G	Popup Report Group Selection Window	
Ctrl + F	Popup Case Finder Window	
Ctrl + L	Popup Case List Window	
Ctrl + E	Popup Case Error Check	"If Report Selection is ""Current Case"", runs interactive debug window - else runs Batch Error Check Report"
Ctrl + X	Popup Primary Economic Report	Primary Economic Report is whatever is in First Economic Report Position
F9	Place a paperclip on current Case	
Ctrl + R	Refresh report or economics	"If report thread is open, will refresh current report - otherwise will refresh ECL date."
CtrlF9	Move to the paper clipped Case	
F10	"WorkStamp, Save and Advance"	"Stamp the Unique Workstation ID (System Preferences) plus Date and Time into the Id Code List, then save the case and advance to the next case in the sort."
CtrlF10	Workstamp	Stamp the Unique Workstation ID (System Preferences) plus Date and Time into the Id Code List - but does not automatically save and advance

GRAPH HOT KEYS

The following Hot Keys are available while the Graph window is active in PHDWin™.

Hot Key	Action	Comments
Double Click	Popup Graph Properties Window	
W Key	Source Well List Window	Only for Summary Plots with multi-well test data
H Key	Toggle vertical/horizontal grid axis hotzone on/off	Used when handles are too close to axis and can't grab them
Alt1	Select Graph Tab 1	
Alt2	Select Graph Tab 2	
Alt3	Select Graph Tab 3	
Alt4	Select Graph Tab 4	
Alt5	Select Graph Tab 5	
Alt6	Select Graph Tab 6	
Alt7	Select Graph Tab 7	
Alt + T	Truncates the projection to the last day Of history.	
Ctrl + P	Toggle Projection (Forecast Mode) on/off	
Home Key	"Moves pointer to the left of current position in following precedence order: AsOf date, Start of Projection, End of Production, Start of Production"	Only active in Walk-mode
End Key	"Moves pointer to the right of current position in following precedence order: Start of Projection, End of Production, AsOf date, End of Projection"	Only active in Walk-mode
Ctrl + A	Invoke Blind Auto Fit	Only active in Forecast mode
Ctrl + B	Toggle Biggie Size	Only active in Forecast mode
Ctrl + M	Toggle Midpoints (Annual) for History and Projection	Only active in Forecast mode
Ctrl + T	Invoke Type Curve Window	Only active in Forecast mode
F3 Key	"Save current projections to Primary Archive, display graph"	Only active in Forecast mode
F4 Key	"Save current projections to Primary Archive, force Save All, advance next Case"	Only active in Forecast mode
F5 Key	"Save current projections to Primary Archive, force Save All, advance next non-projected Primary Arc"	Only active in Forecast mode

Tab Key	Switch to next displayed archive	Only active in Forecast mode and when graph is in focus
Minus Key	"Any data entry field in parameter window, decrease input value slightly and resolve curve."	Only active in Forecast mode
Plus Key	"Any data entry field in parameter window, increase input value slightly and resolve curve."	Only active in Forecast mode

MISCELLANEOUS HOT KEYS

<i>Hot Key</i>	<i>Window</i>	<i>Actions</i>
F4 Key	Memo	Insert report subcomment

CASE EDITOR HOT KEYS

Hot Key	Tab	Action
Enter	ID Code	Edit
Insert Key	ID Codes	Add
Delete Key	ID Codes	Delete
Enter	Monthly History	Edit Months
Alt + E	Monthly History	Edit Months
Alt + A	Monthly History	Add Month
Ctrl + Enter	Monthly History	"Save Year, Insert New Year and Edit Annual Volume"
Enter	Production Tests	Edit
Insert Key	Production Tests	Add
Delete Key	Production Tests	Delete
Enter	Prices	"Edit, Pick Model"
Insert Key	Prices	Add
Delete Key	Prices	Delete
Alt + P	Prices	Pick Model
Plus Key (grey)	Prices	Expand Tree
Minus Key (grey)	Prices	Contract Tree
Ctrl + A	Prices	Annual Price - set 12 month segment and save
Enter	Expense	"Edit, Pick Model"
Insert Key	Expense	Add

Delete Key	Expense	Delete
Alt + P	Expense	Pick Model
Plus Key (grey)	Expense	Expand Tree
Minus Key (grey)	Expense	Contract Tree
Alt + A	Expense	"Pop-up ""ECL After"" Window"
Alt + B	Expense	"Pop-up ""No Expense Before"" Window"
Ctrl + A	Expense	"Annual Cost - set 12 month segment, divide by 12 and save"
Enter	Investment	Edit
Insert Key	Investment	Add
Delete Key	Investment	Delete
Enter	Ownership	Edit
Insert Key	Ownership	Add
Delete Key	Ownership	Delete
Enter	Taxes	"Edit, Pick Model"
Insert Key	Taxes	Add
Delete Key	Taxes	Delete
Alt + P	Taxes	Pick Model
Plus Key (grey)	Taxes	Expand Tree
Minus Key (grey)	Taxes	Contract Tree
Alt + B	Taxes	"Pop-up ""No Tax Before"" Window"
Ctrl + A	Taxes	"Annual Tax - set 12 month segment, divide by 12 and save"