ARIES™ Software
Version 5000.1.10.0

Release Notes
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What’s In This Release

ARIES™ 5000.1.10.0 is the name of the major new ARIES software release for 2012. It delivers improvements in three main areas:

- Top-rated User Group enhancements
- Improved usability
- Defect repairs

To go directly to the enhancements, defect repairs, or known problems for the ARIES application, click on the links below:

- Enhancements and New Functionality
- Defects Repaired
- Known Problems

These Release Notes also contain information on the ARIES Modeler and an Appendix for in-depth discussions of major enhancements.

An Introduction to the ARIES software release and information on Licensing are also provided in this document.
**Introduction**

The ARIES 5000.1.10.0 release includes all the modules for ARIES System (Project Manager, Graphics, and Economics), plus the optional modules for Modeler, Reserve Management System, and DecisionSuite™. Release details specifically for the Modeler are included at the end of main part of this document.

This ARIES release is available for electronic software distribution, or by request, on a dedicated distribution DVD, to all customers who are current on M&S. This is explained in detail below. It provides a simple installation process which is described in the Installation Guide document included with the release.

Customers running ARIES 5000.0.2.0 or later can use their existing software licenses. New users and customers running older versions must obtain new license files to use this new ARIES release. This is described in more detail below. Those customers who use a license server (local or network), as opposed to a standalone license, must also have the R5000 version of the License Application Manager.

**Release 5000 Compatibility**

This ARIES release is compatible with the Landmark R5000 platform which is designed to increase the usability and stability of all the applications, platforms, and third-party tools.

**OS, Hardware, and Platforms**

ARIES 5000.1.10.0 is a 32-bit multi-threaded application capable of supporting up to four processors. It was tested primarily with MS Windows® 7 and Windows XP 64 SP3. The basic hardware requirements have not changed, except that a DVD reader is needed for local installations if the electronic software distribution is not used. Hardware must be appropriate to run the chosen operating system.

Oracle® 10g and 11g, MS SQL Server 2005/2008, and MS SQL Express 2005/2008 databases are supported by the program, as are MS Access databases in the .mdb and .accdb formats. While ARIES 5000.1.10.0 was not tested on Oracle 9i or SQL Server 2000, it is unlikely that any problems will arise with these older databases.

If needed MS SQL Express 2008 or 2012 should be downloaded from Microsoft. MS SQL Server Express 2012 has not been tested extensively, but no problems are expected.

For wide area network environments, such as Citrix, the ARIES installations are custom and must be implemented and supported by your company network administrators or the Landmark Consulting Services group.
System Requirements
The following minimum and recommended local computer system requirements for running the ARIES software are provided as general guidelines. They will vary depending on types of projects, project sizes, number of users, and network infrastructure and traffic.

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS - Windows® 7 x64 SP 1, or Windows® XP Professional, SP 3</td>
<td>OS - Windows® 7 SP 1 or Windows® XP Professional, SP 3</td>
</tr>
<tr>
<td>2 GHz processor</td>
<td>1 GHz processor</td>
</tr>
<tr>
<td>2 GB RAM or greater</td>
<td>1 GB RAM or greater</td>
</tr>
<tr>
<td>XGA Color Monitor, or better</td>
<td>XGA Color Monitor (1024 x 768)</td>
</tr>
<tr>
<td>Windows-compatible integrated keyboard</td>
<td>Windows-compatible integrated keyboard</td>
</tr>
<tr>
<td>Windows-compatible mouse</td>
<td>Windows-compatible mouse</td>
</tr>
<tr>
<td>TCP/IP-based network connection 100 Mbps, or FLEXid bitlock, FLEXlm version 11.6.3 (for licensing)</td>
<td>TCP/IP-based network connection 100 Mbps, or FLEXid bitlock, FLEXlm version 11.6.3 (for licensing)</td>
</tr>
<tr>
<td>3 GB or better disk space</td>
<td>2 GB disk space</td>
</tr>
<tr>
<td>DVD reader (if installing from optional DVD)</td>
<td>DVD reader (if installing from optional DVD)</td>
</tr>
<tr>
<td>USB port (if bitlock license used)</td>
<td>USB port (if bitlock license used)</td>
</tr>
<tr>
<td>Microsoft .NET 3.5 framework</td>
<td>Microsoft .NET 3.5 framework</td>
</tr>
<tr>
<td>Microsoft Access 32-bit.accdb drivers</td>
<td></td>
</tr>
</tbody>
</table>

Third Party Applications
Halliburton uses various third-party applications in the development of its software. Halliburton acknowledges that certain third party code has been bundled with, or embedded in, its software. The licensors of this third party code, and the terms and conditions of their respective licenses, can be found in ARIES by clicking the Patents and Legal Notices button on the Help About... dialog. This dialog is accessible from the Help menu in all modules.

International Trade Compliance
This application is manufactured or designed using U.S. origin technology and is therefore subject to the export control laws of the United States. Any use or further disposition of such items is subject to U.S. law. Exports from the United States and any re-export thereafter may require a formal export license authorization from the government. If there are doubts about the requirements of the applicable law, it is recommended that the buyer obtain qualified legal advice. These items cannot be used in the design, production, use, or storage of chemical, biological, or nuclear weapons, or missiles of any kind.

The ECCN’s provided in Release Notes represent Halliburton’s opinion of the correct classification for the product today (based on the original software and/or original hardware). Classifications are subject to change. If you have any questions or need assistance please contact us at:
Under the U.S. Export Administration Regulations (EAR), the U.S. Government assigns your organization or client, as exporter/importer of record, responsibility for determining the correct authorization for the item at the time of export/import. Restrictions may apply to shipments based on the products, the customer, or the country of destination, and an export license may be required by the Department of Commerce prior to shipment. The U.S. Bureau of Industry and Security provides a website to assist you with determining the need for a license and with information regarding where to obtain help.

The URL is:

http://www.bis.doc.gov

This information is also available within ARIES from the Help, About menu in each module by selecting the Patents and Legal Notices button.

**Definitions**

**CCATS (Commodity Classification Automated Tracking System)** - the tracking number assigned by the U.S. Bureau of Industry and Security (BIS) to products formally reviewed and classified by the government. The CCATS provides information concerning export/re-export authorizations, available exceptions, and conditions.

**ECCN (Export Control Classification Number)** - The ECCN is an alpha-numeric code, e.g., 3A001, that describes a particular item or type of item, and shows the controls placed on that item. The CCL (Commerce Control List) is divided into ten broad categories, and each category is further subdivided into five product groups. The CCL is available on the EAR Website.

<table>
<thead>
<tr>
<th>Product/Component/R5000</th>
<th>ECCN Number</th>
<th>License</th>
<th>CCATS Number</th>
<th>Last Date Updated</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARIES 5000.1.10.0</td>
<td>5D002</td>
<td>ENC</td>
<td>G063964</td>
<td>6/04/2012</td>
</tr>
</tbody>
</table>
Distribution

This latest ARIES version is available for you to download electronically using the Landmark Software Manager (LSM), subject to authorization and registration by your company for you. The link to the LSM website is http://esd.halliburton.com/download/download.jsp.

You can then schedule your downloads, or you can download one or more applications immediately.

If you cannot download the applications through LSM due to bandwidth limitations or for other reasons, you may request a DVD by using features within LSM.

Licensing

ARIES uses the Flexera Software FlexNet Publisher™ version 11.6.3 licensing application. This increases compatibility among all the Landmark applications and third-party applications. This version of FlexNet Publisher also provides license management functions to your company, which you would access through their applications.

All customers currently running ARIES 5000.0.2 or later versions can use their existing software licenses to run ARIES 5000.1.10.0.

New customers and existing customers running older versions must obtain new licenses from Landmark, in the form of updated license files or new bitlocks. These new licenses are compatible with releases 5000.0.0 and later. They are not directly compatible with older releases, such as 2007.1.

Customers who are upgrading from a version prior to 5000.0.1, and who use a network or local license server must install the newer R5000 version of the Landmark License Application Manager. Customers who are upgrading from version 5000.0.1 or later will already have the newer License Application Manager.

This LAM installation is available from the Landmark Software Manager and is accessed from the Discipline – Tools row on the bottom of the list on the Home tab. Click the + box at the left of the row to display the individual downloads. Check mark the LAM 5000.0.3 Release Windows XP and Windows 7 row and select the green download arrow to the right on the row. You can read the release notes or installation instructions prior to downloading by clicking the R or I buttons to the right on the row,
Enhancements and New Functionality

Summaries of the enhancements delivered in 5000.1.10 are provided below. Additional details are provided in the Appendix for those enhancements below that include (more info) links.

1 – New Economic Limits

A new set of economic limit calculations and options is available using the ELOSS data line in the Miscellaneous data section. The approaches include a lease operating income economic limit, a case profitability test, and a combination of these. The features include the ability to delay the economic limit, to include overhead costs, to use a specific discount rate for determining profitability, and to set a minimum life.

Abandonment expenses are computed more precisely and are placed at the end of the final month. They can also be delayed using the existing ABANDON or SALVAGE Miscellaneous data lines. These expenses are included in the profitability test methods. (more info)

2 – Operating Income Net Interests

You can adjust the operating income type economic limit calculations in the new ELOSS feature for cases when your appraised net revenue interests are different from what the nets interests that the 100 percent lease faces. This is typically needed for overrides or promoted interests. (more info)

3 – Stretched Exponential Economic Forecasts

The “stretched exponential” decline method within Economics lets you forecast production for unconventional resources using this new approach by entering the parameters on the economic data lines. SED forecasts entered on the economic data lines can be viewed within MultiGraph and plotted using the normal GET feature. (more info)

4 – Select Properties by ID List

This Project Manager feature lets you select the properties from your database to include in a new empty project based on a list of item ID values you enter. For the database item you specify it matches the values in the list to the values for your properties, and includes the matching properties in the project. You type or paste the list of item values into a dialog. (more info)

5 – Update All Active Groups

You can calculate or re-calculate the values for all the active (un-grayed) production and pool groups in the current project at one time. To do this select the Update Active Groups option from the Project Manager, Entities menu. When the process is complete, a message box appears showing the number of groups that were updated.

This feature has no effect on other types of groups because they are not summaries of member property values.

6 – Direct Access Table Edit Buttons

To improve efficiency in many workflows, additional toolbar buttons have been added so you can directly access editors for three database tables. There are now three of these buttons provided within Project Manager, Graphics, and Economics. They access the M table, the MP table, and one table that you designate. (more info)
7 – *Dmin for HYP and HAR*

The minimum effective decline rate *Dmin* that you enter on the Curve dialog Forecast tab now also applies at the beginning point of the curve fit. If the hyperbolic or harmonic curve fit at the first data point (at the beginning range line) results in a *Deff* that is already below the *Dmin* entered, the data points are refit using the exponential equation.

This exponential fit will have a smaller *De* than the entered *Dmin*. In prior releases, the as-fit hyperbolic forecast with the low *De* was used for the entire forecast, without any exponential tail.

This early time check and switch to the exponential fit formula applies to regular Hyperbolic and Harmonic fitting and Manual Hyperbolic adjustment behavior. It does not apply to Fixed Hyperbolic, which will use the entered b value when fitting. It does not depend on the “back forecast” flag setting. No data entry changes are needed to get this new behavior.

8 – *Plot Legend – Final Decline Rate*

The plot legend now includes the final month decline rate *Df* for hyperbolic forecasts. If the curve has reached a specified minimum decline rate, this rate is shown with the label *Dmin*. Exponential forecasts show the constant decline rate using the label *De*.

9 – *Reference Point for Y Auto Scaling*

Additional customization is available for the vertical auto-scaling feature for the curves on a graph or plot. On the Structure tab of the graph scheme dialog you use the **Auto scale reference** item to specify a date or a date range to use to determine the basis for the Top, Down 1, Bottom, etc. positioning instructions you have set on the Curves tab. You can choose Full History, Visible Points, or Last Actual. *(more info)*

10 – *Hide a Curve*

You can now easily hide one or more curves from a graph or plot without permanently deleting them from the graph scheme. On the Graph Scheme dialog, Curves tab, select **Hide** from the Property Type drop down list for the curve(s) you do not want to display.

To restore the display of the curve, reselect the desired Property Type.
11 – More MultiGraph Forecast Segments
You can now interactively schedule up to 20 forecast segments within MultiGraph and store them in Economics. This provides more capability to model behaviors such as ramp ups, plateaus, and complex combinations.

12 – Opaque Notes and Comments
The small text space surrounding Property Notes and Graph Comments is normally transparent, meaning that the curves and grid lines behind them show through. You can specify that this space be drawn as opaque instead (using the background color), by marking this check box option on the Graph and Plot Preferences dialog. This enhances readability of the text, but covers any data points, curves or grid lines underneath.

13 – Improved MultiGraph Walk Marker
If you manually shift the x-axis of a graph so that the Walk date ends up outside the grid area in either direction, the marker symbol will "stick" to the grid border, so it will not disappear. The marker’s tool tip will still show the “off-the-graph” date where the Walk date really is. If you shift the x-axis back, the marker will return to the original location. If you click the marker, it will relocate to the border position and show that date. From there you can move it back into the grid area as wanted.

14 – Suppress Economic Warning Messages
You can now suppress <W> Warning type messages from the run log window and file by selecting the new checkbox on the Econ User Options tab of the Economics Preferences dialog. This reduces the text that is written out, but could omit information that you want to see.

15 – Economic Editor Navigation
To improve efficiency as you navigate from one property to another, the expert editor now attempts to retain the position of the prior active data cell. It will at least place the cursor in the same column on the last row of data within the same data section.

16 – Trend Graph Export
In addition to production volumes, the PUT to spreadsheet feature now includes the well count by month.

17 – Batch Macro Economic Output
For Batch Macro economic runs, the specified output files are now cleared when you start the session. Within a session, output sent to a repeated output file name will be appended. Information sent to the log files is always appended.

18 – Economic Default Title Lines
If you do not have specific titles lines for a case, a default title line based on your ShowID is provided. This line will be parsed onto multiple lines as needed to minimize any truncation.

19 – Online Help
About 100 new and revised topics have been included in the online help system, and their organization was improved.
Database Changes

One database schema change was made for ARIES 5000.1.10.0 to accommodate the y-axis auto scaling enhancement in graphics. The ARGRAPH table now includes the 32 character TEXT item YAXISAUTOSCALEREF.

We recommend that all users upgrade their current databases for this new item using the Upgrade.exe utility that the installation places in the \Programs folder. Otherwise this new graph feature will be disabled.

The new ARIESSCHEMVERSION is 2008.4. We also updated the contents of the sample databases provided with the installation.

Defects Repaired

The significant defects that are repaired between ARIES 5000.0.3.1 and 5000.1.10.0 are listed in the first section below. Many online Help topics were improved or corrected as well.

Repairs in ARIES 5000.1.10.0

<table>
<thead>
<tr>
<th>Defect ID</th>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>867981</td>
<td>Economics</td>
<td>0% Working Interest on NET interest line appears to default to 100% WI</td>
</tr>
<tr>
<td>871541</td>
<td>Economics</td>
<td>Cannot run or save Batch Macro - Error: String data, right truncated message for Scenario Name</td>
</tr>
<tr>
<td>868035</td>
<td>Economics</td>
<td>Text (Comment Lines) in Lookup Table generate an error message in the run log.</td>
</tr>
<tr>
<td>869259</td>
<td>Economics</td>
<td>Cannot find Qualifier in scenario on Econ Group Property.</td>
</tr>
<tr>
<td>878083</td>
<td>Economics</td>
<td>A NET/NGL or NET/Phase other than OIL and GAS use Economic Phase Backup Interest to calculate Economic Limit rather than the interest entered in the case</td>
</tr>
<tr>
<td>883680</td>
<td>Economics</td>
<td>OH/W issue with Default and Common Lines-the parser cannot handle a two character with '/' input word correctly</td>
</tr>
<tr>
<td>887033</td>
<td>Economics</td>
<td>PAJ/xxx - Price adjustments add '%' method like 'FRAC' method and correct FRAC to default to 1 not 0</td>
</tr>
<tr>
<td>887846</td>
<td>Economics</td>
<td>Continuation line is not correct when following list mode, loadxl or Load line with date prior to start and initial value is X</td>
</tr>
<tr>
<td>868541</td>
<td>Economics</td>
<td>Listmode editor help button does not track with window size.</td>
</tr>
<tr>
<td>873892</td>
<td>Economics</td>
<td>Popup window in economic expert editor does not open on correct monitor.</td>
</tr>
<tr>
<td>867791</td>
<td>Economics</td>
<td>Shrink factor populated in Oneline table for Econ and Summary Groups is incorrect</td>
</tr>
<tr>
<td>867793</td>
<td>Economics</td>
<td>BTU Factors populated to Oneline table for Econ and Summary Groups are incorrect.</td>
</tr>
<tr>
<td>869048</td>
<td>Economics</td>
<td>Error with missing text ... &lt;E&gt; not found.</td>
</tr>
<tr>
<td>872289</td>
<td>Economics</td>
<td>Running Primary Discount 0% results in bad 10% value on an Investment only case</td>
</tr>
<tr>
<td>ID</td>
<td>Module</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>--------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>872527</td>
<td>Economics</td>
<td>Clear Window button does not clear the log file.</td>
</tr>
<tr>
<td>874821</td>
<td>Economics</td>
<td>ECON GROUP: Scenario Hierarchy in Project is not honored if Properties without weight or scenario are interspersed with Econ Groups.</td>
</tr>
<tr>
<td>883174</td>
<td>Economics</td>
<td>Spreadsheet Preview-CND and SGS are switched - i.e. CND shows up as SGS and vice-versa.</td>
</tr>
<tr>
<td>868613</td>
<td>Economics</td>
<td>Modeler function &quot;load_db_record&quot; returns zero for scenario section number on Oracle.</td>
</tr>
<tr>
<td>868773</td>
<td>Economics</td>
<td>Modeler WHERE function may return true instead of false under some circumstances.</td>
</tr>
<tr>
<td>875357</td>
<td>Economics</td>
<td>Random_stream_init when used after sampling starts may cause other random streams to reset.</td>
</tr>
<tr>
<td>877509</td>
<td>Economics</td>
<td>Modeler function tmsys_hypdecline returns zero if time is an unknown parameter, release 5000.0.3.x only.</td>
</tr>
<tr>
<td>881045</td>
<td>Economics</td>
<td>Script error: Actual argument has a different number of dimensions then the dummy.</td>
</tr>
<tr>
<td>881046</td>
<td>Economics</td>
<td>Modeler function decode_ary can duplicate previous case results if an error occurred on a previous case in rare instances.</td>
</tr>
<tr>
<td>890287</td>
<td>Economics</td>
<td>Modeler cannot use ARIBULK db table if multiple table sets/dbs's exist.</td>
</tr>
<tr>
<td>890287</td>
<td>Economics</td>
<td>Modeler cannot use ARI_BULK database table if multiple table sets exist. Models that attempt to read or write blobs, such as the incremental allocation and sampling would fail with an error message.</td>
</tr>
<tr>
<td>870961</td>
<td>Economics</td>
<td>Error on sidefile edit if sidefile is already open.</td>
</tr>
<tr>
<td>890688</td>
<td>Economics</td>
<td>The Economic Monthly table is populated with the abandonment expense amounts every month until the life. It should only exist in the final month.</td>
</tr>
<tr>
<td>890691</td>
<td>Economics</td>
<td>Abandonment expense amounts are not included in Stream 1069 in the Economic Monthly table.</td>
</tr>
<tr>
<td>890693</td>
<td>Economics</td>
<td>Curtailment of production forecasts that are scheduled to a reserve limit do not stop at the correct month. They continue for several months at very small volumes to reach the reserve amount.</td>
</tr>
<tr>
<td>890913</td>
<td>Economics</td>
<td>LOAD line using units of #/Y was incorrectly processed; did not roll up monthly values by year but rather used first month divided by 12 and then zeros.</td>
</tr>
<tr>
<td>883010</td>
<td>Import/Export</td>
<td>Flatfile loader - Error loading data into a table.</td>
</tr>
<tr>
<td>887274</td>
<td>Import/Export</td>
<td>Lasser production import using LOOKUP=M.API fails in 5000.0.3.1.</td>
</tr>
<tr>
<td>854426</td>
<td>Installation</td>
<td>ARIES Install: a first time user installs then attempts to launch ARIES, gets a Server Busy error; can connect after clicking Retry 5+ times.</td>
</tr>
<tr>
<td>869298</td>
<td>MultiGraph</td>
<td>When exporting historical and forecast data from MultiGraph to Excel, any curves using data from the Economic Monthly table are set to the first production date from the monthly production table and cutoff at the last actual.</td>
</tr>
<tr>
<td>872064</td>
<td>MultiGraph</td>
<td>AutoCast with Notes preference set may cause internal error.</td>
</tr>
<tr>
<td>ID</td>
<td>Module</td>
<td>Issue Description</td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>872155</td>
<td>MultiGraph</td>
<td>AutoCasting when there are multiple curves for the same phase on the curves tab of the graph scheme will use the last curve definitions for the phases to perform the AutoCast instead of the first curve definitions for the phases.</td>
</tr>
<tr>
<td>872070</td>
<td>MultiGraph</td>
<td>Performing an AutoCast on forecasts with a ratio causes the CUMS value for the dependent phase to be zero.</td>
</tr>
<tr>
<td>883198</td>
<td>MultiGraph</td>
<td>When there are multiple curves for the same phase on the curves tab of the graph scheme (Daily_Oil and OIL), PUTALL will put both forecast if phase is not major.</td>
</tr>
<tr>
<td>883863</td>
<td>MultiGraph</td>
<td>MG Fitting; temporary line for 3-Point Fit may not be visible if Dmin is set.</td>
</tr>
<tr>
<td>869440</td>
<td>MultiGraph</td>
<td>Tooltip and Status bar message are unavailable for &quot;Average Annual&quot; toolbar button.</td>
</tr>
<tr>
<td>881811</td>
<td>MultiGraph</td>
<td>EL Line does not display on Rate Cum plot.</td>
</tr>
<tr>
<td>870300</td>
<td>MultiGraph</td>
<td>ARIES MultiGraph: get Runtime error and ARIES crashes when creating Graph with Oracle user ARIESVIEWER who only has select rights.</td>
</tr>
<tr>
<td>869658</td>
<td>MultiGraph</td>
<td>PUT of exponential forecast on rate cum semilog graph does not work.</td>
</tr>
<tr>
<td>870619</td>
<td>MultiGraph</td>
<td>Legend box not using correct display type on Trend Graphs.</td>
</tr>
<tr>
<td>873773</td>
<td>MultiGraph</td>
<td>PRIOR cums from Master Table are being divided by 30,416 when a forecast is being put to Economics when using the CALDAY() or AVGDAY() functions.</td>
</tr>
<tr>
<td>873895</td>
<td>MultiGraph</td>
<td>Popup bubbles used for drag update window are on first monitor even when graph is on second monitor.</td>
</tr>
<tr>
<td>874256</td>
<td>MultiGraph</td>
<td>Plot Legend for properties does not include Dmin.</td>
</tr>
<tr>
<td>875613</td>
<td>MultiGraph</td>
<td>MultiGraph: if Preference is set to None then Edit Comments options should be grayed out.</td>
</tr>
<tr>
<td>877633</td>
<td>MultiGraph</td>
<td>Forecast is not showing in MultiGraph when the Start Date is prior to data in production table.</td>
</tr>
<tr>
<td>878472</td>
<td>MultiGraph</td>
<td>Comments and notes do not display when opening graphics using the preference to load previous workspace.</td>
</tr>
<tr>
<td>878895</td>
<td>MultiGraph</td>
<td>When a graph is plotted, the y-axis minor grid lines are placed on top of the historic production curves (and data symbols if included). Only appears in ARIES 5000.0.3.1</td>
</tr>
<tr>
<td>883436</td>
<td>MultiGraph</td>
<td>MultiGraph: Curve labels are not showing up on the top of graphs</td>
</tr>
<tr>
<td>876369</td>
<td>Project Manager</td>
<td>Fields filled out by dropdown lists add a trailing space after the value, there should be no trailing space.</td>
</tr>
<tr>
<td>878616</td>
<td>Project Manager</td>
<td>Select from List: if user enters an Other delimiter in text box, ARIES should check the OTHER checkbox</td>
</tr>
<tr>
<td>870894</td>
<td>Project Manager</td>
<td>Data transport error from Sqlserver to new access database with Criteria selected for economics table.</td>
</tr>
<tr>
<td>873693</td>
<td>Project Manager</td>
<td>Groups in database cause subtotals with incorrect properties when the Properties Only flag is checked in the Select/Sort/Total window.</td>
</tr>
</tbody>
</table>
### Known Problems
The following differences or behaviors are known to exist in 5000.1.10.0.

<table>
<thead>
<tr>
<th>Defect ID</th>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>882644</td>
<td>Project Manager</td>
<td>Adding or removing properties from a group that is in more than one project is not recorded correctly in the project lists</td>
</tr>
<tr>
<td>875614</td>
<td>Project Manager</td>
<td>The Property Notes editor allows changing dates on existing Notes, which causes confusion and can result in accidentally creating extra Notes.</td>
</tr>
<tr>
<td>878606</td>
<td>Project Manager</td>
<td>The Select By List feature will not match properties if the list items originated from a web page (HTML) or if it comes from Excel with embedded blanks in the items. MS &quot;non-blank&quot; blank problem.</td>
</tr>
<tr>
<td>802943</td>
<td>Economics</td>
<td>Results of Econ Groups are included on a Summary only report</td>
</tr>
<tr>
<td>864272</td>
<td>Economics</td>
<td>The Sidefile editor will let you enter or paste more than 100 data lines into a data section, which exceeds the line limit and will not run.</td>
</tr>
<tr>
<td>870238</td>
<td>Economics</td>
<td>If RISK X is entered using a MIX line, the values for risked investments in C353 and C356 in the OL table are not correct</td>
</tr>
<tr>
<td>874771</td>
<td>Economics</td>
<td>The CUMS and WELLS values for an Econ Group are not factored by a WEIGHT entered on the group.</td>
</tr>
<tr>
<td>837536</td>
<td>MultiGraph</td>
<td>The O+G Prop Type entry on the Curves Tab is not recognized on Break Level Summary graphs because there is no major phase</td>
</tr>
<tr>
<td></td>
<td>MultiGraph</td>
<td>When viewing Preview Plot, do not navigate to another property directly – a blank plot will appear. Close the preview before changing properties.</td>
</tr>
<tr>
<td>874769</td>
<td>Reporting</td>
<td>Production Ledger Report: You must always mark the Prior Data check box when creating these reports. Otherwise you will get the message &quot;A Summary has been specified on a non-recurring field @prior_oil&quot; message and get no Grand Total.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>~~</td>
<td>General – Windows 7</td>
<td>DOS conversion Prep utility (used to ensure SEQNUMs are correct) does not work in Windows 7. The Conversion feature works.</td>
</tr>
<tr>
<td>~~</td>
<td>General – Windows 7</td>
<td>Must install 32-bit versions of .accdb drivers to run any database reports from Project Manager or to connect to .accdb databases. These are provided in the installation. Note that you cannot install both these drivers and the 64-bit drivers from Office 2010 at the same time.</td>
</tr>
</tbody>
</table>

**ARIES Modeler 5000.1.10 Release Notes**

The release concentrates on functionality and reliability improvements plus new or improved samples.

**ARIES Modeler Enhancements**

Please refer to the “AriesModeler_functions.txt” document included with the samples for detailed use and syntax of the new functions and subroutines described below.

The sample database, “monthly_script_demo” has been updated to include forecasting examples of Stretched Exponential and Duong Method using the Modeler overlay function technique. Descriptions of all included samples can be found in the document “ARIES_Modeler_Samples_Readme.docx” installed in the DB directory. Highlights of the new sample include a model data tab that lets you choose which forecasting method to use, and if optional Excel™ visualization is used:
New Modeler Functions

Many new functions have been added to the Modeler as follows:

1) To improve extracting data from ARIES reporting arrays, a new subroutine “Transfer” has been added to the Modeler. This routine enables a script to extract character data from real arrays, and visa-versa. A typical use is to access character data from the “M” array as in this example:

```c
char*20 cInputSettings
call transfer( msc_msc(106:110), cInputSettings )
printvar( cInputSettings )
```
2) An array function, “Whereb”, similar to the existing “Where” function is now available, that in addition to doing an element by element test and assignment, returns a logical array with the comparison result. The logical array can be used on subsequent calls where calculations that depend (most commonly) on some threshold value, need to be repeated for different tax or fee rates within an asset or fiscal model.

```plaintext
rary() = whereb( log_ary_expression() & , val_true, val_false, log_ary_result() )
```

3) A series of functions that look up an array index for a given value in reverse order are new:

```plaintext
ival = indr_reverse( rary(), nary, rval )
ival = indc_reverse( cary(), nary, cval )
```

4) In order for models to read and write to the ARIES database, the DBS Key is often needed. If a database is opened in a model (using “attach_aries_database” for example), then the “get_dbskey” function can be used to retrieve the dbs key that can be used in subsequent queries (note that this is different than the dbs name). Three new built-in variables were added, “cquals_used” which stores the qualifies in use for each of the 9 data sections, “csetupname” and “cdbsname” variables to identify those selections within a model.

```plaintext
call get_dbskey( iDB, c dbs_key )
char*12 cquals_used(9)
char*20 csetupname, cdbsname
```

5) A new distribution type, Beta, has been added to the Monte Carlo sampling routine. This is a naturally bounded distribution from 0.0 to 1.0, and is normalized for other endpoints in the implementation. Three (3) forms of input are supported that define the distribution. See the “sample” modeler subroutine for usage:

```plaintext
'beta', vmedian, vstddev, min_val, max_val
'beta_p', val_p10, val_p50, val_p90
'beta_s', shape_a, shape_b, min_val, max_val
```

6) The initialization and seeding of random number streams used by the Monte Carlo functions have been improved. As a result, 2 integer seeds are maintained by the Modeler, in place of 1 as in previous versions. To accommodate this and optionally maintain backwards compatibility, 2 new functions were added; “random_stream_get_seeds” replaces the obsolete function, “random_seed”, and the
function "random_stream_init_5k3old" is introduced for optional use because the behavior of "random_stream_init" has changed under certain conditions.

```fortran
    call random_stream_init( irndstream, iseed1, iseed2 )
call random_stream_get_seeds( irndstream, iseed1, iseed2 )

! obsolete functions:
call random_stream_init_5k3old( irndstream, iseed, idummy )
iseed = random_seed( irndstream )
```

7) Three new mathematical functions are included:

```fortran
    dval = gamma( alpha )       ! gamma function
    dval = gamma_inc( alpha,z ) ! incomplete upper gamma
    dval = sqrt( a )            ! square root
```

8) Six new functions were added to the modeler that allow unknown parameter calculation (without doing a production forecast) of hyperbolic and stretched exponential decline curves. The routines that return the production over a time interval, can be used in models that automate curve fitting of declines to production history. See the samples for an example.

```fortran
    call   hyper_t( dqi, dai,   dhx, dt, dqt, dat, dpit)
call stretch_t( dqi, dtse, dnse, dt, dqt, dat, dpit)

dp12 =  hyper_p12( dqi, dai,  dhx, dt1, dt2)
dp12 =stretch_p12( dqi, dtse,dnse, dt1, dt2)

call hyper_calc( ... )
call stretch_calc( ... )
```

9) Models that move monthly data from average days in month to actual days in the month using the “tmsys_mov_ary” subroutine, can exhibit 2 possibly undesirable side effects, called first/last period orphaning, and investment creep. Orphaning happens if only a few days of an overlapping month are moved into an otherwise empty period. Strictly correct from an absolute time overlap perspective but leads to issues of monthly operating costs being applied to only a few days, or none at all. Creep occurs when an investment that was at the start of March for example, gets moved into February due to the overlap. Both of these issues have been addressed in a new function, “tmsys_mov_arye”, which will not orphan production months if they are less than 10 percent of the month being moved, and does not creep investments (or abandonments). If an existing model has workarounds to handle these affects, they can be removed and “tmsys_mov_arye” used in place of “msys_mov_ary”.
10) To assist in solving problems that require curve fitting or optimization, three functions have been added to the modeler. Details of how to use and call these functions are in “AriesModeler_functions.txt” and the samples. The “simplex” function implements a nonlinear variation of the simplex algorithm to minimize an objective function. The objective function can be any arbitrarily complex script function. The samples include a case where it is used to solve for the stretched exponential parameters given production history. The “scatter” routine uses uniformly distributed random numbers to solve the objective function over the entire solution space, and return the best “n” parameter combinations. This is particularly useful for cases with convergence problems, or to identify good initial guesses for the Simplex method, and is easy to use. The “linear_regression” routine fits straight lines through data. The sample shows how to use this function to solve for the parameters of the unconventional forecasting Duong Method.

```plaintext
call simplex( ... )
call scatter( ... )
call linear_regression( ... )
```

**ARIES Modeler Defects Fixed since the 5000.0.3.0 release**

**Defect: 867317 – Unable to extract character data items from M array.** The miscellaneous run time report array, “M”, can be accessed in a model using the ARIES Modeler defined variable “msc_msc(200)”. However, this is a real array and character data may span several positions within it. A function was added to the Modeler for the 5000.0.3.1 (June 2011) release that enables extracting character data from the array. See the “transfer( from_var, to_var )” subroutine described in the AriesModeler_functiotins.txt file for use and an example.

**Defect: 868773 - The “Where” function may return true instead of false under some circumstances.** If a script called the “Where” function for arrays that were dimensioned inside a script subroutine, then element compares could have been reported as true instead of false, leading to incorrect results. In addition to the fix, a new function “Whereb” was added that returns a logical array to indicate the results of the element by element compares.

**Defect: 868613 - Function "load_db_record" returns zero for scenario section number on Oracle.** This was caused by an error in translating the Oracle short integer type to a Modeler integer type, and could affect other tables as well.

**Defect: 875357 – Function “Random_stream_init” when used after sampling starts may cause other random streams to reset.** This is not common usage, but can come up if a portion of a stochastic script is being exactly duplicated within the same iteration. This bug has been fixed, but the user should be aware that the fix includes more rigorous handling of the random number stream seeds, and that the new release may produce different random numbers if the bug previously affected your cases. A new Modeler function, “random_stream_init_5k3old” has been added as part of this fix to duplicate the old “bad” behavior if required, and a function called “random_stream_get_seeds” was added to retrieve two seeds instead of one as previously. See the AriesModeler_functions.txt file for use.
Defect: 877509 - Function “tmsys_hypdecline” returns zero if time is an unknown parameter, release 5000.0.3.x only. This bug was introduced in the 5000.0.3.0 release and was present in 5000.0.3.1 as well, but not previously, and is now fixed. The parameter combination in question is not commonly used, and most users would not have been affected.

Defect: 881045 – Incorrect error message: Actual argument has a different number of dimensions then the dummy. Under certain rare circumstances, the Modeler may give this error message even though the array does have the correct number of dimensions. It could happen if a function was called using an array section instead of passing the entire array and if several other rare conditions were met. This has been fixed and array sections can be used in calls without causing the incorrect error message.

Defect: 881046 - Function “decode_ary” can duplicate previous case results if an error occurred on a previous case in rare instances. The Modeler associates names used in calls to the “decode_ary” function by remembering internally which model called it. Under certain rare circumstances, if a previous case had a script error, this internal name did not get reset, and a subsequent case could incorrectly return answers from the previous case. The workaround for this was to fix the script error, but this has been fixed and errors on one case should no longer give incorrect results on other cases.

Defect: 882411 – Script Manager Replace dialog changes public/private flag without asking, Access only. This only occurred with Access databases (Oracle was ok) and prevented saving models using “Save as” with the “Public” flag which was being reset to “Private”. This has been fixed and will now preserve whatever the flag was on the current script.

Defect: 889991 - Data transporter Oracle to Access configures ARI_BULKDATA table incorrectly. When transporting from Oracle to Access, the three Oracle INTEGER fields were being mapped to 3 Access INTEGER number types. This has been corrected to map to the Access LONG INTEGER type.

Defect: 890287 - Modeler cannot use ARIBULK database table if multiple table sets exist. Models that attempt to read or write blobs, such as the incremental and allocation samples would fail with an error message when more than one ARIES table sets existed for the ARIBULK table. Fixed.

ARIES Modeler Known Problems

1. If a scripted case reports an error, and you then fix it in script manager but do not close the run log window, then subsequent executions of the same model fail to use the newly changed script. Workaround: Close the run log window after an economics execution that had edited script errors to force the modeler to reload scripts.

2. Text fields on the MDATA_xxx lines in a script file cannot contain imbedded commas, even if the string is quoted. The commas are used as field delimiters.

3. The script function getAriescap_bm fails if a case has LOSS BFIT and EL for primary product and LIFE on investment line. If these 3 conditions are true, then investments with LIFE are not captured by the function.
Appendix

Major enhancements are discussed in detail in this section.

New Economic Limits

A new, more powerful and flexible set of economic limit calculations is available. You use the ELOSS data line in the Miscellaneous section to trigger them and provide the parameters to control them. This feature is an alternative to the LOSS data line, which remains. Do not enter both in the same case; if you do, ELOSS will be used.

The ELOSS line provides two fundamental types of analyses (plus a hybrid of the two):

1. Economic limit calculations for producing wells, based on gross lease operating income. This represents "when do we stop producing the well?"
2. Profitability determinations for cases facing investments, based on appraised values. This represents "should we make these investments and do this case?"

Additionally, for special ownership situations a new OPNET data line works with ELOSS so you can define specific net revenue interests for up to seven production phases. This improves accuracy for promoted leases or overriding royalty situations.

The keyword and data line entries are shown below.

ELOSS Method ELDelay OVHD PW# MinLife [qualifier]

The data entries are described in the following sections. You can omit trailing entries if the default values are suitable.

Method

The method entry triggers the calculations and specifies which approach to use. Note that the first two methods can be specified using alternate entries. These entries are conceptually the same as those for the LOSS data line, but use the ELOSS calculations.

- **OPINC** or NO – use the gross lease operating income method to set the economic life at the end of the last non-negative month, as calculated in Stream 591. The actual producing life can be longer depending on other parameters on this line.
- **PMAX** or BFIT – use the “maximum profitability” method to determine if the case is profitable. If it is, set the economic and producing life at the point of highest profit. If it is not, set the case values to zero. Profitability is based on the cumulative appraised discounted profit as calculated in Stream 1072.
- **RMAX** – use the “maximum profitable reserves” method to determine if the case is profitable (as in PMAX) and, if it is, to set the economic life at the point of maximum reserves that are produced with positive operating income (as in OPINC). If it is not profitable, the case values are set to zero. The actual producing life can be longer depending on other parameters on this line.
- **OK** – do not use the procedure. This causes any other entries on this line to be ignored and provides the entire cash flow as scheduled. This is the default. This entry can be used explicitly to override an ELOSS line in the Common Data lines section of the input settings. Note that while using this method does not compute economic limits, it causes salvage and abandonment expenses to be placed at the end of the final month. This is consistent with the other three methods, but is different than if you omit this line altogether.
The profitability calculations for PMAX and RMAX methods include the discounted amount of expense type abandonment costs. These costs are not used in setting the economic life point for any of the methods.

The PMAX and RMAX methods always use *monthly discounting* for the profitability tests, regardless of the user setting for the regular cash flow discounting method. The OPINC method does not use discounting.

**EL Delay**

You can delay the producing life beyond the economic life to model the situation where the operator does not “catch” the uneconomic situation immediately. Enter the number of months of negative cash flows to retain beyond the calculated economic life point. The default for this value is 0. This entry will not extend the life beyond the originally scheduled forecast life.

This entry applies to the OPINC method and to the cutoff point for the RMAX method. It does not apply to the PMAX method, or to the profitability determination for the RMAX method. If a PMAX or RMAX case is unprofitable, the results are set to zero and there is no delay.

This EL Delay is a separate calculation from the Min Life feature discussed below and the SALVAGE or ABANDON delay feature.

**Overhead**

The non-cash overhead amounts scheduled in Streams 316-320 (using keywords beginning with **OH/**) are always included in the profitability determinations for PMAX and RMAX. They are normally not included in the operating income calculations for OPINC or for the RMAX cutoff.

To deduct these values for OPINC or the RMAX cutoff enter **OH** here. Enter **NOH** or 0 or X to not.

Note that G&A type expenses are not affected by this entry. They are always included.

**Present Worth**

The profitability determinations made by PMAX and RMAX use profit values that are discounted using the monthly method. The default annual discount rate for these is the primary rate you enter in the Input Settings. If you want to make these determinations at a different rate, specify it here.

- Enter a **decimal value** (0<n<1), such as .185, to specify a fractional rate equivalent to 18.5 percent. Negative values are not allowed.
- Enter an **integer value** (1 – 15) to reference the row number in your present worth profile settings that contains the percentage value to use.
- Enter **P** or 0 to use the primary discount rate.

If you have omitted this trailing entry on the data line, the primary discount rate is used.

To obtain zero percent discounting, specify a value of 0 in the first present worth profile setting row (P01), then enter 1 on the ELOSS line to reference it. Similarly, to obtain a 100 percent or greater discounting, specify one of the PW settings values as “100” or a higher value and point to it here using its row number.

Your reports will still show the results discounted at the primary discount rate using your specified method.
This entry is not used for the OPINC method or for the cutoff within the RMAX method.

**Minimum Life**

For the OPINC method and the RMAX method cutoff limit, you can specify here a minimum life, in months from the Effective date. This can provide a common cutoff point for the negative cases in the run, showing, for example, the first 6 months of values.

For the cases with lives of more than six months, or cases that started after six months, this entry will have no effect. An entry of 0 or X or blank means there is no minimum life. This is the default. This value cannot be negative.

You can also enter an absolute date, as MM/YYYY, meaning to show results up to the beginning of this month. Do not enter a date earlier than the Effective date you will use.

This value does not affect PMAX at all, or the profitability determinations for RMAX. If the case is unprofitable, it is set to zeros.

This feature is separate from the EL Delay discussed above.

**Parameter Combinations**

The following table summarizes those combinations of ELOSS parameters that work on each method, and their default values.

<table>
<thead>
<tr>
<th>ELOSS Item</th>
<th>Default</th>
<th>OPINC</th>
<th>PMAX Decision</th>
<th>PMAX Cutoff</th>
<th>RMAX Decision</th>
<th>RMAX Cutoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELDelay</td>
<td>0</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>OVHD</td>
<td>NOH</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>PW#</td>
<td>P</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>MinLife</td>
<td>0</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

Note that the differences in the final two columns reflect the hybrid nature of the RMAX method.

**Net Revenue Interests**

The cutoff points for the OPINC and RMAX methods are based on the operating income to the full lease. If the case ownership lines do not reflect the net revenue interests to the 100% working interest, you must provide them on an OPNET data line. This is typically the situation if you have an override scheduled or have entered a zero working interest.

**Abandonment Expenses**

You should schedule abandonment and salvage amounts in the Expenses data section using the SALV (S1092), ABAN (S1093), and PLUG (S1094) keywords. The expense will be placed at the end of the final month unless you delay it using the Miscellaneous data section ABANDON or SALVAGE data lines.
These streams are not included in the regular reported operating expense totals, but are deducted from the net income.

The discounted value of the abandonment expense is included in the profitability determination for PMAX and RMAX.

Note that abandonment amounts entered as investments do not work as described above. Investments are not “monthly” items and so cannot be manipulated within the ELOSS calculations. They will be treated as they are in the LOSS calculations.

**Examples**

- ELOSS OPINC ← operating income limit using defaults
- ELOSS OPINC 1 OH ← delay one month, include OH
- ELOSS PMAX ← max profitability limit using defaults
- ELOSS PMAX 0 0 0.20 0 ← max profitability, discount at 20%
- ELOSS RMAX ← max profitable reserves limit using defaults
- ELOSS RMAX 1 X P 6 ← delay one month, no OH, use Primary rate %, min life of 6 months
- ELOSS OK ← do not use procedure; ignore any remaining entries

**OPNET Revenue Interests**

The OPNET data line is part of the new ELOSS economic limit calculation feature. It is needed when you are using the ELOSS OPINC method and the net revenue interests in your appraised case are not the same as those for the 100 percent working interest for the lease. This typically occurs when you have an override or a promoted lease.

These entries affect the calculations for Stream 591 which is used to determine the operating income type economic limit. It has no effect on the PMAX profitability method, which always uses the appraised results from your case. Similarly, it does not affect the RMAX method’s profitability determination, but if the case is profitable it does affect the RMAX calculations for the cutoff point.

The format of the line is

```
OPNET NRIOIL NRIGAS NRICND NRISGS NRI_P05 NRI_P06 NRI_P07
```

Following the keyword OPNET, you enter the net revenue interests to use for the first seven production phases, as defined in your current Economic Phases settings. The first four phases are normally as shown above. The final three could be different, depending on your phase settings. The interests for phases eight through fifteen will be taken from the phase name backups in your Economic Phase settings.

You normally enter these values as percents, from 1 through 100. A typical entry could be 85, meaning 85 percent. If you enter a value between 0 and 1, it will be treated as a decimal fraction, such as .85.

If you enter 0 or X, or omit the entries for the trailing phases on the line, ARIES will look to the phase backup names defined in your Economic Phase settings. For example, if the NGL phase backup points to...
GAS, the GAS net interest from this OPNET line will be used. Any NGL net interests in the case will be used for the regular revenue calculations, but not for the operating income limit determination.

There is no entry for a zero net revenue interest. In the unlikely event you need to model this, enter a very small value, such as .000001.

**Stretched Exponential Econ Forecasts**

The Stretched Exponential decline curve formulas published by Valko and Lee are available within Economics to forecast monthly major phase production volumes. This method generates curves that look similar to hyperbolic curves, but it is a more complex calculation using different equations and parameters. Subordinate phases should be forecast as ratios, such as CND/GAS or GAS/OIL, using the LIN and LOG methods.

SED forecasts entered on the economic data lines can be viewed within MultiGraph and plotted using the normal GET feature. They cannot be modified or PUT.

**The SED Parameters**

The SED equations use the original producing rate $Q_o$, a stretch exponent $n$ (dimensionless), and a characteristic time, $\tau$ (months). These values are determined by engineering analysis on wells or groups of wells in similar formations. This stretch exponent $n$ can range from 0.07 through 1.0. $\tau$ is a positive value generally ranging around 1 to 10.

The exponent and $\tau$ define the shape of the curve, and remain constant throughout the forecast. The flattening of the curve results from the time elapsed from the original point. SED does not use a decline rate parameter, and there is no “exponential tail” needed.

The equation parameters $n$ and $\tau$ are based on the ORIGINAL point of the curve, at $T_0$ and $Q_o$. For new wells, the “start” of the forecast and this original point are the same. For updating producing wells, the “start” point for the forecast is generally at a later time. The appropriate $Q_i$ at this time is computed by sliding down the original curve to the new start point.

**Economics Data Lines**

The economic data line for the stretched exponential method uses a modified form of the regular formula type input line.

<table>
<thead>
<tr>
<th>Keyword</th>
<th>$Q_{orig}$</th>
<th>$Q_{ab}$</th>
<th>$Q_{Units}$</th>
<th>Limit</th>
<th>$L_{imUnits}$</th>
<th>$S/n$</th>
<th>$\tau$</th>
</tr>
</thead>
</table>

The first rate entered is the original rate, at time zero where $n$ and $\tau$ were determined. The method type is entered as $SI$ combined with the stretch exponent $n$. The final entry is $\tau$. This data line depends on the preceding START line to provide additional timing information. See the examples below.

Remaining reserve- and time-based limits are relative to the forecast START date. EUR type reserve limits include the amount entered on the associated CUMS line.

While continuation lines for SED projections do not generally make sense, you can enter other types of forecasts after an SED ends. You can also begin your forecast with a LIST, and follow it with an SED data line. In this situation, the end of the LIST data provides the START date for the SED forecast.

**New Well Example**

A forecast for a new well could be entered as:
The first rate, entered here as 40000, is always interpreted as the original rate. The method type is specified by S/ combined with the dimensionless stretch exponent, which here is .40. The characteristic time, tau, is entered here as 11.

The new well forecast above will start on 1/2014 at the 40000 rate, and decline using this curve shape to the 1000 rate. This calculation generates the reserves and life. For new wells, the single entry on the START line is sufficient because the original curve point and the start of the forecast are the same.

If you are using ENDDATE and backup or DELAY parameters on the START line, the origin of the SED forecast curve will shift to honor them.

**Well Update Example**

For producing well updates, the START date (where the forecast starts) will be later than the beginning time To (where the desired SED curve starts). You model this by specifying the To value on the end of the START line, preceded by the code SED. This SED date is generally the same as or earlier than the forecast START date. If it is later, there will be no SED forecast until the curve begins at the SED date.

For example:

```
START 1/2014 SED 7/2012
GAS 40000 1000 M/M X MMF S/.40 11
```

These lines produce a different forecast than the earlier example. Here the forecast still begins on 1/2014, but the initial rate will be less and the shape of the curve is flatter, because the stretched exponential curve shape started at the first of July, 2012.

If you are using an ENDDATE name and backup or the DELAY parameters on the START line, the “SED” and “mm/yyyy” are entered following them. These ENDDATE or DELAY entries will affect the forecast START date but not the SED time zero date.

**Example of LIST and SED Forecast**

You could LIST the first few months of production to represent a gradual increase in well production, then place the SED forecast on a continuation line. To cause the original SED forecast curve shape and 40000 original rate to begin at the end of the listed values, add the SED indicator and date on the START line:

```
START 1/2014 SED 4/2014
GAS 1/2014 10000 20000 30000 #
  40000 1000 M/M X MMF S/.40 11
```

Without the SED date entry the curve shape and the 40000 rate would have started at 1/2012. So when the SED forecast begins three months later at the end of the LISTed values, the rate would be lower and the curve would be flatter.

**Combinations of Forecast Data Line Entries**

As with the exponential and hyperbolic declines, various combinations of known and unknown parameters can be applied in SED forecasts in economics. These are listed in the table below, where X indicates unknowns.
### Select Properties by ID List

This Project Manager feature lets you select the properties from your database to include in a new empty project based on a list of item ID values you enter. For the database item you specify it matches the values in the list to the values for your properties', and includes the matching properties in the project.

You type or paste the list of item values into a dialog.

The result is a manual project Picklist, as if you had dragged the properties from another project and dropped them into the new project.

This feature is only available if the current project is empty. You can later combine this new project with an old one manually using drag and drop or copy/paste.

### Create New Project

Create a new project using the File, New menu or the New toolbar icon. The empty project with a Grand Total summary node appears.

### Populate the Project

Next select the option **Select From List...** from the Project Manager, Entities, Build Property List menu or from the right click speed menu. The following dialog appears, initially as empty:

```plaintext
<table>
<thead>
<tr>
<th>Generic Data Line Examples</th>
<th>Qi</th>
<th>Qf</th>
<th>Rem</th>
<th>Life</th>
<th>Exp,n</th>
<th>Tau</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAS 40000 X M/M 10 YR S/.4 11</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS 40000 X M/M 1000 MMF S/.4 11</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS 40000 1000 M/M X YR S/.4 11</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS 40000 1000 M/M X MMF S/.4 11</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS X 1000 M/M 10 YR S/.4 11</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS 40000 1000 M/M 10 YR S/.4 X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS 40000 1000 M/M 10 YR S/X 11</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS 40000 1000 M/M 1000 MMF S/.4 X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS 40000 1000 M/M 1000 MMF S/X 11</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
Enter or select the Master table item to be matched. This data type of this item can be numeric or text. It cannot be a date type.

Specify the delimiter(s) that will be used in the list of ID values entered at the bottom by marking the appropriate check box(es). If your list uses a different delimiter, mark the Other check box and type in the character. For a single column list as shown above, no delimiter is being used, so the check marks do not matter.

You then type and/or paste the list of values into the box. These values, such as a UWI or an internal accounting code, could be typed manually, pasted from spreadsheet columns or rows, or pasted from a text file. The list can have either a single value on each of the list lines, or multiple values on the lines separated by commas, spaces, tabs, semicolons, or another user-specified character. The ID values can contain embedded blanks only if you have not selected “space” as a delimiter. The values you type or paste will wrap within the entry window.

The Clear button clears the list.

Select the OK button to begin the process. When complete the dialog and the list disappear and the resulting new project Picklist appears. You can drag more properties into it, create breakpoints and rearrange properties manually, or use the Sort/Select/Total feature to organize this subset of the database. Save the new project when you are finished.

The operation also writes a CreateProject.log file into your log folder. It contains a record of the matching process, including the beginning and ending date/time and the following:

1. The ID codes for which no match was found
2. The ID codes for which multiple matches were found, for which the multiple properties were selected
3. The ID codes which existed more than once in your entered list, for which the matching property was inserted multiple times

The log file is not deleted prior to each session. The new log information from a subsequent session is appended to it.

**Direct Access Table Edit Buttons**

To improve efficiency in many workflows, additional toolbar buttons have been added so you can directly access editors for three database tables. There are now three of these buttons provided within Project Manager, Graphics, and Economics.

- The M table button provides access to the Master table editor
- The MP table button provides access to the Monthly Production table editor
- A new customizable table button provides access to a table of your choice. You assign this table in the Project Manager, Definitions, Preferences dialog, by selecting its alias name from the dropdown at the bottom of the right hand column.

Likely tables to be assigned here are DP or OL. If no table is specified here, or if no table can be found with this alias, the button is grayed. Table references that are database views cannot be tied to the button.

**Reference Point for Y Auto Scaling**

Additional customization is available for the vertical auto-scaling feature for the curves on a graph or plot. On the Structure tab of the graph scheme dialog you use the **Auto scale reference** item to specify a date or a date range to use to determine the basis for the Top, Down 1, Bottom, etc. positioning instructions you have set on the Curves tab.
You can select one of these options from the dropdown list:

- Full history – Use the highest value from the entire set of history points in the database
- Visible points – Use the highest value from the history points visible on the graph (default)
- Last actual – Use the value at the last actual history point

You can also specify a date, either:

- Directly by entering it here, in MM/YYYY or YYYY.NN format, or
- By referring to a table and item in the database that contains the date in MM/YYYY, MM/DD/YYYY, or YYYY.NN (decimal) format, as appropriate for its database item data type. This allows each property to have a different reference point. The entry format for this option is @TableAlias.ItemName, for example @M.Mydate.
Contacting Support

Landmark software operates Technical Assistance Centers (TACs) in Australia, the United Kingdom, and the United States for program-level assistance. Additional support is also provided through local support offices around the world. Assistance for custom network installations or Oracle or SQL Server database environments is available through the Consulting Services group.

Local support office information is listed below.

Support information is always available on the Landmark Support internet page located at:


Technical Assistance Centers

North America
7:30 am - 5:30 pm Central Standard Time
Monday - Friday, excluding holidays

713-839-2200 (Houston, TX, USA)
Toll Free 1-877-435-7542
(1-877-HELP-LGC)
Fax: 713-839-2168 (Houston, TX)
Fax: 907-275-2655 (Anchorage, AK)
Fax: 303-796-0807 (Denver, CO)
Fax: 403-262-1929 (Calgary, Canada)

Email: support@lgc.com

Helpful Internet Links

<table>
<thead>
<tr>
<th>Name</th>
<th>Website Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landmark Software &amp; Services home page</td>
<td><a href="http://www.halliburton.com/landmark">http://www.halliburton.com/landmark</a></td>
</tr>
<tr>
<td>Oracle home page</td>
<td><a href="http://www.oracle.com">http://www.oracle.com</a></td>
</tr>
<tr>
<td>FLEXNet Publisher (Flexera Software)</td>
<td><a href="http://www.flexera.com">http://www.flexera.com</a></td>
</tr>
<tr>
<td>Microsoft SQL Server home page</td>
<td><a href="http://www.microsoft.com/sqlserver">http://www.microsoft.com/sqlserver</a></td>
</tr>
<tr>
<td>Microsoft SQL Server Express home page</td>
<td><a href="http://www.microsoft.com/express/sql">http://www.microsoft.com/express/sql</a></td>
</tr>
<tr>
<td>Adobe Acrobat Reader</td>
<td><a href="http://www.adobe.com">http://www.adobe.com</a></td>
</tr>
</tbody>
</table>
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