S3GRAF v9.2 Release Notes

S3GRAF
Version 9.2
October 2016

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1. Introduction

S3GRAF v9.2 is the latest version of the Reservoir Engineering Visualisation software from Sciencesoft Ltd. S3GRAF provides functionality to quickly and efficiently visualise and analyse reservoir simulation data from a range of simulators. Line plots of well production data (for example) and views of the simulation grid can be created. With the 3D module three-dimensional displays of simulation grid data can be generated. The HPG module permits extremely fast loading of grid geometry and vector data, especially for large datasets.

The new features to be found in the latest version of S3GRAF are outlined as follows:

Workflow Manager

The Workflow Manager is a new way of using the power of S3GRAF for plotting, creating new quantities and performing analyses. Workflows capture a standard reservoir engineering task and allows it to be recreated quickly and easily from the Workflow Manager.

The Workflow Manager presents all the included workflows in an easily navigable list that can then be selected for application. The user can then set the relevant properties, based on the loaded data, to produce the analyses and information required.

Help Portal: http://support.sciencesoft.com/hc/en-us/articles/207518436

Improved Eclipse H5 File Support

Support has been further improved for 2014/2015 versions of the Eclipse *.H5* file format for Summary data. This file format requires the *.SMSPEC* to correctly interpret the data. The *.H5* file allows Fetch on Demand to be used for Summary data.

Improved Intersect RFT Support

Support for formatted and binary *.RFT* files produced by Intersect.

Improved RSM Support

Support has been improved for Eclipse and MoRes *.RSM* Summary output files. This is limited to the default format and does not include the Excel or Lotus formats.

Create RFT Data Function Output Completion Coordinates

The Pseudo-RFT data can now include the coordinates for the cell centre containing the completion as defined in the Solution data.

2. Workflow Manager

The Workflow Manager is a new way of using the power of S3GRAF for plotting, creating new quantities and performing analyses. Workflows capture a standard reservoir engineering task and allows it to be recreated quickly and easily from the Workflow Manager.

The Workflow Manager presents all the included workflows in a list that can then be selected for application. The user will then set the relevant properties, based on the loaded data, to produce the analyses and information required.

Workflows are based on modified GRF files, however the user does not need to understand the GRF script. Instead the user is presented with a description of the workflow's actions and a list of user-definable parameters, usually data dependant, which are then set before the workflow is executed.

2.1.Accessing the Workflows

Once any data set has been loaded into the Treeview, the *Workflow Manager* tool will be enabled. This can be accessed from the *Tools* menu, as seen in Figure 1, or from the *Derived Quantities* toolbar.

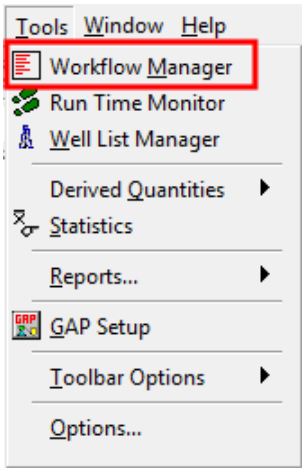

Figure 1 - Menu Access for Workflow Manager

Click on the **Workflow Manager** item and the *Workflow Manager* dialog will appear, as seen in Figure 2.

The presented workflows are dependent upon what data has been loaded into S3GRAF, i.e. if only Eclipse data sets are loaded then only the Eclipse specific Workflows are listed. This filtering can be changed by selection from the *Type* drop-down list, and can be refined further by specifying a filter using the *Filter* textbox and standard wildcards (*, ?, partial names, etc.).

The dialog will contain a list of valid Workflows that can then be applied to the loaded data. Double-clicking on a workflow or clicking the **Next** while a workflow is highlighted will then open a dialog for the chosen workflow where the necessary parameters can be set before execution.

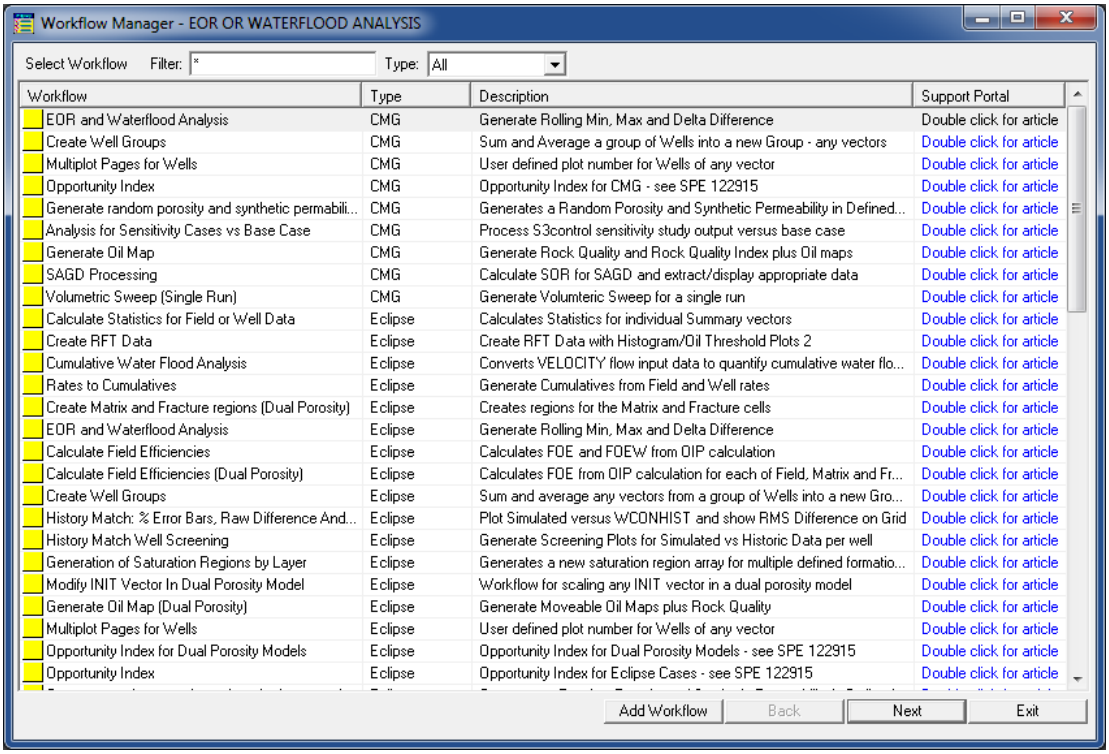

Figure 2 - Workflow Manager Dialog

2.2.Running a Workflow

The procedure for running a Workflow can be summarised as follows:

1. Load the data set upon which to perform the Workflow.
2. Open the *Workflow Manager*.
3. Select the Workflow to perform.
4. Set the required parameter values for the analysis.
5. Run the Workflow.
6. Examine the created plots and new items in the Treeview.

Workflow Selection

Once the *Workflow Manager* has been opened select a workflow from the list and click **Next**.

Each Workflow is accompanied by an article on the Sciencesoft Help Portal. This article will provide extra detail on the construction and use of the Workflow. Double-clicking on the last column will open the corresponding article in a browser. A registered Sciencesoft account is necessary to access the portal.

In this example the *Generate Oil Map* has been selected.

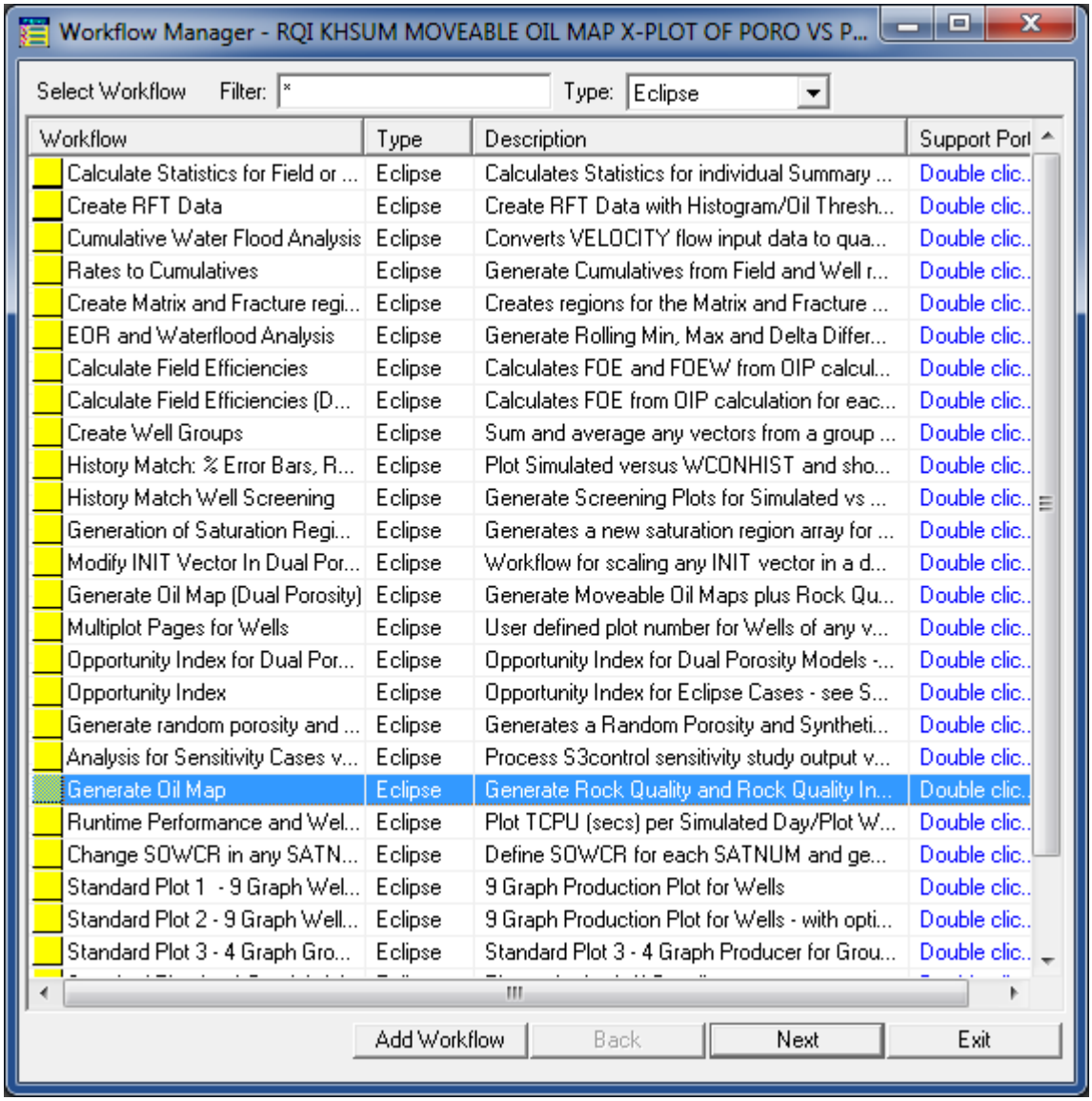

Figure 3 - Selecting a Workflow

Workflow Setup

The details for the chosen Workflow will then be presented, see Figure 4. This dialog will show more information on the Workflow including what data may be required, what calculations are performed and what the output will be.

This dialog details what information is required from the user and lists the parameters that need values to be set, such as well names or property values. Default values are presented but in most cases will be unsuitable for the chosen data set and are usually highly specific to the properties of the data set.

The data set origin will be automatically allocated from the first case in the *Origin* list.

If there are multiple data sets loaded, the origin can be selected from the *Select Origin* drop-down list, or typed in to the *Case name* parameter directly, as seen in Figure 5.

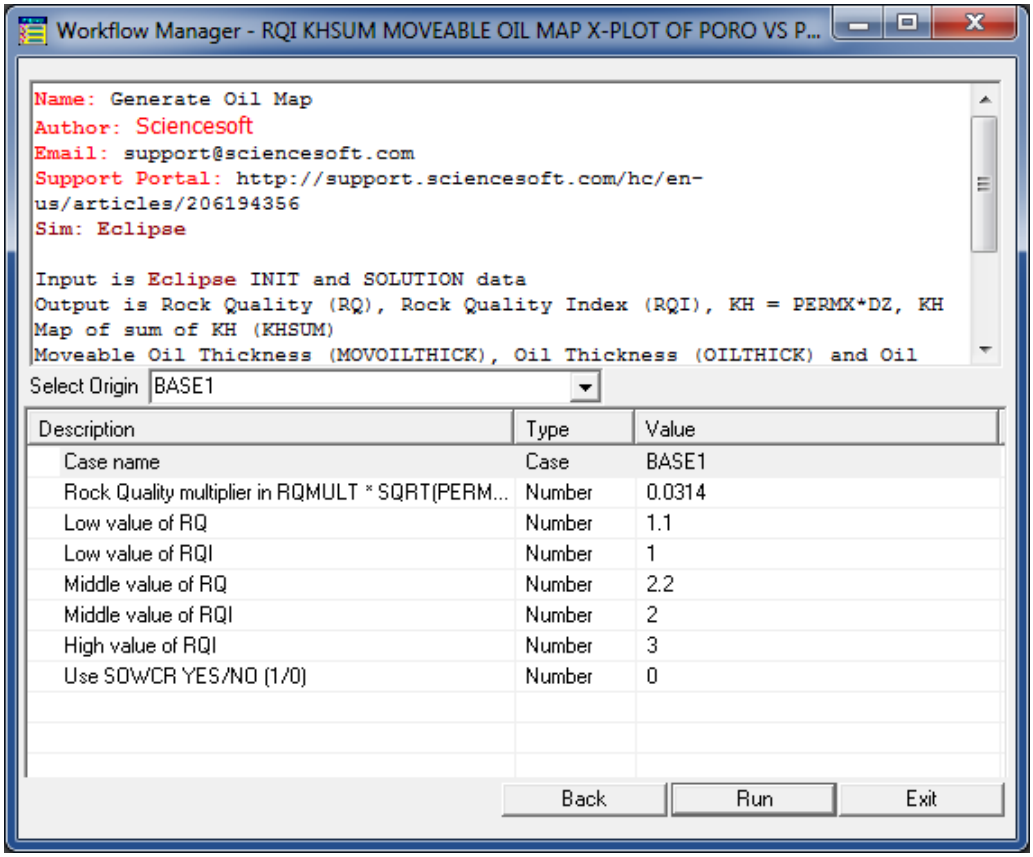

Figure 4 – Workflow Launch Dialog

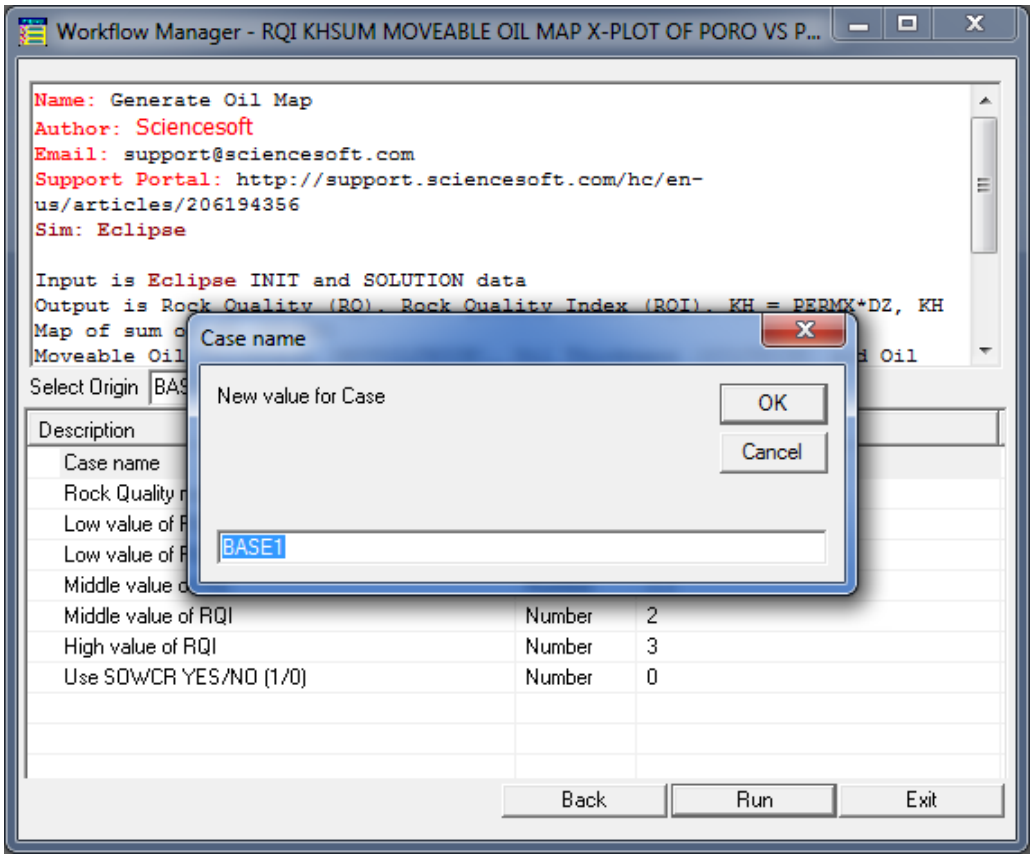

Figure 5 - Setting a Workflow Case Name

Parameter Definitions

A Workflow may depend upon a number of values to be set by the user, such as values for Rock Quality (*RQ*) in the example. These are presented in a list below the description of the Workflow. All of the items should be changed to suit the selected data before running the Workflow.

Double-clicking on any of the rows produces a dialog to change the item value, see Figure 6.

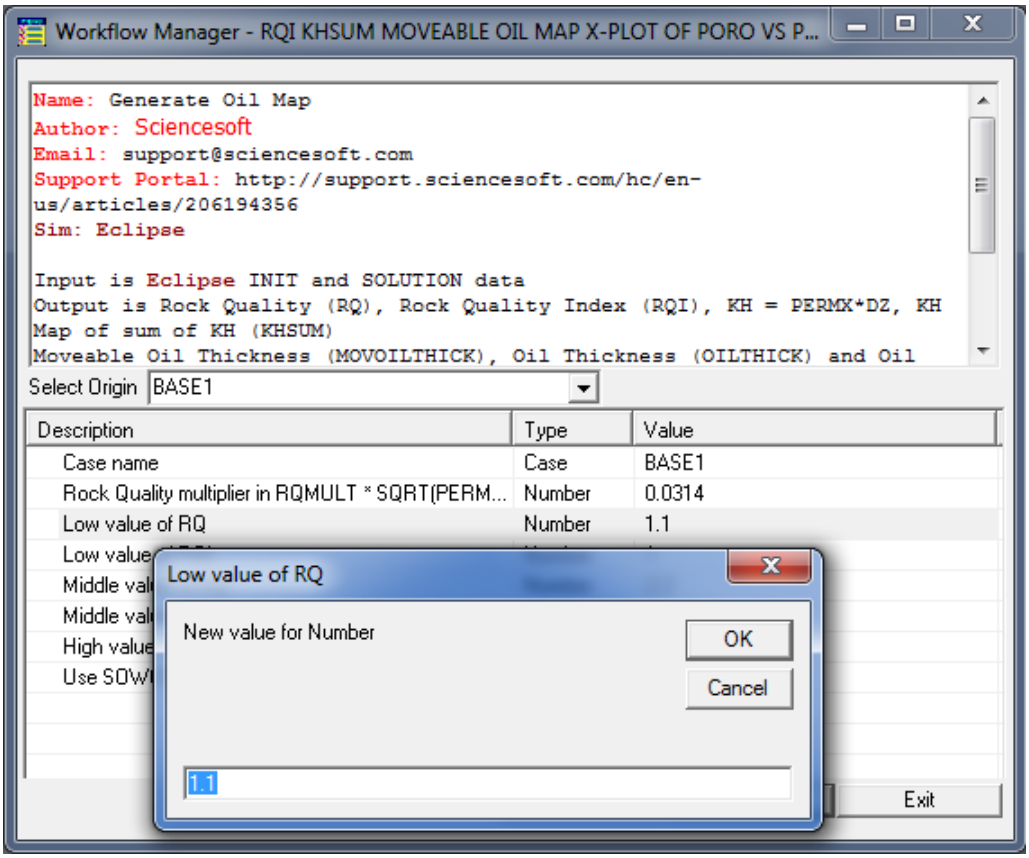

Figure 6 - Setting a Workflow Parameter

Running the Workflow

Once satisfied with the values, click the **Run** button. Behind the scenes the system will create a temporary GRF to apply the workflow procedure and automatically load it into S3GRAF. If the Workflow completes successfully, the normal GRF message will be displayed, see Figure 7.

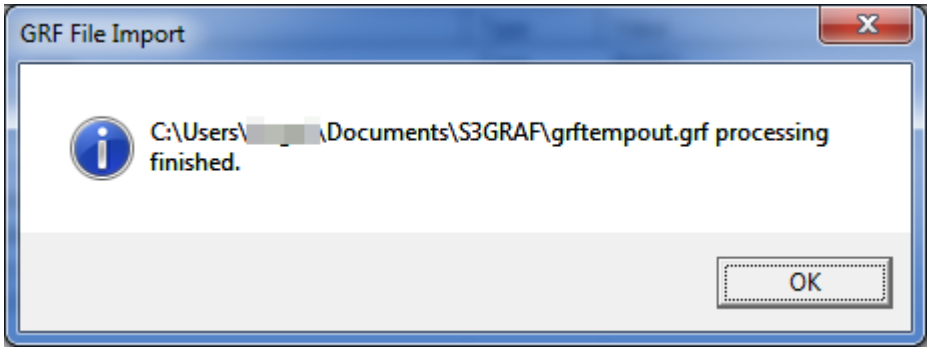

Figure 7 - Successful Workflow Application Message

Any new data sets will appear in the Treeview and any plots or grids will be added to the Graph List (and displayed if the *Display Graphs immediately after import* is on).

If there is an error a warning message, see Figure 8, will appear inviting the user to investigate the GRF reader report file. This can then be used to debug any issues recreating the Workflow.

Figure 8 - Unsuccessful Workflow Application Message

2.3.Importing a New Workflow

New workflows may be supplied through Sciencesoft's support desk and these can be imported into S3GRAF. To do this open the *Workflow Manager* and click on the **Add Workflow** button at the bottom of the dialog. A file open dialog will be presented so select the file to be added and click **OK** in the usual manner.

Alternatively the Workflow file can be dragged-and-dropped onto the *Workflow Manager* dialog to add it to the list.

If it is a valid Workflow file it will be added to the system and a message confirming the addition presented, see Figure 9, clicking **OK** and it will be added to the list for use.

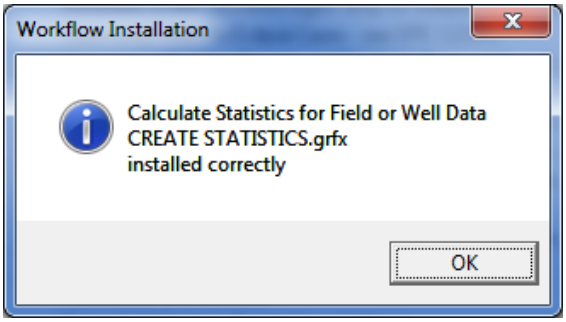

Figure 9 - Workflow Addition Confirmation Message

2.4.Notes on Workflows

A range of common Workflows have been provided as part of the S3GRAF installation and have been created by the Sciencesoft support team. Other Workflows will be added in future and as part of our support system. If a customer requires a new workflow, this can be provided on demand. Please email support@sciencesoft.com.

2.5.Help Centre linkage

Further details on individual Workflows can be found on the Sciencesoft Help Portal. Each Workflow presented in the *Workflow Manager* list has a direct link to the Portal for an article describing, in detail, the workflow performed.

A registered Sciencesoft account is necessary to access the Portal.

3. Improved File Support

3.1.Eclipse H5 Support

Support has been improved for the 2014/2015 versions of the Eclipse H5 file format for Summary data. This file allows Fetch on Demand, as part of the HPG module, to be used for Summary data. This enables faster loading and smaller memory footprints.

Loading the newer version of the *.H5* Summary data (known internally as v1.7) requires the corresponding *.SMSPEC* file to be present. The *.SMSPEC* is necessary as it contains the header information, such as well names, units, etc. as the H5 only contains the data values.

3.2.Intersect RFT Support

The binary and formatted versions of the *.RFT* output files from Intersect are now fully supported. These file types utilise the new data types to allow for well names longer than 8 characters.

3.3.RSM Support

The Run Summary output file (*.RSM*) from Eclipse is a column-formatted text file. It is also output by other simulators. Support for this format has been updated and improved to cope with changes and variations found in the output of other simulators.

RSM output comes in three formats, however only the default format is supported. The other two are specialised for spreadsheets.

Format	Details	Supported?
Default Format	Fixed width columns	Supported
Excel	Tab delineated	Not Supported
Lotus	Space delineated String formatted with quotes	Not Supported

In S3GRAF the RSM file is treated as a specialised text file format. The interpretation of user text files is controlled from the *S3GRAF Options* which can be accessed by clicking on the *Tools* menu and then clicking on *Options…* and finally clicking on the *Text Files* tab. This will present the options as shown in Figure 10.

The option to automatically interpret .RSM files as the prescribed format by Eclipse is controlled by checking the *Use RSM settings for .RSM files* checkbox, circled in red in Figure 10. This option is checked by default. Any RSM files loaded by S3GRAF will use these settings, overriding any rules set in the *Column Data* options within the dialog.

Additionally, the RSM format interpretation rules can be explicitly set in the *Column Data* options. By clicking the **RSM** button (circled in blue in Figure 11) in the *Column Data* options the rules for interpreting the data headers are presented in the list on the right. Any modifications can be defined to cope with deviations from the prescribed format.

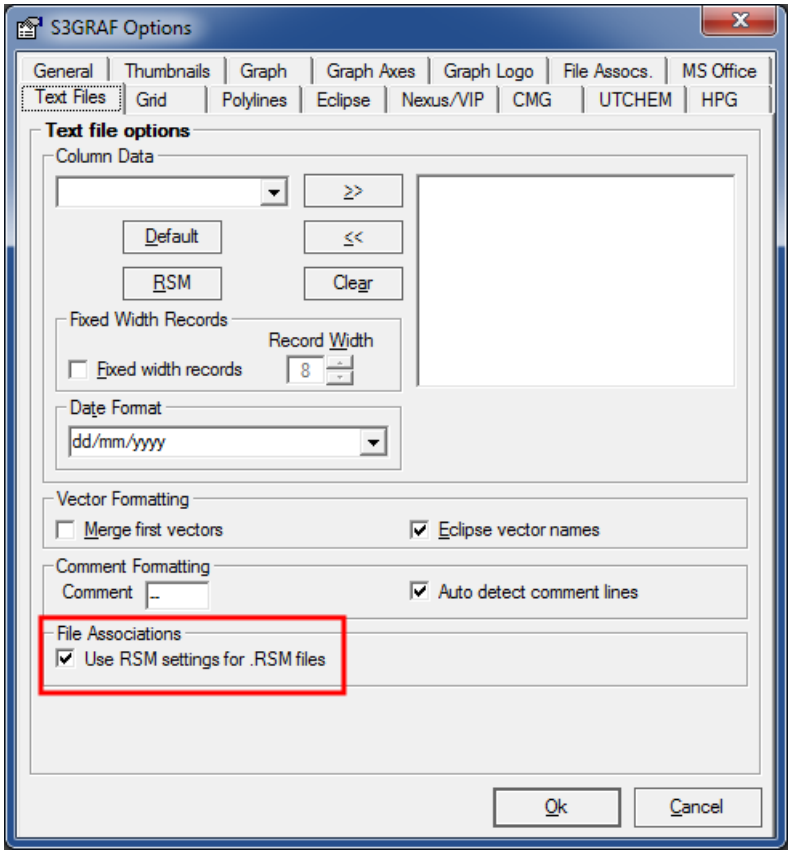

Figure 10 – Tools – Options for Text Files

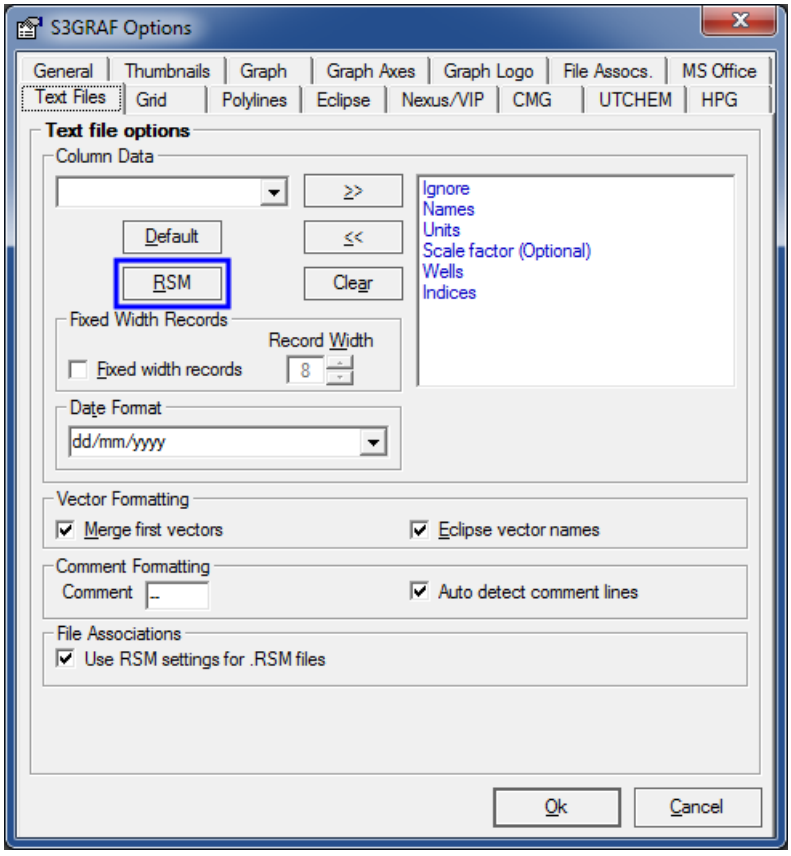

Figure 11 Tools - Options for Text Files with Explicit RSM Rules

4. Create RFT Data with Cell Coordinates

The *Standard Function* feature includes the *Create RFT Data* function that produces RFT data based on a wellbore path as approximated from the completion/perforation locations contained in the Solution data sets and pseudo-RFT data created.

The *Standard Function* feature is accessed from the *Standard Function* item found in the *Tools* menu and clicking on the *Derived Quantities* menu or the corresponding toolbar button. The *Create RFT Data* option can then be selected from the drop-down function selection of the dialog shown in Figure 12.

To perform the calculation based on the Solution select *USE SOLUTION MARKERS* from the Trajectory drop-down, circled in blue in Figure 12. The option to include the cell coordinates is then provided below, circled in red in Figure 12, as the *Include coordinates* checkbox. When this is checked an X, Y and Z column is added to the output data set that estimates the centre for the cell containing the completion/perforation.

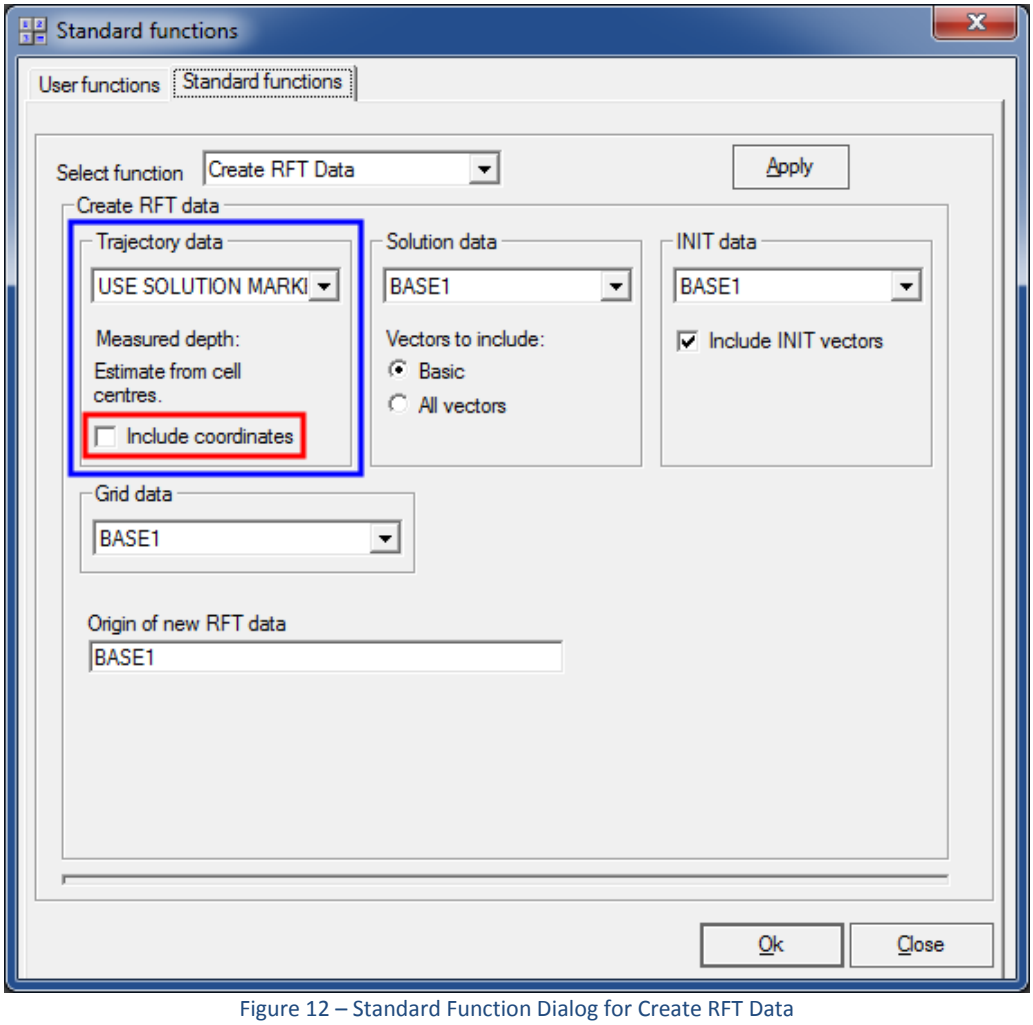

Figure 12 – Standard Function Dialog for Create RFT Data

5. Bug Fixes

Here is a list of the bug fixes applied to S3GRAF v9.2.

- Files
  - Corrected various issues with interpreting Eclipse Summary H5 v1.7 files
  - Corrected issues when loading multiple cases for Nexus/VIP
  - CMG tables now load correctly
  - Tempest wellnames were causing crashes with the grid display
  - Updated to support the changes to UTCHEM corner point grid format
  - Handles missing PERM arrays in 2D UTCHEM models
  - Handles reading UTCHEM models with less than 10 cells per layer
- Analysis
  - Fixed Standard Calculations for Gas Water models
  - Applying a User Function to all grids now works correctly
  - Applying a User Function to all timesteps now correctly works with LGRs
  - User Functions correctly reference vectors for LGR models
  - In some cases the User Function was interface was not displaying the argument units
  - Polygon based User Regions correctly apply the chosen clipping method
  - Dual Porosity Petrel models correctly supported in analyses
- Grids
  - Grid orientation is not determined form MAPAXES for Eclipse grids
  - Corrected issue with saving settings for displaying wells with INIT data
  - Performance improvements to the Explode and Grid Thickening display
  - Grid Display Settings will reopen to the last used settings
- Plots
  - Completion index was missing from the plot legend
  - Data exported from plots now matches the format used for the time axis
  - Fixed an issue where deleting a dataset caused the link to the default x-axis to fail
  - Solution data not using the correct default axis when loaded multiple runs
- General
  - Show wells above first perforation system setting is now being applied correctly
  - The Workflow Manager menu item no longer disappears or is mislabelled
  - Nested loops in GRF can now manage separate well lists
  - Permission issues when installing the Workflow Manager files have been fixed