

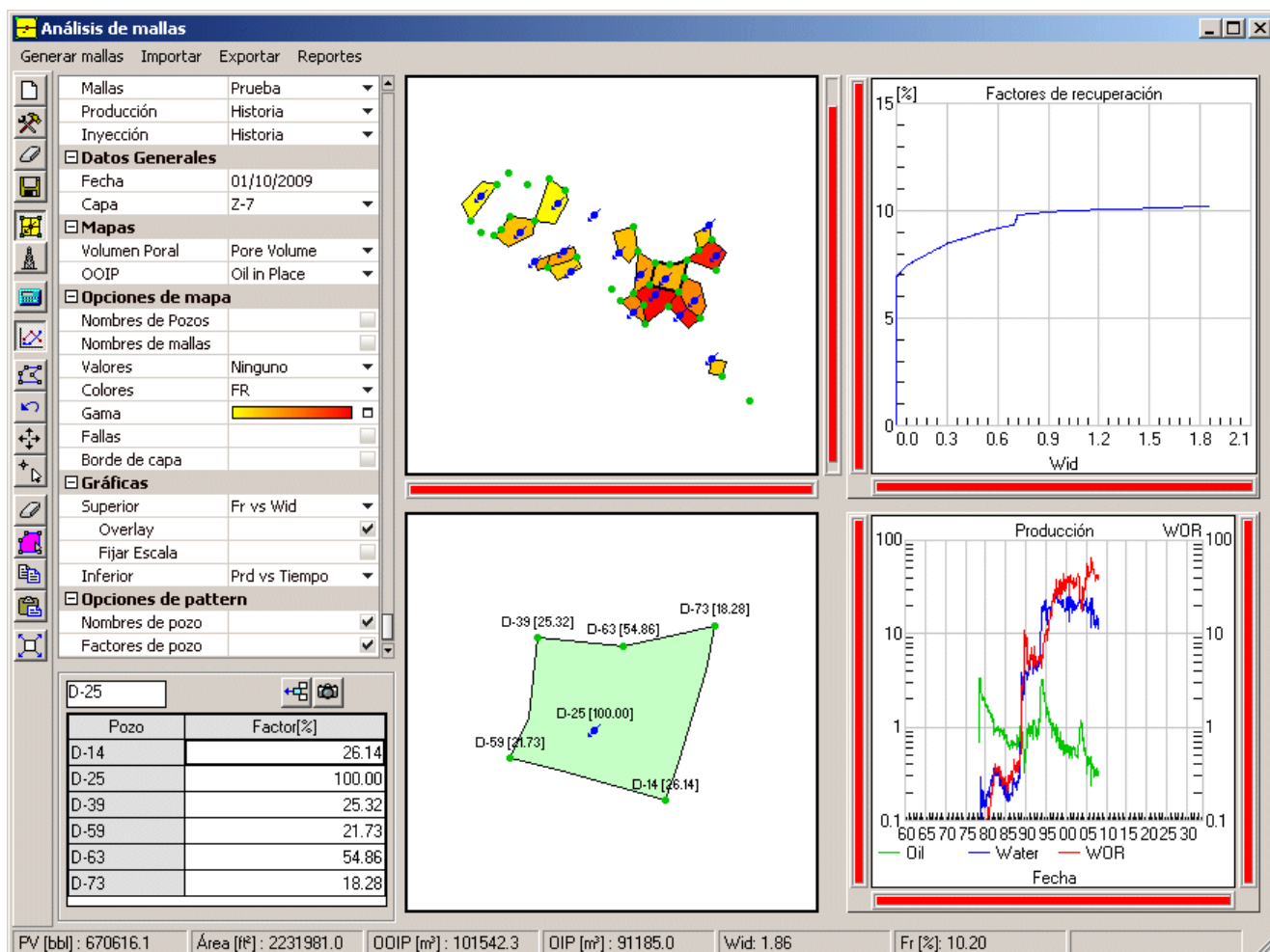
▲ Pattern Analysis

This window, located in **Tools > Diagnostic > Pattern Analysis**, allows the user to design patterns, calculate its characteristic parameters, and look at several charts and graphics needed in their analysis.

This analysis can be done at well, formation, or layer level, according to injection and production information available, and the patterns can be created either using the flow elements system constructed for Sahara's simulator, or designing them at producer well, injector well, or regional level.

Taking into account this generated pattern's geometry, their production and injection history, and pore volume and original oil in place maps, this tool can calculate cumulative production and injection for each pattern.

With this information, the user can also look at charts of Recovery Factor vs. Cumulative injection, or vs. Pattern Area, as well as a number of predefined Production and Injection charts vs. Time or Cumulative production.



Pattern Scenarios

The user can create different work scenarios, and use a different set of patterns in each one.

Escenarios	
Mallas	Prueba ▼
Producción	Historia ▼
Inyección	Historia ▼
Datos Generales	
Fecha	1/10/2009
Capa	Z-7 ▼
Mapas	
Volumen Poral	Volumen poral ▼
OOIP	OOIP ▼
Opciones de mapa	
Gráficas	
Opciones de pattern	

Production and injection scenarios

These scenarios (from where the data will be obtained) can be selected independently, to quickly evaluate alternative production and injection forecasts.

Data can be processed at layer or formation level, according to the information available in the project.

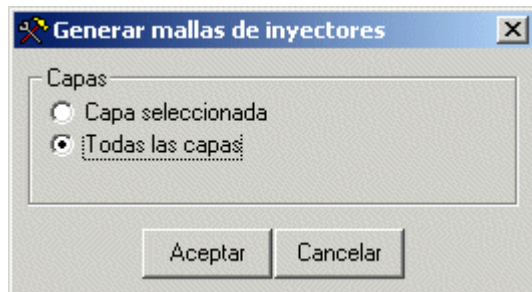
Maps

Sahara needs the user to specify a Pore Volume and an OOIP (original oil in place) map to be able to perform these calculations.

Automatic Pattern generation

Sahara's simulator uses flow elements, which can be created manually or automatically, to perform its calculations.

Since the group of flow elements converging at a particular well (injector or producer) can be considered as that well's pattern, this tool can generate Patterns based on available flow elements geometry. This can be done from the menu **Create Pattern**.



Interactive Pattern design

This window's toolbar has several buttons dedicated to design the polygons that define the pattern system.

You can draw each pattern's perimeter clicking on the map with your mouse.

Well patterns or Regional patterns

The "work unit" for this window is a polygon, which can represent a single well, or a region involving a several producer and/or injector wells.

If the user wants to represent patterns at well level the polygon vertexes should be located at wells.

Well percentages

Once the patterns are defined, Sahara can determine the percentage each well supplies to each pattern. A well inside a particular pattern will provide 100%, while for a well located in a limit of the pattern, the contribution percentage can be estimated using the angle or pondered according to Pore Volume or OOIP of shared patterns.

This values can be manually edited later to correct any singularities not taken into account in this method.

Recovery Factors

Sahara can calculate the recovery factor along history for each pattern and display them in charts and tables.

To do this, the system will take into account Pore Volume and Original oil in place from the maps, production and injection history of each individual well at the selected level (Layer, Formation, Field), and well contribution percentages to each pattern, and calculate the cumulative production and injection.

Maps

The window displays a main map, in the upper part of the window, with the pattern's geometry for the selected layer.

In this map you can see the pattern's and well's name, as well as the numeric values of several properties at the analysis date (Recovery Factor, Injected water in pore volumes (Wid), Oil in place)

These values can also be represented as a color scale in the map.

There are other configuration options to choose whether to show faults and layer borders or not.

The detailed map, in the lower part of the window, shows the geometry of the pattern selected in the main map, the name of the wells and their contribution percentages.

Charts

When selecting one or more patterns by clicking on them, charts are refreshed. Charts can be configured using predefined templates.

By holding down the control key while clicking on the patterns, groups of patterns can be selected and displayed (as a sum) simultaneously.

In the Recovery Factor vs. Wid chart, there is an option to show curves in Overlay mode, allowing all selected pattern's curves to be displayed individually.

In this case, when selecting a particular curve, its name will be displayed in the chart and the pattern will be highlighted on the main map.

The status bar shows information of the curve's values when moving the cursor over the charts as usual.

Upper chart templates:

- Recovery Factor vs. Injected Water (pore volumes)
- Recovery Factor vs. Pattern Area

Lower chart templates

- Oil, Water and WOR vs. Time
- Log(WOR) vs. Np
- Log(WOR) vs. Wid
- Oil, Water and Liquid vs. Time
- Oil, Injected water, Liquid, Number of producing wells and number of injector wells vs. Time

Toolbar

The top four buttons allow the user to create a new pattern scenario,

Los primeros botones permiten la creación y borrado de escenarios y la grabación de las novedades realizadas.

Los siguientes 2 botones permiten la exportación e importación, a un archivo de texto, con la totalidad de la información de un escenario.

Estas opciones permiten portar un escenario de un proyecto a otro. El requisito para poder hacer esas operaciones es, obviamente, que la nomenclatura de pozos y capas sea la misma.

Mallas y Pozos

La opción Mallas es la que se ha descrito hasta ahora, mediante la cual al hacer click en el mapa principal se seleccionan mallas.

La opción Pozos permite seleccionar pozos en el mapa principal y ver el detalle de las mallas que comparten el mismo pozo en el mapa secundario.

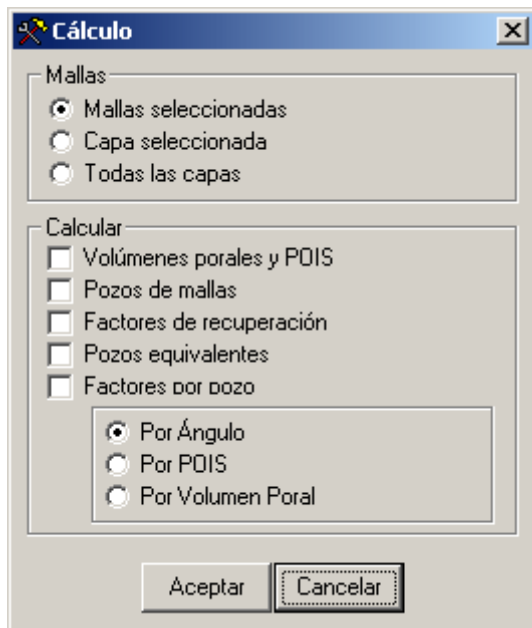
Reportes

Este menú genera reportes tabulares de propiedades de mallas y de factores por pozo.

Cálculos

Este botón desplegable permite calcular:

- Volúmenes porales y petróleo in situ
- Pozos por malla
- Factores de peso
- Factores de recuperación
- Pozos equivalentes



Pozos equivalentes

El cálculo de pozos equivalentes toma en cuenta los porcentajes de aporte de cada pozo de la malla y calcula el número de pozos correspondiente a un aporte del 100% cada uno. Luego se obtiene el área equivalente por pozo.

A modo de ejemplo, una malla del tipo five spot contiene un pozo inyector con 100% y 4 productores con 25%. El resultado del cálculo serán 2 pozos equivalentes.

Toolbar



Create new pattern scenario

This button creates a new pattern scenario



Rename pattern scenario

This button allows changing pattern scenario name.



Erase pattern scenario

This button deletes the pattern scenario in use.



Save changes

This button saves the changes in the pattern scenario in use.



Patterns

If selected, patterns' edit buttons will be enabled.



Wells

If selected, wells edit buttons will be enabled.



Calculate

This button opens a dialog to set some information about calculation options.



Charts

If selected, it shows the four graphics, instead of only the first one.



New pattern

This button allows drawing a pattern.



Erase vertex

When creating a new pattern, this button allows deleting the last vertex drawn.



Edit vertex

This button allows editing a pattern vertex.



Insert point

This button saves the pattern scenario in use.



Add well

This button allows adding a well to a pattern.



Erase selected patterns

This button deletes the selected patterns.



Select all patterns

This button selects all the patterns.



Copy

This button copies the selected patterns.



Paste

This button pastes the patterns previously copied.



View all

This button adjusts the scale for all the charts.

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