

# whitson+

# Comparison Plot

22 January 2025

Virtual

Topics: Coloring, Normalization, Aggregation





Main objective: Click every button and not rush.

# Small Courses throughout the Year

- ✓ 22 Jan: Comparison Plot in whitson+ (virtual)
- ✓ 13 Feb: PVT & Phase Behavior in whitson+ (virtual)
- ✓ 27 Feb: Flowback in whitson+ (virtual)
- ✓ 26 March: Nodal Analysis in whitson+ (virtual)
- ✓ 24 April: Bottomhole Pressure in whitson+ (virtual)
- ✓ 7 May: DCA & Type Wells in whitson+ (virtual)
- ✓ 25 June: Analytical & Numerical RTA in whitson+ (virtual)
- ✓ 20 Aug: Flowing Material Balance in whitson+ (virtual)
- ✓ 25 Sep: Numerical Model in whitson+ (virtual)
- ✓ 1 October: whitson+ software course (in-person)
- ✓ 15 Oct: Nodal Analysis in whitson+ (virtual)
- ✓ 5 Nov: Well Tests (CPG, DQI & DFIT) in whitson+ (virtual)
- ✓ 3 Dec: DCA & Type Wells in whitson+ (virtual)



TODAY

Send e-mail to [carlsen@whitson.com](mailto:carlsen@whitson.com) if you haven't received the invite to the courses.

# Need Course Certificate?

Contact [carlsen@whitson.com](mailto:carlsen@whitson.com)



# Training

<https://whitson.com/training/>

SEP 18 2024	<a href="#">whitson+ software course</a> 1-Day, In person course - Houston 8 am-16 pm Central Time (CT)	Register
OCT 02 2024	<a href="#">Nodal Analysis in whitson+</a> Virtual 1/2 Day Course 8-12 am Central Time (CT)   7-11 am Mountain Time (MDT)   3-7 pm Central European Summer Time (CEST)	Register
OCT 16 2024	<a href="#">Well Tests (CPG &amp; DFIT) in whitson+</a> Virtual 1/2 Day Course 8-12 am Central Time (CT)   7-11 am Mountain Time (MDT)   3-7 pm Central European Summer Time (CEST)	Register
DEC 04 2024	<a href="#">DCA &amp; Type Wells in whitson+</a> Virtual 1/2 Day Course 8-12 am Central Time (CT)   7-11 am Mountain Time (MDT)   3-7 pm Central European Time (CET)	Register
FEB 13 2025	<a href="#">PVT &amp; Phase Behavior in whitson+</a> Virtual 1/2 Day Course 8-12 am Central Time (CT)   7-11 am Mountain Time (MDT)   3-7 pm Central European Time (CET)	Register
APR 24 2025	<a href="#">Bottomhole pressure calculations in whitson+</a> Virtual 1/2 Day Course 8-12 am Central Time (CT)   7-11 am Mountain Time (MDT)   3-7 pm Central European Summer Time (CEST)	Register
JUN 25 2025	<a href="#">Analytical and Numerical RTA in whitson+</a> 1/2 Day Course 8-12 am Central Time (CT)   7-11 am Mountain Time (MDT)   3-7 pm Central European Summer Time (CEST)	Register
AUG 20 2025	<a href="#">Flowing material balance in whitson+</a> Virtual 1/2 Day Course 8-12 am Central Time (CT)   7-11 am Mountain Time (MDT)   3-7 pm Central European Summer Time (CEST)	Register

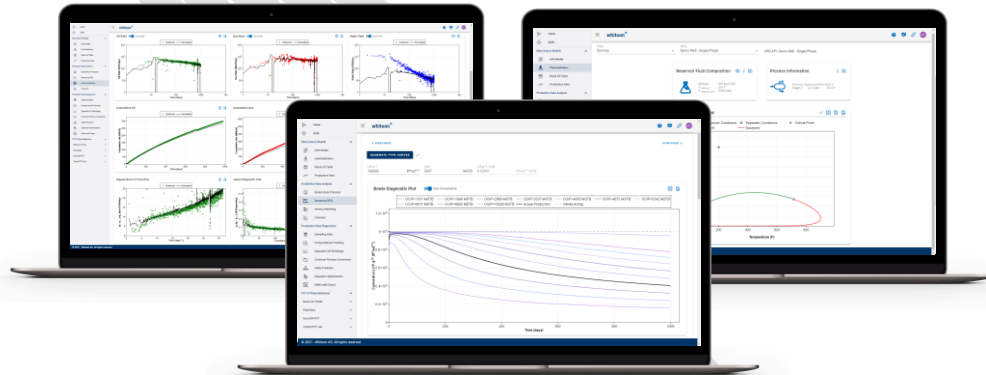


# An all-in-one solution

**whitson<sup>+</sup>**

## Web-based solution

- ✓ DCA & Type Well
- ✓ PVT
- ✓ BHP Calculations
- ✓ FMB
- ✓ RTA
- ✓ Reservoir Simulation
- ✓ Nodal Analysis
- ✓ Well Testing (CPG, DFIT)



# General Support

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**whitson+ software**

[support@whitson.com](mailto:support@whitson.com) (2 min response time)



HELP!

# Agenda

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- Single Plot
  - Create plot
  - Smoothing
  - Coloring
  - Customize Plot
  - Normalization
  - Aggregation
    - By sum
    - By Average
- Advanced
  - Appending forecasts
  - Multiple Axis
  - 2x2 plot
  - RTA plots – PNRs and RNPs



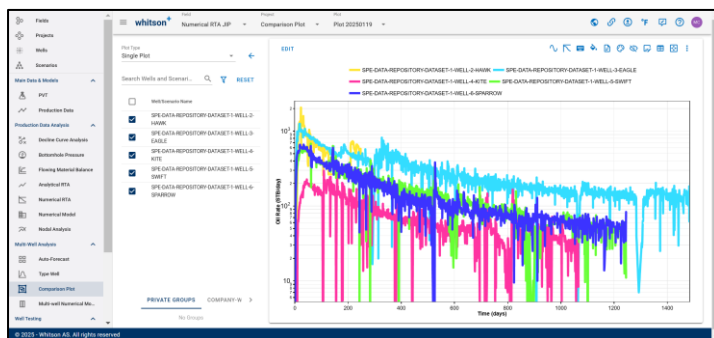
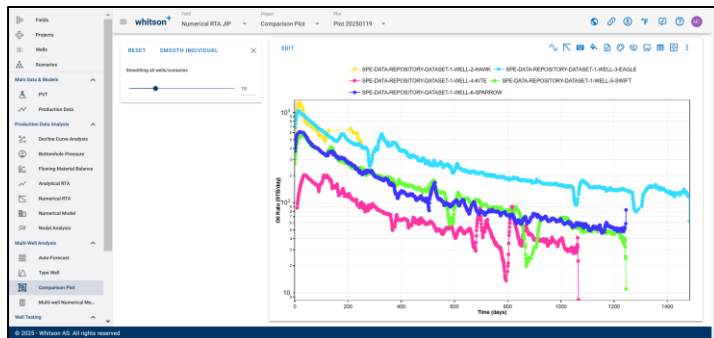
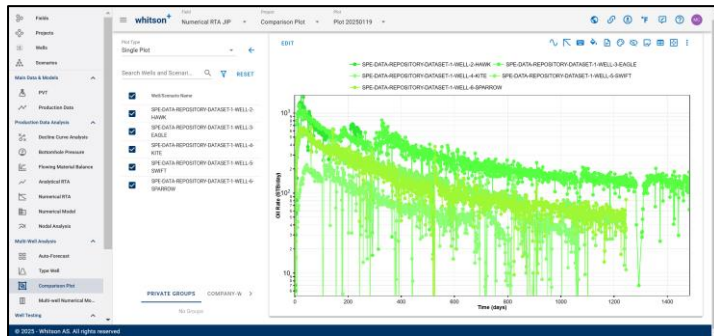
# Exercises

**ALWAYS WARM UP**



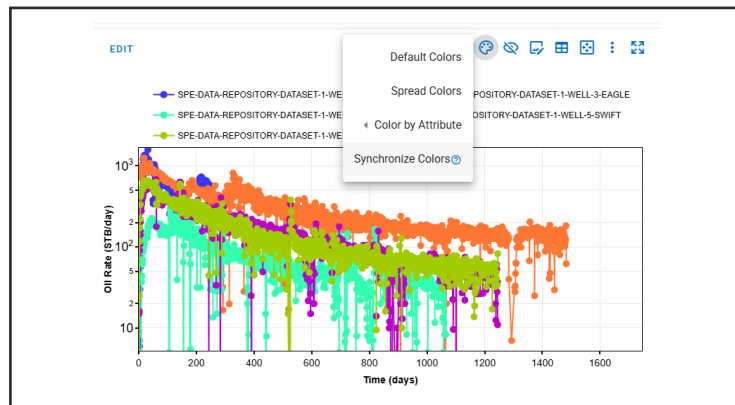
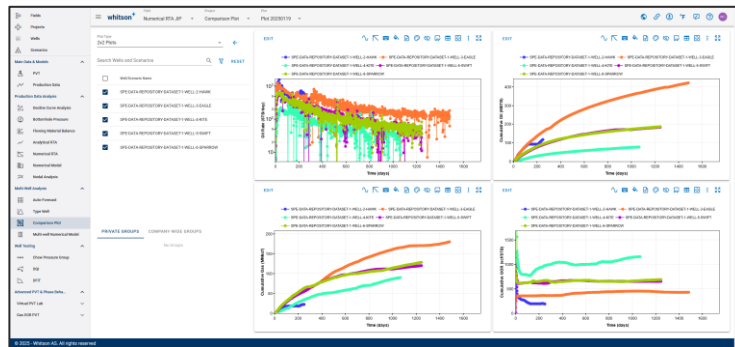
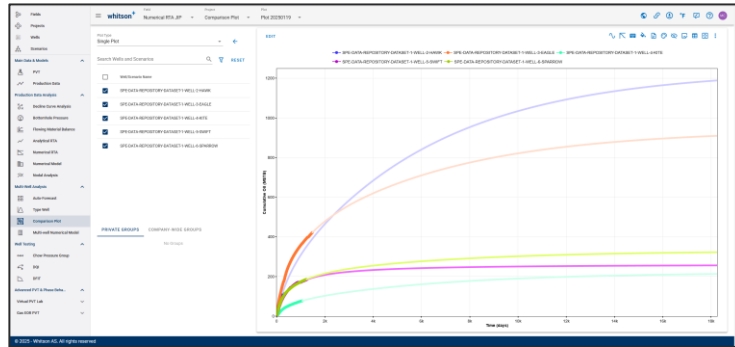
**THOROUGHLY**

# Exercise 1: Single Plot



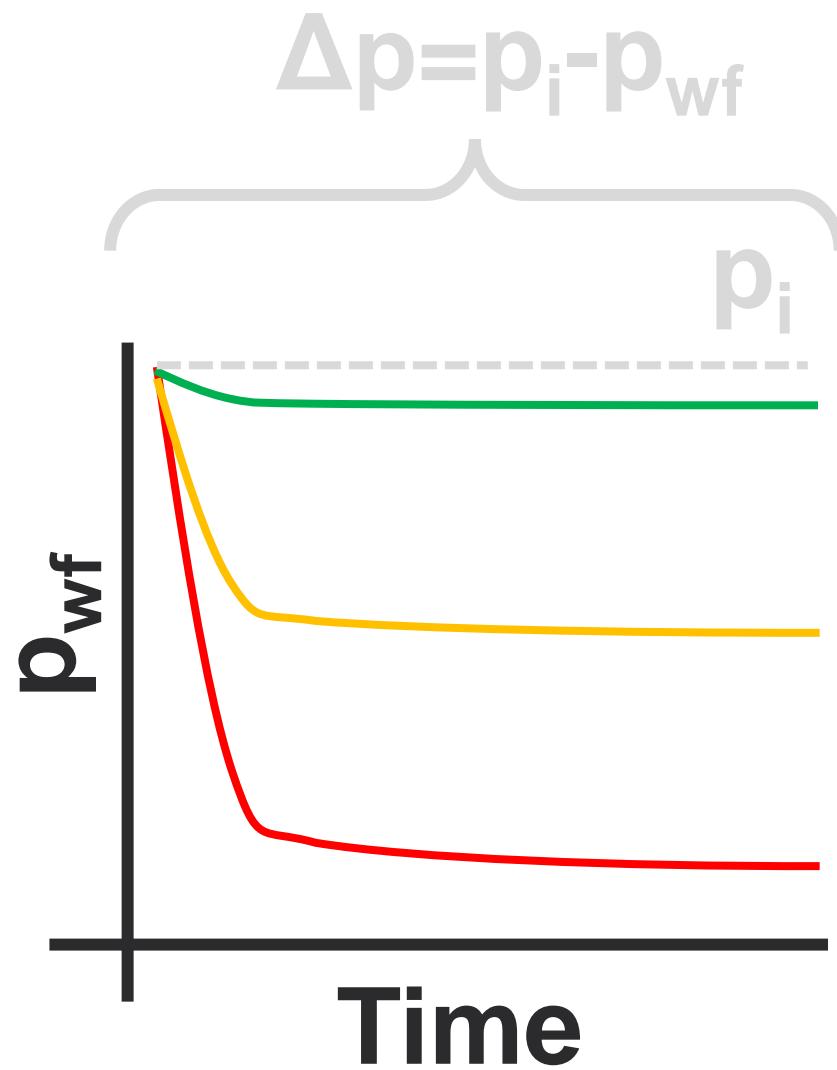
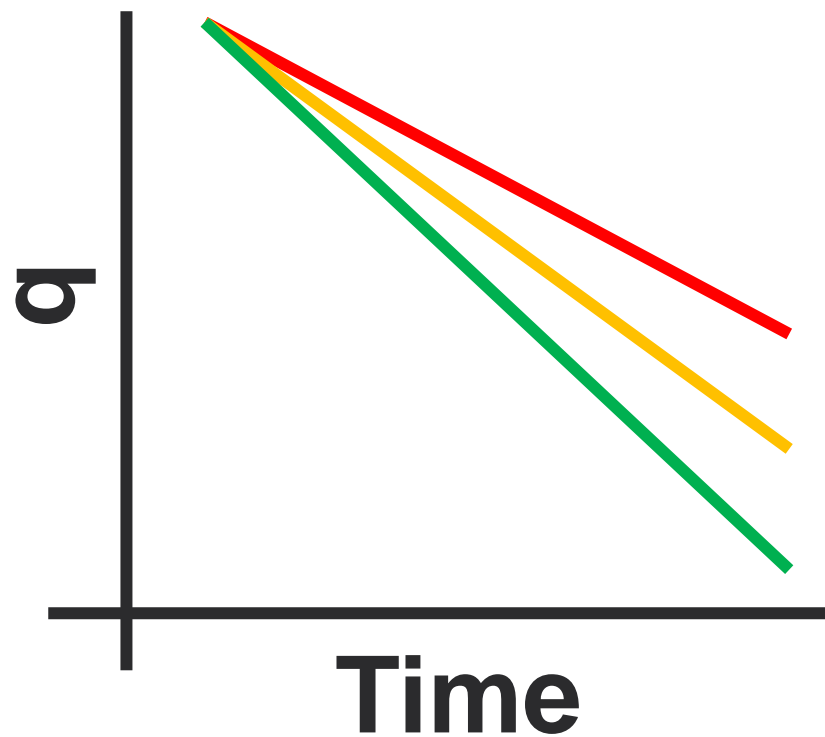
1. Create plot
2. Make rate time plot (semi log)
3. Plot Alteration
4. Spread color
5. Smoothing on
6. Smoothing off
7. Remove Markers
8. Highlighting
9. Customize plot
10. Sharing a plot with a friend
11. Edit x-axis
12. Normalize y-axis
13. Normalize x-axis
14. Remove normalization (x-axis)
15. Aggregation
16. Multiple Axis

# Exercise 2: Advanced Topics

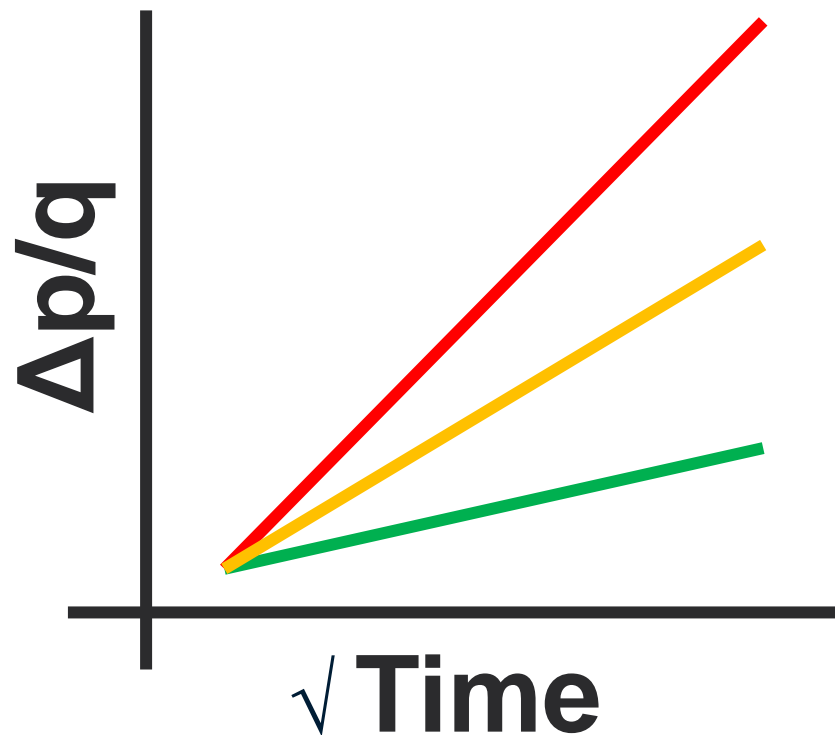
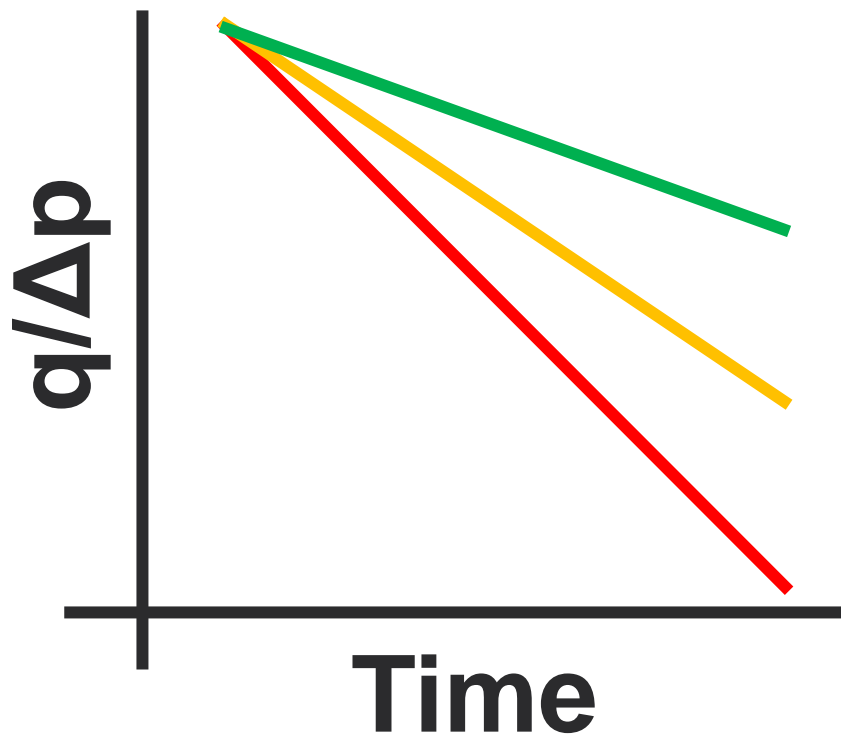


1. Creating a new plot
2. Editing plot settings
3. Rate cum plot
4. Appending forecasts
5. Removing forecasts
6. 2x2 plots
7. Synchronize colors

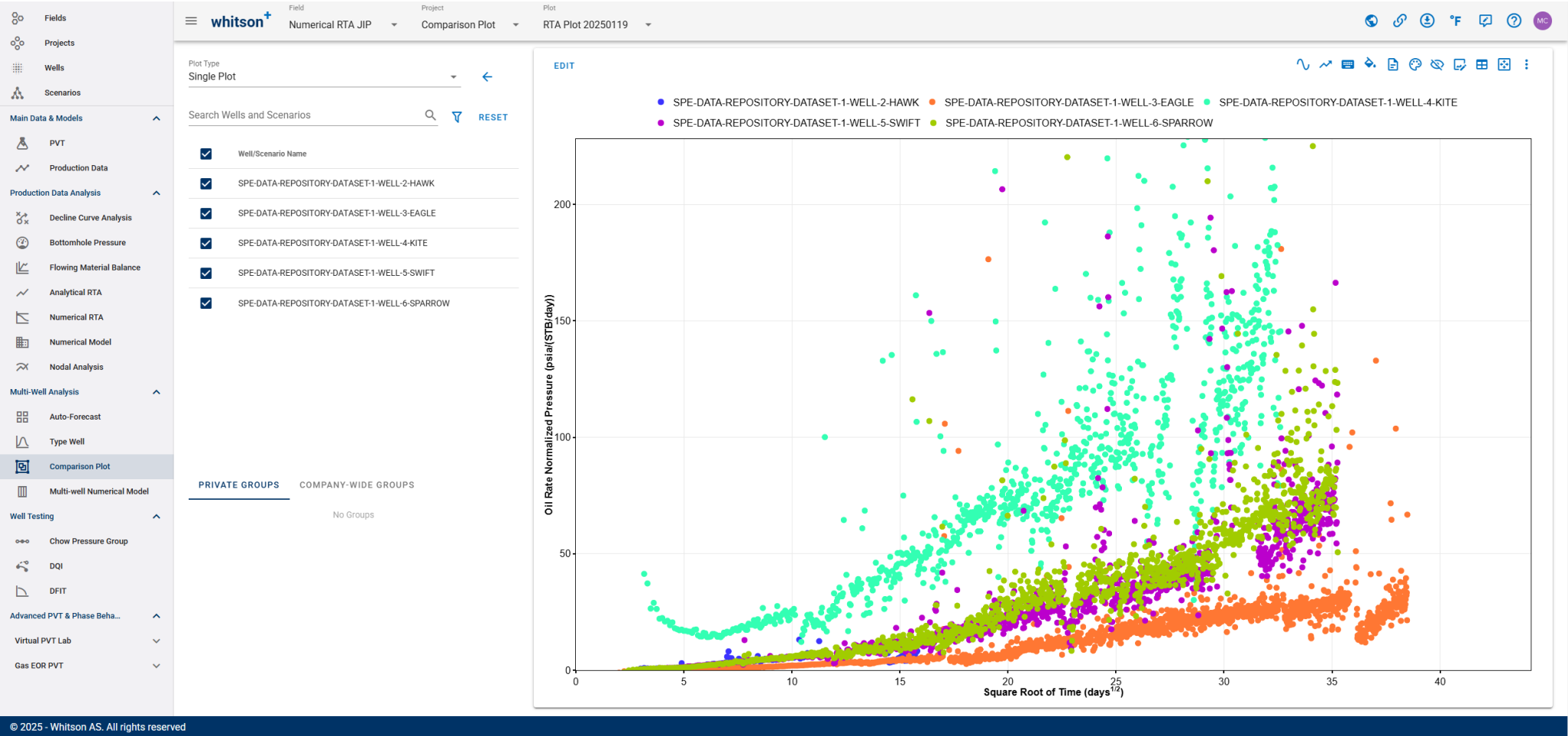
# Which **well** is the 'best' on this plot?



# Which **well** is the 'best' on this plot?



# Exercise 3: Square root of Time Plot



# whitson

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We support energy companies, oil services companies, investors and government organizations with expertise and expansive analysis within PVT, gas condensate reservoirs and gas-based EOR. Our coverage ranges from R&D based industry studies to detailed due diligence, transaction or court case projects.

We help our clients find best possible answers to complex questions and assist them in the successful decision-making on technical challenges. We do this through a continuous, transparent dialog with our clients - before, during and after our engagement.

The company was founded by Dr. Curtis Hays Whitson in 1988 and is a Norwegian corporation located in Trondheim, Norway, with local presence in USA, Middle East, India and Indonesia.

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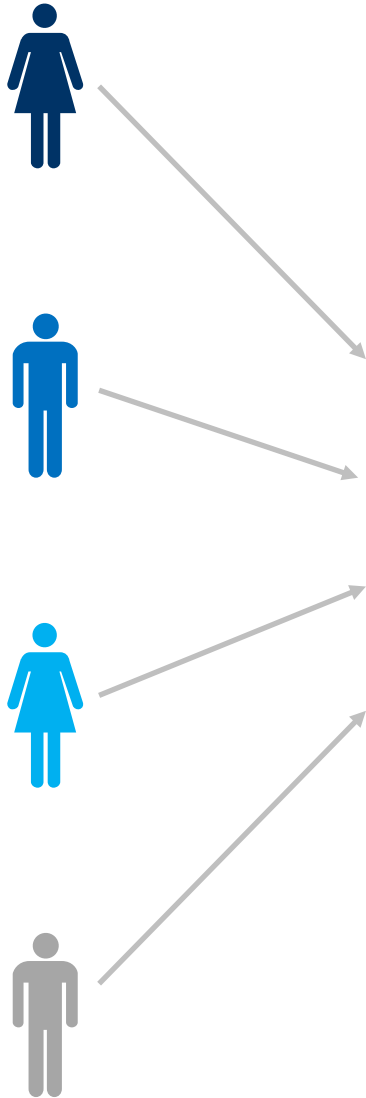
## Whitson USA LLC

3410 W Dallas St.  
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# Software Basics




# Access to whitson+



NOT YOUR COMPANY DOMAIN

 [www.courses.whitson.com](https://www.courses.whitson.com)

 Username: your e-mail

 Password: **WhitsonDCA2024\***

\*Send an e-mail to [dahouk@whitson.com](mailto:dahouk@whitson.com) if you need help to login.

# Access to whitson+

The screenshot displays the whitson+ web application interface. At the top, the browser address bar shows the URL <https://courses.whitson.com>. The application header features the whitson+ logo and a search bar labeled "Search Fields".

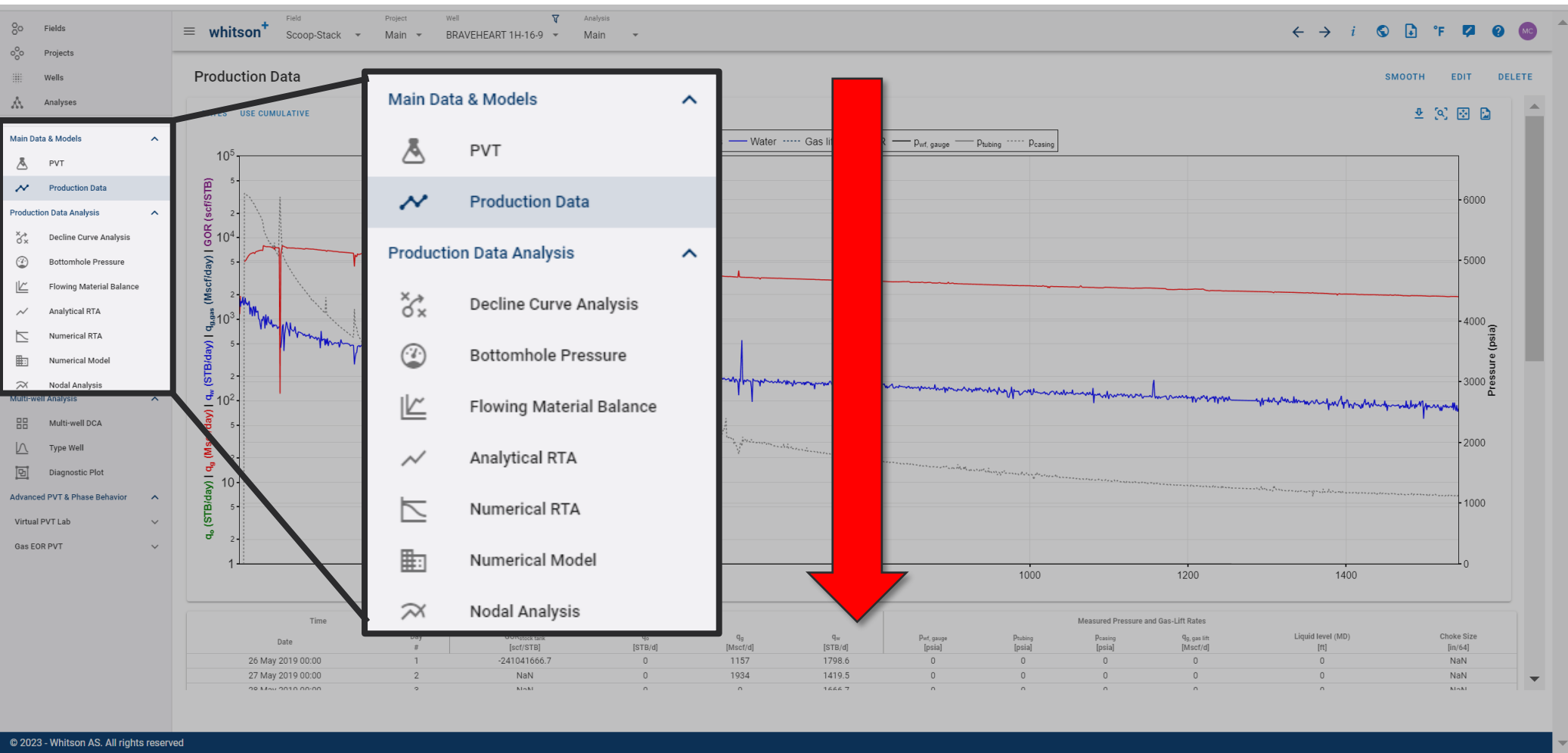
A left-hand navigation menu is visible, containing the following items:

- Fields
- Projects
- Wells
- Scenarios
- Main Data & Models (with an upward arrow)
  - PVT
  - Production Data
- Production Data Analysis (with an upward arrow)
  - Decline Curve Analysis
  - Bottomhole Pressure

The main content area displays search results for "Comparison Plot". A large blue arrow points from the left towards the search results. The results include:

- A yellow star icon.
- The title "Comparison Plot in whitson".
- The subtitle "Company Wide".
- The count "1 projects".
- A preview image of a "whitson+ Comparison Plot" interface, dated "22 January 2025", categorized as "Virtual".
- Topics listed: "Coloring, Normalization, Aggregation".
- A photo of three men.

# Software Structure: Top Down



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# whitson+: Set Zoom to 70-80%

The screenshot displays the whitson+ web application interface. The browser address bar shows the URL: `https://internal.whitson.com/fields/2/projects/49/wells/241/pvt/fluid-definition`. The application header includes navigation menus for Field (Bakken), Project (Stian-PhD-Project), Well (Volatile-Oil), and Analysis (Main). The main content area is titled "FLUID DEFINITION" and contains two panels: "Reservoir Fluid Composition" and "Surface Process".

The "Reservoir Fluid Composition" panel shows the following data:

Method:	API and GOR
T <sub>reservoir</sub>	200 F
P <sub>reservoir, int.</sub>	8000 psia

The "Surface Process" panel shows the following data:

Process:	Well Specific Process
Stage 1:	300 psia 100 F
Stage 2:	14.7 psia 60 F

The "Phase Envelope" plot shows Pressure (psia) on the y-axis (0 to 8000) and Temperature (F) on the x-axis (0 to 700). The plot includes a legend with the following items:

- Initial Reservoir Conditions (diamond symbol)
- Separator Conditions (square symbol)
- Critical Point (circle symbol)
- Bubblepoint (green line)
- Dewpoint (red line)

The plot shows a bubblepoint curve (green) and a dewpoint curve (red) forming a closed loop. The Initial Reservoir Conditions are marked at approximately 200 F and 8000 psia. The Separator Conditions are marked at approximately 100 F and 500 psia. The Critical Point is marked at approximately 380 F and 3800 psia.

A blue callout box with the text "Click here (Alternatively, CTRL + '-' on keyboard)" points to the Zoom option in the browser context menu. The context menu is open, showing the Zoom option selected with a zoom level of 50%.

The Windows taskbar at the bottom shows the system tray with the date and time: ENG NO 5:35 PM 3/1/2023.

# whitson+: Maximize Screen by "F11"

whitson+  
Field: Bakken | Project: Stian-PhD-Project | Well: Volatile-Oil | Analysis: Main

Click F11

Pressure (psia)

Temperature (F)

Initial Reservoir Pressure

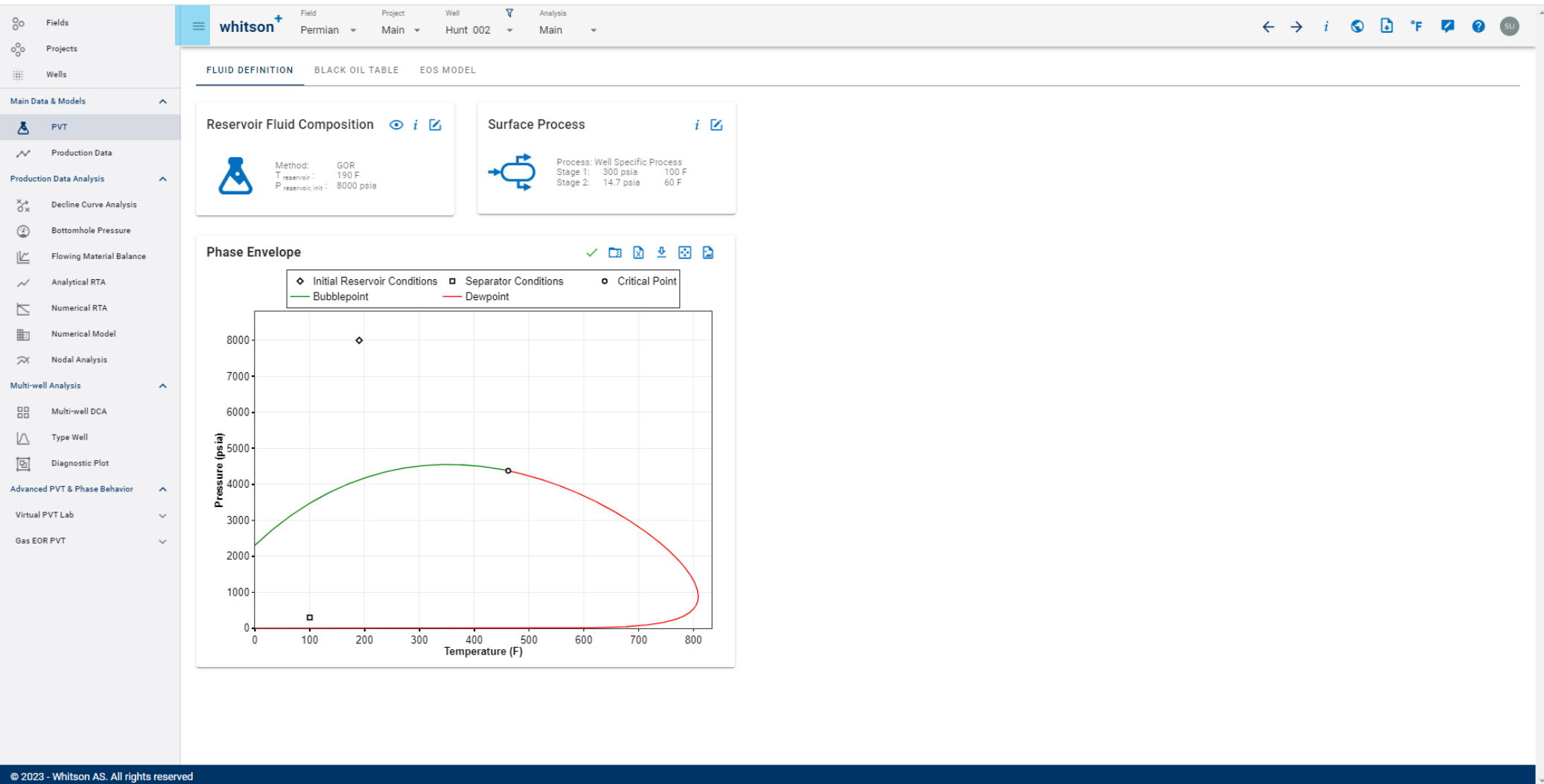
Bubblepoint

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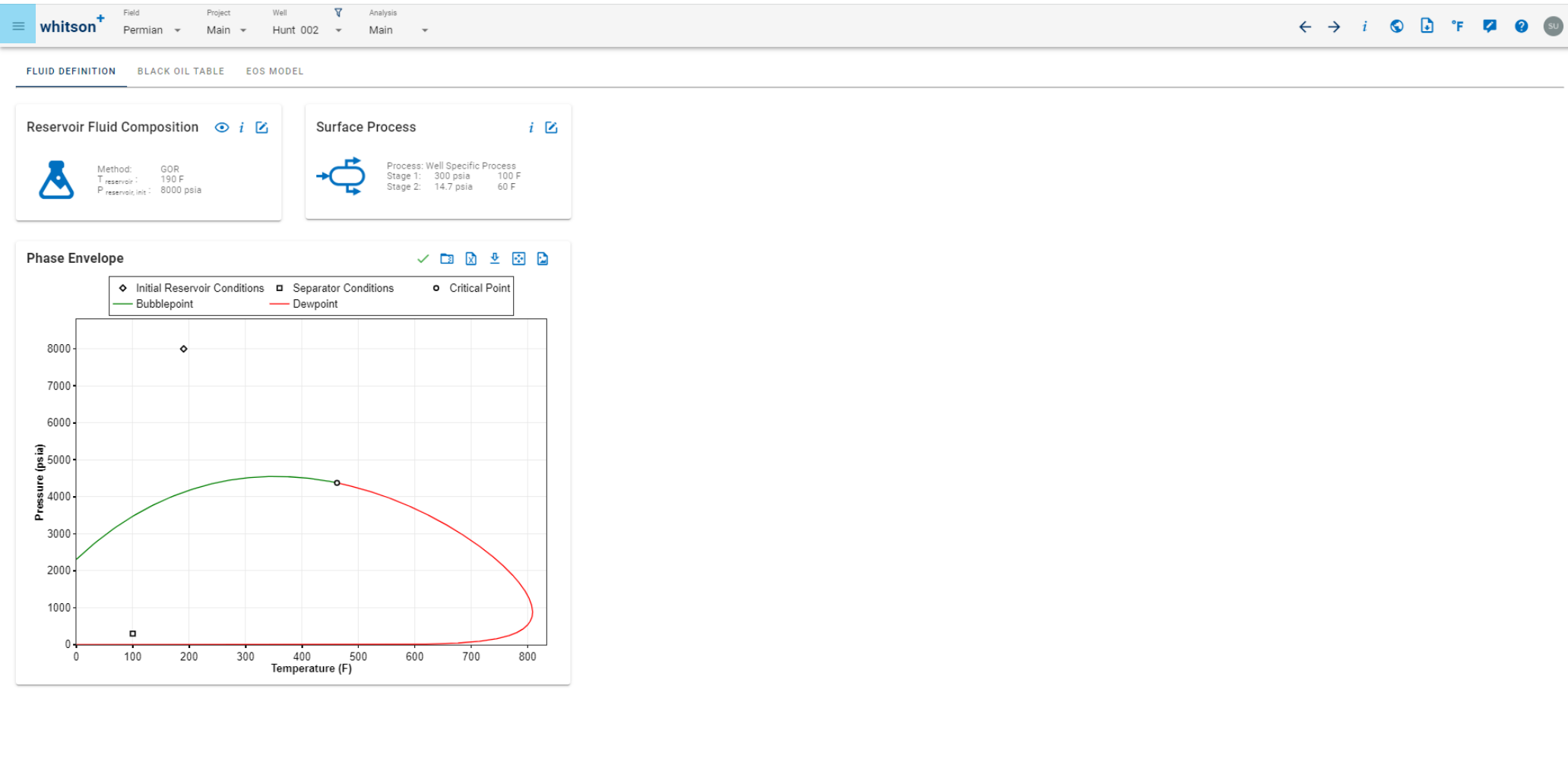
Type here to search

ENG NO 5:37 PM 3/1/2023

# whitson+: More Screen Real Estate



# whitson+: More Screen Real Estate



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# whitson+: Navigation Panel

The screenshot displays the whitson+ software interface. On the left is a navigation panel with a tree view of modules. The main area shows the 'Reservoir Fluid Composition' section with a 'Phase Envelope' plot. A blue callout box highlights the navigation panel.

**Navigation Panel Overview of all modules**

**Phase Envelope**

Legend:

- ◆ Initial Reservoir Conditions
- Separator Conditions
- Critical Point
- Bubblepoint
- Dewpoint

The Phase Envelope plot shows Pressure (psia) on the y-axis (0 to 8000) and Temperature (F) on the x-axis (0 to 800). The plot displays a bubblepoint curve (green) and a dewpoint curve (red) forming a closed loop. Key points are marked: Initial Reservoir Conditions (diamond at ~180 F, 8000 psia), Separator Conditions (square at ~100 F, 300 psia), and Critical Point (circle at ~450 F, 4500 psia).

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# whitson+: Software Hierarchy

The screenshot displays the whitson+ software interface. The top navigation bar includes 'whitson+', 'Field' (Permian), 'Project' (Main), 'Well' (Hunt 002), and 'Analysis' (Main). A red dashed circle highlights navigation arrows in the top right corner. A blue callout box on the left states 'Software Hierarchy Fields → Projects → Wells'. Another blue callout box on the right states 'Next / Previous Well in a project'. The main content area shows 'FLUID DEFINITION', 'BLACK OIL TABLE', and 'EOS MODEL' tabs. A 'Reservoir' section is partially visible. Below it is a 'Phase Envelope' plot with 'Pressure (psia)' on the y-axis (0 to 8000) and 'Temperature (F)' on the x-axis (0 to 800). The plot shows a green bubblepoint curve and a red dewpoint curve. A legend indicates 'Initial Reser' (diamond) and 'Bubblepoint' (line). A small square marker is on the x-axis at approximately 100 F.

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# whitson+: Create Multiple Analyses for a Well

The screenshot displays the whitson+ software interface. The top navigation bar includes 'Fields', 'Projects', and 'Wells'. The main workspace is divided into sections for 'FLUID DEFINITION', 'BLACK OIL TABLE', and 'EOS MODEL'. A 'Main' analysis menu is open, showing options to 'Add new analysis' and 'View all analyses'. A blue callout box points to the 'Add new analysis' option with the text: 'Save an analysis (or interpretation) for a given well'. Below the menu, there are two summary cards: 'Reservoir Fluid Composition' (Method: GOR, T<sub>reservoir</sub>: 190 F, P<sub>reservoir, int</sub>: 8000 psia) and 'Surface' (Process: Well Specific Process, Stage 1: 300 psia, 100 F, Stage 2: 14.7 psia, 60 F). The 'Phase Envelope' plot shows Pressure (psia) on the y-axis (0 to 8000) and Temperature (F) on the x-axis (0 to 800). The plot includes a green 'Bubblepoint' curve, a red 'Dewpoint' curve, and a black 'Critical Point' at approximately 450 F and 4500 psia. Other markers include 'Initial Reservoir Conditions' (diamond at ~180 F, 8000 psia) and 'Separator Conditions' (square at ~100 F, 200 psia).

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# whitson+: Create Multiple Analyses for a Well

The screenshot displays the whitson+ software interface. On the left is a navigation sidebar with categories like 'Fields', 'Projects', 'Wells', and 'Main Data & Models'. The main area shows a 'Main' analysis for 'Hunt 002' with tabs for 'FLUID DEFINITION', 'BLACK OIL TABLE', and 'EOS MODEL'. A dropdown menu is open over the 'Main' analysis, showing options: 'Add new analysis', 'View all analyses', and 'Main'. A blue callout box points to the 'View all analyses' option with the text: 'Click here and it will bring you to the well overview page'. Below the menu, there are two summary cards: 'Reservoir Fluid Composition' (Method: GOR, T<sub>reservoir</sub>: 190 F, P<sub>reservoir, int</sub>: 8000 psia) and 'Surface' (Process: Well Specific Process, Stage 1: 300 psia, 100 F, Stage 2: 14.7 psia, 60 F). A 'Phase Envelope' plot is shown with Pressure (psia) on the y-axis (0 to 8000) and Temperature (F) on the x-axis (0 to 800). The plot includes a green bubblepoint curve, a red dewpoint curve, and a critical point. A legend indicates: Initial Reservoir Conditions (diamond), Separator Conditions (square), and Critical Point (circle).

Click here and it will bring you to the well overview page

## Well Overview page

The screenshot shows the 'Well Overview' page in whitson+. The page is titled 'Analysis: Main' and contains several sections: 'Well Information', 'Reservoir Properties', 'Completion Metrics', and 'Well Data Audit'. The 'Well Information' section includes fields for Well Name, Location, and Status. The 'Reservoir Properties' section includes Reservoir, Depth, and Surface Length. The 'Completion Metrics' section includes Completion Type and Status. The 'Well Data Audit' section includes a list of data points with checkboxes for 'All Data', 'Production Data', and 'Analysis Performed'. A table at the bottom of the page shows a list of analyses with columns for 'Analysis Name', 'Analysis Type', 'Owner', 'Created', and 'Last Modified'.

# whitson+: Change Units

The screenshot displays the whitson+ software interface. At the top, the 'Change Unit System' dropdown menu is open, showing options for 'Field' (selected), 'SI/Metric', and 'SI/Metric'. A blue callout box with the text 'Change Units' is positioned over the dropdown. The main interface shows the 'FLUID DEFINITION' tab with sub-tabs for 'BLACK OIL TABLE' and 'EOS MODEL'. The 'Reservoir Fluid Composition' panel displays: Method: GOR, T<sub>reservoir</sub>: 190 F, P<sub>reservoir,init</sub>: 8000 psia. The 'Surface Process' panel displays: Process: Well Specific Process, Stage 1: 300 psia, 100 F, Stage 2: 14.7 psia, 60 F. The 'Phase Envelope' plot shows Pressure (psia) on the y-axis (0 to 8000) and Temperature (F) on the x-axis (0 to 800). The plot includes a green bubblepoint curve, a red dewpoint curve, a black diamond for 'Initial Reservoir Conditions' at approximately (190, 8000), a black square for 'Separator Conditions' at approximately (100, 300), and a black circle for 'Critical Point' at approximately (450, 4500).

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# whitson+: Input Card

The screenshot displays the whitson+ software interface. The top navigation bar includes 'whitson+', 'Field: Permian', 'Project: Main', 'Well: Hunt 002', and 'Analysis: Main'. Below this, there are tabs for 'FLUID DEFINITION', 'BLACK OIL TABLE', and 'EOS MODEL'. The 'FLUID DEFINITION' tab is active, showing two cards: 'Reservoir Fluid Composition' and 'Surface Process'. The 'Reservoir Fluid Composition' card is highlighted with a blue callout box that says 'Open by clicking here', pointing to an edit icon (a pencil) on the card. Another blue callout box on the left says 'These "Cards" is what we call an "Input Card" and they contain input information for the different features-'. Below the cards is a graph showing 'Temperature (F)' on the x-axis (0 to 800) and an unlabeled y-axis (0 to 2000). The graph features a red curve labeled 'Dewpoint' and a green curve. A legend indicates 'Separator Conditions' with a square symbol and 'Dewpoint' with a line symbol.

Method: GOR  
T<sub>reservoir</sub>: 190 F  
P<sub>reservoir, int</sub>: 8000 psia

Open by clicking here

These "Cards" is what we call an "Input Card" and they contain input information for the different features-

Temperature (F)

Separator Conditions  
Dewpoint

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# whitson+: Support Ticket

The screenshot displays the whitson+ software interface. The top navigation bar includes 'whitson+', 'Field: Permian', 'Project: Main', 'Well: Hunt 002', and 'Analysis: Main'. The main content area is divided into 'FLUID DEFINITION', 'BLACK OIL TABLE', and 'EOS MODEL' tabs. The 'Reservoir Fluid Composition' panel shows 'Method: GOR', 'T<sub>reservoir</sub>: 190 F', and 'P<sub>reservoir, int</sub>: 8000 psia'. The 'Surface Process' panel shows 'Process: Well Specific Process'. The 'Phase Envelope' plot shows Pressure (psia) vs. Temperature (F) with 'Initial Reservoir Conditions' (diamond), 'Separator Conditions' (square), 'Bubblepoint' (green line), and 'Dewpoint' (red line). A 'Feedback / Question' modal window is open, containing the following fields:

- Title
- Type (dropdown)
- Field (optional) (dropdown)
- Well (optional) (dropdown)
- Module (optional): Fluid Definition
- Project (optional) (dropdown)
- Calculation ID: cc3a482e-a74d-42ce-8740-93d3ac5f7116
- Description
- Attachment (optional)

Buttons at the bottom of the modal are HIDE, DISCARD, and SAVE.

You can also e-mail  
support@whitson.com

# whitson+: Manual

The screenshot displays the whitson+ software interface. The top navigation bar includes the whitson+ logo, field information (Permian), project (Main), well (Hunt 002), and analysis (Main). A 'User Manual' button is visible in the top right corner, highlighted by a blue callout box with the text 'User manual'. The main content area is divided into three tabs: 'FLUID DEFINITION', 'BLACK OIL TABLE', and 'EOS MODEL'. The 'FLUID DEFINITION' tab is active, showing two panels: 'Reservoir Fluid Composition' and 'Surface Process'. The 'Reservoir Fluid Composition' panel lists: Method: GOR, T<sub>reservoir</sub>: 190 F, and P<sub>reservoir,init</sub>: 8000 psia. The 'Surface Process' panel lists: Process: Well Specific Process, Stage 1: 300 psia, 100 F, and Stage 2: 14.7 psia, 60 F. Below these panels is a 'Phase Envelope' plot. The plot shows Pressure (psia) on the y-axis (0 to 8000) and Temperature (F) on the x-axis (0 to 800). The plot includes a green bubblepoint curve, a red dewpoint curve, and a critical point marked with a black circle. A legend identifies the symbols: diamond for Initial Reservoir Conditions, square for Separator Conditions, and circle for Critical Point. The Initial Reservoir Conditions point is at approximately (190 F, 8000 psia). The Separator Conditions point is at approximately (100 F, 300 psia). The Critical Point is at approximately (450 F, 4500 psia).

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# Important Shortcut: Refresh

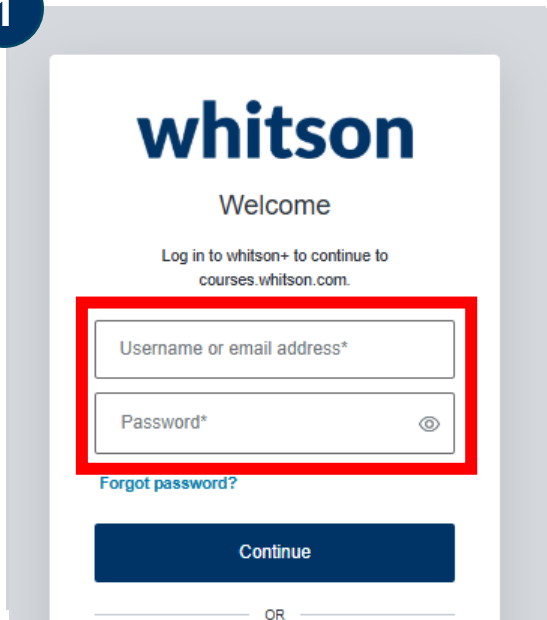
- Refresh shortcut: “CTRL + R”
- Use if you experience
  - Bad connection
  - The browser is “stuck”





# Do this Before Course Starts

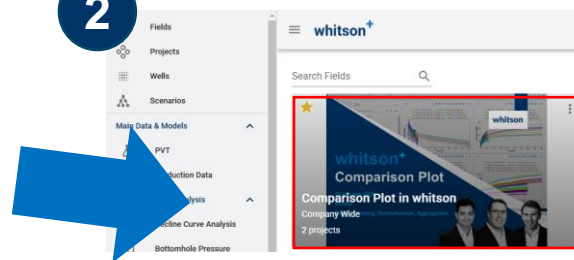
1



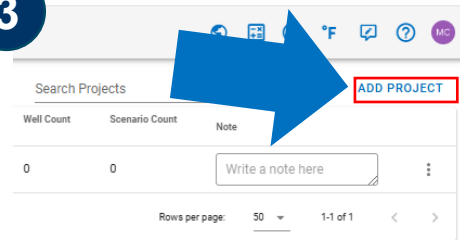
## 1. Login

- <https://courses.whitson.com/>
- Username: Your e-mail
- Password: Comp2025\*

2



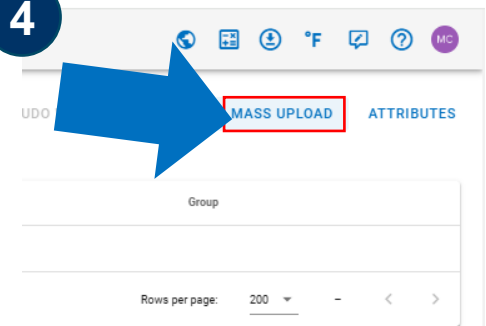
3



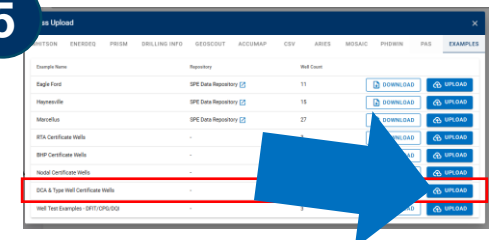
## 2. Add project

- Click '**Comparison Plot in whitson**'
- Add project named 'YOUR NAME'

4



5



## 3. Upload Wells

- Click Mass Upload
- Go to 'Examples'
- Click Comparison Plot Certificate Wells