French Creek
Well Log Module
in DownHole SAT®
Introducing the French Creek The Well Log™
French Creek is pleased to release the DownHole SAT Pressure Temperature Well Log this spring/summer (2015). The Well Log includes more flexible options for modeling pressure downhole. The Well Log will be available in all editions of DownHole SAT.

Why Use The Well Log

- The DownHole SAT® Well Log Creates a Profile of Scale Potential, Predicted Corrosion Rates, and Inhibitor Dosages as a brine flows from bottom hole, to the Separator, and flashes to atmospheric pressure.

- The profiles are displayed as a function of pressure, temperature and depth.

- Graphs of individual parameters versus depth, such as an index, saturation ratio, or dosage can also be prepared using the module.
A Note About Static Versus Dynamic Temperature and Pressure in DownHole SAT
DownHole SAT WHAT-IF modules utilize static or dynamic (ranges) of pressure and temperature.

Vary Temperature & Vary Pressure
Several graphs and the One-Page Summary & new Well Log Summary feature both varying pressure and temperature.

One-Page Summary
Prior to this release, the One-Page Summary used the WHAT-IF > Select Parameters > Temperature Selection Range to vary the temperature. Pressure was dependent on temperature, not increasing until after boiling was reached in the temperature column.

With this release, the One-Page Summary now uses the WHAT-IF > Select Parameters > Temperature Selection and the WHAT-IF > Select Parameters > Pressure Selection.

Water Analysis Temperature / Pressure Input
The temperature and pressure entered into the INPUT > Source Water Analysis are the temperature and pressure of the sample when the analysis was taken. If these are room temperature and atmospheric, enter them as so.

Static Temperature
The Vary Pressure Module uses Evaluation Temperature from the WHAT-IF > Select Parameters > Temperature Selection, for a static temperature for each pressure.

Static Pressure
Vary Temperature uses Evaluation Pressure from the WHAT-IF > Select Parameters > Pressure Selection, for a static pressure throughout each temperature.

To view the temperature or pressure utilized for a specific table format report, view the 2nd window that opens, "Water Chemistry Versus Temperature or Pressure." View under the section PARAMETERS.
Setup Well Log Modeling Parameters in the “What-If” Select Parameters module

You will need:

**Bottom Hole Pressure, Temperature, and Depth**

Pressure, Temperature at the Separator

Temperature after flashing to atmospheric pressure

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**Single Water What-if Scenarios**

- **Well Log Specs**
  - Temperature °F
    - Bottom Hole: 280.00
    - At Separator: 480.00
    - After Flashing: 180.00
  - Pressure PSI
    - Bottom Hole: 360.00
    - At Separator: 50.00
    - After Flashing: 14.70

- **Temperature Selection**
  - Low Temp: 180.00
  - High Temp: 480.00
  - Evaluation Temp: 180.00

- **pH Selection**
  - Low pH: 5.60
  - High pH: 6.50
  - Evaluation pH: 5.60

- **Pressure Selection**
  - Low P: 14.70
  - High P: 7.75
  - Evaluation P: 10.00

- **pCO2 Selection**
  - Low pCO2: 0.00
  - High pCO2: 20.00
  - Evaluation pCO2: 5.00

- **pH Control Method**
  - Alkalis
    - 98% H2SO
    - Caustic Soda (NaOH)
    - Caustic Potash (KOH)
    - Soda ash (Na2CO3)
    - Sodium bicarbonate (NaHCO3)
    - Lime (Ca(OH)2)
    - None
  - Acids
    - 35% HCl
    - CO2
    - None
  - pH Target: 7.00

- **One-Page Summary Graphs**
  - Graph 1
  - Graph 2
  - Graph 3
  - Graph 4

- **Make Default**

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Setup Well Log Modeling Parameters in the “What-If” Select Parameters module

You will need:

Bottom Hole Pressure, Temperature, and Depth

Pressure, Temperature at the Separator

Temperature after flashing to atmospheric pressure

Bottom Hole Pressure: 280.00
Temperature: 180.00
Pressure: 480.00

Separator Pressure: 180.00
Temperature: 180.00
Pressure: 100.00

After Flashing: 14.70

Well Log Specs

Temperature °F
180.00
180.00
130.00

Pressure PSI
180.00
180.00
14.70

Depth
100.00

Temperature Selection
Low Temp: 180.00
High Temp: 180.00
Evaluation Temp: 130.00

pH Selection
Low pH: 5.60
High pH: 6.00
Evaluation pH: 5.60

Pressure Selection
Low P: 14.70
High P: 7.75
Evaluation P: 10.00

pCO2 Selection
Low pCO2: 0.00
High pCO2: 20.00
Evaluation pCO2: 7.00

pH Control Method
Acids:
98% H2SO
35% HCl
CO2
None

Alkalis:
Caustic Soda (NaOH)
Caustic potash (KOH)
Soda ash (Na2CO3)
Sodium bicarbonate (NaHCO3)
Lime (Ca(OH)2)
None

Temperature after flashing to atmospheric pressure

Temperature Selection
Low Temp: 280.00
High Temp: 280.00
Evaluation Temp: 280.00

pH Selection
Low pH: 180.00
High pH: 180.00
Evaluation pH: 180.00

Pressure Selection
Low P: 14.70
High P: 7.75
Evaluation P: 10.00

pCO2 Selection
Low pCO2: 0.00
High pCO2: 20.00
Evaluation pCO2: 7.00

pH Control Method
Acids:
98% H2SO
35% HCl
CO2
None

Alkalis:
Caustic Soda (NaOH)
Caustic potash (KOH)
Soda ash (Na2CO3)
Sodium bicarbonate (NaHCO3)
Lime (Ca(OH)2)
None

pH Target: 7.00

One-Page Summary Graphs
Graph 1
Graph 2
Graph 3
Graph 4

OK
Cancel
Setup Well Log Modeling Parameters in the “What-If” Select Parameters module

You will need:

- Bottom Hole Pressure, Temperature, and Depth
- Pressure, Temperature at the Separator
- Temperature after flashing to atmospheric pressure
Enter the Brine Chemistry
In the Input > Source Water Analysis Module

<table>
<thead>
<tr>
<th>Sample Date</th>
<th>24/4/2015</th>
<th>Time</th>
<th>00:00</th>
<th>ID#</th>
<th>Report Date</th>
<th>24/4/2015</th>
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<tbody>
<tr>
<td>Sample Description</td>
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</tr>
<tr>
<td>Calcium (as CaCO3)</td>
<td>1200</td>
<td>Iron (as Fe)</td>
<td>0.00</td>
<td>H2S (as H2S)</td>
<td>1661</td>
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<tr>
<td>Magnesium (as CaCO3)</td>
<td>0.00</td>
<td>Ammonia (as NH3)</td>
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<td>Silica (as SiO2)</td>
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<tr>
<td>Barium (as Ba)</td>
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<td>Aluminum (as Al)</td>
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<td>Phosphate (as PO4)</td>
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<tr>
<td>Strontium (as Sr)</td>
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<td>Boron (as B)</td>
<td>0.00</td>
<td>Fluoride (as F)</td>
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<tr>
<td>Sodium (as NaCl)</td>
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<td>Chloride (as NaCl)</td>
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<td>Nitrate (as NO3)</td>
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<tr>
<td>Potassium (as K)</td>
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<td>Sulfate (as SO4)</td>
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<tr>
<td>Lithium (as Li)</td>
<td>0.00</td>
<td>Acidity (as CO2)</td>
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<td>Density (g/mL)</td>
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<tr>
<td>pH</td>
<td>5.60</td>
<td>M Alkalinity (as HCO3)</td>
<td>1200</td>
<td>Pressure (psia)</td>
<td>800.00</td>
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<tr>
<td>Res. time (seconds)</td>
<td>180.00</td>
<td>P Alkalinity (as CO3)</td>
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<td>pCO2 (Atm.)</td>
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<tr>
<td>Density (g/mL)</td>
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<td>Oxalic acid (as C2O4)</td>
<td>0.00</td>
<td>pH2S (Atm.)</td>
<td>0.500</td>
<td></td>
</tr>
</tbody>
</table>

| C2 - CS Acids | | | | | |
| C2 | 0.00 | C3 | 0.00 | C4 | 0.00 | C5 | 0.00 |

| Other Parameters | | | | | |
| Manganese (as Mn) | 0.00 | Zinc (as Zn) | 0.00 | Lead (as Pb) | 0.00 |
| Batter (as Br) | 0.00 | Corrosion Target (as mpy) | 0.00 |
Select the Well Log Table
from the “What-If” Menu

**SYSTEM IDENTIFICATION**

**WATER CHEMISTRY**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
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<tbody>
<tr>
<td>Calcium (Ca)</td>
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<tr>
<td>Chloride (Cl)</td>
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<tr>
<td>Magnesium (Mg)</td>
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<tr>
<td>Sodium (Na)</td>
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<tr>
<td>Temperature</td>
<td>120.00</td>
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<td>120.00</td>
</tr>
<tr>
<td>pH</td>
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<tr>
<td>Total Alkalinity</td>
<td>9.00</td>
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<td>9.00</td>
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<td>Carbonate (CO2)</td>
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<tr>
<td>Hardness</td>
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<tr>
<td>Total Dissolved Solids (TDS)</td>
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<tr>
<td>Conductivity</td>
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<tr>
<td>Resistivity</td>
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<tr>
<td>TDS</td>
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**SCALE AND CORROSION POTENTIAL**

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<tr>
<th>Depth (ft)</th>
<th>Temp (°F)</th>
<th>Press (psi)</th>
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<th>Aragonite</th>
<th>Gypsum</th>
<th>Calcite</th>
<th>Aragonite</th>
<th>Gypsum</th>
<th>Calcite</th>
<th>Aragonite</th>
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</table>

**Downhole SAT™ Water Analysis Report**

- **Surface**
  - Well Log Table
  - Well Log Graph
- **Vary**
  - Temperature
  - pH
  - Pressure
  - 3D Profile
Create Individual 2D Graphs from the “What-If” Menu

FILES    INPUT    WHAT-IF    REPORTS     PREFERENCES      HELP

SURFACE
One Page Summary
Well Log Table

Well Log Graph
Vary Temperature
Graph vs Temperature
Vary pH
Graph vs pH
Vary Pressure
Graph vs Pressure
3D Profile
deus ex machina
Please note that What-if Scenarios are only as accurate as the input data and may not reflect the impact of all parameters. As outlined in the French Creek License Agreements:

“DownHole SAT is a predictive tool which will enable Customer to obtain a more complete understanding of the chemistry of the water being analyzed. DownHole SAT should be used as a supplement to Customer's historical experience and other testing procedures which Customer may utilize. DownHole SAT is not intended as a substitute for the exercise of judgment by Customer’s employees or consultants. “