

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

Single Water What-if Scenarios

Well Log Specs

Bottom Hole	At Separator	After Flashing	Depth
Temperature ° F: 280.00	180.00	130.00	500.00
Pressure PSI: 480.00	40.00	14.70	

Temperature Selection

Low Temp: 180.00 High Temp: 280.00 Evaluation Temp: 180.00

Correct pH for Temperature Use input Temperature for Evaluation

pH Selection

Low pH: 5.60 High pH: 8.00 Evaluation pH: 6.50

Use input pH for evaluation.

Pressure Selection

Low P: 14.70 High P: 7.75 Evaluation P: 40.00

Force pH to evaluation pH for Pressure Profile

pCO2 Selection

Low pCO2: 0.00 High pCO2: 20.00 Evaluation pCO2: 6.00

pH Control Method

Acids:

- 98% H2SO4
- 35% HCl
- CO2
- None

Alkalies:

- 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: [] []

Make Default

OK Cancel

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pH Target: 7.00

One-Page Summary Graphs

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Graph 3: [] Graph 4: []

Make Default

OK Cancel

Enter the Brine Chemistry

In the Input > Source Water Analysis Module

FILES	INPUT	WHAT-IF	REPORTS	PREFERENCES	HELP
SURFACE					
✓ Source Water Analysis					
WATERFLOOD					
Injection Water Analysis					
Formation Water Analysis					
MULTI-MIX					
Water Analysis					
Input pH Curve					

SURFACE CHEMISTRY INPUT FORM							
Sample Date	<input type="text" value="24/4/2015"/>	Time	<input type="text" value="00:00"/>	ID#	<input type="text"/>	Report Date	<input type="text" value="24/4/2015"/>
Sample Description				Flows			
<input type="text"/>				Brine Flow (bpd) <input type="text" value="0.00"/>			
<input type="text"/>				Oil Flow (BPD) <input type="text" value="0.00"/>			
<input type="text"/>				Gas Flow (MMCF/D) <input type="text" value="0.00"/>			
Calcium (as CaCO3)	<input type="text" value="1200"/>	Iron (as Fe)	<input type="text" value="0.00"/>	H2S (as H2S)	<input type="text" value="1661"/>	C2 - C5 Acids	
Magnesium (as CaCO3)	<input type="text" value="0.00"/>	Ammonia (as NH3)	<input type="text" value="0.00"/>	Silica (as SiO2)	<input type="text" value="0.00"/>	C2	<input type="text" value="0.00"/>
Barium (as Ba)	<input type="text" value="0.00"/>	Aluminum (as Al)	<input type="text" value="0.00"/>	Phosphate (as PO4)	<input type="text" value="0.00"/>	C3	<input type="text" value="0.00"/>
Strontium (as Sr)	<input type="text" value="0.00"/>	Boron (as B)	<input type="text" value="0.00"/>	Fluoride (as F)	<input type="text" value="0.00"/>	C4	<input type="text" value="0.00"/>
Sodium (as NaCl)	<input type="text" value="1247"/>	Chloride (as NaCl)	<input type="text" value="0.00"/>	Nitrate (as NO3)	<input type="text" value="0.00"/>	C5	<input type="text" value="0.00"/>
Potassium (as K)	<input type="text" value="0.00"/>	Sulfate (as SO4)	<input type="text" value="0.00"/>	Temperature (as °C)	<input type="text" value="0.00"/>	Manganese (as Mn)	<input type="text" value="0.00"/>
Lithium (as Li)	<input type="text" value="0.00"/>	Acidity (as CO2)	<input type="text" value="0.00"/>	Density (g/mL)	<input type="text" value="1.00"/>	Zinc (as Zn)	<input type="text" value="0.00"/>
pH	<input type="text" value="5.60"/>	M Alkalinity (as HCO3)	<input type="text" value="1200"/>	Pressure (psia)	<input type="text" value="800.00"/>	Lead (as Pb)	<input type="text" value="0.00"/>
Res. time (seconds)	<input type="text" value="180.00"/>	P Alkalinity (as CO3)	<input type="text" value="0.00"/>	pCO2 (Atm.)	<input type="text" value="0.200"/>	Bromine (as Br)	<input type="text" value="0.00"/>
Density (g/mL)	<input type="text" value="1.01"/>	Oxalic acid (as C2O4)	<input type="text" value="0.00"/>	pH2S (Atm.)	<input type="text" value="0.500"/>	Corrosion Target (as mpy)	<input type="text" value="0.00"/>
OK Open Chem. Save Chem. Correlate Recalculate Change Units Copy Paste Cancel							

Select the Well Log Table

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

DownHole SAT™ Water Analysis Report



SYSTEM IDENTIFICATION

DownHole SAT
Well Log Example
Scale Potential versus
P, T, Depth

Sample ID#: 0
Sample ID:
Sample Date: 03-10-2015 at 1311
Report Date: 03-10-2015

WATER CHEMISTRY

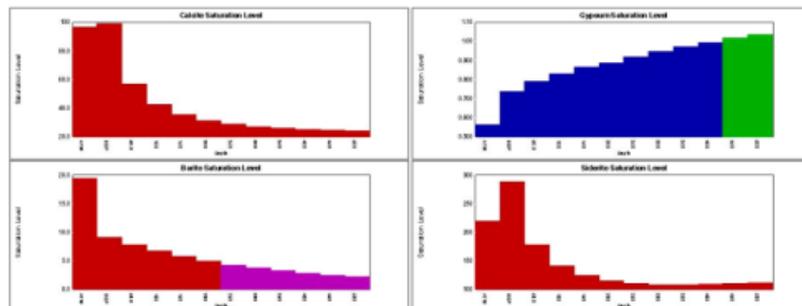
CATIONS		ANIONS	
Calcium(as Ca)	550.00	Chloride(as Cl)	912.04
Magnesium(as Mg)	132.00	Sulfate(as SO ₄)	2800
Barium(as Ba)	0.500	Bromine(as Br)	0.00
Strontium(as Sr)	1.80	Dissolved CO ₂ (as CO ₂)	2504
Sodium(as Na)	1408	Bicarbonate(as HCO ₃)	1296
Potassium(as K)	0.00	Carbonate(as CO ₃)	6.11
Lithium(as Li)	0.00	Silica(as SiO ₂)	7.00
Iron(as Fe)	0.400	Phosphate(as PO ₄)	0.00
Ammonia(as NH ₃)	0.00	H ₂ S (as H ₂ S)	0.244
Aluminum(as Al)	0.00	Fluoride(as F)	1.20
Manganese(as Mn)	0.00	Nitrate(as NO ₃)	0.00
Zinc(as Zn)	0.00	Boron(as B)	0.00
Lead(as Pb)	0.00		

PARAMETERS	
Temperature(°F)	280.00
Conductivity	5635
Resistivity	177.45
T.D.S.	8802

SCALE AND CORROSION POTENTIAL

Depth	Temp. (°F)	Pres. (psig)	Calcite CaCO ₃	ArHydrite CaSO ₄	Gypsum CaSO ₄ *2H ₂ O	Sulfit BaSO ₄	Oxalite SrSO ₄	Selenite FeSO ₄	Medjaverite FeS	CO ₂ (mg/L)	CO ₂ (mole %)							
After Flush	130.00	0.00	96.63	24.23	0.430	-698.91	0.563	-472.26	19.41	0.006	0.151	-21.00	220.36	0.634	0.00311	-0.221	0.366	5.30
At Separator	300.00	25.30	99.01	19.76	0.877	-80.97	0.739	-219.98	9.20	0.757	0.366	-18.77	288.47	0.989	0.265	-0.197	0.367	5.30
50	190.00	69.30	97.05	10.56	1.07	39.24	0.791	-269.12	7.84	0.741	0.365	-18.92	176.51	0.619	0.120	-0.376	0.353	5.30
100	200.00	113.30	42.34	7.54	1.29	144.46	0.830	-132.40	6.76	0.724	0.365	-18.92	141.72	0.428	0.07796	-0.516	0.421	5.30
150	210.00	157.30	35.73	6.06	1.57	241.11	0.865	-101.59	5.86	0.705	0.365	-18.92	124.92	0.630	0.0537	-0.635	0.333	5.30
200	220.00	201.30	31.48	5.24	1.91	327.78	0.889	-62.22	5.01	0.680	0.362	-19.29	115.39	0.632	0.0401	-0.746	0.226	5.30
250	230.00	245.30	28.96	4.69	2.35	430.47	0.918	-30.80	4.36	0.655	0.361	-19.37	111.14	0.630	0.0319	-0.841	0.130	5.30
300	240.00	289.30	27.27	4.32	2.91	486.37	0.946	-17.91	3.80	0.626	0.360	-19.48	109.25	0.626	0.0262	-0.930	0.409	5.30
350	250.00	333.30	26.12	4.06	3.63	555.48	0.971	-19.54	3.32	0.594	0.359	-19.64	108.92	0.622	0.0220	-1.01	0.524	5.30
400	260.00	377.30	25.31	3.87	4.55	638.27	0.995	-3.22	2.91	0.558	0.358	-19.84	109.49	0.615	0.0188	-1.09	0.600	5.30
450	270.00	421.30	24.74	3.73	5.73	676.00	1.02	13.00	2.55	0.517	0.356	-20.08	110.65	0.608	0.0162	-1.17	0.598	5.30
Bottom Hole	300.00	465.30	24.33	3.64	7.25	726.05	1.04	23.50	2.24	0.471	0.354	-20.37	112.16	0.599	0.0141	-1.24	0.488	5.30

Saturation Levels (SAT) are the ratio of ion activity to solubility, e.g. (Ca)/(CO₂)_{K_{sp}}. CO₂ (mole %) refers to CO₂ in the gas phase. mg/L scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.

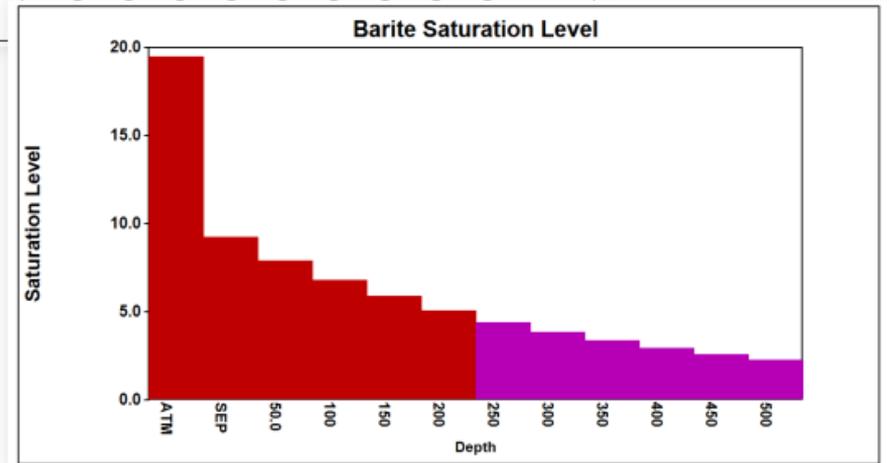
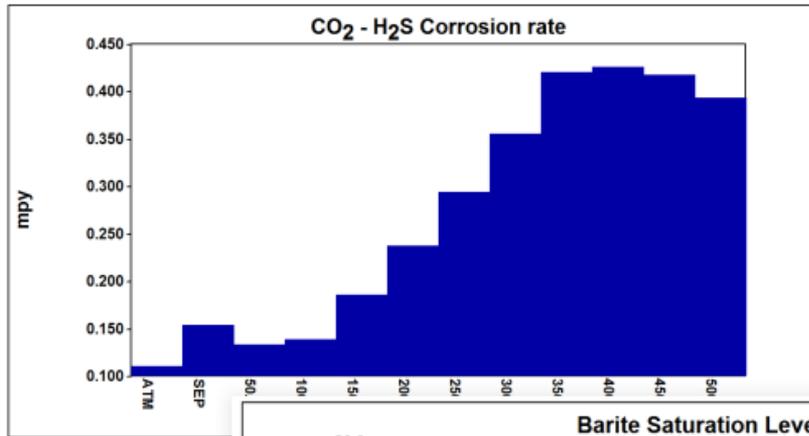


Create Individual 2D Graphs

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. “

French Creek

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