

North Permian Basin Region
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Water Analysis Report by Baker Petrolite

Company:	MACK ENERGY INCORPORATED	Sales RDT:	33512
Region:	PERMIAN BASIN	Account Manager:	WAYNE PETERSON (505) 910-9389
Area:	ARTESIA, NM	Sample #:	135289
Lease/Platform:	SPRUCE FEDERAL	Analysis ID #:	27511
Entity (or well #):	1	Analysis Cost	\$40.00
Formation:	UNKNOWN		
Sample Point:	HEATER		

Summary		Analysis of Sample 135289 @ 75 °F					
Sampling Date:	7/19/02	Anions	mg/l	meq/l	Cations	mg/l	meq/l
Analysis Date:	7/29/02	Chloride:	76682.0	2162.92	Sodium:	41063.1	1786.14
Analyst:	SHEILA HERNANDEZ	Bicarbonate:	1360.8	22.3	Magnesium:	1845.0	151.78
TDS (mg/l or g/m3):	132804.2	Carbonate:	0.0	0.	Calcium:	2825.0	140.97
Density (g/cm3, tonne/m3):	1.086	Sulfate	2698.0	56.17	Strontium:	55.0	1.26
Anion/Cation Ratio:	1	Phosphate:			Barium:	0.3	0.
		Borate:			Iron:	73.0	2.64
		Silicate:			Potassium:	6202.0	158.61
Carbon Dioxide:	980 PPM	Hydrogen Sulfide:		4 PPM	Aluminum:		
Oxygen:	0 PPM	pH at time of sampling:		6.3	Chromium:		
Comments:		pH at time of analysis:			Copper:		
		pH used in Calculation:		6.3	Lead:		
					Manganese:		
					Nickel:		

Conditions		Values Calculated at the Given Conditions - Amounts of Scale in lb/1000 bbl										
Temp	Gauge Press.	Calcite CaCO ₃		Gypsum CaSO ₄ *2H ₂ O		Anhydrite CaSO ₄		Celestite SrSO ₄		Barite BaSO ₄		CO ₂ Press
°F	psi	Index	Amount	Index	Amount	Index	Amount	Index	Amount	Index	Amount	psi
80	0	0.57	125.83	-0.10	0.00	-0.11	0.00	-0.07	0.00	0.78	0.00	5.29
100	0	0.67	146.75	-0.16	0.00	-0.10	0.00	-0.09	0.00	0.59	0.00	6.62
120	0	0.78	167.67	-0.21	0.00	-0.07	0.00	-0.10	0.00	0.43	0.00	8
140	0	0.89	187.97	-0.25	0.00	-0.02	0.00	-0.10	0.00	0.28	0.00	9.38

Note 1: When assessing the severity of the scale problem, both the saturation index (SI) and amount of scale must be considered.

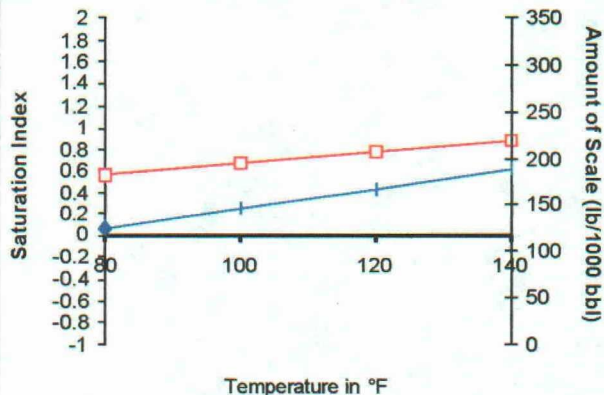
Note 2: Precipitation of each scale is considered separately. Total scale will be less than the sum of the amounts of the five scales.

Note 3: The reported CO2 pressure is actually the calculated CO2 fugacity. It is usually nearly the same as the CO2 partial pressure.

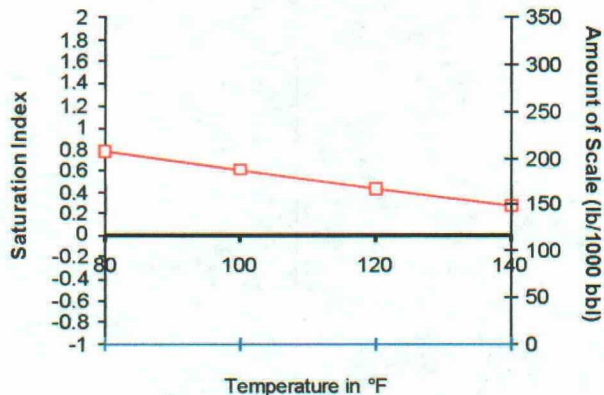
Scale Predictions from Baker Petrolite

Analysis of Sample 135289 @ 75 °F for MACK ENERGY INCORPORATED, 7/29/02

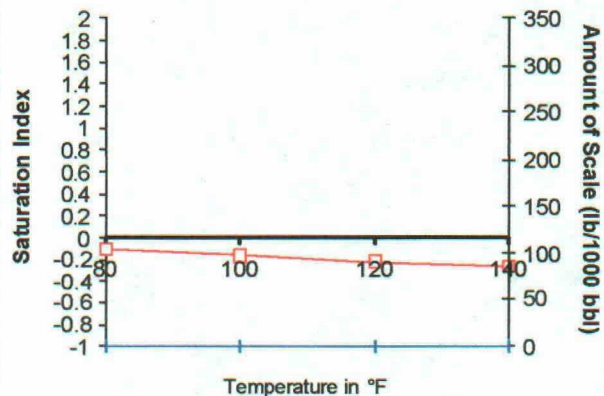
Calcite - CaCO_3



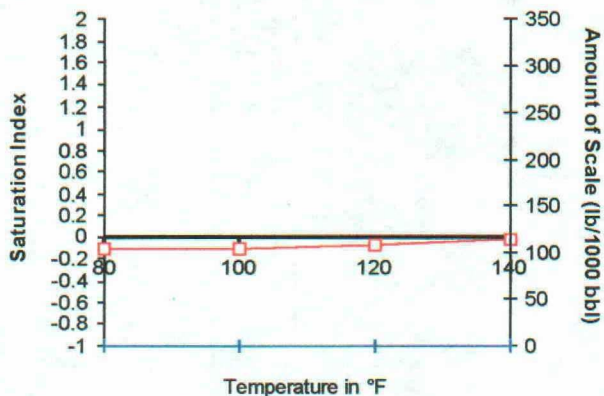
Barite - BaSO_4



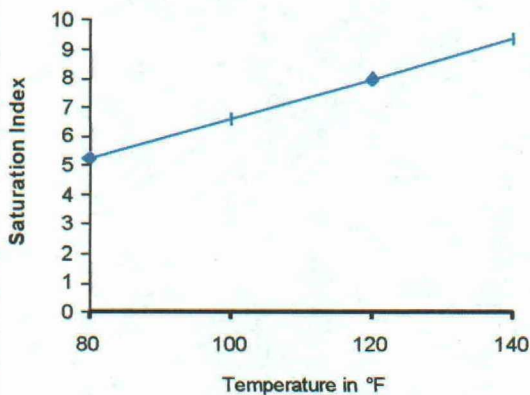
Gypsum - $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$



Anhydrite - CaSO_4



Carbon Dioxide Partial Pressure



Celestite - SrSO_4

