

CUSTOMER:	ATLAS RESOURCE PARTNERS, LP
DISTRICT:	OKLAHOMA
AREA/LEASE:	VERMEJO PARK RANCH
SAMPLE POINT NAME	VPR A 117
SITE TYPE:	WELL SITES
SAMPLE POINT DESCRIPTION:	WELL HEAD

ACCOUNT REP:	TY L. CLINESMITH
SAMPLE ID:	201410005366
SAMPLE DATE:	9/23/2014
ANALYSIS DATE:	10/1/2014
ANALYST:	BS

FIELD DATA			ANALYSIS OF SAMPLE				
		ANIONS:	mg/L	meq/L	CATIONS:	mg/L	meq/L
Initial Temperature (°F):	250	Chloride (Cl ⁻):	17.4	0.5	Sodium (Na ⁺):	646.4	28.1
Final Temperature (°F):	80	Sulfate (SO ₄ ²⁻):	1.0	0.0	Potassium (K ⁺):	2.3	0.1
Initial Pressure (psi):	100	Borate (H ₃ BO ₃):	1.9	0.0	Magnesium (Mg ²⁺):	3.4	0.3
Final Pressure (psi):	15	Fluoride (F ⁻):	ND		Calcium (Ca ²⁺):	71.1	3.5
		Bromide (Br ⁻):	ND		Strontium (Sr ²⁺):	2.3	0.1
pH:		Nitrite (NO ₂ ⁻):	ND		Barium (Ba ²⁺):	3.9	0.1
pH at time of sampling:	8.0	Nitrate (NO ₃ ⁻):	ND		Iron (Fe ²⁺):	225.0	8.1
		Phosphate (PO ₄ ³⁻):	7.3	0.2	Manganese (Mn ²⁺):	2.9	0.1
		Silica (SiO ₂):	ND		Lead (Pb ²⁺):	ND	
					Zinc (Zn ²⁺):	8.8	0.3
ALKALINITY BY TITRATION:		mg/L	meq/L				
Bicarbonate (HCO ₃ ⁻):	1562.0	25.6			Aluminum (Al ³⁺):	ND	
Carbonate (CO ₃ ²⁻):	ND				Chromium (Cr ³⁺):	ND	
Hydroxide (OH ⁻):	ND				Cobalt (Co ²⁺):	ND	
					Copper (Cu ²⁺):	ND	
aqueous CO ₂ (ppm):	0.0	Formic Acid:	ND		Molybdenum (Mo ²⁺):	ND	
aqueous H ₂ S (ppm):	ND	Acetic Acid:	ND		Nickel (Ni ²⁺):	ND	
aqueous O ₂ (ppb):	ND	Propionic Acid:	ND		Tin (Sn ²⁺):	ND	
		Butyric Acid:	ND		Titanium (Ti ²⁺):	ND	
Calculated TDS (mg/L):	2547	Valeric Acid:	ND		Vanadium (V ²⁺):	ND	
Density/Specific Gravity (g/cm ³):	0.9992				Zirconium (Zr ²⁺):	ND	
Measured Specific Gravity	ND				Lithium (Li):	ND	
Conductivity (mmhos):	ND						
Resistivity:	ND				Total Hardness:	197	N/A
MCF/D:	No Data						
BOPD:	No Data						
BWPD:	No Data	Anion/Cation Ratio:		0.65	ND = Not Determined		

Conditions		Barite (BaSO ₄)		Calcite (CaCO ₃)		Gypsum (CaSO ₄ ·2H ₂ O)		Anhydrite (CaSO ₄)	
Temp	Press.	Index	Amt (ptb)	Index	Amt (ptb)	Index	Amt (ptb)	Index	Amt (ptb)
80°F	15 psi	-0.34	0.000	1.48	57.562	-3.80	0.000	-4.05	0.000
99°F	24 psi	-0.49	0.000	1.55	58.216	-3.80	0.000	-3.97	0.000
118°F	34 psi	-0.61	0.000	1.65	59.032	-3.78	0.000	-3.87	0.000
137°F	43 psi	-0.71	0.000	1.76	59.774	-3.76	0.000	-3.76	0.000
156°F	53 psi	-0.78	0.000	1.88	60.386	-3.73	0.000	-3.63	0.000
174°F	62 psi	-0.83	0.000	2.01	60.867	-3.69	0.000	-3.50	0.000
193°F	72 psi	-0.87	0.000	2.15	61.233	-3.64	0.000	-3.35	0.000
212°F	81 psi	-0.88	0.000	2.30	61.518	-3.59	0.000	-3.20	0.000
231°F	91 psi	-0.89	0.000	2.45	61.724	-3.54	0.000	-3.04	0.000
250°F	100 psi	-0.88	0.000	2.61	61.869	-3.48	0.000	-2.87	0.000

Conditions		Celestite (SrSO ₄)		Halite (NaCl)		Iron Sulfide (FeS)		Iron Carbonate (FeCO ₃)	
Temp	Press.	Index	Amt (ptb)	Index	Amt (ptb)	Index	Amt (ptb)	Index	Amt (ptb)
80°F	15 psi	-3.64	0.000	-6.61	0.000	-5.62	0.000	3.90	163.253
99°F	24 psi	-3.63	0.000	-6.63	0.000	-5.71	0.000	4.04	163.287
118°F	34 psi	-3.61	0.000	-6.64	0.000	-5.75	0.000	4.19	163.315
137°F	43 psi	-3.57	0.000	-6.65	0.000	-5.75	0.000	4.35	163.335
156°F	53 psi	-3.51	0.000	-6.65	0.000	-5.72	0.000	4.51	163.348
174°F	62 psi	-3.45	0.000	-6.64	0.000	-5.67	0.000	4.67	163.357
193°F	72 psi	-3.37	0.000	-6.64	0.000	-5.61	0.000	4.82	163.363
212°F	81 psi	-3.28	0.000	-6.62	0.000	-5.52	0.000	4.97	163.367
231°F	91 psi	-3.18	0.000	-6.61	0.000	-5.41	0.000	5.12	163.370
250°F	100 psi	-3.08	0.000	-6.59	0.000	-5.29	0.000	5.26	163.372

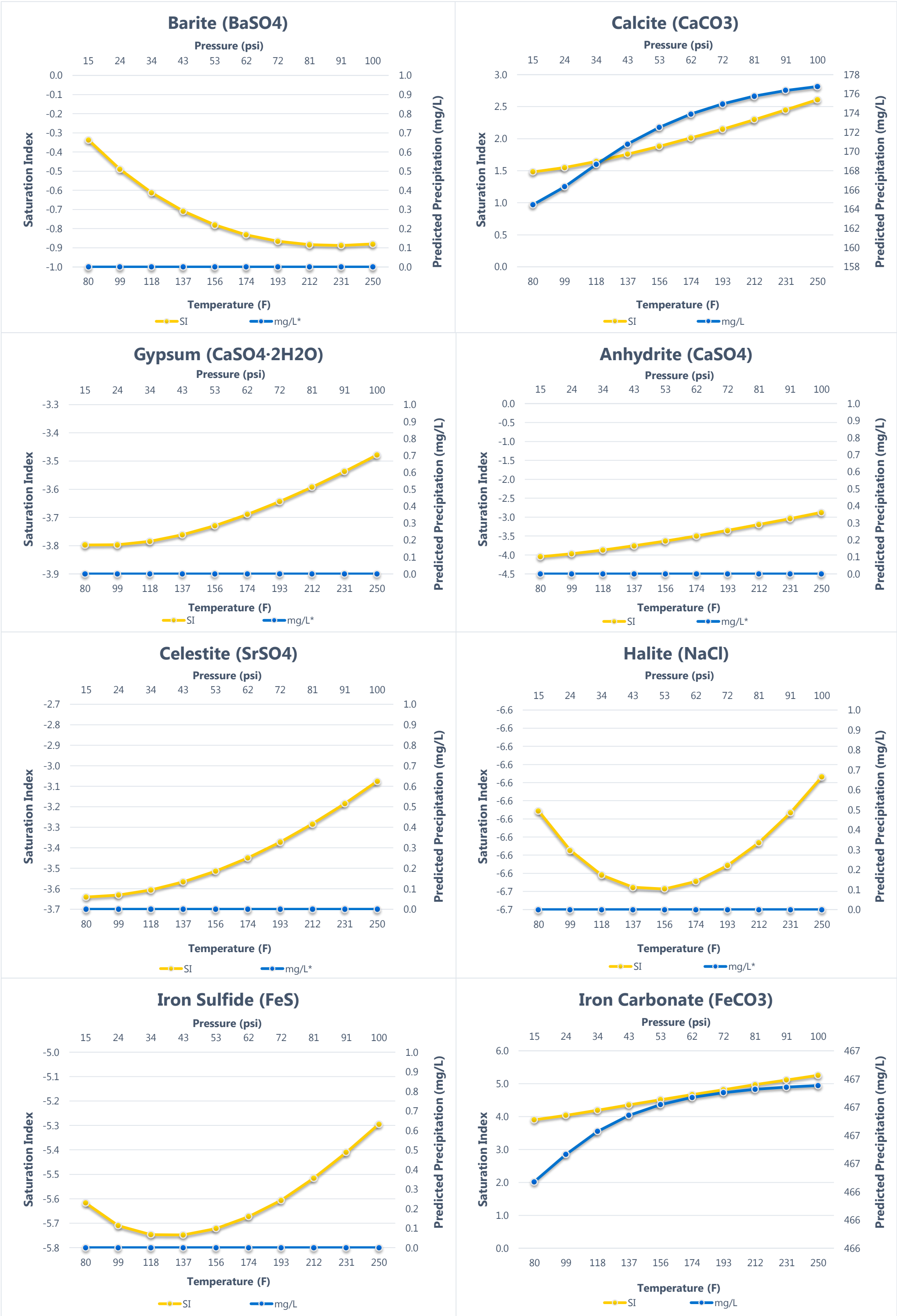
Note 1: When assessing the severity of the scale problem, both the saturation index (SI) and amount of scale must be considered

Note 2: Precipitation of each scale is considered separately. Total scale will be less than the sum of the amounts of the eight (8) scales.

Note 3: Saturation Index predictions on this sheet use pH and alkalinity; %CO₂ is not included in the calculations.



Comments:



SCALE PREDICTIONS BASED ON FIELD PROVIDED DATA; FUTHER MODELING MAY BE REQUIRED FOR VALIDATION OF SCALE PREDICTION RESULTS.