



Pacific Coast Area Laboratory
3901 Fanucchi Way E.
Shafter, California 93263

Upstream Chemicals

COMPLETE WATER ANALYSIS REPORT SSP v.2010

REPORT DATE: 12/2/2016

CUSTOMER: AUGUSTUS ENERGY
DISTRICT: FOUR CORNERS
AREA/LEASE: MEEKER
SAMPLE POINT NAME: WILEY 23-3-97-H1 TANK
SITE TYPE: WELL SITES
SAMPLE POINT DESCRIPTION: NOT PROVIDED

ACCOUNT REP:
SAMPLE ID: 201606044448
SAMPLE DATE: 10/31/2016
ANALYSIS DATE: 11/21/2016
ANALYST: ER/L

AUGUSTUS ENERGY, MEEKER, WILEY 23-3-97-H1 TANK

FIELD DATA		ANALYSIS OF SAMPLE					
		ANIONS:	mg/L	meq/L	CATIONS:	mg/L	meq/L
Initial Temperature (°F):		250 Chloride (Cl ⁻):	20649.2		582.5 Sodium (Na ⁺):	12031.8	523.6
Final Temperature (°F):		60 Sulfate (SO ₄ ²⁻):		3.0	0.1 Potassium (K ⁺):	75.5	1.9
Initial Pressure (psi):		100 Borate (H ₃ BO ₃):		ND	Magnesium (Mg ²⁺):	121.7	10.0
Final Pressure (psi):		15 Fluoride (F ⁻):		ND	Calcium (Ca ²⁺):	1263.7	63.1
pH:		Bromide (Br ⁻):		ND	Strontium (Sr ²⁺):	222.0	5.1
		Nitrite (NO ₂ ⁻):		ND	Barium (Ba ²⁺):	85.3	1.2
		6.0 Nitrate (NO ₃ ⁻):		ND	Iron (Fe ³⁺):	79.1	2.8
pH at time of sampling:		Phosphate (PO ₄ ³⁻):	3.2		0.1 Manganese (Mn ²⁺):	0.8	0.0
		Silica (SiO ₂):	121.9		Lead (Pb ²⁺):	ND	
					Zinc (Zn ²⁺):	ND	
ALKALINITY BY TITRATION:			meq/L				
Bicarbonate (HCO ₃ ⁻):	190.3		3.1		Aluminum (Al ³⁺):	ND	
Carbonate (CO ₃ ²⁻):	ND				Chromium (Cr ³⁺):	ND	
Hydroxide (OH ⁻):	ND				Cobalt (Co ²⁺):	ND	
		ORGANIC ACIDS:		meq/L	Copper (Cu ²⁺):	ND	
aqueous CO ₂ (ppm):		160.0 Formic Acid:		ND	Molybdenum (Mo ²⁺):	ND	
aqueous H ₂ S (ppm):		0.0 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	
		Valeric Acid:		ND	Vanadium (V ²⁺):	ND	
Calculated TDS (mg/L):		34844			Zirconium (Zr ²⁺):	ND	
Density/Specific Gravity (g/cm ³):		1.0217			Total Hardness:	3976	N/A
Measured Specific Gravity		ND					
Conductivity (mmhos):		39.4					
Resistivity:		ND					
MCF/D:		No Data					
BOPD:		No Data					
BWPD:		No Data					
		Anion/Cation Ratio:		0.96			
							ND = Not Determined

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

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)	Index	Amt (ptb)
60°F	15 psi	0.68	1.972	-0.75	0.000	-3.00	0.000	-3.31	0.000	-3.31	0.000
81°F	24 psi	0.48	1.660	-0.66	0.000	-3.01	0.000	-3.24	0.000	-3.24	0.000
102°F	34 psi	0.32	1.275	-0.54	0.000	-3.01	0.000	-3.15	0.000	-3.15	0.000
123°F	43 psi	0.18	0.839	-0.41	0.000	-3.00	0.000	-3.04	0.000	-3.04	0.000
144°F	53 psi	0.07	0.382	-0.28	0.000	-2.98	0.000	-2.92	0.000	-2.92	0.000
166°F	62 psi	-0.01	0.000	-0.14	0.000	-2.96	0.000	-2.79	0.000	-2.79	0.000
187°F	72 psi	-0.08	0.000	0.01	0.498	-2.93	0.000	-2.66	0.000	-2.66	0.000
208°F	81 psi	-0.13	0.000	0.16	8.835	-2.90	0.000	-2.51	0.000	-2.51	0.000
229°F	91 psi	-0.17	0.000	0.32	16.084	-2.87	0.000	-2.37	0.000	-2.37	0.000
250°F	100 psi	-0.19	0.000	0.48	22.361	-2.84	0.000	-2.22	0.000	-2.22	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)	Index	Amt (ptb)
60°F	15 psi	-2.07	0.000	-2.41	0.000	-9.45	0.000	-0.33	0.000	-0.33	0.000
81°F	24 psi	-2.07	0.000	-2.44	0.000	-9.49	0.000	-0.16	0.000	-0.16	0.000
102°F	34 psi	-2.07	0.000	-2.46	0.000	-9.45	0.000	0.03	1.288	0.03	1.288
123°F	43 psi	-2.05	0.000	-2.47	0.000	-9.38	0.000	0.21	8.813	0.21	8.813
144°F	53 psi	-2.03	0.000	-2.48	0.000	-9.29	0.000	0.38	15.088	0.38	15.088
166°F	62 psi	-1.99	0.000	-2.48	0.000	-9.19	0.000	0.54	20.276	0.54	20.276
187°F	72 psi	-1.95	0.000	-2.48	0.000	-9.07	0.000	0.69	24.683	0.69	24.683
208°F	81 psi	-1.90	0.000	-2.48	0.000	-8.94	0.000	0.84	28.485	0.84	28.485
229°F	91 psi	-1.84	0.000	-2.47	0.000	-8.81	0.000	0.97	31.640	0.97	31.640
250°F	100 psi	-1.77	0.000	-2.46	0.000	-8.67	0.000	1.10	34.276	1.10	34.276

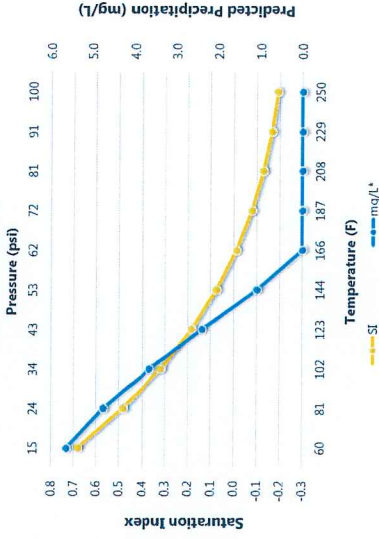
Note 1: When assessing the severity of the scale problem, both the saturation index (SI) and amount of scale must be considered

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.

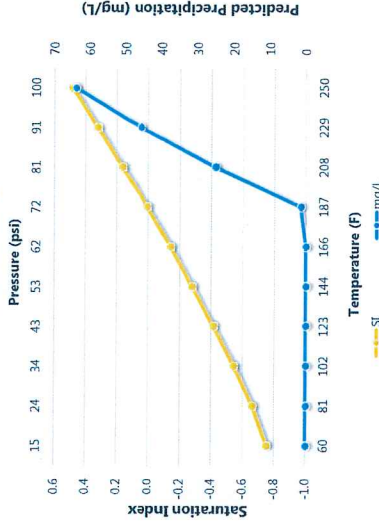
Note 3: Saturation Index predictions on this sheet use pH and alkalinity. %CO₂ is not included in the calculations.

Comments:

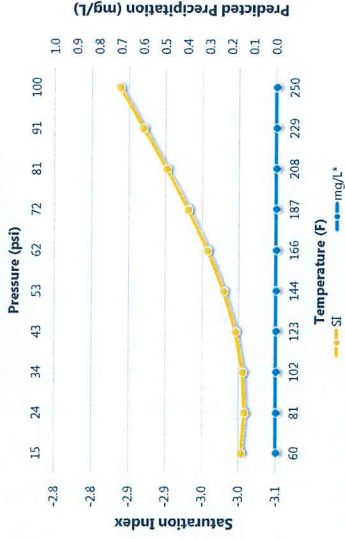
Barite (BaSO4)



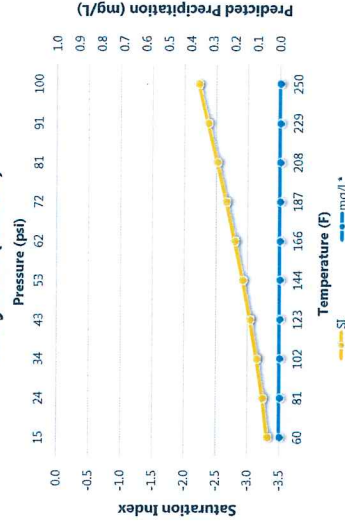
Calcite (CaCO3)



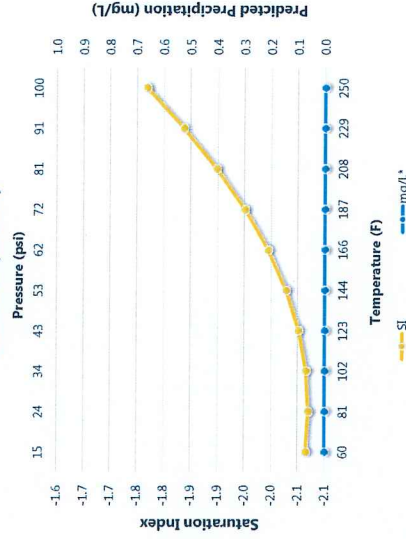
Gypsum (CaSO4·2H2O)



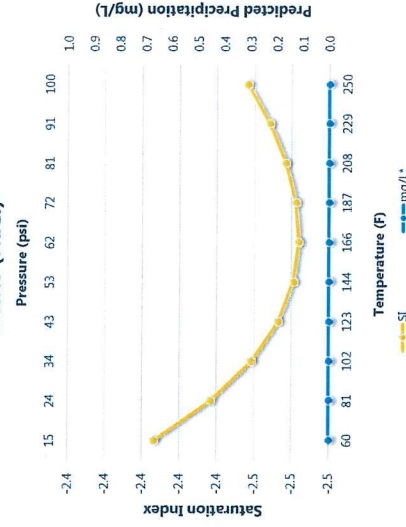
Anhydrite (CaSO4)



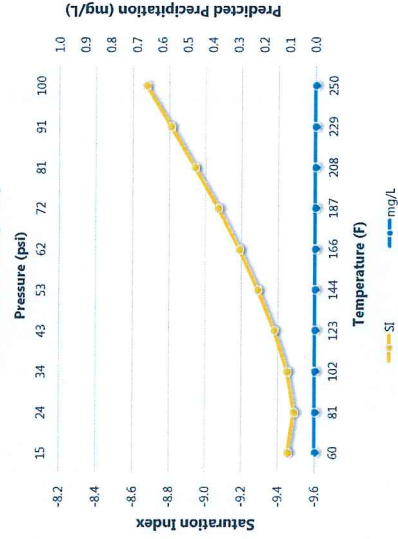
Celestite (SrSO4)



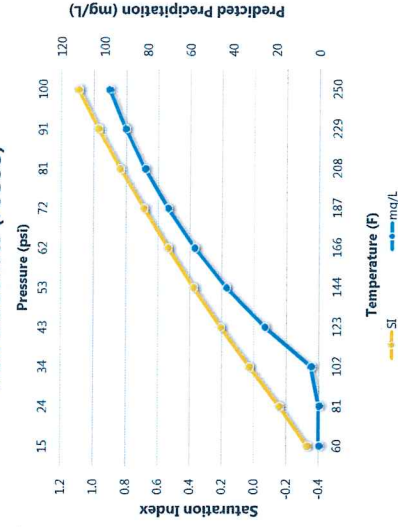
Halite (NaCl)



Iron Sulfide (FeS)



Iron Carbonate (FeCO3)



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