

Application

Part III

Produced Water Samples

1. Nageezi Unit 219H/220H/221H

UL L, Section 27-24N-9W

API: 030-45-35748 – 219H

API: 030-45-35481 – 220H

API: 030-45-35820 – 221H

2. Nageezi Unit 222H

UL M, Section 27-24N-9W

API: 030-45-35480

Multi-Chem Analytical Laboratory

1553 East Highway 40
Vernal, UT 84078

Units of Measurement: **Standard**

Water Analysis Report

Production Company: **DJR Operating, LLC**
Well Name: **NAGEEZI UNIT 219H/220H/221H**
Sample Point: **SEPARATOR**
Sample Date: **4/9/2019**
Sample ID: **WA-385505**

Sales Rep: **Craig Smith**
Lab Tech: **Amanda Harvey**

Scaling potential predicted using ScaleSoftPitzer from
Brine Chemistry Consortium (Rice University)

Sample Specifics		Analysis @ Properties in Sample Specifics			
		Cations		Anions	
		mg/L		mg/L	
Test Date:	4/19/2019	Sodium (Na):	8477.88	Chloride (Cl):	14500.00
System Temperature 1 (°F):	50	Potassium (K):	57.22	Sulfate (SO ₄):	0.00
System Pressure 1 (psig):	15	Magnesium (Mg):	99.09	Bicarbonate (HCO ₃):	335.50
System Temperature 2 (°F):	200	Calcium (Ca):	632.37	Carbonate (CO ₃):	
System Pressure 2 (psig):	200	Strontium (Sr):	131.55	Hydroxide (HO):	
Calculated Density (g/ml):	1.0142	Barium (Ba):	46.00	Acetic Acid (CH ₃ COO)	
pH:	7.60	Iron (Fe):	23.33	Propionic Acid (C ₂ H ₅ COO)	
Calculated TDS (mg/L):	24341.18	Zinc (Zn):	0.21	Butanoic Acid (C ₃ H ₇ COO)	
CO ₂ in Gas (%):		Lead (Pb):	0.29	Isobutyric Acid ((CH ₃) ₂ CHCOO)	
Dissolved CO ₂ (mg/L):	49.50	Ammonia NH ₃ :		Fluoride (F):	
H ₂ S in Gas (%):		Manganese (Mn):	0.88	Bromine (Br):	
H ₂ S in Water (mg/L):	0.00	Aluminum (Al):	0.16	Silica (SiO ₂):	36.86
Tot. Suspended Solids (mg/L):		Lithium (Li):	2.60	Calcium Carbonate (CaCO ₃):	
Corrosivity (Langlier Sat. Indx)	0.00	Boron (B):	4.16	Phosphates (PO ₄):	1.41
Alkalinity:		Silicon (Si):	17.23	Oxygen (O ₂):	

Notes:

(PTB = Pounds per Thousand Barrels)

		Calcium Carbonate		Barium Sulfate		Iron Sulfide		Iron Carbonate		Gypsum CaSO ₄ ·2H ₂ O		Celestite SrSO ₄		Halite NaCl		Zinc Sulfide	
Temp (°F)	PSI	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
200.00	200.00	1.42	48.79	0.00	0.00	0.00	0.00	1.91	16.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
183.00	179.00	1.33	44.22	0.00	0.00	0.00	0.00	1.82	16.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167.00	159.00	1.24	39.79	0.00	0.00	0.00	0.00	1.72	15.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150.00	138.00	1.15	35.66	0.00	0.00	0.00	0.00	1.63	15.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
133.00	118.00	1.08	31.89	0.00	0.00	0.00	0.00	1.52	15.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
117.00	97.00	1.01	28.49	0.00	0.00	0.00	0.00	1.42	14.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	77.00	0.94	25.52	0.00	0.00	0.00	0.00	1.31	14.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
83.00	56.00	0.89	23.02	0.00	0.00	0.00	0.00	1.20	13.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67.00	36.00	0.85	21.08	0.00	0.00	0.00	0.00	1.10	12.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50.00	15.00	0.82	20.18	0.00	0.00	0.00	0.00	1.00	11.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

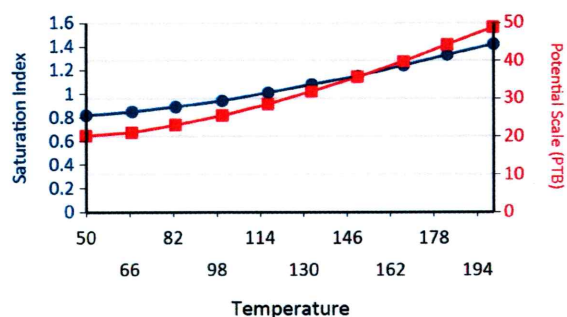
Water Analysis Report

Temp (°F)	PSI	Hemihydrate CaSO ₄ ~0.5H ₂ O		Anhydrate CaSO ₄		Calcium Fluoride		Zinc Carbonate		Lead Sulfide		Mg Silicate		Ca Mg Silicate		Fe Silicate	
		SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
200.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.89	25.18	3.13	17.44	9.35	17.84
183.00	179.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.13	18.65	2.69	13.38	8.81	17.63
167.00	159.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.36	13.17	2.23	9.87	8.26	17.30
150.00	138.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.58	8.78	1.78	6.97	7.72	16.80
133.00	118.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.79	5.32	1.33	4.61	7.19	16.10
117.00	97.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	2.63	0.88	2.72	6.67	15.19
100.00	77.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.52	0.43	1.22	6.16	14.10
83.00	56.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	5.67	12.90
67.00	36.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.23	11.71
50.00	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.91	10.87

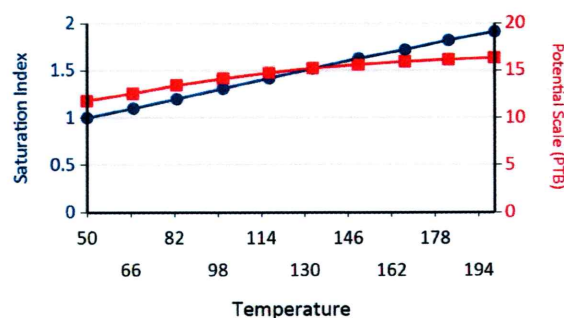
These scales have positive scaling potential under initial temperature and pressure: Calcium Carbonate Iron Carbonate Mg Silicate Ca Mg Silicate Fe Silicate

These scales have positive scaling potential under final temperature and pressure: Calcium Carbonate Iron Carbonate Fe Silicate

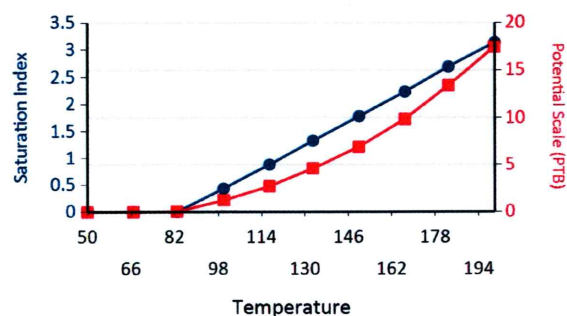
Calcium Carbonate



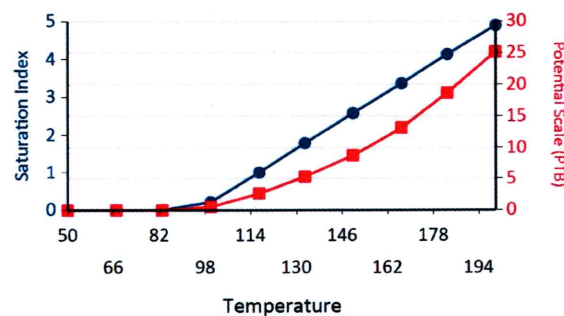
Iron Carbonate



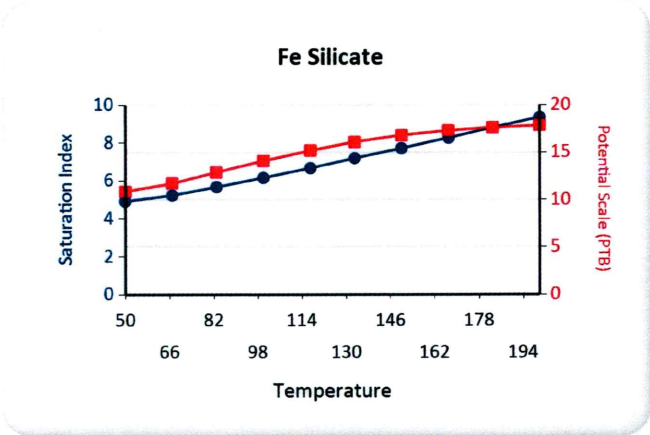
Ca Mg Silicate



Mg Silicate



Water Analysis Report



Multi-Chem Analytical Laboratory

1553 East Highway 40

Vernal, UT 84078

multi-chem®

A HALLIBURTON SERVICE

Units of Measurement: Standard

Water Analysis Report

Production Company: DJR Operating, LLC
 Well Name: NAGEEZI UNIT 222H
 Sample Point: SEPARATOR
 Sample Date: 4/9/2019
 Sample ID: WA-385506

Sales Rep: Craig Smith
 Lab Tech: Amanda Harvey

Scaling potential predicted using ScaleSoftPitzer from
 Brine Chemistry Consortium (Rice University)

Sample Specifics		Analysis @ Properties in Sample Specifics			
		Cations	mg/L	Anions	mg/L
Test Date:	4/22/2019	Sodium (Na):	12841.14	Chloride (Cl):	20500.00
System Temperature 1 (°F):	50	Potassium (K):	45.25	Sulfate (SO4):	0.00
System Pressure 1 (psig):	15	Magnesium (Mg):	56.34	Bicarbonate (HCO3):	427.00
System Temperature 2 (°F):	200	Calcium (Ca):	361.90	Carbonate (CO3):	
System Pressure 2 (psig):	200	Strontium (Sr):	85.24	Hydroxide (HO):	
Calculated Density (g/ml):	1.0209	Barium (Ba):	27.30	Acetic Acid (CH3COO)	
pH:	7.30	Iron (Fe):	12.15	Propionic Acid (C2H5COO)	
Calculated TDS (mg/L):	34396.13	Zinc (Zn):	0.52	Butanoic Acid (C3H7COO)	
CO2 in Gas (%):		Lead (Pb):	0.39	Isobutyric Acid ((CH3)2CHCOO)	
Dissolved CO2 (mg/L):	49.50	Ammonia (NH3):		Fluoride (F):	
H2S in Gas (%):		Manganese (Mn):	0.52	Bromine (Br):	
H2S in Water (mg/L):	0.00	Aluminum (Al):	0.07	Silica (SiO2):	38.38
Tot. Suspended Solids (mg/L):		Lithium (Li):	2.25	Calcium Carbonate (CaCO3):	
Corrosivity (Langlier Sat. Indx)	0.00	Boron (B):	4.76	Phosphates (PO4):	
Alkalinity:		Silicon (Si):	17.94	Oxygen (O2):	

Notes:

(PTB = Pounds per Thousand Barrels)

		Calcium Carbonate		Barium Sulfate		Iron Sulfide		Iron Carbonate		Gypsum CaSO4·2H2O		Celestite SrSO4		Halite NaCl		Zinc Sulfide	
Temp (°F)	PSI	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
200.00	200.00	1.03	46.85	0.00	0.00	0.00	0.00	1.45	8.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
183.00	179.00	0.92	40.88	0.00	0.00	0.00	0.00	1.35	8.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167.00	159.00	0.82	35.23	0.00	0.00	0.00	0.00	1.25	8.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150.00	138.00	0.73	30.12	0.00	0.00	0.00	0.00	1.14	7.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
133.00	118.00	0.64	25.50	0.00	0.00	0.00	0.00	1.03	7.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
117.00	97.00	0.56	21.40	0.00	0.00	0.00	0.00	0.92	7.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	77.00	0.49	17.86	0.00	0.00	0.00	0.00	0.80	6.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
83.00	56.00	0.42	14.89	0.00	0.00	0.00	0.00	0.68	6.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67.00	36.00	0.37	12.54	0.00	0.00	0.00	0.00	0.57	5.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50.00	15.00	0.34	11.36	0.00	0.00	0.00	0.00	0.47	4.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

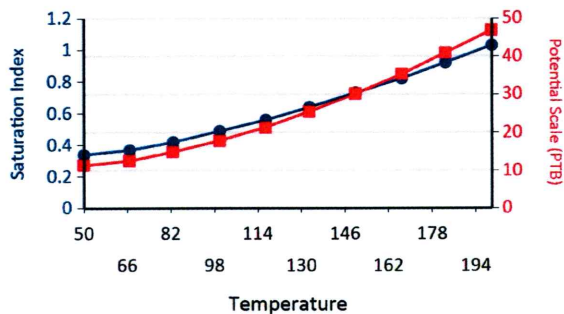
Water Analysis Report

Temp (°F)	PSI	Hemihydrate CaSO ₄ ~0.5H ₂ O		Anhydrate CaSO ₄		Calcium Fluoride		Zinc Carbonate		Lead Sulfide		Mg Silicate		Ca Mg Silicate		Fe Silicate	
		SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
200.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.00	0.00	2.89	18.11	1.82	12.88	7.16	9.31
183.00	179.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.06	11.55	1.32	8.50	6.54	9.21
167.00	159.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.21	6.06	0.82	4.77	5.93	9.06
150.00	138.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	1.63	0.32	1.71	5.32	8.82
133.00	118.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.72	8.47
117.00	97.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.14	7.97
100.00	77.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.57	7.31
83.00	56.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.03	6.52
67.00	36.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.54	5.65
50.00	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.20	4.99

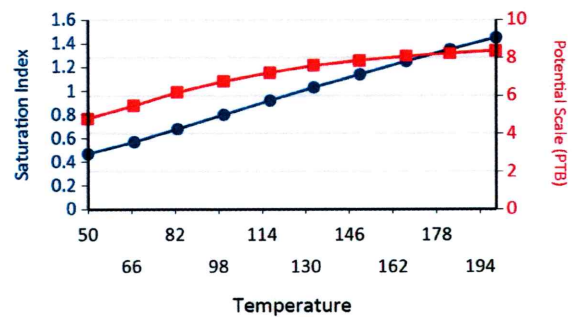
These scales have positive scaling potential under initial temperature and pressure: Calcium Carbonate Iron Carbonate Zinc Carbonate Mg Silicate Ca Mg Silicate Fe Silicate

These scales have positive scaling potential under final temperature and pressure: Calcium Carbonate Iron Carbonate Fe Silicate

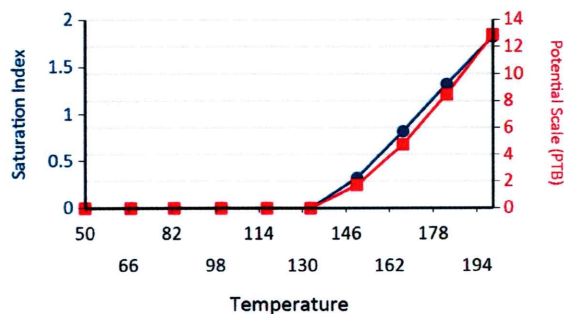
Calcium Carbonate



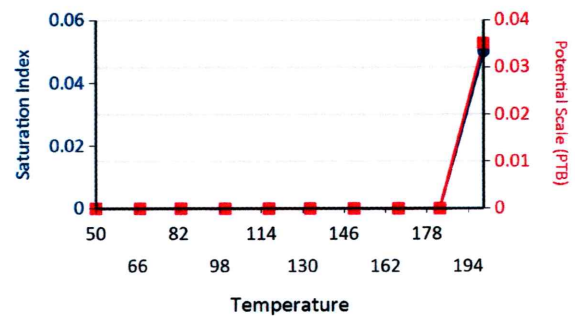
Iron Carbonate



Ca Mg Silicate

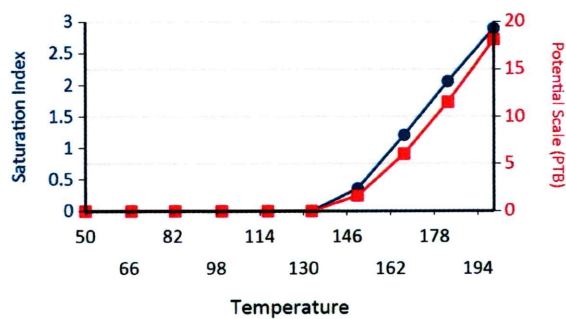


Zinc Carbonate



Water Analysis Report

Mg Silicate



Fe Silicate

