

# Multi-Chem Group, LLC

Multi-Chem Analytical Laboratory

349 PR 4473

Sonora, TX 76950



## Water Analysis Report

Production Company: **ANTERO RESOURCES**

Sample ID: **WA-18759**

Well Name: **RIVER RANCH A-6**

Sample Point: **Separator**

Sample Date: **12/9 /2008**

Sales Rep: **Brian Bernatis**

Lab Tech: **Joseph Sadler**

Sample Specifics	
Test Date:	12/30/2008
Temperature (°F):	54
Sample Pressure (psig):	0
Specific Gravity (g/cm³):	1.0590
pH:	7.85
Turbidity (NTU):	-
Calculated T.D.S. (mg/L)	74325
Molar Conductivity (µS/cm):	112613
Resistivity (Mohm):	0.0888

Analysis @ Properties in Sample Specifics			
Cations	mg/L	Anions	mg/L
Calcium (Ca):	320.00	Chloride (Cl):	44158.00
Magnesium (Mg):	97.60	Sulfate (SO <sub>4</sub> ):	0.01
Barium (Ba):	18.27	Dissolved CO <sub>2</sub> :	91.08
Strontium (Sr):	-	Bicarbonate (HCO <sub>3</sub> ):	2306.00
Sodium (Na):	27328.00	Carbonate (CO <sub>3</sub> ):	-
Potassium (K):	-	H <sub>2</sub> S:	0.01
Iron (Fe):	5.74	Phosphate (PO <sub>4</sub> ):	-
Manganese (Mn):	0.10	Silica (SiO <sub>2</sub> ):	-
Lithium (Li):	-	Fluoride (F):	-
Aluminum (Al):	-	Nitrate (NO <sub>3</sub> ):	-
Ammonia NH <sub>3</sub> :	-	Lead (Pb):	-
		Zinc (Zn):	-
		Bromine (Br):	-
		Boron (B):	-

Test Conditions		Scale Values @ Test Conditions - Potential Amount of Scale in lb/1000bbl										
		Calcium Carbonate CaCO <sub>3</sub>		Gypsum CaSO <sub>4</sub> · 2H <sub>2</sub> O		Calcium Sulfate CaSO <sub>4</sub>		Strontium Sulfate SrSO <sub>4</sub>		Barium Sulfate BaSO <sub>4</sub>		Calculated CO <sub>2</sub>
		Sat Index	Scale	Sat Index	Scale	Sat Index	Scale	Sat Index	Scale	Sat Index	Scale	psi
Temp °F	Gauge Press. psi											
54	0	13.88	19.97	0.00	-3635.80	0.00	-4241.30	-	-	0.00	-6.41	0.61
80	0	22.31	28.17	0.00	20.84	0.00	-4240.40	-	-	0.00	-10.46	0.32
100	0	28.58	33.17	0.00	25.83	0.00	-4024.60	-	-	0.00	-14.61	0.39
120	0	33.69	36.43	0.00	29.07	0.00	-3675.80	-	-	0.00	-19.75	0.43
140	0	37.41	38.01	0.00	30.75	0.00	-3245.90	-	-	0.00	-26.01	0.49
160	0	39.21	37.57	0.00	30.62	0.00	-2780.40	-	-	0.00	-33.50	0.54
180	0	38.91	35.16	0.00	28.78	0.00	-2315.50	-	-	0.00	-42.39	0.59
200	0	36.81	31.37	0.00	25.75	0.00	-1877.50	-	-	0.00	-52.86	0.59
220	2.51	33.06	27.41	0.00	22.54	0.00	-1510.60	-	-	0.00	-66.36	0.59
240	10.3	29.08	23.07	0.00	19.01	0.00	-1165.70	-	-	0.00	-81.14	0.60
260	20.76	24.99	19.18	0.00	15.83	0.00	-875.70	-	-	0.00	-98.42	0.60
280	34.54	21.11	15.87	0.00	13.12	0.00	-639.76	-	-	0.00	-118.63	0.61
300	52.34	17.62	13.16	0.00	10.89	0.00	-454.31	-	-	0.00	-142.30	0.61

### Conclusions:

Calcium Carbonate scale is indicated at all temperatures from 80°F to 300°F

Gypsum Scaling Index is negative from 80°F to 300°F

Calcium Sulfate Scaling Index is negative from 80°F to 300°F

Strontium Sulfate scaling was not evaluated

Barium Sulfate Scaling Index is negative from 80°F to 300°F

### Notes:

# Multi-Chem Group, LLC

Multi-Chem Analytical Laboratory

349 PR 4473

Sonora, TX 76950



## Scale Prediction Graphs

Well Name: RIVER RANCH A-6

Sample ID: WA-18759

