

## FRAC Operations Treatability Report

The water sample from a CUDD Energy oil field site was treated for solids reduction, BOD reduction, metals and dissolved metals. The table below shows the results of the analytical, with the untreated water sample and sample treated with Floccin TR-1. The jar tests below show the effect of the Floccin TR-1.



Constituent	Untreated	Treated	% Reduction
Total Suspended Solids (TSS)	9,300 ppm	160 ppm	98%
Turbidity	180	13	93%
pH	6.77	7.48	
Electrical Conductivity	11400	11900	4%
Total Dissolved Solids	9,100	9,000	1%
<b>Metals</b>			
Antimony	ND	ND	
Arsenic	ND	ND	
Barium	960	280	71%
Beryllium	ND	ND	
Cadmium	ND	ND	

Chromium	13	ND	100%
Cobalt	ND	ND	
Copper	ND	ND	
Iron	8,200	370	95%
Lead	ND	ND	
Manganese	150	130	13%
Mercury	0.26	ND	100%
Molybdenum	48	30	38%
Nickel	16	9.2	43%
Selenium	120	ND	100%
Silver	ND	ND	
Thallium	ND	ND	
Vanadium	ND	ND	
Zinc	32	21	34%
<b>Cations</b>			
Calcium	110	120	-9%
Magnesium	11	15	-36%
Potassium	35	37	-6%
Sodium	2,600	2,700	-4%
<b>Anions</b>			
Alkalinity (bicarbonate)	750	730	3%
Alkalinity (carbonate)	ND	ND	
Alkalinity (hydroxide)	N/A	N/A	
Boron	N/A	N/A	
Bromide	N/A	N/A	
Chloride	3,500	3,700	-6%
Fluoride	N/A	N/A	
Nitrate	ND	ND	
Sulfate	270	220	19%
Phosphate	N/A	N/A	
Phosphorus	N/A	N/A	

### Conclusion

The treatability shows the high removal rate for heavy metals, minimal increase in EC/TDS as shown in the anions/cations and high removal of particulate solids in the form of suspended solids. Increases are shown as negative percent reductions and are the contribution of the Floccin. The minimal increase is less than conventional chemistry. There was not enough sample to test for Total Petroleum hydrocarbons, COD, BOD or any bacterial colony counts.