

# Electrocoagulation Process

## Central California Heavy Oil Production Field

### Produced Water

Constituent	Units	Produced Water	Permeate	% Change	Solids	TTLc
pH	Standard Units	7.4	8.4	--	7	--
Total Sulfides	mg/l	0.5	<.1	-80%	<8	--
Total Ammonia	mg/l	29	28	-3%	N/A	--
Calcium	mg/l	54	11	-80%	1600	--
Magnesium	mg/l	7.3	4.3	-41%	160	--
Sodium	mg/l	2200	2100	-5%	2200	--
Potassium	mg/l	39	37	-5%	42	--
Barium	mg/l	0.21	0.012	-94%	10	10000
Total Alkalinity	mg/l	650	540	-17%	N/A	--
Fluoride	mg/l	1.4	1.8	29%	N/A	--
Chloride	mg/l	3900	3800	-3%	2900	--
Nitrate	mg/l	<1.0	<1.0	--	N/A	--
Phosphate	mg/l	0.11	0.07	-36%	6.2	--
Sulfate	mg/l	130	120	-8%	380	--
<b>Boron</b>	<b>mg/l</b>	<b>24</b>	<b>19</b>	<b>-21%</b>	190	--
TDS	mg/l	6100	5700	-7%	N/A	--
<b>Total Hardness</b>	<b>mg/l as CaCO<sub>3</sub></b>	<b>170</b>	<b>40</b>	<b>-76%</b>	N/A	--
TSS	mg/l	13	N/A	-100%	N/A	--
Total Iron	mg/l	0.26	9.5	3554%	52000	--
Ferrous Iron	mg/l	0.13	1.5	1054%	N/A	--
<b>Silica (as SiO<sub>2</sub>)</b>	<b>mg/l</b>	<b>229</b>	<b>6</b>	<b>-97%</b>	N/A	--
Water Soluble Organics	mg/l	<10	<10	ND	N/A	--
Total Oil and Grease	mg/l	60	<10	-83%	33	--
Aluminum	mg/l	<.06	<.03	ND	5.3	--
Beryllium	mg/l	<.002	<.001	ND	<.1	75
Cadmium	mg/l	<.01	<.0005	ND	<.6	100
Chromium	mg/l	<.01	<.01	ND	7.1	500
Cobalt	mg/l	<.01	<.0005	ND	4.1	8000
Copper	mg/l	<.04	<.02	ND	<2.0	2500
Lead	mg/l	<.004	<.002	ND	6	1000
Manganese	mg/l	0.083	0.085	2%	310	--
Mercury	mg/l	<.0005	<.0005	ND	<.04	20
Molybdeum	mg/l	<.02	0.03	ND	<1.0	3500
Nickel	mg/l	<.002	0.01	ND	48	2000
Selenium	mg/l	<.1	<.05	ND	20	100
Silver	mg/l	<.01	<.005	ND	<.6	500
Thallium	mg/l	<.1	<.05	ND	<10	700
Vanadium	mg/l	<.01	<.005	ND	<10	2400
Zinc	mg/l	<.04	<.02	ND	10	--

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