Sorbster

Ecologically Effective Contaminants Adsorption

REFINERY:	Midwestern Refinery A	Western Refinery B	Midwestern Refinery C	Western Refinery D	Western Refinery E	Western Refinery F	Midwestern Refinery G
Water Location:	Final Effluent	FBR/Membrane Permeate	Final Effluent	Final Effluent	Final Effluent	Filtered Effluent	Stripped Sour Water
Selenium Inlet	**22.8**	**5.7 ppb**	**32 ppb**	**23.0 ppb**	**109 ppb**	**184 ppb**	**4440 ppb**
Client Target	**10 ppb**	**3.1 ppb**	**10-12 ppb**	**10 ppb**	**20 ppb**	**20 ppb**	
Treated Outlet	**9 ppb**	**1.3 ppb**	**5 ppb**	**5 ppb**	**10 ppb**	**11.5 ppb**	**89 ppb then to 20 ppb***
Water Constituents							
pH	7.4	8.0	7.34	7.59	7.25	7.5	9.5
Mercury	ND		ND		3.44 ppb	44 ppt	
Zinc	39		10	13		20 ppb	7 ppb
Calcium	86 ppm	45 ppm	104 ppm	30 ppm			
Chloride	701 ppm	392 ppm	882 ppm	347 ppm	546 ppm	541 ppm	10 ppm
Sulfate	221 ppm	203 ppm	433 ppm	325 ppm	1300 ppm	334 ppm	2 ppm
Fluoride	1.2 ppm			2.2 ppm	2.1 ppm	3.2 ppm	1.1 ppm
Nitrate	2.4 ppm	ND	5.1 ppm	1.1 ppm		4.2 ppm	
O-PO4	0.9 ppm		ND	0.8 ppm		1 ppm	
Ammonia	0.6 ppm			1.0 ppm		1.2	42 ppm
Arsenic	13.8 ppb		ND	2 ppb		10	ND
Boron	0.2 ppm	0.5 ppm	0.25 ppm	0.45 ppm	0.9 ppm		
Iron	ND	ND	0.02 ppm	0.13 ppm	0.05 ppm		
Silica	6.3 ppm	6.9 ppm	3.5				1.4 ppm
Vanadium	3.6		ND	1.9 ppb	56 ppb	4 ppb	
Upstream Se Treatment	Carbon filtration	FBR/Membrane	Iron co-precipitation, polycarbamates	Iron co-precipitation, carbon polishing	Iron co-precipitation, biologically treated effluent	Sand carbon filtration	None
Se Speciation	Not known	Selenocyanate then selenite, minor selenate	Selenate, selenite	Not known	Mostly selenite, minor selenate	Selenite, minor selenate	Selenocyanate