

Frac Sand Wash Pond Samples, Fall 2013
 Ruth M King
 bradley johnson

Site Name	Units	LOD	LOQ	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Completion	Nikolai	Marawood	Doine	Weiler	Panther Creek	Croell	Goose Landing	Taylor	Taylor	Opelt	Brannt - Guza	Hi Crush	Wyeville	Preferred	Smart Sand	US Silica	Range	Average	Mean
				#1	#2	#3	#4	#5																				
Sample Location				Midwest Frac back pond	Midwest Frac front pond	Tiller/IEP Pond 9	Great Northern Pond A	Superior Silica FLS Center Pond																				
Date Sampled				10/02/2013	10/02/2013	10/09/2013	11/12/2013	11/12/2013																				
Time Sampled				10:20 AM	10:30 AM	12:00 AM	10:20	13:20																				
pH				8.8*	8.1	7.4	6.35	6.98	8.4	8.1	6.3	7.9	8.1	6.7	6.7	6	7.6	7.6	7.3	8.2	7.4	9.2	6.8	7.2	6.0-9.2	7.4165	7.4	
Aluminum, Total Recoverable (TR)	ug/L	10.0	30.0	480	618	39600**	7820***	135	7740	1350	275	234	266	11200	29600	15100	8660	1050	6260	831	605	4890	35600	3440	135-39600	6754.421	1350	
Antimony, TR	ug/L	5.0	16.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic, TR	ug/L	5.0	16.0	ND	ND	8.68	ND	ND	ND	ND	ND	ND	ND	ND	13.2	11.7	ND	ND	ND	ND	ND	ND	ND	20	ND	ND-20	13.395	12.45
Barium, TR	ug/L	1.0	3.0	26.8	57.3	235	91.9	6.73	217	17.3	91.4	52	44.4	149	255	206	75.1	16.9	64.9	9.31	70.2	32.9	325	61.5	6.73-325	100.2686	64.9	
Beryllium, TR	ug/L	0.5	1.6	ND	ND	4.18	ND	ND	0.61	ND	ND	ND	ND	1.49	0.94	0.77	ND	ND	ND	ND	ND	ND	2.55	ND	ND-4.18	1.756667	1.215	
Boron, TR	ug/L	10.0	30.0	30.3	23.7	49.7	100	20.6	114	29.3	36.3	34.3	26.9	57.7	41.2	33.7	23.4	18.4	27.3	48.9	21.2	32.1	54.4	27.5	18.4-114	40.51905	32.1	
Cadmium, TR	ug/L	1.0	3.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium, TR	MG/L	0.1	0.3	29.5	31.6	23	9.32	9.97	38.4	4.18	6.97	23.5	60.8	8.53	7.16	3.24	13.3	15	13.6	19.2	31.9	22.8	21.6	20.9	3.24-60.8	19.73667	19.2	
Chromium, TR	ug/L	1.0	3.0	8.55	4.7	153	12.4	ND	14.9	3.11	ND	ND	1.23	24.7	40.4	13.7	10.2	1.85	6.53	ND	1.12	6.63	62.7	5.79	ND-153	21.85353	8.55	
Cobalt, TR	ug/L	1.0	3.0	ND	8.54	34.2	5.71	ND	7.57	1.31	4.53	ND	ND	9.11	20.4	9.51	3.92	1.05	3.87	ND	3.36	4.21	35.2	3.62	ND-35.2	9.756875	5.12	
Copper, TR	ug/L	5.0	15.0	ND	20.2	1030	19.4	ND	18.4	ND	ND	ND	6.12	28.2	60.3	34.6	14	9.51	9.51	ND	ND	14.1	98.7	9.81	ND-1030	104.8723	19.4	
Iron, TR	MG/L	0.1	0.3	0.585	9.91	68.8	9.05	0.316	9.91	0.954	0.248	0.723	0.311	20.3	59.8	11.3	13.8	1.95	7.55	1.47	0.395	10.6	32.4	5.58	0.248-68.8	12.66438	7.55	
Lead, TR	ug/L	3.0	10.0	ND	8.82	59.1	3.46	ND	ND	ND	ND	ND	5.5	16	19.5	6.72	3.55	8.25	ND	ND	7.03	40.6	4.22	ND-59.1	15.22917	7.64		
Magnesium, TR	MG/L	0.1	0.3	11.5	13.5	13.8	3.66	4.28	13.3	2.24	2.41	9.55	15.2	4.98	5.33	2.12	5.68	5.85	5.44	6.99	15.5	8.01	16.1	10.5	2.12-16.1	8.378095	6.99	
Manganese ICP TR	ug/L	1.0	3.0	70.2	1220	1050	385	21.6	350	15	325	249	83.1	844	661	154	358	70.3	198	9.88	51.8	220	206	208	9.88-1220	321.4229	208	
Molybdenum TR	ug/L	3.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.35	ND	ND-4.35	4.35	4.35	
Nickel ICP TR	ug/L	2.0	6.0	ND	8.12	64	15.2	3.73	17.5	3.39	8.5	ND	ND	22.8	26.7	6.41	8.5	3.81	6.38	ND	9.06	5.93	67.1	4.88	ND-67.1	16.91235	8.5	
Potassium TR	MG/L	0.1	0.3	2.03	2.52	4.44	11.8	1.66	9.25	2.36	4.47	2.17	1.44	9.02	4.64	9.47	2.22	2.05	3.26	8.86	4.61	9.02	8.18	5.18	1.44-11.8	5.17381	4.47	
Selenium TR	ug/L	10.0	30.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver TR	ug/L	2.0	6.0	ND	ND	ND	ND	ND	ND	ND	ND	3.61	2.69	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND-3.61	3.15	3.15
Sodium TR	MG/L	0.1	0.3	5.26	5.02	6.04	7.4	10.9	52	2.84	6.03	22.1	12.8	6.63	2.27	3.2	1.99	3.45	5.95	6.7	4.92	5.35	3.68	5.66	1.99-22.1	8.580476	5.66	
Strontium TR	ug/L	1.0	3.0	59.6	39.8	391	72.6	46.1	164	29.1	52.6	80	102	57.2	54.3	179	58.6	38	58.3	56.1	60.7	81.8	94.1	59.9	38-391	87.37143	59.6	
Thallium TR	ug/L	5.0	16.0	ND	ND	8.31	ND	ND	ND	ND	ND	ND	ND	ND	7.74	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND-8.31	8.025	8.025
Titanium TR	ug/L	2.0	6.0	19	30.3	591	300	5.78	201	18.2	8.97	12.3	12.1	403	991	196	194	26.3	205	16.8	15.8	114	460	95.8	5.78-991	186.4929	95.8	
Vanadium TR	ug/L	1.0	3.0	1.8	4.78	268	17.5	ND	22.4	3.16	ND	ND	2.52	55.9	82.4	30.4	18.4	2.21	16.7	1.99	3.24	11.9	90.9	10.5	ND-268	35.81667	14.3	
Zinc TR	ug/L	5.0	15.0	ND	11.8	75.4	36.8	ND	18.2	6.1	17.7	ND	ND	42.2	85.6	31.5	34.1	8.37	17.3	ND	ND	43.7	133	12.8	ND-133	38.30467	31.5	
TSS (mg/L)																				11.4	2.8		125					
Ca & Mg Hardness CaCo3				121	134	114	38	42	151	20	27	98	214	42	40	17	57	61	56	77	143	90	120		95			

*Algae bloom on this pond.
 **LOD = 100 LOQ = 300
 ***LOD = 50.0 LOQ = 150

Cadmium, ATC	5.42	6.11	5.07	1.45	1.63	6.96	0.67	0.98	4.25	10.44	1.6	1.51	0.56	2.26	2.49	2.25	3.21	6.58	3.85	5.37	4.12
Cadmium, CTC	2.86	3.1	2.73	1.16	1.26	3.39	0.69	0.89	2.42	4.48	1.24	1.19	0.61	1.57	1.68	1.57	2	3.27	2.26	2.84	2.37
Chromium, ATC	2106	2296.02	2008.13	821.58	894.07	2520.17	475.24	622.66	1771.82	3365.94	881.45	846.86	418.11	1130.1	1210.47	1126.27	1450.15	2420.53	1651.4	2093.19	1733.09
Chromium, CTC	100.69	109.77	96.01	39.28	42.75	120.49	22.72	29.77	84.71	160.93	42.14	40.49	19.99	54.03	57.87	53.85	69.33	115.73	78.95	100.08	82.86
Copper, ATC	18.56	20.5	17.57	6.27	6.91	22.82	3.34	4.56	15.21	31.85	6.8	6.5	2.88	9.06	9.8	9.02	12.07	21.78	14.02	18.43	14.82
Copper, CTC	12.17	13.32	11.58	4.55	4.97	14.69	2.57	3.41	10.16	19.87	4.9	4.7	2.25	6.35	6.83	6.33	8.24	14.08	9.44	12.1	9.93
Lead, ATC	128.42	142.2	121.41	42.3	46.74	158.72	22.18	30.5	104.74	223.3	45.96	43.84	19.07	61.62	66.82	61.37	82.69	151.34	96.4	127.5	102.05
Lead, CTC	33.64	37.25	31.8	11.08	12.24	41.57	5.81	7.99	27.43	58.49	12.04	11.48	4.99	16.14	17.5	16.08	21.66	39.64	25.25	33.4	26.73
Nickel ICP ATC	550.82	602.23	524.4	208.31	227.33	663.06	118.35	156.44	460.78	894.07	224.01	214.94	103.68	289.57	310.87	288.56	374.64	635.99	428.47	547.36	450.38
Nickel ICP CTC	61.28	67	58.34	23.17	25.29	73.76	13.17	17.4	51.26	99.46	24.92	23.91	11.53	32.21	34.58	32.1	41.68	70.75	47.67	60.89	50.1
Zinc ATC & CTC	142.09	155.82	135.05	52.01	56.92	172.11	28.99	38.68	118.15	234.43	56.06	53.72	25.28	73.1	78.66	72.83	95.4	164.86	109.6	141.17	115.4