







Data As-Received		Feed										Product										Tallings										Results									
Size Class	Retained (mesh)	Passing (mm)	Retained (mm)	Mean (mm)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Yield (%)	Cumulative Yield (%)	Individual Recovery (%)	Cumulative Recovery (%)	Individual Yield (%)	Cumulative Yield (%)	Individual Recovery (%)	Cumulative Recovery (%)					
																																					Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Sulfur (%)
10 x 20	100	...	...	0.15	12.62	100.00	24.55	8.20	5.84	2.22	1.49	1.49	33.37	20.28	2.42	2.42	100.00	76.99	36.88	24.07	6.27	6.27	92.76	97.59	2.21	2.21	80.37	85.62	19.57	19.57	85.62	85.62	19.57	19.57	85.62	85.62					

Data Normalized w.o. +10 Material		Feed										Product										Tallings										Results									
Size Class	Retained (mesh)	Passing (mm)	Retained (mm)	Mean (mm)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Yield (%)	Cumulative Yield (%)	Individual Recovery (%)	Cumulative Recovery (%)	Individual Yield (%)	Cumulative Yield (%)	Individual Recovery (%)	Cumulative Recovery (%)					
																																					Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Sulfur (%)
10 x 20	100	...	...	0.15	12.62	100.00	24.55	8.20	5.84	2.22	1.49	1.49	33.37	20.28	2.42	2.42	100.00	76.99	36.88	24.07	6.27	6.27	92.76	97.59	2.21	2.21	80.37	85.62	19.57	19.57	85.62	85.62	19.57	19.57	85.62	85.62					

Results	Feed		Product		Tallings		Yield		Recovery	
	(% Ash)	(% Sulfur)	(% Ash)	(% Sulfur)	(% Ash)	(% Sulfur)	(%)	(%)	(%)	(%)
As Fed	13.83	2.20	2.22	36.88	80.37	85.62	80.37	85.62	80.37	85.62
+10 x 60	11.64	5.41	1.67	34.68	79.73	84.27	79.73	84.27	79.73	84.27
+10 x 100	11.81	5.94	1.73	36.02	80.19	85.63	80.19	85.63	80.19	85.63
10 x 60	11.56	5.41	1.67	34.68	80.26	85.64	80.26	85.64	80.26	85.64
10 x 100	11.75	5.94	1.73	36.02	81.51	87.08	81.51	87.08	81.51	87.08







Size		Feed				Product				Tallings				Results			
Passing (mesh)	Retained (mm)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Yield (%)	Cumulative Yield (%)	Individual Recovery (%)	Cumulative Recovery (%)
35	5.0	2.32	2.32	13.92	14.02	0.38	0.38	5.09	5.09	1.49	1.49	1.20	1.20	3.18	3.18	136.58	136.58
40	3.75	1.72	4.04	13.44	11.61	1.43	1.83	4.70	5.28	1.49	1.49	1.49	1.49	4.95	4.95	53.02	48.94
45	3.0	1.42	5.46	12.02	11.19	1.55	3.38	4.38	6.28	1.61	1.61	1.61	1.61	6.56	6.56	78.65	84.41
50	2.5	0.84	6.30	10.75	11.45	2.03	5.35	5.28	7.01	1.72	1.72	1.72	1.72	8.28	8.28	84.57	89.69
60	1.5	0.39	6.69	9.28	11.81	2.64	8.27	6.28	7.95	1.74	1.74	1.74	1.74	10.02	10.02	85.70	91.38
80	0.75	0.15	6.84	8.13	13.83	3.35	10.00	5.28	10.02	2.19	2.19	2.19	2.19	12.12	12.12	88.73	92.65
100	0.425	0.00	6.84	8.13	13.83	3.35	10.00	5.28	10.02	2.19	2.19	2.19	2.19	14.31	14.31	90.92	93.84

Size		Feed				Product				Tallings				Results			
Passing (mesh)	Retained (mm)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Cumulative Ash (%)	Individual Yield (%)	Cumulative Yield (%)	Individual Recovery (%)	Cumulative Recovery (%)
35	5.0	2.32	2.32	13.92	14.02	0.38	0.38	5.09	5.09	1.49	1.49	1.20	1.20	3.18	3.18	136.58	136.58
40	3.75	1.72	4.04	13.44	11.61	1.43	1.83	4.70	5.28	1.49	1.49	1.49	1.49	4.95	4.95	53.02	48.94
45	3.0	1.42	5.46	12.02	11.19	1.55	3.38	4.38	6.28	1.61	1.61	1.61	1.61	6.56	6.56	78.65	84.41
50	2.5	0.84	6.30	10.75	11.45	2.03	5.35	5.28	7.01	1.72	1.72	1.72	1.72	8.28	8.28	84.57	89.69
60	1.5	0.39	6.69	9.28	11.81	2.64	8.27	6.28	7.95	1.74	1.74	1.74	1.74	10.02	10.02	85.70	91.38
80	0.75	0.15	6.84	8.13	13.83	3.35	10.00	5.28	10.02	2.19	2.19	2.19	2.19	12.12	12.12	88.73	92.65
100	0.425	0.00	6.84	8.13	13.83	3.35	10.00	5.28	10.02	2.19	2.19	2.19	2.19	14.31	14.31	90.92	93.84

As Tested	Feed		Product		Tallings		Yield (%)	Recovery (%)
	(% Ash)	(% Sulfur)	(% Ash)	(% Sulfur)	(% Ash)	(% Sulfur)		
As Tested	13.63	10.02	2.19	43.80	68.73	92.65		
-10 x 60	11.64	6.28	1.96	40.99	84.57	89.69		
-10 x 100	11.81	7.05	1.74	42.82	86.70	91.38		
-10 x 150	11.75	7.08	1.74	42.82	86.70	91.38		
-10 x 100	11.75	7.08	1.74	42.82	86.70	91.38		

Results



Data As Received																			
Passing (mm)	Retained (mm)	Mean (mm)	Feed			Product			Tailings			Results							
			Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Individual Sulfur (%)	Individual Mass (%)	Individual Ash (%)	Individual Sulfur (%)	Individual Mass (%)	Individual Ash (%)	Individual Sulfur (%)	Individual Yield (%)	Individual Recovery (%)	Individual Sulfur (%)	Cumulative Mass (%)	Cumulative Ash (%)	Cumulative Sulfur (%)	
10	10	1.70	1.54	1.54	1.70	1.35	10.89	0.82	2.02	1.54	10.89	0.82	2.02	10.89	0.82	2.02	10.89	0.82	2.02
14	14	1.70	1.54	1.54	1.70	1.35	10.89	0.82	2.02	1.54	10.89	0.82	2.02	10.89	0.82	2.02	10.89	0.82	2.02
20	20	1.70	1.54	1.54	1.70	1.35	10.89	0.82	2.02	1.54	10.89	0.82	2.02	10.89	0.82	2.02	10.89	0.82	2.02
25	25	1.70	1.54	1.54	1.70	1.35	10.89	0.82	2.02	1.54	10.89	0.82	2.02	10.89	0.82	2.02	10.89	0.82	2.02
30	30	1.70	1.54	1.54	1.70	1.35	10.89	0.82	2.02	1.54	10.89	0.82	2.02	10.89	0.82	2.02	10.89	0.82	2.02
38	38	1.70	1.54	1.54	1.70	1.35	10.89	0.82	2.02	1.54	10.89	0.82	2.02	10.89	0.82	2.02	10.89	0.82	2.02
50	50	1.70	1.54	1.54	1.70	1.35	10.89	0.82	2.02	1.54	10.89	0.82	2.02	10.89	0.82	2.02	10.89	0.82	2.02
60	60	1.70	1.54	1.54	1.70	1.35	10.89	0.82	2.02	1.54	10.89	0.82	2.02	10.89	0.82	2.02	10.89	0.82	2.02
75	75	1.70	1.54	1.54	1.70	1.35	10.89	0.82	2.02	1.54	10.89	0.82	2.02	10.89	0.82	2.02	10.89	0.82	2.02
100	100	1.70	1.54	1.54	1.70	1.35	10.89	0.82	2.02	1.54	10.89	0.82	2.02	10.89	0.82	2.02	10.89	0.82	2.02

Data Normalized w.o. +10 Material																			
Passing (mm)	Retained (mm)	Mean (mm)	Feed			Product			Tailings			Results							
			Individual Mass (%)	Cumulative Mass (%)	Individual Ash (%)	Individual Sulfur (%)	Individual Mass (%)	Individual Ash (%)	Individual Sulfur (%)	Individual Mass (%)	Individual Ash (%)	Individual Sulfur (%)	Individual Yield (%)	Individual Recovery (%)	Individual Sulfur (%)	Cumulative Mass (%)	Cumulative Ash (%)	Cumulative Sulfur (%)	
10	10	1.70	8.20	8.20	9.11	9.11	9.11	1.75	1.75	26.34	79.07	79.07	9.99	102.29	102.56	7.07	102.49	102.56	7.07
14	14	1.70	8.20	8.20	9.11	9.11	9.11	1.75	1.75	26.34	79.07	79.07	9.99	102.29	102.56	7.07	102.49	102.56	7.07
20	20	1.70	8.20	8.20	9.11	9.11	9.11	1.75	1.75	26.34	79.07	79.07	9.99	102.29	102.56	7.07	102.49	102.56	7.07
25	25	1.70	8.20	8.20	9.11	9.11	9.11	1.75	1.75	26.34	79.07	79.07	9.99	102.29	102.56	7.07	102.49	102.56	7.07
30	30	1.70	8.20	8.20	9.11	9.11	9.11	1.75	1.75	26.34	79.07	79.07	9.99	102.29	102.56	7.07	102.49	102.56	7.07
38	38	1.70	8.20	8.20	9.11	9.11	9.11	1.75	1.75	26.34	79.07	79.07	9.99	102.29	102.56	7.07	102.49	102.56	7.07
50	50	1.70	8.20	8.20	9.11	9.11	9.11	1.75	1.75	26.34	79.07	79.07	9.99	102.29	102.56	7.07	102.49	102.56	7.07
60	60	1.70	8.20	8.20	9.11	9.11	9.11	1.75	1.75	26.34	79.07	79.07	9.99	102.29	102.56	7.07	102.49	102.56	7.07
75	75	1.70	8.20	8.20	9.11	9.11	9.11	1.75	1.75	26.34	79.07	79.07	9.99	102.29	102.56	7.07	102.49	102.56	7.07
100	100	1.70	8.20	8.20	9.11	9.11	9.11	1.75	1.75	26.34	79.07	79.07	9.99	102.29	102.56	7.07	102.49	102.56	7.07

Results											
Feed	Product	Tailings	Feed	Product	Tailings	Feed	Product	Tailings	Feed	Product	Tailings
Mass (%)	Mass (%)	Mass (%)	Mass (%)	Mass (%)	Mass (%)	Mass (%)	Mass (%)	Mass (%)	Mass (%)	Mass (%)	Mass (%)
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00



Data As-Received		Feed				Product				Tailings				Results											
Size Class	Retained	Mean	Individual Mass (%)	Cumulative Mass (%)	Ash (%)	Individual Ash (%)	Cumulative Ash (%)	Sulfur (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Mass (%)	Cumulative Mass (%)	Ash (%)	Individual Ash (%)	Cumulative Ash (%)	Sulfur (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Yield (%)	Cumulative Yield (%)	Individual Recovery (%)	Cumulative Recovery (%)	Individual Sub-Rel (%)	Cumulative Sub-Rel (%)	
Passing (mesh)	1.70	1.70	0.77	0.77	6.14	5.33	5.33	1.74	1.74	1.74	11.64	11.64	28.01	28.01	28.01	2.84	2.84	2.84	99.74	99.74	99.74	99.74	99.74	99.74	99.74
10	14	1.70	1.18	1.42	3.83	2.72	7.40	1.51	1.75	3.35	37.99	73.62	78.43	8.22	8.22	6.57	6.57	6.57	99.85	99.85	99.85	99.85	99.85	99.85	99.85
20	28	1.18	0.60	0.84	3.24	3.07	7.55	1.79	7.07	7.05	51.13	51.13	76.73	11.89	11.89	9.67	9.67	9.67	99.74	99.74	99.74	99.74	99.74	99.74	99.74
40	60	0.60	0.25	0.39	2.41	2.56	7.69	1.85	1.80	3.33	73.23	73.23	19.72	2.31	2.31	1.57	1.57	1.57	103.32	103.32	103.32	103.32	103.32	103.32	103.32
80	100	0.25	0.15	0.19	1.94	2.06	8.54	2.31	1.85	2.31	82.68	100.00	10.54	1.97	1.97	0.48	0.48	0.48	102.10	102.10	102.10	102.10	102.10	102.10	102.10
100	...	0.15	...	0.15	11.09	11.09	22.32	3.62	2.19	2.19	100.00	100.00	22.49	4.10	4.10	2.34	2.34	2.34	99.16	99.16	99.16	99.16	99.16	99.16	99.16

0.515

Data Normalized to <math>+10\mu\text{m}</math> Material		Feed				Product				Tailings				Results											
Size Class	Retained	Mean	Individual Mass (%)	Cumulative Mass (%)	Ash (%)	Individual Ash (%)	Cumulative Ash (%)	Sulfur (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Mass (%)	Cumulative Mass (%)	Ash (%)	Individual Ash (%)	Cumulative Ash (%)	Sulfur (%)	Individual Sulfur (%)	Cumulative Sulfur (%)	Individual Yield (%)	Cumulative Yield (%)	Individual Recovery (%)	Cumulative Recovery (%)	Individual Sub-Rel (%)	Cumulative Sub-Rel (%)	
Passing (mesh)	1.70	1.70	3.05	3.05	7.72	7.61	7.61	1.51	1.51	1.51	23.82	23.82	78.62	78.62	78.62	3.22	3.22	3.22	99.55	99.55	99.55	99.55	99.55	99.55	99.55
10	14	1.70	1.19	1.42	3.08	2.72	7.29	1.48	1.48	1.48	36.14	36.14	72.64	10.72	10.72	2.01	2.01	2.01	103.32	103.32	103.32	103.32	103.32	103.32	103.32
20	28	1.19	0.84	0.94	3.50	3.59	7.29	1.48	1.84	1.84	69.62	69.62	76.91	11.49	11.49	1.49	1.49	1.49	102.10	102.10	102.10	102.10	102.10	102.10	102.10
40	60	0.84	0.45	0.55	2.66	2.66	8.26	2.26	1.86	1.86	86.65	86.65	19.94	2.31	2.31	1.38	1.38	1.38	115.4	115.4	115.4	115.4	115.4	115.4	115.4
80	100	0.45	0.15	0.15	19.59	19.59	100.00	22.49	11.13	11.13	100.00	100.00	22.49	4.10	4.10	2.38	2.38	2.38	99.16	99.16	99.16	99.16	99.16	99.16	99.16

Results

As Tested	Feed (% Ash)	Product (% Ash)	Tailings (% Ash)	Yield (%)	Recovery (%)
As Tested	1.09	1.20	2.34	100.00	100.00
10 + 100	1.20	1.20	2.34	100.00	100.00
10 + 60	1.01	1.94	2.34	100.00	100.00
10 + 100	0.25	1.98	2.34	101.01	100.27





Coal Plant A - Tests 1-14 Summary

Test Parameters

Test No.	Feed				T-Water (gpm)	Level No.	Comment
	(gpm)	(SG)	(% Solids)	(tph/sqft)			
1	10.0	1.170	40.9	1.2	6.0	64	Round 1
2	10.0	1.170	40.9	1.2	6.0	64	
3	9.2	1.180	43.0	1.2	6.0	99	Sensor Reset
4	9.7	1.165	39.9	1.1	6.0	97	
5	9.8	1.170	40.9	1.2	6.0	95	
6	9.8	1.160	38.9	1.1	6.0	96	
7	12.6	1.165	39.9	1.5	6.0	96	
8	12.7	1.180	43.0	1.6	6.0	92	
9	30.0	1.210	48.9	4.4	7.0	94	Round 2
10	35.3	1.200	47.0	5.0	7.0	92	
11	33.3	1.197	46.4	4.6	7.0	93	
12	28.6	1.200	47.0	4.0	7.0	94	Water in Contacts
13	28.6	1.200	47.0	4.0	7.0	94	
14	20.0	1.185	44.0	2.6	7.0	90	

Results x 100 Mesh

	Feed (% Ash)	Product (% Ash)	Product (% Sulfur)	Tailings (% Ash)	Yield (%)	Recovery (%)
Test 1	11.81	7.22	1.76	59.99	91.29	96.05
Test 2	11.81	5.89	1.73	64.09	89.82	95.85
Test 3	11.81	6.58	1.74	58.28	89.87	95.21
Test 4	11.81	5.84	1.73	36.02	80.19	85.63
Test 5	11.81	5.40	1.77	36.99	79.69	85.49
Test 6	11.81	6.28	1.69	27.73	74.20	78.86
Test 7	11.81	7.66	1.70	68.77	93.20	97.59
Test 8	11.81	7.05	1.74	42.84	86.70	91.38
Test 9	8.77	8.30	1.97	75.67	99.31	99.81
Test 10	7.49	10.07	2.21	77.35	103.83	100.94
Test 11	8.69	7.90	1.87	75.35	98.83	99.69
Test 12	8.24	8.84	1.97	76.03	100.89	100.23
Test 13	6.72	6.55	1.90	78.95	99.77	99.95
Test 14	8.18	8.91	2.06	77.66	101.06	100.26

Results As-Tested

	Feed (% Ash)	Product (% Ash)	Product (% Sulfur)	Tailings (% Ash)	Yield (%)	Recovery (%)
Test 1	13.83	9.21	2.25	60.28	90.96	95.83
Test 2	13.83	8.34	2.20	64.21	90.17	95.92
Test 3	13.83	9.21	2.24	58.58	90.65	95.50
Test 4	13.83	8.20	2.22	36.88	80.37	85.62
Test 5	13.83	8.13	2.34	37.87	80.83	86.18
Test 6	13.83	8.40	2.08	28.61	73.14	77.75
Test 7	13.83	9.60	2.13	69.00	92.88	97.44
Test 8	13.83	10.02	2.19	43.80	88.73	92.65
Test 9	9.86	9.60	2.27	75.51	99.61	99.89
Test 10	10.11	11.69	2.64	77.29	102.41	100.61
Test 11	11.54	9.35	2.21	75.23	96.67	99.07
Test 12	11.09	11.20	2.34	76.01	100.17	100.05
Test 13	9.27	8.91	2.25	78.88	99.49	99.88
Test 14	10.64	10.94	2.52	77.59	100.45	100.11

Test 1-8	0.631	11.94
Test 9	0.635	8.94
Test 10	0.591	10.52
Test 11	0.545	15.68
Test 12	0.515	13.16
Test 13	0.560	12.97
Test 14	0.587	
Tests 9-14	0.572	

Test 9		Test 10		Test 11	
Mass	Ash	Mass	Ash	Mass	Ash
1.88	7.45	1.54	6.05	1.23	7.56
10.43	6.96	8.07	7.37	5.25	6.97
36.68	9.23	35.49	6.23	33.88	7.77
27.71	8.72	27.55	8.76	29.98	9.31
10.2	9.35	9.94	8.80	10.29	10.90
13.1	17.08	17.41	22.51	19.37	23.44
100	9.86	100	10.11	100	11.54

Test 12		Test 13		Test 14		Average
Mass	Ash	Mass	Ash	Mass	Ash	
0.77	6.14	0.57	6.29	1.28	6.54	1.21
3.06	7.72	6.15	7.65	8.57	5.88	6.92
33.24	7.25	36.02	5.95	34.04	7.18	34.89
34.01	8.77	29.21	6.72	28.89	9.33	29.56
9.48	10.15	11.56	8.63	10.79	10.30	10.38
19.44	22.92	16.49	22.21	16.43	23.16	17.04
100	11.09	100	9.27	100	10.64	100.00

Coal Plant D

Test No.	Ash (%)			Sulfur (%)			Yield (%)	Comb. Rec. (%)	Ash Rej. (%)
	Feed	Product	Reject	Feed	Product	Reject			
1	20.98	13.55	84.56	1.87	2.24	4.33	89.54	97.96	42.17
2	20.1	10.32	85.9	2.11	2	3.99	87.06	97.72	55.30
3	18.33	13.36	85.47	2.31	2.2	3.79	93.11	98.77	32.14
4	20.71	12.98	84.24	1.93	2.01		89.15	97.84	44.12
5	20.03	11.96	86.48		2.24		89.17	98.17	46.76
6	28.12	14.93	85.43		2.23		81.29	96.21	56.84
7	22.12	13.53	86.83		2.5		88.28	98.02	46.00
8	21.82	13.98	84.03		2.43		88.81	97.71	43.10
9	28.16	13.48	81.64		2.46		78.46	94.50	62.44
	16.10	16.10			2.35		100.00	100.00	0.00
								0	100
	22.26	22.26					87.21	97.43	

Test No.	Ash (%)			Sulfur (%)			Yield (%)	Comb. Rec. (%)	Ash Rej. (%)
	Feed	Product	Reject	Feed	Product	Reject			
1	17.37	9.08	84.38	1.58	1.83	4.23	88.99	97.92	53.48
2	17.91	11.35	85.91	1.78	1.3	3.83	91.20	98.49	42.20
3	15.31	9.96	85.5	1.88	1.75	3.75	92.92	98.79	39.55
4	15.09	8.67	85.06	1.51	1.47	2.53	91.60	98.52	47.37
5	13.08	5.95	85.6	1.27	1.22	2.12	91.05	98.52	58.58
6	15.94	7.59	85.35	1.38	1.29	1.75	89.26	98.13	57.50
7	15.39	10.32	86.81	1.47	1.28	1.68	93.37	98.97	37.39
8	17.75	9.66	83.9	1.79	1.34	1.42	89.10	97.87	51.51
9	17.21	8.82	81.8	1.57	1.93	2.01	88.50	97.47	54.64
	16.12	16.12					100.00	100.00	0.00
								0	100
Average	16.12	9.04	84.92	1.58	1.49	2.59	90.67	98.30	49.14

Coal Plant D - Size by Size Analysis

Test No. 1							Test No. 4						
Sample I.D.	Feed			Ash			Sample I.D.	Feed			Ash		
	Wt. (%)	Cum. Wt. (%)	Ash (%)	Units	Cum. Units	Cum. Ash (%)		Wt. (%)	Cum. Wt. (%)	Ash (%)	Units	Cum. Units	Cum. Ash (%)
Plus 16	5.7	5.7	10.49	59.79	59.79	10.49	Plus 16	1.26	1.26	16.34	20.59	20.59	16.34
16x28	14.24	23.98	18.19	295.40	355.20	14.81	16x28	14.88	16.08	15.52	230.01	250.59	15.58
28x100	53.61	77.59	16.51	992.32	1347.52	17.37	28x100	56.79	72.87	11.95	849.01	1099.61	15.09
100 x 0	22.41	100	23.68	740.87	2088.39	20.88	100 x 0	27.13	100	25.85	972.61	2072.22	20.72
				2088.39							2072.22		

  

Test No. 1							Test No. 4						
Sample I.D.	Product			Ash			Sample I.D.	Product			Ash		
	Wt. (%)	Cum. Wt. (%)	Ash (%)	Units	Cum. Units	Cum. Ash (%)		Wt. (%)	Cum. Wt. (%)	Ash (%)	Units	Cum. Units	Cum. Ash (%)
Plus 16	1.29	4.29	10.41	44.66	44.66	10.41	Plus 16	1.91	1.91	7.09	13.54	13.54	7.09
16x28	19.75	24.04	8.14	160.77	205.42	8.55	16x28	16.61	18.55	6.92	115.15	128.69	6.94
28x100	54.52	78.56	9.32	508.13	713.55	9.08	28x100	62.92	80.87	9.18	572.10	700.79	8.67
100 x 0	21.44	100	30.25	648.56	1362.11	13.62	100 x 0	19.19	100	31.79	608.14	1308.93	13.09
				1362.11							1308.93		

  

Test No. 1							Test No. 4						
Sample I.D.	Reject			Ash			Sample I.D.	Reject			Ash		
	Wt. (%)	Cum. Wt. (%)	Ash (%)	Units	Cum. Units	Cum. Ash (%)		Wt. (%)	Cum. Wt. (%)	Ash (%)	Units	Cum. Units	Cum. Ash (%)
Plus 16	31.5	34.5	83.77	2890.07	2890.07	83.77	Plus 16	26.77	26.77	84.24	2255.10	2255.10	84.24
16x28	30.29	64.79	82.39	2495.59	5385.66	83.12	16x28	34.22	60.99	85.52	2926.49	5181.60	84.96
28x100	39.83	98.62	85.79	2936.11	8321.76	84.38	28x100	36.96	97.95	85.24	3150.47	8332.07	85.06
100 x 0	1.39	100	76.7	105.85	8427.61	84.28	100 x 0	2.05	100	79.95	163.90	8495.97	84.96
				8427.61							8495.97		

  

Ash (%)							Ash (%)						
	Feed	Product	Reject	Yield (%)	Rec. (%)	Rej. (%)		Feed	Product	Reject	Yield (%)	Rec. (%)	Rej. (%)
Plus 16	10.49	10.41	83.77	99.89	99.98	0.87	Plus 16	16.34	7.09	84.24	88.01	97.74	61.81
16x28	16.16	8.14	82.39	89.20	97.73	55.07	16x28	15.52	6.92	85.52	89.06	98.12	60.29
28x100	18.51	9.32	86.79	88.14	98.08	55.62	28x100	14.95	9.18	85.24	92.41	98.68	43.25
100 x 0	33.06	30.25	76.7	93.95	97.89	14.04	100 x 0	35.85	31.79	79.95	91.57	97.37	18.80

**Phosphate Plant A - Test No. 1-6**

**Purpose:** Initial shakedown runs to establish approximate equipment settings and rates.

**Feed:** Coarse feed for 3 June 2003, 1st and 2nd shift

**Test Conditions:**

**Plant** Feed rate = 235 tph for 1 bank. Fa/Fo = 1150 lb/hr. Fuel oil = 450 lb/hr. Water quality = 3.5 in.  
Coarse rougher tailings estimate = 3-4% BPL

**Column**

- Test 1 -- Baseline/shakedown. One hose feed
- Test 2 -- Same as Test 1 except samples taken 30 minutes later
- Test 3 -- Higher feed rates. Two hoses feed.
- Test 4 -- One hose feed for comparison with Test 3. Timed product rates taken.
- Test 5 -- Similar to Test 4 but higher bed level used. Timed feed rate taken
- Test 6 -- Various changes; frother down, feed rate up, bed level up. No actual measurements.

**Results:**

Test No.	Feed Rate		Feed		Rate,tph	Conc		Tails		% BPL Recovery
	tph(1)	tph/ft2	%BPL	%Insol		%BPL	%Insol	Rate,tph	%BPL	
1	nc	nc	26.50	60.11	nc	60.02	18.95	nc	2.06	95.5
2	nc	nc	26.98	55.56	nc	53.73	27.71	nc	1.96	96.2
3	nc	nc	25.81	58.05	nc	56.17	23.41	nc	2.77	93.9
4	2.23	1.12	26.52	61.55	1.38	56.67	23.12	5.67(2)	2.04	95.8
5	2.59	1.30	22.13	66.74	nc	45.22	36.56	nc	2.61	93.6
6	nc	nc	21.94	67.54	nc	41.80	42.44	nc	1.64	96.3
	(1)	Timed Rate								
	(2)	Tailing discharge not steady								

**Phosphate Plant A - Test No. 7- 8**

**Purpose:** To establish operating parameters using the new test set-up. Two feed rates were run.

**Feed:** Coarse feed for 11 July 2003, 1st & 2nd shift

<b>Test Conditions: Plant</b>	<b>Column</b>
Feed rate, tph = 301	Air Flow, cfm = 4.5
Fa/Fo Mix, lb/hr = 946	Sparge Water, gpm = 24
Fuel Oil, lb/hr = 129	Bed Level = 85
Water Quality, inches = 2.0	Surfactant, cc/min = 18.6
Coarse rougher tailings est, %BPL = 8 - 10	Other
Other	

**Results:**

Test No.	Purpose	Measured Rate				% Solids	Weight % (2)	Chem. Analysis		% BPL Dist.(2)
		tph (1)	tph/ft2	ft3/tph	lb/hr/ft			% BPL	% Insol	
7 - Column	Feed Rates	(1.60)								
Feed	High	<b>1.33</b>	0.67	9.02		66.4	100.00	30.76	58.17	100.00
Tails	"	1.07	0.40			74.3	58.21	<b>10.22</b>	84.34	19.34
Conc	"	<b>0.53</b>	0.27		203	8.0	41.7904	59.37	21.73	<b>80.66</b>
Plant										
Feed		301		9.97			100.00	28.38	61.51	100.00
Tails							91.62	<b>24.85</b>	65.53	80.23
Conc		42			352		8.38	66.99	11.38	<b>19.77</b>
8 - Column	Feed Rates	(0.77)								
Feed	Lower	<b>0.37</b>	0.19	32.40		32.7	100.00	26.00	64.85	100.00
Tails	"	0.54	0.07			71.0	68.60	<b>10.44</b>	86.68	27.55
Conc	"	<b>0.23</b>	0.12		88	3.5	31.40	60	20	<b>72.45</b>
Plant										
Feed		301		9.97			100.00	28.38	61.51	100.00
Tails							91.62	<b>24.85</b>	65.53	80.23
Conc		42			352		8.38	66.99	11.38	<b>19.77</b>
(--) calc from (tails+conc) measured (2) calc from BPL analyses										

**Remarks:** The new test set-up worked well and no problems were encountered with respect to either operation of the unit or associated sampling procedures. The test itself did not achieve the desired feed rates for Test # 7 (too low) and was also influenced by declining plant feed rates for Test # 8.

**Phosphate Plant A - Test No. 9**

**Purpose:** To obtain Column Cell performance data at, and around, design feed rates (4 tph).

**Feed:** Coarse feed for 11 July 2003, 1st & 2nd shift

<p><b>Test Conditions: Plant</b></p> <p>Feed rate, tph = 266          Fa/Fo Mix, lb/hr = 1070          Fuel Oil, lb/hr = 150          pH = 9.95          Water Quality, inches = 2.0          Coarse rougher tailings est, %BPL = 6          Other</p>	<p><b>Column</b></p> <p>Air Flow, cfm = 4.5          Sparge Water, gpm = 21          Bed Level = 85          Surfactant, cc/min = 18.6          Other</p>
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**Results:**

Test No.	Purpose	Measured Rate				% Solids	Weight % (2)	Chem. Analysis		% BPL Dist. (2)
		tph (1)	tph/ft2	ft3/tph	lb/hr/ft			% BPL	% Insol	
9 - Column	Baseline	(4.15)	--							
	Feed	<b>3.92</b>	1.96	3.06		77.54	100.00	28.69	59.04	100.00
	Tails	2.60	1.19			82.24	56.34	<b>3.91</b>	89.41	7.68
	Conc	1.55	0.78		593	20.59	43.66	60.67	18.42	92.32
Plant	Baseline									
	Feed	266		11.28		100.00	28.69	59.04		100.00
	Tails					67.43	<b>8.95</b>	84.02		21.03
	Conc	87			722	32.57	69.55	8.09		<b>78.97</b>

(--) calc from (tails+conc) measured  
 (2) calc from BPL analyses

**Remarks:** Very strong float. Concentrate overflow launder was full. Froth covered surface. Thought to be close to design rates.

Phosphate Plant A - Test No. 10- 11

**Purpose:** To re-establish design operating parameters after shift change and to investigate surfactant requirements.

**Feed:** Coarse feed for 11 July 2003, 2nd shift

<p><b>Test Conditions: Plant</b></p> <p>Feed rate, tph = 244          Fa/Fo Mix, lb/hr = 1102          Fuel Oil, lb/hr = 44          Ph = 9.53          Water Quality, inches = 2.0          Coarse rougher tailings est, %BPL = 6          Other</p>	<p><b>Column</b></p> <p>Air Flow, cfm = 4.75          Sparge Water, gpm = 21          Bed Level = 85          Surfactant, cc / min = 18.6 / 11.2          Push water, cc / min = 2955</p>
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**Results:**

Test No.	Surfactant cc / min.	Measured Rate				% Solids	Weight % (2)	Chem. Analysis		% BPL Distribution
		tph (1)	tph/ft2	ft3/tph	lb/hr/ft			% BPL	% Insol	
10 - Column	High	(9.15)								
Feed	18.6	<b>6.57</b>	3.29	1.83		79.36	100.00	27.21	61.78	100.00
Tails		7.24(3)	2.33			78.39	60.32	<b>4.91</b>	89.23	10.88
Conc		1.91	0.96		730	27.42	39.68	61.11	19.01	89.12
Plant										
Feed		244		12.30			100.00	27.21	61.78	100.00
Tails							67.45	<b>8.52</b>	84.47	21.12
Conc					662		32.55	65.94	11.45	<b>78.88</b>
11 - Column	Low	(3.15)								
Feed	11.2	<b>6.57</b>	3.29	1.83		79.36	100.00	27.21	61.78	100.00
Tails		1.56(3)	2.49			66.67	61.86	<b>6.30</b>	87.40	14.32
Conc		1.59	0.80		608	19.43	38.14	61.13	18.19	85.68
Plant										
Feed		244		12.30			100.00	27.21	61.78	100.00
Tails							67.45	<b>8.52</b>	84.47	21.12
Conc					662		32.55	65.94	11.45	<b>78.88</b>

(--) calc from (tails+conc) measured  
 (2) calc from BPL analyses  
 (3) varying rates -- questionable measurements

**Remarks:** Froth became splotchy at times during Test 11 (low surfactant) but tails appeared similar to Test 10.

Phosphate Plant A - Test No. 12-13

**Purpose:** To establish operating parameters at feed rates above design (4 tph). Two feed rates were run.

**Feed:** Coarse feed for 13 July 2003, 2nd shift

Test Conditions:	Plant	Test # 12	Test # 13	Column
Feed rate, tph		276	409	Air Flow, cfm = 4.75
Fa/Fo Mix, lb/hr		1097	1045	Sparge Water, gpm = 22
Fuel Oil, lb/hr		200	199	Bed Level = 85
Ph		9.72	9.84	Surfactant, cc/min = 18.3 / 25.6
Water Quality, inches		2.0	2.0	Push water, cc / min. = 2585
Co. Ro.tails est, %BPL		6.0	8.0	
Other				

Test No.	Purpose	Surfactant cc / min	Measured Rate				% Solids	Weight % (2)	Chem. Analysis		% BPL Distribution
			tph (1)	tph/ft <sup>2</sup>	ft <sup>3</sup> /tph	lb/hr/ft			% BPL	% Insol	
12 - Column	Feed Rates	18.3	(7.77)								
	Feed High		7.43	3.72	1.62		71.8	100.00	26.54	61.15	100.00
	Tails "		5.52	2.76			76.0	71.19	10.93	82.28	29.32
	Conc "		2.25	1.13		860	38.0	28.81	65.11	12.17	70.68
Plant											
	Feed		276		10.86		100.00	26.54	61.15		100.00
	Tails						70.52	9.30	83.97		24.71
	Conc		81			675	29.48	67.79	9.98		75.29
13 - Column	Feed Rates	25.6	(4.72)								
	Feed Lower		4.57	2.29	2.63		47.1	100.00	30.64	57.10	100.00
	Tails surfactant		2.95	1.40			76.5	68.77	14.07	78.23	31.58
	Conc higher		1.77	0.89		677	22.9	31.23	67.12	9.20	68.42
Plant											
	Feed		409		7.34		100.00	30.64	57.1		100.00
	Tails						69.31	13.51	78.84		30.56
	Conc		126			1046	30.69	69.33	7.45		69.44
(-) calc from (tails+conc) measured (2) calc from BPL analyses											

**Remarks:** The froth overflow had a full ring for both tests, while the tailings discharge had a full pipe most of the time. The water pressure varied considerably at times.

PCS Phosphate - Flotation Testwork conducted June 2-3, 2004 @ Eriez Magnetics

	Test No.	Date	Feed Weight (gram)	H <sub>2</sub> O Addition (gram)	Conditioning % Solids (%)	pH	pH Adjuster	Brand Name	Reagent Addition Rate (uL)	Conditioning Time (sec)	
	1	6/2/04	149.90	145.80	50.69	9.0	Na <sub>2</sub> CO <sub>3</sub>				
Rougher								PQ "D"	75	1.00	
								SYLFAT FA1	75	1.00	
Cleaner								PQ "D"	300	4.00	
Re-Cleaner								PQ "D"	150	2.00	
	2	6/2/04	150.00	145.00	50.85	9.0	Na <sub>2</sub> CO <sub>3</sub>				
Rougher								Fischer	75	1.00	
								SYLFAT FA1	150	2.00	
Cleaner								PQ "D"	75	1.00	
	3	6/2/04	153.40	150.00	50.56	5.5	HCl			120	
Rougher								SYLFAT FA1	150	1.96	
								2 Drops		10	
Cleaner								PQ "D"	100	1.30	
	4	6/2/04	150.00	150.00	50.00	9.7	Na <sub>2</sub> CO <sub>3</sub>				
Rougher								Fischer	100	1.33	
								SYLFAT FA1	150	2.00	
								2 Drops		120	
Tests 5 - 12: Amine Floats @ neutral pH, 2 drops of frother and no conditioning.											
		Initial Conditions	6/3/04	150.00	150.00	50.00	N	Na <sub>2</sub> CO <sub>3</sub>			
		Amine	5						100	1.33	
		Amine	6						200	2.67	
		Amine	7						300	4.00	
		Amine	8						300	4.00	
		Diesel							300	4.00	
		Amine	9						400	5.33	
		Diesel							75	1.00	
		Amine	10						500	6.67	
		Amine	11						1000	13.33	
		Amine	12						750	10.00	
Tests 13-16: Conditioned with Reagent W; 2 drops Frother added to each cell											
			6/3/04	150.00	175.50	46.08	9.0	Na <sub>2</sub> CO <sub>3</sub>			
Rougher		Reagent W	13	Floated for approx. 1.5 minutes only					Fluka	150	2.00
		Reagent W	14					Fluka	300	4.00	
		Reagent W	15					Fluka	75	1.00	
		Reagent W	16					Fluka	450	6.00	
		Na <sub>2</sub> SiO <sub>3</sub>						PQ "D"	75	1.00	
	17	6/3/04	149.00	150.00	49.83	9.4	Na <sub>2</sub> CO <sub>3</sub>				
Rougher								IMC	150	2.01	
								PQ "D"	225	3.02	
								2 Drops		60	
	18	6/3/04	150.20	150.00	50.03	9.2	Na <sub>2</sub> CO <sub>3</sub>				
Rougher								IMC	375	4.99	
								PQ "D"	225	3.00	
								2 Drops		60	
	19	6/3/04	149.80	150.00	49.97	9.2	Na <sub>2</sub> CO <sub>3</sub>				
Rougher								SYLFAT FA1	375	5.01	
								PQ "D"	225	3.00	
								2 Drops		60	
	20	6/3/04	150.00	150.00	50.00	9.2	Na <sub>2</sub> CO <sub>3</sub>			Scrubbed for 7 minutes	
Rougher								SYLFAT FA1	225	3.00	
								PQ "N"	150	2.00	
								2 Drops		30	
	21	6/3/04	150.00	150.00	50.00	N	Na <sub>2</sub> CO <sub>3</sub>			Scrubbed for 5 minutes	
Rougher									500	6.67	
									50	0.67	

Customer: PCS Phosphate  
 Location: White Springs, FL  
 Date: January 19-22, 2004

Test No.: 1  
 Sample ID: Cyclone U/F Composite, Bucket 3/4

Size Fraction	Particle Size, Microns	Sample Weight	Weight, %	Cum. Wt., %	% Passing
+100M	150	7.17	4.94	4.94	95.1
-100+150M	100	1.51	1.04	5.98	94.0
-150+270M	53	19.70	13.57	19.55	80.4
-270+325M	45	8.34	5.75	25.30	74.7
-325+400M	38	8.88	6.12	31.42	68.6
-400M		99.53	68.58	100.00	0.0
Composite		145.13	100.00		

Test No.: 2  
 Sample ID: Cyclone U/F Composite, Bucket 4/4

Size Fraction	Particle Size, Microns	Sample Weight	Weight, %	Cum. Wt., %	% Passing
+100M	150	1.23	0.57	0.57	99.4
-100+150M	100	3.00	1.40	1.97	98.0
-150+270M	53	16.08	7.51	9.48	90.5
-270+325M	45	6.20	2.89	12.37	87.6
-325+400M	38	8.60	4.01	16.39	83.6
-400M		179.14	83.61	100.00	0.0
Composite		214.25	100.00		

Test No.: 3  
 Sample ID: Cyclone U/F Composite, Bucket 2/4

Size Fraction	Particle Size, Microns	Sample Weight	Weight, %	Cum. Wt., %	% Passing
+100M	150	1.09	0.56	0.56	99.4
-100+150M	100	2.61	1.34	1.90	98.1
-150+270M	53	18.76	9.63	11.53	88.5
-270+325M	45	4.76	2.44	13.97	86.0
-325+400M	38	6.35	3.26	17.23	82.8
-400M		161.31	82.77	100.00	0.0
Composite		194.88	100.00		

Test No.: 4

Sample ID: Cyclone Feed Composite, 28PSI, 3/4"A, 2"V

Size Fraction	Particle Size, Microns	Sample Weight	Weight, %	Cum. Wt., %	% Passing
+100M	150	0.65	1.98	1.98	98.0
-100+150M	100	1.51	4.59	6.57	93.4
-150+270M	53	1.25	3.80	10.37	89.6
-270+325M	45	0.34	1.03	11.40	88.6
-325+400M	38	0.48	1.46	12.86	87.1
-400M		28.66	87.14	100.00	0.0
Composite		32.89	100.00		

Test No.: 5

Sample ID: Cyclone Feed Composite, 26PSI, 2.5"V, 3/4"A

Size Fraction	Particle Size, Microns	Sample Weight	Weight, %	Cum. Wt., %	% Passing
+100M	150	0.53	0.60	0.60	99.4
-100+150M	100	1.97	2.25	2.85	97.1
-150+270M	53	3.35	3.82	6.67	93.3
-270+325M	45	0.61	0.70	7.37	92.6
-325+400M	38	0.58	0.66	8.03	92.0
-400M		80.66	91.97	100.00	0.0
Composite		87.70	100.00		

Test No.: 6

Sample ID: Cyclone Feed Composite, 20PSI, 2"V, 3/4"A

Size Fraction	Particle Size, Microns	Sample Weight	Weight, %	Cum. Wt., %	% Passing
+100M	150	0.30	0.35	0.35	99.7
-100+150M	100	2.54	2.96	3.31	96.7
-150+270M	53	2.58	3.01	6.32	93.7
-270+325M	45	0.55	0.64	6.96	93.0
-325+400M	38	0.59	0.69	7.65	92.4
-400M		79.23	92.35	100.00	0.0
Composite		85.79	100.00		