Minntac Pre-Classification:

Hydrocyclone Classification of Flotation Feed

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ABSTRACT

Hydrocycloning of flotation feed was shown to increase recovery by decreasing fine iron losses in the processing of magnetic taconite concentrates. The hydrocyclone classification of flotation feed allows the fine, liberated particles to bypass flotation and to be processed with conventional magnetic separators to achieve a final concentrate grade with a much higher iron recovery. The fine particles also include a fraction of material referred to as silica "slimes." Silica slimes are detrimental to the flotation process by consuming large amounts of amine with minimal reduction in silica. Hydrocyclone classification allows for the slimes to bypass flotation and results in much improved flotation selectivity on the coarse fraction. The coarse, unliberated middling particles go through the existing flotation plant. The absence of the fine iron particles from flotation alleviates the iron loss due to the fine iron entrainment. Furthermore, the coarse particles have nearly twice as much retention time in the flotation plant.

INTRODUCTION

Minntac must make use of flotation for upgrading concentrates to achieve the pellet silica content required by customers. In taconite flotation, the flotation collector is an ether diamine and the mineral floated is silica. The ether diamine molecule has a partial positive charge associated with it and the silica particles have a partial negative charge. Differences in charge results in the attraction and attachment of the amine to the silica particles. For taconite flotation to work, amine and air are introduced to the slurry in a highly agitated flotation cell. The well-mixed contents of the cell allows for the amine and silica to interact and subsequently attach. Amine is also attracted to the air bubbles. The binding of the silica-laden amine to the air bubbles brings the silica to the surface and is removed as tailings. The process efficiency is less than 100% because fine iron particles are entrained with the air bubbles and report to the tailings stream.

Silica grade in the concentrate is controlled by the addition rate of amine. Increasing the amine rate results in more silica removal. The flotation process is time and chemical concentration dependent. To achieve an increase in retention time, feed rates must be lowered or capacity must be increased. Large amounts of amine have been shown to correlate with poor pellet quality. When the amine rate is high, iron recovery is lowered due to the relatively large amount of fine iron particles entrained in the froth and ultimately lost to tails.

The theory behind pre-classification of flotation feed is to utilize hydrocyclones to separate the fine, liberated particles from the coarse, unliberated particles, and process the two by different means to achieve a higher iron recovery. The fine, liberated particles can be processed with a conventional magnetic separator to achieve final concentrate grade with a much higher iron recovery than would result in flotation. The fine particles also include a fraction of material referred to as silica "slimes." The slimes are very detrimental to flotation by consuming large amounts of amine with little reduction in silica. Pre-classification of flotation feed will allow for these slimes to by-pass flotation.

This results in much improved flotation selectivity on the coarse fraction. The coarse, unliberated particles will go through the existing flotation plant. With the slimes removed, flotation of the coarse particles will require less amine. The absence of the fine iron particles from flotation improves recovery by alleviating the iron loss due to fine iron entrainment. The coarse particles will now have nearly twice as much retention time in the flotation plant, and flotation selectivity will increase.

The pre-classification project was subject to three phases of research and development before plant installation. Work began in 1997, by Coleraine Minerals Research Laboratory (CMRL), as a part of a Minntac research project, to study the feasibility of producing a desirable split on the flotation feed using a hydrocyclone. After promising results were shown in the laboratory, a full-scale hydrocyclone was slipstreamed into a grinding circuit in the Minntac concentrator. This circuit was tested for over a year to examine the effects of process water temperature on the cyclone split. In the later part of 2000, work was done to engineer a circuit to test pre-classification on two grinding lines and to float the material separate from the rest of the grinding lines. The installation of the circuit was completed in May 2001, and full scale plant testing was performed during the period of May-July 2001. The 2001 plant testing verified the cyclones could make the desired size split and the nest of cyclones could be controlled during normal operation. The fine particle stream was upgraded over conventional double drum cleaners to produce silica levels below the required value with a high iron recovery. The coarse particle stream was floated separately in one flotation bank and also on a bench scale in the laboratory. The plant flotation results were inconclusive due to the low flow rate of coarse material being processed. The bench flotation results showed an increase in flotation weight recovery at a lower chemical addition rate. The results of the plant testing were used for the design of the Step 3 installation.

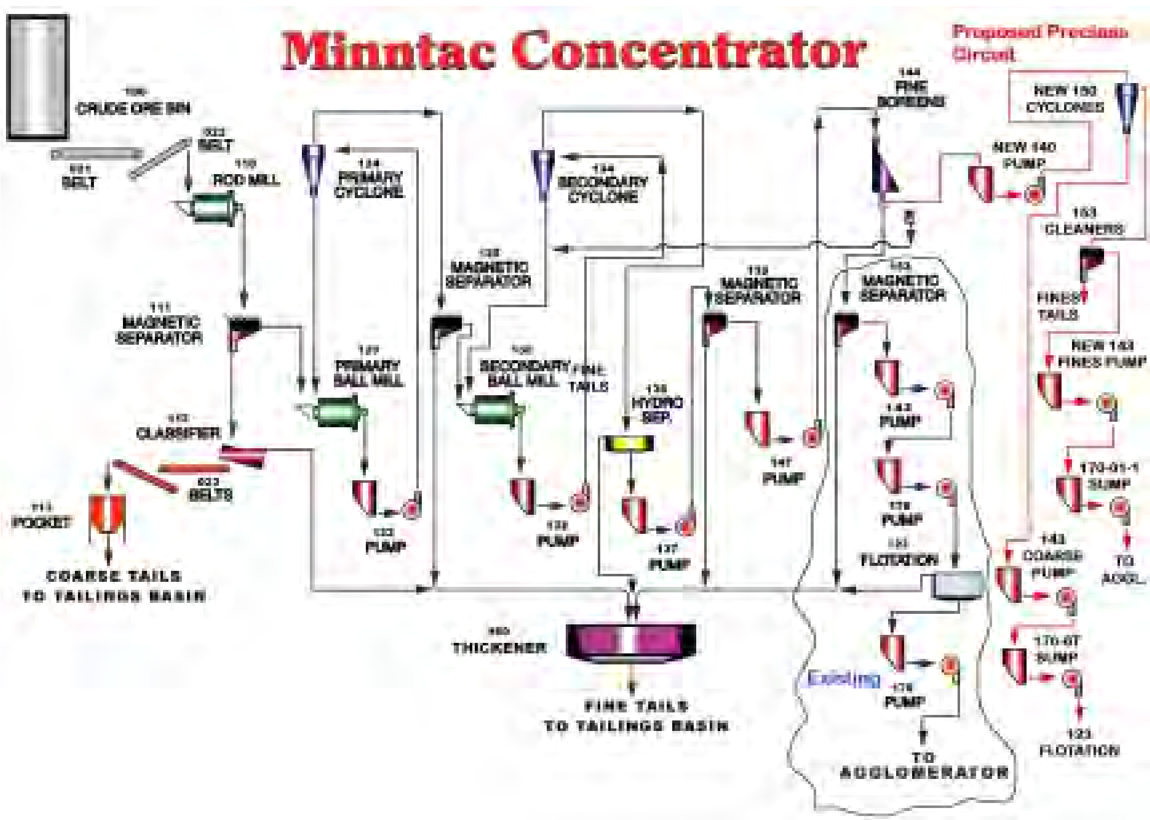
Late in 2002, US Steel approved the capital project for the installation of pre-classification in the Minntac Step 3 concentrator commencing in 2003. The Step 3 concentrator was chosen for the logistics of material handling and issues with the production of dual products at Minntac. NORAMCO Engineering Corp. of Hibbing, MN was hired to perform the detailed engineering of the project. Installation occurred in June-August of 2003.

Startup and testing of the pre-classification cyclones began immediately after the installation. Much of September, October, and November were used for troubleshooting mechanical and operating issues with the cyclone circuit. Problems with the design of the cyclone feed sump and cleaner tailings flows were the two main issues, but both were resolved by November. Data from the 2001 plant test was used to pick the starting point for the cyclone testing. The test plan was modified accordingly with each set of results. After the cyclones were operating properly, flotation of the pre-classified material began in December. The testing of the pre-classification cyclones and flotation continued through May 2004. The test period was lengthy due to the operating conditions of the concentrator. The production of both acid and flux pellets restricted the amount of flotation testing due to upset conditions in the plant and no control data. At the end of April, the plant went back to total flux pellet production. This allowed for a rigorous testing campaign of the flotation plant in May.

PROCESS FLOWSHEET AND EQUIPMENT

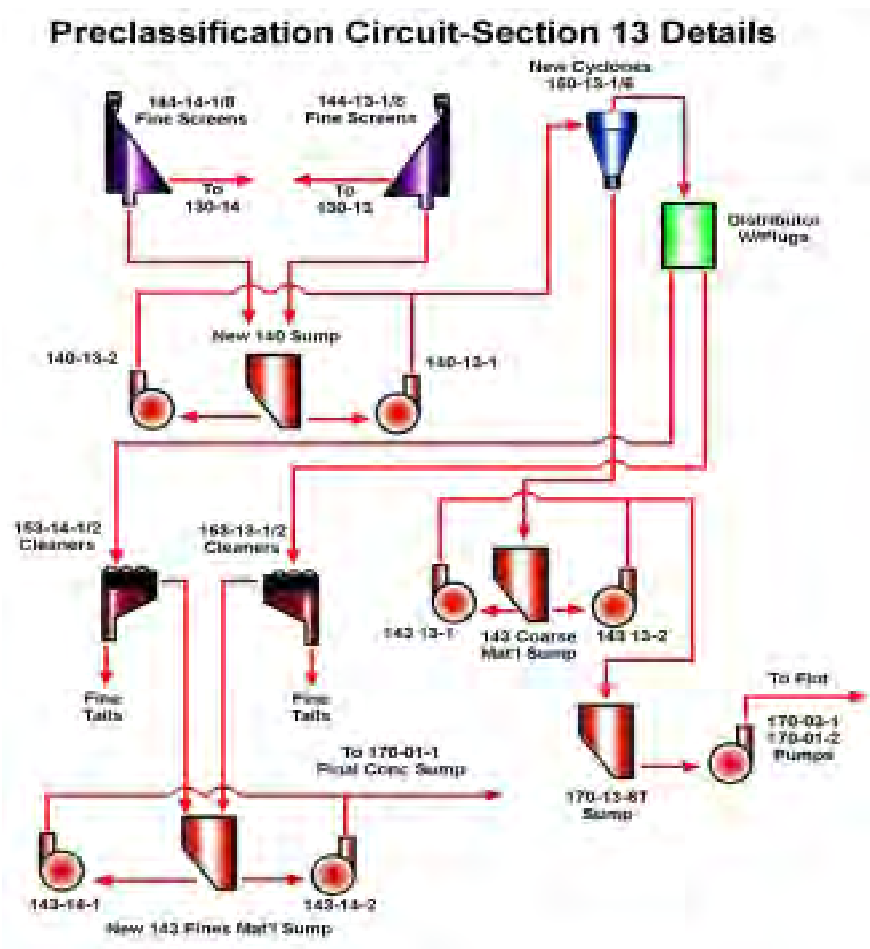
The pre-classification circuit is situated between the grinding lines and the flotation plant in the Minntac flow sheet. Figure 1 is a detailed diagram of a typical grinding line with a simplified flotation plant that illustrates how the pre-classification circuit is incorporated in the concentrating process. The grinding line consists of three stages of grinding with four stages of magnetic separation and various stages of size classification to produce feed to the flotation plant. With pre-classification the grinding line remained essentially the same with the exception of the final stage of magnetic separation.

FIGURE 1



Two grinding lines (1 Section) feed each pre-classification circuit. Figure 2 shows the pre-classification circuit in detail. The screen undersize from the two grinding lines is combined in a common sump. The sump is equipped with 2-200hp pumps to feed the nest of cyclones (one for normal operation and one spare). The pipeline feeding the cyclones is equipped with a density gauge. Cyclone feed density is controlled by the pump speed and water valve. Each nest has eight cyclones that are fed by knife gate valves, which automatically open and close to control the cyclone pressure. The cyclone overflow is distributed over four sets of double drum cleaners for further upgrading. The cleaner concentrate reports to a sump and is pumped to another sump at the end of flotation where the coarse and fine material can be mixed. The cleaner tailings report to the fine tails thickener. The underflow from the cyclones reports to a sump and is pumped over to flotation. The pre-classified flotation feed is floated in a separate float bank from the rest of the flotation material. Finally, the pre-classified flotation concentrate is mixed with the pre-classified fines and the flotation concentrate from the rest of the plant in a sump before being pumped to the agglomerator.

FIGURE 2



Operating Conditions

Feed density of the cyclones is controlled at a set point of 29.0%. During normal operation the density will vary +/- 1.0%. Cyclone pressure is controlled over the range of 14-28 psi. The pressure is measured at the cyclone feed distributor. Both the feed density and pressure are controlled automatically by the Westinghouse WDPF system.

Cyclone Feed System

A new pumping system was installed on each section to feed the hydrocyclones. Fine screen undersize launderers were modified to deliver material to the new cyclone feed sump. The sump is equipped with two GIW LSA 8x10-32.5 pumps (one for normal operation and one spare). Each pump is rated at 200 hp and is equipped with a variable frequency drive (VFD). The feed sump is equipped with a sonar head for measuring sump level. The feed piping to the cyclones is equipped with a density gauge.

Hydrocyclones

Each section has a nest of 8 Warman CAVEX model 400CVX10E hydrocyclones. The cyclones are 15-inches in diameter. All cyclones operate with a 49mm apex and a 100mm vortex finder. The cyclones are fed by a Warman 8-place radial cyclone/manifold system. A transducer on the manifold system measures the cyclone feed pressure. Air actuated knife gate valves on the distributor feed the cyclones.

Magnetic Separators

Four sets of double drum 4x10 cleaners were used for the magnetic upgrading of the cyclone overflow.

Particle Size Measurement

A multi-line PSI 200 Model 2601 was installed on each section to read the screen undersize particle size. The screen undersize particle size is necessary for grind control in each mill line.

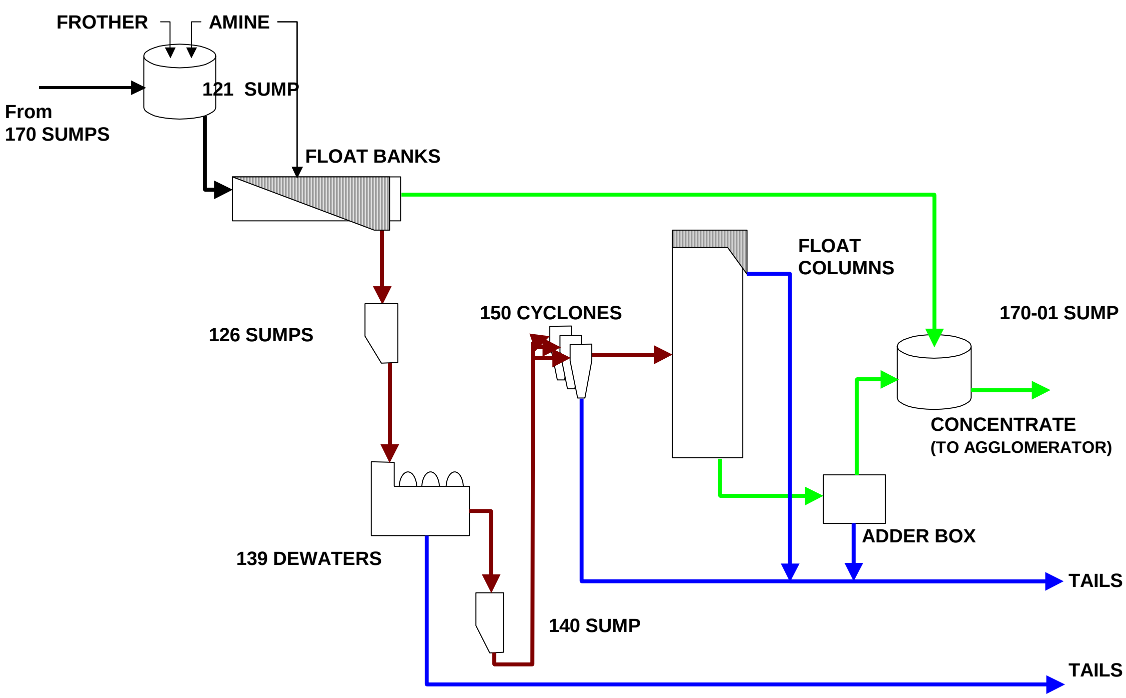
Flotation Banks

Each bank consists of 10 500-cubic foot Denver flotation cells in series. The bank is divided into three sections (4-4-2) by dart valves that control the level in the preceding section. The amine is added to the flotation bank in the first cell and the fifth cell. A frother is also added to assist in the flotation process. Manual dampers on a blower system control air addition to the cells.

Flotation Scavenging Circuit

The tailings from the flotation banks act as feed to the scavenging circuit. The flotation scavenging circuit consists of 8 single drum 4x10 cleaners, 12-10 inch hydrocyclones, and 3-flotation columns. The concentrate from the columns is added back to final concentrate when the proper operating conditions exist. The basic flow sheet for the scavenging circuit can be seen in Figure 3.

FIGURE 3



RESULTS AND DISCUSSION

Hydrocyclone Classification

The cyclone results were as predicted from the earlier phases of testing. Results show 49.0% of the material reported to the fine fraction from the cyclones and was easily upgraded to final concentrate grade with the magnetic separators. The remaining 51.0% of the material reported to the flotation plant. As discussed before, the benefits from pre-classification are based upon the fine, liberated material bypassing flotation and the coarse, non-liberated material reporting to flotation. Therefore, the size split of the cyclones is very important. The split of the cyclones occurs between the 400 and 500 mesh particles. Only 10.4% of the +400 mesh material in the cyclone feed reports to the cyclone overflow, while 23.3% of the +500 mesh material and 81.7% of the –500 mesh material reports to the overflow. Complete size analysis can be seen in the Appendix.

A limited amount of test work was done with density and pressure because the results duplicated the earlier work. Density testing examined the cyclone performance over a range of feed solids from 26% to 34%. As seen in the pilot testing, feed density had by far the largest effect on cyclone performance. The effect of density on various characteristics of cyclone performance can be seen in graphical form in the Appendix. The pressure range of the cyclones was also examined, but was limited due to the design of the circuit. The pressure range of the cyclones was varied from 10 to 30 psi during the testing.

A majority of the testing focused on the proper operation of the circuit. Samples were collected during stable and non-stable periods of operation to examine changes in the product split during upset conditions. Density control was examined closely since it is the most important variable in achieving the proper cyclone split. The optimum cyclone feed density was found to be 28-29%. At this percent solids, the cyclones made a clean size split with a high amount of material in the overflow and cleaner concentrate silica low enough to be final product. On a daily basis the density control varies +/- 1% from the set point. During upsets, such as mill charging or line startups, the cyclone feed density will vary as much as 4% for a period of an hour or two. The operating range of the cyclone feed pressure is set at 14 to 28 psi. Testing showed the optimum to be in the low 20's with little change over the whole test range. Since the cyclones open and close based on the pressure, the range was set large enough to ensure stable operation could be achieved.

Magnetic Separators

With the pre-classification cyclones producing the proper split, the cleaner magnetic separator concentrate averaged 3.71% silica. This is below the required 4.00% silica required to meet the flux pellet specification. Testing of the cleaner magnetic separators show an average silica reduction of 0.82%. This compares to the average reduction of 0.80% for the non-pre-classified material. More magnetic iron was lost to tails due to the extremely low density feeding the cleaners and because much of the material is exceptionally fine. The magnetic iron recovery of the cleaners dropped by 0.28%. The low density in the cleaner feed also caused some minor problems in the material handling of the cleaner tails. The volume of cleaner tails increased slightly, but was enough to tax the current system. The launderers and pipes that transport the cleaner tails were cleaned out and the problem was rectified.

Plant Flotation

Extensive flotation testing was performed to compare the performance of the pre-classified and non-pre-classified material. The setup of the flotation plant allowed for a head to head comparison in the flotation banks, even through all of the material is eventually combined in the scavenging circuit. Comparison of flotation bank performance showed the pre-classified material to have a lower weight recovery (2.90%), but a much higher silica reduction (0.85%). The amine consumption of the pre-classified flotation material averaged 21.3% higher but was 14.7% lower on a unit of amine per unit of silica removed basis. Details can be seen in the Appendix.

Flotation operating conditions were examined to ensure the banks would not sand up with the coarser material. This concern never became an issue. With less material reporting to flotation, the density of the flotation feed could be dropped to keep the superficial velocity through the float bank high enough to prevent sanding. The ability to decrease the flotation density from the previous operating range of 45-48% solids to 40-42% solids brought the banks into the optimum range for density. The residence time of the flotation banks increased even with the flotation feed solids being lower. The increase in residence time and decrease in solids increased the performance of both the pre-classified material and the non-pre-classified (control) material. A summary of the flotation bank testing can be seen in the Appendix.

Addition rate of the amine was adjusted to achieve the proper reduction in silica assuming the material was combined with the pre-classification cleaner concentrate. The adjustment was accomplished on a test-by-test basis using the results from the previous testing as a guide. This adjustment was an inexact science and resulted in both the pre-classified and control banks being slightly under-dosed or over-dosed. On average, the pre-classified material required 21.3% more amine, but amine consumption changed from day-to-day. It is speculated that the reason for this difference is due to the changes in floatability of the various ore types. Different ores produce a variety of particle shapes that may not process the same in the pre-classification cyclones. The liberation characteristics of the various ores will also play a large part in the amine efficiency and flotation performance.

Recovery Increase

The recovery increase due to the installation of pre-classification in the Step 3 concentrator is from both the pre-classified and non-pre-classified material. A weight recovery increase of 3.75% was measured on the pre-classified material, whereas the weight recovery of the non-pre-classified material increased by 0.68%. The increase in weight recovery of the pre-classified material is because nearly half of the material reports to the cyclone overflow and is upgraded over cleaner magnetic separators. This results in a weight recovery of 98.6% compared to being floated at a recovery of 91.1% before pre-classification was installed.

The increased weight recovery of the non-pre-classified material is the result of lower flotation feed density, increased flotation retention time, and an increased amount of time the scavenging flotation concentrate is added back to final concentrate. The lower flotation feed density and increased retention time are the result of nearly half of the pre-classified material bypassing the flotation plant. The flotation feed density dropped nearly 4% while the residence time increase almost 10%. Both of these changes resulted in better flotation performance. The increase in flotation performance also results in lower amine rates. The addition of scavenging circuit material is based upon the amine rate. Prior to pre-classification, addition of scavenging circuit material averaged 64.5% of the time. Since pre-classification flotation came on line, addition of scavenging circuit material has averaged 79.6% of the time. The addition of scavenging circuit material typically increases flotation weight recovery by over 4%.

Chemical Reduction

Almost half of the predicted monetary benefit of pre-classification was from reduction in flotation chemicals. Based on testing, the reduction in amine, defoamer, and frother consumption for the total plant is 27.9%, 27.9%, and 20.3% respectively. The amine reduction is measured from the metering pumps and calculated from the amount of material reporting to flotation. The defoamer reduction is based strictly upon amine usage. The defoamer is not metered into the process. It is used on an as needed basis, but the defoamer usage mirrors that of amine. Since frother is dosed on strictly on the amount of material reporting to flotation, the amount of reduction is equal to the amount of fines material bypassing flotation. A majority of the reduction in the amine and defoamer is the result of nearly half of the pre-classified material bypassing flotation. About 15% of the reduction is from the increased performance of the non-pre-classified material due to the lower float feed density and the increased retention time.

Maintenance

Maintenance on the pre-classification circuit has been minimal. Cyclone change-outs have accrued 120 man-hours in the first eight months of 2004. Cyclone overflow pipe change outs have accounted for 144 man-hours. During the same time period, the pre-classification circuits have produced 4,415,736 LT of concentrate. That equates to 16,726 LT of concentrate per maintenance man-hour.

Minimal special maintenance is required for the pre-classification circuits. The wear parts of the cyclone are changed out as necessary and the cyclone feed pumps will be overhauled when needed. The instrumentation in the circuit is monitored in the same manner as the rest of the plant and periodically audited through special sampling.

Energy Requirements

Additional energy requirements of pre-classification are from the cyclone feed pumps. Each cyclone nest is fed by one 200hp pump equipped with a VFD. At average operating time and pump speed each 200hp pump will consume 3,300 KWH/Day. During the first eight months of 2004, the pre-classification circuits have produced 4,415,736 LT of concentrate. That equates to 0.547 kwh/LT of concentrate.

CONCLUSION

The installation of hydrocyclones in Step 3 of the Minntac concentrator to classify the flotation feed was a success. Weight recovery of the pre-classified Step 3 material increased by 3.75% while the weight recovery Step 1&2 non-pre-classified material also increased by 0.68%. The result was a 1.95% increase in weight recovery for the total concentrator, or a 4.71% increase when normalized to the Step 3 production. A majority of the recovery increase is possible because 81.7% of the –500 mesh material is bypassing flotation and being upgraded over conventional magnetic separators. Prior to the installation of pre-classification the –500 mesh material accounted for over 80% of the iron losses in flotation. The rest of the recovery increase is from lower flotation feed density and more residence time in the flotation banks. These two reasons increased the flotation performance of both the pre-classified material and the non-pre-classified material. Flotation chemical consumption was decreased by 23.57% for the total plant based on annual flotation chemical spending. The removal of the silica slimes from the flotation feed stream, lower flotation feed density, and increased float bank residence time all resulted in higher amine efficiency and lower flotation chemical rates.

APPENDIX

APPENDIX

Table 1 – Cyclone Stream Data Summary

Summary of Laboratory Sampling for Pre-Class Cyclones					
		Silica	Density	% -270 Mesh	% -500 Mesh
Cyclone Feed	Average	5.84	28.13	84.92	54.63
	STDEV	0.42	1.64	2.09	3.75
Cyclone Overflow	Average	4.53	17.04	98.58	89.54
	STDEV	0.44	1.94	0.60	3.88
Cyclone Underflow	Average	7.04	76.26	71.80	20.01
	STDEV	0.71	1.53	3.00	2.09
Cleaner Concentrate	Average	3.71	56.39	98.40	88.01
	STDEV	0.36	2.14	0.64	3.91
Recovery to Overflow	Average	48.86%	48.85%	48.67%	49.59%
	STDEV	3.70%	3.34%	3.55%	3.22%

Table 2 – Cyclone Stream Size Summary

Summary of Pre-Classification Cyclone Stream Size Distributions - Percent Passing Mesh Size							
		100	150	200	270	400	500
Cyclone Feed	Average	99.68%	98.94%	95.43%	85.11%	68.76%	54.79%
	STDEV	0.25%	0.38%	0.99%	2.36%	3.61%	4.17%
Cyclone Overflow	Average	100.00%	100.00%	99.64%	98.39%	95.25%	88.46%
	STDEV	0.00%	0.00%	0.32%	0.85%	1.97%	4.87%
Cyclone Underflow	Average	66.92%	99.44%	98.10%	91.72%	72.00%	41.44%
	STDEV	38.10%	0.33%	0.61%	1.60%	4.12%	3.84%

Table 3 – Cyclone Size Recovery Summary

Summary of Weight of Cyclone Feed Stream								
		100	150	200	270	400	500	-500
Recovery to Cyclone Overflow	Average	0.0%	0.0%	5.6%	6.8%	10.4%	23.3%	81.7%
	STDEV	0.0%	0.0%	6.3%	5.0%	5.8%	12.2%	3.3%
Recovery to Cyclone Underflow	Average	100.0%	100.0%	94.4%	93.2%	89.6%	76.7%	18.3%
	STDEV	0.0%	0.0%	6.3%	5.0%	5.8%	12.2%	3.3%

Table 4 – Flotation Lab Sampling and Performance Summary

Summary of Flotation Lab Samping and Performance								
	Float Feed		Float Con		Float Tails		Silica	Weight
	Silica	Solids	Silica	Solids	Silica	Solids	Upgrade	Recovery
Pre-Class	7.10	40.89	4.11	44.14	22.36	15.00	2.99	83.24%
Flotation	0.79	4.33	0.80	8.27	2.46	3.73	1.23	7.81%
Control	5.49	33.60	3.35	39.26	16.15	15.32	2.14	80.34%
Flotation	0.44	8.37	0.61	9.49	3.90	4.73	0.68	12.94%

Table 5 – Flotation Bank Process Value Summary

Summary of Flotaiton Bank Process Values			
		Bank Feed LTPH	Amine Rate
Pre-Class	Average	329	0.156
Flotation	STDEV	64	0.045
Control	Average	434	0.129
Flotation	STDEV	169	0.034

Table 6 – Pre-Classification Flotation Stream Size Summary

Summary of Pre-Classification Flotation Stream Size Distributions - Percent Passing Mesh Size							
		100	150	200	270	400	500
Flotation	Average	99.52%	98.38%	91.68%	71.32%	42.09%	20.42%
Bank Feed	STDEV	0.09%	0.25%	0.75%	1.86%	2.35%	2.05%
Flotation	Average	99.45%	98.30%	92.64%	71.03%	38.64%	17.79%
Bank	STDEV	0.26%	0.41%	0.99%	2.28%	2.50%	2.08%
Flotation	Average	99.65%	98.11%	85.94%	64.62%	48.39%	37.18%
Bank Tails	STDEV	0.23%	0.41%	1.47%	2.85%	3.29%	3.91%

Table 7 – Control Flotation Stream Size Summary

Summary of Control Flotation Stream Size Distributions - Percent Passing Mesh Size							
		100	150	200	270	400	500
Flotation	Average	99.77%	99.20%	95.45%	83.73%	66.86%	53.77%
Bank Feed	STDEV	0.25%	0.34%	0.87%	2.05%	1.90%	1.82%
Flotation	Average	99.75%	99.16%	95.66%	84.57%	66.46%	50.36%
Bank	STDEV	0.25%	0.33%	0.95%	2.32%	3.02%	3.08%
Flotation	Average	99.96%	99.22%	94.04%	84.59%	75.69%	68.87%
Bank Tails	STDEV	0.13%	0.35%	1.30%	2.40%	2.68%	2.91%

Process Flow Sheet Prior to Pre-classification

Screen Undersize/Cleaner Feed

6.29	100.00%
64.64	100.00%

Cleaner Tails

76.92	1.12%
5.06	1.12%

Cleaner Concentrate/Flotation Bank Feed

5.49	98.88%
65.31	98.88%

Flotation Bank Tails/Scavenging Feed

18.15	10.78%
54.63	10.66%

Scavenging Flotation Tails

27.04	57.98%
46.83	6.18%

Flotation Bank Concentrate

3.96	89.22%
66.60	88.22%

Scavenging Flotation Concentrate

5.40	42.02%
65.39	4.48%

Adder Box

64.5% → Final Float Concentrate

35.5% → Tails

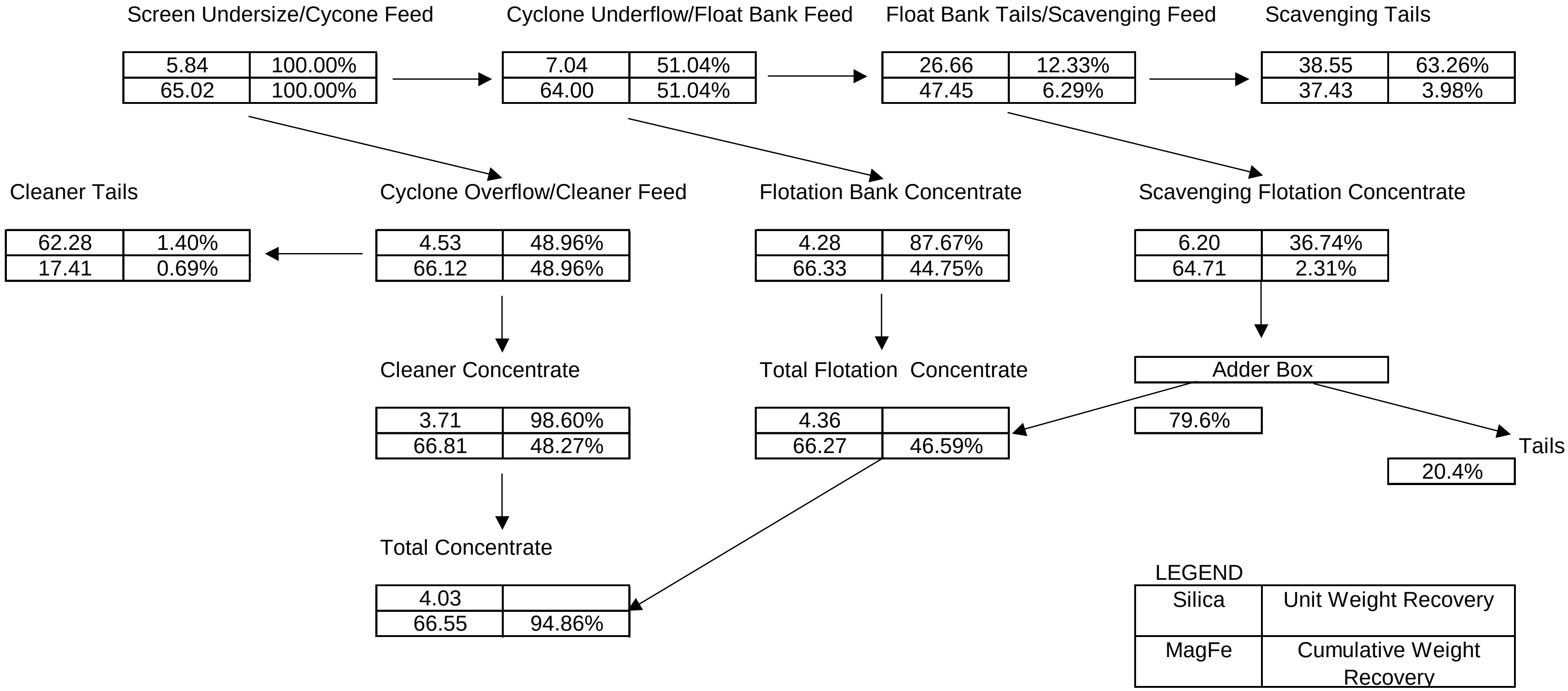
Final Float Concentrate

4.01	-
66.56	91.11%

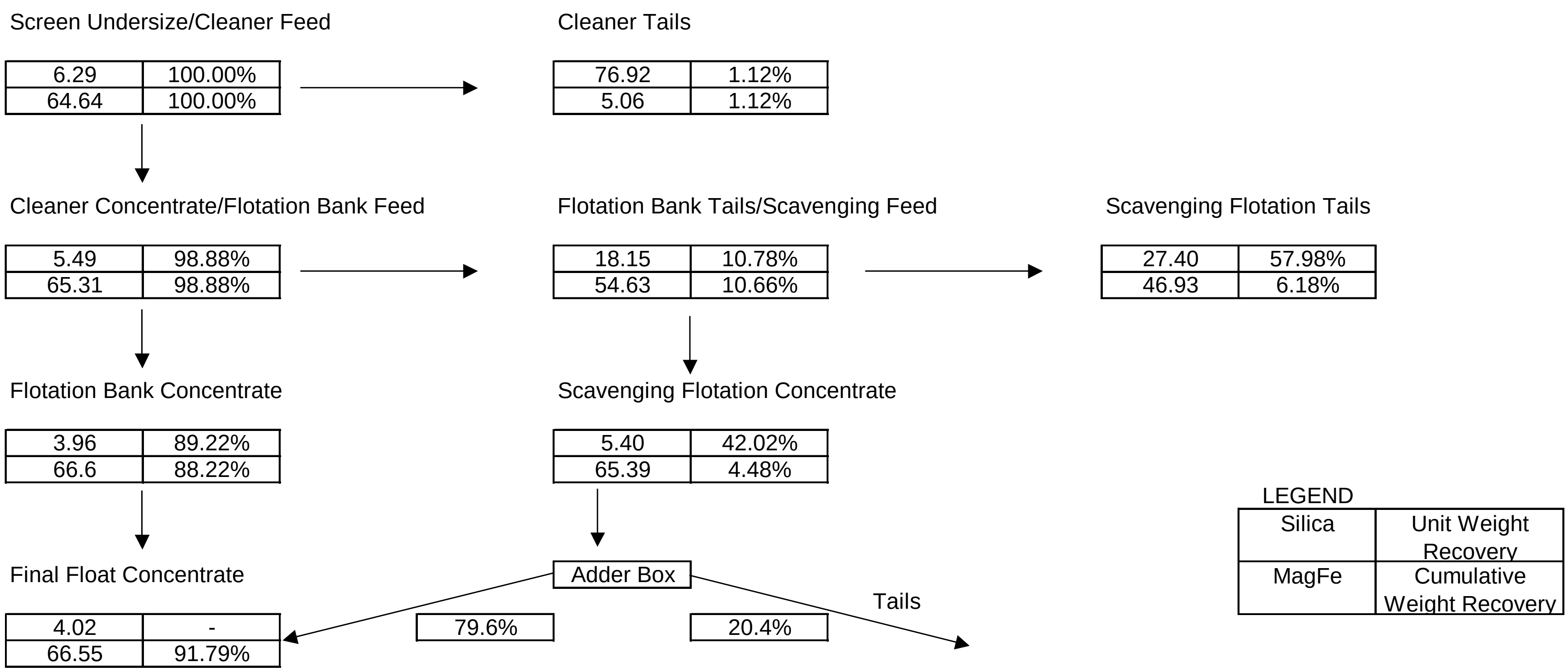
LEGEND

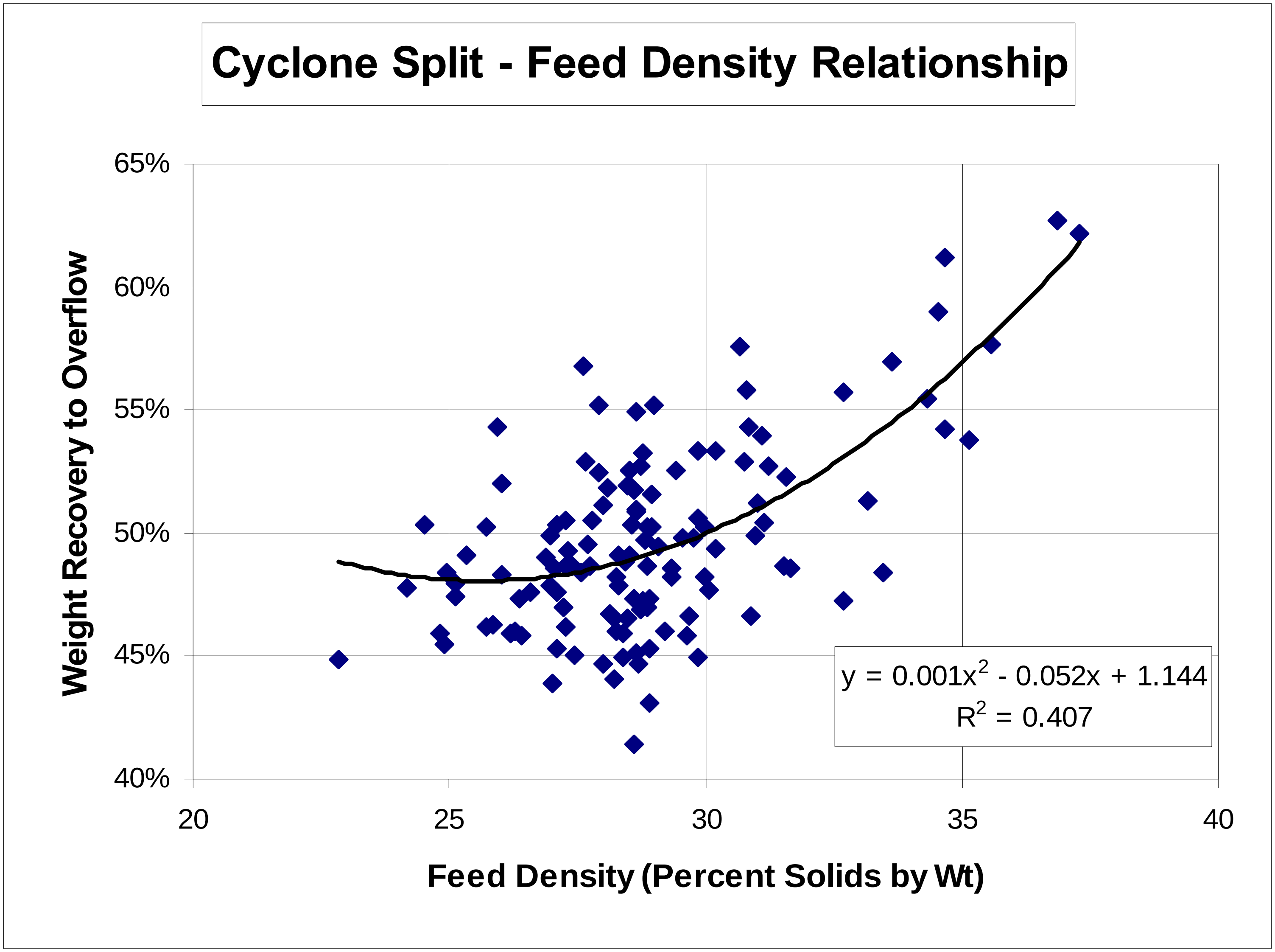
Silica	Unit Weight Recovery
MagFe	Cumulative Weight

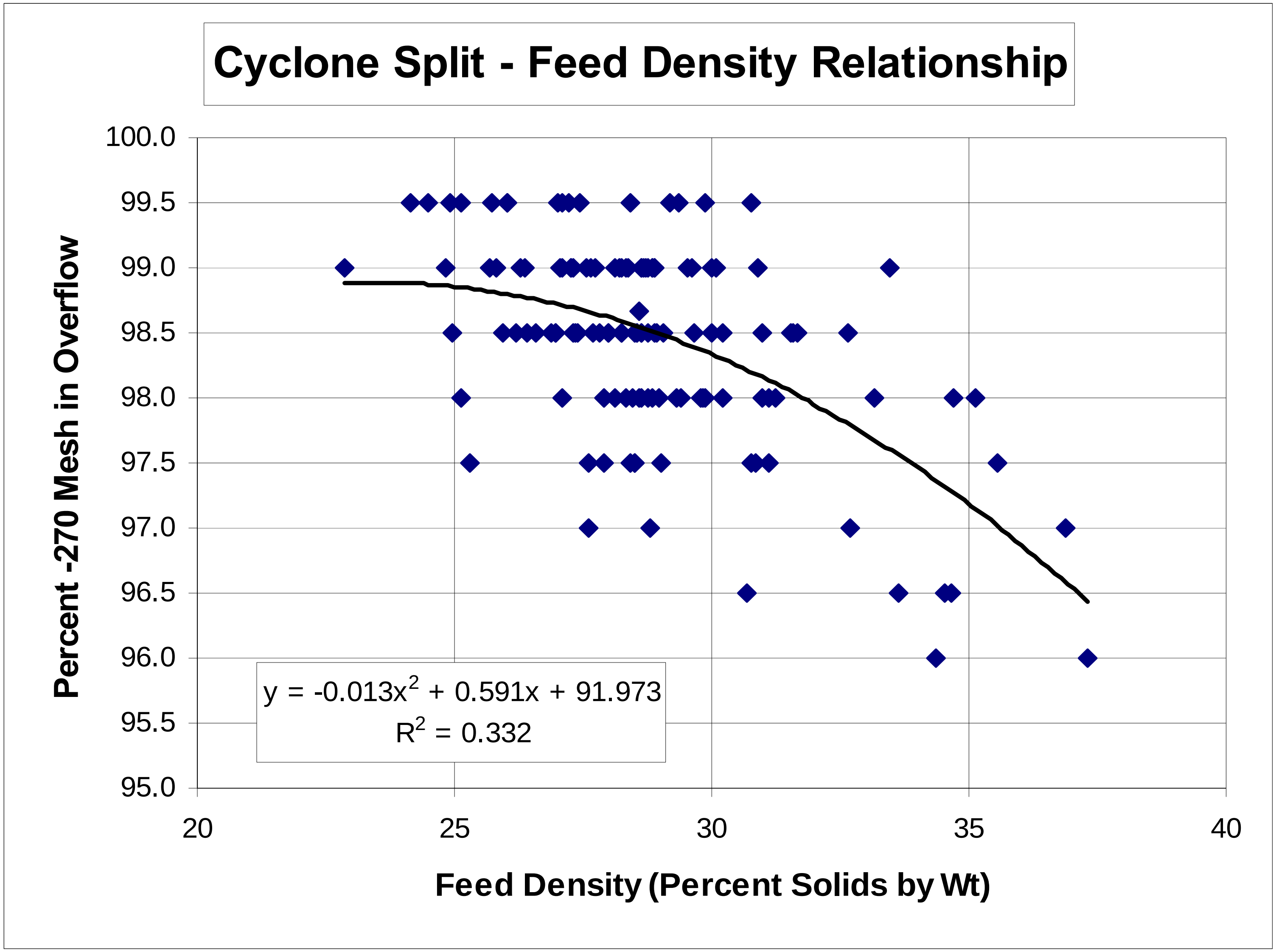
Process Flow Sheet for Step 3 Pre-classification



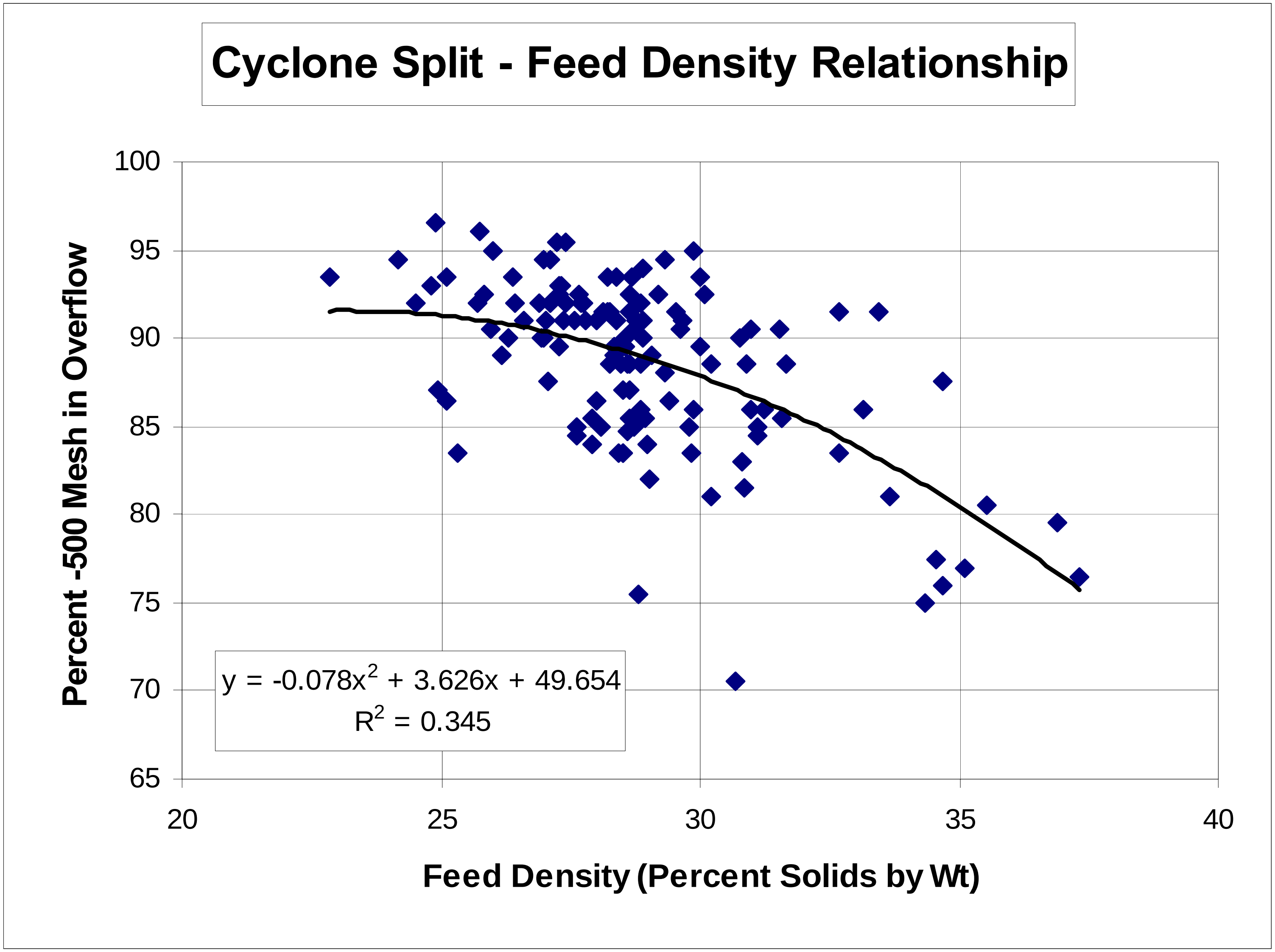
Process Flow Sheet for Steps 1&2 with Step 3 Pre-classification

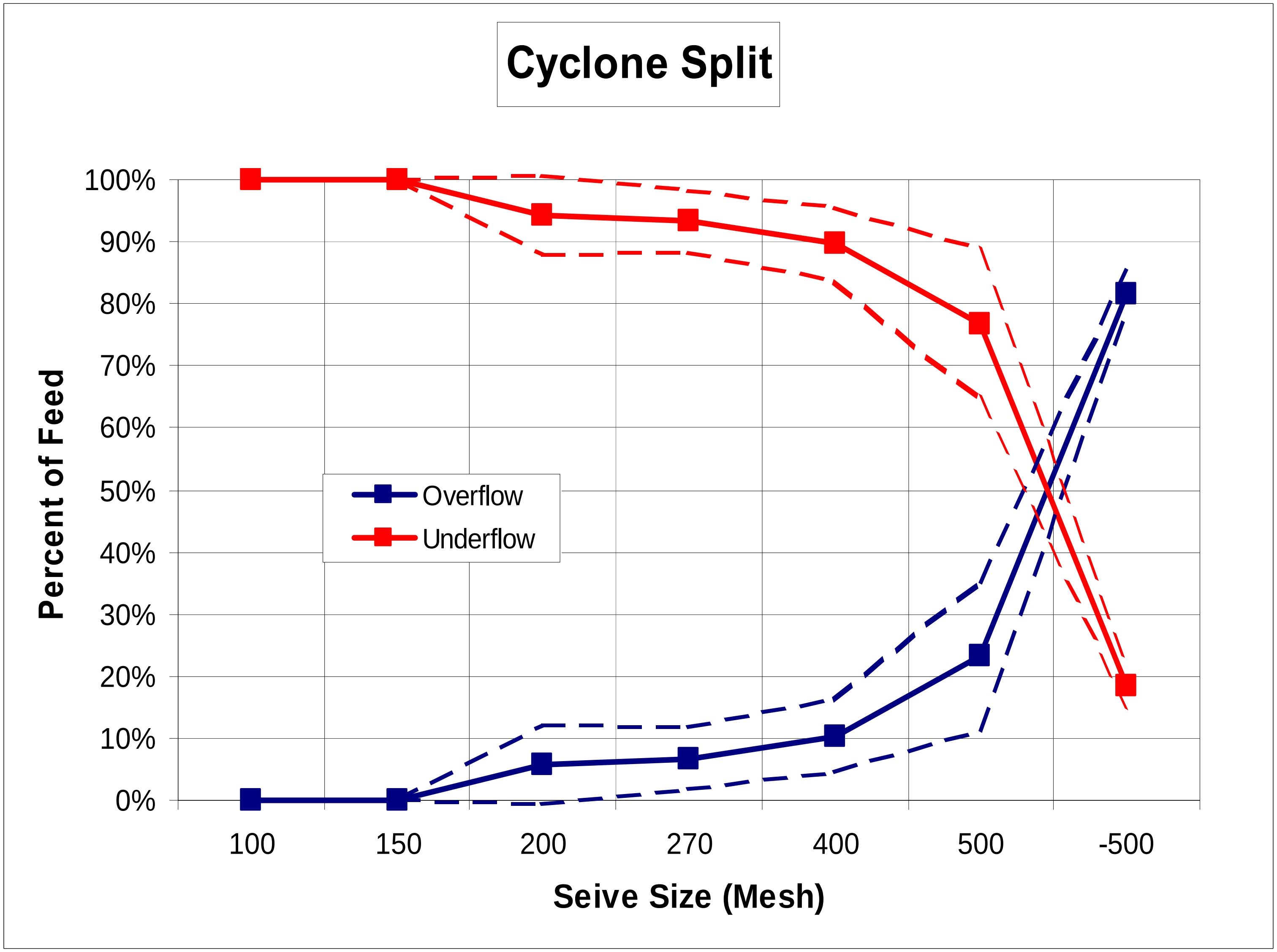


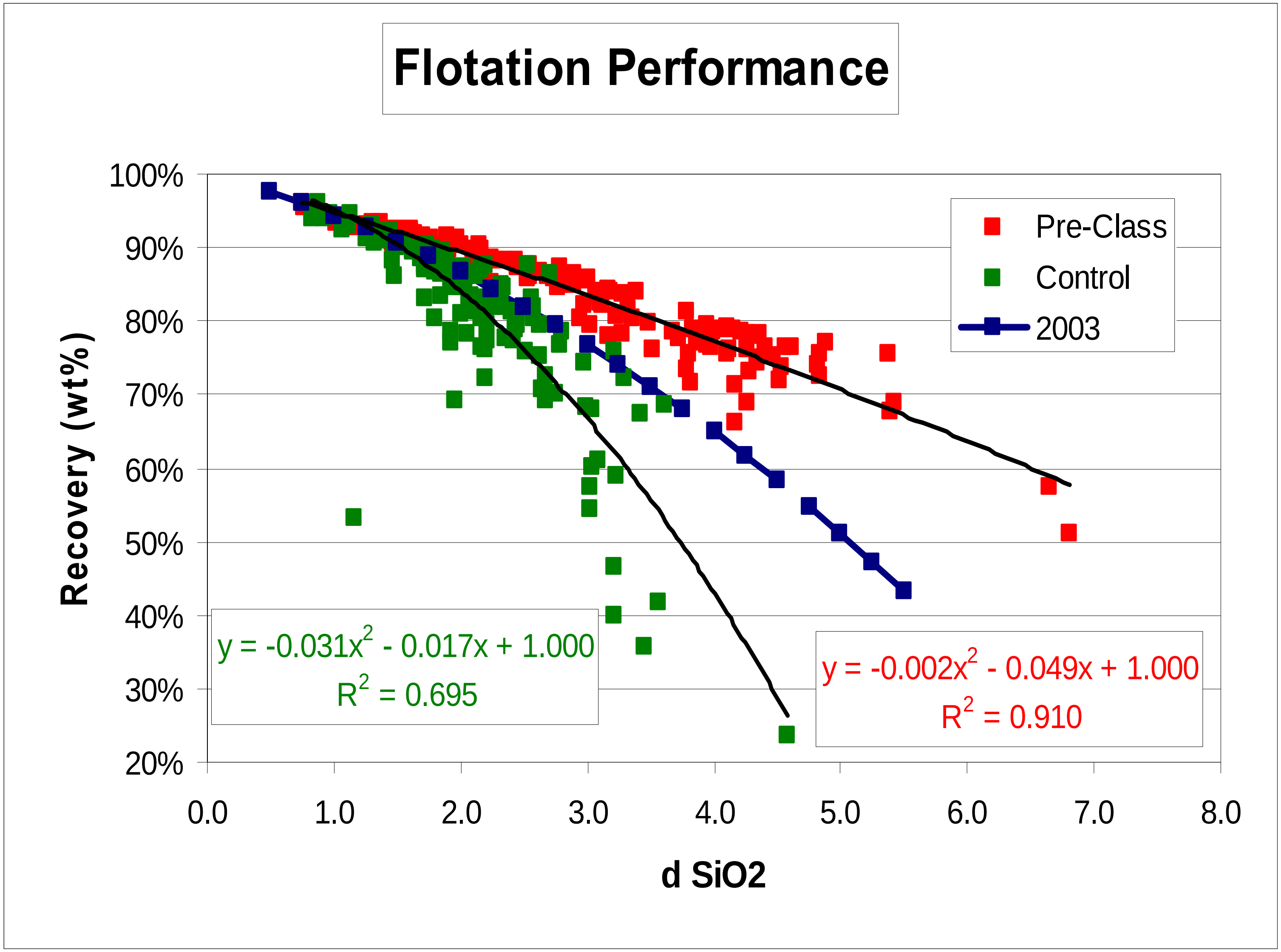

Cyclone Split - Feed Density Relationship
65%
60%
55%
50%
45%
40%
Weight Recovery to Overflow
20
25
30
35
40
Feed Density (Percent Solids by Wt)
y = 0.001x2 - 0.052x + 1.144
R2 = 0.407



Cyclone Split - Feed Density Relationship
Percent -270 Mesh in Overflow
100.0
99.5
99.0
98.5
98.0
97.5
97.0
96.5
96.0
95.5
95.0
20
25
30
35
40
Feed Density (Percent Solids by Wt)
y = -0.013x2 + 0.591x + 91.973
R2 = 0.332


Cyclone Split - Feed Density Relationship
100
95
90
85
80
75
70
65
20
25
30
35
40
Percent -500 Mesh in Overflow
Feed Density (Percent Solids by Wt)
y = -0.078x2 + 3.626x + 49.654
R2 = 0.345


Cyclone Split
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent of Feed
Overflow
Underflow
100
150
200
270
400
500
-500
Seive Size (Mesh)



Flotation Performance
Recovery (wt%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
d SiO2
Pre-Class
Control
2003
y = -0.031x2 - 0.017x + 1.000
R2 = 0.695
y = -0.002x2 - 0.049x + 1.000
R2 = 0.910

		Pre-Class Cyclone Process Values				
Test	Date	Section	Lines	Density	Cyclones	Pressure
1	18-Aug	13	13,14	34	4	22
2	19-Aug	13	13,14	36	3	
3	19-Aug	13	13,14	35	2	
4	19-Aug	13	13,14	34	4	
5	20-Aug	13	13	35	2	20
6	20-Aug	13	13	35	3	8
7	20-Aug	13	13	30	2	27
8	20-Aug	13	13	30	3	10
9	20-Aug	13	13	25	3	21
10	22-Aug	13	13	30	3	12
11	22-Aug	13	13	32	2	27
13	25-Aug	13	13,14	30	5	16
14	27-Aug	15	15,16	32	4	29
15	29-Aug	13	13,14	29	5	17
16	29-Sep	13	13,14	31	5	9
17	29-Sep	15	15,16	31	5	20
18	1-Oct	13	13,14	31	4	20
19	1-Oct	15	15,16	30	5	17
20	2-Oct	13	13,14	30	4	21
21	2-Oct	15	15,16	30	5	21
22	3-Oct	13	13,14	31	4	22
23	3-Oct	15	15,16	30	5	21
24	3-Oct	17	17,18	30	5	21
25	6-Oct	13	13,14	30	4	17
26	8-Oct	13	13,14	30	5	25
27	8-Oct	15	15,16	30	5	21
28	8-Oct	17	17,18	31	5	21
29	9-Oct	15	15,16	30	5	18
30	9-Oct	17	17,18	32	5	17
31	30-Oct	13	13,14	30	2	22
32	30-Oct	15	15,16	30	5	20
33	30-Oct	17	17,18	31	5	18
34	31-Oct	13	13,14	30	4	24
35	31-Oct	15	15,16	30	5	18
36	31-Oct	17	17,18	28	5	17
37	3-Nov	13	13,14	30	4	20
38	3-Nov	15	15,16	29	5	19
39	3-Nov	17	17,18	29	5	18
40	4-Nov	13	13,14	29	4	22
41	4-Nov	17	17,18	29	5	19
42	5-Nov	13	13,14	29	4	27
43	5-Nov	15	15,16	29	5	24
44	5-Nov	17	17,18	30	5	21
45	6-Nov	13	13,14	28	4	24
46	6-Nov	15	15,16	30	5	20
47	6-Nov	17	17,18	31	5	17
48	11-Nov	13	13,14	28	5	18

		Pre-Class Cyclone Process Values				
Test	Date	Section	Lines	Density	Cyclones	Pressure
49	11-Nov	15	15,16	32	5	23
50	11-Nov	17	17,18	30	5	22
51	12-Nov	13	13,14	26	4	19
52	12-Nov	15	15,16	28	5	23
53	12-Nov	17	17,18	27	6	19
54	13-Nov	13	13,14	26	4	20
55	13-Nov	15	15,16	28	5	22
56	13-Nov	17	17,18	27	5	26
57	17-Nov	13	13,14	30	5	16
58	17-Nov	15	15,16	29	5	23
59	17-Nov	17	17,18	30	5	23
60	18-Nov	15	15,16	30	5	21
61	18-Nov	17	17,18	27	5	25
62	19-Nov	13	13,14	32	4	21
63	19-Nov	15	15,16	26	6	18
64	19-Nov	17	17,18	26	6	22
65	20-Nov	13	13,14	26	5	20
66	20-Nov	15	15,16	27	6	20
67	24-Nov	13	13,14	30	4	22
68	24-Nov	15	15,16	29	5	16
69	24-Nov	17	17,18	30	5	21
70	25-Nov	13	13,14	34	4	15
71	25-Nov	15	15,16	30	5	16
72	25-Nov	17	17,18	27	6	17
73	1-Dec	15	15,16	31	5	17
74	2-Dec	13	13,14	29	4	24
75	2-Dec	15	15,16	30	5	13
76	3-Dec	13	13,14	30	4	22
77	3-Dec	17	17,18	27	3	16
78	4-Dec	13	13,14	27	4	24
79	4-Dec	15	15,16	27	5	19
80	4-Dec	17	17,18	29	2	20
81	5-Jan	13	13,14	28	4	21
82	5-Jan	15	15,16	29	5	18
83	5-Jan	17	17,18	29	5	21
84	14-Jan	13	13,14	28	4	20
85	14-Jan	15	16	29	3	28
86	14-Jan	17	17,18	28	5	23
87	20-Jan	13	13,14			
88	20-Jan	15	15,16			
89	20-Jan	17	17,18			
90	22-Jan	13	13,14	28	5	16
91	22-Jan	15	15,16	29	5	23
92	22-Jan	17	17,18	29	6	18
93	27-Jan	13	13,14			
94	27-Jan	15	15,16			
95	27-Jan	17	17,18			

		Pre-Class Cyclone Process Values				
Test	Date	Section	Lines	Density	Cyclones	Pressure
96	28-Jan	13	13,14			
97	28-Jan	15	15,16			
98	28-Jan	17	17,18			
99	2-Feb	15	15,16			
100	2-Feb	17	17,18			
101	5-Feb	15	15,16			
102	5-Feb	17	17,18			
103	6-Feb	15	15,16			
104	6-Feb	17	17,18			
105	9-Feb	13	13,14			
106	9-Feb	15	15,16			
107	9-Feb	17	17,18			
108	23-Feb	15	15,16	29	6	21
109	23-Feb	17	17,18	30	6	18
110	1-Mar	13	13,14	28	5	20
111	1-Mar	15	15,16	30	6	17
112	1-Mar	17	17,18	29	6	18
113	4-Mar	13	13,14	32	4	22
114	4-Mar	15	15,16	27	4	14
115	4-Mar	17	17,18	29	6	17
116	8-Mar	13	14	27	2	33
117	8-Mar	15	15,16	29	6	21
118	8-Mar	17	17,18	29	6	17
119	9-Mar	13	14	28	3	13
120	9-Mar	15	15,16	30	6	19
121	9-Mar	17	17,18	28	6	16
122	17-Mar	13	13,14	28	5	18
123	17-Mar	15	16	30	3	15
124	22-Mar	15	15,16	29	5	25
125	29-Mar	13	13,14	29	4	17
126	29-Mar	15	15	28	3	18
127	31-Mar	13	13,14	28	5	18
128	31-Mar	15	15,16	29	5	24
129	31-Mar	17	18	29	2	11
130	5-Apr	13	13,14	28	5	19
131	5-Apr	15	15,16	29	5	23
132	5-Apr	17	17,18	32	4	21

	Pre-Class Cyclone Feed - Lab Data			
Test	Silica	Density	% -270	% -500
1	5.04	34.7	92.0	62.5
2	5.47	37.3	87.5	58.0
3	5.39	36.9	89.0	59.0
4	5.41	35.6	89.0	59.0
5	5.33	34.6	84.0	54.0
6	5.32	34.7	84.0	53.5
7	5.29	30.9	84.0	54.0
8	4.38	30.8	91.5	61.5
9	4.46	24.2	89.5	60.0
10	4.71	31.0	86.5	55.5
11	4.87	33.5	86.0	55.0
13	5.34	33.2	85.5	54.5
14	5.09	32.7	84.5	53.5
15	5.40	31.7	84.0	52.5
16	5.22	31.6	88.5	56.5
17	6.17	29.3	85.5	54.5
18	7.24	34.3	80.0	49.5
19	7.08	29.6	86.5	55.0
20	5.63	31.2	86.5	53.5
21	6.05	28.9	85.5	54.5
22	5.38	29.9	83.0	52.0
23	5.72	29.2	83.0	52.5
24	6.29	29.7	83.0	51.5
25	5.68	30.8	87.0	53.0
26	5.57	29.1	83.0	52.0
27	5.65	28.7	83.0	53.0
28	5.86	28.6	83.5	52.5
29	5.32	27.2	88.0	56.0
30	5.62	30.1	87.0	54.5
31	5.95	30.7	83.5	51.0
32	6.39	28.6	84.0	50.5
33	4.89	28.5	85.5	52.0
34	6.4	30.2	79.5	50.0
35	6.65	28.9	80.5	47.5
36	5.07	27.6	92.5	74.0
37	5.69	29.4	86.0	54.0
38	6.13	28.9	81.5	52.0
39	6.06	28.8	83.0	54.0
40	5.31	30.0	84.5	54.0
41	5.53	27.9	86.0	55.0
42	5.14	29.8	83.0	53.5
43	5.4	28.4	81.0	50.5
44	5.42	28.1	84.5	54.5
45	6.18	29.0	83.0	54.0
46	6.2	27.4	85.5	54.5
47	6.4	29.0	87.0	56.5
48	5.44	28.0	83.5	53.5

	Pre-Class Cyclone Feed - Lab Data			
Test	Silica	Density	% -270	% -500
49	5.45	31.5	87.0	56.5
50	5.61	27.9	85.0	54.5
51	5.77	28.4	83.5	52.5
52	5.9	26.2	84.0	52.5
53	6.08	25.3	84.5	55.0
54	5.96	25.1	85.0	55.5
55	6.14	26.3	84.5	53.5
56	6.22	25.1	86.0	54.5
57	5.66	31.1	83.0	53.0
58	5.8	29.6	84.0	53.5
59	5.46	28.3	83.0	52.0
60	6.3	28.9	83.5	53.0
61	6.09	26.4	84.5	53.5
62	5.65	33.7	84.0	54.0
63	5.86	25.8	85.5	54.5
64	5.75	24.8	85.5	54.5
65	6.09	26.6	86.0	55.0
66	6.64	24.5	96.0	84.2
67	5.65	31.0	82.0	52.5
68	5.6	28.3	84.0	53.5
69	5.9	28.3	83.0	52.5
70	5.81	35.1	84.5	43.5
71	5.55	28.6	86.5	55.5
72	5.79	22.9	86.5	54.5
73	5.03	28.8	82.5	52.0
74	5.43	30.8	84.5	54.0
75	5.53	28.3	83.5	54.0
76	5.8	31.1	84.5	55.0
77	5.34	25.0	82.5	53.0
78	6.34	27.6	88.0	59.0
79	6.01	25.7	86.5	56.5
80	5.92	25.9	88.5	58.5
81	5.78	30.2	86.5	57.5
82				
83	6.38	28.6	85.0	55.5
84	6.26	28.6	87.0	58.5
85	6.28	27.7	89.0	59.5
86	6.36	26.0	89.5	61.5
87	5.71	28.8	87.5	58.0
88	6.06	26.4	84.5	54.0
89	6.37	27.0	86.0	55.5
90	6.29	28.6	86.5	55.0
91	6.11	27.8	85.5	56.0
92	6.2	27.1	85.5	54.5
93	5.91	29.8	84.0	52.0
94	6.03	27.4	85.5	55.0
95	5.77	27.7	85.0	55.5

	Pre-Class Cyclone Feed - Lab Data			
Test	Silica	Density	% -270	% -500
96	6.24		83.0	54.5
97	6.25		84.0	52.5
98	5.75		86.5	58.0
99	5.76	28.2	84.5	54.5
100	6.3	27.3	86.5	56.0
101	5.93	27.1	83.0	53.5
102	6.15	27.0	86.0	56.5
103	5.82	28.2	84.5	53.5
104	6.25	27.0	86.5	56.0
105	5.74	28.5	84.5	42.0
106	5.97	27.3	85.0	53.5
107	6.41	26.9	87.5	57.0
108	6.4	27.6	85.5	55.0
109	6.86	27.7	86.0	57.0
110	5.47	28.7	85.0	54.5
111	5.58	28.5	83.0	51.5
112	6	27.3	85.5	56.5
113	5.82	32.7	83.0	54.0
114	6.01	29.3	82.5	52.5
115	6.12	26.0	86.5	56.0
116	5.22	30.0	85.0	55.5
117	5.32	28.0	82.0	52.0
118	5.68	27.4	85.0	55.0
119	5.76	28.1	84.0	56.5
120	5.67	28.6	83.0	53.5
121	6.13	27.1	86.0	57.0
122	4.99	28.9	83.5	52.0
123	5.5	28.5	86.0	54.0
124	6.04	28.7	83.5	52.5
125	5.21	28.7	84.5	55.5
126	5.61	27.0	83.5	54.0
127	5.14	28.5	84.5	56.5
128	5.21	27.3	84.0	55.5
129	6.29	25.7	85.5	57.5
130	5.09	28.9	84.0	54.5
131	5.36	28.4	84.5	54.5
132	5.73	29.9	85.5	54.5

	Pre-Class Cyclone Overflow - Lab Data			
Test	Silica	Density	% -270	% -500
1	4.84	25.8	98.0	87.5
2	5.69	28.0	96.0	76.5
3	5.29	27.0	97.0	79.5
4	5.3	26.1	97.5	80.5
5	5.16	25.6	96.5	77.5
6	5.15	24.7	96.5	76.0
7	4.22	18.1	99.0	88.5
8	3.58	20.7	99.5	90.0
9	3.53	14.1	99.5	94.5
10	4.02	20.1	98.5	90.5
11	4.20	20.5	99.0	91.5
13	4.82	21.5	98.0	86.0
14	4.08	18.9	98.5	91.5
15	4.75	19.1	98.5	88.5
16	4.18	21.0	98.5	85.5
17	5.48	17.5	99.5	94.5
18	6.21	23.1	96.0	75.0
19	5.43	17.9	99.0	91.5
20	4.66	20.6	98.0	86.0
21	4.54	16.8	99.0	94.0
22	4.33	26.6	98.0	86.0
23	4.28	20.9	99.5	92.5
24	4.68	18.2	98.5	91.0
25	4.82	20.3	97.5	81.5
26	4.19	18.4	98.5	89.0
27	4.03	16.1	99.0	93.5
28	4.46	16.9	99.0	92.5
29	3.53	15.6	99.5	95.5
30	4.19	17.7	99.0	92.5
31	5.16	20.7	96.5	70.5
32	4.3	16.1	98.7	84.7
33	4.7	18.4	97.5	83.5
34	5	18.7	98.0	81.0
35	4.64	16.2	98.5	91.0
36	5.69	17.6	97.5	84.5
37	4.37	19.2	98.0	86.5
38	4.23	17.0	99.0	90.0
39	5.01	18.4	97.0	75.5
40	3.85	18.6	98.5	89.5
41	4.5	17.8	97.5	85.5
42	4.2	19.8	98.0	83.5
43	3.82	16.2	99.0	91.0
44	4.41	17.2	98.0	85.0
45	4.97	18.7	98.0	84.0
46	4.27	15.9	98.5	91.0
47	5.58	18.9	97.5	82.0
48	4.35	17.1	98.5	86.5

	Pre-Class Cyclone Overflow - Lab Data			
Test	Silica	Density	% -270	% -500
49	3.92	17.9	98.5	90.5
50	4.81	18.6	98.0	84.0
51	4.53	17.2	97.5	83.5
52	4.07	14.6	98.5	89.0
53	4.74	14.4	97.5	83.5
54	4.37	14.3	99.5	93.5
55	4.18	14.8	99.0	90.0
56	4.69	14.6	98.0	86.5
57	4.91	19.6	98.0	85.0
58	4.41	16.9	99.0	90.5
59	4.08	16.4	98.5	88.5
60	4.66	16.6	99.0	92.0
61	4.33	14.3	98.5	92.0
62	5.36	23.3	96.5	81.0
63	4.3	14.4	99.0	92.5
64	4.25	13.3	99.0	93.0
65	4.36	15.6	98.5	91.0
66	4.73	14.6	99.5	92.0
67	4.38	19.4	98.0	86.0
68	3.94	17.4	99.0	91.5
69	4.52	16.8	98.0	89.0
70	5.26	25.1	98.0	77.0
71	3.78	17.5	98.5	87.0
72	3.9	12.7	99.0	93.5
73	3.83	17.9	99.0	88.5
74	4.73	21.5	97.5	83.0
75	4.12	17.2	99.0	89.5
76	4.97	20.4	97.5	84.5
77	4.07	15.5	98.5	87.0
78	5.26	17.7	97.0	85.0
79	4.25	15.4	99.0	92.0
80	4.31	17.2	98.5	90.5
81	4.67	19.2	98.5	88.5
82	4.66	17.9	99.0	92.5
83	5.17	18.5	98.5	89.5
84	4.81	18.6	98.5	88.5
85	4.3	17.6	99.0	92.5
86	4.51	16.2	99.5	95.0
87	4.76	18.7	98.5	91.0
88	4.3	15.5	99.0	93.5
89	5.1	15.9	99.0	91.0
90	5.36	18.9	98.0	88.5
91	4.67	16.2	98.5	91.0
92	5.18	16.4	98.0	87.5
93	4.82	18.2	98.0	85.0
94	4.29	17.0	98.5	92.0
95	4.07	16.5	99.0	92.0

	Pre-Class Cyclone Overflow - Lab Data			
Test	Silica	Density	% -270	% -500
96	5.28	26.3	98.0	83.5
97	4.41	25.9	98.5	88.0
98	4.04	25.6	98.5	88.5
99	4.11	15.3	99.0	93.5
100	5.01	16.4	99.0	93.0
101	4.64	15.2	99.0	92.0
102	4.99	16.6	98.5	90.0
103	4.32	15.6	98.5	91.5
104	5.04	16.2	98.5	90.0
105	4.89	17.7	97.5	83.5
106	4.35	15.7	99.0	92.5
107	4.93	15.4	98.5	92.0
108	5.04	16.4	99.0	91.0
109	6.02	16.6	98.5	92.0
110	4.63	17.8	98.0	85.5
111	4.4	16.7	98.5	87.0
112	5.32	16.2	98.5	89.5
113	5.61	21.8	97.0	83.5
114	5.15	17.9	98.0	88.0
115	4.96	15.7	99.5	95.0
116	4.31	17.3	99.0	93.5
117	4.41	16.1	98.5	91.0
118	4.82	14.7	99.5	95.5
119	4.73	16.1	99.0	91.5
120	4.55	16.1	99.0	91.5
121	5.19	15.6	99.5	94.5
122	4.39	18.3	98.0	86.0
123	4.79	17.4	98.5	90.0
124	4.58	16.1	99.0	90.5
125	4.47	19.0	98.0	85.0
126	3.87	15.1	99.5	94.5
127	4.4	17.0	98.0	88.5
128	4.01	16.3	99.0	93.0
129	4.26	14.9	99.5	96.0
130	4.41	18.1	98.5	85.5
131	4.15	16.1	99.5	93.5
132	4.26	16.9	99.5	95.0

	Pre-Class Cyclone Underflow - Lab Data			
Test	Silica	Density	% -270	% -500
1	5.23	78.1	82.5	24.0
2	5.16	76.9	72.0	23.5
3	5.19	79.2	74.5	22.0
4	5.55	73.1	78.0	27.0
5	5.47	78.4	67.0	21.5
6	5.38	72.4	69.5	28.5
7	5.93	78.2	71.5	21.5
8	5.25	72.0	83.0	28.5
9	5.23	76.7	80.0	28.0
10	5.46	76.2	74.5	19.5
11	5.43	77.8	73.0	17.5
13	5.82	76.4	70.5	21.0
14	6.08	79.1	70.5	22.5
15	6.08	76.1	70.5	19.0
16	6.33	71.4	78.0	23.0
17	6.85	77.3	72.0	18.0
18	8.49	77.4	58.0	17.0
19	8.9	75.4	74.5	19.5
20	6.66	77.4	73.5	17.5
21	7.54	76.7	74.0	19.0
22	6.31	71.2	65.5	16.5
23	7.24	77.5	72.0	17.5
24	7.61	76.5	69.5	18.5
25	6.9	76.7	74.5	18.0
26	6.72	78.5	66.5	17.0
27	6.98	75.2	70.5	19.0
28	7.24	79.8	70.5	18.5
29	6.66	76.2	76.0	20.0
30	6.83	75.9	74.5	20.0
31	7.01	77.3	68.5	17.0
32	7.21	80.6	72.5	18.5
33	7.19	74.7	75.0	23.0
34	7.89	77.0	65.5	14.5
35	8.4	77.0	68.5	16.5
36	7.47	75.9	70.5	19.5
37	7.01	78.2	66.0	16.0
38	7.61	76.5	68.5	17.0
39	7.03	75.4	69.5	21.5
40	6.87	77.5	71.0	18.0
41	6.64	74.8	73.0	21.5
42	6.18	78.4	67.5	16.5
43	6.64	77.0	66.5	16.5
44	6.56	75.4	70.5	19.5
45	7.15	77.6	68.5	18.5
46	7.97	76.3	72.5	18.0
47	7.5	73.2	74.5	23.5
48	6.7	77.1	69.0	18.0

	Pre-Class Cyclone Underflow - Lab Data			
Test	Silica	Density	% -270	% -500
49	7.06	73.2	76.0	20.0
50	6.84	75.9	71.5	21.0
51	6.93	76.8	71.5	19.5
52	7.45	77.4	72.0	20.0
53	7.4	74.5	73.0	22.5
54	7.41	77.3	72.0	21.0
55	3.75	77.0	73.0	20.0
56	7.5	75.7	75.5	21.0
57	6.43	76.8	68.5	19.0
58	6.92	77.0	71.5	19.0
59	6.6	76.6	70.5	18.5
60	7.78	77.6	69.5	18.0
61	7.85	73.2	73.0	21.5
62	6.13	77.8	70.0	19.0
63	7.32	75.7	74.5	21.5
64	7.15		75.0	22.0
65	7.57	76.1	74.5	21.0
66	8.62	74.4	79.5	23.5
67	6.75	77.4	65.0	17.0
68	7.03	77.3	70.0	18.5
69	7.2	76.3	69.5	19.0
70	6.62	76.0	66.5	20.0
71	7.43	75.1	74.5	20.0
72	7.37	75.3	76.5	25.0
73	6.09	77.0	67.5	16.0
74	6.25	77.1	68.0	18.0
75	6.9	74.7	69.0	18.5
76	6.7	77.3	68.0	19.5
77	6.43	73.3	68.5	20.5
78	7.65	75.9	74.5	21.0
79	7.84	73.7	74.0	20.0
80	7.78	74.1	77.0	21.0
81	7.11	76.0	73.0	20.5
82	7.7	75.8	70.5	19.5
83	7.7	75.8	71.0	20.0
84	7.98	76.9	72.5	20.5
85	8.53	76.5	78.0	21.5
86	8.49	75.2	79.5	24.5
87	6.87	77.7	76.0	20.5
88	7.48	77.4	71.0	17.5
89	7.48	75.0	73.0	20.0
90	7.26	75.0	74.0	22.5
91	7.58	75.9	71.5	17.0
92	7.23	74.5	72.5	20.5
93	7.04	76.9	70.0	20.0
94	7.45	76.3	72.5	20.0
95	7.48	75.4	72.5	20.0

	Pre-Class Cyclone Underflow - Lab Data			
Test	Silica	Density	% -270	% -500
96	7.15	76.1	69.5	21.0
97	7.99	75.1	72.5	19.0
98	7.49	74.6	73.5	20.5
99	7.02	74.6	72.5	22.0
100	7.52	76.5	73.5	21.0
101	7.14	74.8	71.0	21.5
102	7.08	73.4	75.0	23.5
103	7.25	73.9	71.5	21.5
104	7.38	75.2	73.5	21.5
105	6.74	76.2	70.0	19.5
106	7.33	76.6	73.0	20.0
107	7.85	74.6	76.5	21.5
108	7.72	76.4	73.0	22.0
109	7.71	76.0	73.5	23.0
110	6.22	77.0	70.5	19.0
111	6.57	76.4	70.0	19.0
112	6.83	76.0	73.0	23.5
113	6.14	78.2	66.0	19.5
114	6.74	76.8	67.5	19.0
115	7.3	76.3	75.0	23.0
116	6.05	78.7	70.5	19.5
117	6.03	77.8	69.5	19.5
118	6.52	77.3	73.5	23.5
119	6.59	76.4	70.5	22.5
120	6.62	77.6	70.5	21.0
121	7.03	76.8	74.0	23.0
122	5.62	76.8	69.0	21.0
123	6.3	75.8	73.0	20.5
124	7.28	77.6	68.5	17.5
125	5.98	76.6	70.0	22.0
126	6.71	76.5	70.5	18.5
127	5.99	76.7	68.5	22.0
128	6.28	77.6	69.5	19.0
129	7.92	77.7	74.0	23.0
130	5.86	76.5	69.5	20.5
131	6.39	77.3	72.0	20.0
132	6.83	79.1	73.5	20.0

	Pre-Class Cleaner Concentrate - Lab Data			
Test	Silica	Density	% -270	% -500
1	4.51	58.5	98.0	86.5
2	5.13	52.1	96.5	76.5
3	4.98	49.6	97.0	80.0
4	4.86	46.6	97.0	79.0
5	4.58	58.9	97.0	79.0
6	4.74	58.9	96.0	74.0
7	3.75	54.5	99.0	88.0
8	3.3	55.0	99.0	90.0
9	2.99	52.5	99.5	96.0
10	3.43	42.7	98.5	89.5
11	3.70	43.0	98.5	86.0
13	4.25	58.9	98.0	84.4
14	3.73	44.5	97.5	83.5
15	4.05	58.7	98.6	87.6
16	3.47	57.5	99.0	86.5
17	3.83	55.0	99.5	92.5
18	5.26	58.3	97.0	76.5
19	4.43	55.2	99.0	90.0
20	3.99	58.9	98.0	85.0
21	3.66	55.4	99.0	88.5
22	3.63	58.8	98.5	87.0
23	3.29	54.7	99.5	91.0
24	3.64	57.6	99.0	86.0
25	4.23	58.6	97.5	75.5
26	3.6	57.9	98.5	88.0
27	3.25	55.5	99.0	92.0
28	3.3	56.9	98.5	89.0
29	3.08	55.4	99.5	94.5
30	3.37	58.8	99.5	92.0
31	4.77	58.7	96.5	69.0
32	3.46	55.1	98.5	81.5
33	4.06	58.3	98.0	83.0
34	4.3	57.6	97.5	80.5
35	3.85			
36	4.66	56.7	98.0	86.0
37	3.98	58.1	98.0	86.5
38	3.6	55.1	98.0	82.0
39	4.19	58.7	98.0	84.0
40	3.55	58.1	98.5	87.5
41	3.82	58.2	97.5	82.5
42	3.54	58.7	98.0	83.5
43	3.03	55.3	98.5	90.0
44	3.66	57.9	98.0	84.5
45	4.23	58.7	98.0	87.5
46	3.75	54.0	99.0	91.5
47	4.67	57.5	97.5	81.5
48	3.66	58.9	98.0	83.0

	Pre-Class Cleaner Concentrate - Lab Data			
Test	Silica	Density	% -270	% -500
49	3.6	56.2	98.5	86.5
50	3.82	59.0	97.5	80.0
51	3.73	58.8	98.0	87.5
52	3.08	55.6	99.0	92.0
53	3.76	58.9	97.5	82.0
54	3.63	58.2	98.5	91.5
55	3.43	54.1	98.5	88.0
56	3.77	58.5	97.5	83.5
57	3.79	58.6	97.5	82.5
58	3.29	55.2	98.5	89.5
59	3.29	58.2	98.5	85.0
60	3.54	55.9	98.0	86.0
61	3.49	57.6	98.5	89.0
62	4.58	59.1	97.0	80.0
63	3.4	54.7	99.5	92.5
64	3.29	43.5	99.0	91.0
65	3.71	58.5	98.5	90.0
66	3.69	52.4	99.5	94.5
67	3.86	58.8	97.5	83.5
68	3.22	55.4	98.5	89.5
69	3.59	56.8	98.0	87.5
70	4.66	58.7	95.5	76.5
71	3.3	55.0	98.5	86.5
72	3.1	56.7	99.0	92.5
73	3.22	54.1	98.0	83.5
74	4.2	57.3	97.5	83.5
75	3.66	55.2	98.0	82.0
76	4.35	57.7	97.0	82.0
77	3.35	54.2	98.0	85.5
78	4.61	57.0	97.0	82.5
79	3.89	54.1	99.0	91.0
80	3.89	54.5	98.0	86.0
81	4.03	58.1	98.5	89.0
82	3.73	54.7	99.0	92.0
83	4.35	56.2	98.5	86.5
84	4.26	57.1	98.5	88.5
85	3.71	52.7	99.0	93.5
86	3.81	57.3	99.5	94.5
87	4.01	57.8	98.5	90.5
88	3.66	54.9	98.5	93.0
89	3.96	55.9	98.5	90.5
90	4.55	57.2	98.0	87.0
91	3.91	54.8	98.5	87.5
92	4.07	56.2	98.0	88.5
93	4.22	58.6	98.0	85.5
94	3.47	54.8	98.5	91.5
95	3.48	55.7	98.5	90.0

	Pre-Class Cleaner Concentrate - Lab Data			
Test	Silica	Density	% -270	% -500
96	4.38	57.9	98.0	82.5
97	3.7	55.3	98.5	88.5
98	3.49	54.0	99.0	87.0
99	3.47	55.7	98.5	92.0
100	3.86	55.3	99.0	93.0
101	3.35	55.3	98.5	90.0
102	3.65	56.7	98.5	88.5
103	3.39	55.7	98.5	91.5
104	3.73	57.6	98.5	89.5
105	4.28	58.7	97.5	82.5
106	3.41	55.7	98.5	91.5
107	3.79	56.2	98.5	88.5
108	4.07	52.6	99.0	90.5
109	4.39	56.7	98.5	89.0
110	3.88	54.8	98.0	81.0
111	3.61	55.4	98.5	86.0
112	4.1	57.0	98.0	87.0
113	4.59	58.5	97.5	83.0
114	3.91	59.9	98.5	90.0
115	3.95	56.8	98.5	92.5
116	3.44	56.9	99.0	91.5
117	3.43	55.6	99.0	91.5
118	3.59	57.1	98.5	93.5
119	3.84	60.1	99.0	90.0
120	3.6	56.0	98.5	91.0
121	3.84	56.3	98.5	91.0
122	3.86	58.4	98.0	85.5
123	3.8	55.1	99.0	88.5
124	3.68	56.1	98.5	86.0
125	3.69	58.3	98.0	86.5
126	3.14	55.8	99.0	87.5
127	3.77	56.9	98.0	86.0
128	3.27	53.0	99.0	92.5
129	3.31	52.7	99.5	94.0
130	3.7	58.1	95.8	86.5
131	3.37	55.3	99.0	92.0
132	3.89	55.3	97.0	88.5

	Pre-Class Cyclone Weight Recovery to Overflow				
Test	Silica	Solids	% -270	% -500	Average
1		61.8%	61.3%	60.6%	61.2%
2	58.5%	60.6%	64.6%	65.1%	62.2%
3		59.3%	64.4%	64.3%	62.7%
4	56.0%	58.6%	56.4%	59.8%	57.7%
5		61.4%	57.6%	58.0%	59.0%
6		56.3%	53.7%	52.6%	54.2%
7		46.0%	45.5%	48.5%	46.7%
8	52.1%	54.2%	51.5%	53.7%	52.9%
9	45.3%	48.8%	48.7%	48.1%	47.7%
10	52.1%	52.2%	50.0%	50.7%	51.2%
11	45.5%	47.4%	50.0%	50.7%	48.4%
13	48.0%	51.0%	54.5%	51.5%	51.3%
14	49.5%	44.5%	50.0%	44.9%	47.2%
15	51.1%	46.9%	48.2%	48.2%	48.6%
16	51.6%	52.7%	51.2%	53.6%	52.3%
17	49.6%	47.9%	49.1%	47.7%	48.6%
18	54.8%	53.3%	57.9%	56.0%	55.5%
19	52.4%	48.4%	49.0%	49.3%	49.8%
20	51.5%	53.7%	53.1%	52.6%	52.7%
21	49.7%	46.2%	46.0%	47.3%	47.3%
22	47.0%		53.8%	51.1%	50.6%
23	51.4%		40.0%	46.7%	46.0%
24	45.1%	49.3%	46.6%	45.5%	46.6%
25		53.6%	54.3%	55.1%	54.4%
26	45.5%	52.0%	51.6%	48.6%	49.4%
27	45.1%	44.2%	43.9%	45.6%	44.7%
28	49.6%	48.0%	45.6%	45.9%	47.3%
29	42.8%	46.2%	51.1%	47.7%	46.9%
30	45.8%	46.4%	51.0%	47.6%	47.7%
31	57.3%	55.8%	53.6%	63.6%	57.5%
32		45.2%	43.9%	48.4%	45.8%
33		52.8%	46.7%	47.9%	49.1%
34	51.6%	49.6%	43.1%	53.4%	49.4%
35	46.5%	44.3%	40.0%	41.6%	43.1%
36					
37	50.0%	53.8%		53.9%	52.6%
38	43.8%	46.8%	42.6%	47.9%	45.3%
39	48.0%	52.2%	49.1%		49.8%
40	51.7%	49.9%	49.1%	50.3%	50.3%
41	51.9%	52.4%	53.1%	52.3%	52.4%
42	52.5%	54.8%	50.8%	55.2%	53.4%
43	44.0%	45.6%	44.6%	45.6%	45.0%
44	53.0%	49.8%	50.9%	53.4%	51.8%
45	44.5%	53.2%	49.2%	54.2%	50.3%
46	47.8%	47.2%	50.0%	50.0%	48.7%
47	57.3%	52.9%	54.3%	56.4%	55.2%
48	53.6%	49.8%	49.2%	51.8%	51.1%

	Pre-Class Cyclone Weight Recovery to Overflow				
Test	Silica	Solids	% -270	% -500	Average
49	51.3%	42.9%	48.9%	51.8%	48.7%
50	60.6%	55.9%	50.9%	53.2%	55.2%
51	48.3%	49.2%	46.2%	51.6%	48.8%
52	45.9%	45.3%	45.3%	47.1%	45.9%
53	49.6%	46.6%	46.9%	53.3%	49.1%
54	47.7%	47.0%	47.3%	47.6%	47.4%
55		45.9%	44.2%	47.9%	46.0%
56	45.6%	48.3%	46.7%	51.1%	47.9%
57	50.7%	50.4%	49.2%	51.5%	50.4%
58	44.6%	45.1%	45.5%	48.3%	45.9%
59	45.2%	46.4%	44.6%	47.9%	46.0%
60	47.4%	45.9%	47.5%	47.3%	47.0%
61	50.0%	42.9%	45.1%	45.4%	45.9%
62	62.3%	56.2%	52.8%	56.5%	57.0%
63	48.3%	45.3%	44.9%	46.5%	46.3%
64	48.3%		43.8%	45.8%	45.9%
65	46.1%	47.8%	47.9%	48.6%	47.6%
66	50.9%	49.7%			50.3%
67	46.4%	50.1%	51.5%	51.4%	49.9%
68	46.3%	50.3%	48.3%	47.9%	48.2%
69	48.5%	47.8%	47.4%	47.9%	47.9%
70	59.6%	57.3%	57.1%	41.2%	53.8%
71	51.5%	49.1%	50.0%	53.0%	50.9%
72	45.5%	46.4%	44.4%	43.1%	44.9%
73	46.9%	50.6%	47.6%	49.7%	48.7%
74	53.9%	58.1%	55.9%	55.4%	55.8%
75	49.3%	48.9%	48.3%	50.0%	49.1%
76	52.0%	53.4%	55.9%	54.6%	54.0%
77	46.2%	52.0%	46.7%	48.9%	48.4%
78	54.8%	53.0%	60.0%	59.4%	56.8%
79	51.0%	49.4%	50.0%	50.7%	50.3%
80	53.6%	56.2%	53.5%	54.0%	54.3%
81	54.5%	51.4%	52.9%	54.4%	53.3%
82					
83	52.2%	53.4%	50.9%	51.1%	51.9%
84	54.3%	53.7%	55.8%	55.9%	54.9%
85	53.2%	52.7%	52.4%	53.5%	52.9%
86	53.5%	52.0%	50.0%	52.5%	52.0%
87	55.0%	53.8%	51.1%	53.2%	53.3%
88	44.7%	48.6%	48.2%	48.0%	47.4%
89	46.6%	47.8%	50.0%	50.0%	48.6%
90	51.1%	54.5%	52.1%	49.2%	51.7%
91	50.5%	47.1%	51.9%	52.7%	50.5%
92	50.2%	49.5%	51.0%	50.7%	50.4%
93	50.9%	49.0%	50.0%	49.2%	49.8%
94	44.9%	51.1%	50.0%	48.6%	48.7%
95	50.1%	48.1%	47.2%	49.3%	48.7%

	Pre-Class Cyclone Weight Recovery to Overflow				
Test	Silica	Solids	% -270	% -500	Average
96	48.7%		47.4%	53.6%	49.9%
97	48.6%		44.2%	48.6%	47.1%
98	50.4%		52.0%	55.1%	52.5%
99	43.3%	42.3%	45.3%	45.5%	44.1%
100	48.6%	49.1%	51.0%	48.6%	49.3%
101	48.4%	44.7%	42.9%	45.4%	45.3%
102	44.5%	50.5%	46.8%	49.6%	47.9%
103	48.8%	43.3%	48.1%	45.7%	46.5%
104	48.3%	49.0%	52.0%	50.4%	49.9%
105	54.1%	50.7%	52.7%		52.5%
106	45.6%	46.8%	46.2%	46.2%	46.2%
107	49.3%	46.3%	50.0%	50.4%	49.0%
108	49.3%	48.4%	48.1%	47.8%	48.4%
109	50.3%	48.6%	50.0%	49.3%	49.5%
110	47.2%	50.6%	52.7%	53.4%	51.0%
111	45.6%	47.0%	45.6%	47.8%	46.5%
112	55.0%	48.2%	49.0%	50.0%	50.5%
113	60.4%	53.9%	54.8%	53.9%	55.8%
114	45.9%	49.1%	49.2%	48.6%	48.2%
115	50.4%	50.0%	46.9%	45.8%	48.3%
116	47.7%	45.7%	50.9%	48.6%	48.2%
117	43.8%	46.3%	43.1%	45.5%	44.7%
118	49.4%	42.9%	44.2%	43.8%	45.1%
119	44.6%	45.7%	47.4%	49.3%	46.7%
120	45.9%	44.6%	43.9%	46.1%	45.1%
121	48.9%	46.9%	47.1%	47.6%	47.6%
122	51.2%	52.1%	50.0%	47.7%	50.3%
123	53.0%	49.3%	51.0%	48.2%	50.4%
124	45.9%	44.5%	49.2%	47.9%	46.9%
125	51.0%	54.8%	51.8%	53.2%	52.7%
126	38.7%	45.2%	44.8%	46.7%	43.9%
127	53.5%	48.1%	54.2%	51.9%	51.9%
128	47.1%	48.9%	49.2%	49.3%	48.6%
129	44.5%	47.9%	45.1%	47.3%	46.2%
130	53.1%	51.0%	50.0%	52.3%	51.6%
131	46.0%	45.3%	45.5%	46.9%	45.9%
132	42.8%	44.8%	46.2%	46.0%	44.9%

Feed Size Distribution - Percent Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
1	99.5	99.0	97.5	92.0	78.0	62.5
2	100.0	99.5	97.0	87.5	72.0	58.0
3	100.0	99.5	97.5	89.0	72.5	59.0
4	99.5	99.0	97.0	89.0	73.0	59.0
5	99.5	98.5	95.0	84.0	68.0	54.0
6	99.5	98.5	95.0	84.0	68.0	53.5
7	99.5	98.5	95.0	84.0	68.0	54.0
8	100.0	99.5	98.0	91.5	76.5	61.5
9	100.0	99.5	97.5	89.5	73.5	60.0
10	99.5	99.0	96.5	86.5	71.0	55.5
11	99.5	99.0	96.5	86.0	70.0	55.0
13	100.0	99.0	96.0	85.5	69.0	54.5
14	99.5	99.0	96.0	84.5	66.5	53.5
15	99.5	99.0	95.0	84.0	67.0	52.5
16	100.0	99.5	97.0	88.5	71.0	56.5
17	100.0	99.5	96.5	85.5	68.0	54.5
18	99.0	97.5	91.5	80.0	63.5	49.5
19	100.0	99.5	96.0	86.5	70.0	55.0
20	100.0	99.0	96.0	86.5	69.0	53.5
21	100.0	99.0	96.0	85.5	69.0	54.5
22	99.5	98.5	95.0	83.0	66.0	52.0
23	100.0	99.0	95.5	83.0	65.5	52.5
24	99.5	98.5	94.5	83.0	66.5	51.5
25	99.5	99.0	96.0	87.0	69.5	53.0
26	100.0	99.0	95.5	83.0	65.5	52.0
27	99.5	98.5	95.0	83.0	66.0	53.0
28	99.5	98.5	95.0	83.5	66.5	52.5
29	100.0	99.5	97.0	88.0	70.0	56.0
30	100.0	99.5	96.5	87.0	68.5	54.5
31	99.5	98.5	94.5	83.5	66.0	51.0
32	100.0	99.0	95.0	84.0	66.5	50.5
33	99.5	98.5	95.0	85.5	68.5	52.0
34	99.5	98.5	93.0	79.5	64.0	50.0
35	99.5	98.5	93.0	80.5	62.0	47.5
36	99.5	99.0	97.0	92.5	83.5	74.0
37	99.5	98.5	95.0	86.0	68.5	54.0
38	99.5	98.5	94.5	81.5	65.0	52.0
39	99.5	99.0	95.0	83.0	67.0	54.0
40	100.0	99.0	95.5	84.5	67.5	54.0
41	99.5	98.5	95.5	86.0	69.0	55.0
42	99.5	98.5	94.5	83.0	67.0	53.5
43	99.5	98.5	93.5	81.0	64.5	50.5
44	99.5	99.0	95.5	84.5	68.0	54.5
45	99.5	98.5	93.5	83.0	67.5	54.0
46	100.0	99.0	95.5	85.5	69.0	54.5
47	100.0	99.0	96.0	87.0	70.5	56.5
48	99.5	99.0	95.0	83.5	68.0	53.5

Feed Size Distribution - Percent Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
49	99.5	99.0	96.0	87.0	71.5	56.5
50	99.5	99.0	95.5	85.0	69.0	54.5
51	99.5	98.5	94.5	83.5	67.0	52.5
52	99.5	98.5	94.5	84.0	67.0	52.5
53	99.5	98.5	95.0	84.5	67.0	55.0
54	99.5	99.0	95.5	85.0	69.5	55.5
55	99.5	98.5	95.0	84.5	67.0	53.5
56	100.0	99.0	96.0	86.0	68.5	54.5
57	99.5	98.5	94.5	83.0	66.0	53.0
58	99.5	98.5	95.0	84.0	67.5	53.5
59	99.5	98.5	94.5	83.0	66.0	52.0
60	99.5	98.5	94.5	83.5	66.5	53.0
61	99.5	98.5	95.0	84.5	67.5	53.5
62	99.5	98.5	94.5	84.0	67.5	54.0
63	100.0	99.0	95.5	85.5	69.0	54.5
64	100.0	99.0	95.5	85.5	68.0	54.5
65	100.0	99.0	95.5	86.0	68.5	55.0
66	100.0	99.8	98.8	96.0	89.6	84.2
67	99.5	98.5	94.0	82.0	66.0	52.5
68	99.5	98.5	95.0	84.0	67.5	53.5
69	99.5	98.5	94.5	83.0	66.0	52.5
70	100.0	99.0	95.0	84.5	57.5	43.5
71	99.5	98.5	95.5	86.5	70.0	55.5
72	99.5	99.0	96.0	86.5	69.5	54.5
73	99.5	98.5	94.5	82.5	66.0	52.0
74	100.0	99.0	95.5	84.4	68.0	54.0
75	100.0	99.0	95.0	83.5	67.0	54.0
76	99.5	99.0	95.0	84.5	68.5	55.0
77	99.5	98.5	94.0	82.5	66.5	53.0
78	100.0	99.5	96.5	88.0	72.5	59.0
79	99.5	99.0	96.0	86.5	70.0	56.5
80	100.0	99.5	96.5	88.5	73.0	58.5
81	99.5	99.0	96.0	86.5	71.5	57.5
82						
83	100.0	99.0	95.5	85.0	68.5	55.5
84	100.0	99.0	95.5	87.0	73.0	58.5
85	100.0	99.5	96.5	89.0	74.5	59.5
86	99.5	99.0	96.5	89.5	76.0	61.5
87	100.0	99.0	96.0	87.5	72.0	58.0
88	99.5	99.0	95.0	84.5	68.5	54.0
89	100.0	99.5	96.0	86.0	70.0	55.5
90	100.0	99.5	96.0	86.5	69.5	55.0
91	99.5	99.0	95.5	85.5	69.5	56.0
92	100.0	99.5	96.0	85.5	69.0	54.5
93	99.5	99.0	95.0	84.0	67.5	52.0
94	99.5	99.0	95.5	85.5	70.0	55.0
95	99.5	99.0	95.5	85.0	69.0	55.5

Feed Size Distribution - Percent Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
96	99.5	98.5	94.5	83.0	68.0	54.5
97	99.5	98.5	95.0	84.0	68.0	52.5
98	100.0	99.5	96.5	86.5	70.5	58.0
99	99.5	98.5	94.5	84.5	68.5	54.5
100	100.0	99.5	96.0	86.5	70.0	56.0
101	99.5	98.5	94.0	83.0	67.0	53.5
102	100.0	99.0	95.5	86.0	70.5	56.5
103	99.5	99.0	95.0	84.5	68.0	53.5
104	99.5	99.0	95.5	86.5	70.0	56.0
105	99.5	99.0	95.0	84.5	57.0	42.0
106	99.5	99.0	95.5	85.0	68.5	53.5
107	99.5	99.0	96.0	87.5	72.0	57.0
108	99.5	99.0	95.5	85.5	69.5	55.0
109	100.0	99.5	96.0	86.0	70.0	57.0
110	100.0	99.5	96.0	85.0	69.0	54.5
111	99.5	99.0	95.0	83.0	66.0	51.5
112	100.0	99.5	96.0	85.5	70.0	56.5
113	100.0	99.0	94.5	83.0	67.5	54.0
114	99.5	98.5	94.0	82.5	66.5	52.5
115	100.0	99.0	96.0	86.5	70.5	56.0
116	99.5	99.0	95.5	85.0	69.5	55.5
117	99.5	98.5	94.5	82.0	65.5	52.0
118	100.0	99.5	96.5	85.0	69.0	55.0
119	99.5	99.0	95.0	84.0	69.5	56.5
120	99.5	99.0	95.0	83.0	67.5	53.5
121	99.5	99.0	96.0	86.0	71.0	57.0
122	99.5	99.0	95.0	83.5	66.0	52.0
123	99.5	99.0	96.0	86.0	67.5	54.0
124	99.5	99.0	95.5	83.5	66.5	52.5
125	99.5	99.0	95.0	84.5	69.0	55.5
126	99.5	99.0	95.5	83.5	67.5	54.0
127	100.0	99.5	95.5	84.5	69.5	56.5
128	100.0	99.5	95.5	84.0	69.0	55.5
129	100.0	99.5	95.5	85.5	70.5	57.5
130	99.5	99.0	95.0	84.0	68.0	54.5
131	99.5	99.0	95.5	84.5	68.5	54.5
132	100.0	99.5	96.0	85.5	69.0	54.5

Overflow Size Distribution - Percent Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
1	100.0	100.0	99.5	98.0	95.0	87.5
2	100.0	100.0	98.5	96.0	89.5	76.5
3	100.0	100.0	99.0	97.0	91.5	79.5
4	100.0	100.0	99.5	97.5	92.5	80.5
5	100.0	100.0	99.0	96.5	91.5	77.5
6	100.0	100.0	99.0	96.5	90.5	76.0
7	100.0	100.0	100.0	99.0	95.5	88.5
8	100.0	100.0	100.0	99.5	96.5	90.0
9	100.0	100.0	100.0	99.5	98.5	94.5
10	100.0	100.0	99.5	98.5	96.0	90.5
11	100.0	100.0	99.5	99.0	96.5	91.5
13	100.0	100.0	99.5	98.0	95.0	86.0
14	100.0	100.0	99.5	98.5	95.5	91.5
15	100.0	100.0	99.5	98.5	95.5	88.5
16	100.0	100.0	99.5	98.5	95.0	85.5
17	100.0	100.0	100.0	99.5	98.0	94.5
18	100.0	100.0	99.0	96.0	89.5	75.0
19	100.0	100.0	99.5	99.0	96.5	91.5
20	100.0	100.0	99.5	98.0	95.0	86.0
21	100.0	100.0	100.0	99.0	97.5	94.0
22	100.0	100.0	99.5	98.0	95.5	86.0
23	100.0	100.0	100.0	99.5	97.5	92.5
24	100.0	100.0	99.5	98.5	96.0	91.0
25	100.0	100.0	99.5	97.5	93.0	81.5
26	100.0	100.0	99.5	98.5	95.5	89.0
27	100.0	100.0	99.5	99.0	97.5	93.5
28	100.0	100.0	100.0	99.0	97.0	92.5
29	100.0	100.0	100.0	99.5	98.0	95.5
30	100.0	100.0	99.5	99.0	97.0	92.5
31	100.0	100.0	99.0	96.5	89.0	70.5
32	100.0	100.0	100.0	98.7	95.3	84.7
33	100.0	100.0	99.5	97.5	93.5	83.5
34	100.0	100.0	99.5	98.0	93.5	81.0
35	100.0	100.0	99.5	98.5	96.0	91.0
36	100.0	100.0	99.5	97.5	93.5	84.5
37	100.0	100.0	99.5	98.0	95.0	86.5
38	100.0	100.0	100.0	99.0	96.0	90.0
39	100.0	100.0	99.5	97.0	90.5	75.5
40	100.0	100.0	99.5	98.5	95.5	89.5
41	100.0	100.0	99.5	97.5	93.0	85.5
42	100.0	100.0	99.5	98.0	94.0	83.5
43	100.0	100.0	100.0	99.0	96.5	91.0
44	100.0	100.0	99.5	98.0	94.0	85.0
45	100.0	100.0	99.5	98.0	94.0	84.0
46	100.0	100.0	99.5	98.5	96.0	91.0
47	100.0	100.0	99.5	97.5	92.0	82.0
48	100.0	100.0	100.0	98.5	95.0	86.5

Overflow Size Distribution - Percent Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
49	100.0	100.0	99.5	98.5	95.5	90.5
50	100.0	100.0	99.5	98.0	93.5	84.0
51	100.0	100.0	99.5	97.5	94.0	83.5
52	100.0	100.0	100.0	98.5	96.0	89.0
53	100.0	100.0	99.5	97.5	93.0	83.5
54	100.0	100.0	100.0	99.5	97.5	93.5
55	100.0	100.0	100.0	99.0	96.5	90.0
56	100.0	100.0	99.5	98.0	94.5	86.5
57	100.0	100.0	99.5	98.0	94.0	85.0
58	100.0	100.0	100.0	99.0	96.5	90.5
59	100.0	100.0	99.5	98.5	95.0	88.5
60	100.0	100.0	100.0	99.0	96.5	92.0
61	100.0	100.0	99.5	98.5	96.0	92.0
62	100.0	100.0	99.0	96.5	91.0	81.0
63	100.0	100.0	100.0	99.0	97.0	92.5
64	100.0	100.0	100.0	99.0	96.5	93.0
65	100.0	100.0	99.5	98.5	96.0	91.0
66	100.0	100.0	100.0	99.5	97.0	92.0
67	100.0	100.0	99.5	95.0	94.5	86.0
68	100.0	100.0	100.0	99.0	96.5	91.5
69	100.0	100.0	99.5	98.0	95.0	89.0
70	100.0	100.0	98.5	96.0	89.5	77.0
71	100.0	100.0	99.5	98.5	95.5	87.0
72	100.0	100.0	100.0	99.0	97.0	93.5
73	100.0	100.0	100.0	99.0	96.0	88.5
74	100.0	100.0	99.5	97.5	92.5	86.0
75	100.0	100.0	100.0	99.0	95.5	89.5
76	100.0	100.0	99.5	97.5	93.5	84.5
77	100.0	100.0	99.5	98.5	93.5	87.0
78	100.0	100.0	99.0	97.0	93.0	85.0
79	100.0	100.0	100.0	99.0	96.0	92.0
80	100.0	100.0	99.5	98.5	95.5	90.5
81	100.0	100.0	99.5	98.5	95.0	88.5
82	100.0	100.0	100.0	99.0	97.0	92.5
83	100.0	100.0	99.5	98.5	95.5	89.5
84	100.0	100.0	99.5	98.5	95.5	88.5
85	100.0	100.0	100.0	99.0	96.5	92.5
86	100.0	100.0	100.0	99.5	98.0	95.0
87	100.0	100.0	100.0	98.5	96.0	91.0
88	100.0	100.0	100.0	99.0	97.0	93.5
89	100.0	100.0	100.0	99.0	95.5	91.0
90	100.0	100.0	99.5	98.0	94.0	85.5
91	100.0	100.0	99.5	98.5	96.0	91.0
92	100.0	100.0	99.5	98.0	94.5	87.5
93	100.0	100.0	99.5	98.0	94.0	85.0
94	100.0	100.0	99.5	98.5	96.0	92.0
95	100.0	100.0	100.0	99.0	96.5	92.0

Overflow Size Distribution - Percent Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
96	100.0	100.0	99.5	98.0	93.5	83.5
97	100.0	100.0	99.5	98.5	95.0	88.0
98	100.0	100.0	99.5	98.5	95.5	88.5
99	100.0	100.0	100.0	99.0	97.5	93.5
100	100.0	100.0	100.0	99.0	97.0	93.0
101	100.0	100.0	100.0	99.0	96.5	92.0
102	100.0	100.0	99.5	98.5	95.5	90.0
103	100.0	100.0	99.5	98.5	96.0	91.0
104	100.0	100.0	99.5	98.5	95.5	90.0
105	100.0	100.0	99.5	97.5	93.5	83.5
106	100.0	100.0	100.0	99.0	97.0	92.5
107	100.0	100.0	99.5	98.5	96.0	92.0
108	100.0	100.0	100.0	99.0	96.0	91.0
109	100.0	100.0	99.5	98.5	96.0	92.0
110	100.0	100.0	99.5	98.0	94.5	85.5
111	100.0	100.0	99.5	98.5	95.0	87.0
112	100.0	100.0	99.5	98.5	95.0	89.5
113	100.0	100.0	99.0	97.0	92.5	83.5
114	100.0	100.0	99.5	98.5	95.0	88.0
115	100.0	100.0	100.0	99.5	98.0	95.0
116	100.0	100.0	100.0	99.0	97.0	93.5
117	100.0	100.0	99.5	98.5	96.0	91.0
118	100.0	100.0	100.0	99.5	98.0	95.5
119	100.0	100.0	100.0	99.0	96.5	91.5
120	100.0	100.0	99.5	99.0	96.5	91.5
121	100.0	100.0	100.0	99.5	97.5	94.5
122	100.0	100.0	99.5	98.0	94.0	86.0
123	100.0	100.0	99.5	98.5	95.5	90.0
124	100.0	100.0	100.0	99.0	96.5	90.5
125	100.0	100.0	99.5	98.0	94.0	85.0
126	100.0	100.0	100.0	99.5	98.0	94.5
127	100.0	100.0	99.5	98.0	95.5	88.5
128	100.0	100.0	100.0	99.0	97.0	93.0
129	100.0	100.0	100.0	99.5	98.5	96.0
130	100.0	100.0	100.0	98.5	94.5	85.5
131	100.0	100.0	100.0	99.5	97.5	93.5
132	100.0	100.0	100.0	99.5	98.0	95.0

Underflow Size Distribution - Percent Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
1	99.5	99.0	95.5	82.5	47.5	24.0
2	99.5	98.5	94.0	72.0	38.5	23.5
3	99.0	98.0	94.0	74.5	38.5	22.0
4	99.5	98.5	94.5	78.0	43.5	27.0
5	98.5	97.0	90.0	67.0	36.0	21.5
6	99.0	97.0	91.0	69.5	41.5	28.5
7	99.5	98.0	92.0	71.5	41.5	21.5
8	100.0	99.0	95.5	83.0	54.0	28.5
9	99.5	98.5	95.0	80.0	49.0	28.0
10	99.5	98.5	94.0	74.5	43.5	19.5
11	99.5	98.5	93.5	73.0	40.5	17.5
13	99.5	98.5	92.5	70.5	40.5	21.0
14	99.5	98.5	93.0	70.5	40.5	22.5
15	99.0	98.0	91.0	70.5	41.0	19.0
16	100.0	99.0	94.5	78.0	42.5	23.0
17	99.5	98.5	93.0	72.0	39.0	18.0
18	98.0	95.0	83.0	58.0	29.0	17.0
19	100.0	98.5	92.5	74.5	43.5	19.5
20	99.5	98.0	92.5	73.5	39.5	17.5
21	99.5	98.0	92.5	74.0	41.0	19.0
22	99.0	97.5	91.0	65.5	31.5	16.5
23	99.5	98.0	92.0	72.0	43.0	17.5
24	99.5	98.0	91.0	69.5	41.0	18.5
25	100.0	98.5	92.5	74.5	40.0	18.0
26	99.5	98.0	91.0	66.5	33.5	17.0
27	99.5	98.5	92.0	70.5	40.0	19.0
28	99.5	98.0	91.5	70.5	38.5	18.5
29	99.5	98.0	93.5	76.0	40.5	20.0
30	99.5	98.5	93.5	74.5	40.0	20.0
31	98.5	96.5	89.5	68.5	36.0	17.0
32	99.5	98.0	91.5	72.5	43.5	18.5
33	99.0	97.5	91.5	75.0	46.0	23.0
34	98.5	96.0	87.0	65.5	33.0	14.5
35	98.5	96.5	88.0	68.5	37.5	16.5
36	99.5	97.5	89.5	70.5	37.5	19.5
37	99.5	98.0	91.0	73.0	38.5	17.0
38	99.0	97.5	90.5	68.5	37.5	17.0
39	99.0	97.5	90.5	69.5	39.0	21.5
40	100.0	98.5	92.0	71.0	38.0	18.0
41	99.5	98.0	92.0	73.0	40.5	21.5
42	99.0	97.5	90.0	67.5	35.5	16.5
43	99.0	97.0	89.0	66.5	38.0	16.5
44	99.5	98.0	91.0	70.5	40.0	19.5
45	99.5	98.0	88.5	68.5	39.5	18.5
46	99.5	98.0	92.0	72.5	40.5	18.0
47	99.5	98.0	92.0	74.5	45.5	23.5
48	99.5	98.0	90.5	69.0	40.5	18.0

Underflow Size Distribution - Percent Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
49	99.5	98.5	93.0	76.0	46.0	20.0
50	99.5	98.0	91.5	71.5	42.0	21.0
51	99.5	98.0	91.5	71.5	40.5	19.5
52	99.5	97.5	91.5	72.0	42.0	20.0
53	99.5	98.0	91.5	73.0	43.5	22.5
54	99.0	97.5	91.5	72.0	42.5	21.0
55	99.0	97.5	92.0	73.0	42.5	20.0
56	100.0	98.5	93.0	75.5	43.0	21.0
57	99.5	97.5	90.0	68.5	38.5	19.0
58	99.5	98.0	91.5	71.5	42.0	19.0
59	99.5	98.0	91.5	70.5	41.0	18.5
60	99.5	97.5	90.5	69.5	38.5	18.0
61	99.5	98.0	91.5	73.0	43.0	21.5
62	99.5	98.0	91.0	70.0	36.5	19.0
63	100.0	98.5	92.5	74.5	45.5	21.5
64	100.0	98.5	93.0	75.0	45.5	22.0
65	99.5	98.0	92.0	74.5	45.0	21.0
66	99.5	98.5	93.5	97.5	50.0	23.5
67	99.0	97.0	88.5	65.0	34.5	17.0
68	99.5	97.5	91.0	70.0	39.0	18.5
69	99.5	98.0	91.0	69.5	40.5	19.0
70	99.0	97.0	89.0	66.0	35.0	20.0
71	99.0	97.5	92.0	74.5	44.0	20.0
72	99.5	98.5	93.5	76.5	47.0	25.0
73	99.0	97.5	90.0	67.5	38.5	16.0
74	99.5	98.0	91.0	68.0	35.0	18.0
75	99.5	98.0	91.0	69.0	37.5	18.5
76	99.0	97.5	90.5	68.0	36.0	19.5
77	99.5	98.0	90.5	68.5	40.0	20.5
78	100.0	99.0	92.5	74.5	43.5	21.0
79	100.0	99.0	93.0	74.0	42.5	20.0
80	100.0	99.0	93.5	77.0	46.0	21.0
81	99.5	98.5	92.5	73.0	43.5	20.5
82	99.5	98.5	92.0	70.5	39.0	19.5
83	99.5	98.5	92.0	71.0	39.5	20.0
84	99.0	97.5	90.5	72.5	43.5	20.5
85	99.5	98.5	92.5	78.0	48.5	21.5
86	99.5	98.5	93.5	79.5	51.5	24.5
87	99.5	98.0	92.5	76.0	46.0	20.5
88	99.5	98.0	91.0	71.0	41.5	17.5
89	99.5	98.5	92.0	73.0	44.0	20.0
90	99.5	98.5	92.5	74.0	42.5	22.5
91	99.5	98.5	92.0	71.5	41.0	17.0
92	99.5	98.5	92.5	72.5	42.5	20.5
93	99.5	98.0	91.0	70.0	40.5	20.0
94	99.5	98.0	92.0	72.5	43.0	20.0
95	99.5	98.5	92.0	72.5	43.5	20.0

Underflow Size Distribution - Percent Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
96	99.5	98.0	91.0	69.5	41.0	21.0
97	99.5	98.0	92.0	72.5	44.0	19.0
98	99.5	98.5	92.5	73.5	43.0	20.5
99	99.5	98.0	91.5	72.5	44.5	22.0
100	99.5	98.5	92.0	73.5	43.5	21.0
101	99.5	98.0	90.5	71.0	43.0	21.0
102	99.5	98.5	92.5	75.0	46.5	23.5
103	99.5	98.0	91.5	71.5	43.5	21.5
104	99.5	98.0	92.0	73.5	45.0	21.5
105	99.0	97.5	90.5	70.0	38.0	19.5
106	99.5	98.5	92.5	73.0	44.0	20.0
107	99.5	98.5	93.0	76.5	44.5	21.5
108	100.0	99.0	93.0	73.0	44.5	22.0
109	99.5	98.5	92.5	73.5	44.0	23.0
110	99.5	98.5	92.0	70.5	39.0	19.0
111	99.5	98.5	92.0	70.0	40.0	19.0
112	99.5	98.5	92.5	73.0	44.0	23.5
113	99.0	97.5	89.0	66.0	35.5	19.5
114	99.0	97.5	89.5	67.5	39.5	19.0
115	99.5	98.0	92.5	75.0	47.0	23.0
116	99.5	98.5	92.0	70.5	41.0	19.5
117	99.5	98.5	91.5	69.5	41.0	19.5
118	99.5	98.5	93.0	73.5	45.5	23.5
119	99.5	98.5	91.5	70.5	42.5	22.5
120	99.5	98.5	92.0	70.5	42.5	21.0
121	99.5	98.5	93.0	74.0	45.5	23.0
122	99.5	98.5	91.5	69.0	38.0	21.0
123	99.5	98.5	93.0	73.0	40.5	20.5
124	99.5	98.5	91.5	68.5	36.0	17.5
125	99.5	98.5	91.5	70.0	40.5	22.0
126	99.5	98.5	92.0	70.5	42.0	18.5
127	99.5	98.5	90.5	68.5	41.0	22.0
128	99.5	98.5	91.5	69.5	42.0	19.0
129	100.0	99.0	92.0	74.0	47.5	23.0
130	99.5	98.0	91.0	69.5	39.0	20.5
131	100.0	99.0	93.0	72.0	44.0	20.0
132	100.0	99.0	93.0	73.5	44.0	20.0

Recovery of Feed to Overflow							
Test	**100**	**150**	**200**	**270**	**400**	**500**	**-500**
1	0%	0%	22%	18%	14%	24%	85%
2	0%	0%	40%	17%	28%	46%	86%
3	0%	0%	33%	15%	21%	59%	87%
4	0%	0%	14%	15%	20%	48%	82%
5	0%	0%	17%	13%	18%		83%
6	0%	0%	14%	13%	20%		75%
7	0%	0%	0%	4%	12%	23%	79%
8	0%	0%	0%	4%	11%	24%	79%
9	0%	0%	0%	3%	3%	13%	76%
10	0%	0%	10%	5%	9%	16%	83%
11	0%	0%	11%	2%	9%	15%	84%
13	0%	0%	9%	8%	9%	30%	81%
14	0%	0%	8%	4%	7%	11%	77%
15	0%	0%	6%	4%	8%	24%	81%
16	0%	0%	10%	6%	11%	33%	81%
17	0%	0%	0%	2%	4%	11%	83%
18	0%	0%	9%	16%	22%		85%
19	0%	0%	6%	3%	8%	16%	82%
20	0%	0%	8%	9%	9%	29%	84%
21	0%	0%	0%	4%	5%	10%	82%
22	0%	0%	7%	7%	8%	12%	84%
23	0%	0%	0%	2%	5%	23%	82%
24	0%	0%	6%	4%	7%	14%	80%
25	0%	0%	9%	13%	15%	37%	85%
26	0%	0%	8%	4%	9%	14%	83%
27	0%	0%	7%	2%	4%	14%	81%
28	0%	0%	0%	4%	6%	12%	81%
29	0%	0%	0%	3%	4%	6%	81%
30	0%	0%	7%	3%	5%	12%	81%
31	0%	0%	13%	12%	26%		88%
32	0%	0%	0%	5%	9%	42%	81%
33	0%	0%	6%	10%	11%	30%	77%
34	0%	0%	4%	4%	18%	67%	86%
35	0%	0%	3%	3%	6%	14%	80%
36	0%	0%	20%	38%	37%		96%
37	0%	0%	8%	9%	9%	32%	85%
38	0%	0%	0%	3%	9%	24%	83%
39	0%	0%	6%	10%	25%		84%
40	0%	0%	7%	5%	9%	21%	83%
41	0%	0%	9%	12%	15%	23%	81%
42	0%	0%	6%	7%	14%	50%	86%
43	0%	0%	0%	4%	7%	18%	82%
44	0%	0%	8%	7%	13%	41%	83%
45	0%	0%	5%	7%	14%	51%	84%
46	0%	0%	6%	5%	8%	16%	83%
47	0%	0%	9%	12%	18%	48%	82%
48	0%	0%	0%	7%	12%	33%	84%

Recovery of Feed to Overflow							
Test	**100**	**150**	**200**	**270**	**400**	**500**	**-500**
49	0%	0%	8%	6%	10%	17%	83%
50	0%	0%	7%	7%	15%	37%	82%
51	0%	0%	5%	9%	11%	45%	82%
52	0%	0%	0%	7%	7%	24%	80%
53	0%	0%	7%	9%	12%	62%	81%
54	0%	0%	0%	2%	7%	12%	80%
55	0%	0%	0%	4%	7%	27%	81%
56	0%	0%	8%	7%	10%	33%	81%
57	0%	0%	6%	7%	12%	43%	83%
58	0%	0%	0%	4%	7%	23%	82%
59	0%	0%	5%	4%	10%	25%	81%
60	0%	0%	0%	5%	7%	15%	82%
61	0%	0%	7%	4%	7%	12%	78%
62	0%	0%	13%	14%	20%	40%	85%
63	0%	0%	0%	5%	6%	15%	79%
64	0%	0%	0%	5%	6%	13%	78%
65	0%	0%	6%	5%	6%	20%	80%
66	0%	0%	0%	27%	36%		97%
67	0%	0%	6%	23%	2%	28%	84%
68	0%	0%	0%	5%	8%	15%	82%
69	0%	0%	6%	7%	8%	23%	81%
70	0%	0%	23%	15%	4%	36%	73%
71	0%	0%	8%	6%	9%	36%	83%
72	0%	0%	0%	5%	5%	9%	74%
73	0%	0%	0%	4%	9%	30%	85%
74	0%	0%	8%	10%	18%	13%	84%
75	0%	0%	0%	4%	11%	21%	83%
76	0%	0%	6%	11%	14%	27%	84%
77	0%	0%	5%	4%	17%	22%	80%
78		0%	21%	14%	15%	37%	86%
79		0%	0%	6%	10%	14%	83%
80		0%	8%	7%	11%	18%	83%
81	0%	0%	9%	6%	13%	25%	84%
82							
83		0%	7%	5%	10%	22%	82%
84		0%	8%	7%	12%	26%	85%
85		0%	0%	7%	10%	14%	83%
86	0%	0%	0%	4%	6%	11%	81%
87		0%	0%	9%	9%	20%	83%
88	0%	0%	0%	5%	6%	11%	83%
89		0%	0%	5%	11%	15%	82%
90		0%	6%	8%	12%	28%	80%
91	0%	0%	7%	5%	8%	20%	86%
92		0%	6%	7%	11%	24%	81%
93	0%	0%	6%	7%	12%	25%	80%
94	0%	0%	6%	5%	8%	11%	81%
95	0%	0%	0%	5%	8%	18%	82%

Recovery of Feed to Overflow							
Test	**100**	**150**	**200**	**270**	**400**	**500**	**-500**
96	0%	0%	6%	7%	17%	48%	82%
97	0%	0%	6%	4%	11%	24%	81%
98	0%	0%	9%	5%	10%	36%	84%
99	0%	0%	0%	5%	4%	13%	78%
100	0%	0%	0%	5%	6%	13%	81%
101	0%	0%	0%	4%	7%	16%	79%
102	0%	0%	6%	5%	10%	20%	79%
103	0%	0%	5%	5%	7%	15%	78%
104	0%	0%	6%	6%	9%	21%	81%
105	0%	0%	6%	10%	2%	27%	70%
106	0%	0%	0%	5%	6%	14%	80%
107	0%	0%	8%	6%	9%	11%	81%
108	0%	0%	0%	5%	9%	16%	79%
109	0%	0%	6%	5%	8%	14%	80%
110	0%	0%	7%	7%	12%	31%	84%
111	0%	0%	5%	4%	10%	28%	81%
112	0%	0%	6%	5%	12%	19%	79%
113	0%	0%	12%	10%	17%	24%	83%
114	0%	0%	5%	4%	11%	24%	81%
115	0%	0%	0%	2%	4%	9%	78%
116	0%	0%	0%	5%	7%	10%	82%
117	0%	0%	6%	4%	7%	18%	80%
118	0%	0%	0%	2%	4%	7%	76%
119	0%	0%	0%	5%	9%	18%	80%
120	0%	0%	5%	2%	8%	16%	79%
121	0%	0%	0%	2%	7%	9%	79%
122	0%	0%	6%	7%	11%	19%	79%
123	0%	0%	8%	5%	8%	18%	80%
124	0%	0%	0%	4%	8%	15%	83%
125	0%	0%	6%	8%	14%	35%	81%
126	0%	0%	0%	2%	4%	13%	82%
127	0%	0%	7%	7%	8%	27%	81%
128	0%	0%	0%	4%	7%	15%	83%
129	0%	0%	0%	2%	3%	10%	79%
130	0%	0%	0%	7%	14%	35%	82%
131	0%	0%	0%	2%	6%	14%	81%
132	0%	0%	0%	2%	4%	9%	80%

Recovery of Feed to Underflow							
Test	**100**	**150**	**200**	**270**	**400**	**500**	**-500**
1	100%	100%	78%	82%	86%	76%	15%
2	100%	100%	60%	83%	72%	54%	14%
3	100%	100%	67%	85%	79%	41%	13%
4	100%	100%	86%	85%	80%	52%	18%
5	100%	100%	83%	87%	82%		17%
6	100%	100%	86%	87%	80%		25%
7	100%	100%	100%	96%	88%	77%	21%
8	100%	100%	100%	96%	89%	76%	21%
9	100%	100%	100%	97%	97%	87%	24%
10	100%	100%	90%	95%	91%	84%	17%
11	100%	100%	89%	98%	91%	85%	16%
13	100%	100%	91%	92%	91%	70%	19%
14	100%	100%	92%	96%	93%	89%	23%
15	100%	100%	94%	96%	92%	76%	19%
16	100%	100%	90%	94%	89%	67%	19%
17	100%	100%	100%	98%	96%	89%	17%
18	100%	100%	91%	84%	78%		15%
19	100%	100%	94%	97%	92%	84%	18%
20	100%	100%	92%	91%	91%	71%	16%
21	100%	100%	100%	96%	95%	90%	18%
22	100%	100%	93%	93%	92%	88%	16%
23	100%	100%	100%	98%	95%	77%	18%
24	100%	100%	94%	96%	93%	86%	20%
25	100%	100%	91%	88%	85%	63%	15%
26	100%	100%	92%	96%	91%	86%	17%
27	100%	100%	93%	98%	96%	86%	19%
28	100%	100%	100%	96%	94%	88%	19%
29	100%	100%	100%	97%	96%	94%	19%
30	100%	100%	93%	97%	95%	88%	19%
31	100%	100%	88%	88%	74%		12%
32	100%	100%	100%	95%	91%	58%	19%
33	100%	100%	94%	90%	89%	70%	23%
34	100%	100%	96%	96%	82%	33%	14%
35	100%	100%	97%	97%	94%	86%	20%
36	100%	100%	80%	62%	63%		4%
37	100%	100%	92%	91%	91%	68%	15%
38	100%	100%	100%	97%	91%	76%	17%
39	100%	100%	94%	90%	75%		16%
40	100%	100%	93%	95%	91%	79%	17%
41	100%	100%	91%	88%	85%	77%	19%
42	100%	100%	94%	93%	86%	50%	14%
43	100%	100%	100%	96%	93%	82%	18%
44	100%	100%	92%	93%	87%	59%	17%
45	100%	100%	95%	93%	86%	49%	16%
46	100%	100%	94%	95%	92%	84%	17%
47	100%	100%	91%	88%	82%	52%	18%
48	100%	100%	100%	93%	88%	67%	16%

Recovery of Feed to Underflow							
Test	**100**	**150**	**200**	**270**	**400**	**500**	**-500**
49	100%	100%	92%	94%	90%	83%	17%
50	100%	100%	93%	93%	85%	63%	18%
51	100%	100%	95%	91%	89%	55%	18%
52	100%	100%	100%	93%	93%	76%	20%
53	100%	100%	93%	91%	88%	38%	19%
54	100%	100%	100%	98%	93%	88%	20%
55	100%	100%	100%	96%	93%	73%	19%
56	100%	100%	92%	93%	90%	67%	19%
57	100%	100%	94%	93%	88%	57%	17%
58	100%	100%	100%	96%	93%	77%	18%
59	100%	100%	95%	96%	90%	75%	19%
60	100%	100%	100%	95%	93%	85%	18%
61	100%	100%	93%	96%	93%	88%	22%
62	100%	100%	88%	86%	80%	60%	15%
63	100%	100%	100%	95%	94%	85%	21%
64	100%	100%	100%	95%	94%	87%	22%
65	100%	100%	94%	95%	94%	80%	20%
66	100%	100%	100%	73%	64%		3%
67	100%	100%	94%	77%	98%	72%	16%
68	100%	100%	100%	95%	92%	85%	18%
69	100%	100%	94%	93%	92%	77%	19%
70	100%	100%	77%	85%	96%	64%	27%
71	100%	100%	92%	94%	91%	64%	17%
72	100%	100%	100%	95%	95%	91%	26%
73	100%	100%	100%	96%	91%	70%	15%
74	100%	100%	92%	90%	82%	87%	16%
75	100%	100%	100%	96%	89%	79%	17%
76	100%	100%	94%	89%	86%	73%	16%
77	100%	100%	95%	96%	83%	78%	20%
78	100%	100%	79%	86%	85%	63%	14%
79	100%	100%	100%	94%	90%	86%	17%
80	100%	100%	92%	93%	89%	82%	17%
81	100%	100%	91%	94%	87%	75%	16%
82							
83	100%	100%	93%	95%	90%	78%	18%
84	100%	100%	92%	93%	88%	74%	15%
85	100%	100%	100%	93%	90%	86%	17%
86	100%	100%	100%	96%	94%	89%	19%
87	100%	100%	100%	91%	91%	80%	17%
88	100%	100%	100%	95%	94%	89%	17%
89	100%	100%	100%	95%	89%	85%	18%
90	100%	100%	94%	92%	88%	72%	20%
91	100%	100%	93%	95%	92%	80%	14%
92	100%	100%	94%	93%	89%	76%	19%
93	100%	100%	94%	93%	88%	75%	20%
94	100%	100%	94%	95%	92%	89%	19%
95	100%	100%	100%	95%	92%	82%	18%

Recovery of Feed to Underflow							
Test	**100**	**150**	**200**	**270**	**400**	**500**	**-500**
96	100%	100%	94%	93%	83%	52%	18%
97	100%	100%	94%	96%	89%	76%	19%
98	100%	100%	91%	95%	90%	64%	16%
99	100%	100%	100%	95%	96%	87%	22%
100	100%	100%	100%	95%	94%	87%	19%
101	100%	100%	100%	96%	93%	84%	21%
102	100%	100%	94%	95%	90%	80%	21%
103	100%	100%	95%	95%	93%	85%	22%
104	100%	100%	94%	94%	91%	79%	19%
105	100%	100%	94%	90%	98%	73%	30%
106	100%	100%	100%	95%	94%	86%	20%
107	100%	100%	92%	94%	91%	89%	19%
108	100%	100%	100%	95%	91%	84%	21%
109	100%	100%	94%	95%	92%	86%	20%
110	100%	100%	93%	93%	88%	69%	16%
111	100%	100%	95%	96%	90%	72%	19%
112	100%	100%	94%	95%	88%	81%	21%
113	100%	100%	88%	90%	83%	76%	17%
114	100%	100%	95%	96%	89%	76%	19%
115	100%	100%	100%	98%	96%	91%	22%
116	100%	100%	100%	95%	93%	90%	18%
117	100%	100%	94%	96%	93%	82%	20%
118	100%	100%	100%	98%	96%	93%	24%
119	100%	100%	100%	95%	91%	82%	20%
120	100%	100%	95%	98%	92%	84%	21%
121	100%	100%	100%	98%	93%	91%	21%
122	100%	100%	94%	93%	89%	81%	21%
123	100%	100%	92%	95%	92%	82%	20%
124	100%	100%	100%	96%	92%	85%	17%
125	100%	100%	94%	92%	86%	65%	19%
126	100%	100%	100%	98%	96%	87%	18%
127	100%	100%	93%	93%	92%	73%	19%
128	100%	100%	100%	96%	93%	85%	17%
129	100%	100%	100%	98%	97%	90%	21%
130	100%	100%	100%	93%	86%	65%	18%
131	100%	100%	100%	98%	94%	86%	19%
132	100%	100%	100%	98%	96%	91%	20%

Flotation Process Values							
		Flotation Bank(s)		LTPH		Amine Rate	
Test	Date	Test	Control	Test	Control	Test	Control
1	15-Dec		1,2,4		480		0.143
2	15-Dec	1	2,4	431	300	0.178	0.178
3	16-Dec	1	2	340	440	0.193	0.138
4	16-Dec	1	2	370	806	0.155	0.111
5	16-Dec	1	2	370	820	0.112	0.086
6	16-Dec	1	2	420	720	0.099	0.076
7	17-Dec	1	2	221	253	0.198	0.152
8	17-Dec	1	2	235	281	0.165	0.127
9	17-Dec	1	2	216	414	0.186	0.143
10	17-Dec	1	2	218	330	0.263	0.188
11	18-Dec	1	2	376	114	0.135	0.104
12	18-Dec	1	2	289	100	0.186	0.143
13	18-Dec	1	2	254	259	0.142	0.109
14	18-Dec	1	2	407	160	0.143	0.110
15	19-Dec	1	2	405	315	0.159	0.122
16	19-Dec	1	2	398	329	0.170	0.131
17	19-Dec	1	2	410	360	0.156	0.120
18	29-Dec	1	2	415	503	0.190	0.146
19	29-Dec	1	2	403	427	0.173	0.133
20	29-Dec	1	2	395	300	0.151	0.116
21	29-Dec	1	2	334	274	0.148	0.114
22	30-Dec	1	2	409	120	0.212	0.163
23	30-Dec	1		407		0.205	
24	30-Dec	1		356		0.186	
25	6-Jan	2	3	397	704	0.091	0.083
26	7-Jan	2	3	391	560	0.098	0.089
27	8-Jan	2	3	400	771	0.143	0.130
28	9-Jan	2	3	384	425	0.188	0.154
29	9-Jan	2	3	419	460	0.186	0.152
30	9-Jan	2	3	266	495	0.182	0.149
31	9-Jan	2	3	292	370	0.187	0.153
32	12-Jan	2	3	388	525	0.153	0.132
33	12-Jan	2	3	386	179	0.140	0.121
34	12-Jan	2	3	314	38	0.136	0.118
35	12-Jan	2	3	402	57	0.140	0.121
36	13-Jan	2	3	330	438	0.169	0.146
37	13-Jan	2	3	333	462	0.180	0.156
38	13-Jan	2	3	318	489	0.173	0.149
39	14-Jan	2	3	272	179	0.188	0.162
40	14-Jan	2	3	259	713	0.117	0.101
41	14-Jan	2	3	234	384	0.150	0.129
42	15-Jan	2	3	342	507	0.177	0.153
43	15-Jan	2	3	289	316	0.175	0.151
44	15-Jan	2	3	248	484	0.152	0.131
45	15-Jan	2	3	222	284	0.194	0.167
46	21-Jan	2	3				

Flotation Process Values							
		Flotation Bank(s)		LTPH		Amine Rate	
Test	Date	Test	Control	Test	Control	Test	Control
47	21-Jan	2	3				
48	21-Jan	2	3				
49	21-Jan	2	3				
50	23-Jan	2	3,4				
51	27-Jan	2	1				
52	28-Jan	1	3				
53	29-Jan	1	3				
54	2-Feb	1	3,4				
55	4-Feb	1	3				
56	4-Feb	1	3				
57	4-Feb	1	3				
58	4-Feb	1	3				
59	5-Feb	1	3				
60	11-Feb	2	1				
61	17-Feb	1	3	352	938	0.101	0.083
62	18-Feb	1	3	330	626	0.079	0.065
63	18-Feb	1		350		0.068	
64	18-Feb	1		370		0.052	
65	23-Feb	1	2	260	427	0.220	0.180
66	24-Feb	1	2	366	390	0.193	0.158
67	24-Feb	1	2	407	430	0.186	0.152
68	24-Feb	1	2	300	785	0.173	0.141
69	24-Feb	1	2	246	376	0.156	0.128
70	26-Feb	2	3	445	274	0.204	0.167
71	26-Feb	2	3	410	390	0.208	0.170
72	26-Feb	2	3	295	421	0.139	0.113
73	1-Mar	1		388		0.220	
74	3-Mar	2	3	413	365	0.205	0.167
75	3-Mar	2	3	406	390	0.212	0.174
76	3-Mar	2	3	353	687	0.220	0.180
77	3-Mar	2	3	299	774	0.220	0.180
78	4-Mar	2		339		0.146	
79	8-Mar	2		374		0.103	
80	9-Mar	2	4	372	481	0.121	0.099
81	16-Mar	2	1	329	328	0.187	0.153
82	16-Mar	2	1	263	261	0.180	0.148
83	16-Mar	2	1	252	144	0.152	0.124
84	16-Mar	2	1	200	277	0.102	0.084
85	25-Mar	2		419		0.124	
86	29-Mar	2		214		0.138	
87	5-Apr	2		382		0.087	
88	7-Apr	2	1	371	766	0.098	0.080
89	7-Apr	2	1	364	786	0.011	0.009
90	7-Apr	2	1	412	536	0.059	0.049
91	7-Apr	2	1	305	180	0.096	0.078
92	3-May	2	1,2,4	345	509	0.130	0.114

Flotation Process Values							
		Flotation Bank(s)		LTPH		Amine Rate	
Test	Date	Test	Control	Test	Control	Test	Control
93	3-May	2	1,2,4	326	401	0.113	0.113
94	3-May	2	1,2,4	256	508	0.118	0.102
95	5-May	2	1,2,4	332	598	0.099	0.083
96	5-May	2	1,2,4	285	523	0.123	0.103
97	5-May	2	1,2,4	297	501	0.117	0.099
98	6-May	2	1,2,4	303	459	0.176	0.148
99	6-May	2	1,2,4	280	384	0.151	0.127
100	6-May	2	1,2,4	330	411	0.099	0.083
101	7-May	2	1,2,4	305	458	0.114	0.096
102	7-May	2	1,2,4	292	415	0.114	0.096
103	10-May	2	1,2,4	227	563	0.072	0.061
104	10-May	2	1,2,4	184	435	0.082	0.069
105	10-May	2	1,2,4	301	492	0.070	0.059
106	12-May	2	1,2,4	330	518	0.090	0.075
107	13-May	2	1,2,4	301	463	0.156	0.131
108	13-May	2	1,2,4	293	346	0.171	0.144
109	13-May	2	1,2,4	298	462	0.162	0.136
110	14-May	2	1,2,4	383	502	0.186	0.157
111	14-May	2	1,2,4	324	535	0.176	0.148
112	14-May	2	1,2,4	336	509	0.123	0.103
113	17-May	1	2,3,4	304	428	0.151	0.129
114	17-May	1	2,3,4	234	431	0.128	0.109
115	17-May	1	2,3,4	278	493	0.119	0.097
116	19-May	1	2,3,4	348	546	0.173	0.142
117	19-May	1	2,3,4	285	409	0.184	0.150
118	19-May	1	2,3,4	261	501	0.178	0.146
119	20-May	1	2,3,4	286	547	0.189	0.148
120	20-May	1	2,3,4	239	412	0.184	0.145
121	20-May	1	2,3,4	255	358	0.201	0.158
122	21-May	1	2,3,4	385	485	0.158	0.124
123	21-May	1	2,3,4	404	441	0.201	0.158
124	21-May	1	2,3,4	419	503	0.199	0.156
125	24-May	1	2,3,4	383	552	0.163	0.128
126	24-May	1	2,3,4	233	394	0.169	0.133
127	24-May	1	2,3,4	219	389	0.191	0.150
128	25-May	1	2,3,4	367	375	0.180	0.142
129	25-May	1	2,3,4	288	295	0.203	0.159
130	25-May	1	2,3,4	311	355	0.216	0.170
131	26-May	1	2,3,4	414	401	0.224	0.176
132	26-May	1	2,3,4	345	322	0.234	0.184
133	26-May	1	2,3,4	327	314	0.238	0.187

Test Flotation Bank Performance								
	Float Feed		Float Con		Float Tails		Upgraded SiO2	Weight Recovery
Test	Silica	Solids	Silica	Solids	Silica	Solids		
1								
2	7.18	42.3%	5.72	3.8%	21.26	15.4%	1.46	90.6%
3	6.86	42.1%	4.60	35.1%	18.48	16.7%	2.26	83.7%
4	6.62	39.1%	3.45	56.8%	17.93	17.6%	3.17	78.1%
5	6.55	40.5%	4.86	53.2%	20.71	11.5%	1.69	89.3%
6	6.42	43.3%	4.84	51.5%	22.67	10.1%	1.58	91.1%
7	7.23	42.3%	4.28	54.3%	19.30	16.3%	2.95	80.4%
8	7.49	44.8%	3.81	54.9%	21.03	16.1%	3.68	78.6%
9	7.46	39.1%	3.19	48.4%	16.87	19.9%	4.27	68.8%
10	7.67	38.0%	3.51	55.6%	18.06	17.0%	4.16	71.4%
11	7.55	39.9%	3.40	47.7%	23.11	18.1%	4.15	78.9%
12	7.32	41.5%	2.79	48.2%	20.09	20.2%	4.53	73.8%
13	6.85	38.4%	3.01	49.1%	21.30	12.3%	3.84	79.0%
14	6.72	43.8%	3.00	49.4%	19.63	20.2%	3.72	77.6%
15	7.69	40.7%	3.64	49.9%	22.73	18.4%	4.05	78.8%
16	7.78	41.3%	3.47	49.8%	22.93	18.6%	4.31	77.9%
17	7.67	43.3%	3.56	49.2%	23.29	19.2%	4.11	79.2%
18	8.22	41.0%	3.86	51.9%	23.99	16.8%	4.36	78.3%
19	8.15	40.1%	3.88	48.7%	23.49	16.7%	4.27	78.2%
20	7.80	42.1%	3.23	48.0%	22.63	18.0%	4.57	76.4%
21	7.38	39.6%	2.55	47.8%	20.12	18.7%	4.83	72.5%
22	7.59	43.7%	3.19	51.9%	21.92	16.3%	4.40	76.5%
23	7.17	42.2%	3.19	51.1%	21.99	15.4%	3.98	78.8%
24	7.31	40.9%	2.70	45.5%	22.23	15.5%	4.61	76.4%
25	7.36	45.1%	4.46	45.7%	23.67	12.1%	2.90	84.9%
26	7.90	41.8%	5.03	44.4%	24.94	12.3%	2.87	85.6%
27	7.09	41.3%	4.02	45.9%	22.77	19.5%	3.07	83.6%
28	7.87	42.0%	3.77	52.2%	20.44	20.1%	4.10	75.4%
29	7.76	40.2%	3.90	48.6%	20.65	19.7%	3.86	77.0%
30	7.75	43.2%	3.48	52.3%	21.35	19.7%	4.27	76.1%
31	7.69	34.9%	3.41	40.9%	19.28	18.6%	4.28	73.0%
32	8.95	41.5%	4.06	45.5%	25.47	14.6%	4.89	77.2%
33	9.44	41.9%	4.06	42.5%	25.95	17.7%	5.38	75.4%
34	8.45	39.9%	3.62	45.8%	23.47	14.1%	4.83	75.7%
35	7.98	41.1%	3.16	47.3%	21.77	14.4%	4.82	74.1%
36	8.69	41.2%	3.30	52.9%	20.00	14.6%	5.39	67.7%
37	9.97	37.9%	3.32	55.7%	18.94	17.1%	6.65	57.4%
38	9.61	41.4%	4.18	49.0%	21.57	16.0%	5.43	68.8%
39	9.34	33.7%	2.54	55.1%	16.48	20.5%	6.80	51.2%
40	7.68	38.7%	3.74	42.2%	23.01	13.0%	3.94	79.6%
41	6.89	41.7%	3.09	48.5%	18.66	9.8%	3.80	75.6%
42	7.24	41.6%	3.43	49.6%	16.84	13.7%	3.81	71.6%
43	7.39	39.8%	3.60	48.1%	17.79	12.7%	3.79	73.3%
44	7.23	41.2%	4.21	4.9%	18.84	9.5%	3.02	79.4%
45	7.52	35.5%	3.36	50.5%	15.62	11.1%	4.16	66.1%
46	7.58	40.4%	3.24	50.5%	20.14	16.9%	4.34	74.3%

Test Flotation Bank Performance

Test	Float Feed		Float Con		Float Tails		Upgraded SiO2	Weight Recovery
	Silica	Solids	Silica	Solids	Silica	Solids		
47	7.46	37.9%	3.12	47.8%	20.50	16.9%	4.34	75.0%
48	7.77	35.8%	3.30	42.7%	21.33	14.2%	4.47	75.2%
49	7.05	42.4%	3.10	46.9%	20.13	12.8%	3.95	76.8%
50	7.80	39.9%	3.28	52.9%	19.32	18.7%	4.52	71.8%
51	7.30	40.4%	4.14	41.1%	24.35	13.8%	3.16	84.4%
52	7.06	42.8%	3.97	53.8%	22.93	12.1%	3.09	83.7%
53	6.21	42.9%	3.97	51.2%	23.55	10.6%	2.24	88.6%
54	7.27	40.3%	3.29	52.5%	20.25	14.6%	3.98	76.5%
55	6.66	41.3%	4.50	40.9%	25.79	11.9%	2.16	89.9%
56	6.96	40.0%	5.39	51.6%	24.68	7.1%	1.57	91.9%
57	6.70	43.3%	5.36	52.9%	24.25	7.3%	1.34	92.9%
58	7.67	40.3%	4.18	52.8%	21.48	7.7%	3.49	79.8%
59	7.76	36.3%	4.90	49.8%	24.43	10.4%	2.86	85.4%
60	6.71	41.1%	3.97	49.4%	23.13	13.7%	2.74	85.7%
61	6.41	39.9%	4.41	44.0%	25.20	9.6%	2.00	90.4%
62	6.80	40.5%	5.03	45.4%	25.03	9.5%	1.77	91.2%
63	6.56	39.2%	3.67	39.1%	23.96	7.7%	2.89	85.8%
64	6.63	40.0%	4.73	45.0%	26.90	11.4%	1.90	91.4%
65	7.91	39.6%	4.13	44.0%	24.27	16.0%	3.78	81.2%
66	6.77	40.0%	4.08	43.7%	23.49	12.7%	2.69	86.1%
67	6.78	44.2%	4.25	44.0%	22.21	10.8%	2.53	85.9%
68	6.86	39.2%	4.10	41.9%	22.13	10.6%	2.76	84.7%
69	6.44	37.8%	3.46	37.9%	20.19	14.6%	2.98	82.2%
70	6.91	41.6%	3.81	59.2%	21.64	18.0%	3.10	82.6%
71	6.89	40.7%	3.80	40.4%	22.96	18.4%	3.09	83.9%
72	7.22	41.5%	4.37	38.0%	24.28	17.8%	2.85	85.7%
73	6.66	40.6%	3.54	49.1%	21.18	14.3%	3.12	82.3%
74	7.20	41.7%	3.87	45.4%	21.88	14.2%	3.33	81.5%
75	7.33	40.7%	4.23	49.0%	22.52	13.6%	3.10	83.1%
76	7.94	37.4%	5.65	39.5%	25.04	9.3%	2.29	88.2%
77	8.48	33.9%	5.70	35.9%	27.47	9.7%	2.78	87.2%
78	6.89	39.4%	4.09	36.7%	22.77	11.4%	2.80	85.0%
79	6.85	36.2%	3.96	36.0%	25.17	15.0%	2.89	86.4%
80	6.99	38.8%	4.00	41.7%	24.82	15.3%	2.99	85.6%
81	6.69	39.2%	3.34	39.9%	20.41	19.9%	3.35	80.4%
82	6.08	3.9%	2.80	36.2%	17.89	17.8%	3.28	78.3%
83	6.35	31.1%	2.83	32.8%	17.64	15.2%	3.52	76.2%
84	5.72	37.2%	3.47	35.7%	18.65	9.1%	2.25	85.2%
85	6.96	43.0%	3.69	42.3%	23.82	17.2%	3.27	83.8%
86	6.24	31.2%	4.40	26.4%	18.58	12.6%	1.84	87.0%
87	6.48	41.9%	3.80	42.2%	23.74	13.4%	2.68	86.6%
88	6.63	43.7%	4.49	44.6%	21.17	10.0%	2.14	87.2%
89	7.09	41.5%	4.93	39.5%	23.27	12.8%	2.16	88.2%
90	6.17	41.9%	4.26	40.7%	22.90	9.2%	1.91	89.8%
91	6.48	41.8%	5.22	43.3%	23.53	15.7%	1.26	93.1%
92	5.63	46.1%	4.03	45.7%	25.15	10.8%	1.60	92.4%

Test Flotation Bank Performance								
	Float Feed		Float Con		Float Tails		Upgraded SiO2	Weight Recovery
Test	Silica	Solids	Silica	Solids	Silica	Solids		
93	6.22	44.8%	4.83	45.0%	23.46	12.3%	1.39	92.5%
94	5.64	42.1%	4.53	45.9%	21.36	12.7%	1.11	93.4%
95	6.05	39.6%	4.89	43.8%	20.67	11.3%	1.16	92.6%
96	6.31	42.0%	4.88	44.5%	22.07	15.9%	1.43	91.7%
97	6.03	44.1%	5.01	47.3%	20.38	13.2%	1.02	93.4%
98	6.59	44.8%	4.04	45.0%	22.41	17.9%	2.55	86.1%
99	6.37	47.2%	3.83	45.7%	22.15	16.2%	2.54	86.1%
100	6.70	44.1%	5.14	43.7%	24.50	14.2%	1.56	91.9%
101	7.47	42.8%	4.96	37.7%	24.79	15.0%	2.51	87.3%
102	7.32	41.8%	4.88	38.7%	25.47	13.7%	2.44	88.1%
103	6.13	39.9%	4.33	39.8%	22.72	17.4%	1.80	90.2%
104	6.43	41.1%	4.69	42.3%	22.46	15.7%	1.74	90.2%
105	6.10	45.3%	5.35	44.1%	24.61	12.1%	0.75	96.1%
106	6.63	43.4%	5.26	43.5%	25.80	9.5%	1.37	93.3%
107	7.59	43.7%	6.28	42.4%	26.23	11.6%	1.31	93.4%
108	8.19	39.9%	5.83	25.2%	25.91	18.1%	2.36	88.2%
109	7.84	42.5%	5.74	26.0%	26.02	18.7%	2.10	89.6%
110	7.44	44.1%	4.44	45.5%	25.59	25.6%	3.00	85.8%
111	6.62	43.8%	5.12	26.6%	25.22	14.8%	1.50	92.5%
112	6.26	44.6%	5.21	29.1%	23.45	21.5%	1.05	94.2%
113	6.59	43.8%	4.05	44.7%	24.36	15.8%	2.54	87.5%
114	6.53	42.6%	3.90	39.3%	23.58	19.1%	2.63	86.6%
115	6.71	44.9%	5.01	45.4%	25.04	13.8%	1.70	91.5%
116	6.13	41.2%	4.59	46.4%	21.35	11.0%	1.54	90.8%
117	6.10	47.5%	5.05	44.1%	22.81	15.8%	1.05	94.1%
118	5.80	45.2%	5.03	45.3%	21.66	13.4%	0.77	95.4%
119	6.72	42.5%	5.19	44.4%	21.91	12.2%	1.53	90.8%
120	5.80	40.3%	3.61	38.9%	21.10	13.4%	2.19	87.5%
121	6.71	41.0%	4.95	42.8%	22.18	13.0%	1.76	89.8%
122	6.61	43.3%	4.64	36.4%	26.78	21.2%	1.97	91.1%
123	6.66	44.3%	5.06	29.2%	25.51	15.7%	1.60	92.2%
124	6.43	44.7%	4.79	28.8%	24.97	17.1%	1.64	91.9%
125	6.73	45.1%	4.59	49.5%	26.46	14.6%	2.14	90.2%
126	6.66	38.3%	4.53	37.7%	22.70	17.2%	2.13	88.3%
127	6.63	37.9%	3.40	39.2%	20.00	16.5%	3.23	80.5%
128	6.63	43.8%	3.25	49.9%	24.28	15.1%	3.38	83.9%
129	7.07	43.0%	3.08	46.4%	21.63	18.5%	3.99	78.5%
130	7.36	45.4%	3.15	52.2%	22.66	17.6%	4.21	78.4%
131	7.10	44.2%	3.92	45.8%	23.86	24.5%	3.18	84.1%
132	7.26	36.8%	3.14	44.1%	20.46	24.3%	4.12	76.2%
133	6.95	43.9%	4.50	43.0%	23.66	24.2%	2.45	87.2%

Control Flotation Banks Performance

	Float Feed		Float Con		Float Tails		Upgraded SiO2	Weight Recovery
Test	Silica	Solids	Silica	Solids	Silica	Solids		
1	5.46	44.73	3.98	52.03	15.29	18.43	1.48	86.9%
2	5.72	45.60	3.77	59.45	10.25	21.95	1.95	69.9%
3	5.12	33.70	3.41	45.90	13.44	18.90	1.71	83.0%
4	5.40	37.50	3.47	51.60	12.48	21.30	1.93	78.6%
5	5.22	47.40	4.30	48.20	19.42	17.30	0.92	93.9%
6	5.28	42.30	4.03	46.70	18.32	20.00	1.25	91.3%
7	5.63	26.60	2.40	43.80	10.29	15.80	3.23	59.1%
8	6.04	39.10	2.95	38.70	10.90	17.10	3.09	61.1%
9	5.82	31.60	3.77	36.10	13.18	17.80	2.05	78.2%
10	6.08	43.60	4.76	43.70	18.73	20.50	1.32	90.6%
11	6.02	28.00	2.81	51.80	8.81	10.50	3.21	46.5%
12	6.08	30.10	2.52	49.30	8.62	10.00	3.56	41.6%
13	5.49	43.60	3.46	46.10	16.64	11.80	2.03	84.6%
14	5.02	39.90	2.59	44.90	14.05	11.20	2.43	78.8%
15	5.55	44.61	3.54	49.33	14.03	21.18	2.01	80.8%
16	5.42	29.30	2.43	39.80	11.85	19.90	2.99	68.3%
17	6.11	37.70	3.82	42.00	16.50	20.50	2.29	81.9%
18	6.18	33.40	2.88	36.50	14.75	12.00	3.30	72.2%
19	6.26	28.40	3.28	38.10	14.93	12.40	2.98	74.4%
20	4.92	17.80	1.88	18.30	9.52	7.40	3.04	60.2%
21	6.21	21.10	3.19	29.20	10.30	14.00	3.02	57.5%
22	6.43	38.81	2.82	49.96	14.32	11.85	3.61	68.6%
23								
24								
25	5.54	42.29	3.83	42.08	17.38	7.11	1.71	87.4%
26	5.32	39.70	3.59	40.85	21.50	1.03	1.73	90.3%
27	5.15	40.23	3.07	43.45	15.49	23.03	2.08	83.3%
28	5.84	42.99	3.89	47.10	17.08	25.32	1.95	85.2%
29	5.62	41.30	3.70	45.20	16.23	24.80	1.92	84.7%
30	6.15	40.60	4.09	43.60	15.95	22.10	2.06	82.6%
31	6.82	37.10	4.50	44.50	18.54	23.00	2.32	83.5%
32	5.79	40.96	3.22	44.38	17.39	20.66	2.57	81.9%
33	6.01	28.60	2.79	44.80	8.14	17.20	3.22	39.8%
34	5.51	29.50	2.06	48.60	7.42	19.10	3.45	35.6%
35	6.39	29.90	1.81	52.90	7.80	21.00	4.58	23.5%
36	5.95	40.41	3.94	43.81	17.73	22.35	2.01	85.4%
37	5.71	42.20	3.79	45.10	17.80	22.80	1.92	86.3%
38	5.77	44.70	3.98	45.30	17.39	22.20	1.79	86.7%
39	5.35	42.70	3.18	48.10	14.19	16.90	2.17	80.3%
40	4.79	40.80	2.58	47.90	12.35	20.00	2.21	77.4%
41	4.67	36.50	2.51	40.50	11.64	19.70	2.16	76.3%
42	5.55	43.02	3.84	46.89	16.97	20.43	1.71	87.0%
43	5.50	41.00	3.30	47.90	15.18	21.90	2.20	81.5%
44	5.13	46.00	3.97	48.60	6.45	18.10	1.16	53.2%
45	5.94	44.00	4.31	47.00	20.21	20.90	1.63	89.7%
46	6.01	41.91	3.44	48.35	16.49	18.62	2.57	80.3%

Control Flotation Banks Performance								
	Float Feed		Float Con		Float Tails		Upgraded SiO2	Weight Recovery
Test	Silica	Solids	Silica	Solids	Silica	Solids		
47	5.80	26.30	2.77	45.70	12.26	19.50	3.03	68.1%
48	6.23	30.10	3.02	44.70	16.23	15.30	3.21	75.7%
49	5.44	29.80	2.66	36.70	14.61	14.50	2.78	76.7%
50	5.84	39.64	3.44	46.81	16.51	20.15	2.40	81.6%
51	5.34	37.39	3.33	41.33	18.69	15.65	2.01	86.9%
52	5.74	43.26	3.73	47.43	19.55	18.30	2.01	87.3%
53	5.57	43.57	3.24	54.52	18.75	17.09	2.33	85.0%
54	5.91	42.51	3.72	50.60	13.44	23.90	2.20	77.4%
55	5.14	33.78	2.51	33.44	15.29	24.46	2.63	79.4%
56	4.96	42.40	4.14	50.60	17.75	15.80	0.82	94.0%
57	4.88	3.97	2.37	50.00	12.79	15.40	2.51	75.9%
58	4.95	39.30	2.81	45.10	14.21	13.20	2.14	81.2%
59	5.24	39.82	3.54	41.37	18.62	15.13	1.70	88.7%
60	5.15	41.98	3.02	48.01	14.37	13.42	2.13	81.2%
61	4.89	44.77	3.43	46.47	15.90	18.09	1.46	88.3%
62	5.11	38.94	3.27	42.07	14.45	14.16	1.84	83.5%
63								
64								
65	5.56	41.46	2.89	51.12	12.62	17.82	2.67	72.6%
66	5.06	33.15	2.42	35.95	11.48	17.60	2.64	70.9%
67	5.13	36.00	2.71	35.60	13.33	15.10	2.42	77.2%
68	4.90	38.70	3.12	37.40	17.76	14.10	1.78	87.8%
69	5.07	35.30	2.62	33.10	14.64	20.10	2.45	79.6%
70	4.82	39.89	2.07	50.83	11.28	19.50	2.75	70.1%
71	5.02	37.70	2.00	47.30	8.62	20.60	3.02	54.4%
72	4.72	36.70	2.36	39.70	12.86	19.20	2.36	77.5%
73								
74	5.78	45.77	3.84	48.75	18.92	18.55	1.94	87.1%
75	5.91	42.70	3.24	48.10	11.91	15.90	2.67	69.2%
76	5.61	45.80	4.05	49.10	20.07	17.10	1.56	90.3%
77	5.82	43.70	3.92	48.20	20.00	19.60	1.90	88.2%
78								
79								
80	5.37	19.60	2.75	49.65	13.27	19.60	2.62	75.1%
81	6.37	36.86	3.67	43.15	23.58	12.60	2.70	86.4%
82	6.36	36.20	3.83	39.20	24.35	14.10	2.53	87.7%
83	5.56	18.90	2.14	19.40	12.63	15.10	3.42	67.4%
84	5.26	36.00	3.95	33.20	19.87	13.90	1.31	91.8%
85								
86								
87								
88	5.36	40.03	3.70	49.47	14.84	18.21	1.66	85.1%
89	5.98	25.30	2.38	50.30	8.65	19.20	3.60	42.6%
90	5.22	33.80	3.89	42.50	16.68	13.90	1.33	89.6%
91	5.47	43.10	3.10	48.70	13.01	17.30	2.37	76.1%
92	5.24	28.35	3.90	30.02	21.22	11.04	1.34	92.2%

Control Flotation Banks Performance								
	Float Feed		**Float Con**		**Float Tails**		**Upgraded SiO2**	**Weight Recovery**
Test	Silica	Solids	Silica	Solids	Silica	Solids		
93	4.87	27.81	3.24	28.71	18.87	11.48	1.63	89.6%
94	5.08	31.06	3.97	31.65	20.92	9.22	1.11	93.5%
95	5.08	15.64	4.12	16.12	22.12	8.33	0.96	94.6%
96	5.20	26.37	3.45	30.65	18.18	11.30	1.75	88.1%
97	4.98	29.14	3.51	28.82	18.56	11.03	1.47	90.2%
98	5.44	28.28	3.31	31.72	18.92	12.06	2.13	86.4%
99	5.67	28.44	3.10	31.75	18.33	12.52	2.56	83.2%
100	5.45	28.45	3.67	31.79	21.04	11.33	1.78	89.8%
101	5.39	29.35	3.53	28.21	20.84	11.75	1.86	89.3%
102	5.28	23.02	2.74	25.02	17.22	12.46	2.54	82.5%
103	4.85	29.78	3.71	29.85	24.96	8.70	1.14	94.7%
104	5.03	27.44	3.58	27.84	22.19	7.30	1.45	92.2%
105	4.96	27.64	4.08	28.21	25.97	9.63	0.87	96.0%
106	5.05	29.95	3.75	30.65	22.90	9.96	1.30	93.2%
107	5.31	29.35	3.15	32.56	20.17	10.74	2.16	87.3%
108	5.28	27.53	2.83	27.40	15.93	10.95	2.45	81.3%
109	5.19	27.00	3.17	28.57	19.19	11.11	2.02	87.4%
110	5.32	30.49	3.34	35.17	18.79	11.17	1.98	87.2%
111	5.41	26.87	3.36	30.66	18.31	8.88	2.05	86.3%
112	5.23	26.87	4.72	21.42	17.47	8.10	0.51	96.0%
113	5.27	26.59	3.15	28.97	18.67	11.24	2.12	86.3%
114	5.53	25.82	3.34	27.02	21.01	12.11	2.19	87.6%
115	5.29	27.37	3.44	28.33	21.11	10.81	1.85	89.5%
116	5.23	29.81	3.81	32.69	19.32	10.32	1.42	90.9%
117	5.04	28.17	3.36	31.72	18.00	10.95	1.68	88.5%
118	5.16	28.64	3.67	31.55	18.78	9.28	1.49	90.1%
119	5.20	27.47	3.47	29.98	17.50	11.16	1.72	87.7%
120	4.60	14.24	2.39	16.06	13.33	8.29	2.21	79.8%
121	5.84	10.69	3.42	19.32	16.37	8.10	2.42	81.3%
122	5.01	16.01	3.95	14.30	18.31	10.56	1.06	92.6%
123	5.68	25.70	3.68	29.60	16.87	13.41	2.00	84.8%
124	5.38	28.91	3.54	34.05	17.36	12.48	1.84	86.7%
125	5.60	30.25	3.58	36.20	17.40	13.14	2.02	85.4%
126	5.75	26.91	3.41	32.80	18.78	13.55	2.34	84.8%
127	5.93	29.75	4.10	33.39	19.41	11.94	1.83	88.0%
128	5.99	30.11	4.07	34.90	15.75	17.65	1.93	83.5%
129	6.02	27.24	3.22	32.46	16.29	13.36	2.80	78.6%
130	5.96	29.58	3.80	34.50	16.69	13.62	2.17	83.2%
131	5.70	30.15	3.90	35.04	14.06	12.84	1.79	82.3%
132	5.50	29.13	3.31	33.73	13.44	13.74	2.20	78.3%
133	5.96	25.93	3.80	31.42	16.73	13.43	2.17	83.3%

Pre-classification Flotation Feed Size Distribution - % Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
15	99.5	98.0	90.5	69.5	39.0	18.0
22	99.5	98.5	92.5	73.5	43.5	21.5
25	99.5	98.0	91.5	70.5	42.5	19.5
26	99.5	98.0	90.0	67.5	39.5	17.5
27	99.5	98.5	92.5	71.0	38.5	18.0
28	99.5	98.5	91.5	71.5	41.0	17.5
32	99.5	98.5	92.5	77.0	49.5	23.0
36	99.5	98.0	91.0	71.5	39.0	18.0
42	99.5	98.5	92.0	71.5	45.0	22.0
46	99.5	98.5	92.0	73.0	42.5	18.5
50	99.5	98.5	91.5	72.0	42.0	18.0
51	99.5	98.0	91.0	70.5	39.5	17.0
51	99.5	98.5	92.0	71.5	42.0	22.0
53	99.5	98.0	91.0	70.0	40.0	18.5
54	99.5	98.0	91.5	73.0	43.0	20.5
56	99.5	98.0	90.5	69.5	41.0	20.5
59	99.5	98.0	91.0	70.5	42.5	22.0
60	99.5	98.5	92.5	71.0	43.0	20.5
61	99.5	98.5	91.5	68.5	37.5	18.5
63	99.5	98.5	91.5	70.0	40.0	18.0
65	99.5	98.5	92.5	73.0	43.0	23.0
66	99.5	98.5	92.5	73.0	42.5	21.5
70	99.5	98.5	90.5	68.0	41.5	20.0
73	99.5	98.5	92.0	71.0	42.5	23.0
74	99.5	98.5	92.0	72.5	44.5	22.0
78	99.5	98.5	91.0	70.5	41.5	21.5
79	99.5	98.5	92.0	71.0	43.0	22.0
80	99.5	98.5	92.5	72.0	44.0	23.0
81	99.5	98.5	93.0	74.0	44.0	24.5
85	99.5	98.5	92.0	71.5	43.0	22.0
86	99.5	98.5	91.0	69.5	40.5	20.0
87	100.0	99.0	92.5	71.5	43.0	20.5
88	99.5	98.5	92.0	73.0	45.5	22.0

Pre-classification Flotation Concentrate Size Distribution - % Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
15	99.0	97.5	92.0	68.5	34.0	14.5
22	100.0	99.0	94.5	72.5	40.5	19.0
25	99.0	97.5	92.0	70.5	38.5	17.5
26	99.5	98.0	91.0	69.5	36.0	16.5
27	99.5	98.0	93.0	72.0	38.0	16.5
28	99.5	98.0	93.0	73.0	36.0	14.0
32	99.0	98.0	93.5	78.0	46.5	20.5
36	99.5	98.0	93.5	74.5	37.5	14.0
42	99.5	98.5	93.5	72.5	38.5	15.0
46	99.0	98.0	93.5	72.5	38.5	15.5
50	99.5	98.5	93.5	71.5	37.0	15.5
51	99.0	98.0	92.0	70.0	36.0	17.5
51	99.5	98.0	92.5	71.0	36.0	16.0
53	99.5	98.0	91.5	68.0	35.5	17.0
54	99.5	98.5	93.5	72.0	39.5	16.5
56	99.0	97.5	90.0	66.5	38.0	18.5
59	99.5	98.0	91.5	70.0	41.0	19.5
60	99.5	98.5	92.5	71.0	38.5	18.0
61	99.5	98.5	92.0	68.0	36.0	17.5
63	99.5	98.5	91.5	68.0	37.5	16.0
65	99.5	98.5	93.0	72.0	39.0	18.5
66	100.0	99.0	93.5	72.0	39.5	18.0
70	99.5	98.0	91.0	67.5	37.0	17.5
73	99.5	98.5	93.0	71.0	38.0	18.0
74	99.5	98.5	93.5	73.5	40.0	19.5
78	99.5	99.0	92.0	69.5	38.0	20.0
79	99.5	98.5	92.5	70.5	39.5	20.5
80	99.5	98.5	93.5	72.0	38.5	17.5
81	99.5	98.5	93.5	72.0	41.0	21.5
85	99.5	98.5	93.0	71.5	41.0	21.0
86	99.5	98.5	92.0	68.5	38.5	19.0
87	100.0	99.0	93.5	72.5	43.0	20.5
88	99.5	98.5	93.0	72.0	43.0	20.5

Pre-classification Flotation Tails Size Distribution - % Passing Mesh Size						
Test	100	150	200	270	400	500
15	99.5	97.0	83.0	60.0	42.5	30.5
22	99.5	98.0	86.0	64.0	45.5	32.0
25	99.5	97.5	85.0	62.0	45.5	34.0
26	99.5	97.5	83.5	60.5	44.5	33.0
27	99.5	98.0	85.0	62.0	44.0	33.0
28	100.0	98.5	86.5	65.5	49.0	35.0
32	100.0	98.5	86.5	63.5	46.0	33.0
36	100.0	98.5	85.5	65.5	47.5	33.5
42	99.5	98.5	87.5	68.5	53.0	39.0
46	100.0	98.5	86.5	65.5	48.5	35.0
50	99.5	98.0	86.0	65.5	49.0	34.0
51	99.5	98.0	85.0	62.0	45.5	35.0
51	100.0	98.5	85.5	63.5	48.5	38.5
53	99.8	97.5	83.5	61.5	46.0	36.5
54	99.5	98.0	86.5	68.0	51.5	37.0
56	99.5	97.5	84.5	63.0	47.0	37.0
59	99.5	98.0	86.5	67.0	51.0	41.5
60	99.5	98.0	86.5	65.0	49.5	38.5
61	100.0	98.5	86.0	66.0	52.0	44.5
63	99.5	98.0	86.0	63.0	45.0	35.0
65	99.5	98.5	86.5	64.0	46.0	35.5
66	99.5	98.0	86.5	66.0	49.0	38.5
70	99.5	98.0	85.0	63.5	49.0	38.5
73	99.5	98.0	86.0	65.5	51.5	41.0
74	99.5	98.0	85.5	64.0	49.0	38.5
78	99.5	98.0	86.0	65.5	51.0	41.5
79	99.5	98.0	85.5	62.0	46.0	36.5
80	99.5	98.0	86.0	63.0	48.0	38.5
81	99.5	98.0	87.5	67.0	49.0	38.0
85	100.0	98.5	85.0	62.5	46.5	35.5
86	99.5	98.5	89.5	71.0	56.0	47.5
87	100.0	98.5	85.5	63.5	47.5	36.0
88	100.0	99.0	90.5	73.5	57.5	46.0

Control Flotation Feed Size Distribution - % Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
15	100.0	99.5	96.0	84.5	67.0	54.0
22	99.5	98.5	94.0	80.5	64.0	51.0
25	99.5	98.5	94.5	81.5	64.5	51.5
26	99.5	99.0	95.5	84.5	66.5	52.0
27	100.0	99.5	96.0	83.5	65.5	52.0
28	100.0	99.5	96.5	86.0	67.0	53.5
32	99.5	99.0	95.5	84.5	67.5	53.5
36	99.5	99.0	95.0	82.5	65.5	53.0
42	100.0	99.5	96.5	87.0	70.5	57.0
46	100.0	99.5	96.0	85.5	69.5	56.5
50	100.0	99.5	96.5	86.5	68.0	55.0
51	100.0	99.5	96.0	84.0	67.5	55.5
52	100.0	99.0	95.5	84.5	67.5	55.0
53	99.5	98.5	94.0	82.0	65.0	51.5
54	99.5	99.0	95.5	85.0	69.0	55.5
54	99.5	99.0	95.5	85.0	69.0	55.5
56	99.5	99.0	93.5	79.5	63.5	51.0
59	99.5	99.0	94.5	82.0	66.5	53.5
60	100.0	99.5	95.5	82.5	66.0	53.0
61	100.0	99.5	95.5	84.5	67.5	54.0
63	99.5	99.0	93.5	78.5	62.0	49.5
65	100.0	99.5	96.5	85.5	68.5	55.5
66	99.5	99.0	96.0	85.0	67.5	54.5
70	100.0	99.5	96.0	84.5	67.5	55.0
74	100.0	99.5	95.5	82.5	66.0	53.5
80	100.0	99.5	96.0	85.5	68.0	54.5
81	100.0	99.5	96.0	83.0	67.0	55.0
88	99.5	99.0	95.5	84.5	68.5	54.5

Control Flotation Concentrate Size Distribution - % Passing Mesh Size						
Test	100	150	200	270	400	500
15	100.0	99.5	96.0	85.5	66.5	51.0
22	99.5	98.5	94.5	82.0	61.5	44.5
25	99.5	99.0	95.0	82.5	66.5	51.5
26	99.5	99.0	96.0	86.0	70.0	54.0
27	99.5	99.0	96.0	83.0	61.0	44.5
28	99.5	99.0	96.0	86.5	67.5	50.0
32	100.0	99.5	96.5	87.0	69.0	51.0
36	99.5	99.0	95.5	84.0	66.0	50.5
42	100.0	99.5	96.5	87.5	71.0	55.0
46	100.0	99.5	96.5	86.5	68.0	52.5
50	100.0	99.5	97.0	89.0	74.0	54.5
51	100.0	99.5	96.5	86.0	68.5	53.0
52	100.0	99.5	96.0	85.0	67.5	54.0
53	100.0	99.0	95.0	81.5	63.5	49.5
54	99.5	98.5	95.0	85.5	66.0	50.5
54	100.0	99.0	96.0	87.0	68.5	52.5
56	99.5	99.0	94.0	81.0	66.5	46.5
59	100.0	99.5	95.0	83.5	65.5	49.5
60	99.5	99.0	95.0	81.5	64.5	49.0
61	100.0	99.5	95.5	84.0	65.0	50.5
63	99.5	98.5	92.5	79.0	60.0	44.5
65	99.5	99.0	96.0	85.5	66.0	49.5
66	99.5	99.0	96.5	87.0	67.0	48.0
70	99.5	99.0	96.0	83.5	63.0	45.5
74	99.5	99.0	95.0	83.0	65.5	52.0
80	100.0	99.5	96.5	85.5	67.5	50.0
81	100.0	99.5	96.0	84.0	66.0	52.5
88	100.0	99.5	96.5	86.0	69.5	54.0

Control Flotation Tails Size Distribution - % Passing Mesh Size						
Test	**100**	**150**	**200**	**270**	**400**	**500**
15	99.5	98.5	93.5	83.5	73.0	65.0
22	100.0	98.5	92.0	81.5	72.5	66.0
25	100.0	99.5	96.5	90.0	82.0	75.0
26						
27	100.0	99.0	92.5	82.0	72.5	66.0
28	100.0	99.5	94.5	85.0	74.5	66.5
32	100.0	99.5	94.0	83.5	74.5	68.0
36	100.0	99.0	93.5	83.5	74.5	68.0
42	100.0	99.5	96.0	88.0	79.0	72.0
46	100.0	99.0	93.0	81.5	71.5	63.5
50	100.0	99.5	95.0	86.0	76.5	69.5
51	100.0	99.5	93.5	83.0	74.5	69.0
52	100.0	99.5	94.0	83.5	74.0	67.5
53	100.0	99.0	93.0	84.5	75.5	69.0
54	100.0	99.5	95.5	87.0	76.5	67.5
54	100.0	99.0	94.0	84.5	76.5	70.0
56	99.5	98.5	92.0	80.5	72.5	66.0
59	100.0	99.0	91.5	81.0	72.0	64.5
60	100.0	99.5	94.5	85.5	78.0	72.5
61	100.0	99.0	94.0	85.5	77.5	71.0
63	100.0	99.0	93.0	83.5	76.0	70.5
65	100.0	99.5	95.0	85.5	75.0	67.0
66	100.0	99.5	95.0	86.5	78.0	71.5
70	100.0	99.5	95.0	87.0	79.5	73.5
74	100.0	99.5	93.5	82.5	73.5	67.0
80	100.0	99.5	94.5	85.5	77.0	70.5
81	100.0	99.0	94.0	85.0	77.0	71.0
88	100.0	99.5	96.5	89.0	80.0	72.0