

Appendix A

Sand Wash and Dry Facility Equipment and Process Flow Diagrams

Total H.P. 7070

Material : 100 lbs/cu.ft.

Canadian Premium Sand

Silica Sand Processing Plant

Wanipigow, MB Site EQUIPMENT LISTING WITH OPERATIONG PARAMETERS

ltem		Equipment	H.P.	Design	Operating	Control
				TPH	TPH	
Process Equi	oment - Primary	/ Wet Plant				
	0	0	0	n/a	n/a	>30% moisture
	VGF101	62" x 24' Long VGF	50	n/a	n/a	>30% moisture
	0	0	0	n/a	n/a	>30% moisture
	CR101	5165LP Horizontal Shaft Impactor	250	n/a	n/a	>30% moisture
	0	0	0	n/a	n/a	>30% moisture
	0	0	0	n/a	n/a	>30% moisture
	C101	54" x 35' front discharge conveyor	30	n/a	n/a	>30% moisture
	0	0	0	n/a	n/a	>30% moisture
	STU101	Portable Chassis with hopper extens	0	n/a	n/a	>30% moisture
	C102	42" x 100' Portable jumper Conveyo	20	600	600	>30% moisture
	C103	42" x 100' Portable jumper Conveyo	20	600	600	>30% moisture
	C104	42" x 100' Portable jumper Conveyo	20	600	600	>30% moisture
	C105	42" x 100' Portable jumper Conveyo	20	600	600	>30% moisture
	C106	42" x 100' Portable jumper Conveyo	20	600	600	>30% moisture
	C107	42" x 100' Portable jumper Conveyo	20	600	600	>30% moisture
	FH101	Feed Hopper Skid - Portable 9' x 16	0	600	600	>30% moisture
	BF101	42" x 28' Belt Feeder	50	600	600	>30% moisture
	C108	42" x 125' portable conveyor	40	600	600	>30% moisture
	0	Hydraulic Raise	5	n/a	n/a	>30% moisture
	SCR101	5' x 12' Deister Screen	15	600	600	>30% moisture
	0	Screen Media	0	n/a	n/a	>30% moisture
	SU101	Sump	0	n/a	n/a	>65% moisture
	0	Small Sump Feedwell - rubber lined	0	n/a	n/a	>65% moisture
	0	Sump Level sensor	0	n/a	n/a	>65% moisture
	0	6" control valve - electric actuated b	0	n/a	n/a	>65% moisture
	0	14" x 5' suction hose	0	n/a	n/a	>65% moisture
	SP101	14x12 Slurry Pump - Rubber	0	n/a	n/a	>65% moisture
	0	Pump Stand	0	n/a	n/a	>65% moisture
	0	400 hp drive package	400	n/a	n/a	>65% moisture
	0	12" Dia. slurry hose	0	n/a	n/a	>65% moisture
	BP101	14x12 Slurry Pump - Rubber Booste	0	n/a	n/a	>65% moisture
	0	Pump Stand	0	n/a	n/a	>65% moisture
	0	400 np drive package	400	n/a	n/a	>65% moisture
	0	12" Dia. siurry nose	0	n/a	n/a	>65% moisture
	STU102	Skid structure to support the above	- 0	n/a	n/a	n/a
	PW-C03	36" X 25' Collection Conveyor	7.5	100	/5	>30% moisture
		Modification to supports and mounti	75	n/a	n/a	
	PVV-C04	30 X 100 Idulai Slackel	7.5	100	75	>30% moisture
	0	10 DR11 HDPE Black Plastic Pipe	0	n/a	n/a	11/a
	0	20 DRTT HDFE Black Flastic Fipe	0	11/a	n/a	
	0	Decant system pumps	0	11/a	n/a	
	0	Decant system pumps	0	n/a	n/a	
	0	Demo and relocate existing primary	0	n/a	n/a	>65% moisture
	0		0	n/a	n/a	
	0	0	0			
	0	0	0			
	0	0	0			
	0	0	0			
	0	0	0			
	0	0	0			
	0	Ũ	0			
	0	0	0			
	0	č	0			
	U	U	0			



Processing Eq	uipment-Thick	ener System				
	WT101	Water Tank	0	n/a	n/a	n/a
	0	Piping and valvesThickener system	0	n/a	n/a	n/a
	0	16" DR11 HDPE Black Plastic Pipe	0	n/a	n/a	n/a
	0	20" DR11 HDPE Black Plastic Pipe	0	n/a	n/a	n/a
	BWP101	Booster Water Pump - Rubber Boos	0	n/a	n/a	n/a
	0	Pump Stand	0	n/a	n/a	n/a
	0	5 hp drive package	5	n/a	n/a	n/a
	0	slurry hose	0	n/a	n/a	n/a
	DF101	Dry Floc Feed System	0	n/a	n/a	n/a
	SF101	Screw Feeder	2	n/a	n/a	n/a
	0	0	0	n/a	n/a	n/a
	MT101	Floc - Mix Tank	0	n/a	n/a	n/a
	0	Mixer	2	n/a	n/a	n/a
	0	0	0	n/a	n/a	n/a
	MP101	Mix Tank - Transfer Pump	0	n/a	n/a	n/a
	0	Pump Stand	0	n/a	n/a	n/a
	0	5 hp drive package	5	n/a	n/a	n/a
	0	Slurry hose	0	n/a	n/a	n/a
	AT101	Floc - Aging Tank	0	n/a	n/a	n/a
	0	Mixer	0	n/a	n/a	n/a
	0	0	0	n/a	n/a	n/a
	AP101	Age Tank - Transfer Pump	0	n/a	n/a	n/a
	0	Pump Stand	0	n/a	n/a	n/a
	0	5 hp drive package	5	n/a	n/a	n/a
	0	Slurry hose	0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	CAT101	CAT Tank	0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	CP102	CAT - Transfer Pump	0	n/a	n/a	n/a
	0	Pump Stand	0	n/a	n/a	n/a
	0	2 hp drive package	2	n/a	n/a	n/a
	0	Slurry hose	0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	1HK101	PHOENIX HIFLO [™] THICKENER, N	0	n/a	n/a	n/a
	0	Drive Motor	7.5	n/a	n/a	n/a
	0	Rake Motor	2	n/a	n/a	n/a
	0	PHOENIX Auto-Chem Dose Control	0	n/a	n/a	n/a
	0	PHOENIX Density Control System	0	n/a	n/a	n/a
	0	Phoenix Model D3400-1371 Dry Ch	0	n/a	n/a	n/a
	U	0	U	n/a	n/a	n/a
	U	0	U	n/a	n/a	n/a
			0	n/a	n/a	n/a
	5P102	o x o Pump Undernow Pump – RUDI		n/a	n/a	n/a
	U		15	n/a	n/a	n/a

Process Equipm	ent - Wet Plan	t				
	BLD-102	Building - Wet Plant	0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	PW-SU01	Sump	0	570	430	>65% moisture
	PW-SP01	Pump	0	570	430	>65% moisture
	0	Pump Stand	0	n/a	n/a	n/a
	0	250 hp drive package	250	570	430	>65% moisture
	0	Slurry hose	0	n/a	n/a	n/a
	0	0	0	n/a	n/a	n/a
	0	0	0	n/a	n/a	n/a
	PB101	Pump box	0	600	450	>65% moisture
	STU103	Structure For Pump Box	0	n/a	n/a	n/a
	0	Building Enclosure Modifications	0	n/a	n/a	n/a
	0	0	0	n/a	n/a	n/a
	PW-SCR01	8' X 20' SCREEN	25	570	430	>69% moisture
	0	Motor	25	n/a	n/a	n/a
	0	Media	0	n/a	n/a	n/a
	0	Structure	0	n/a	n/a	n/a
	PW-SU02	Sump	0	570	430	>69% moisture
	BP01	Booster Slurry Pump - Rubber Boos	0	570	430	>69% moisture
	0	Pump Stand	0	n/a	n/a	n/a
	0	250 hp drive package	250	n/a	n/a	n/a
	0	slurry hose	0	n/a	n/a	n/a
	SL-C05	Transfer Conveyor	30	600	600	>30% moisture
	0		0	n/a	n/a	n/a
	SL-C06	Transfer Conveyor	30	600	600	>30% moisture
	SL-BS03	Belt Scale	0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	SL-C07	Stacking Conveyor	25	600	600	>30% moisture
	0	o y	0	n/a	n/a	n/a
	WP01	Water Pump - 5000gpm	0	n/a	n/a	n/a
	0	Pump Stand	0	n/a	n/a	n/a
	0	300 hp drive package	300	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	WP02	Water Pump - 5000gpm	0	n/a	n/a	n/a
	0	Pump Stand	0	n/a	n/a	n/a
	0	300 hp drive package	300	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	WP101	Water Pump - 6500gpm	0	n/a	n/a	n/a
	0	Pump Stand	0	n/a	n/a	n/a
	0	200 hp drive package	300	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	WT-103	Water Tank	0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	PW-SU03	Sump	0	26	20	>98% moisture
	SWP03	Water Pump - ??gpm	0	26	20	>98% moisture
	0	Pump Stand	0	n/a	n/a	n/a
	0	? hp drive package	?	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	WP04	Water Pump - ??gpm	0	n/a	n/a	n/a
	0	Pump Stand	0	n/a	n/a	n/a
	0	? hp drive package	?	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	WP05	Water Pump - 150pm	0 0	n/a	n/a	n/a
	0	Pump Stand	n n	n/a	n/a	n/a
	2		0	- /-	r./-	1//a
	0	э пр опуе раскаде	3	n/a	n/a	n/a ,
	0		U	n/a	n/a	n/a
	U		U	n/a	n/a	n/a

Process Equipment - Wet Plant	t				
SW-CY01	SS Cyclone	0	570	430	>69% moisture
0	Overflow Pipe	0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
SW-CY02	SS Cvclone	0	570	430	>69% moisture
0	Overflow Pipe	0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
	SS Cyclona (2000 anm)	0	570	170	>60% moisturo
300-0103	Overflow Dine	0	570	430	
0	Overnow Pipe	0	n/a	n/a	11/a
0		0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
SW-DS01	Hydrosizer - 10x10	0	570	430	>69% moisture
0		0	n/a	n/a	n/a
SW-DS02	Hydrosizer - 10x10	0	570	430	>69% moisture
0		0	n/a	n/a	n/a
SW-DS03	Hydrosizer - 12x12	0	570	430	>69% moisture
0	Cyclone and Hydrosizer Structure	0	n/a	n/a	n/a
0	, ,	0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
0		0	n/a	n/a	n/a n/a
0		0	n/a	n/a	1//a p/o
0		0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
SU101	Slurry Sump - 7000gal Capacity	0	395	300	>30% moisture
SP101	Slurry Pump	0	395	300	>30% moisture
0	Pump Stand	0	n/a	n/a	n/a
0	300 hp drive package	300	n/a	n/a	n/a
0	eee np ante paenage	0	n/a	n/a	n/a
5 5 7 102	Shurry Dump	0	205	200	> 20% maintura
3F 102	Siury Fump Dump Stand	0	395	300	
0	Pump Stand	0	n/a	n/a	n/a
0	300 hp drive package	300	n/a	n/a	n/a
0		0	n/a	n/a	n/a
SW-CY04	SS Cyclone	0	570	430	>69% moisture
0	Overflow Pipe	0	n/a	n/a	n/a
SW-CY05	SS Cyclone	0	570	430	>69% moisture
0	Overflow Pipe	0	n/a	n/a	n/a
0	·	0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
SW-DW/S05	Dewatering Screen	10	570	430	>69% moisture
0	Motor	10	5/0 n/o	+30 n/a	
0	Noto	10	n/a	n/a	11/a n/a
0	Dewateing Screen Structure	0	n/a	n/a	n/a
SW-SU01	Overflow Sump	0	n/a	n/a	n/a
SW-P01	Slurry Water Pump	0	n/a	n/a	n/a
0	Pump Stand	0	n/a	n/a	n/a
0	150 hp drive package	150	n/a	n/a	n/a
0		0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
SI -C06	Transfer Conveyor	30	600	600	>30% moisture
0		0	n/a	n/a	n/a
SI COO	Transfor Convoyor	30	600	600	> 20% maistura
SL-C09		30	000	000	
SL-B304		0	n/a	11/a	
SL-010	Stacking Conveyor	25	600	600	>30% moisture
0		0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
0		0	n/a	n/a	n/a
WT102	Water Tank - 3000gal	0	n/a	n/a	n/a
0	č	0	n/a	n/a	n/a
WP102	Water Pump - 450gpm	0	n/a	n/a	n/a
0	Pump Stand	ů N	n/a	n/a	n/a
0	30 hp drive package	20 2	n/9	n/a	n/a
0	ou ny unive paolage	50	11/a	11/a	11/a

Process Equip	ment - Wet Plar	nt				
	BLD-103	Building - Wet Plant	0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	SW-CY06	SS Cyclone	0	26	20	>98% moisture
	0	Overflow Pipe	0	n/a	n/a	n/a
	SW-CY07	SS Cyclone	0	26	20	>98% moisture
	0	Overflow Pipe	0	n/a	n/a	n/a
	SW-CY08	SS Cyclone	0	26	20	>98% moisture
	0	Overflow Pipe	0	n/a	n/a	n/a
	SW-CY09	SS Cyclone	0	26	20	>98% moisture
	0	Overflow Pipe	0	n/a	n/a	n/a
	SW-CY10	SS Cyclone	0	26	20	>98% moisture
	0	Overflow Pipe	0	n/a	n/a	n/a
	SW-CY11	SS Cyclone	0	26	20	>98% moisture
	0	Overflow Pipe	0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	SW-DWS04	Dewatering Screen	10	51	38	>96% moisture
	0	Motor	10	n/a	n/a	n/a
	0	Dewateing Screen Structure	0	n/a	n/a	n/a
	SU301	Overflow Sump	0	51	38	>96% moisture
	SUP301	Slurry Water Pump	0	51	38	>96% moisture
	0	Pump Stand	0	n/a	n/a	n/a
	0	??? hp drive package	150	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	C301	Stacking Conveyor	?	28	21	>30% moisture
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	PW-EH01	Ehouse	0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	PW-EH02	Ehouse	0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a
	0		0	n/a	n/a	n/a

Decanting Circuit-	Section 20	00					
S	SU203		6000 gallon sump	0	n/a	n/a	n/a
		0	Large Sump Feedwell - rubber lined	0	n/a	n/a	n/a
		0	Level Sensor	0	n/a	n/a	n/a
		0	12" x 5' suction hose	0	n/a	n/a	n/a
S	SP203		12x14 Slurry Pump - Rubber	0	480	450	>100% moisture
		0	350 hp drive package	350	n/a	n/a	n/a
		0	nump stand	0	n/a	n/a	n/a
		0	10x14 Lined reducer	0	n/a	n/a	n/a
		0	14" Dia slurry bose	0	n/a	n/a	n/a
		0	16" DB11 HDBE Black Blactic Bing	0	n/a	n/a	n/a
		0	Two wow manifold rubbar lined	0	n/a	n/a	11/a n/a
		0		0	n/a	n/a	11/a
		0		0	n/a	n/a	n/a
-		0	8° pinch valve	0	n/a	n/a	n/a
	JY201			0	n/a	n/a	n/a
C	Y202	_	33" SS Cyclone	0	n/a	n/a	n/a
		0	14" SSC overflow pipe	0	n/a	n/a	n/a
		0	14" SSC overflow pipe	0	n/a	n/a	n/a
		0	Cyclone overflow box, unlined (2 cyc	0	n/a	n/a	n/a
		0	16" DR17 HDPE Black Plastic Pipe	0	n/a	n/a	n/a
S	SW-DWS0)1	Customer Provided 6x12 Dewatering	10	240	225	>100% moisture
		0	Support Structure for Dewatering Sc	0	n/a	n/a	n/a
S	SW-DWS0)2	Customer Provided 6x12 Dewatering	10	240	225	>100% moisture
		0	Spray Bars	0	n/a	n/a	n/a
S	SU204		7000 gallon sump	0	n/a	n/a	n/a
		0	Large Sump Feedwell - rubber lined	0	n/a	n/a	n/a
		0	Level Sensor	0	n/a	n/a	n/a
S	SP204		12x14 Slurry Pump - Rubber	0	n/a	n/a	n/a
-		0	250 hp drive package	250	n/a	n/a	n/a
		0	numn stand	200	n/a	n/a	n/a
		0	10v18 Lined Reducer	0	n/a	n/a	n/a
		0		0	n/a	n/a	n/a
		0	18" DB17 HDBE Black Blactic Bing	0	n/a	n/a	11/a n/a
c	211205	0	750 gollon sump	0	n/a	n/a	11/a n/a
			Avd Slurge Dump Bubbor	0	n/a	n/a	11/a
2	5P205	~	4x4 Siully Pullip - Rubbel	0	n/a	n/a	n/a
		0	15 np drive package	15	n/a	n/a	n/a
		0	4" DR17 HDPE Black Plastic Pipe	0	n/a	n/a	n/a
C	200		36x325' I ripper conveyor with electr	25	480	450	>30% moisture
_		0	Tripper Drive	5	n/a	n/a	n/a
F	RC201		36" X 65'Reclaimer boom type Conv	30	240	225	>6% moisture
		0	Carriage Drive	3	n/a	n/a	n/a
		0	Hoist Trolley Drive	15	n/a	n/a	n/a
F	RC202		36" X 65'Reclaimer boom type Conv	30	240	225	>6% moisture
		0	Carriage Drive	3	n/a	n/a	n/a
		0	Hoist Trolley Drive	15	n/a	n/a	n/a
S	SL-FH01		Customer Provided Emergency Rec	0	600	500	>6% moisture
S	SL-BF01		Customer Provided Belt Feeder Cor	40	600	500	>6% moisture
		0	Lower Cover & Support	0	n/a	n/a	n/a
C	201		36" x 350' Collection Conveyor	25	300	250	>6% moisture
Ċ	202		36" x 196' Drver feed bin conveyor	50	300	250	>6% moisture
F	35201		Siemens-Milltronics MLIS Belt Scale	0	n/a	_00	n/a
-			Decanting Building 130' x 252' with t	0	n/a	n/a	n/a
L		0	Devatoring Scroop Structure	0	n/a	n/a	n/a
г		0	Drainage System (numps and nining	0	n/a	n/a	11/a n/a
L		^	Dialitage System (pumps and pipin)	0	n/a	n/a	11/a
-		0	6 water control valves	0	n/a	n/a	n/a
E	:H201		Enouse Structures, stairs & landing	0	n/a	n/a	n/a
		0	Rail for Track Support Steel on Recl	0	n/a	n/a	n/a
		0	Liners for cross bracing	0	n/a	n/a	n/a
		0	Walkway on opposite side of Trippe	0	n/a	n/a	n/a
		0	0	0	n/a	n/a	n/a
		0	0	0	n/a	n/a	n/a
		0	0	0	n/a	n/a	n/a
		0	0	0	n/a	n/a	n/a
		0	0	0	n/a	n/a	n/a
		0	0	0	n/a	n/a	n/a

Dry Circuit-Section 300						
FT301		250 Ton Feed Tank	0	300	250	>6% moisture
HS30 ²	I	High Level Sensor	0	n/a	n/a	n/a
LS301		Low Level Sensor	0	n/a	n/a	n/a
BF301		48" X 74' Feed Belt-250 tph 19.1' lift	40	300	250	>6% moisture
BS301		Siemens-Milltronics MUS Belt Scale	0	n/a	n/a	n/a
DRY3	01	Fluid Bed Dryer System	25	300	250	>6% moisture
MA30	1	Moisture Analyzer	0	n/a	n/a	n/a
FN301		Fan (Drying)	300	n/a	n/a	n/a
FN302	2	Fan (Cooling)	100	n/a	n/a	n/a
BH30 ⁷	l	Bag House	0	n/a	n/a	17,784 sq. ft. of media with a ratio of 4.2 :1 @ 75.000 CFM
AL301		Air Lock	1.5	n/a	n/a	>3% moisture-Enclosed
SC30 ²		Screw Conveyor	15	18	15	>3% moisture-Enclosed
SC302	2	Screw Conveyor	15	18	15	>3% moisture-Enclosed
FN303	3	Fan (Exhaust)	350	n/a	n/a	Enclosed in duct work
ES301		Exhaust Stack	0	n/a	n/a	54" dia x 76 ft tall from grade elevation
DP301	l	Dense Phase System	0	n/a	n/a	>3% moisture-Enclosed
51.00	. 0	Process Controls	0	n/a	n/a	n/a
	0	Engineering & Project Management	0	n/a	n/a	n/a
	0	Installation Review Start-up & Shin	0	n/a	n/a	n/a
	0	Pining	0	n/a	n/a	n/a
	0	Support	0	n/a	n/a	n/a
SC307	2	16"Dia x 21'-3" Screw Conveyor	75	n/a	n/a	n/a
BE301		18x8 x 107' Single Wide Bucket Ele	40	330	250	>3% moisture-Enclosed
	0	Work Platform w/Ladder	.0	n/a	_00	n/a
	0	Chute Work 16" x16" x 16' AR with F	0	n/a	n/a	n/a
FT302		40 Ton Feed Tank	0	330	250	>3% moisture-Enclosed
HS302	2	High Level Sensor	0	n/a	 n/a	n/a
1 \$302		l ow l evel Sensor	0	n/a	n/a	n/a
G301		16" Pneumatic Actuated gate	0	n/a	n/a	>3% moisture-Enclosed
	0	Chute Work 16" x16" x 15' AR with F	0	n/a	n/a	>3% moisture-Enclosed
G302	-	16" Pneumatic Actuated gate	0	n/a	n/a	>3% moisture-Enclosed
	0	Chute Work 16" x16" x 15' AR with F	0	n/a	n/a	>3% moisture-Enclosed
G303	Ū	16" Pneumatic Actuated gate	0	n/a	n/a	>3% moisture-Enclosed
	0	Chute Work 16" x16" x 15' AR with F	0	n/a	n/a	>3% moisture-Enclosed
G304	-	16" Pneumatic Actuated gate	0	n/a	n/a	>3% moisture-Enclosed
	0	Chute Work 16" x16" x 15' AR with I	0	n/a	n/a	>3% moisture-Enclosed
G305	-	16" Pneumatic Actuated gate	0	n/a	n/a	>3% moisture-Enclosed
	0	Chute Work 16" x16" x 15' AR with [0	n/a	n/a	>3% moisture-Enclosed
WBF3	01	30" X 32'-8" Weigh belt Feeder	3	75	50	>3% moisture-Enclosed
WBF3	02	30" X 12'-8" Weigh belt Feeder	3	75	50	>3% moisture-Enclosed
WBF3	03	30" X 10'-2" Weigh belt Feeder	3	75	50	>3% moisture-Enclosed
WBF3	04	30" X 12'-8" Weigh belt Feeder	3	75	50	>3% moisture-Enclosed
WBF3	05	30" X 32'-8" Weigh belt Feeder	3	75	50	>3% moisture-Enclosed
	0	Start-up	0	n/a	n/a	n/a
	0	PC Program & Cables	0	n/a	n/a	n/a
SCR3	01	Rotex 3180-4 Screen	20	75	50	>3% moisture-Enclosed
	0	Rotex Suspension Stand	0	n/a	n/a	n/a

Dry	Circuit-Section	on 300						
0	0		0	Screen Cloth	0	n/a	n/a	n/a
0	0		0	Chute Work 10" x10" x 22' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 22' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 26' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 26' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 24' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 24' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0	SCR302		Rotex 3180-4 Screen	20	75	50	>3% moisture-Enclosed
0	0		0	Rotex Suspension Stand	0	n/a	n/a	n/a
0	0		0	Screen Cloth	0	n/a	n/a	n/a
0	0		0	Chute Work 10" x10" x 22' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 22' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 26' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 26' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 24' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 24' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0	SCR303		Rotex 3180-4 Screen	20	75	50	>3% moisture-Enclosed
0	0		0	Rotex Suspension Stand	0	n/a	n/a	n/a
0	0		0	Screen Cloth	0	n/a	n/a	n/a
0	0		0	Chute Work 10" x10" x 22' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 22' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 26' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 26' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed

Dry	Circuit-Secti	on 300						
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 24' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 24' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0	SCR304		Rotex 3180-4 Screen	20	75	50	>3% moisture-Enclosed
0	0		0	Rotex Suspension Stand	0	n/a	n/a	n/a
0	0		0	Screen Cloth	0	n/a	n/a	n/a
0	0		0	Chute Work 10" x10" x 22' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 22' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 26' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 26' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 42' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Chute Work 10" x10" x 24' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0	000000	0	Chute Work 10" x10" x 24' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0	SCR305	~	Rotex 3180-4 Screen	20	75 ,	50	>3% moisture-Enclosed
0	0		0	Rotex Suspension Stand	0	n/a	n/a	n/a
0	U		U		0	n/a	n/a	n/a
0	0		U C	Chute Work 10" x10" x 22' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	U		U	Chute Work 10" x10" x 22' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	U		U	Chute Work 10" x10" x 26" AR with I	U	n/a	n/a	>3% moisture-Enclosed
0	0		U	Chute Work 10" x10" x 26" AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0		U O	Chule Work TO XTO X 42 AR with E	0	n/a	n/a	>3% INOISTURE-ENCLOSED
0	0		U O	Manual Cata	0	n/a	n/a	>3% moisture-Enclosed
0	0		0		0	n/a	n/a	>3% INVISIURE-ENCIOSED
0	0		U O	Manual Cata	0	n/a	n/a	>3% moisture-Enclosed
0	0		0	Manual Gate	0	n/a	n/a	>3% INDISTURE-ENCIOSED
0	0		0		0	n/a	n/a	>3% moisture-Enclosed
0	U		U	Gnute work TU XTU X 42 AR with I	0	n/a	n/a	>3% moisture-Enclosed

0 0 Manual Gate 0 n/a n/a >3% 0 0 0 Manual Gate 0 n/a n/a >3% 0 0 0 Manual Gate 0 n/a n/a >3% 0 0 0 Chute Work 10" x10" x 42' AR with I 0 n/a n/a >3%	moisture-Enclosed moisture-Enclosed moisture-Enclosed
0 0 Manual Gate 0 n/a >3% 0 0 0 Chute Work 10" x10" x 42' AR with I 0 n/a n/a >3%	moisture-Enclosed
0 0 0 Chute Work 10" x 10" x 42' AR with I 0 n/a n/a >3%	moisture-Enclosed
0 0 0 Manual Gate 0 n/a n/a >3%	moisture-Enclosed
0 0 0 Manual Gate 0 n/a n/a >3%	moisture-Enclosed
0 0 0 Chute Work 10" x 24' AR with I 0 n/a n/a >3%	moisture-Enclosed
0 0 0 Chute Work 10" x 24' AR with I 0 n/a n/a >3%	moisture-Enclosed
0 0 C301 30" X 111' Box Conveyor 150 tph-0 10 200 150 >3%	moisture-Enclosed
0 0 0 Chute Work 18" x18" x 8' AR with E: 0 n/a n/a >3%	moisture-Enclosed
0 0 BS302 Siemens-Milltronics MSI Belt Scale 0 n/a n/a	n/a
0 0 BE302 18" x 8" x 63'-0" Single Wide Bucket 20 200 150 >3%	moisture-Enclosed
0 0 0 Work Platform w/ Ladder 0 n/a n/a	n/a
0 0 0 Chute Work 16" x16" x 18' AR with I 0 n/a n/a >3%	moisture-Enclosed
0 0 SCR306 Rotex 6360-1 Screen 15 200 150 >3%	moisture-Enclosed
0 0 0 Rotex Suspension Stand 0 n/a n/a	n/a
0 0 0 Screen Cloth 0 n/a n/a	n/a
0 0 0 Chute Work 10" x 10" x 22' AR with I 0 n/a n/a >3%	moisture-Enclosed
0 0 0 Chute Work 10" x10" x 22' AR with I 0 n/a n/a >3%	moisture-Enclosed
0 0 0 Chute Work 10" x 26' AR with I 0 n/a n/a >3%	moisture-Enclosed
0 0 0 Chute Work 10" x 26' AR with I 0 n/a n/a >3%	moisture-Enclosed
0 0 DP303 Dense Phase System 0 7 5 >3%	moisture-Enclosed
0 0 0 Process Controls 0 n/a n/a	n/a
0 0 0 Engineering & Project Management 0 n/a n/a	n/a
0 0 0 Installation Review , Start-up & Ship 0 n/a n/a	n/a
0 0 0 Piping 0 n/a n/a	n/a
0 0 0 Support 0 n/a n/a	n/a
0 0 C302 30" X 158' Box Conveyor 200 tph-0 10 260 200 >3%	moisture-Enclosed
0 0 0 Chute Work 18" x18" x 3' AR with E: 0 n/a n/a >3%	moisture-Enclosed
0 0 BS303 Siemens-Militronics MSI Belt Scale 0 n/a n/a	n/a
0 0 BE303 16" x 8" x 125'-2" Double Wide Buck 50 260 200 >3%	moisture-Enclosed
0 0 0 Work Platform W/ Ladder 0 n/a n/a	n/a
0 0 0 Chute Work 16" x16" x 25' AR with 1 0 n/a n/a >3%	moisture-Enclosed
0 0 C303 30" X 158' Box Conveyor 200 tph-0 15 260 200 >3%	moisture-Enclosed
0 0 0 Chute Work 18" x18" x 3' AR with E: 0 n/a n/a $>3\%$	moisture-Enclosed
0 0 BS304 Siemens-Militronics MUS Beit Scale 0 n/a n/a	n/a
0 0 BE304 16" x 8" x 125'-2" Double Wide Buck 50 260 200 >3%	moisture-Enclosed
0 0 0 Work Platform W/Ladder 0 n/a n/a	n/a
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	moisture-Enclosed
0 0 C304 30 X 158 Box Conveyor 200 tph-0 15 260 200 >3%	moisture-Enclosed
0 0 BS305 Stemens-Militronics MOS Belt Scale 0 n/a n/a	n/a
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	moisture-Enclosed
0 0 BE305 16 x 8 x 125 - 2 Double Wide Buck 50 200 200 >3%	noisture-Enclosed
0 0 0 0 0 0 0 0 $1/a$ $1/a$	moioturo Enclosed
- 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	moisture Enclosed
$\frac{1}{200} = \frac{1}{200} = \frac{1}$	moisture Enclosed
0 0 BS306 Sigmans-Milltranics MLIS Belt Scale 0 n/a n/a	
0 0 BE306 16" x 8" x 125'-2" Double Wide Buck 50 260 200 <3%	

Dry C	ircuit-Sec	tion 300						
0	0		0	Work Platform w/ Ladder	0	n/a	n/a	n/a
0	0		0	Chute Work 16" x16" x 25' AR with I	0	n/a	n/a	>3% moisture-Enclosed
0	0	C306		Hudco 24" x 41'-3" Air Conveyor-20(5	260	200	>3% moisture-Enclosed
0	0		0	Hudco Blower Drive	3	n/a	n/a	n/a
0	0		0	Vandegraaf Belt Brush	1	n/a	n/a	n/a
0	0		0	Chute Work 18" x18" x 6' AR with E:	0	n/a	n/a	>3% moisture-Enclosed
0	0	C307		Hudco 24" x 41-3' Air Conveyor-200	5	260	200	>3% moisture-Enclosed
0	0		0	Hudco Blower Drive	3	n/a	n/a	n/a
0	0		0	Vandegraaf Belt Brush	1	n/a	n/a	n/a
0	0		0	Chute Work 18" x18" x 6' AR with E:	0	n/a	n/a	>3% moisture-Enclosed 10894 Sq. ft. of media with and air to
0	0	BH302		Bag House	0	n/a	n/a	media ratio of 7.2:1 @ 78342 CFM.
0	0		0	Distribution Arm	1	n/a	n/a	n/a
0	0		0	Blower Package	10	n/a	n/a	n/a
0	0		0	Lower Level enclosure	0	n/a	n/a	n/a
0	0	FN304		Exhaust Fan	300	n/a	n/a	Enclosed in duck work
0	0	ES302		Stack	0	n/a	n/a t	53' Dia x 50ft tall from grade elevation
0	0		0	Ducting	0	n/a	n/a	n/a
0	0		0	Ducting Steel Supports	0	n/a	n/a	n/a
0	0	DP302		Dense Phase System	0	2	1	>3% moisture-Enclosed
0	0		0	Process Controls	0	n/a	n/a	n/a
0	0		0	Engineering & Project Management	0	n/a	n/a	n/a
0	0		0	Installation Review, Start-up & Ship	0	n/a	n/a	n/a
0	0		0	Piping	0	n/a	n/a	n/a
0	0		0	Support	0	n/a	n/a	n/a
0	0		0	Splitter Chute on Drop Out Box	0	n/a	n/a	n/a
0	0	AC301		Air Compressor (Dense Phase)	200	n/a	n/a	n/a
0	0		0	Air Piping	0	n/a	n/a	n/a
0	0	AC302		Air Compressor (Dense Phase back	200	n/a	n/a	n/a
0	0		0	Air Piping	0	n/a	n/a	n/a
0	0	AC303		Air Compressor (General Air)	50	n/a	n/a	n/a
0	0		0	Air Piping	0	n/a	n/a	n/a
0	0	AC304		Air Compressor (General Air Back-	50	n/a	n/a	n/a
0	0		0	Air Piping	0	n/a	n/a	n/a
0	0		0	Air Knife	0	n/a	n/a	n/a
0	0	EH301		Ehouse Structures, stairs & landing	0	n/a	n/a	n/a
0	0	BLD302		Structure with access for Screens, F	0	n/a	n/a	n/a
0	0	BLD301		Building around Dryer	0	n/a	n/a	n/a
0	0		0	Motorized Louvers in walls and roof	0	n/a	n/a	n/a
0	0	BLD303		Building for Compressors	0	n/a	n/a	n/a
0	0	CBS301		RS-30 Belt Sampler	5	n/a	n/a	n/a
0	0	CBS302		RS-30 Belt Sampler	5	n/a	n/a	n/a
0	0	CBS303		RS-30 Belt Sampler	5	n/a	n/a	n/a
0	0	CBS304		RS-30 Belt Sampler	5	n/a	n/a	n/a
0	0	CBS305		PRT-18 Probe Belt Sampler	0	n/a	n/a	n/a
0	0		0	Vandegraaf Belt Brush	1	n/a	n/a	n/a
0	0		0	Vandegraaf Belt Brush	1	n/a	n/a	n/a
0	0		0	Vandegraaf Belt Brush	1	n/a	n/a	n/a
0	0		0	Vandegraaf Belt Brush	1	n/a	n/a	n/a

Storag	e Circuit	-Section 40	0					
0	0		0	Vandegraaf Belt Brush	1	n/a	n/a	n/a
0	0	SC304		16"Dia x 21'-3" Screw Conveyor	7.5	n/a	n/a	n/a
0	0	ST401		2000 Ton bolted storage tank	0	n/a	n/a	>3% moisture-Enclosed
0	0	HS401		High Level Sensor	0	n/a	n/a	n/a
0	0	LS401		Low Level Sensor	0	n/a	n/a	n/a
0	0		0	16" Manual Slide gate	0	1000	800	>3% moisture-Enclosed
0	0		0	16" Pneumatic Actuated Slide gate	0	1000	800	>3% moisture-Enclosed
0	0	POS401		Dual Directional Positioner	1	n/a	n/a	>3% moisture-Enclosed
0	0	BL401		Enclosed Vehicle Bulk Loading Spo	1	1000	800	>3% moisture-Enclosed
0	0		0	Pendent Controller (7 button)	0	n/a	n/a	n/a
0	0		0	Dual Loadout Motor Starter Panel (L	0	n/a	n/a	n/a
0	0		0	Single Lane Vision System (Lane 1)	0	n/a	n/a	n/a
0	0		0	Gangway with Safety Cage	0	n/a	n/a	n/a
0	0		0	Bumper on bottom of cage 4th safet	0	n/a	n/a	n/a
0	0	ST402		2000 Ton bolted storage tank	0	n/a	n/a	>3% moisture-Enclosed
0	0	HS402		High Level Sensor	0	n/a	n/a	n/a
0	0	LS402	_	Low Level Sensor	0	n/a	n/a	n/a
0	0		0	16" Manual Slide gate	0	1000	800	>3% moisture-Enclosed
0	0	500/00	0	16" Pneumatic Actuated Slide gate	0	1000	800	>3% moisture-Enclosed
0	0	POS402		Dual Directional Positioner	1	n/a	n/a	>3% moisture-Enclosed
0	0	BL402	•	Enclosed Vehicle Bulk Loading Spo	1	1000	800	>3% moisture-Enclosed
0	0		0	Pendent Controller (7 button)	0	n/a	n/a	n/a
0	0		0	Gangway with Safety Cage	0	n/a	n/a	n/a
0	0	07400	0	Bumper on bottom of cage 4th safet	0	n/a	n/a	n/a
0	0	S1403		2000 Ton bolted storage tank	0	n/a	n/a	>3% moisture-Enclosed
0	0	HS403		High Level Sensor	0	n/a	n/a	n/a
0	0	LS403	0	Low Level Sensor	0	n/a	n/a	n/a
0	0		0	16" Manual Slide gate	0	1000	800	>3% moisture-Enclosed
0	0	DO0 400	0	16" Pneumatic Actuated Silde gate	0	1000	800	>3% moisture-Enclosed
0	0	PU5403		Enclosed Vahiala Bulk Loading Spa	1	n/a	n/a	>3% moisture-Enclosed
0	0	BL403	0	Enclosed Vehicle Burk Loading Spo	0	1000	800 n/a	>3% moisture-enclosed
0	0		0	Dual Loadout Motor Startor Banal (0	n/a	11/a	11/a n/a
0	0		0	Single Long Vision System (Long 1)	0	11/a	11/a	17/4
0	0		0	Gangway with Safety Cage	0	n/a	n/a	n/a
0	0		0	Bumper on bottom of care 4th safet	0	n/a	n/a	n/a
0	0	ST404	0	2000 Ton bolted storage tank	0	n/a	n/a	>3% moisture-Enclosed
0	0	HS404		High Level Sensor	0	n/a	n/a	n/a
0	0	1.5404		l ow Level Sensor	0	n/a	n/a	n/a
0	0	20404	0	16" Manual Slide gate	0	1000	800	>3% moisture-Enclosed
0	0		0	16" Pneumatic Actuated Slide date	0	1000	800	>3% moisture-Enclosed
0	0	POS404	Ũ	Dual Directional Positioner	1	n/a	n/a	>3% moisture-Enclosed
0	0	BL404		Enclosed Vehicle Bulk Loading Spo	1	1000	800	>3% moisture-Enclosed
0	0		0	Pendent Controller (7 button)	0	n/a	n/a	n/a
0	0		0	Gangway with Safety Cage	0 0	n/a	n/a	n/a
0	0		0	Bumper on bottom of cade 4th safet	0	n/a	n/a	n/a
0	0	ST405	-	500 Ton bolted storage tank	0	n/a	n/a	>3% moisture-Enclosed
0	0	HS405	_	High Level Sensor	0	n/a	n/a	n/a

Storage Circuit-Section 400								
0	0	LS405		Low Level Sensor	0	n/a	n/a	n/a
0	0		0	16" Manual Slide gate	0	n/a	n/a	n/a
0	0		0	16" Actuated Slide gate	0	1000	800	>3% moisture-Enclosed
0	0	POS405		Single Direction Positioner	1	1000	800	>3% moisture-Enclosed
0	0	BL405		Close Vehicle Bulk Loading Spout (1	n/a	n/a	>3% moisture-Enclosed
0	0		0	Single Loadout Motor Starter Panel	0	1000	800	>3% moisture-Enclosed
0	0		0	Pendent Controller (6) button	0	n/a	n/a	n/a
0	0		0	Gangway with Safety Cage	0	n/a	n/a	n/a
0	0		0	Bumper on bottom of cage 4th safet	0	n/a	n/a	n/a
0	0	CTR401		10x10 Control Room	0	n/a	n/a	n/a
0	0		0	Loading Structure	0	n/a	n/a	n/a
0	0	TS401		Truck Scale 125'	0	n/a	n/a	n/a
0	0	TS402		Truck Scale 135'	0	n/a	n/a	n/a
0	0		0	Canopies between tanks	0	n/a	n/a	n/a
0	0		0	Entrance Traffic Gate Lane 2	0	n/a	n/a	n/a
0	0		0	Entrance Traffic Gate First Silo Lane	0	n/a	n/a	n/a
0	0		0	Entrance Traffic Gate Second Silo L	0	n/a	n/a	n/a
0	0		0	Access around Hudco Conveyors or	0	n/a	n/a	n/a
0	0		0	Ticketing	0	n/a	n/a	n/a
0	0		0	Well Pump for office users	0	n/a	n/a	n/a













Appendix B

Water Soluble Polymer Information



Water Soluble Polymers and Industrial Sand Mining

What are polymers?

Polymers are chemical compounds or mixtures of compounds that cause very fine particles to quickly cluster into a lesser number of much larger particles. Polymers are made up of constituent monomers. Some polymers are water soluble; some are not.

How do polymers work?

Polymers are comprised of long molecular chains that adsorb (stick) quickly and strongly onto the surfaces of adjacent particles through a combination of processes known as electrostatic and hydrogen bonding. Joined together by this polymer "tentacle", these now less mobile particles are ultimately drawn together to form a much larger particle. This process is the same regardless of the industry in which the polymer is used. Water soluble polymers of the type used in industrial sand mining operations include coagulants and flocculants, which are primarily used to separate materials suspended in water or other aqueous media.

Why are polymers used in the industrial sand mining industry?

Polymers are used in the industry because the sand is washed with water. The washing process makes the industrial sand clean and ready for use. The source of most industrial sand mined in Wisconsin is sandstone, which is 95% to 99% sand and 1% to 5% very fine particles (silt and clay). Users of industrial sand require a clean grain of sand, without any fines or impurities. After mining, sand is rinsed or "washed" using water to remove the silt and clay particles.

When the sand is washed, the fine particles become suspended in the wash water. Polymers are used to clarify or clean the particles out of the wash water. By accelerating the settling of fine particles, the polymers shorten the period of time to clarify the water for reuse in industrial sand processing. Polymer use greatly reduces the need for new makeup water for sand washing that would come from a well or other source. Using polymers also reduces or eliminates the amount of land area that might otherwise be needed for settling ponds, which are another means of clarifying the wash water.

Is the use of polymers unique to industrial sand mining?

No. The same water soluble polymers used in industrial sand mining are used in a variety of other applications, including sewage treatment, municipal drinking water treatment, construction aggregates wash water, and to settle dredge flow sediment during waterway remediation. Acrylamide-based polymers are used to condition bare soil on farm land and construction sites to control erosion and for the manufacturing of many products such as plastics, grouts, cosmetics, paper, and diapers.

What polymers are typically used to wash sand?

The two common polymers used in industrial sand operations are water soluble polymers:

- 1. Poly-DADMAC polymer -- a water solution of a cationic (positively-charged) polymer (poly-diallyldimethylamonium chloride).
- 2. PAM polymer -- an anionic (negatively-charged) co-polymer (polyacrylamide/acrylate).

How much of these polymers is used in the sand washing process?

The two commonly used polymers are poly-DADMAC and PAM. The monomer in the poly-DADMAC polymer is called the DADMAC monomer; the monomer in the PAM polymer is called the acrylamide monomer, and is often referred to simply as acrylamide. These monomers are present in very low concentrations in each polymer.

Industrial sand mining operations that use the poly-DADMAC polymer typically add about 15 parts per million (ppm) to the wash water. The poly-DADMAC polymer averages about 20% poly-DADMAC. The poly-DADMAC portion of the polymer contains less than 0.1% of the DADMAC monomer. That calculates to a DADMAC monomer concentration in the wash water of approximately 3 parts per billion (ppb).

Industrial sand mining operations that use the PAM polymer typically add about 6 to 7 ppm to the wash water. The PAM polymer is an emulsion with an average of about 30% PAM polymer. The acrylamide monomer is present at concentrations less than 0.05% of the PAM polymer portion of the emulsion. That calculates to an acrylamide monomer concentration in the wash water of approximately 1 ppb.

How does Wisconsin Department of Natural Resources (WDNR) regulate polymer use at industrial sand operations?

WDNR regulations protect surface water and groundwater by regulating stormwater and surface water discharges, well drilling, and the application of materials to the land surface with the potential to impact groundwater. Any stormwater or surface water discharge of industrial sand wash water is regulated by WDNR under Ch. NR 216. WDNR approves the application of products containing polymers for sediment control purposes under DNR Conservation Practice Standard 1051 to protect surface waters. WDNR has not established specific groundwater standards for polymers under Ch. NR 140; however, if the wash water is held in a pond, WDNR reports that "[s]ealed ponds will have very little potential for groundwater impacts. Unsealed ponds will likely seal themselves with the fines that are removed from the frac sand."[1]

Does polymer use at industrial sand operations pose a risk to public health?

No. For comparative purposes, it is worth noting that municipal drinking water treatment facilities add polymer directly to the drinking water; industrial sand operations add polymer to the sand wash water, which is part of the industrial sand process and not a source of drinking water. These polymers are also approved by the National Sanitation Foundation (NSF) and American National Standards Institute (ANSI) NSF/ANSI Standard 60 for treatment of drinking water.

The maximum allowable DADMAC monomer concentration in drinking water established by NSF/ANSI (at the request of the United States Environmental Protection Agency (US EPA)) is 50 ppb [2]. By comparison, approximately 3 ppb DADMAC monomer is present in the wash water used in industrial sand mining operations.

Concerns about potential adverse health effects from polymers have focused on acrylamide because it is a possible human carcinogen and a neurotoxin (damages the nervous system). Acrylamide is the monomer present in a very low concentration in PAM polymers. US EPA regulates acrylamide in drinking water using a treatment technique requirement because there is not a standardized analytical method for its measurement in drinking water. US EPA's Phase II Rule limits the allowable residual acrylamide to 0.05% when the polymer is added directly into raw drinking water supplies at 1 ppm. Due to this regulation, acrylamide concentrations in drinking water are not expected to exceed 0.5 ppb. US EPA considers this level low enough to be "safe" accounting for any uncertainty in the data relating acrylamide to cancer and neurotoxic effects. [3]

Environmental fate studies by US EPA report that acrylamide degrades rapidly in the environment – in a matter of a few days in both soil and water. Depending on whether the soil is aerobic or anaerobic, the estimated half-lives range from 22 to 36 hours. Degradation in river water occurred within 2 to 12 days, depending on the availability of microorganisms that utilize the acrylamide. Fish tissue samples showed no appreciable bioconcentration. [4,5]

The maximum allowable acrylamide monomer concentration in drinking water established by NSF/ANSI is 0.5 ppb [2]. By comparison, at typical industrial sand operations the concentration of the acrylamide monomer in the wash water is 1.0 ppb. This wash water is in the clarifiers and settling ponds that are part of the industrial sand production process – which are not sources of drinking water. If the wash water with less than 1 ppb acrylamide were to leave the industrial sand operation -- either through seepage from settling ponds to ground water (unlikely, since the ponds will become sealed as noted above by the WDNR) or discharge to surface water streams or rivers -- it is very unlikely that the acrylamide monomer would be detected because it would degrade and be diluted before it reached any drinking water source.

References

- [1] WDNR Silica Sand Mining in Wisconsin, January 2012, p. 28 accessed at: <u>http://dnr.wi.gov/topic/Mines/documents/SilicaSandMiningFinal.pdf</u>
- [2] The National Sanitation Foundation and American National Standards Institute, Standard 60: Drinking Water Treatment Chemicals Health Effects
- [3] EPA Water: Basic Information about Regulated Drinking Water Contaminants, accessed at <u>http://water.epa.gov/drink/contaminants/basicinformation/acrylamide.cfm</u>
- [4] EPA Technical Fact Sheet on: Acrylamide (Part of a larger publication: National Primary Drinking Water Regulations)
- [5] EPA 749-F-94-005a, Chemical Summary for Acrylamide, Office of Pollution Prevention and Toxics, EPA (1994) available at <u>http://www.epa.gov/chemfact/s_acryla.txt</u>

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