NORLITE

April 10, 1997

WWTP OPERATORS MANUAL

NORLITE

INDEX TO WWTP OPERATORS MANUAL

April 10, 1997

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GENERAL OUTFALL 006 PERMIT LIMITS

Effluent Temperature:	115 degrees Farenheit
pH:	6.0 to 9.0
Color:	Clear no visible solids
Flow:	No limit

GENERAL OPERATING SETTINGS:

Equalization Tank:	Operating level between Low and High. Operating pH between 7.0 and 7.5, minimum 6.0, maximum 8.0.
Floc Tank:	pH setpoint 9.2, minimum operating pH of 8.0, maximum operating pH of 9.8. Polymer setting generally between 30 and 50 ppm.
Clarifier:	Sludge level to be kept below "A", maximum level is "B". Desluding of clarifier must be done at minimum of once per 12 hour shift irregardless of sludge level. Overflow should be clear to slightly turbid.
Overflow Collection Tank:	Operating level between Low and High.
Effluent pH:	Setpoint of 8.4.
Carbon, Sock, Sand Filters:	Backwash based on pressure drop of maximum 15, clarity, and flowrate.
Effluent Tanks:	Operate generally on 1 Tank maintaining a minimum level between 3000 and 10,000 gallons; maintain a minimum level in other effluent tank between 5,000 and 10,000 gallons----this is used for backwash----this water must be dischargeable to the river.

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OPERATOR LOG SHEET

NORLITE WASTEWATER TREATMENT SHIFT REPROT SHIFT: A B C D DATE:

	KILN 1 BLOWDOWN		
TIME	BLOWDOWN FLOW, gpm	BLOWDOWN TOTALIZER	BLOWDOWN pH
7:00			
10:00			
1:00			
4:00			

	KILN 2 BLOWDOWN		
TIME	BLOWDOWN FLOW, gpm	BLOWDOWN TOTALIZER	BLOWDOWN pH
7:00			
10:00			
1:00			
4:00			

	EQUALIZATION TANK			
TIME	EQ TK PUMP A or B FLOW,gpm	EQ TK PUMP TOTALIZER	EQ TANK LEVEL	EQ TANK pH
7:00				
10:00				
1:00				
4:00				

		FLOC TANK			
FLOC TK pH PROBE "A"	FLOC TK pH PROBE "B"	FLOC DOSAGE, ppm	FLOC PUMP SPEED	FLOC PUMP STROKE	FLOC WATER FLOW, gph

CLARIFIER		
CLARIFIER SLUDGE LEVEL	CLARIFIER RAKE TORQUE %	CLARIFIER OVERFLOW ***CLARITY—Describe***

		OVERFLOW COLLECTION TANK			
OFC TK PUMP A or B FLOW,gpm	OFC TANK LEVEL	TRUNNION FLOW, gpm	TRUNNION TOTALIZER	MPA DOSAGE, ppm	MPA PUMP STROKE

OPERATOR SIGNATURE:

NORLITE WASTEWATER TREATMENT SHIFT REPROT SHIFT: A B C D DATE:

		FILTER OPERATION DATA							
TIME	CARBON FILTERS, F-4626 A & B				SULFUR CARBON FILTERS, A & B			
	PRESSURE, psig			BACKWASHED	PRESSURE, psig			BACKWASHED
	INLET	CENTER	OUTLET	Y or N	INLET	CENTER	OUTLET	Y or N
7:00								
10:00								
1:00								
4:00								

		FILTER OPERATION DATA				
TIME	SAND FILTER			POLISHING FILTERS		
	PRESSURE, psig		BACKWASHED	PRESSURE, psig		BACKWASHED
	INLET	OUTLET	Y or N	INLET	OUTLET	Y or N
7:00						
10:00						
1:00						
4:00						

		EFFLUENT DATA							
TIME	EFF TK PUMP A or B FLOW,gpm	EFFLUENT TOTALIZER (South Wall WWTP)	EFFLUENT, pH PROBE "A" (At Sock Filters)	EFFLUENT, pH PROBE "B" (At Sock Filters)	EFFLUENT pH (South Wall)	EFFLUENT "ORP" Reading (South Wall)	EFFLUENT TEMP, F (South Wall)	EFFLUENT TANK "A" LEVEL, gallons	EFFLUENT TANK "B" LEVEL, gallons
7:00									
10:00									
1:00									
4:00									

OPERATOR SIGNATURE:

C:\QPRO\TIM\WWLOG1.WB1

NORLITE WASTEWATER TREATMENT SHIFT REPROT SHIFT: A B C D DATE:

EFFLUENT DATA

TIME	HYDROGEN SULFIDE RESULTS	BLEACH ADDITION RATES or SETTINGS	RESIDUAL CHLORIDE ppm	EFFLUENT TANK "A" AIR RATE, cfm	EFFLUENT TANK "B" AIR RATE, cfm	EFFLUENT TANK DISCHARGED FROM A or B	EFFLUENT STOPPED Y or N	EFFLUENT CITY WATER ON Y or N
7:00								
10:00								
1:00								
4:00								

FILTER PRESS

SLUDGE PUMPED FROM CLARIFIER Y or N	SLUDGE TANK LEVEL	NUMBER OF CAKES MADE DURING SHIFT

IRON SULFATE

TIME ADDED	BAGS OF IRON SULFATE ADDED
TOTAL:	

INVENTORY

START OF SHIFT INVENTORY

CHEMICAL	*AMOUNT*
BAGS OF IRON--40/PALLE	
DRUMS OF BLEACH	
DRUMS OF POLYMER	

AMPLE QUANTITY OF:	*Y or N*
ALKA SELTZER	
HYDROGEN SULFIDE PAP	
CHLORIDE TEST PACKET	

ACID TANK LEVEL	FULL	>1/2
	<1/2	REFILL

CUASTIC TANK LEVEL	FULL	>1/2
	<1/2	REFILL

NOTES AND/OR REQUIRED MAINTENANCE

OPERATOR SIGNATURE:

C:\QPRO\TIM\WWLOG1.WB1

April 7, 1997

OPERATING PROCEDURE
Iron Sulfate Addition

Iron Sulfate Heptahydrate is a greenish granular powder. Iron sulfate acts as metals complexing agent for trace metals removal. Additionally Iron Sulfate acts a flocculating agent to aid in suspended solids settling.

Iron Sulfate is used at the WWTP in powder form and comes generally in 50 pound bags.

Iron Sulfate is to be added to the top of the Equalization Tank via the screen covered manway.

Iron Sulfate addition rates are based on analytical results, Equalization Tank pH, and solids settling rates.

The Iron Sulfate chemistry, based on analytical results, is operating at peak efficiency when the Equalization Tank pH is run in the range of 6.0 to 8.0. ***The general operating pH range is 7.0 to 7.5.*** Depending on suspended solids concentrations, the minimum Iron sulfate addition rate is 50 pounds(1 bag) every 2 hours.

Iron Sulfate, since it acts as flocculating agent will be complexed by suspended solids and will not be available for metals chemistry. As the suspended solids concentration in the Equalization Tank increases, so will the demand for Iron Sulfate(above the minimum). The 2 guidelines to follow for adding Iron Sulfate for increasing suspended solids level are:

1) Maintain the optimum Equalization Tank pH between 7.0 and 7.5.
2) Maintain a settling rate in the Floc Tank in conjunction with the use of polymeric flocculent of approximately 3/4" settling per minute. Generally, required polymer additions rates are between 30 and 50 ppm (follow polymer addition rate guidelines for varying flow conditions).

Generally, there is no maximum for the amount of Iron Sulfate addition. Although it is possible to "overdose" with Iron. This condition can be detected by an extremely low pH in the Equalization Tank generally below a pH of 6.0. Also an Iron overdose condition can be evidenced by the clarifier overflow fluid to look yellowish or rusty colored. Should these conditions occur, reduce the Iron Sulfate addition rates until the system returns to the above referenced operating pH ranges.

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FLOCCULANT DOSAGE & ADDITION PROCEDURE

DATE: FEBRUARY 5, 1996

FLOC DOSAGE DETERMINATION

Maintaining the optimum dosage of flocculent to the Floc Tank is required to transform fine-sized, slow settling suspended solids into a large, dense and fast settling floc. The better the floc of solids that is formed, the cleaner the overflow from the clarifier and the fewer down stream will need to be performed by the operator.

Flocculent settings are based on solids settling rates and flowrate from the Equalization Tank. Floc settling rates should be in the 1/2" to 3/4" per minute range. Use a clear glass jar to determine the approximate settling rate. Follow the settings on the curves which are based on the Equalization Tank flowrates. Generally flocculent dosage will be in the 30 to 50 ppm range.

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1. DETERMINE THE FLOWRATE TO THE FLOC TANK/CLARIFIER BY READING THE FLOW FROM THE EQ TANK DISCHARGE LINE FLOWMETER.

2. SELECT THE FLOC FEED CURVE BASED ON THE FLOC TESTING ("10ppm", "15ppm", etc.).

3. ADJUST THE FLOC METERING PUMP SPEED SETTING (TOP DIAL) TO THE SPEED INDICATED ON THE TOP OF THE FLOC FEED CURVE.

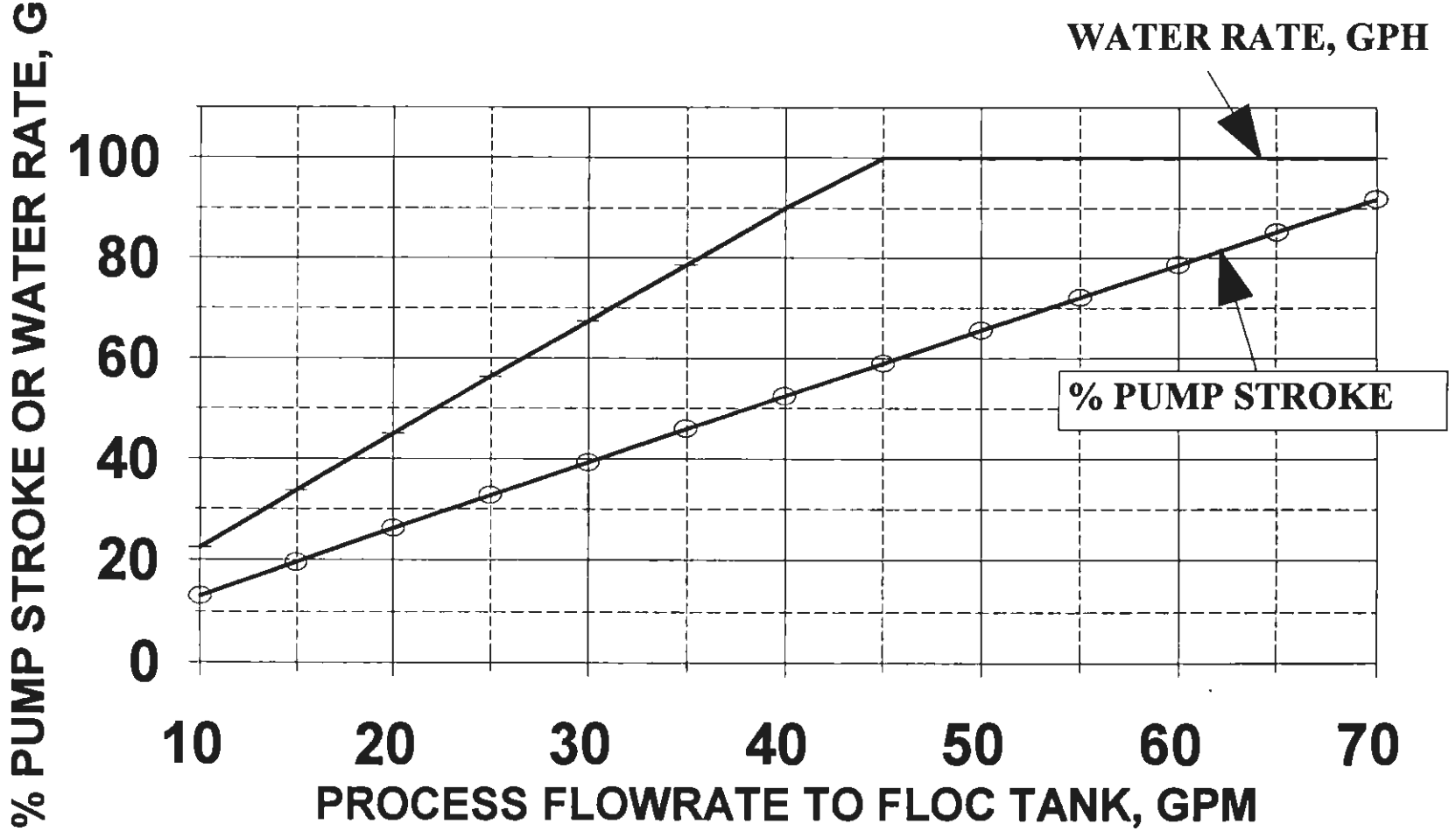
4. MOVE VERTICALLY FROM THE POINT ON THE GRAPH EQUAL TO THE EQ TANK DISCHARGE FLOWRATE TO MEET THE "PUMP STROKE" LINE ON THE GRAPH. ADJUST THE PUMP STROKE SETTING (LOWER DIAL) TO THAT INDICATED ON THE GRAPH.

5. REPEAT STEP 4 TO DETERMINE THE WATER ADDITION RATE AND ADJUST THE CONTROL KNOB ON THE FLOWMETER UNTIL THAT SETTING IS OBTAINED. (FLOW ON THIS ROTAMETER IS READ FROM THE WIDEST POINT ON THE FLOAT.)

FLOC FEED CURVE - 30 ppm DOSAGE

PUMP STROKE/WATER RATE VS PROCESS FLOW

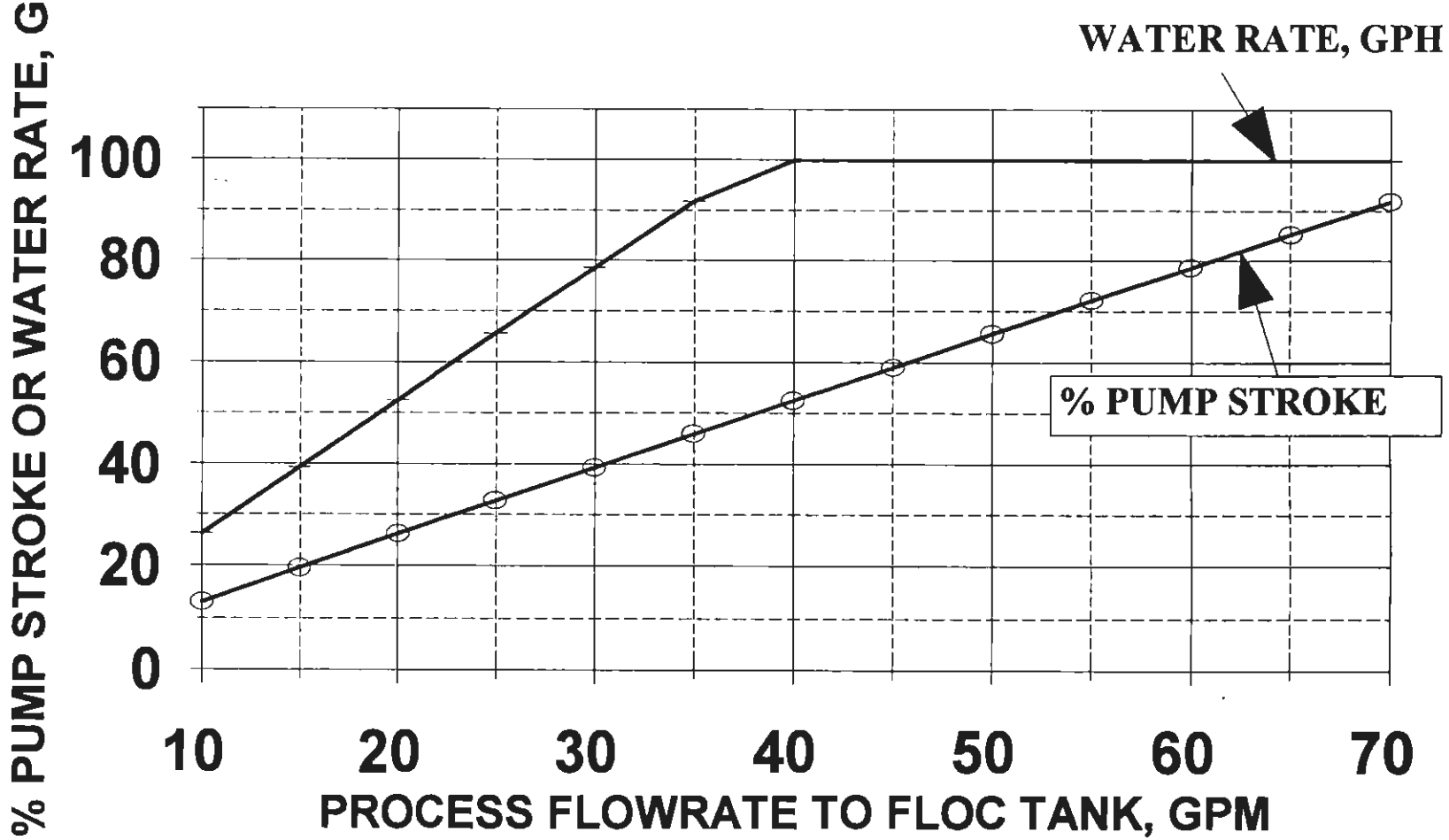
FLOC PUMP SPEED SETTING AT 30%



FLOC FEED CURVE - 35 ppm DOSAGE

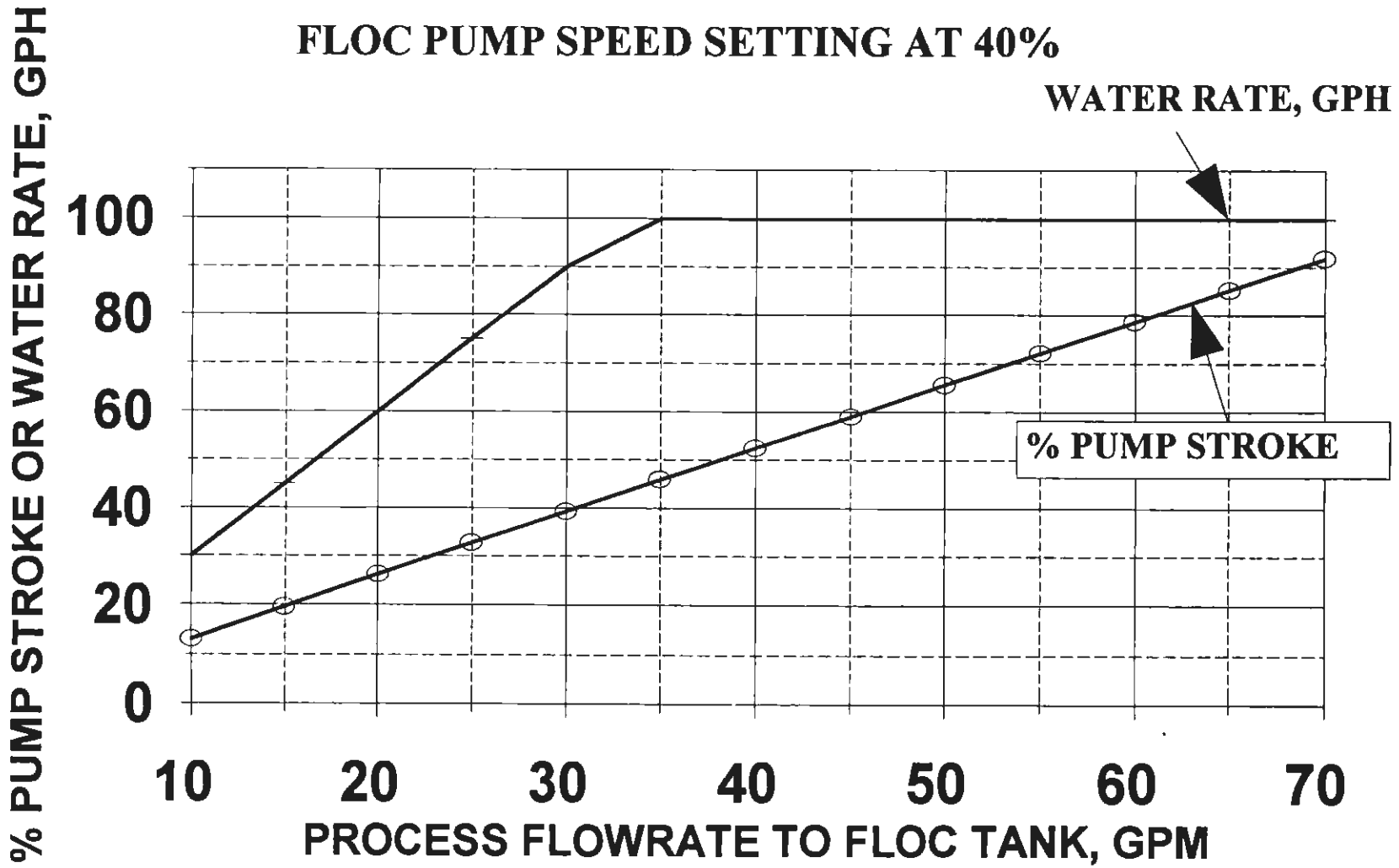
PUMP STROKE/WATER RATE VS PROCESS FLOW

FLOC PUMP SPEED SETTING AT 35%



FLOC FEED CURVE - 40 ppm DOSAGE

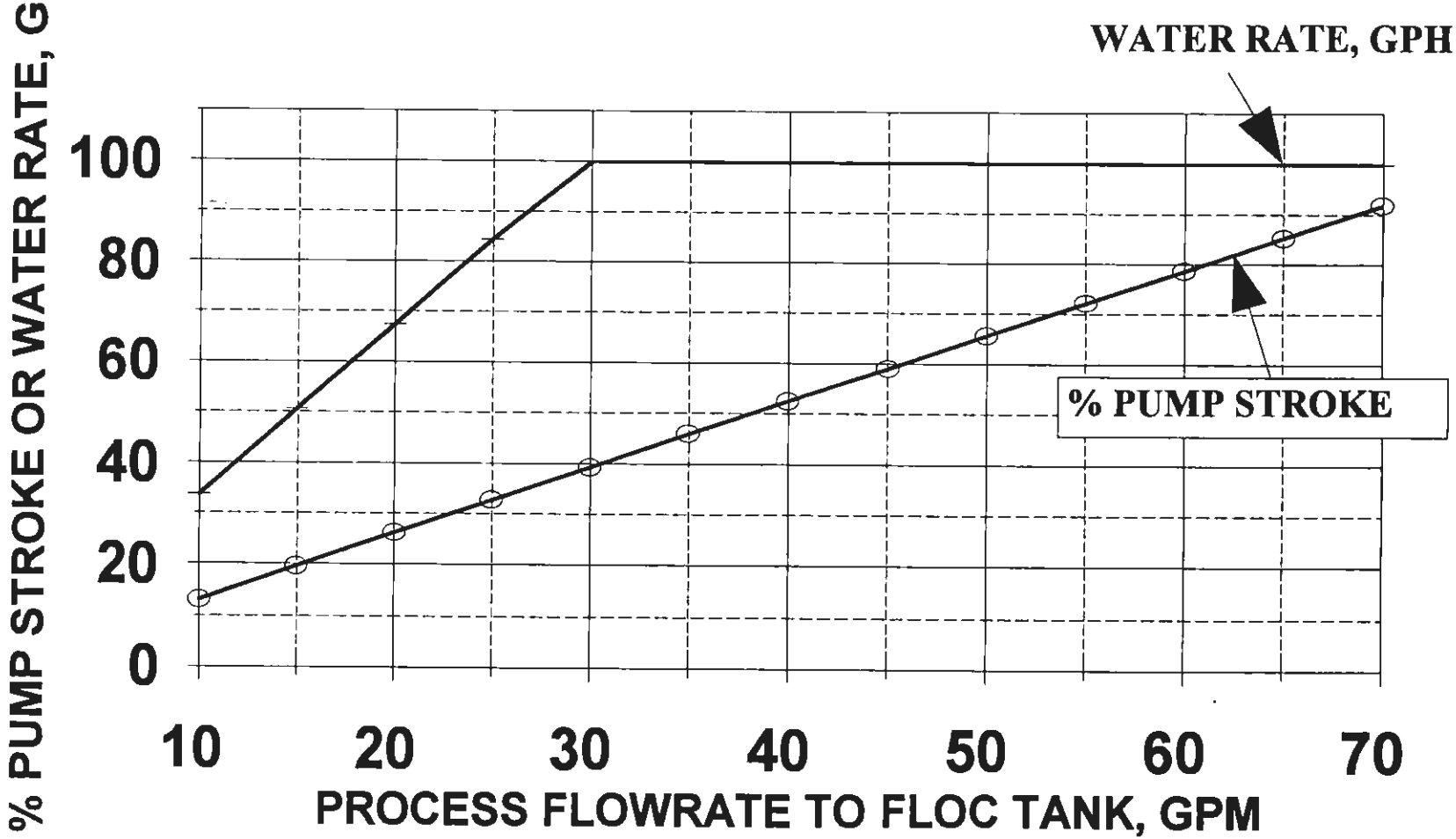
PUMP STROKE/WATER RATE VS PROCESS FLOW



FLOC FEED CURVE - 45 ppm DOSAGE

PUMP STROKE/WATER RATE VS PROCESS FLOW

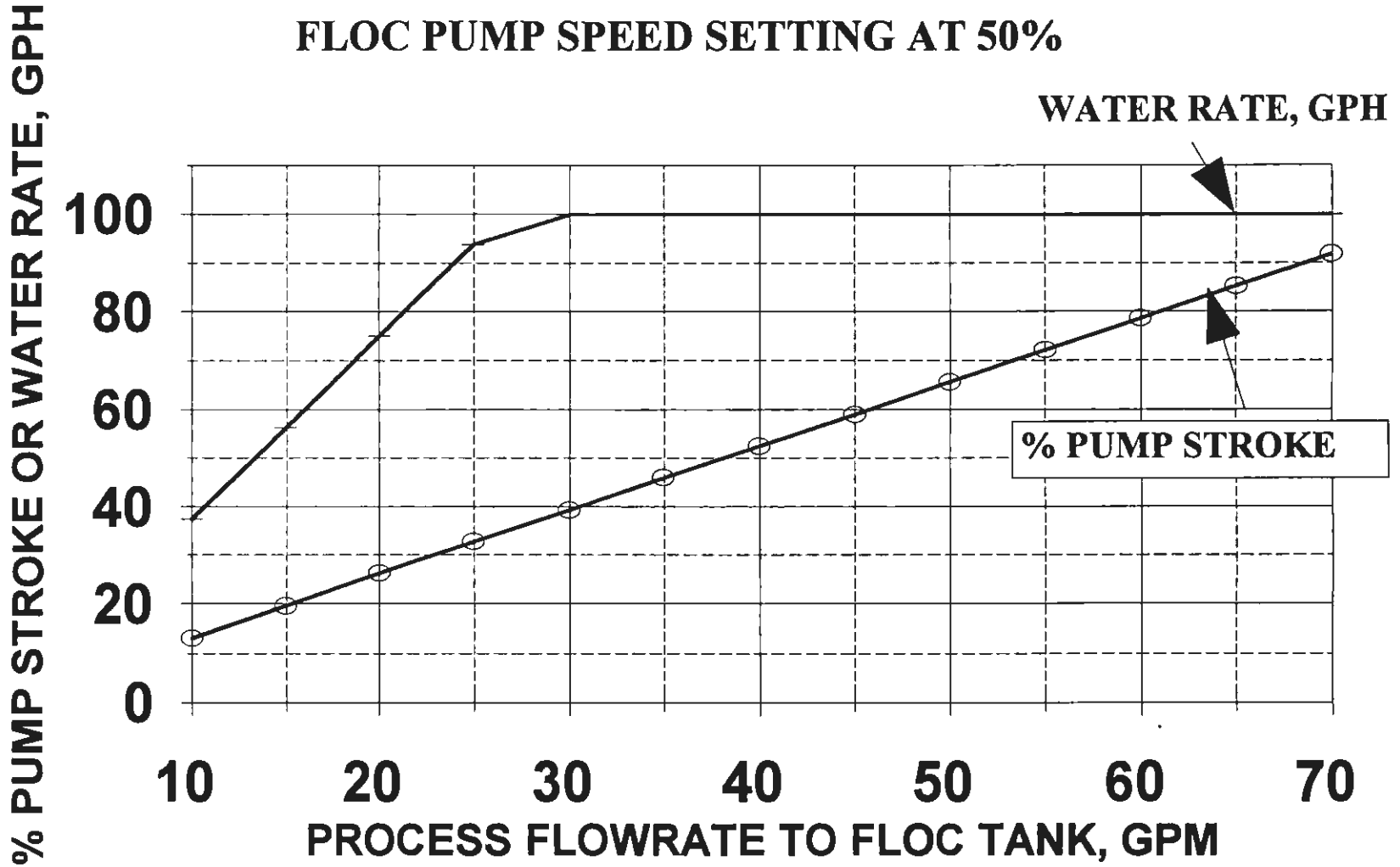
FLOC PUMP SPEED SETTING AT 45%



FLOC FEED CURVE - 50 ppm DOSAGE

PUMP STROKE/WATER RATE VS PROCESS FLOW

FLOC PUMP SPEED SETTING AT 50%



METALS PRECIPITATING AGENT ADDITION PROCEDURE

DATE: FEBRUARY 6, 1996

GENERAL

METALS PRECIPITATING AGENT ("MPA") WILL BE ADDED WHENEVER THERE IS A HIGH RESIDUAL OF DISSOLVED METALS THAT HAVE NOT BEEN ADEQUATELY REMOVED IN THE FLOC TANK/CLARIFIER PORTION OF THE NORLITE WASTEWATER TREATMENT PROCESS. THE *MPA* CHEMICALLY BINDS DISSOLVED METALS AND PRECIPITATES THEM AS SUSPENDED SOLIDS. ADDITION OF *MPA* WILL NOT BE A ROUTINE TREATMENT IN THE WWT PROCESS.

THE *MPA* IS ADDED DIRECT FROM THE DRUM VIA A CHEMICAL METERING PUMP ("PM-4623") INTO THE "OVERFLOW COLLECTION TANK". IN THIS TANK, THE *MPA* WILL MIX WITH THE INCOMING OVERFLOW FROM THE CLARIFIER AND WITH THE TRUNNION COOLING WATER. FOR OPTIMUM PERFORMANCE OF THE *MPA*, A MINIMUM OF 45 MINUTES REACTION TIME IS REQUIRED IN THE OVERFLOW COLLECTION TANK. FOR THIS REASON, IT IS NECESSARY TO MAINTAIN THE LEVEL IN THIS TANK ABOVE THE "LOW" LEVEL AT ALL TIMES.

THE METALS THAT ARE PRECIPITATED BY THE *MPA* WILL SUBSEQUENTLY BE CAPTURED ON THE POLISHING FILTERS, REMOVED DURING BACKWASHING BACK TO THE EQUALIZATION TANK.

SINCE THE ADDITION OF *MPA* IS A NON-ROUTINE TREATMENT, INITIATION OF TREATMENT WILL BE MADE ONLY UNDER THE DIRECTION OF THE NORLITE ANALYTICAL LABORATORY. THE LABORATORY WILL SPECIFY THE *MPA* DOSAGE REQUIRED TO BE ADDED.

MPA FEED PROCEDURE

AN ***MPA* FEED CURVE** HAS BEEN PREPARED TO ALLOW THE OPERATOR TO ACCURATELY ADJUST THE FEED OF *MPA* TO THE OVERFLOW COLLECTION TANK. THIS CURVE COVERS A RANGE OF 10 ppm TO 50 ppm OF *MPA*. THE FEED RATE OF *MPA* IS ACCOMPLISHED BY STROKE ADJUSTMENT ON THE *MPA* METERING PUMP. THERE IS NO SPEED ADJUSTMENT ON THIS PUMP. THE FEED RATE OF *MPA* REQUIRED TO OBTAIN A GIVEN DOSAGE RATE WILL BE DEPENDENT ON THE <u>TOTAL</u> PROCESS FLOW INTO THE OVERFLOW COLLECTION TANK - CLARIFIER OVERFLOW (ACTUALLY EQ TANK DISCHARGE FLOWRATE) PLUS TRUNNION WATER FLOW.

IMPORTANT!
THE *MPA* FEED RATE MUST BE ADJUSTED WHENEVER;

A. **THE LABORATORY SPECIFIES THAT A HIGHER OR LOWER DOSAGE OF *MPA* IS REQUIRED.**
B. **THE FLOWRATE FROM THE EQUALIZATION TANK TO THE FLOC TANK/CLARIFIER HAS BEEN CHANGED OR THE FLOWRATE OF TRUNNION WATER INTO THE COLLECTION TANK HAS CHANGED..**

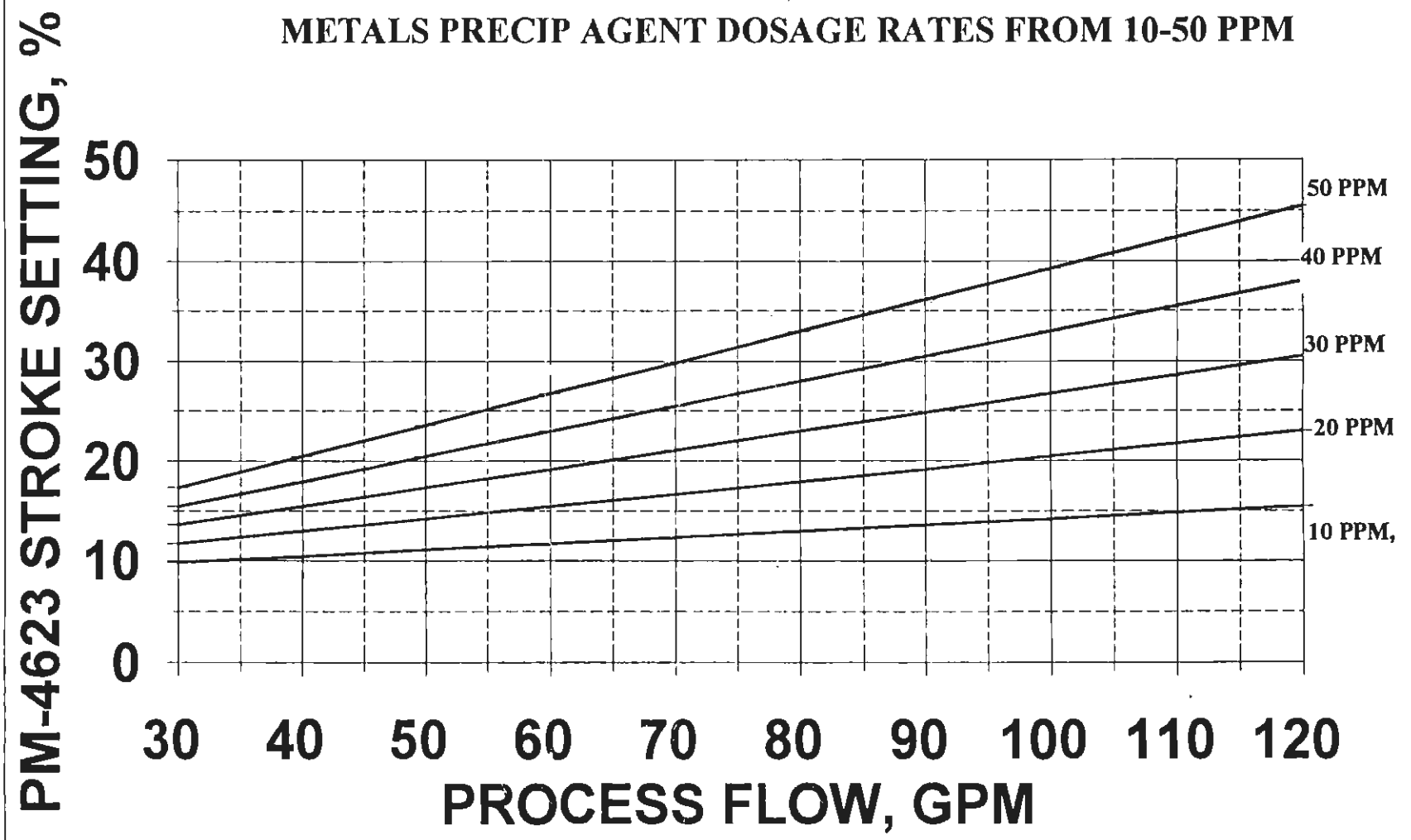
1. DETERMINE THE TOTAL FLOWRATE TO THE OVERFLOW COLLECTION TANK BY READING THE FLOW FROM THE EQ TANK DISCHARGE LINE FLOWMETER AND ADDING TO IT THE FLOWRATE OF TRUNNION WATER (FROM THE KILN #1 CONTROL ROOM).

2. SELECT THE *MPA* FEED LINE BASED ON THE MPA DOSAGE DIRECTED BY THE LABORATORY ("10ppm" OR "20ppm", etc.).

3. MOVE VERTICALLY FROM THE POINT ON THE GRAPH EQUAL TO THE TOTAL FLOW INTO THE COLLECTION TANK TO MEET THE DESIRED "PPM DOSAGE" LINE ON THE GRAPH. ADJUST THE *MPA* METERING PUMP STROKE SETTING TO THAT INDICATED ON THE LEFT SIDE OF THE GRAPH.

4. RECORD THE TIME OF INITIATION OF *MPA* DOSAGE ALONG WITH THE DOSAGE (PPM) AND PUMP STROKE SETTING ON THE **WWT OPERATORS LOG.**

METALS PRECIP AGENT FEED RATE CALIBRATION CURVE FOR MPA PUMP PM-4623



SANDFILTER OPERATIONS

Follow the valving instructions for:

Normal Operation
Backwashing Operation
Rinse Operation

Backwashing is based on maintaining a maximum pressure drop of 15 psig, minimum flowrate of 40 gpm, and clear to slightly cloudy product water.

Backwashing should be done at approximately 100 gpm and not to exceed 140 gpm; backwash time is approximately 20 to 30 minutes.

After Backwashing a rinse cycle must be done to resettle the filter bed. Rinse should be at 40 gpm for 5 to 10 minutes.

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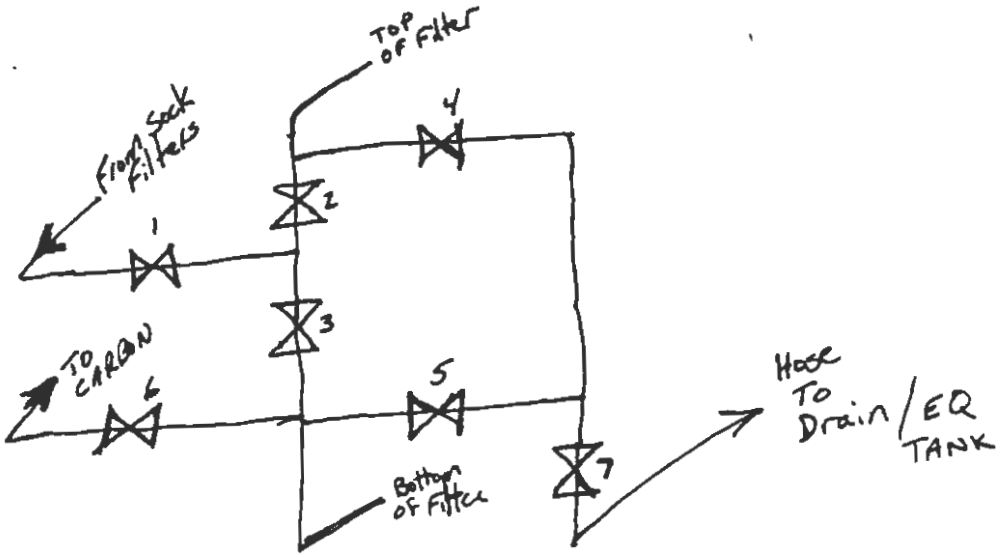
Sand Filter

Flow Rate
for Backwash
Still 90 To 100gal
Per min. Backwash
for 25 minute

Rinse AT 40gal
Per minute for
5 To 8 minutes



Normal operation

Valve #	Position
1	OPEN
2	OPEN
3	CLOSED
4	CLOSED
5	CLOSED
6	OPEN
7	OPEN

Rinse Mode

Valve #	Position
1	OPEN
2	OPEN
3	CLOSED
4	CLOSED
5	OPEN
6	CLOSED
7	OPEN

Backwash Mode

Valve #	Position
1	OPEN
2	CLOSED
3	OPEN
4	OPEN
5	CLOSED
6	CLOSED
7	OPEN

CARBON FILTER F-4626 A&B
VALVE SET UP DIRECTIONS

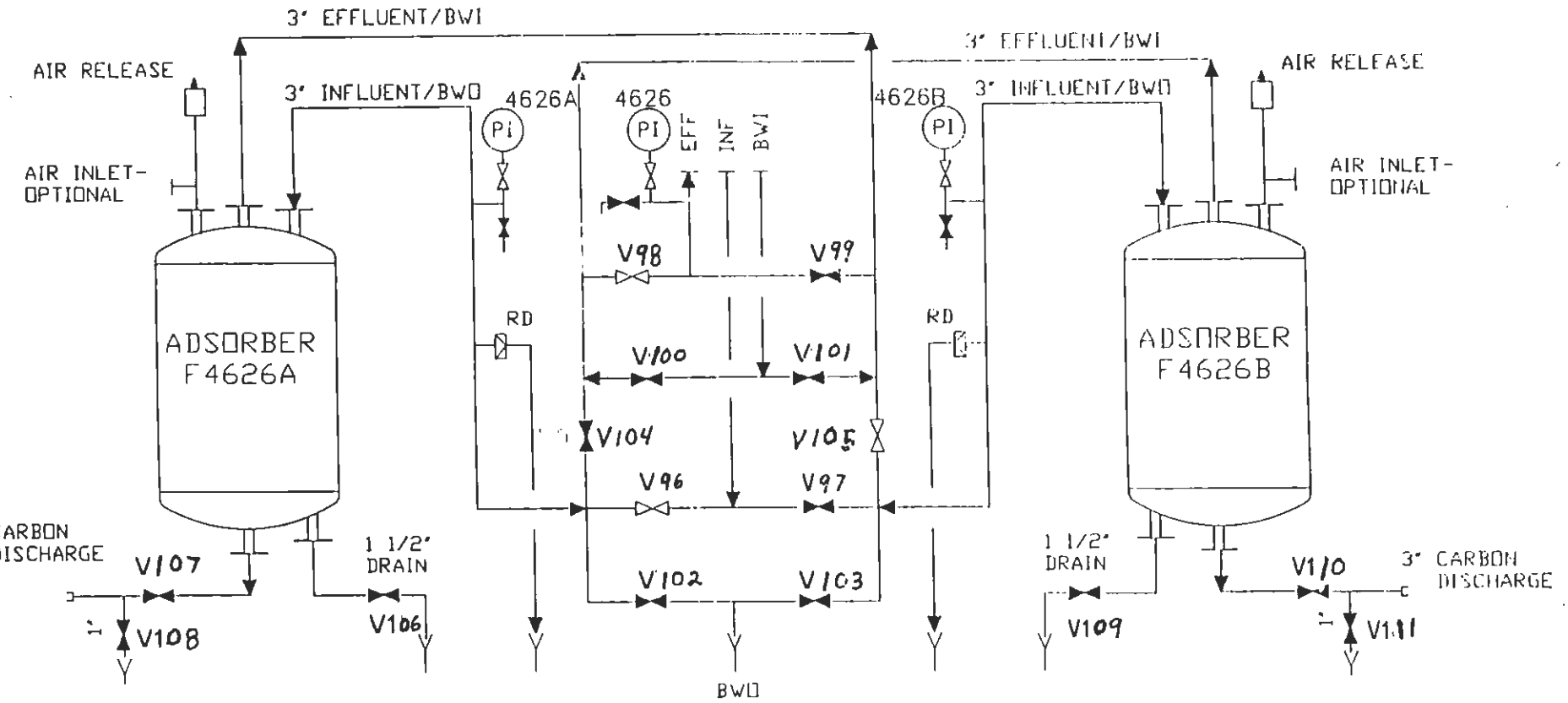
DATE: JANUARY 31, 1996

1. SERIES ARRANGEMENT "A" INTO "B"

VALVES OPEN	VALVES CLOSED
V-96	
V-98	ALL OTHERS
V-105	

REFER TO TIGG DRAWING # 1 ATTACHED

DRAWING #1



VALVE CLOSED

VALVE OPEN

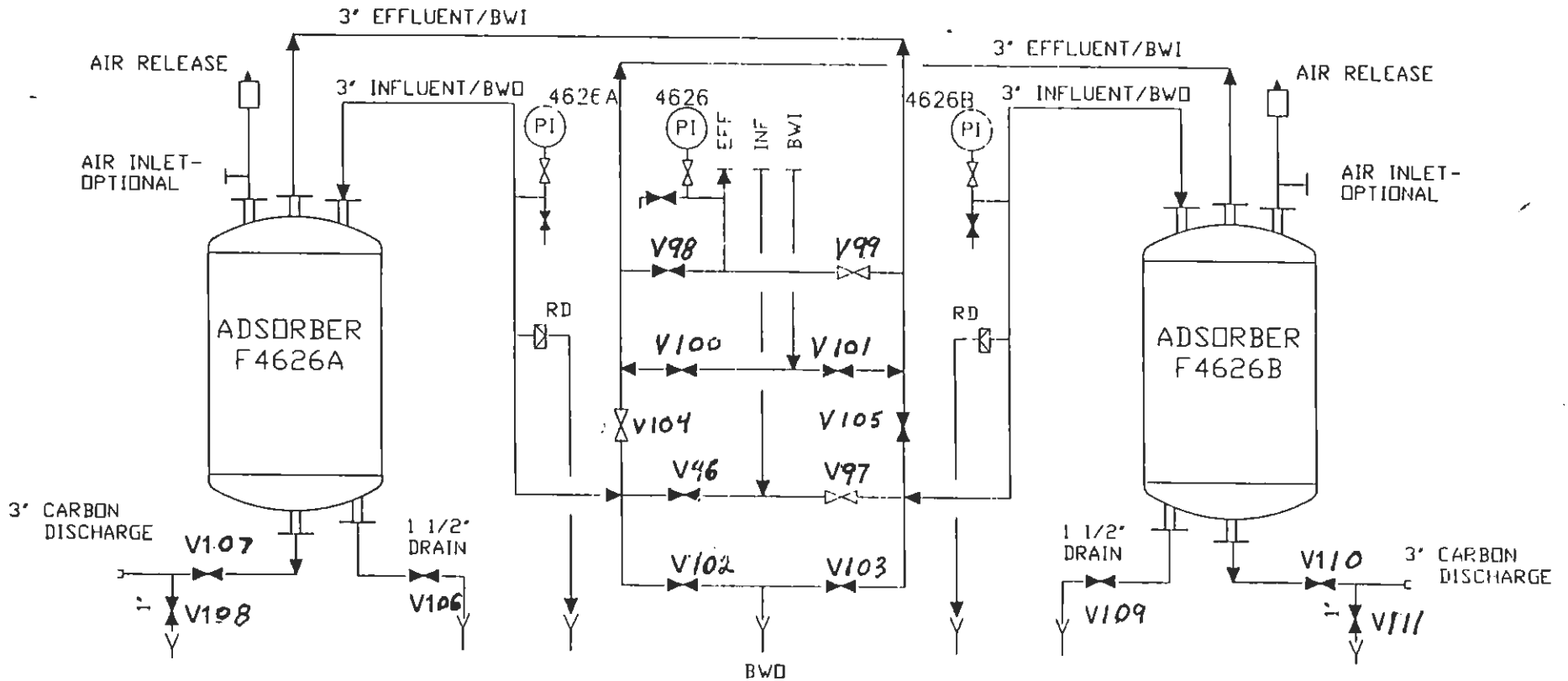
			TIGG CORPORATION BOX 11661 PITTSBURGH, PA 15228 PH # 412 563-4300 FAX# 412 563-6155		NORLITE	ADSORPTION A INTO B
			PROJ. NO.	PROJ. LOC. COHOES, NY	DATE: 5/8/95	D 95-5-022 REV.
			DESIGN BY: WGS	CHECKED BY:	SCALE: NONE	

2. SERIES ARRANGEMENT "B" INTO "A"

VALVES OPEN	VALVES CLOSED
V-97	
V-99	ALL OTHERS
V-104	

REFER TO TIGG DRAWING # 2 ATTACHED

DRAWING #2



VALVE CLOSED

VALVE OPEN

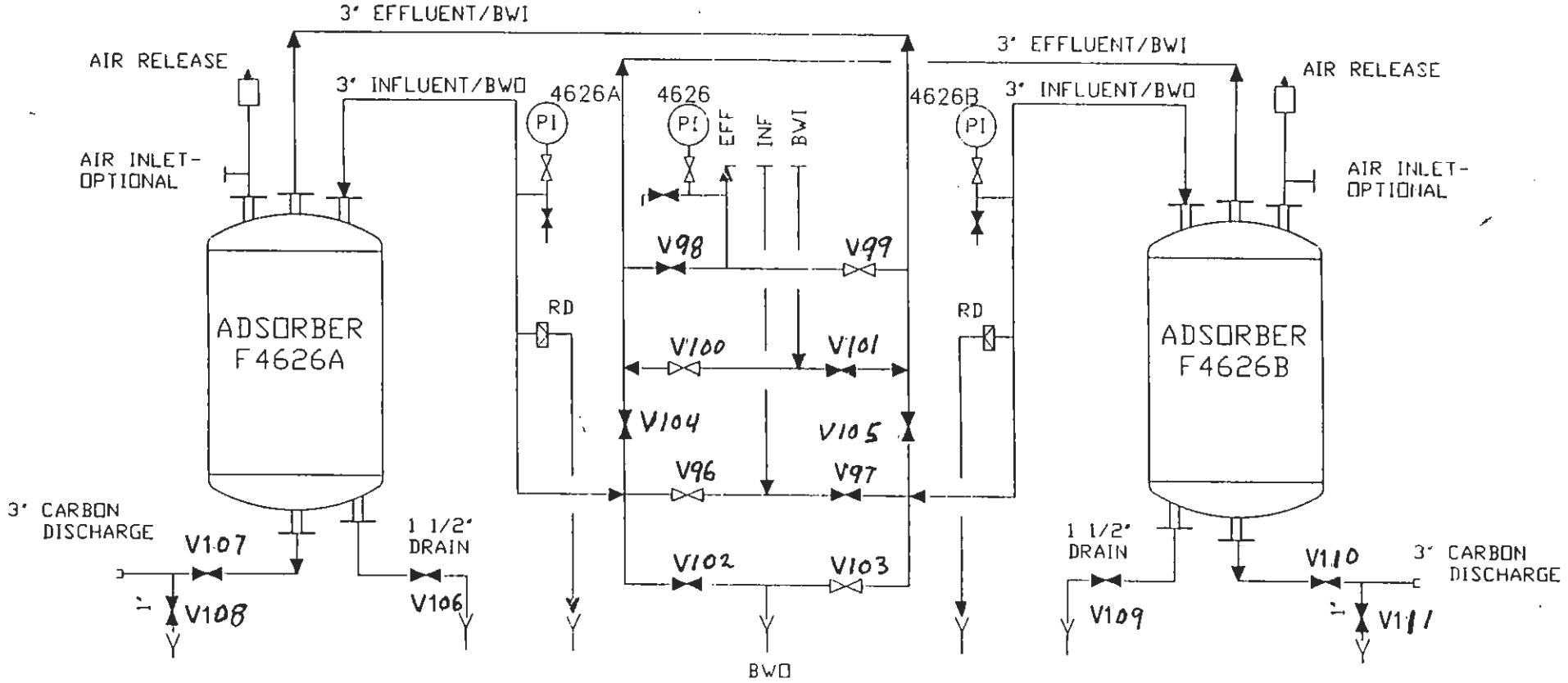
TIGG	TIGG CORPORATION BOX 11661 PITTSBURGH, PA 15228 PH # 412 563-4300 FAX# 412 563-6155		NORLITE	ADSORPTION B INTO A	
	PROJ. NO.	PROJ. LOC. COHOES, NY	DATE: 5/8/95	95-5-020	REV.
	DESIGN BY: WGS	CHECKED BY:	SCALE: NONE		

3. "A" UNIT ADSORBING;
"B" UNIT BACKWASHING

VALVES OPEN	VALVES CLOSED
V-96	
V-99	ALL OTHERS
V-100	
V-103	

REFER TO TIGG DRAWING # 3 ATTACHED.

DRAWING #3



VALVE CLOSED

VALVE OPEN

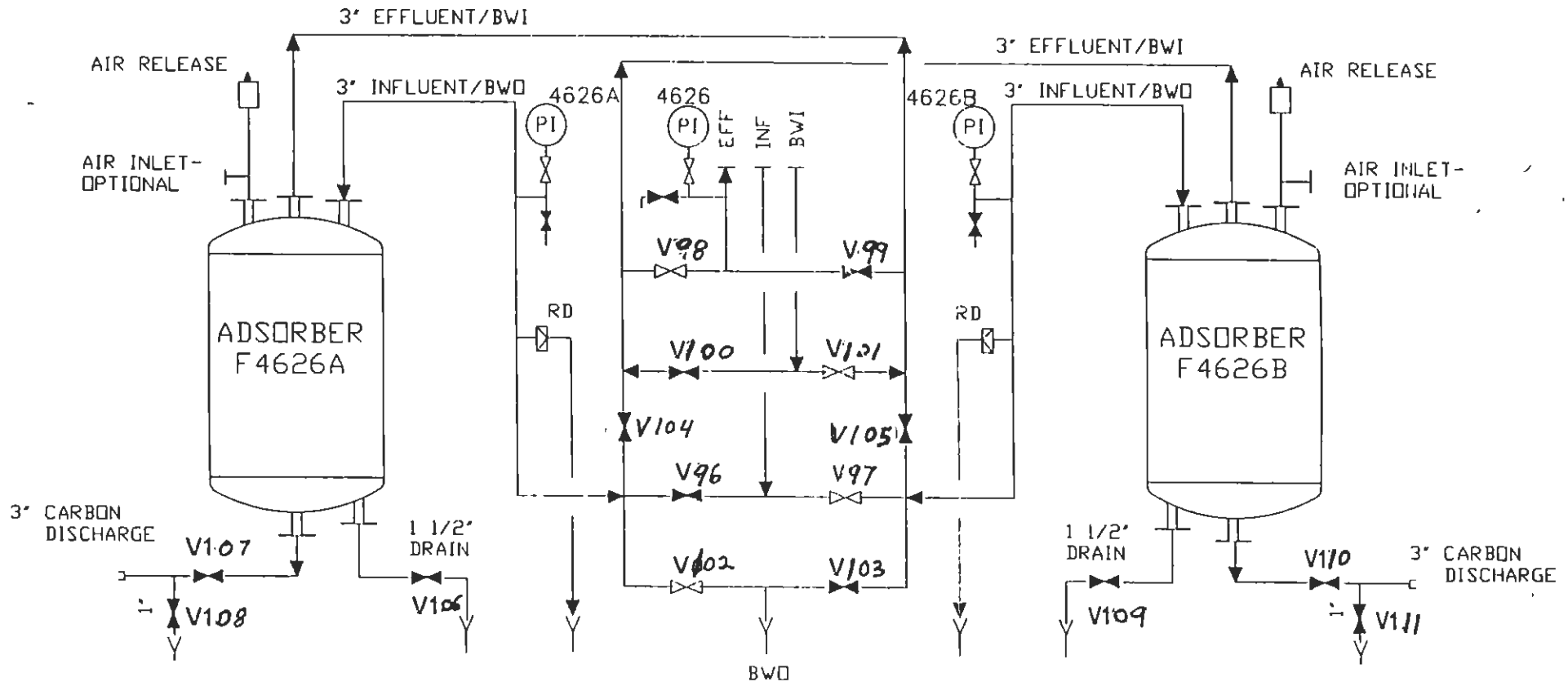
TIGG CORPORATION BOX 11661 PITTSBURGH, PA 15228 PH # 412 563-4300 FAX# 412 563-6155		NORLITE	A ADSORBING B BACKWASHING	
PROJ. NO.	PROJ. LOC. COHOES, NY	DATE: 5/8/95	D 95-5-022	REV.
DESIGN BY: WGS	CHECKED BY:	SCALE: NONE		

4. "A" UNIT BACKWASHING;
"B" UNIT ADSORBING

VALVES OPEN	VALVES CLOSED
V-97	
V-98	ALL OTHERS
V-101	
V-102	

REFER TO TIGG DRAWING # 4 ATTACHED.

DRAWING #4



VALVE CLOSED

VALVE OPEN

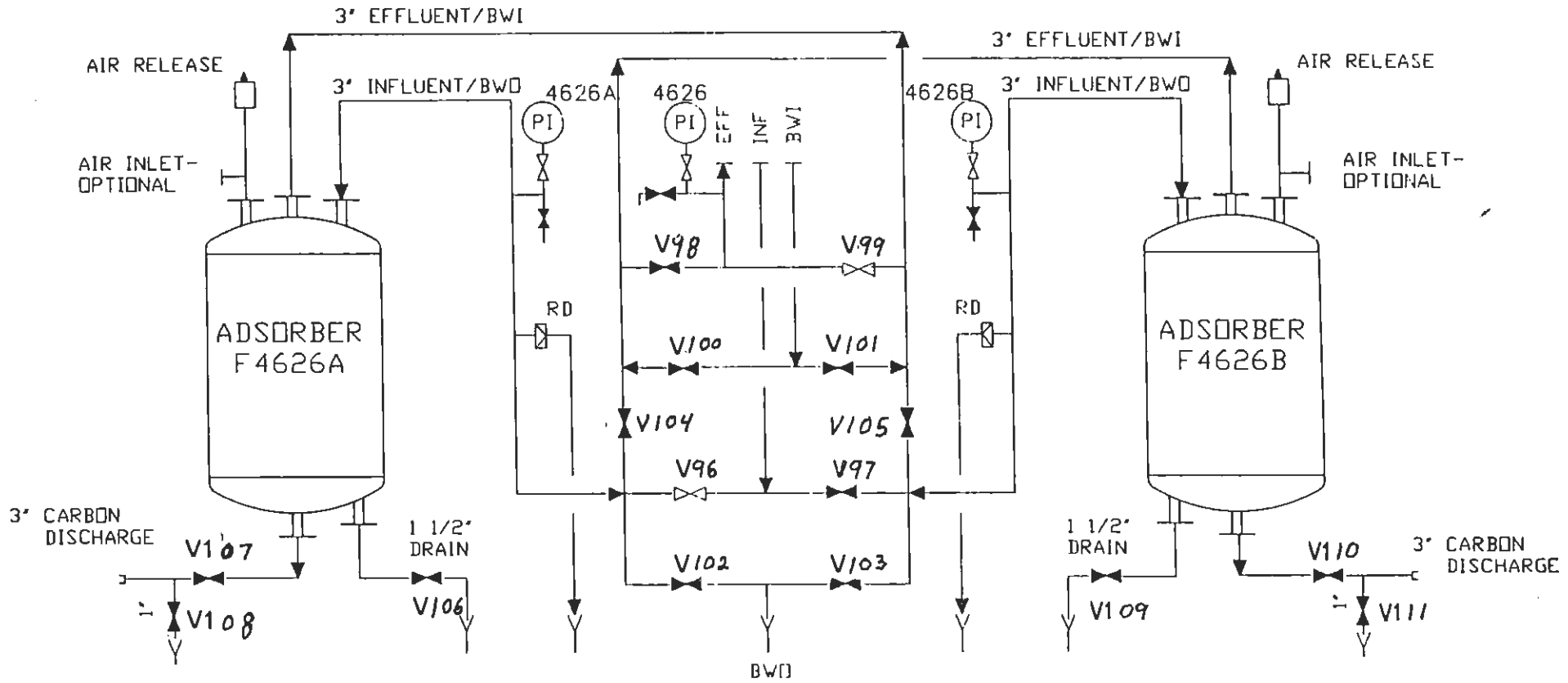
TIGG	TIGG CORPORATION BOX 11661 PITTSBURGH, PA 15228 PH # 412 563-4300 FAX# 412 563-6155		NORLITE	A BACKWASHING B ADSORBING	
	PROJ. NO.	PROJ. LOC. COHOES, NY	DATE: 5/8/95	D 95-5-022	REV.
	DESIGN BY: WGS	CHECKED BY:	SCALE: NONE		

5. "A" UNIT ADSORBING;
"B" UNIT CARBON FILL
OR OUT OF SERVICE

VALVES OPEN	VALVES CLOSED
V-96	
V-99	ALL OTHERS

REFER TO TIGG DRAWING # 5 ATTACHED.

DRAWING #5



VALVE CLOSED

VALVE OPEN

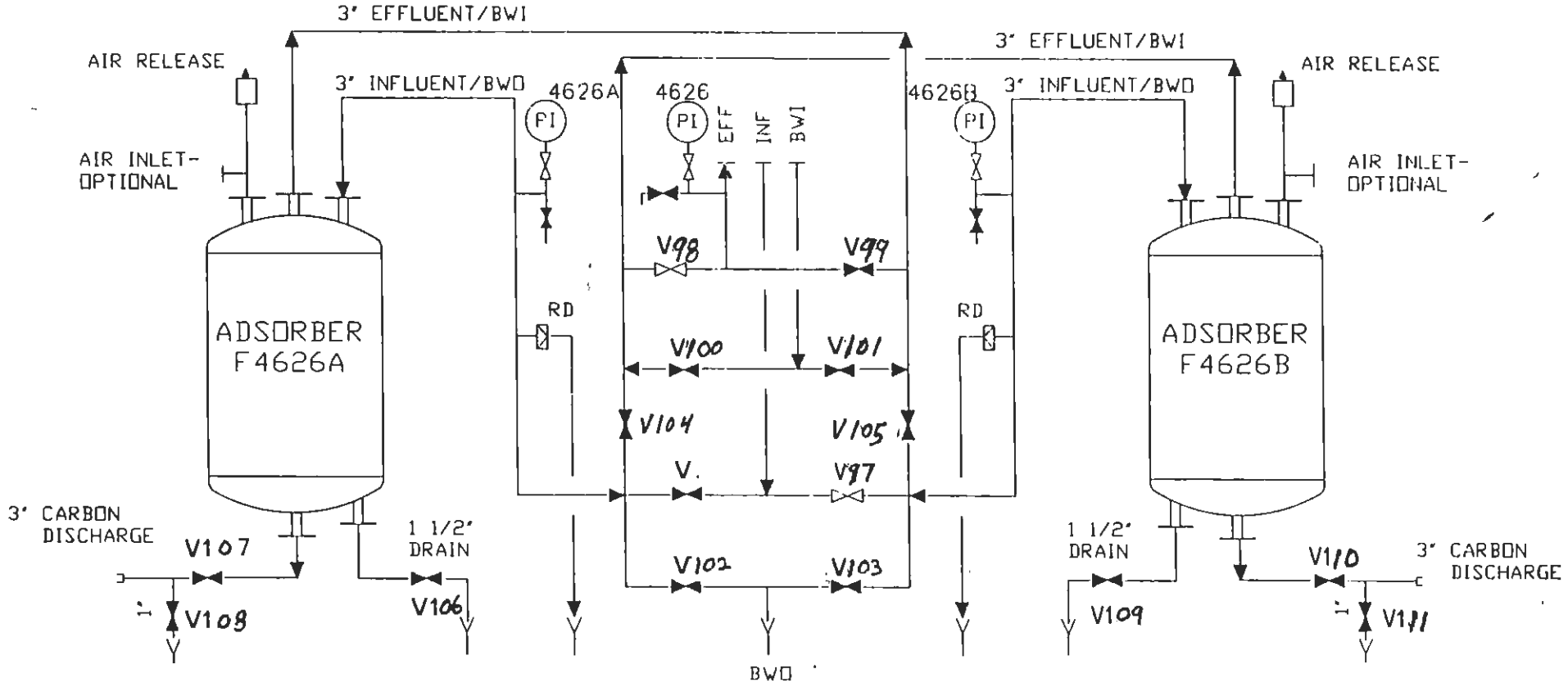
TIGG	TIGG CORPORATION BOX 11661 PITTSBURGH, PA 15228 PH # 412 563-4300 FAX# 412 563-6155		NORLITE	B CARBON FILL A ADSORBING	
	PROJ. NO.	PROJ. LOC. COHOES, NY	DATE: 5/8/95	D 95-5-025	REV.
	DESIGN BY: WGS	CHECKED BY:	SCALE: NONE		

6. "B" UNIT ADSORBING;
"A" UNIT CARBON FILL
OR OUT OF SERVICE

VALVES OPEN	VALVES CLOSED
V-97	
V-98	ALL OTHERS

REFER TO TIGG DRAWING # 6 ATTACHED.

DRAWING #6



VALVE CLOSED

VALVE OPEN

TIGG CORPORATION
BOX 11661
PITTSBURGH, PA 15228
PH # 412 563-4300
FAX# 412 563-6155

NORLITE	A CARBON FILL B ADSORBING		
PROJ. NO.	PROJ. LOC. COHOES, NY	DATE: 5/8/95	D 95-5-026
DESIGN BY: WGS	CHECKED BY:	SCALE: NONE	REV.

SULFUR CARBON FILTER F-4627 A&B
VALVE SET UP DIRECTIONS

DATE: JANUARY 31, 1996

1. SERIES ARRANGEMENT "A" INTO "B"

VALVES OPEN	VALVES CLOSED
V-57A	
V-61B	ALL OTHERS
V-58A	

2. SERIES ARRANGEMENT "B" INTO "A"

VALVES OPEN	VALVES CLOSED
V-57B	
V-61A	ALL OTHERS
V-58B	

3. "A" UNIT ADSORBING;
"B" UNIT BACKWASHING

VALVES OPEN	VALVES CLOSED
V-57A	
V-58B	ALL OTHERS
V-59A	
V-60B	

4. "A" UNIT BACKWASHING;
"B" UNIT ADSORBING

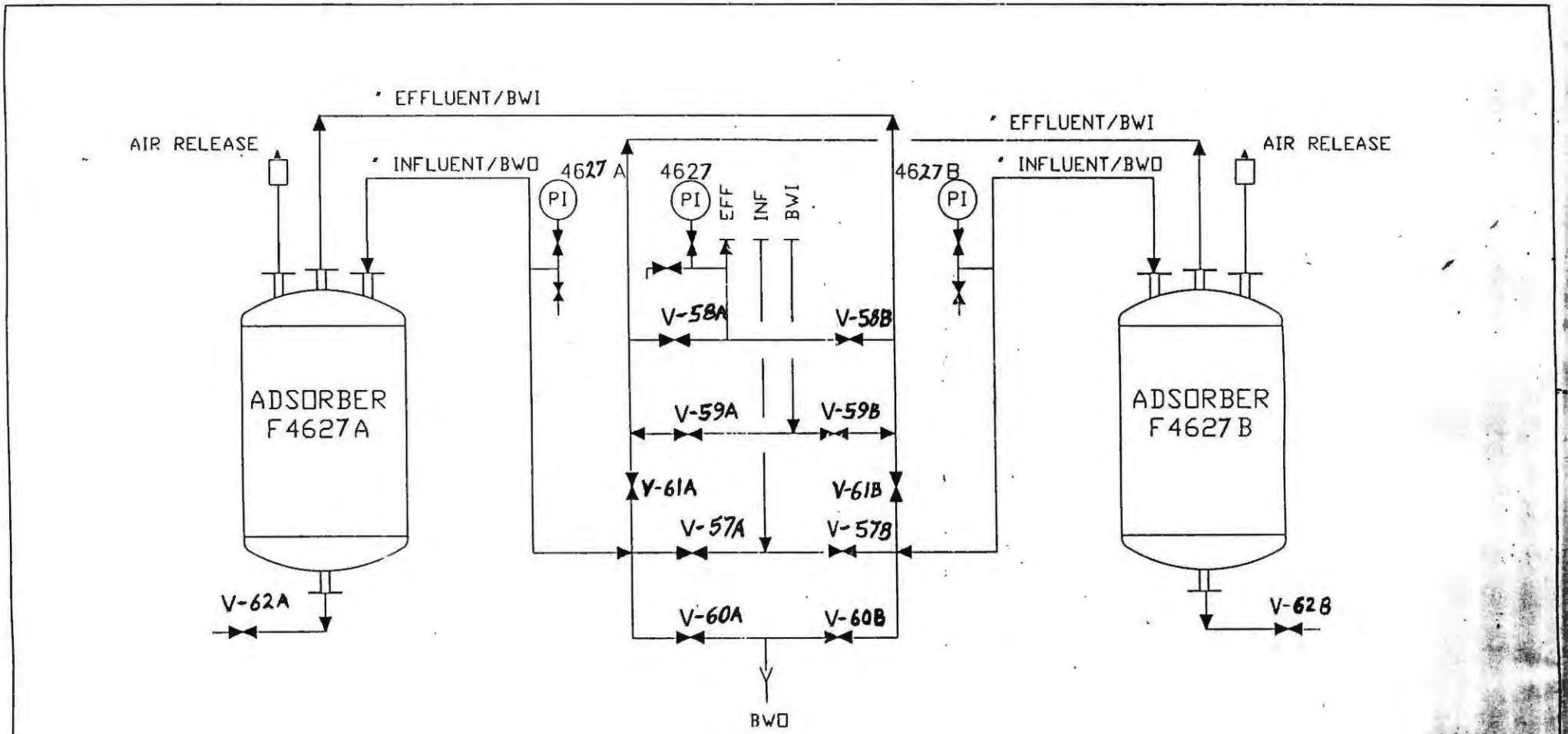
VALVES OPEN	VALVES CLOSED
V-57B	
V-58A	ALL OTHERS
V-59B	
V-60A	

5. "A" UNIT ADSORBING;
"B" UNIT CARBON FILL
OR OUT OF SERVICE

VALVES OPEN	VALVES CLOSED
V-57A	
V-58B	ALL OTHERS

6. "B" UNIT ADSORBING;
"A" UNIT CARBON FILL
OR OUT OF SERVICE

VALVES OPEN	VALVES CLOSED
V-57B	
V-58A	ALL OTHERS



SK-4627
1/30/96

CARBON ADSORBER BACKWASHING PROCEDURE

DATE: FEBRUARY 5, 1996

GENERAL

THE NORLITE WASTEWATER TREATMENT PLANT IS EQUIPPED WITH TWO TYPES OF CARBON ADSORPTION UNITS. BOTH OF THESE SYSTEMS ARE DESIGNED FOR REMOVAL OF TRACE AMOUNTS OF DISSOLVED METALS FROM THE WASTEWATER STREAM. NORMAL OPERATION WILL BE THROUGH THE LARGER 100 CUBIC FOOT UNITS FILLED WITH A STANDARD ACTIVATED CARBON. WHEN HIGHER THAN NORMAL METAL CONCENTRATIONS ARE PRESENT, THE WASTEWATER WILL BE SWITCHED TO THE SMALLER 33 CUBIC FOOT UNITS WHICH ARE FILLED WITH A SPECIAL SULFUR IMPREGNATED CARBON. THESE SULFUR IMPREGNATED CARBON UNITS HAVE A GREATER INCREASED ABILITY TO ADSORB DISSOLVED METALS.

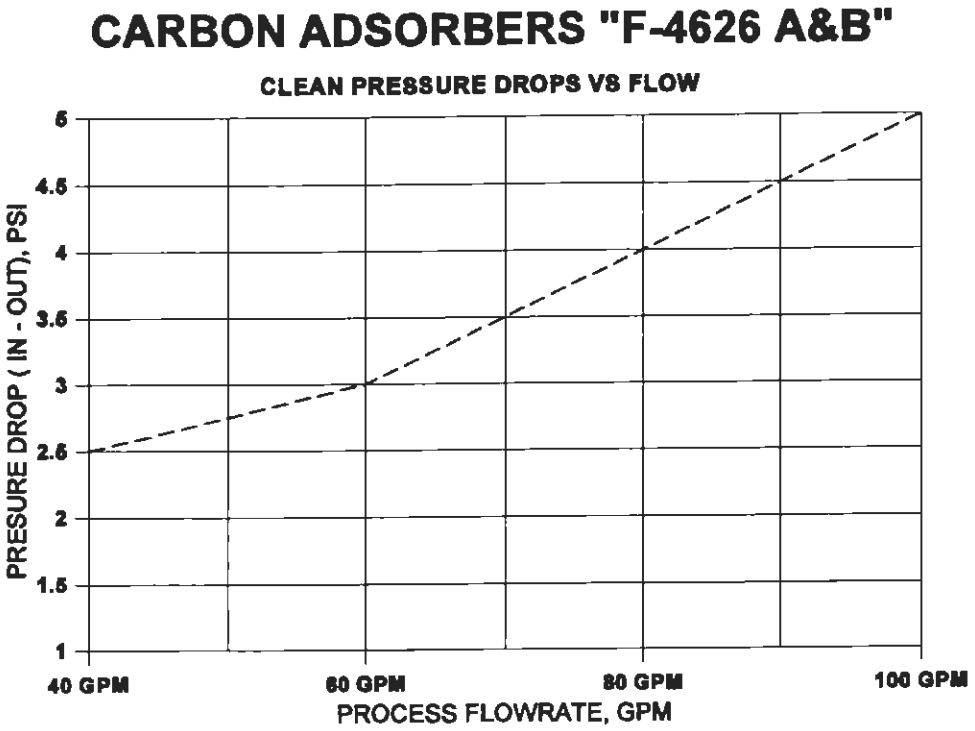
THE FUNCTION OF THE CARBON ADSORBERS IS NOT TO FILTER SUSPENDED SOLIDS FROM THE WASTEWATER. SUSPENDED SOLIDS WILL CLOG THE ACTIVE METALS ADSORBING AREAS OF THE CARBON AND THE METALS REMOVAL EFFICIENCY OF THE SYSTEMS WILL DECREASE SIGNIFICANTLY. SUSPENDED SOLIDS REMOVAL IN THE NORLITE WASTEWATER TREATMENT PROCESS IS THE FUNCTION OF UPSTREAM CLARIFICATION AND POLISHING FILTRATION SYSTEMS. IF ANY SIGNIFICANT SUSPENDED SOLIDS ARE PRESENT IN THE INCOMING FLOW TO THE CARBON ADSORBERS, FLOW TO THE ADSORBERS SHOULD BE IMMEDIATELY STOPPED AND APPROPRIATE MAINTENANCE OR ADJUSTMENTS SHOULD BE MADE TO THE UPSTREAM PROCESSING SYSTEMS.

BOTH THE NORMAL AND SULFUR IMPREGNATED CARBON SYSTEMS ARE DESIGNED WITH TWO SEPARATE ADSORBERS, "A" &"B". THESE WILL BE NORMALLY OPERATED IN WHAT IS CALLED A "LEAD -LAG" MODE OF OPERATION. THE FRESHEST CARBON ADSORBER (MOST RECENTLY FILLED WITH NEW CARBON) WILL BE PLACED VIA VALVING ARRANGEMENT AS THE UNIT IN THE BACKUP OR LAG POSITION. THE LESS FRESH CARBON UNIT WILL BE POSITIONED TO FIRST RECEIVE THE WASTEWATER FLOW. THE FLOW ARRANGEMENT WILL INITIALLY BE "A" INTO "B". FOLLOWING DETERMINATION THAT A REFILL OF THE UNIT "A" CARBON IS REQUIRED (DUE TO REDUCED METALS ADSORPTION CAPABILITY), THE SYSTEM WILL BE THEN OPERATED IN THE "B" INTO " A" MODE.

TRACE AMOUNTS OF SOLIDS WILL EVENTUALLY ACCUMULATE IN THE CARBON UNITS. THIS WILL NORMALLY OCCUR IN THE "LEAD" UNIT FIRST. EVIDENCE OF THIS SOLIDS BUILDUP WILL BE BY AN INCREASED PRESSURE DROP ACROSS THE INDIVIDUAL UNIT. THIS IS NORMAL AND CAN BE TREATED BY BACKWASHING THE UNITS AS NEEDED. BACKWASHING SHOULD BE PERFORMED WHENEVER THE CLEAN UNIT PRESSURE DROP INCREASES BY 3 PSI. FAILURE TO BACKWASH AT THIS POINT WILL ALLOW FLOW CHANNELS TO BE FORMED WITHIN THE CARBON BED. THESE CHANNELS HELP DRIVE THE SOLIDS DEEPER INTO THE BED, MAKING SUBSEQUENT BACKWASHING LESS EFFECTIVE AND DECREASING METALS ADSORPTION EFFICIENCY.

BACKWASHING PROCEDURE FOR THE 100 CUBIC FOOT UNITS, F-4626 A&B

THE NEW NORLITE "F-4626 A&B" CARBON ADSORBERS HAVE BEEN TESTED AT VARIOUS FLOWRATES AND BASELINE PRESSURE DROPS HAVE BEEN DETERMINED. THE CHART BELOW DISPLAYS THIS DATA.



TO DETERMINE WHEN BACKWASHING OF EITHER OF THESE CARBON ADSORBERS IS REQUIRED, CALCULATE THE CURRENT UNIT PRESSURE DROP BY SUBTRACTING THE OUTLET PRESSURE FROM THE INLET PRESSURE. NOTE THE EXISTING FLOWRATE TO THE UNIT (AS READ FROM THE O.F. COLLECTION TANK DISCHARGE FLOW METER) AND DETERMINE FROM THE CHART ABOVE THE CLEAN UNIT PRESSURE DROP AT THAT FLOWRATE. IF THE CURRENT UNIT PRESSURE DROP EXCEEDS THE CLEAN UNIT PRESSURE DROP BY 3 PSI, THE UNIT REQUIRES BACKWASHING.

NOTE: THERE ARE THREE SYSTEMS IN THE NORLITE WASTEWATER TREATMENT PROCESS THAT REQUIRE BACKWASHING - THE CARBON ADSORBERS, THE SULFUR IMPREGNATED CARBON ADSORBERS AND THE POLISHING FILTERS. ONLY ONE OF THE UNITS CAN BE BACKWASHED AT A TIME. THE BACKWASH OUTLET PIPING RETURN TO THE "EQUALIZATION TANK" IS COMMON TO ALL OF THESE SYSTEMS.

THE ADSORBERS ARE BACKWASHED WITH CLEAN, TREATED WASTEWATER EFFLUENT FROM ONE OF THE "EFFLUENT STORAGE TANKS". TO BACKWASH THE CARBON UNIT REFER TO THE "CARBON FILTER F-4626 A&B VALVE SET UP DIRECTIONS". ASSUMING A BACKWASH OF THE "A" UNIT, VALVE SET UP #4;

1. OPEN INLET VALVE TO THE "B" CARBON ADSORBER, VALVE V-97.

2. CLOSE "A" CARBON ADSORBER INLET AND OUTLET VALVES V-96 & V-105.

3. OPEN THE "A" UNIT BACKWASH INLET AND OUTLET VALVES V-101 & V-102.

4. CLOSE VALVE V-3 AND OPEN VALVE V-2 ON THE EFFLUENT RECIRCULATION MANIFOLD. THE BACKWASH FLOW CONTROL VALVE FV-1 SHOULD BE IN THE CRACKED OPEN POSITION.

5. CHOOSE THE "EFFLUENT TANK" FROM WHICH TO DRAW BACKWASH WATER. ALL OF THE FLOW FROM THIS TANK WILL BE DIRECTED TO THE BACKWASHING OPERATION, SO DISCHARGE TO THE SEWER FROM THIS TANK WILL BE STOPPED PRIOR TO THE BACKWASHING. OPEN THE RECIRCULATION LINE VALVE V-69A 0R 69B.

6. CLOSE THE EFFLUENT TANK SPRAY RECIRC VALVE V-73 OR V-74 (DEPENDING ON BACKWASH PUMP SELECTION).

7. OPEN THE BACKWASH FLOW CONTROL VALVE FV-1 AS NECESSARY TO ATTAIN A BACKWASH FLOWRATE OF 180 GPM. MAINTAIN THIS BACKWASH RATE FOR 12 MINUTES.

   NOTE: BACKWASHING THE F-4626 CARBON UNITS WILL ADD APPROXIMATELY 2,200 GALLONS OF WATER TO THE "EQUALIZATION TANK".

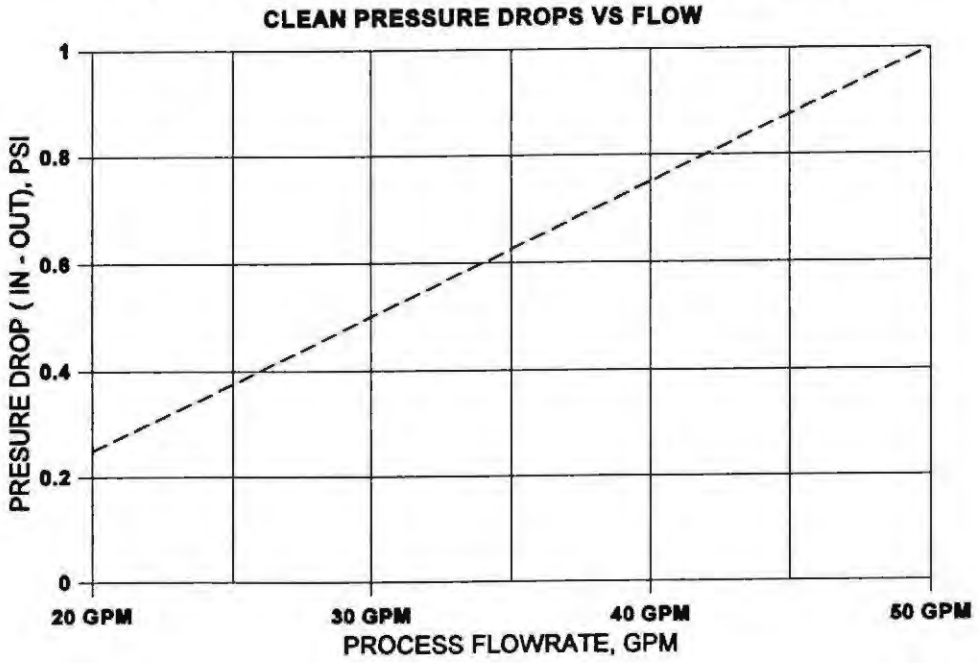
8. AFTER BACKWASHING FOR 12 MINUTES, OPEN THE EFFLUENT PUMP SPRAY RECIRC VALVE V-73 0R 74 AND CLOSE THE RECIRCULATION LINE VALVE V-69A OR B.. CLOSE THE CARBON ADSORBER BACKWASH INLET VALVE V-2 AND THE BACKWASH FLOW CONTROL VALVE FV-1.

9. RETURN THE CARBON ADSORBERS TO THEIR INITIAL VALVE SET UP ("A" INTO"B" OR "B" INTO "A"). THE PRESSURE DROP ACROSS THE RECENTLY BACKWASHED UNIT SHOULD NOW BE NEAR THAT OF A FRESH UNIT AS SHOWN ON THE CHART ABOVE.

BACKWASHING PROCEDURE FOR THE SULFUR IMPREGNATED MODEL C50 Rx UNITS, F-4627 A&B

THE NEW NORLITE "F-4627 A&B" CARBON ADSORBERS HAVE BEEN TESTED AT VARIOUS FLOWRATES AND BASELINE PRESSURE DROPS HAVE BEEN DETERMINED. THE CHART BELOW DISPLAYS THIS DATA.

CARBON ADSORBERS "F-4627 A&B"



TO DETERMINE WHEN BACKWASHING OF EITHER OF THESE CARBON ADSORBERS IS REQUIRED, CALCULATE THE CURRENT UNIT PRESSURE DROP BY SUBTRACTING THE OUTLET PRESSURE FROM THE INLET PRESSURE. NOTE THE EXISTING FLOWRATE TO THE UNIT (AS READ FROM THE O.F. COLLECTION TANK DISCHARGE FLOW METER) AND DETERMINE FROM THE CHART ABOVE THE CLEAN UNIT PRESSURE DROP AT THAT FLOWRATE. IF THE CURRENT UNIT PRESSURE DROP EXCEEDS THE CLEAN UNIT PRESSURE DROP BY 3 PSI, THE UNIT REQUIRES BACKWASHING.

NOTE: THERE ARE THREE SYSTEMS IN THE NORLITE WASTEWATER TREATMENT PROCESS THAT REQUIRE BACKWASHING - THE CARBON ADSORBERS, THE SULFUR IMPREGNATED CARBON ADSORBERS AND THE POLISHING FILTERS. ONLY ONE OF THE UNITS CAN BE BACKWASHED AT A TIME. THE BACKWASH OUTLET PIPING RETURN TO THE "EQUALIZATION TANK" IS COMMON TO ALL OF THESE SYSTEMS.

THE ADSORBERS ARE BACKWASHED WITH CLEAN, TREATED WASTEWATER EFFLUENT FROM ONE OF THE "EFFLUENT STORAGE TANKS". TO BACKWASH THE CARBON UNIT REFER TO THE "CARBON FILTER F-4627 A&B VALVE SET UP DIRECTIONS". ASSUMING A BACKWASH OF THE "A" UNIT, VALVE SET UP #4;

1. OPEN INLET VALVE TO THE "B" CARBON ADSORBER, VALVE V-57B.

2. CLOSE "A" CARBON ADSORBER INLET AND OUTLET VALVES V-57A & V-61B.

3. OPEN THE "A" UNIT BACKWASH INLET AND OUTLET VALVES V-59B & V-60A.

4. CLOSE VALVE V-3 AND OPEN VALVE V-2 ON THE EFFLUENT RECIRCULATION MANIFOLD. THE BACKWASH FLOW CONTROL VALVE FV-1 SHOULD BE IN THE CRACKED OPEN POSITION.

5. CHOOSE THE "EFFLUENT TANK" FROM WHICH TO DRAW BACKWASH WATER. ALL OF THE FLOW FROM THIS TANK WILL BE DIRECTED TO THE BACKWASHING OPERATION, SO DISCHARGE TO THE SEWER FROM THIS TANK WILL BE STOPPED PRIOR TO THE BACKWASHING. OPEN THE RECIRCULATION LINE VALVE V-69A 0R 69B.

6. CLOSE THE EFFLUENT TANK SPRAY RECIRC VALVE V-73 OR V-74 (DEPENDING ON BACKWASH PUMP SELECTION).

7. OPEN THE BACKWASH FLOW CONTROL VALVE FV-1 AS NECESSARY TO ATTAIN A BACKWASH FLOWRATE OF 120 GPM. MAINTAIN THIS BACKWASH RATE FOR 6-1/2 MINUTES.

NOTE: BACKWASHING THE F-4627 CARBON UNITS WILL ADD APPROXIMATELY 750 GALLONS OF WATER TO THE "EQUALIZATION TANK".

8. AFTER BACKWASHING FOR 6-1/2 MINUTES, OPEN THE EFFLUENT PUMP SPRAY RECIRC VALVE V-73 0R 74 AND CLOSE THE RECIRCULATION LINE VALVE V-69A OR B.. CLOSE THE CARBON ADSORBER BACKWASH INLET VALVE V-2 AND THE BACKWASH FLOW CONTROL VALVE FV-1.

9. RETURN THE CARBON ADSORBERS TO THEIR INITIAL VALVE SET UP ("A" INTO"B" OR "B" INTO "A"). THE PRESSURE DROP ACROSS THE RECENTLY BACKWASHED UNIT SHOULD NOW BE NEAR THAT OF A FRESH UNIT AS SHOWN ON THE CHART ABOVE.

POLISHING FILTER
BACKWASHING PROCEDURE

DATE: FEBRUARY 5, 1996

TO DETERMINE WHEN BACKWASHING OF THE POLISHING FILTERS IS REQUIRED, CALCULATE THE CURRENT FILTER SYSTEM PRESSURE DROP BY SUBTRACTING THE OUTLET HEADER PRESSURE FROM THE INLET HEADER PRESSURE. NOTE THE EXISTING FLOWRATE TO THE POLISHING FILTERS (AS READ FROM THE O.F. COLLECTION TANK DISCHARGE FLOW METER) AND DETERMINE FROM THE CHART ABOVE THE CLEAN UNIT PRESSURE DROP AT THAT FLOWRATE. IF THE CURRENT UNIT PRESSURE DROP EXCEEDS THE CLEAN UNIT PRESSURE DROP BY 15 PSI, THE POLISHING FILTERS REQUIRE BACKWASHING.

NOTE: THERE ARE THREE SYSTEMS IN THE NORLITE WASTEWATER TREATMENT PROCESS THAT REQUIRE BACKWASHING - THE CARBON ADSORBERS, THE SULFUR IMPREGNATED CARBON ADSORBERS AND THE POLISHING FILTERS. ONLY ONE OF THE UNITS CAN BE BACKWASHED AT A TIME. THE BACKWASH OUTLET PIPING RETURN TO THE "EQUALIZATION TANK" IS COMMON TO ALL OF THESE SYSTEMS.

THE POLISHING FILTERS ARE BACKWASHED ONE AT A TIME WITH PROCESS DISCHARGE FROM THE OTHER THREE OPERATING FILTERS. THE BACKWASH IS DIRECTED IN A REVERSE DIRECTION THROUGH THE FILTER TO PUSH ACCUMULATED SOLIDS OFF THE SOCK FILTER MEDIA. THE BACKWASH FLUID WITH THE SOLIDS IS RETURNED TO THE "EQUALIZATION TANK". WHEN PERFORMING A BACKWASH OF THE POLISHING FILTERS, EACH FILTER MUST BE BACKWASHED. A BACKWASHING OF ONLY ONE POLISHING FILTER IS INSUFFICIENT TO RESTORE NORMAL FLOW THROUGH THE FILTERS.

1. ADJUST THE FLOWRATE TO THE POLISHING FILTERS TO 90 GPM. BACKWASHING WILL BE PERFORMED ON EACH FILTER STARTING WITH THE "D" FILTER, THEN "C","B" & "A".

Open Backwash Valve V52A

2. LOWER THE HANDLE ON THE THREEWAY VALVE V-54D ON THE "D" FILTER. THE VALVE IS NOW IN THE BACKWASH POSITION.

3. CLOSE VALVE V-56. THIS WILL DIRECT THE PROCESS OUTLET FLOW FROM THE OTHER THREE FILTERS INTO THE "D" FILTER.

4. ALLOW THE "D" FILTER TO BE BACKWASHED FOR 15 SECONDS. LOWER THE HANDLE ON THE "C" FILTER THREEWAY VALVE V-54C.

5. RAISE THE HANDLE ON THE "D" FILTER THREEWAY VALVE V-54D. THIS WILL INITIATE THE BACKWASH OF THE "C" FILTER.

6. ALLOW THE "C" FILTER TO BE BACKWASHED FOR 15 SECONDS. LOWER THE HANDLE ON THE "B" FILTER THREEWAY VALVE V-54B.

7. RAISE THE HANDLE ON THE "C" FILTER THREEWAY VALVE V-54C. THIS WILL INITIATE THE BACKWASH OF THE "B" FILTER.

8. ALLOW THE "B" FILTER TO BE BACKWASHED FOR 15 SECONDS. LOWER THE HANDLE ON THE "A" FILTER THREEWAY VALVE V-54A.

9. RAISE THE HANDLE ON THE "B" FILTER THREEWAY VALVE V-54B. THIS WILL INITIATE THE BACKWASH OF THE "A" FILTER.

Close Valve V-52A

10. ALLOW THE "A" FILTER TO BE BACKWASHED FOR 15 SECONDS. OPEN OUTLET VALVE V-56 AND RAISE THE HANDLE ON THE "A" FILTER THREEWAY VALVE V-54A. RETURN THE PROCESS FLOWRATE (FROM THE "OVERFLOW COLLECTION TANK") TO IT'S ORIGINAL SETTING. THE BACKWASHING IS COMPLETED AND THE POLISHING FILTER SYSTEM IS NOW BACK IN A NORMAL FLOW ARRANGEMENT.

THE PRESSURE DROP ACROSS THE POLISHING FILTER SYSTEM SHOULD BE SIGNIFICANTLY REDUCED FROM THAT PRIOR TO THE BACKWASHING. IF A SIGNIFICANT REDUCTION IN PRESSURE DROP ACROSS THE SYSTEM WAS NOT ATTAINED AFTER BACKWASHING, REPLACEMENT OF THE SOCK FILTER MEDIA IS REQUIRED TO REGAIN NORMAL, CLEAN SYSTEM PERFORMANCE. THE EXISTING SOCKS ARE MOST LIKELY PLUGGED WITH FINE SOLIDS THAT CANNOT BE REMOVED BY BACKWASHING.

April 7, 1997

OPERATING PROCEDURE
Hydrogen Sulfide Control

Hydrogen sulfide is a chemical generated in the WWTP by the nature of the operating conditions in the WWTP. These conditions namely are warm treatment temperatures, low dissolved oxygen levels, mild base pH conditions, and stagnation.

These conditions promote the growth of bacteria that produce Hydrogen Sulfide gas. The odor of Hydrogen Sulfide gas is of rotten eggs and can be detected by smell at only a few parts per million. The presence of Hydrogen Sulfide is normally monitored only in the effluent water.

Testing for Hydrogen Sulfide is accomplished by using **HACH** Hydrogen Sulfide Test paper, an Alka Seltzer Gold tablet, and a ~~100 ml~~ test bottle. ~~100 ml~~ of waste water is placed in the test bottle an Alka Seltzer Gold tablet is placed in the water. The Test paper is placed in the lid of the test bottle and the lid is screwed onto the Test Bottle. If Hydrogen Sulfide is present a brown spot will appear on the test paper. The darkness of the brown spot indicates the relative level of Hydrogen Sulfide present. A light brown spot indicates a trace amount. A dark brown spot indicates a significant level.

There are 2 methods of controlling Hydrogen Sulfide:

1) Controlling the conditions for the generation of Hydrogen Sulfide prior to the generation of Hydrogen Sulfide.
2) Controlling and eliminating Hydrogen Sulfide after the generation of Hydrogen Sulfide.

Controlling the conditions for Hydrogen Sulfide generation prior to the generation of Hydrogen Sulfide is the operating principle of the WWTP.

CONTROLLING THE CONDITIONS FOR HYDROGEN SULFIDE GENERATION:

1) Constant air sparging of the effluent tanks is required to maintain a high level of dissolved oxygen.
2) Constant recirculation of the effluent water to the effluent tank is required while the water is being discharged to the river.
3) Monitoring of the ORP level of the effluent water. See discussion below on ORP readings and bleach addition.

ORP Readings and Bleach Addition:

ORP stands for "Oxidation/Reduction Potential". This is a relative measure for the potential for a chemical to change state. In the case of Hydrogen Sulfide, the potential is for Sulfate to change to Sulfide. The ORP meter reads in millivolts on a scale of -700 to +700. A positive reading indicates a low risk for Sulfide formation, the higher the positive number the lower the risk. A negative reading indicates a high risk for Sulfide formation, the higher the negative number the higher the risk. A negative ORP reading does not necessarily mean Sulfide is present, presence of Sulfide is determined by the Hydrogen Sulfide Test Paper.

Operation of the WWTP for the Effluent discharge for ORP readings should always be in the positive range. The trigger point for operator attention and potential bleach addition is an ORP reading of +100. If the ORP reading is stable around the +100 reading, generally no action is required. If the ORP reading is unstable and falling below +100 toward zero or negative, the addition of bleach is required.

Bleach should be added to the on line pump suction line using a the small metering pump. This should bring the effluent discharge ORP up very quickly and prohibit the formation of Hydrogen Sulfide. Bleach addition should continue until ORP readings are stable and above +100.

Monitoring of Residual Chloride using the HACH DPD Free Chloride Reagent is a normal operator test. Bleach addition will increase the residual chloride level. Generally, without bleach addition the residual chloride is zero. With bleach addition, the residual chloride level will be in 1 ppm to 3 ppm range. Residual chloride should not exceed 3.5 ppm.

CONTROLLING HYDROGEN SULFIDE WHEN TEST EVIDENCE INDICATES THE PRESENCE OF HYDROGEN SULFIDE:

The presence of a brown spot on the Hydrogen Sulfide Test Paper indicates the presence of Hydrogen Sulfide. The operator must:

1) Be sure air sparging, recirculation, and bleach addition as outlined in above are taking place.
2) Shock dose the effluent tank with bleach. Use the large metering pump and add bleach to the effluent tank between 20 and 50 gallons per hour. After 1 drum of bleach addition, reevaluate the situation as to whether the Hydrogen Sulfide problem is a short term (1 hour) problem or a long term problem(longer than 1 hour). If the Sulfide problem can not be cleared up within 1 hour the operator must do the following:

    a) continue the shock dose of bleach.
    b) Notify his/her immediate supervisor.

SUPERVISOR'S COURSE OF ACTION FOR POSITIVE SULFIDE READINGS:

1) Verify that a positive Hydrogen Sulfide condition exists and the degree of the problem.
2) Reverify that air sparging, recirculation, and bleach addition are in progress.
3) The effluent discharge going to the river from the current operating effluent tank should be stopped. This fluid should be recirculated in the effluent tank and bleach added until the Hydrogen Sulfide Test shows no brown spot. Upon stopping discharge from one of the effluent tanks the supervisor can do ***one*** of the following:

    a) discharge water from the other effluent tank.
    b) begin discharging city water to the river.

4) Notify his supervisor of the situation.

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PROCEDURE FOR RECEIVING AND UNLOADING ACID OR CAUSTIC SOLUTIONS

NORLITE PROCEDURE #NL-4600.03
REVISION 1

DATE: JANUARY 23, 1996

PREPARED BY: _____

REVIEWED BY: _____

APPROVED BY: _____ PLANT SAFETY

_____ PLANT COMPLIANCE

_____ PLANT ENGINEERING

_____ WASTEWATER SUPERVISOR

_____ PLANT MANAGER

1.0 GENERAL

This procedure details the steps required to safely receive and unload shipments of acid or caustic for use in the Wastewater Treatment Plant. These chemicals are designated as extremely hazardous, corrosive liquids and as such require necessary caution whenever handling or personnel exposure is possible. The storage and handling of these chemicals is regulated by the New York State Department of Environmental Conservation Hazardous Substances Regulations 6 NYCRR Parts 595 through 599.

The acid used in the Wastewater Treatment Plant is a 37% solution of Hydrochloric Acid in water. It is also known as Muriatic Acid. The acid has a relatively high vapor pressure which means that corrosive acid vapors will be present whenever the liquid is exposed to the air. Contact with metals can result in the production of potentially explosive hydrogen gas.

The caustic used in the Wastewater Treatment Plant is a 50% solution of Sodium Hydroxide in water. It has a low vapor pressure and little vapor is generated upon exposure of the liquid to air. The freezing point of the caustic solution is below 55 degrees F. Failure to maintain WWT building temperatures above this temperature at all times can result in freezing and blockage of piping.

Extreme care must be made to avoid mixing of acid and caustic as the resulting reaction will produce extreme amounts of heat and produce a boiling solution. Material Safety Data Sheets on both of these chemicals are attached for reference. Strict adherence to the handling and personal protection requirements for each chemical will be required at all times.

2.0 RECEIVING AND STORAGE FACILITY DESIGN

2.1 WWT RECEIVING AREA

Deliveries of both acid and caustic will be received in the Wastewater Treatment Plant unloading area located on the north side of the WWT building. The unloading area consists of a 18 foot wide concrete pad with a 25 foot long sloping surface towards the acid tank containment wall. This pad is coated with a non-skid, corrosion resistant material. It is curbed along the sloped portion of the pad and has a 5,000 gallon capacity (greater than 100% of the tanker volume) containment sump at the low end. In the event of a delivery

tanker failure, this sump will provide complete containment of the tanker contents.

Fill line connections for both Acid and Caustic receipt are located on the WWT building north wall. These connections are clearly labeled for the chemical designated for filling. An alarm horn is located near these connections to notify the receiving operator and the tanker driver when a tank overfill condition is imminent.

2.2 ACID STORAGE TANK, TK-4620

The Acid Storage Tank is a 8,655 gallon tank made of fiberglass reinforced plastic. The FRP tank material has an inner corrosion resistant lining and is impregnated with a fire retardant. It is equipped with two manways, top and side mounted, for personnel access. A level float switch is located near the top of the tank (at the 7,650 gallon mark) to issue an alarm to prevent overfilling with acid. A side mounted sight level gauge provides indication of the Tank working volume.

The Acid Storage Tank is fitted with a vent line to direct hydrochloric acid vapors to an Acid Vent Scrubber (SC-4632) during filling of the tank. This scrubber prevents discharge of harmful acid vapors. During normal use, this vent line is directed to a drum of soda ash solution to adsorb vapors emitted. Since capture and control of the acid vapor is required, the tank is not fitted with an overflow line. Overfilling beyond the high-high level alarm switch will result in a flooding of the vent line back into the acid vent scrubber.

A combination pressure/vacuum relief valve is fitted on the top of the tank to prevent tank rupture due to over-pressurization or drawing of excess vacuum. This relief valve discharges into the Soda Ash drum upon actuation. The operability of this relief valve should be checked at regular intervals to ensure that this protective device is available.

The Acid Storage Tank is located outdoors near the northwest corner of the WWT building. It is seated on a raised, coated steel base set on the concrete pad foundation. The raised base will allow periodic inspection beneath the tank to check for leakage. As an additional leak detection device, the concrete base is fitted with weepage grooves to direct any leaks to a point beyond the tank base for rapid identification. The tank is set within a concrete containment that has a volume capacity (9,600 gallons) that exceeds the maximum tank volume.

The Acid Feed Pump (PM-4622) is also located within the Tank containment. All of the

acid piping and valves are of polypropylene material.

2.3 CAUSTIC STORAGE TANK (TK-4609)

The Caustic Storage Tank is a 7,900 gallon tank of API 650 carbon steel construction. It is equipped with two manways, top and side mounted, for personnel access. A level float switch is located near the top of the tank (at the 7,210 gallon mark) to issue an alarm to prevent overfilling with caustic solution. A side mounted sight level gauge provides indication of the Tank working volume.

The Caustic Storage Tank is fitted with a vent line. This allows escape of tank overhead space during fill periods. In addition, the tank is fitted with an overflow line in the event of overfilling of the tank. Both of these lines are directed to the caustic containment sump.

Since a the Tank has a vent line, no pressure/vacuum relief device is required to prevent tank rupture due to over-pressurization or drawing of excess vacuum.

The Caustic Storage Tank is located inside the WWT building. It is seated on a raised, coated steel base set on the concrete pad foundation. The raised base will allow periodic inspection beneath the tank to check for leakage. As an additional leak detection device, the concrete base is fitted with weepage grooves to direct any leaks to a point beyond the tank base for rapid identification. The tank is set within a curbed containment to prevent the spread of small spills or leaks and to protect the tank from any vehicular traffic. The curbed containment of the entire WWT building serves as the containment for the full capacity of the Caustic Storage Tank. This containment, with a volume capacity in excess of 28,000 gallons that exceeds the maximum tank volume.

The Caustic Feed Pump (PM-4611) is also located within the Tank curbed containment area. All of the caustic piping and valves are of polypropylene material. To minimize the potential of freezing of caustic within the piping, all suction piping is heat traced and insulated and all discharge piping is insulated.

3.0 PERSONAL PROTECTION

The potential for injury resulting from handling of either caustic or hydrochloric acid is extremely high. Appropriate personal protection is absolutely necessary whenever handling of either of these chemicals.

Prior to working with Muriatic Acid and/or Caustic Soda. the respective MSDS must be read by the employee. Copies of the MSDS shall be maintained with the PPE and emergency equipment.

Before working with Muriatic Acid or Caustic Soda, the following PPE is required to be worn and maintained during the entire work application:

PVC Acid Suit (fully buttoned)
Goggles
Face Shield
PVC Gloves
PVC Boots

These items will be maintained in an accessible storage facility in the WWT Plant

Sodium Bicarbonate shall be available in an appropriate quantity prior to unloading.

If actual or potential contamination of PPE occurs, then the PPE shall be cleaned with a bicarbonate paste and fully rinsed prior to returning to storage. If there is any breakthrough contamination, immediate use of the safety shower with bicarbonate is required. Notify Safety immediately.

4.0 UNLOADING PROCEDURE

4.1 The unloading/receipt of caustic or hydrochloric acid must be supervised at all times by a trained, qualified WWT operator. It will be the WWT operator's responsibility to ensure that a load is safely and correctly received. The WWT operator responsible for the unloading shall fill out the attached RAW MATERIAL RECEIPT REPORT during each delivery of acid or caustic.

4.2 Upon arrival of the chemical shipment at the plant security gate, the guard will log in the driver and notify the Kiln Supervisor that the shipment has arrived. The delivery vehicle will be weighed and the entry weight recorded.

4.3 The Kiln Supervisor will have the WWT operator meet the driver at the security gate. The operator will review the driver's bill of lading to confirm that the proper material is being received.

4.4 The security guard will notify via radio the Finish Plant Loader Operator that a shipment of acid or caustic is being received and that appropriate caution should be taken if operating plant vehicles are near the route to be taken to the WWT building.

4.5 The WWT operator will accompany and direct the driver to the WWT unloading area and guide him to the designated unloading point. The truck's brakes should be set and wheels chocked before proceeding.

4.6 All normal accessways to the unloading area shall be enclosed with appropriate safety barriers prior to unloading the shipment to prevent unauthorized personnel entry to the unloading area.

4.7 The WWT operator shall outfit himself with the required PPE at this point.

4.8 The driver shall be provided with a sample jar for collection of a sample of the contents of the tanker. This sample collection is the responsibility of the driver who should be outfitted with his own personal protective equipment. The collected sample shall be given to the operator for confirmatory testing.

4.10 If the testing results are satisfactory, the operator will proceed with step 5.11. If not, the Lab Supervisor shall be notified to resolve the discrepancy.

4.11 The operator will check to confirm that the tank to be filled has sufficient volume available to receive the shipment. This volume check will be made using the side mounted level gauge. If the tank does not appear to have sufficient available volume to receive the shipment, the Kiln Supervisor should be notified.

4.12 The driver shall secure the deliverer supplied unloading hose to the correct fill line connection. The Operator shall check that the proper fill line connection has been made and that there is no leakage at the connection.

FOR FILLING OF THE ACID STORAGE TANK;

4.13 Initiate city water supply to the Acid Vent Scrubber by opening valve V-77. Using the flow control valve FV-120, adjust the flowrate to 2.9= gpm as indicated on the rotameter, FI-4632.

4.14 Turn the three-way valve V-39 to a position to direct the Acid Tank vent flow to the Acid Vent Scrubber.

4.15 Open the Acid Tank fill valve V-38. Review all valve settings and confirm that they are properly set. Confirm that no leaks are evident. Direct the driver to initiate the transfer of acid to the tank.

4.16 As the Acid Tank is being filled, the tank level as indicated on the sight level gauge should be monitored to ensure that the tank is not overfilled. If the level gauge indicates that the high-high level in the tank is being approached or if the high-high level alarm horn is activated (along with a Acid Tank High-High Level Alarm light on the WWT Control Panel), the filling of the Acid Tank should be stopped.

4.17 Once the contents of the tanker have been completely transferred to the Acid Tank, the delivery system should be stopped by the driver, fill line valve V-38 should be closed and the unloading hose disconnected. Any small spills or leaks should be immediately covered with sodium bicarbonate. After allowing to set for a few minutes, wash the sodium bicarbonate down to the unloading area sump with water.

4.18 As soon as possible, close the city water supply valve V-77 to the Acid Vent Scrubber and turn the three-way valve V-39 to direct the Acid Tank vents to the Soda Ash vent collection drum.

4.19 If during the filling operation a major spill occurs, evacuate persons from the area that are not equipped with appropriate PPE and stay upwind of the spill area. Notify the Kiln Supervisor and the Emergency Coordinator immediately.

FOR FILLING OF THE CAUSTIC STORAGE TANK;

4.20 Open the Caustic Tank fill valve V-15. Confirm that no leaks are evident. Direct the driver to initiate the transfer of caustic to the tank.

4.21 As the Caustic Tank is being filled, the tank level as indicated on the sight level gauge should be monitored to ensure that the tank is not overfilled. If the level gauge indicates that the high-high level in the tank is being approached or if the high-high level alarm horn is activated (along with a Caustic Tank High-High Level Alarm light on the WWT Control Panel), the filling of the Caustic Tank should be stopped.

4.22 Once the contents of the tanker have been completely transferred to the Caustic Tank, the delivery system should be stopped by the driver, fill line valve V-15 should be closed and the unloading hose disconnected. Any small spills or leaks should be immediately covered with sodium bicarbonate. After allowing to set for a few minutes, wash the sodium bicarbonate down to the unloading area sump with water.

4.23 If during the filling operation a major spill occurs, evacuate persons from the area that are not equipped with appropriate PPE. Notify the Kiln Supervisor and the Emergency Coordinator immediately.

4.24 Upon completion of the unloading of the tanker, remove the safety barrier from the area and notify the Kiln Supervisor that the unloading is complete. Remove the chocks from the truck's wheels.

4.25 Notify the Kiln Supervisor and the Finish Plant Loader Operator that the tanker is ready to travel offsite and that caution should be taken if operating plant vehicles are near the route to be taken back to the security gate.

4.26 The operator will guide the driver as he leaves the unloading ramp. The operator will accompany the driver back to the security gate.

4.27 The security guard will again weigh the vehicle and record the exit weight.

4.28 Prior to returning to his normal duties, the WWT operator will complete and sign the RAW MATERIAL RECEIPT REPORT and submit it to the Kiln Supervisor for his review and signature.

NORLITE CORPORATION
RAW MATERIAL RECEIPT REPORT

DATE: _____ **NORLITE RECEIVER:** _____
CARRIER: _____ **DRIVER NAME:** _____

1. MATERIAL CARRIED (CIRCLE ONE) : CAUSTIC OR HYDROCHLORIC ACID
2. CONFIRM PER BILL OF LADING
3. SITE NOTIFIED OF TANKER TRAVEL ON SITE: _____
4. TANKER ON WWT UNLOADING PAD,
   BRAKES SET, WHEELS CHOCKED: _____
5. SAFETY BARRIER IN PLACE: _____
6. DRIVER CONFIRMATION OF TANKER CONTENTS: _____
7. TANKER SAMPLE COLLECTED AND TESTING PERFORMED: _____
8. ANALYSIS APPROVAL: pH _____ SPECIFIC GRAVITY _____
9. SODIUM BICARBONATE AVAILABLE IN UNLOADING AREA: _____

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10 FOR ACID DELIVERIES;

10.1 TANKER HOSE CONNECTED: _____
10.2 V-77 OPEN, WATER TO SCRUBBER @ 2.9 GPM: _____
10.3 V-38 DIRECTED TO ACID VENT SCRUBBER & V-38 OPEN: _____
10.4 NO LEAKAGE DETECTED: _____
10.5 FILLING COMPLETED: _____
10.6 V-38 CLOSED, HOSE TANKER HOSE DISCONNECTED: _____
10.7 V-77 CLOSED, V-39 DIRECTED TO SODA ASH DRUM: _____

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11 FOR CAUSTIC DELIVERIES;

11.1 TANKER HOSE CONNECTED: _____
11.2 VALVE V-15 OPEN: _____
11.3 NO LEAKAGE DETECTED: _____
11.4 FILLING COMPLETED: _____
11.5 VALVE V-15 CLOSED: _____

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12. CAUTION TAPE REMOVED: _____
13. KILN SUPERVISOR NOTIFIED OF COMPLETION: _____
14. CHOCKS REMOVED: _____

KILN SUPERVISOR SIGNATURE: _____