OPERATIONS AND MAINTENANCE PLAN

H_2PRO WATER INJECTION SYSTEM AND CASCADE "ZERO BLEED"

Scrap, Inc.
1751 North Green Street
Pensacola, Florida

JULY 2009

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Appendix A – Cascade System – General Operating Instructions

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1.0 Introduction

This Operation and Maintenance Plan was prepared for the Scrap, Inc. metal shredding facility located at 1751 North Green Street, Pensacola, Escambia County, Florida. The facility includes a 4000 HP electric shredder that has the potential to process up to 360,000 tons/year, and a Cascade "Zero Bleed" air classifier. Particulate emissions from the shredder are suppressed by an integrated, electronically controlled H_2PRO Water Injection System. This equipment will be operated in accordance with the requirements of Florida Department of Environmental Protection Air Permit No_____.

2.0 Setting Controls – Cascade System

The following sections provide information on specific controls of the Cascade System manufactured by Osborn Engineering. Refer to General Operating Instructions in Appendix A.

2.1 Bleed Off Control

Location: At fan discharge.

Type: Variable air volume for discharge to atmosphere

Purpose: To minimize leakage of air at discharge of cascade, to relieve heat and dust buildup.

Actuator: Manual or electromechanical.

Adjustment Required Due To:

1. Extreme weather changes
2. Wearing our of rubber flaps

Optimum Setting Determined By:

Visual inspection of "blow-out" at cascade discharge.

1. Setting too little bleed-off will cause "blow out" at cascade discharge.
2. Setting too much bleed-off will cause accumulation of fine particulate to atmosphere which may be excessive and may cause lack of necessary air for cleaning.

When to Set: With fan running and no shredded product.

2.2 Bypass Control

Location: At fan discharge.

Type: Variable air volume for bypassing cascade.

Purpose: For control of cleaning efficiency through cascade by metering air through a parallel duct. This allows cyclone to maintain constant

Purpose: For control of cleaning efficiency through cascade by metering air through a parallel duct. This allows cyclone to maintain constant volume (equaling constant efficiency), which dampening of air would not allow, while allowing variable velocity through the cascade cleaning section. This, in turn, allows for "cut point" to be adjusted by operator.

Actuator: Manual or electromechanical

Adjustment Require Due to:

1. Weather changes (e.g. wet or dry)
2. Change in input feed stock
3. change in moisture input
4. Change in process rate.

Optimum Setting Determine by:

Visual inspection of quality of non-ferrous finished product with relation to metal "contaminant" of waste pile. There is a "grey area" in which operator will be required to make the final adjustment, a judgment call determined by the basis of maximum importance of the following:

(A) Is there too much dirt in the non-ferrous finished product, or

(B) Is there too much non-ferrous carryover in the dirt pile?

If (A) is positive, bypass is reduced to allow more air through the cascade.

If (B) is positive, bypass is increased to allow less air throughout he cascade.

Optimum setting is a balance between A and B.

When to Set: During normal production.

2.3 Indirect Control Water Volume In Shredder

Location: In control tower.

Type: Variable water volume (typical max + 65 gpm)

Purpose: To suppress dust and hydrocarbon emissions at mill in-feed area. To minimize explosion potential by lowering temperature in mill and extinguishing sparks, etc.

Actuator: Gate valve or electrical potentiometer at shredder operator control console.

1. Wet/dry weather conditions.
2. Input feed stock (more water required with flammable materials (autos vs. white goods).

Optimum Setting Determined By:

1. Addition of water when excessive smoke generated at shredder in-feed area.

2. Reduction of water when transfer conveyor and shredded material becomes saturated.

When to Set: During normal operation.

3.0 Setting Controls – H_2PRO Water System

Refer to Riverside Engineering, Inc. Operations Plan in Appendix B.

4.0 Startup and Shutdown

The water suppression system will be engaged prior to commencing shredding operations to ensure proper operation of the water suppression system. Once a load is placed on the shredder drive motor, the water suppression system is automatically engaged and the optimum water flow rate is set based on the shredder motor output. The water suppression system is automatically disengaged once the shredder motor output is at a zero load.

5.0 Inspections and Maintenance

5.1 Cascade System

Certain areas inside the cascade cleaning system will require daily cleaning due to dirt buildup. Other areas will require periodic inspection to determine if sufficient abrasion has occurred to necessitate replacement or repair of that part. Still other areas require inspection of or maintenance.

5.1.1 Daily:

- Remove debris from internal surfaces of horizontal inlet duct, cyclone inlet transition, and ledge on cyclone inlet scroll. These areas tend to build up with loose dirt and light metals, sometimes up to a depth of 12 inches. If scooped off into cyclone center daily the buildup is easily and quickly taken care of. If allowed to accumulate for a number of days, then this material will become hard packed and difficult to remove.
- Remove dirt from internal top surface and center tube of cyclone.
- Inspect fan discharge chute with diverter gate. The lead edge of the diverter gate will cause airborne rags and stringy material to hang up, requiring daily removal. Failure to remove waste may cause gate to become wedged. Also, the discharge chute entry into cascade area will require daily removal of relatively large pieces of shredded metal. These pieces are usually coil springs which tend to bounce for the opposite side of the cascade cleaning section into the chute area.
- Inspect all fan bearings and shaft bearings for proper lubrications.
- Inspect rotary valve rubber flaps daily to insure that damage is not causing air leakage, in turn causing re-entrainment of dirt in air stream. Easy visual check by watching light dust to see if it is drawn upward by

any "vacuum leak" on discharge side of valve. This may only require cleaning

5.1.2 Bi-Weekly

- Internal surface of cone – a dirt "ridge" will build up with wet materials becoming quickly hard packed. Inspect every 2 to 3 days – scrape off to remove.

5.1.3 Weekly

- Fan wheel – inspect blades weekly for dirt buildup. Moderate buildup will cause wheel to become unbalanced which could cause bearing and/or shaft damage.

5.1.4 Monthly

- Abrasive resistant liners in the cascade are bolted in and should be replaced before worn through to external housing material.
- Discharge flaps on cascade cleaning chamber will eventually become "ragged". Replace when necessary.
- Inlet air gate rubber flaps will become worn. These flaps should be replaced when necessary.
- 90 degree elbow inlet duct with bolt on back places require monthly inspection for replacement.
- The abrasive resistant plate welded in the cyclone inlet scroll may require infrequent repair. Since this is a very large shape, repair by patching areas with new AR steel, by welding.
- Rotary valve flaps may require replacement (as previously described).
- All other rubber flaps and seals may periodically require replacement.
- V-Belt Drive: Using tachometer, check fan RPM to insure fan is turning the correct speed. If belts are slipping, the speed of fan will be slower than original. If slipping, tighten per V-Belt drive manufacturer's instructions.
- Magnehelic Gauges: The gauges furnished are very accurate when new. But, when liquid and dust are allowed to enter through the vacuum tubes, they quickly become useless. Install the tubing and fittings permanently as required, but leave the gauges un-mounted, so they can be kept inside in a cleaner environment. Bring out the gauges only when necessary and then treat them as a hand held instrument.

5.2 H_2PRO Water System

5.2.1 Daily

- Inspect air and water piping – examine for leaks in any junctions or fittings.
- Drain condensation from air regulator collection bulb to prevent corrosion of components in the air system.
- Inspect regulators when the system is operating to make sure pressure is sufficient for proper operation.
  - 90 – 100 pounds per square inch (psi) for proportional valve.
  - 12 – 25 psi for air through water nozzles.
- Inspect nozzles to prevent debris from building up within the shredder box.
  - Water pressure needs to be 65 – 95 psi for the required flow into the shredder box.

5.2.2 Weekly

- Inspect nylon inserts inside the water nozzles to make sure that they are present and clean.
- Inspect lines that feed the nozzles. Examine the lines for any cuts or abrasions that might impair proper operation of the system.
- Inspect and clean the filter on the air system for the proportional valve.

5.2.3 Quarterly

- Inspect and calibrate the proportional valve to make sure it has a proper stroke.
  - Remove valve from manifold and inspect the gasket on the cone to make sure it is pliable and there are no deformations to the seal.
  - Inspect the seat from which the valve was removed to make sure there is not any build up of corrosions or foreign objects.
  - Check operation of the valve:
    - Give a 0% command from the operators touch screen and make sure the valve is fully extended.
    - Give a 100% command and make sure the valve is fully retracted.
    - When the stroke of the valve has finished a Green light on the top of the valve should illuminate.
    - If the stroke of the valve does not either fully extend or retract, contact the Manufacturer.
    - Red light on top of the valve indicated it has power and is ready for operation.
- Check calibration of water meter:

- Fill a 55-gallon drum (or comparable container of known volume) and document time required for container to fill. Calculate the flow rate.
- Repeat procedure a minimum of three times and take average flow rate.
- If the average flow rate differs from the meter reading by more than 5%, contact the Manufacturer.

6.0 Troubleshooting

6.1 Cascade System

6.1.1 Ferrous Product Dirty:

A. Too much bypass air.

B. Too much bleed off air.

C. Too much water.

D. Fan not operating correctly (belts slipping, out of phase, etc.)

E. Air system leaking or partially plugged.

6.1.2 Non-Ferrous dirty:

A. Same as ferrous dirty.

6.1.3 Excessive Particulate Discharge from Bleed-Off Stack"

A. Not enough water in mill.

B. Rotary valve flaps or surge hopper doors leaking, causing re-entrainment of dust in air stream.

C. Excessive fluff in feed stock.

6.1.4 Blow Out of Air at bottom of Cascade

A. Not enough bleed off air.

B. Leakage of air anywhere in system from top of cascade to fan inlet.

C. Buildup of material in bleed off stack.

6.1.5 Excessive Metal in Waste:

A. Not enough bypass air.

6.2 Troubleshooting – H_2PRO Water System

Refer to Operations Manual in Appendix B

APPENDIX B

H_2PRO WATER SYSTEM MANUAL

WATER SYSTEM OPERATION MANUAL

Version 1.1
5/24/07

RIVERSIDE ENGINEERING

121 Interpark, Suite 604
San Antonio, Texas 78216
Phone: 210-227-9090
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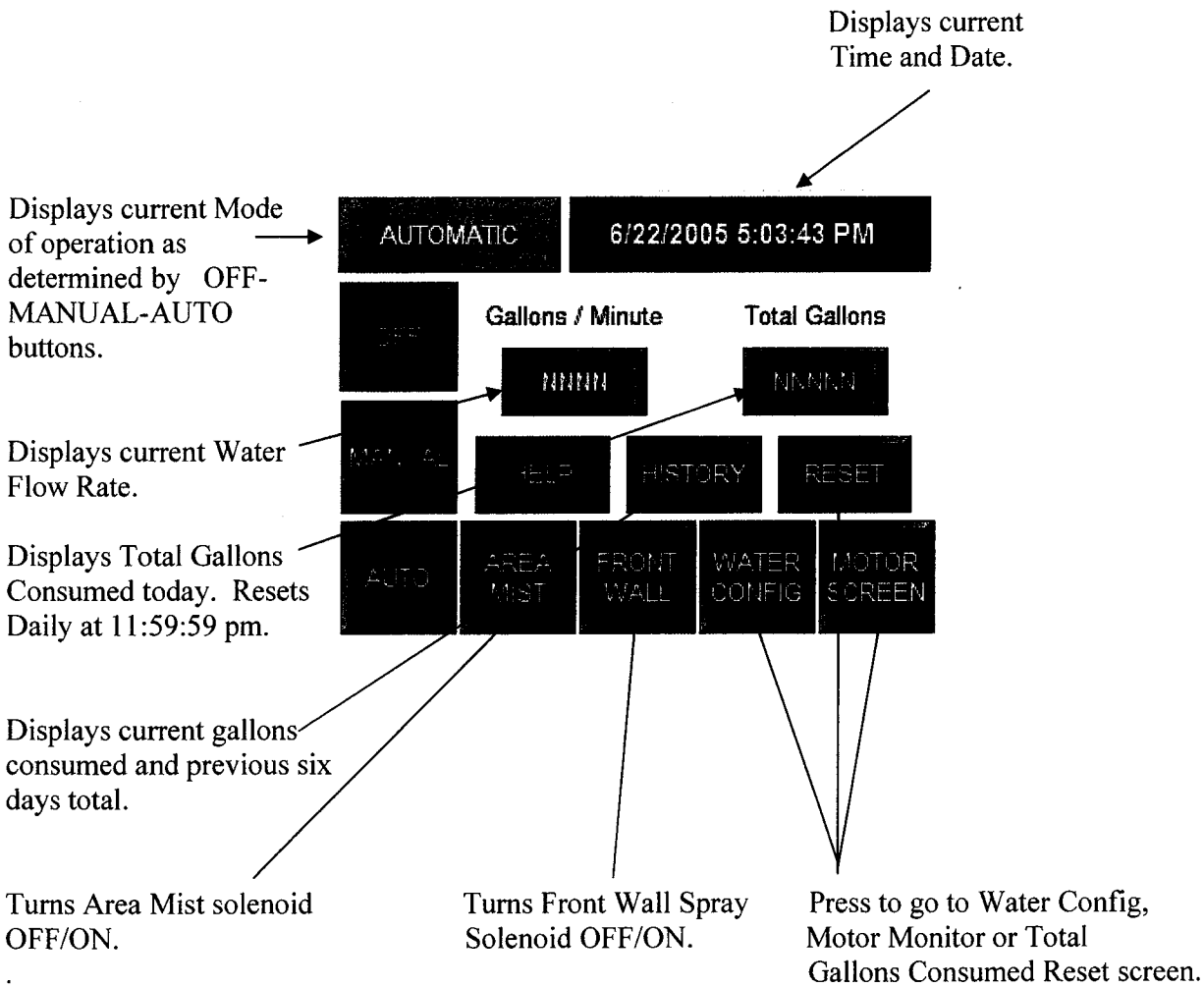
Water System
Setup Manual

Riverside Engineering

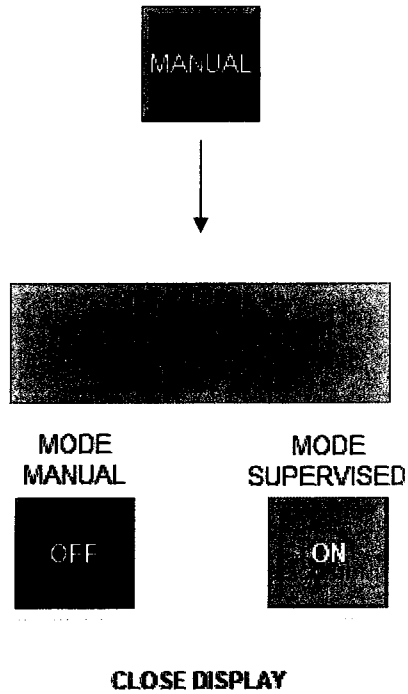
121 Interpark, Suite 604
San Antonio, Texas 78216
Phone: 210-227-9090
Fax: 210-227-7038

MAIN CONTROL PANEL



Turns Water System off. Resets Area Mist and Front Wall Spray to OFF.

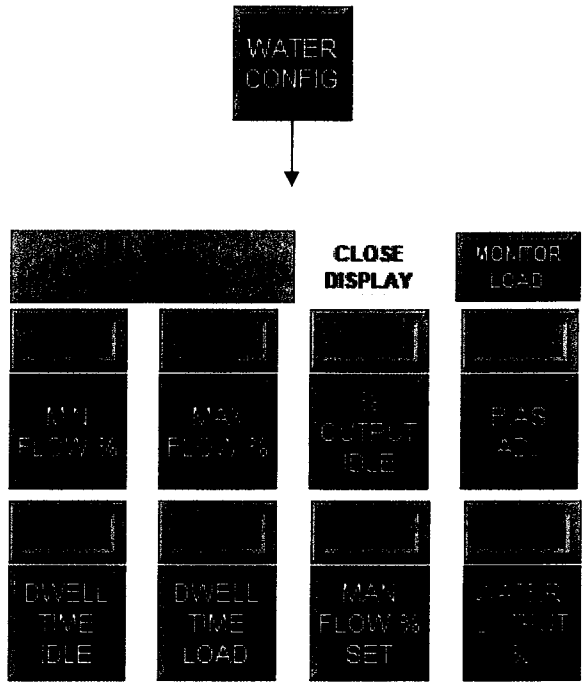
NOTE: Front Wall & Area Mist may be turned back on after OFF has been pressed.



The MANUAL button takes user to the *Manual Mode Selection Screen* where the following Modes may be selected.
MANUAL – Operator sets the MAN % FLOW SET in % of full output at the *FLOW CONFIG* screen. The system will then operate at this setting regardless of MOTOR % OUTPUT status until turned OFF by the operator.
SUPERVISED – Operator sets the MAN FLOW % SET in % of full output at the *FLOW CONFIG* screen. The system will operate at this setting as long as Motor % Output is above the % OUTPUT IDLE setting and the DWELL TIME IDLE setting has not timed out. Both % FLA IDLE and DWELL TIME IDLE settings are set at the *FLOW CONFIG* screen.

Presing the AUTO button on the *MAIN CONTROL PANEL* screen will begin operating the WATER SYSTEM in proportion to MOTOR % OUTPUT. Before operating in AUTO mode, the WATER SYSTEM must first be configured for the application. By pressing the

WATER CONFIG button on the *MAIN CONTROL PANEL* screen the operator will be able to view and edit the parameters necessary for AUTO operation



Set as the desired minimum water flow in percent to be delivered to the shredder through the proportional valve. Water flow will only go below this setting in the MANUAL/SUPERVISED and AUTO modes of operation under the following conditions.

- MOTOR % OUTPUT $\leq$ % OUTPUT IDLE for (X) seconds as set at the DWELL TIME IDLE button.

Set as the desired maximum water flow in percent to be delivered to the shredder through the proportional valve. *Exception: The SYSTEM FLOOD push button will produce a 100% flow output through the proportional valve.*

Set as the percentage of Motor % Output at which the Mill Motor is at speed and idling with no material in the shredder. *Note: Set this parameter approximately 5 – 10% higher than actual Idle Speed. This will help insure that the water system will turn off at Idle Speed. Bearing and Hammer condition may have an influence on this setting.*

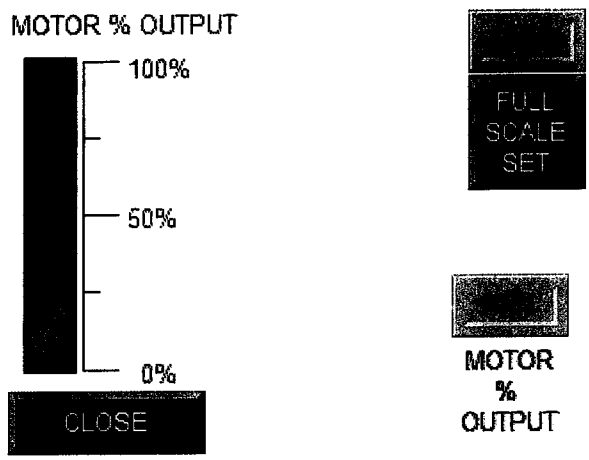
Amount of time in which Motor % Output is at or under the % Output Idle setting before Water Output % (water flow rate) is forced to 0 %.

In AUTO mode only – the amount of time in which Water Output % remains at current level before responding to a decrease flow request from the PLC. An increase flow request will bypass the Dwell Time Load setting and respond immediately.

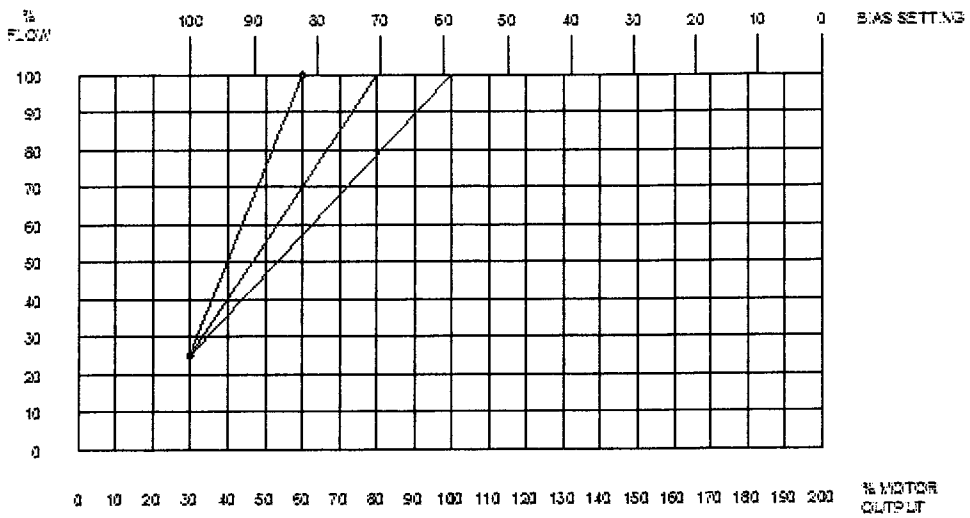
The Monitor Load push button takes the user to the Motor Load screen. This screen displays MOTOR % OUTPUT and scales the 4-20 ma input signal for MOTOR % OUTPUT at the FULL SCALE SET button.

NOTE: The customer supplied MILL MOTOR LOAD (4-20 ma signal) will be scaled in the PLC with 4 ma = 0 % Output and 20 ma = 100% Output. For example: A motor with a FLA rating of 600 amps is scaled to read a maximum of 1200 amps or 200 % of FLA at 20 ma input signal. Therefore in the (WATER SYSTEM PLC) 1200 amps (20 ma) = 100 % Motor Output.

MOTOR LOAD



The BIAS ADJ button is the primary means of adjusting WATER % OUTPUT once system operational parameters have been established. Based upon material condition (wet material vs. dry material) the operator may wish to alter the WATER % OUTPUT based upon % MOTOR OUTPUT. An increase in the BIAS SETTING will increase flow output and vice versa. The chart on page 6 shows the WATER % OUTPUT to % MOTOR OUTPUT relationship in more detail.



RED
MIN FLOW % = 25
MAX FLOW % = 100
% OUTPUT IDLE = 30
BIAS = 83 approx

GREEN
MIN FLOW % = 25
MAX FLOW % = 100
% OUTPUT IDLE = 30
BIAS = 71 approx

BLUE
MIN FLOW % = 25
MAX FLOW % = 100
% OUTPUT IDLE = 30
BIAS = 59 approx

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H_2PRO WATER SYSTEM

MAINTENANCE SCHEDULE

The H_2PRO water system was designed as a relatively maintenance free system, there is however, items that require routine maintenance for proper operation. This document outlines the maintenance schedule on the H_2PRO water system. It breaks down the daily, weekly, and quarterly tasks that need to be carried out for continuous operation of the manifold and all its systems.

The water system has three basic separate systems which include water delivery, air and electrical. The electrical system does not need any maintenance other than to keep the control junction boxes free of any debris and foreign objects within the closures. Yearly blow out with low pressure air is recommended to minimize dust collection.

DAILY:

The daily inspection of the water system will consists of a visual inspection of both the air and water piping examining the system for leaks in any junctions and fittings. The air regulators collection bulb needs to be inspected and drained of condensation to prevent corrosion of any components in the air system. There will also need to be an inspection of the regulators when the system is operating to make sure the pressure is sufficient for proper operation. The settings for the air system are as follows: 90-100 psi for the proportional valve and 15-25 psi for the air through the water nozzles. The inspection of the nozzles is required to be on a daily basis due to debris build up within the shredder box. The pressure for the water needs to be 65-95 psi for the required flow into the shredder box.

WEEKLY:

Inspecting the nylon inserts inside the water nozzles to make sure that they are present and clean of debris. They need to be kept clear so proper water air mixture can be delivered in to the shredder box freely. The lines that are feeding the nozzles will also need to be inspected at this time also for any cuts or abrasions that might impair proper operation of the system. The filter on the air system for the proportional valve needs to be inspected and cleaned for protection of the valve.

QUARTERLY:

Quarterly inspection needs to be performed on the proportional valve to make sure that it has a proper stroke and it is calibrated correctly. The first is to remove it from the manifold and inspect the

gasket on the cone to make sure that is pliable and there are no deformations to the seal, also inspect the seat from which the valve was removed to make sure there is not any build up of corrosion or foreign objects. Next the operation of the valve needs to be checked by giving a 0% command from the operators touch screen and make sure the valve is fully extended. Then give a 100% command and make sure the valve is fully retracted. In either case, when the stroke of the valve has finished a Green light on the top of the valve should illuminate. If for any reason the light or the stroke of the valve is not either fully extended or retracted then a representative from Riverside Engineering should be contacted to determine what actions need to be made to correct the problem. The red light on the top of the valve indicates it has power and is ready for operation.

The calibration of the water meter needs to be checked to ensure that the gallons per minutes are correct. This can be accomplished by filling a 55 gallon drum and keeping track of the amount of time it took to completely fill the drum. This procedure needs to be done a minimum of three times and the average of all three times needs to be compared to the reported figure on the water meter. If the discrepancy is greater than 5% then a representative of Riverside Engineering will need to be contacted and the recalibration of the water meter will need to be addressed.

SUMMARY:

This maintenance procedure is a minimum for proper operation of the system. As operators and maintenance personnel become more familiar with the system at each location, they might add to this procedure to customize it for its location: i.e. regular draining of the system for cold operation and addition of heat traces for freezing conditions.

At any time if there are any questions to the proper operation or maintenance of the system a representative at Riverside Engineering can address those questions and present solutions for continued operation of the system.

Riverside Engineering
System Integration Division

TECHNICAL SUMMARY

$H_2^{PR}O$ WATER INJECTION SYSTEM

The purpose of this Technical Summary is to provide a basic operational overview of the $H_2^{PR}O$ water injection system from Riverside Engineering.

Q) What is the $H_2^{PR}O$ Water Injection System?

A) The $H_2^{PR}O$ Water Injection System (W.I.S.) is a PLC (Programmable Logic Controller) controlled wall mounted water injection system. The system is fully adjustable and can be easily customized in the field to meet most customer water injection requirements. The customer or Riverside Technician inputs the required parameters into the PLC via a 6" Color Touch Screen HMI (Human Machine Interface). The PLC then calculates and controls the water flow to the Shredder based upon these parameters. The ability to adjust and change these operational parameters means the $H_2^{PR}O$ W.I.S. will easily adapt to meet the customers changing needs.

Q) What does it do for me?

A) The primary function of the $H_2^{PR}O$ W.I.S is to control the amount of water injected into the shredder in proportion to motor or engine percent output. If the motor or engine is running with only a light load, less water is needed in the shredder. Conversely, if the motor or engine is heavily loaded, more water is needed in the shredder. The system also stops water flow when the shredder is operating under a no load condition for a specific amount of time (operator adjustable). In addition to flow control, the Riverside spray nozzles inject air into the water stream at the point of entry into the shredder to atomize the water into a fine mist that distributes throughout the shredder. As the highly distributed water vapor encounters hot spots in the shredder it creates steam. The steam then accumulates in the shredder collecting dust and vapors as it reduces the amount of combustible air that is available in the shredder. The limited amount of air available in the shredder helps reduce the quantity and severity of explosions.

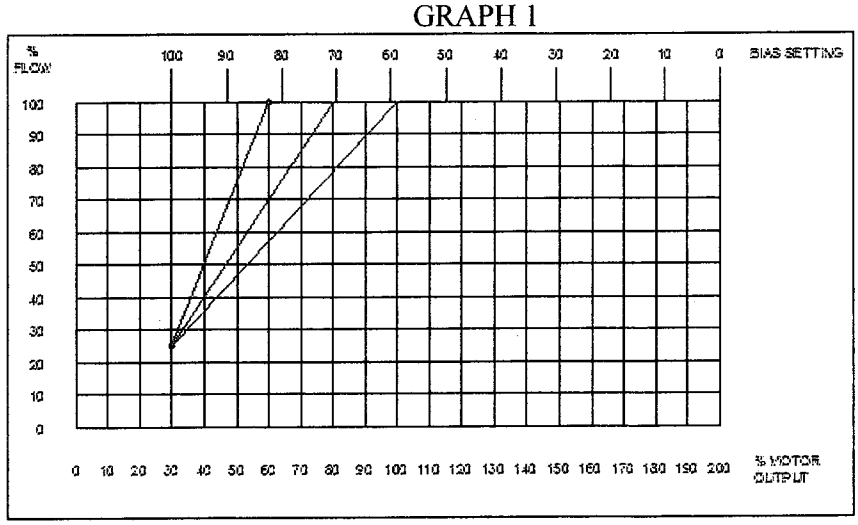
Q) How does it work?

A) The PLC will calculate and control water injection based upon the following parameters.

- % OUTPUT IDLE – expressed in percent FLA (full load amps) for AC/DC motors or RPM (revolutions per minute) for engines. This is the percent of motor or engine output, where the shredder is running at idle condition (no shredding).
- BIAS ADJ – This is the percent of FLA or RPM at which maximum water flow is desired.
- MIN FLOW % - Minimum water flow desired at % output idle. Set as percentage of full flow capacity.
- MAX FLOW % - Maximum water flow desired at BIAS ADJ set point. Set as a percentage of full flow capacity.
- DWELL TIME IDLE – Time in seconds that Flow Output will remain at the Min Flow % setting when at or below the % Output Idle setting.
- DWELL TIME LOAD – Time in seconds that Flow Output will remain at the last peak state, in regards to a decrease in Motor % Output. An increase in Motor % Output will be reflected immediately in Flow Output.

After the above parameters are entered, the PLC can calculate the desired water flow by monitoring MOTOR % OUTPUT. See the following graph.

GRAPH 1

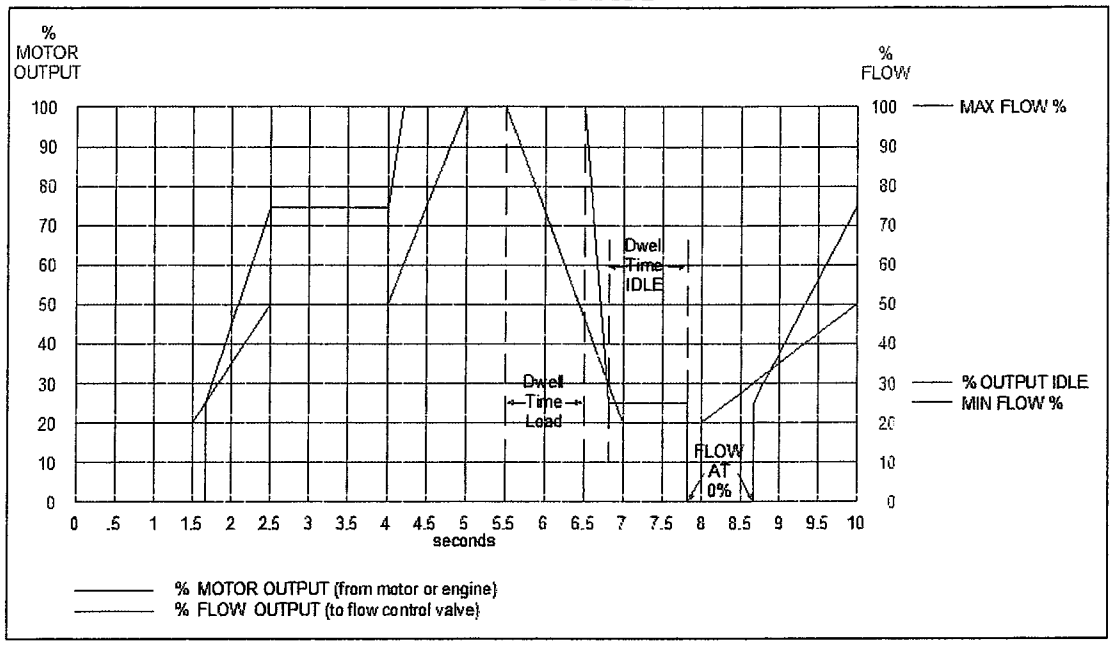


"A" RED LINE	"B" GREEN LINE	"C" BLUE LINE
MIN FLOW % = 25	MIN FLOW % = 25	MIN FLOW % = 25
MAX FLOW % = 100	MAX FLOW % = 100	MAX FLOW % = 100
% OUTPUT IDLE = 30	% OUTPUT IDLE = 30	% OUTPUT IDLE = 30
BIAS = 83 approx	BIAS = 71 approx	BIAS = 59 approx
DWELL TIME LOAD = 1 sec		
DWELL TIME IDLE = 1 sec		

Each colored line in GRAPH 1 represents % Flow Output at different Operational Parameter settings. By determining where each line intersects with % Motor Output on the horizontal line, % Flow Output can be read from the vertical line on the left.

The following graph details the relationship between % Motor Output, % Flow Output and Dwell Time.

GRAPH 2



NOTE: Refer to GRAPH 1 example "A" to determine calculated % FLOW OUTPUT at a specific % MOTOR OUTPUT level.

Q) Why not just inject water at a constant rate?

A) Injecting water at a constant rate, regardless of shredder load, has a few drawbacks. First, to be truly effective at dust control and explosion prevention, the flow of water will have to be set for the maximum capacity of the shredder. Therefore only at short, intermittent time intervals will water injection match production needs. This causes a great deal more water being consumed than production requires. In addition, a manual system will continue to deliver water to the shredder until turned off. The $H_2^{PR}O$ W.I.S. will stop water flow when no flow is required. The result is a significant reduction in overall water consumption and associated costs. Secondly, shredded product that is to wet will have a negative effect on Downstream and Non-Ferrous separation operations.

Q) What does the $H_2^{PR}O$ system need from me?

A) There are a few requirements needed from the customer for proper operation of the system. If the customer cannot provide one or more of these items Riverside can assist in providing these requirements.

1) 4 - 20 ma or 0 – 10 vdc signal referencing % Motor Load (amps from AC or DC motor or RPM from natural gas or diesel).

2) Compressed air – 1 CFM @ 80 PSI for Proportional Valve operation

3) Compressed air – 10 CFM @ 15 PSI for water injection nozzles.

4) Water Supply rated for 10 – 30 GPM at normal operation and 100 GPM at flood conditions. 2"-3" Line @ city pressure (50 – 75 PSI) typical.

Q) Anything else I need to know?

A) Pre-plumbed on the $H_2^{PR}O$ W.I.S. rack are three additional water outlets with solenoid valve operation. These additional lines can be plumbed to other areas on or near the shredder as deemed necessary. The typical default locations for these lines are: Area Mist (located above the Shredder Ramp and DFR area), First Shredded Product Conveyor, and the Front Wall spray. These lines can be turned on individually from the HMI or collectively from the blue FLOOD BUTTON on the control console. These lines are often used during an explosion to extinguish the resulting fires.

An added benefit to the $H_2^{PR}O$ W.I.S. is the flow rate and totalizing feature. Displayed on the Main Screen of the HMI are the current values for GPM (rate) and Total Gallons Consumed (totalizer). In addition, by pressing the HISTORY button on the HMI, the previous water consumption for the last six days is displayed.

The last features of the $H_2^{PR}O$ W.I.S. are the three modes of operation: AUTO, SUPERVISED MANUAL and MANUAL. AUTO is the most beneficial mode of operation and has been described above. MANUAL and SUPERVISED MANUAL modes of operation allow the operator to inject water into the shredder at a constant rate (set from HMI) regardless of Shredder Load. SUPERVISED MANUAL mode will however stop water flow when Shredder Load is less than the % OUTPUT IDLE setting.