CITY OF ATLANTA

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DEPARTMENT OF PROCUREMENT
Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP
Chief Procurement Officer
asmith@atlantaga.gov

May 12, 2015

Dear Potential Proponents:

Re: FC-8155, Design Build RM Clayton Water Reclamation Center ("WRC") Headworks Improvement Project

Attached is one (1) copy of **Addendum Number 4,** which is hereby made a part of the above-referenced project.

For additional information, please contact Ms. Jill Watkins, Contracting Officer, at (404) 865-8703 or by email at jewatkins@atlantaga.gov.

Sincerely,

Adam L. Smith

ALS/jew

cc: Jo Ann J. Macrina, PE
Ms. Cynthia Lunn
Mr. Anthony Stanley
Ms. Paula Days

ADDENDUM NO. 4

This Addendum No. 4 forms a part of the Request for Proposals and modifies the original solicitation package and any prior Addenda as noted below and is issued to incorporate the following:

1. **Revision:** Part 5, "Standard Form of Agreement", Article 6.1 – Contract Price; Insert the following language after the first sentence:

   > The Lump Sum will be funded by the Owner in two phases, with Phase 1 funding being an amount of _____($_____), which has been approved and appropriated for this Agreement; and Phase 2 funding being an amount of _____($_____), and being subject to the Owner's approval and appropriation of said amount as may be included in its budget for its Fiscal Year 2016, commencing July 1, 2015.

2. **Attachment No. 4**: Operations and Maintenance Manual for existing Headworks Odor Control system.
3. **Attachment No. 5**: Appendix B – Insurance and Bonding Requirements for FC-8155, RM Clayton WRC Headworks Improvement **Maintenance** Project.
4. **Revision**: Part 4, Form 9, "Required Submittal Checklist"; replace "six (6)" with "seven (7)" in paragraph two of the instructions.
5. **Revision:** Design Criteria Package, Section 2.2.4, page 2-4; replace "0.15mm (100 mesh)" with "75 micron".
6. **Revision:** Part 2, Paragraph 3.2.9, "Warranty", Paragraph 3.2.9 shall be revised as follows: "The equipment warranty ("**Warranty**") shall extend for a period of five (5) years…"
7. **Attachment No. 6**: Draft Payment and Performance Bond Forms.
8. **Response to Questions: Attachment No. 7** (Total of 75 questions).

All questions and inquiries concerning this project should be directed in writing to Jill Watkins, Contracting Officer, Department of Procurement, 55 Trinity Avenue, S.W., City Hall South, Suite 1900, Atlanta, Georgia 30303 or questions may be e-mailed to jewatkins@atlantaga.gov or by efax to (404) 739-4683.

The last day for questions was **Friday, May 1, 2015 at 12:00 noon EDT.**

The Proposal due date has NOT been modified and Proposals are due on Monday, June 1, 2015 and should be time stamped in no later than 2:00 P.M. EDT and delivered to the address listed below:

Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP
Chief Procurement Officer
Department of Procurement
55 Trinity Avenue, S. W.
City Hall South, Suite 1900
Atlanta, Georgia 30303

****All other pertinent information is to remain unchanged****

Acknowledgment of Addendum No. 4

Proponents must sign below and return this form with Proposal to the Department of Procurement, 55 Trinity Avenue, City Hall South, Suite 1900, Atlanta, Georgia 30303 as acknowledgment of receipt of this Addendum.

This is to acknowledge receipt of Addendum No. 4 for **FC-8155, Design Build RM Clayton WRC Headworks Improvement Project** on this the _____ day of _____, 20___.

_____
Legal Company Name of Proponent

_____
Signature of Authorized Representative

_____
Printed Name

_____
Title

_____
Date

ATTACHMENT NO. 4

Operations and Maintenance Manual for Existing Headworks Odor Control System

ODOR CONTROL SYSTEMS

Table of Contents

Headworks Facility,

[redacted]

OPERATION & MAINTENANCE MANUAL

ODOR CONTROL SYSTEMS

[redacted]

TABLE OF CONTENTS

Back

ODOR CONTROL SYSTEMS

(Headworks, BNR-1, BNR-2, and Flowspliter)

RM Clayton WRC Expansion Phase 3

Spec. Section 11255

TABLE OF CONTENTS

Headworks Odor Control
Purpose and Intent

- The purpose of the Headworks Odor Control system is to reduce the emission of odorous substances from the treatment processes in the Headworks Building, so that the odors are not detectable beyond the boundaries of the plant property.
- The Headworks Odor Control system treats the air captured from the enclosed preliminary treatment processes of coarse screening, grit removal and fine screening.
- A centrifugal fan pulls the air from the Headworks Building through two scrubbers operating in series. A scrubbing liquid of Sodium Hydroxide (Caustic) and Sodium Hypochlorite solution is sprayed, opposite the air flow direction, over the packing material in the scrubber. The scrubbing liquid absorbs the contaminants from the air as it drops down through the packing material and the treated air is discharged to the second scrubber or to the atmosphere. The chemical solution reacts with odor-causing compounds to remove or alter them to a less offensive state.
- The rate of chemical additions is controlled by the pH and the ORP of the scrubbing liquid. Make-up water is continuously added to maintain a constant water elevation in the scrubber sump and a small amount is continuously wasted through a sump overflow.

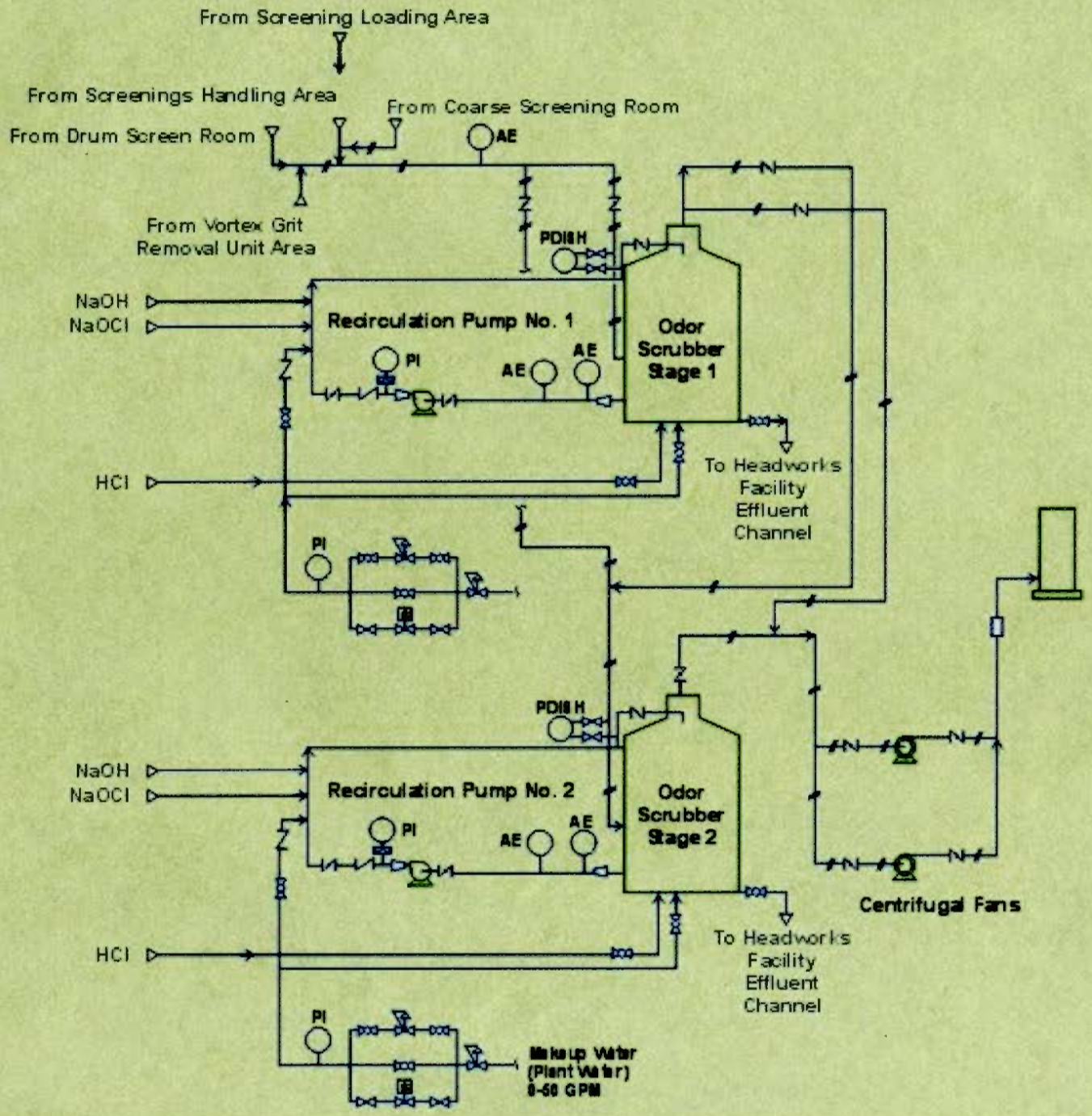
Comment: ho1pai01.htm
last edited: 9/17/01

Headworks Odor Control
Keys to Operation and Control

Objective	To draw odorous air from various covered processes in the Headworks Building of the plant and alter the odorous compounds through scrubbers with chemical solution sprays, prior to discharge into the atmosphere	
Variables Affecting Performance	Air flow rate two-stage versus single-stage operation	
Process Control Parameter	pH target setting, ORP target setting	
Headworks Scrubber Flow Schematic	**Recommended Mode**	**Alternate Mode**
Control	Headworks Odor Control System equipment in Automatic Control	Each equipment in the Headworks Odor Control System can be operated in Remote or Local Hand mode. • Component Control Summary Table
Operation	DCS controls the operation of the equipment	Operators manually control the operation of the equipment through local control panels or at the DCS, if possible

Comment: ho1koc01.htm
last edited: 9/19/01

Headworks Scrubber Flow Schematic



Back

ODOR CONTROL SYSTEMS

(Headworks, BNR-1, BNR-2, and Flowspliter)

RM Clayton WRC Expansion Phase 3

Spec. Section 11255

TABLE OF CONTENTS

Headworks Odor Control
Equipment Summary Table

Name of Equipment	Equipment Number	MAXIMO Number
Scrubber 1 Scrubber 2	10SCRH1 10SCRH2	
Recirculation Pump 1 Recirculation Pump 2	10RP1 10RP2	
Centrifugal Fan 1 Centrifugal Fan 2	10OCFH1 10OCFH2	
Sodium Hydroxide (Caustic) Metering Pump 1 Sodium Hydroxide (Caustic) Metering Pump 2	10CMP1 10CMP2	
Sodium Hydroxide (Caustic) Storage Tank	10CST1	
Sodium Hypochlorite Metering Pump 1 Sodium Hypochlorite Metering Pump 2	10SHMP1 10SHMP2	
Sodium Hypochlorite Storage Tank 1 Sodium Hypochlorite Storage Tank 2	10SHST1 10SHST2	
Hydrochloric Acid Metering Pump	10AMP1	
Hydrochloric Acid Storage Tank	10AST1	
Recirculation Pumps Containment Sump Pump	10CSP1	
Sodium Hydroxide (Caustic) Containment Sump Pump	10CSP1	
Sodium Hypochlorite Containment Sump Pump	10CSP1	

Comment: ho2est01.htm
last edited: 3/25/02

Headworks Odor Control Scrubbers

Design and Operating Criteria

Location	Headworks Building	
Units	2	
Equipment Number	10SCRH1, 10SCRH1	
Associated Auxiliary Systems	Recirculation pumps, Centrifugal fans, Sodium Hypochlorite metering pumps, Sodium Hydroxide (Caustic) metering pumps, and Hydrochloric Acid metering pump	
Function	Provide contact between odorous air and scrubbing liquid to convert odorous compounds to non-odorous forms	
Flow Stream	Odorous air	
Design Criteria	Manufacturer	Duall
	Model (diameter X depth of packing)	12X10
	Design Airflow, cfm	49,400
	Scrubber pressure drop, w.g./ft	0.28
	Service	100 ppm H2S
	Air Temperature	-10 to 105
	Removal Efficiency, H2S	99.95%, one stage
	Recirculation Liquid Flow Rate	750 gpm
	Recirculation Liquid	Make-Up Water Sodium Hydroxide Sodium Hypochlorite
	Make-up Water Flow Rate	6.5 gpm
	Operating pH	10-11 standard units
	Operating ORP	300 - 500 ppmv
Effect of Failure	Decline in odor control treatment efficiency	
Response Time/Action	**Priority 1** - Place failed scrubber and associated equipment off-line. Operate complementary scrubber in single-stage mode.	

Comment: ho2edc01.htm
last edited: 9/18/02

Headworks Odor Control Recirculation Pumps
Design and Operating Criteria

Location	Headworks Building	
Units	2	
Equipment Number	10RP1, 10RP2	
Associated Auxiliary Systems	Scrubbers	
Function	Recirculate the scrubbing liquid between the scrubber sump and scrubber tower	
Flow Stream	Caustic and Sodium Hypochlorite solutions	
Design Criteria	Manufacturer	Fybroc
	Model	
	Type	End suction, centrifugal
	Size (Suction x Discharge diameter)	6 X 4
	Material of construction (wetted metal parts)	vinyl ester resin
	Capacity, gpm	741
	Total Dynamic Head, feet	70
	Drive Motor	
	Manufacturer	
	Horsepower	25
	RPM	1750
	Volts/Phase/Hertz	460/3/60
Effect of Failure	Stops scrubber operation; odorous air cannot flow through scrubber without recirculation pump in operation	
Response Time/Action	**Priority 1** - Place failed pump and associated scrubber off-line. Operate complementary scrubber and recirculation pump in single stage mode. Repair/replace failed pump.	

Comment: ho2edc02.htm
last edited: 9/18/02

Headworks Odor Control
Centrifugal Fans
Design and Operating Criteria

Location	Headworks Building	
Units	2	
Equipment Number	10OCFH1, 10OCFH2	
Associated Auxiliary Systems	Scrubbers	
Function	Pull air from the covered process units and structures through the scrubber before discharge to the atmosphere	
Flow Stream	Odorous Air	
Design Criteria	Manufacturer	Ceilcote
	Model	CLUB-5425
	Type	Centrifugal
	Size	48 inches
	Material of construction	Fiberglass Reinforced Vinylester
	Capacity - max. cfm	49,400
	Drive Motor	
	Manufacturer	Toshiba
	Horsepower	200
	RPM	1800
	Frame	447UZ
	Volts/Phase/Hertz	460/3/60
	Driven sheave diameter	28 inches
	Conveyor Drive	Dodge V-belt Drive 10/5V12.5-J
Effect of Failure	Odors and potential combustible or explosive vapors cannot be pulled from headworks processes. Odorous contaminants may escape to the atmosphere to create off-site odor nuisances. In addition, potentially hazardous levels of combustible or toxic gases may build up in the covered processes, creating a safety problem.	
Response Time/Action	**Priority 1** - Bring standby fan online. Replace/repair failed fan.	

Comment: ho2edc03.htm
last edited: 3/25/02

Headworks Odor Control
Sodium Hydroxide (Caustic) Metering Pumps
Design and Operating Criteria

Location	Headworks Building	
Units	1 (and one uninstalled spare)	
Equipment Number	10CMP1, 10CMP2	
Associated Auxiliary Systems	Caustic Storage Tank, Scrubber Recirculation Pump	
Function	Feed caustic to therecirculated chemical solution in the lead scrubber	
Flow Stream	Sodium Hydroxide (50 percent)	
Design Criteria	Manufacturer	Watson/Marlow
	Model	
	Type	Hose
	Capacity - min/maxgph	1.3/13.4
	Discharge pressure, min psig	100
	Drive Type	SCR
	Horsepower	1/4
	RPM	39
	Frame	
	Volts/Phase/Hertz	SCR
Effect of Failure	Reduced efficiency of scrubber operation due to lack of caustic	
Response Time/Action	**Priority 1** - Bypass scrubber associated with failed metering pump. Operate complementary scrubber and associated equipment in single stage mode. Repair/replace failed metering pump.	

Comment: ho2edc04.htm
last edited: 9/18/02

Headworks Odor Control
Sodium Hydroxide (Caustic) Metering Pumps
Design and Operating Criteria

Location	Headworks Building	
Units	1 (and one uninstalled spare)	
Equipment Number	10CMP3, 10CMP4	
Associated Auxiliary Systems	Caustic Storage Tank, Scrubber Recirculation Pump	
Function	Feed caustic to therecirculated chemical solution of the lag scrubber	
Flow Stream	Sodium Hydroxide (50 percent)	
Design Criteria	Manufacturer	Watson/Marlow
	Model	
	Type	Hose
	Size - diaphragm diameter	
	Capacity - min/maxgph	0.4/3.9
	Discharge Pressure, min psig	100
	Drive Type	SCR
	Manufacturer	
	Horsepower	1/4
	RPM	12
	Frame	
	Volts/Phase/Hertz	SCR
Effect of Failure	Reduced efficiency of scrubber operation due to lack of caustic	
Response Time/Action	**Priority 1** - Bypass scrubber associated with failed metering pump. Operate complementary scrubber and associated equipment in single stage mode. Repair/replace failed metering pump.	

Comment: ho2edc05.htm
last edited: 9/18/02

Headworks Odor Control
Sodium Hypochlorite Metering Pumps
Design and Operating Criteria

Location	Headworks Building	
Units	2 (and one uninstalled spare)	
Equipment Number	10SHMP1, 10SHMP2	
Associated Auxiliary Systems	Sodium Hypochlorite Storage Tank, Scrubber Recirculation Pump	
Function	Feed Sodium Hypochlorite to the recirculated solution in the scrubber	
Flow Stream	Sodium Hypochlorite (15 percent)	
Design Criteria	Manufacturer	Watson/Marlow
	Model	
	Type	Hose
	Capacity - min/maxgph	1.6/16.4
	Discharge pressure-min psig	100
	Drive Type	SCR
	Manufacturer	
	Horsepower	1/4
	RPM	48
	Frame	
	Volts/Phase/Hertz	SCR
Effect of Failure	Reduced efficiency of scrubber operation due to lack of SodiumHypochlorite	
Response Time/Action	**Priority 1** - Bypass scrubber associated with failed metering pump. Operate complementary scrubber and associated equipment in single stage mode. Repair/replace failed metering pump.	

Comment: ho2edc06.htm
last edited: 9/18/02

Headworks Odor Control
Hydrochloric Acid Metering Pump
Design and Operating Criteria

Location	Headworks Building	
Units	1	
Equipment Number	10AMP1	
Associated Auxiliary Systems	Hydrochloric Acid Storage Tank, Scrubber Recirculation Pump	
Function	Pump Hydrochloric acid solution from tank to scrubber for removal of scale build-up of packing material	
Flow Stream	Hydrochloric acid (15 percent)	
Design Criteria	Manufacturer	Liquid Metronics
	Model	
	Type	Diaphragm
	Size - diaphragm diameter	
	Capacity - min/maxgph	0.5/10
	Discharge pressure-min psig	35
	Drive Motor	
	Manufacturer	
	Horsepower	381 watts
	RPM	80
	Frame	
	Volts/Phase/Hertz	115/1
Effect of Failure	Unable to clean scrubbers' packing material; decline in scrubber efficiency.	
Response Time/Action	**Priority 2**- Repair/replace failed metering pump.	

Comment: ho2edc07.htm
last edited: 9/18/02

Headworks Odor Control
Sodium Hydroxide (Caustic) Storage Tank
Design and Operating Criteria

Location	Headworks Building	
Units	1	
Equipment Number	10CST1	
Associated Auxiliary Systems	Caustic Metering Pump	
Function	To store supply of caustic	
Flow Stream	Sodium Hydroxide (50 percent)	
Design Criteria	Tank Dimensions	7 ft Diameter
	Capacity, gallons	2,500
	Material of Construction (wetted metal parts)	Steel
Effect of Failure	Reduced efficiency of scrubber operation due to lack of caustic as scrubbing agent.	
Response Time/Action	**Priority 1** - Empty tank into temporarytankage, clean-up any spilled material and ensure proper containment, and make necessary repairs.	

Comment: ho2edc08.htm
last edited: 9/18/02

Headworks Odor Control
Sodium Hypochlorite Storage Tank
Design and Operating Criteria

Location	Headworks Building	
Units	2	
Equipment Number	10SHST1, 10SHST2	
Associated Auxiliary Systems	Sodium Hypochlorite Metering Pump	
Function	To store supply of Sodium Hypochlorite	
Flow Stream	Sodium Hypochlorite (15 percent)	
Design Criteria	Manufacturer	An-Cor
	Tank Dimensions	9 ft High x 7 ft Diameter
	Capacity	2,500
	Material of Construction (wetted metal parts)	Fiberglass
Effect of Failure	Reduced efficiency of scrubber operation due to lack of SodiumHypochlorite as scrubbing agent.	
Response Time/Action	**Priority 1** - Empty tank into temporarytankage, clean-up any spilled material and ensure proper containment, and make necessary repairs.	

Comment: ho2edc09.htm
last edited: 9/18/02

Headworks Odor Control
Hydrochloric Acid Storage Tank
Design and Operating Criteria

Location	Headworks Building	
Units	1	
Equipment Number	10AST1	
Associated Auxiliary Systems	Hydrochloric Acid Metering Pump	
Function	To store supply of Hydrochloric acid for scrubber cleaning system	
Flow Stream	Hydrochloric Acid (15 percent)	
Design Criteria	Manufacturer	
	Model	
	Tank Dimensions	
	Capacity	
	Material of Construction (wetted metal parts)	
Effect of Failure	Reduced efficiency of scrubber operation due to lack of Hydrochloric acid for scrubber cleaning system	
Response Time/Action	**Priority 1** - Empty tank into temporarytankage, clean-up any spilled material and ensure proper containment, and make necessary repairs to tank.	

Comment: ho2edc10.htm
last edited: 3/26/02

Headworks Odor Control
Recirculation Pumps Containment Sump Pump
Design and Operating Criteria

Location	Headworks Building	
Units	1	
Equipment Number	10CSP1	
Associated Auxiliary Systems	Recirculation Pumps	
Function	Pump sump flows to Headworks Building Effluent Channel	
Flow Stream	Caustic, Sodium Hypochlorite and Hydrochloric Acid solutions	
Design Criteria	Manufacturer	Fybroc
	Model	Series 6000
	Type	Submersible
	Material of construction (wetted metal parts)	CPVC
	Capacity - gph	25
	Drive Motor	
	Horsepower	2
	RPM	1,750
	Volts/Phase/Hertz	480/3/60
Effect of Failure	Liquid level of sump reaches high level, activating alarm. Potential overflow of sump onto containment floor, creating a safety hazard.	
Response Time/Action	**Priority 2** - Identify source of water into sump as soon as possible and stop flow immediately. Repair sump pump as soon as possible. If necessary, use portable pump to drain containment curb to prevent a safety hazard.	

Comment: ho2edc11.htm
last edited: 9/18/02

Headworks Odor Control
Sodium Hydroxide (Caustic) Containment Sump Pump
Design and Operating Criteria

Location	Headworks Building	
Units	1	
Equipment Number	10CSP1	
Associated Auxiliary Systems	Caustic Storage Tank, Caustic Metering Pumps	
Function	Pump sump flows to Headworks Facility Effluent Channel	
Flow Stream	Caustic (50 percent)	
Design Criteria	Manufacturer	Fybroc
	Model	Series 6000
	Type	Submersible
	Material of construction (wetted metal parts)	CPVC
	Capacity - gph	25
	Drive Motor	
	Horsepower	2
	RPM	1,750
	Volts/Phase/Hertz	480/3/60
Effect of Failure	Liquid level of sump reaches high level, activating alarm. Potential overflow of sump onto containment floor, creating a safety hazard.	
Response Time/Action	**Priority 2**- Identify source of water into sump as soon as possible and stop flow immediately. Repair sump pump as soon as possible. If necessary, use portable pump to drain containment curb to prevent a safety hazard.	

Comment: ho2edc12.htm
last edited: 9/18/02

Headworks Odor Control
Sodium Hypochlorite Containment Sump Pump
Design and Operating Criteria

Location	Headworks Building	
Units	1	
Equipment Number	10CSP1	
Associated Auxiliary Systems	Sodium Hypochlorite Storage Tank, Sodium Hypochlorite Metering Pumps	
Function	Pump sump pump flows to Headworks Facility Effluent Channel	
Flow Stream	Sodium Hypochlorite (15 percent)	
Design Criteria	Manufacturer	Fybroc
	Model	Series 6000
	Type	Submersible
	Material of construction (wetted metal parts)	CPVC
	Capacity - gph	25
	Drive Motor	
	Horsepower	2
	RPM	1750
	Volts/Phase/Hertz	480/3/60
Effect of Failure	Liquid level of sump reaches high level, activating alarm. Potential overflow of sump onto containment floor, creating a safety hazard.	
Response Time/Action	**Priority 2**- Identify source of water into as soon as possible and stop flow immediately. Repair sump pump as soon as possible. If necessary, use portable pump to drain containment curb to prevent a safety hazard.	

Comment: ho2edc13.htm
last edited: 9/18/02

ODOR CONTROL SYSTEMS

(Headworks, BNR-1, BNR-2, and Flowspliter)

RM Clayton WRC Expansion Phase 3

Spec. Section 11255

TABLE OF CONTENTS

Back

Headworks Odor Control
Component Control Summary Table

Control	Control Mode
Centrifugal Fans	Remote Hand
	Local Hand
Recirculation Pumps	Remote Hand
	Local Hand
Sodium Hydroxide (Caustic) Metering Pumps	Automatic
	Local Hand
	Remote Hand
Sodium Hypochlorite Metering Pumps	Automatic
	Local Hand
	Remote Hand
Hydrochloric Acid Metering Pump	Local Hand

Comment: ho3pcs01.htm
last edited: 3/26/02

Centrifugal Fans Remote Hand Control Mode

For operation of any of the two centrifugal fans, close the breaker at the motor control center and position the hand switches as shown in the table below. Only one centrifugal fan can operate at one time. Follow proper procedures for removing LOTO.

Control Mode: Manual

Breakers	OCF-HW-1- MCC-7C OCF-HW-2- MCC-7D	
Hand switch (Location)	**Position**	**Action**
HAND-OFF-REMOTE **(At the Headworks Odor Control Panel)** HS-3551A HS-3552A	REMOTE	Allows the fan to be operated from theDCS.
START-STOP **(At the DCS)** HS-3551B HS-3552B	START	Starts the centrifugal fan.
START-STOP **(At the DCS)** HS-3551B HS-3552B	STOP	Stops the centrifugal fan.

Comment: ho3pcd01.htm
last edited: 3/26/02

Centrifugal Fans Local Hand Control Mode

For operation of any of the two exhaust fans, close the breaker at the motor control center and position the hand switches as shown in the table below. Only one centrifugal fan can operate at one time. Follow proper procedures for removing LOTO.

Control Mode: Manual

Breakers	OCF-HW-1- MCC-7C OCF-HW-2- MCC-7D	
Hand switch (Location)	**Position**	**Action**
HAND-OFF-REMOTE **(At the Headworks Odor Control Panel)** HS-3551A HS-3552A	HAND	Starts the centrifugal fan.
HAND-OFF-REMOTE **(At the Headworks Odor Control Panel)** HS-3551A HS-3552A	OFF	Stops the centrifugal fan.

Comment: ho3pcd02.htm
last edited: 3/26/02

Recirculation Pumps Remote Hand Control Mode

For operation of any of the two recirculation pumps, close the breaker at the motor control center and position the hand switches as shown in the table below. Follow proper procedures for removing LOTO.

Control Mode: Manual

Breakers	Recirculation Pump #1-MCC-7C Recirculation Pump #2-MCC-7D	
Hand switch (Location)	**Position**	**Action**
HAND-OFF-REMOTE **(At the Headworks Odor Control Panel)** HS-3541A HS-3542A	REMOTE	Allows the recirculation pump to be operated from the DCS.
START-STOP **(At the DCS)** HS-3541B HS-3542B	START	Starts the recirculation pump.
START-STOP **(At the DCS)** HS-3541B HS-3542B	STOP	Stops the recirculation pump.

Comment: ho3pcd03.htm
last edited: 3/26/02

Recirculation Pumps Local Hand Control Mode

For operation of any of the two recirculation pumps, close the breaker at the motor control center and position the hand switches as shown in the table below. Follow proper procedures for removing LOTO.

Control Mode: Manual

Breakers	Recirculation Pump #1-MCC-7C Recirculation Pump #2-MCC-7D	
Hand switch (Location)	**Position**	**Action**
HAND-OFF-REMOTE **(At the Headworks Odor Control Panel)** HS-3541A HS-3542A	HAND	Starts the recirculation pump.
HAND-OFF-REMOTE **(At the Headworks Odor Control Panel)** HS-3541A HS-3542A	OFF	Stops the recirculation pump.

Comment: ho3pcd04.htm
last edited: 3/26/02

Sodium Hydroxide (Caustic) Metering Pumps Automatic Control Mode

For operation of any of the two caustic metering pumps, close the breaker at the motor control center and position the hand switches as shown in the table below. Follow proper procedures for removing LOTO.

Control Mode: Automatic

Breakers	Caustic Pump 1-MCC-7C Caustic Pump 2-MCC-7D	
Hand switch (Location)	**Position**	**Action**
HAND-OFF-REMOTE **(At the Caustic Pump Control Panel)** HS-3512A HS-3513A	REMOTE	Enables metering pump to be operated from the Headworks Odor Control Panel.
HAND-OFF-AUTO **(At the Headworks Odor Control Panel)** HS-3512C HS-3513C	AUTO	Places metering pump in Auto mode, i.e., metering pump will start only if corresponding recirculation pump is on.
LOCAL-REMOTE **(At the Headworks Odor Control Panel)** HS-3512B HS-3513B	REMOTE	The variable speed adjustment will be controlled by the pH monitoring system.

Comment: ho3pcd05.htm
last edited: 3/26/02

Sodium Hydroxide (Caustic) Metering Pumps Local Hand Control Mode

For operation of any of the two caustic metering pumps, close the breaker at the motor control center and position the hand switches as shown in the table below. Follow proper procedures for removing LOTO.

Control Mode: Manual

Breakers	Caustic Pump 1-MCC-7C Caustic Pump 2-MCC-7D	
Hand switch (Location)	**Position**	**Action**
HAND-OFF-REMOTE (At the Caustic Pump Control Panel) HS-3512A HS-3513A	HAND	Starts the Caustic Metering Pump.
Speed Control Station (At the Caustic Pump Control Panel) SK-3512A SK-3513A	0-100%	Manually adjust the speed controller of the Caustic Metering Pump.
HAND-OFF-REMOTE (At the Caustic Pump Control Panel) HS-3512A HS-3513A	OFF	Manually stops the Caustic Metering Pump.

Comment: ho3pcd06.htm
last edited: 3/26/02

Sodium Hydroxide (Caustic) Metering Pumps Remote Hand Control Mode

For operation of any of the two caustic metering pumps, close the breaker at the motor control center and position the hand switches as shown in the table below. Follow proper procedures for removing LOTO.

Control Mode: Manual

Breakers	Caustic Pump 1-MCC-7C Caustic Pump 2-MCC-7D	
Hand switch (Location)	**Position**	**Action**
HAND-OFF-REMOTE **(At the Caustic Pump Control Panel)** HS-3512A HS-3513A	REMOTE	Enables metering pump to be operated from the Headworks Odor Control Panel.
HAND-OFF-AUTO **(At the Headworks Odor Control Panel)** HS-3512C HS-3513C	HAND	Starts the Caustic Metering Pump.
LOCAL-REMOTE **(At the Headworks Odor Control Panel)** HS-3512B HS-3513B	LOCAL	The variable speed adjustment can be controlled from the speed controller on the Headworks Odor Control Panel.
Speed Control Station **(At the Headworks Odor Control Panel)** SK-3512C SK-3513C	0-100%	Manually adjust the speed of the Caustic Metering Pump.
HAND-OFF-REMOTE **(At the Headworks Odor Control Panel)** HS-3512C HS-3513C	OFF	Manually stops the Caustic Metering Pump.

Comment: ho3pcd07.htm
last edited: 3/26/02

Sodium Hypochlorite Metering Pumps Automatic Control Mode

For operation of any of the two Sodium Hypochlorite metering pumps, close the breaker at the motor control center and position the hand switches as shown in the table below. Follow proper procedures for removing LOTO.

Control Mode: Automatic

Breakers	Sodium Hypochlorite Pump 1-MCC-7C Sodium Hypochlorite Pump 2-MCC-7D	
Hand switch (Location)	**Position**	**Action**
HAND-OFF-REMOTE **(At the Sodium Hypochlorite Pump Control Panel)** HS-3514A HS-3515A	REMOTE	Enables metering pump to be operated from the Headworks Odor Control Panel.
HAND-OFF-AUTO **(At the Headworks Odor Control Panel)** HS-3514C HS-3515C	AUTO	Places metering pump in Auto mode, i.e., metering pump will start only if corresponding recirculation pump is on.
LOCAL-REMOTE **(At the Headworks Odor Control Panel)** HS-3514B HS-3515B	REMOTE	The variable speed adjustment will be controlled by the ORP monitoring system.

Comment: ho3pcd08.htm
last edited: 3/26/02

Sodium Hypochlorite Metering Pumps Local Hand Control Mode

For operation of any of the two Sodium Hypochlorite metering pumps, close the breaker at the motor control center and position the hand switches as shown in the table below.Follow proper procedures for removing LOTO.

Control Mode: Manual

Breakers	Sodium Hypochlorite Pump 1-MCC-7C Sodium Hypochlorite Pump 2-MCC-7D	
Hand switch (Location)	**Position**	**Action**
HAND-OFF-REMOTE **(At the Sodium Hypochlorite Pump Control Panel)** HS-3514A HS-3515A	HAND	Starts the Sodium Hypochlorite Metering Pump.
Speed Control Station **(At the Sodium Hypochlorite Pump Control Panel)** SK-3514A SK-3515A	0-100%	Manually adjust the speed controller of the Sodium Hypochlorite Metering Pump.
HAND-OFF-REMOTE **(At the Sodium Hypochlorite Pump Control Panel)** HS-3514A HS-3515A	OFF	Manually stops the Sodium Hypochlorite Metering Pump.

Comment: ho3pcd09.htm
last edited: 3/26/02

Sodium Hypochlorite Metering Pumps Remote Hand Control Mode

For operation of any of the two Sodium Hypochlorite metering pumps, close the breaker at the motor control center and position the hand switches as shown in the table below. Follow proper procedures for removing LOTO.

Control Mode: Manual

Breakers	Sodium Hypochlorite Pump 1-MCC-7C Sodium Hypochlorite Pump 2-MCC-7D	
Hand switch (Location)	**Position**	**Action**
HAND-OFF-REMOTE **(At the Sodium Hypochlorite Pump Control Panel)** HS-3514A HS-3515A	REMOTE	Enables metering pump to be operated from the Headworks Odor Control Panel.
HAND-OFF-AUTO **(At the Headworks Odor Control Panel)** HS-3514C HS-3515C	HAND	Starts the Sodium Hypochlorite Metering Pump.
LOCAL-REMOTE **(At the Headworks Odor Control Panel)** HS-3514B HS-3515B	LOCAL	The variable speed adjustment can be controlled from the speed controller on the Headworks Odor Control Panel.
Speed Control Station **(At the Headworks Odor Control Panel)** SK-3514C SK-3515C	0-100%	Manually adjust the speed of the Sodium Hypochlorite Metering Pump.
HAND-OFF-REMOTE **(At the Headworks Odor Control Panel)** HS-3514C HS-3515C	OFF	Manually stops the Sodium Hypochlorite Metering Pump.

Comment: ho3pcd10.htm
last edited: 3/26/02

Hydrochloric Acid Metering Pump Local Hand Control Mode

For operation of the Hydrochloric Acid metering pump, close the breaker at the motor control center and position the hand switches as shown in the table below. Follow proper procedures for removing LOTO.

Control Mode: Manual

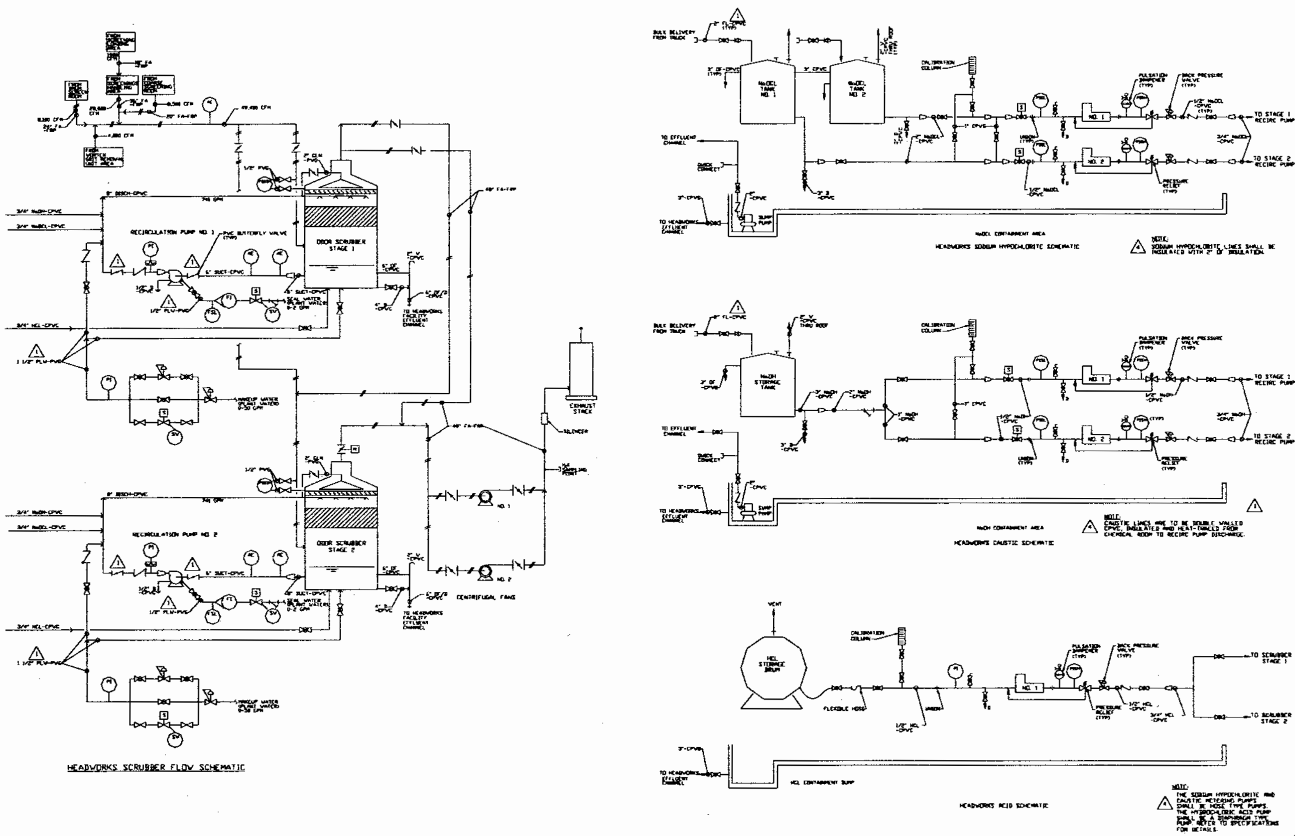
Breakers	Hydrochloric Acid MeteringPump-MCC-7C	
Hand switch (Location)	**Position**	**Action**
START-STOP (At the Hydrochloric Acid Pump Control Panel) HS-3511	START	Starts the Hydrochloric Acid Metering Pump.
START-STOP (At the Hydrochloric Acid Pump Control Panel) HS-3511	STOP	Stops the Hydrochloric Acid Metering Pump.

Comment: ho3pcd11.htm
last edited: 3/26/02

Headworks Odor Control
Drawing Summary Table

Drawing	Description
HW-M8	Headworks Odor Control Schematics
HW-M9	Headworks Odor Control Plan 1
HW-M10	Headworks Odor Control Plan 2
HW-M11	Headworks Odor Control Sections
I-6	Headworks Odor Control P&ID

Comment: ho3dst01.htm
last edited: 9/18/02



CITY OF ATLANTA, GEORGIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WASTEWATER SERVICES

R. M. CLAYTON WATER RECLAMATION CENTER EXPANSION
(PHOSPHORUS CONTROL AND FACILITY IMPROVEMENT PROJECT)

PHASE 3 - PLANT EXPANSION

HEADWORKS FACILITY ODOR CONTROL SCRUBBER FLOW, SODIUM HYPOCHLORITE AND CAUSTIC SCHEMATICS

Camp Dresser & McKee Inc. / Harrington, George and Cannon, PC
Joint Venture
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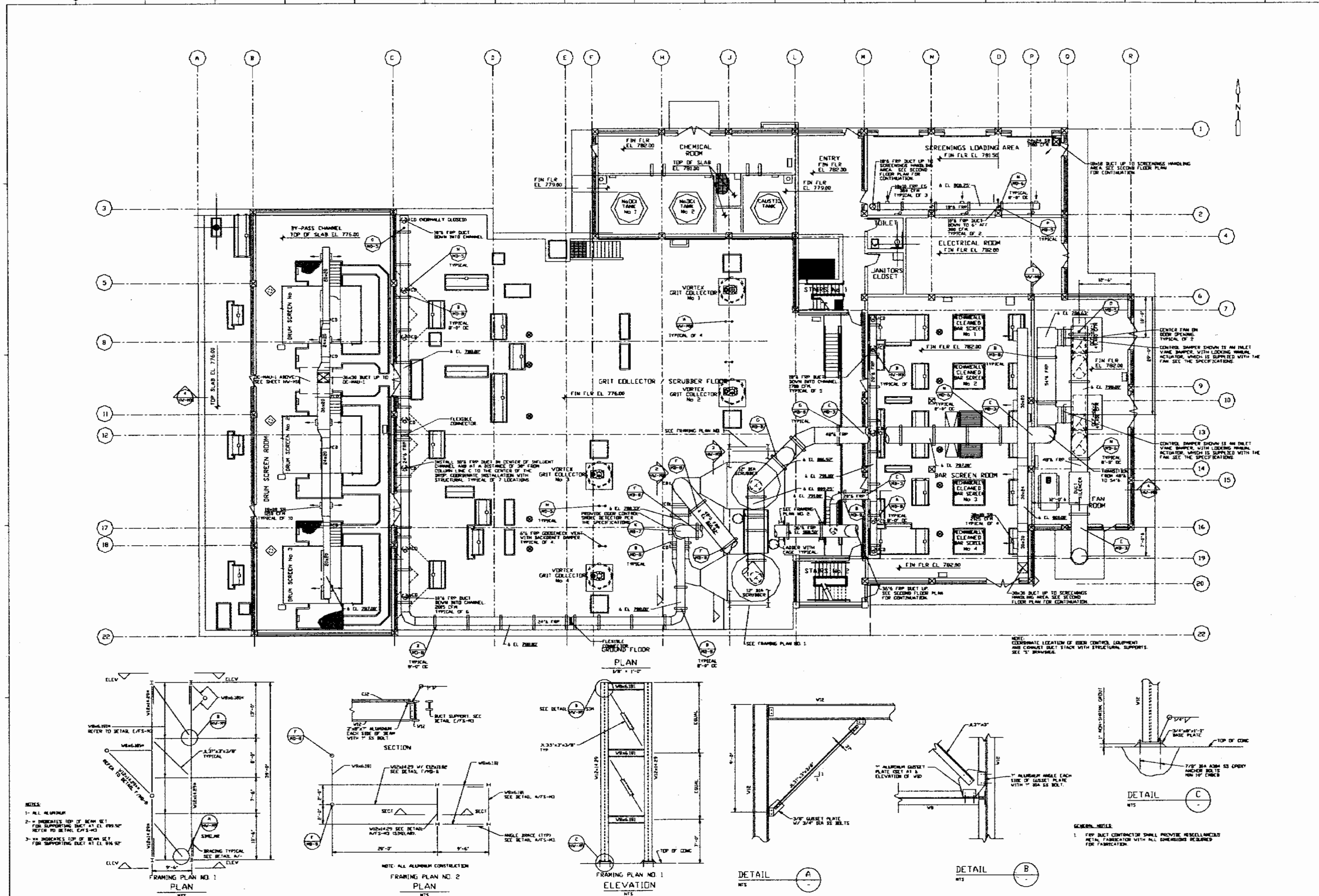
(404) 352-8344

DRAWING NO. HW-M8

SHEET 13 OF 129

REV. NO.	DATE	DRAWN	CHKD	REMARKS
2	8/22/98	AJS	TWH	ADDENDUM NO. 4
1	6/23/98	AJS	TWH	ADDENDUM NO. 1



REV NO.	DATE	DRWN	CHKD	REMARKS
	9/98	FMP	VRH	CONFORMED DRAWINGS
1	1/23/98	FMP	VRH	ADDENDUM NO. 1

DESIGNED BY	W. MAYGOOD
DRAWN BY	P. POULIOT
SHEET CHK'D BY	B. GAUDES, J. HALL
CHK'D BY	S. FENNIGER
APPROVED BY	W. MAYGOOD
DATE	MAY 1998

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CITY OF ATLANTA, GEORGIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WASTEWATER SERVICES

R. M. CLAYTON WATER RECLAMATION CENTER EXPANSION
(PHOSPHORUS CONTROL AND FACILITY IMPROVEMENT PROJECT)

PHASE 3 - PLANT EXPANSION

HEADWORKS - ODOR CONTROL SYSTEM
GROUND FLOOR PLAN

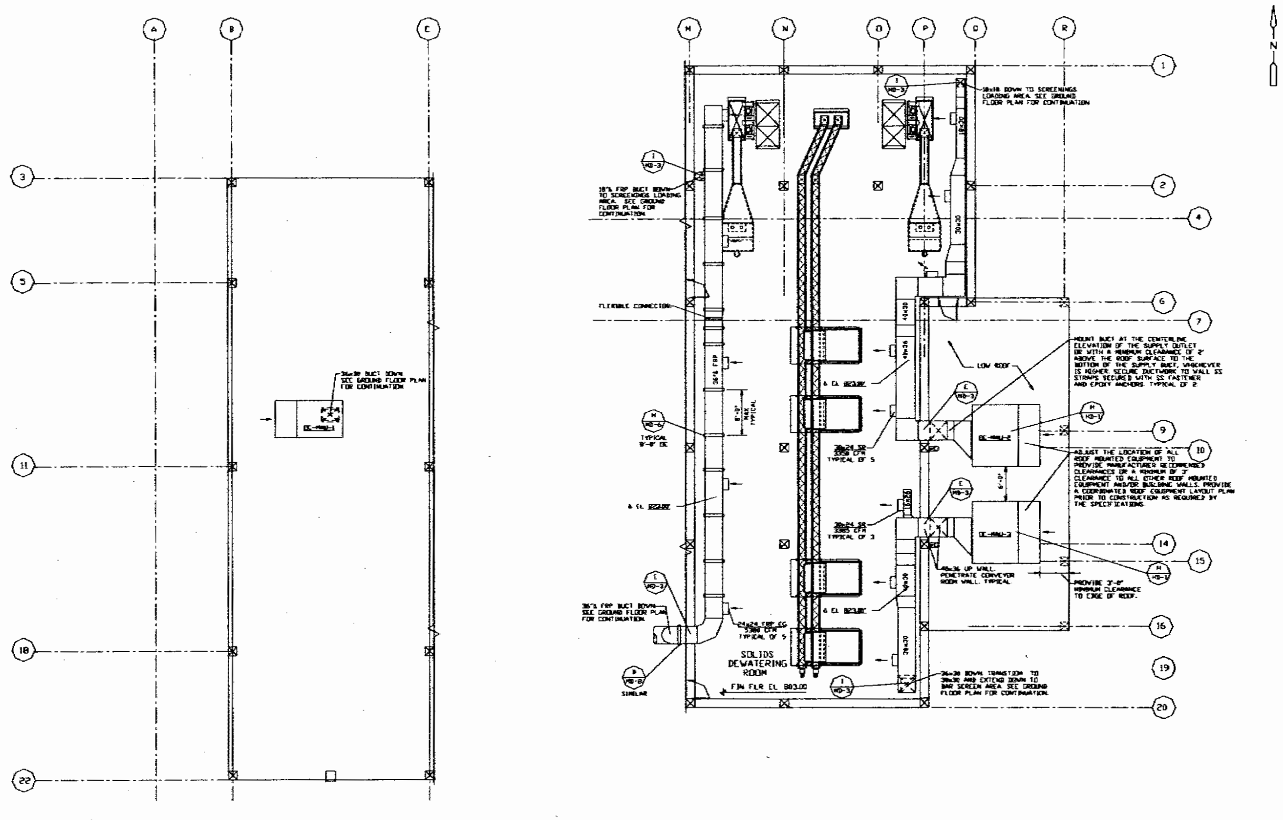
DRAWING NO. HW-M9

MAKE-UP AIR UNIT SCHEDULE

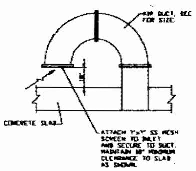
ITEM NO.	NO. REQ'D	AREA SERVED	SHEET NO.	HEATING DATA OUTPUT MBH	HEATING DATA -	FAN DATA CFM	OSA CFM	ESP	HP	DRIVE	VOLT PHASE	FILTERS TYPE	FILTERS SIZE NO.	REMARKS	MODINE MODEL
OC-MAU-1	1	DRUM SCREEN ROOM HEADWORKS	HW-M9	730	-	12,100	12,100	1.10"	10	BELT	460 3Ø	-	-	SEE THE SPECIFICATIONS	QB-122C
OC-MAU-2	1	SOLIDS DEWATERING/ SCREENING UNLOADING HEADWORKS	HW-M10	1168	-	18,650	18,650	1.10"	15	BELT	460 3Ø	-	-	SEE THE SPECIFICATIONS	QB-220A
OC-MAU-3	1	SOLIDS DEWATERING/ BAR SCREEN ROOM HEADWORKS	HW-M10	1168	-	18,650	18,650	1.10"	15	BELT	460 3Ø	-	-	SEE THE SPECIFICATIONS	QB-220A

ODOR CONTROL EXHAUST FANS

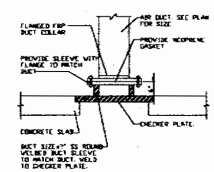
ITEM NO.	NO. REQ'D	AREA SERVED	SHEET NO.	CFM	S.P.	TYPE SET	TYPE WHEEL	TYPE DRIVE	H.P.	VOLT PHASE	FAN RPM	MAX SONE VALUE	NEW YORK BLOWER MODEL NO.	REMARKS	CONTROL
OCF-HW-1,2	2	FAN ROOM HEADWORKS	HW-M9	49,400	15"	UTILITY	CENT.	BELT	200	460 V 3Ø	1239	-	FE-54	SEE THE SPECIFICATIONS	SEE THE SPECIFICATIONS
OCF-BNR1-1,2	2	EXISTING BNR PROCESS BASIN	BN1-M23	23,000	18"	UTILITY	CENT.	BELT	75	460 V 3Ø	1018	-	FE-48	SEE THE SPECIFICATIONS	SEE THE SPECIFICATIONS
OCF-BNR2-1,2	2	NEW BNR PROCESS BASIN	BN2-M10	21,625	18"	UTILITY	CENT.	BELT	75	460 V 3Ø	1018	-	FE-48	SEE THE SPECIFICATIONS	SEE THE SPECIFICATIONS
OCF-FS-1	1	FLOW SPLIT STRUCTURE PRIM. EFFLUENT CHANNEL	FS-M3	8000	20"	UTILITY	CENT.	BELT	10	460 V 3Ø	1522	-	FE-24	SEE THE SPECIFICATIONS	SEE THE SPECIFICATIONS



SECOND FLOOR PLAN
1/8" = 1'-0"



AIR INTAKE
DETAIL A
NTS



DUCT PENETRATION
DETAIL B
NTS

REV. NO.	DATE	DRWN	CHKD	REMARKS
	9/98	PAP	WRH	CONFORMED DRAWINGS
1	6/23/98	PAP	WRH	ADDENDUM NO. 1

DESIGNED BY: W. HAYGOOD
DRAWN BY: P. POULIOT
SHEET CHK'D BY: B. DAVIES, J. HILL
CROSS CHK'D BY: S. FEHNIGER
APPROVED BY: W. HAYGOOD
DATE: MAY 1998

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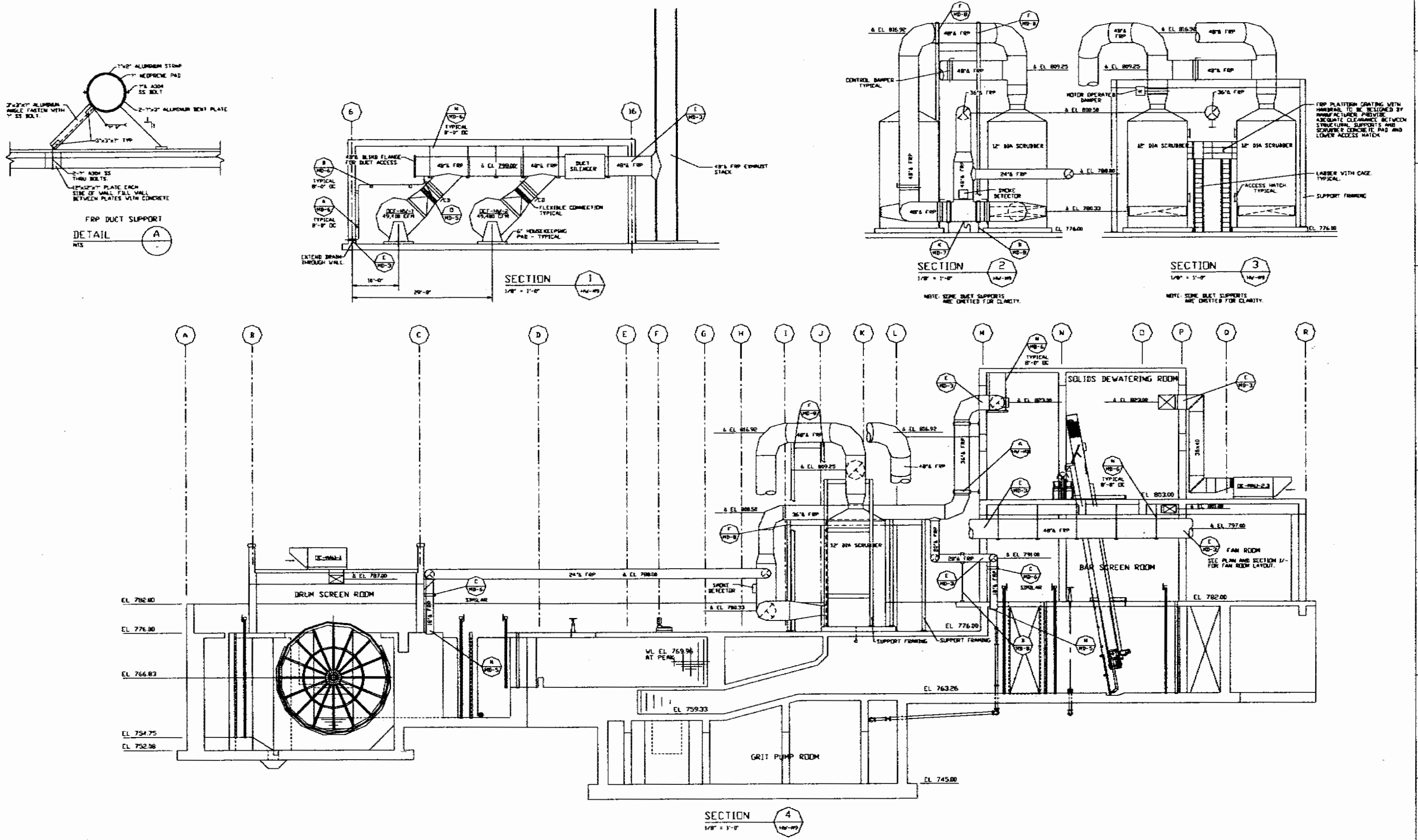
DIVISION OF WASTEWATER SERVICES
R. M. CLAYTON WATER RECLAMATION CENTER EXPANSION
(PHOSPHORUS CONTROL AND FACILITY IMPROVEMENT PROJECT)

PHASE 3 - PLANT EXPANSION
HEADWORKS - ODOR CONTROL SYSTEM
SECOND FLOOR PLAN

DRAWING NO.
HW-M10
SHEET 15 OF 129



REV NO.	DATE	DRWN	CHKD	REMARKS
	9/98	PAP	VRH	CONFORMED DRAWINGS
1	6/23/98	PAP	VRH	ADDENDUM NO. 1

DESIGNED BY: M. HAYGOOD
DRAWN BY: P. POULIOT
SHEET CHK'D BY: B. GAINES, J. HILL
CROSS CHK'D BY: S. FENNIGER
APPROVED BY: V. HAYGOOD
DATE: MAY 1998

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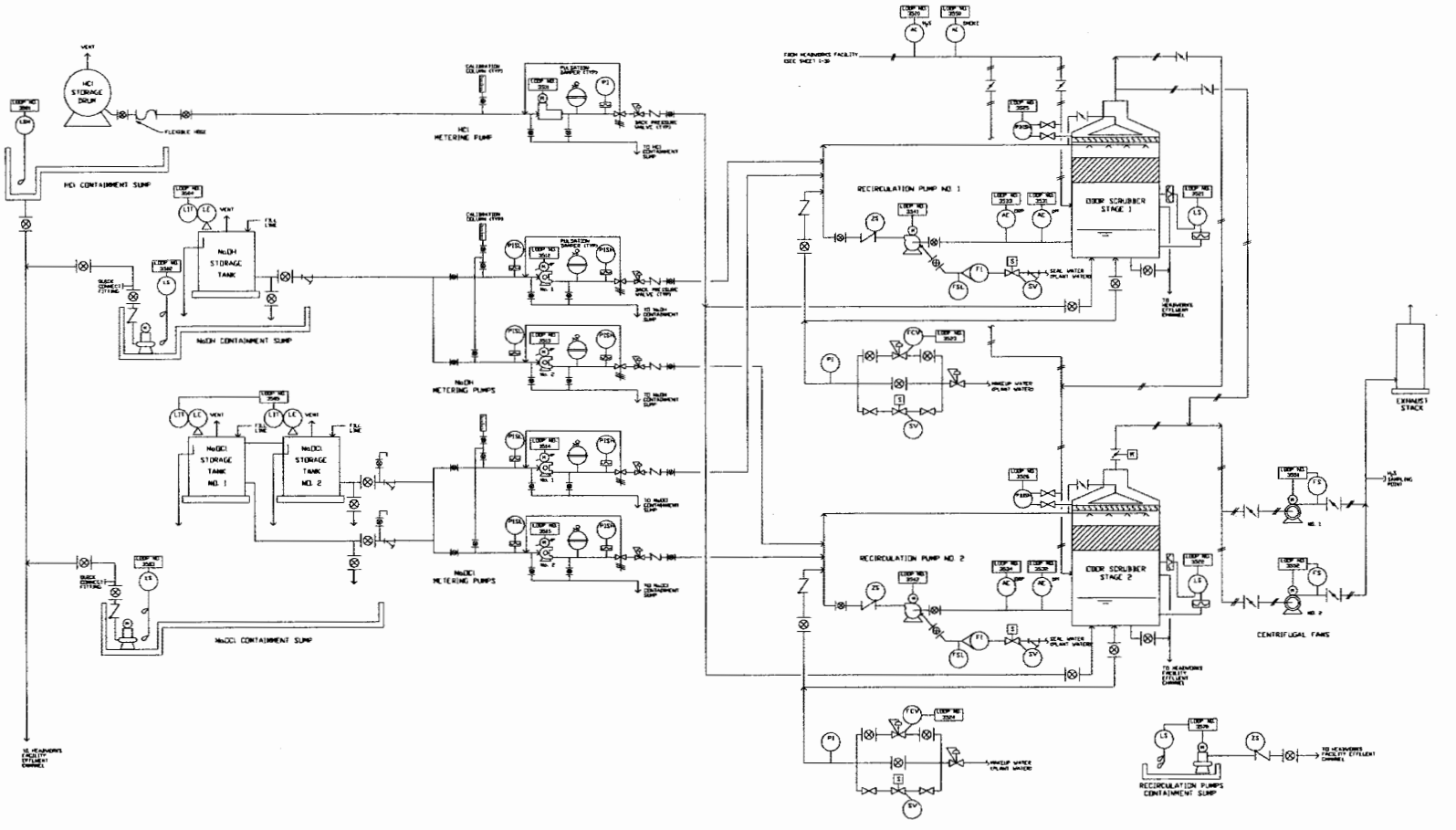
R. M. CLAYTON WATER RECLAMATION CENTER EXPANSION
(PHOSPHORUS CONTROL AND FACILITY IMPROVEMENT PROJECT)

PHASE 3 - PLANT EXPANSION
HEADWORKS - ODOR CONTROL SYSTEM
SECTIONS AND DETAILS

PROJECT NO. 924-83
FILE NAME: HOCMI1
DRAWING NO.
HW-M11
SHEET 16 OF 129



HEADWORKS FACILITY ODOR CONTROL SYSTEM

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CITY OF ATLANTA, GEORGIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WASTEWATER SERVICES
R. M. CLAYTON WATER RECLAMATION CENTER EXPANSION
(PHOSPHORUS CONTROL AND FACILITY IMPROVEMENT PROJECT)

PHASE 3 - PLANT EXPANSION
PROCESS AND INSTRUMENTATION DIAGRAM

SHEET NO. I-6

Headworks Odor Control
Instrument Summary Table

Scrubber Differential Pressure Gauge with Switch
pH Analyzer/Transmitter
ORP Analyzer/Transmitter
Scrubber Level Switch
Makeup Water Pressure Control Valve
Makeup Water Flow Control Valve
Seal Water Flow Rotameter
Level Element/Transmitter
Metering Pump Suction Pressure Indicator
Metering Pump Discharge Pressure Indicator
Seal Water Flow Switch Low
Acid Metering Discharge Pressure Indicator
Recirculation Pump Seal Water Solenoid Valve
High Level Switch
Low Level Switch
Recirculation Pump Containment Sump Level Switches
Air Flow Switch
Smoke Detector
Hydrogen Sulfide Monitor

Comment: ho3ist01.htm
last edited: 3/26/02

Headworks Odor Control

Scrubber Differential Pressure Indicator/Switch High - Instrument Description

Scrubber Differential Pressure Indicator/Switch High - PDISH-3525, 3526			
Function	Gage the pressure drop across the scrubber packing and indicate when the pressure reaches the high set point, serving as in indicator of when acid wash of the scrubber is necessary		
Effect of Failure	Not able to use pressure drop across scrubber packing to indicate plugged media		
Location	At each scrubber		
Measurement			
Foxboro Loop Number	3525, 3526		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range			
Normal Operating Range			
Action Level			

Comment: ho3id01.htm
last edited: 9/17/01

Headworks Odor Control

pH Analyzer/Transmitter- Instrument Description

pH Analyzer/Transmitter - AE/AIT-3531, 3532			
Function	Provides the pH measurement of the recirculated flow; controls chemical metering pumps output		
Effect of Failure	Unable to control chemical output and set alarms when pH falls out of target limits		
Location	Suction of recirculation pump		
Measurement	pH		
Foxboro Loop Number	3531, 3532		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	s. u.	2	12
Normal Operating Range	s. u.	9	10
Action Level	s. u.		

Comment: ho3id02.htm
last edited: 3/26/02

Headworks Odor Control

ORP Analyzer/Transmitter - Instrument Description

ORP Analyzer/Transmitter - AE/AIT-3533, 3534			
Function	Provides the ORP measurement of the recirculated flow		
Effect of Failure	Unable to control chemical output and set alarms when ORP falls out of target limits		
Location	Suction of recirculation pump		
Measurement	ORP, mV		
Foxboro Loop Number	3533, 3534		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	mV	0	1000
Normal Operating Range	mV	600	700
Action Level	mV		

Comment: ho3id03.htm
last edited: 3/26/02

Headworks Odor Control

Scrubber Level Switch - Instrument Description

Scrubber Level Switch - LS-3521, 3522			
Function	Detects water level in scrubber sump; open and close make-up water solenoid valve and alarm at field adjustable levels		
Effect of Failure	Loss of automatic control of make-up water solenoid valve		
Location	Scrubber sump		
Measurement	feet		
Foxboro Loop Number	3521, 3522		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	feet		
Normal Operating Range	feet	1.00	1.25
Action Level	feet	0.75	1.75

Comment: ho3id04.htm
last edited: 9/17/01

Headworks Odor Control

Make-up Water Pressure Control Valve - Instrument Description

Make-up Water Pressure Control Valve - PCV-3523, 3524			
Function	Make up water pressure control		
Effect of Failure	Cannot control makeup water pressure as per scrubber manufacturer		
Location	Makeup water line		
Measurement			
Foxboro Loop Number	3523, 3524		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range			
Normal Operating Range			
Action Level			

Comment: ho3id05.htm
last edited: 3/26/02

Headworks Odor Control

Make-up Water Flow Control Valve - Instrument Description

Make-up Water Flow Control Valve - FCV-3523, 3524			
Function	Maintain constant makeup water flow, regardless of upstream or downstream pressure fluctuations by regulating differential pressure		
Effect of Failure	Cannot control makeup water flow as per scrubber manufacturer		
Location	Makeup water line		
Measurement	GPM		
Foxboro Loop Number	3523, 3524		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	GPM	0	50
Normal Operating Range			
Action Level			

Comment: ho3id06.htm
last edited: 3/26/02

Headworks Odor Control

Seal Water Flow Rotameter - Instrument Description

Seal Water Flow Rotameter - FI-3541, 3542			
Function	Measure seal water flow rate		
Effect of Failure	Cannot measure and adjust set seal water flow rate of recirculation pumps		
Location	Seal water flow line		
Measurement	GPM		
Foxboro Loop Number	3541, 3542		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	GPM	0	5
Normal Operating Range	GPM		
Action Level	GPM		

Comment: ho3id07.htm
last edited: 9/17/01

Headworks Odor Control

Level Element/Transmitter - Instrument Description

Level Element/Transmitter - LE/LIT-3504, 3505A, 3505B			
Function	Measures and transmits storage tank levels		
Effect of Failure	Cannot monitor storage tank levels		
Location	Above water level of storage tanks		
Measurement	feet		
Foxboro Loop Number	3504, 3505A, 3505B		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	feet	0	9
Normal Operating Range	feet		
Action Level	feet		8.70

Comment: ho3id08.htm
last edited: 9/17/01

Headworks Odor Control

Metering Pump Suction Pressure Indicator - Instrument Description

Metering Pump Suction Pressure Indicator - PISL-3512, 3513, 3514, 3515			
Function	Indicates suction pressure of metering pump		
Effect of Failure	Cannot measure suction line pressure		
Location	Caustic and Sodium Hypochlorite Metering pumps suction line		
Measurement	pressure, ft H_2O		
Foxboro Loop Number	3512, 3513, 3514, 3515		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	ft / H_2O		
Normal Operating Range	ft / H_2O		
Action Level	ft / H_2O		

Comment: ho3id09.htm
last edited: 3/26/02

Headworks Odor Control

Metering Pump Discharge Pressure Indicator - Instrument Description

Metering Pump Discharge Pressure Indicator - PISH-3512, 3513, 3514, 3515			
Function	Indicates discharge pressure of metering pump		
Effect of Failure	Cannot measure discharge line pressure		
Location	Caustic and Sodium Hypochlorite Metering pumps discharge line		
Measurement	pressure, psig		
Foxboro Loop Number	3512, 3513, 3514, 3515		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	psig	0	150
Normal Operating Range	psig	100	
Action Level	psig		

Comment: ho3id10.htm
last edited: 9/17/01

Headworks Odor Control

Seal Water Flow Switch Low - Instrument Description

Seal Water Flow Switch Low- FLS-3541, 3542			
Function	Detects seal water low flow		
Effect of Failure	Damage to recirculation pump if pump runs without seal water		
Location	Seal water line		
Measurement			
Foxboro Loop Number	3541, 3542		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range			
Normal Operating Range			
Action Level			

Comment: ho3id11.htm
last edited: 9/17/01

Headworks Odor Control

Acid Metering Pump Discharge Pressure Indicator - Instrument Description

Acid Metering Pump Discharge Pressure Indicator - PI-3511			
Function	Indicates discharge pressure of metering pump		
Effect of Failure	Cannot measure discharge line pressure		
Location	Acid metering pump discharge line		
Measurement	pressure, psig		
Foxboro Loop Number	3511		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	psig	0	35
Normal Operating Range	psig		
Action Level	psig		

Comment: ho3id12.htm
last edited: 9/17/01

Headworks Odor Control

Seal Water Solenoid Valve - Instrument Description

Seal Water Solenoid Valve - SV-3541, 3542			
Function	Two-way pilot operated, normally open to allow seal water to recirculation pump		
Effect of Failure	Valve will not automatically open or close according to operation of recirculation pump		
Location	Seal water line		
Measurement	NA		
Foxboro Loop Number	3541, 3542		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range			
Normal Operating Range			
Action Level			

Comment: ho3id13.htm
last edited: 9/17/01

Headworks Odor Control

High Level Switch - Instrument Description

High Level Switch-LSH-3501, 3502, 3503			
Function	Activates alarm when containment sump level is high		
Effect of Failure	Does not activate alarm to notify operator to manually start sump pump, if available		
Location	Hydrochloric Acid, Caustic and Sodium Hydroxide Containment sumps		
Measurement			
Foxboro Loop Number	3501, 3502, 3503		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	feet		
Normal Operating Range	feet		
Action Level	feet		

Comment: ho3id14.htm
last edited: 9/17/01

Headworks Odor Control

Low Level Switch- Instrument Description

Low Level Switch - LSL-3502, 3503			
Function	Turns off sump pump		
Effect of Failure	Sump pump will not automatically turn off when water level reaches low		
Location	Caustic and Sodium Hydroxide Containment sump		
Measurement			
Foxboro Loop Number	3502, 3503		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	feet		
Normal Operating Range	feet		
Action Level	feet		

Comment: ho3id15.htm
last edited: 9/17/01

Headworks Odor Control

Level Switches - Instrument Description

Level Switches-LSH/LSL-3570			
Function	Activate containment sump pump at low and high levels		
Effect of Failure	Will not automatically turn on and off sump pump according to level		
Location	Recirculation pumps containment sump		
Measurement	NA		
Foxboro Loop Number	3570		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range			
Normal Operating Range			
Action Level			

Comment: ho3id16.htm
last edited: 9/17/01

Headworks Odor Control

Air Flow Switch - Instrument Description

Air Flow Switch - FS-3551, 3552			
Function	Detects air flow in duct		
Effect of Failure	Cannot detect air flow		
Location	Downstream of centrifugal fan		
Measurement	N/A		
Foxboro Loop Number	3551, 3552		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range			
Normal Operating Range			
Action Level			

Comment: ho3id17.htm
last edited: 3/26/02

Headworks Odor Control

Smoke Detector - Instrument Description

Smoke Detector - AE/ASH-3550			
Function	Shut down centrifugal fan when smoke alarm is activated		
Effect of Failure	Alarm will not be activated upon smoke condition		
Location	Duct from Headworks Facility		
Measurement	N/A		
Foxboro Loop Number	3550		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range			
Normal Operating Range			
Action Level			

Comment: ho3id18.htm
last edited: 3/26/02

Headworks Odor Control

Hydrogen Sulfide Monitor - Instrument Description

Hydrogen Sulfide Monitor- AE/AIT-3520			
Function	Sensor and transmitter to monitor hydrogen sulfide concentration		
Effect of Failure	Hydrogen sulfide concentration unknown; safety hazard		
Location	Duct from Headworks Facility		
Measurement			
Foxboro Loop Number	3520		
MAXIMO Number			
Operational Parameter	U/M	Min.	Max.
Instrument Range	PPM	0	100
Normal Operating Range			
Action Level			

Comment: ho3id19.htm
last edited: 9/17/01

Back

ODOR CONTROL SYSTEMS

(Headworks, BNR-1, BNR-2, and Flowspliter)

RM Clayton WRC Expansion Phase 3

Spec. Section 11255

TABLE OF CONTENTS

Standard Operating Procedures Summary Table

Standard Operating Procedure	
 **Headworks Odor Control**	Headworks Odor Control Pre Start-up
	Headworks Odor Control Start-up
	Headworks Odor Control Normal Operation
	Headworks Odor Control Shutdown
	Headworks Odor Control Acid Cleaning Procedure

Comment: ho4sps01.htm
last edited: 9/19/01

Headworks Odor Control

Headworks Odor Control System Pre Start-up Procedure

The Headworks Odor Control system is composed of a two-stage scrubber system. Each scrubber is associated with a recirculation pump, a Sodium Hydroxide feed pump, and a Sodium Hypochlorite feed pump. The Headworks Odor Control system includes two centrifugal fans. The following SOP outlines the steps for operating the two scrubbers in series.

Safety Concerns: Ensure that all LOTO and confined space entry procedures are followed. Follow all plant safety procedures for working in hazardous and explosive atmospheres.

Step	Remarks/Response
1. Confirm that the local disconnects for all pumps, centrifugal fan and sump pumps are enabled.	1. If equipment is locked-out and tagged out, leave disconnected. Contact supervisor to confirm equipment lock-out status.
2. Conduct visual inspection of scrubber and chemical storage areas.	2. Check for leaks and levels of chemical storage tanks.
3. Determine which scrubber will be lead and lag.	3. Open and close valves accordingly.
4. Check pumps' suction and discharge valves.	4. Ensure valves are in the OPEN position.
5. Perform required equipment lubrication and maintenance procedures.	5. Refer to equipment manufacturer's O&M manuals.
6. Calibrate pH and ORP sensors.	6. Refer to equipment manufacturer's O&M manuals.
7. Check scrubber media.	7. Check packing material and spray nozzles visually through inspection ports. Look for debris, scale and sludge build up. Correct if necessary.
8. Fill scrubber sumps with make-up water and drain to remove any dirt or foreign material.	8. Open makeup water feed line valves and fill sump to overflow. Open drain valve to empty sump.
9. Close the drain valve and refill the sump with water until water begins to go out the overflow.	9.
10. Check that differential pressure monitoring system valves are open.	10.
11. Ensure that the pump seal water is ON before starting the recirculation pump.	11. Read seal water flowrotameter. Seal water flow should be in the range of ___ gpm.

12. Start the Scrubber recirculation pump.	12. Check that the pump is operating appropriately. • Recirculation Pumps Remote Hand Control Mode • Recirculation Pumps Local Hand Control Mode
13. Start the Caustic feed pump in Manual mode and add Caustic solution to the recirculating liquid.	13. Check the pump suction and discharge pressure. Turn off the pump when the pH is 10.5. • Caustic Metering Pumps Remote Hand Control Mode • Caustic Metering Pumps Local Hand Control Mode
14. Start the Sodium Hypochlorite feed pump in Manual mode and add Sodium Hypochlorite solution to the recirculating liquid.	14. Check the pump suction and discharge pressure. Turn off the pump when the ORP is 650 mV. • Sodium Hypochlorite Metering Pumps Remote Hand Control Mode • Sodium Hypochlorite Metering Pumps Local Hand Control Mode
15. Place the Caustic feed pump and the Sodium Hypochlorite feed pump in AUTO mode.	15. Refer to: • Caustic Metering Pumps Automatic Control Mode • Sodium Hypochlorite Metering Pumps Automatic Control Mode The pH and the ORP will control the Caustic and Sodium Hypochlorite feed pumps, respectively.
16. Enter the pH and ORP set points at the DCS for each scrubber.	16. The pH and the ORP set points will control the Caustic and Sodium Hypochlorite feed pumps, respectively. • pH: 10.5 • ORP: 650 mv
17. Notify Supervisor of Pre-start SOP completion.	17. Record in Operations Log.

Comment: ho4spd01.htm
last edited: 3/26/02

Headworks Odor Control System Start-up Procedure

The Headworks Odor Control system is composed of a two-stage scrubber system. Each scrubber is associated with a recirculation pump, a Sodium Hydroxide feed pump, and a Sodium Hypochlorite feed pump. The Headworks Odor Control system includes two centrifugal fans. The following SOP outlines the steps for operating the two scrubbers in series.

Safety Concerns: Ensure that all LOTO and confined space entry procedures are followed. Follow all plant safety procedures for working in hazardous and explosive atmospheres.

Step	Remarks/Response
1. Ensure the completion of the Pre-start SOP.	1. Perform procedures outlined in Headworks Odor Control System Pre Start-up Procedure
2. Adjust the makeup water flow control valves to obtain the desired make-up water flow rate.	2. Refer to Manufacturer's O&M manual for required make-up water flow rate.
3. Start the Centrifugal fan that will be in operation.	3. Check that the inlet and outlet vane dampers are open first. Be sure that all safety guards are installed and no debris or tools have been left in the air duct before start before starting centrifugal fan. • Centrifugal Fans Remote Hand Control Mode • Centrifugal Fans Local Hand Control Mode
4. Note whether the belts squeal or slip.	4. If so, refer to the manufacturer's manual to obtain proper belt tension.
5. Adjust the inlet vane damper to achieve the desired air flow rate.	5.
6. Notify Supervisor of Start-up SOP completion.	6. Record in Operations Log.

Comment: ho4spd02.htm
last edited: 3/26/02

Headworks Odor Control System Shutdown Procedure

The Headworks Odor Control system is composed of a two-stage scrubber system. Each scrubber is associated with a recirculation pump, a Sodium Hydroxide feed pump, and a Sodium Hypochlorite feed pump. The Headworks Odor Control system includes two centrifugal fans. The following SOP outlines the steps for shutting down the scrubber system.

Safety Concerns: Ensure that all LOTO and confined space entry procedures are followed. Follow all plant safety procedures for working in hazardous and explosive atmospheres.

Step	Remarks/Response
1. Turn off the Centrifugal Fan at theDCS or at the Headworks Odor Control Panel.	1. Airflow is stopped first to ensure that the air is treated before it is discharged into the atmosphere. • Centrifugal Fans Remote Hand Control Mode or • Centrifugal Fans Local Hand Control Mode
2. Turn off the Sodium Hydroxide (Caustic) and Sodium Hypochlorite Metering Pumps at the Headworks Odor Control Panel or Metering Pump Control Panel.	2. Refer to: • Sodium Hydroxide (Caustic) Metering Pumps Remote Hand Control Mode or • Sodium Hydroxide (Caustic) Metering Pumps Local Hand Control Mode; • Sodium Hypochlorite Metering Pumps Remote Hand Control Mode or • Sodium Hypochlorite Metering Pumps Local Hand Control Mode
3. Turn off Recirculation Pumps at the Headworks Odor Control Panel or the DCS. Check that its seal water solenoid valve closes. In cold weather, drain pump and lines to prevent freezing.	3. Refer to: • Recirculation Pump Remote Hand Control Mode • Recirculation Pump Local Hand Control Mode
4. Maintain water level in sump of scrubber that is shut down to prevent the pH and ORP probes from drying out.	
5. Place the local disconnect breaker and the main breaker for the equipment to the OFF position.	5. Follow proper lock-out and tag-out procedures for equipment to be placed out of service.
6. Place the complementary scrubber and associated equipment into service in single stage mode.	6. Open and close valves accordingly.
7. Follow proper maintenance procedures	7. Refer to equipment manufacturer's manuals for long-term

for long-term shutdown of all equipment.	shutdown requirements.
8. Notify Supervisor of Shutdown SOP completion.	8. Record in Operations Log

Comment: ho4spd04.htm
last edited: 3/26/02

Headworks Odor Control System Acid Cleaning Procedure

The Headworks Odor Control system is composed of a two-stage scrubber system. Each scrubber is associated with a recirculation pump, a Sodium Hydroxide feed pump, and a Sodium Hypochlorite feed pump. The Headworks Odor Control system includes two centrifugal fans. The following SOP outlines the steps for cleaning a scrubber, when high differential pressure through the scrubber is indicated.

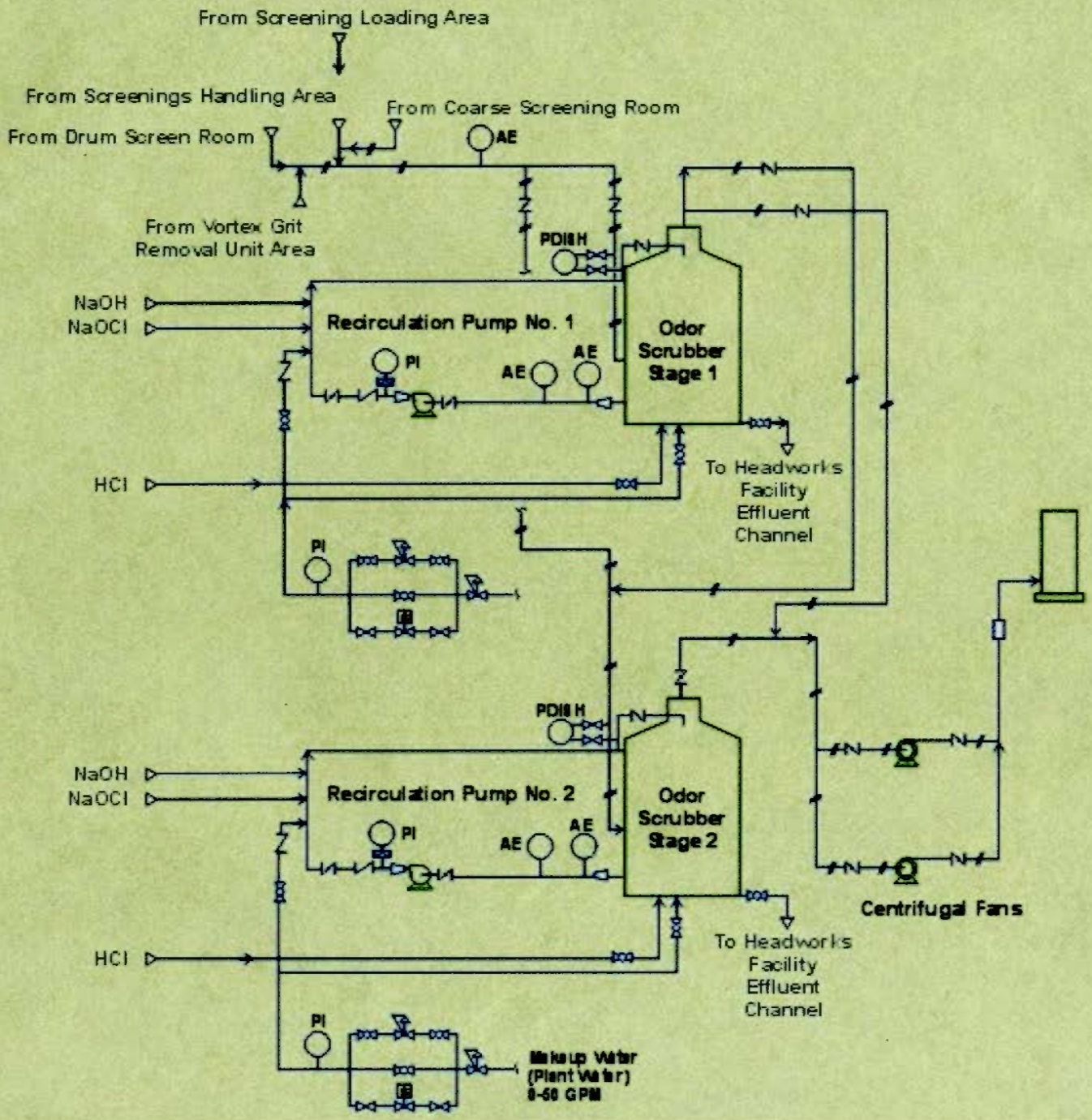
Safety Concerns: Ensure that all LOTO and confined space entry procedures are followed. Follow all plant safety procedures for working in hazardous and explosive atmospheres.

Step	Remarks/Response
1. Isolate the scrubber to be cleaned by placing the complementary scrubber and associated equipment into service in single stage mode.	1. Close inlet and outlet dampers of scrubber accordingly. Shut down respective recirculation pump and chemical feed pumps. • Recirculation Pump Remote Hand Control Mode or • Recirculation Pump Local Hand Control Mode; • Sodium Hydroxide (Caustic) Metering Pumps Remote Hand Control Mode or • Sodium Hydroxide (Caustic) Metering Pumps Local Hand Control Mode; • Sodium Hypochlorite Metering Pumps Remote Hand Control Mode or • Sodium Hypochlorite Metering Pumps Local Hand Control Mode.
2. Drain scrubber sump. Close drain valve when finished.	2.
3. Rinse the scrubber.	3. Fill the scrubbers sump with scrubber make-up water. Run the recirculation pump for 30 minutes and then drain the sump again.
4. Fill the scrubber sump again with make-up water.	4. Ensure drain valve is closed before filling.
5. Start the Hydrochloric acid metering pump.	5. Ensure that Hydrochloric acid metering pump suction and discharge valves are open. Check that there is sufficient Hydrochloric acid in the storage tank.
6. Run the Hydrochloric acid pump until the required pH is achieved in the scrubber sump.	6. The correct amount of hydrochloric acid in the scrubber sump correlates to a pH of __.
7. Start recirculation pump.	7. Circulate hydrochloric acid solution for ____ hours and then stop the recirculation pump.

8. Drain scrubber sump and then rinse the recirculation pump system.	8. Fill the sump again with make-up water. Run the recirculation pump for 10 minutes and then stop the recirculation pump. Drain the sump again.
9. Open the spray header access door, and the mist eliminator access door.	9. Air dry for a minimum of 8 hours prior to start-up, the close doors.
10. Record completion of acid cleaning procedure in Operations Log Book.	10. Place valves in the correct positions for normal operation of scrubber.

Comment: ho4spd05.htm
last edited: 3/26/02

Headworks Scrubber Flow Schematic



Back

ODOR CONTROL SYSTEMS

(Headworks, BNR-1, BNR-2, and Flowspliter)

RM Clayton WRC Expansion Phase 3

Spec. Section 11255

TABLE OF CONTENTS

Headworks Odor Control
Process Control Parameter Summary Table

Parameter	Sampling Location/Type
pH	Recirculation Flow/Grab
ORP	Recirculation Flow/Grab
Color	Inspection ports

Comment: ho5pst01.htm
last edited: 9/17/01

Headworks Odor Control
Process Control Parameter

Process Parameter	pH
Importance	Activates alarm when pH deviates from target pH levels; high pH is required to control odor
Normal Range	9-10 s.u.
Analysis Frequency	Continuous
Sample Location and Number	Scrubber recirculation loop
Sample Type	Grab
Sample Holding Time and Preservation	N/A
Test Procedure	Through pH analyzer

Headworks Odor Control
Process Control Parameter

Process Parameter	ORP
Importance	Activates alarm when ORP deviates from target ORP.
Normal Range	300-500 m.v.
Analysis Frequency	Continuous
Sample Location and Number	Scrubber recirculation loop
Sample Type	Grab
Sample Holding Time and Preservation	Several minutes, no means topreserve.
Test Procedure	Through ORP analyzer

Headworks Odor Control
Process Control Parameter

Process Parameter	Color
Importance	Color is an indication of the state of therecirculation flow and if a cleaning cycle is required
Normal Range	Yellow to green
Analysis Frequency	Daily
Sample Location and Number	Scrubber inspection ports
Sample Type	Visual
Sample Holding Time and Preservation	Several minutes, no means to preserve
Test Procedure	Standard Methods

Comment: ho5pcp03.htm

Headworks Odor Control
Calculation Summary Table

Calculation	Frequency of Calculation
Removal Efficiency	
Metering Pump Output	

Comment: ho5cst01.htm
last edited: 9/17/01

Headworks Odor Control
Process Control Parameter Calculation

Process Control Parameter	Removal Efficiency
Purpose	To determine the scrubber's effectiveness in reducing H_2S concentrations or other parameters from the air after passing through the packing material
Calculation Formula	$$Percent\,Removal = \frac{(Inlet\ (ppm) - Outlet\ (ppm))}{Inlet\ (ppm)} \times 100$$
Example of Calculation Formula	The H_2S concentration of the air into the scrubber is 5 ppm (v). The H_2S concentration of air out of the scrubber is 0.025 ppm (v). What is the H_2S removal efficiency of the scrubber? $$Percent\,Removal = \frac{(Inlet\ (ppm) - Outlet\ (ppm))}{Inlet\ (ppm)} \times 100$$ $$Percent\,Removal = \frac{(5\ ppm\ (v) - 0.025\ ppm\ (v))}{ppm\ (v)} \times 100$$ $$Percent\,Removal = 99.25$$

Comment: ho5pcc01.htm
last edited: 3/26/02

Headworks Odor Control
Process Control Parameter Calculation

Process Control Parameter	Metering Pump Output
Purpose	To calculate chemical output from metering pump settings during normal operations
Calculation Formula	Metering Pump Output = Maximum Pump Capacity (gph) x Speed (decimal) x Stroke (decimal)
Example of Calculation Formula	The nameplate on the metering pump shows the maximum pump capacity to be 1 gph. If the speed setting is 75% and the stroke length setting is 30%, what is output of the metering pump in gph? Metering Pump Output = Maximum Pump Capacity (gph) x Speed (decimal) x Stroke (decimal) Metering Pump Output = 1gph x 0.75 x 0.30 Metering Pump Output = 0.23 gph

Comment: ho5pcc02.htm
last edited: 9/17/01

Headworks Odor Control
Sampling Summary Table

Parameter	Purpose/Freq	Sampling Location/Type
There are no samples to be taken	N/A	N/A

Comment: ho5sst01.htm
last edited: 9/18/02

Back

ODOR CONTROL SYSTEMS

(Headworks, BNR-1, BNR-2, and Flowspliter)

RM Clayton WRC Expansion Phase 3

Spec. Section 11255

TABLE OF CONTENTS

Headworks Odor Control
Process Troubleshooting Summary Table

Troubleshooting Guide
Off site odors
Scrubber high differential pressure

Comment: ho6pts01.htm
last edited: 9/17/01

Headworks Odor Control Troubleshooting
Process Troubleshooting Guide

Symptom: Off site odors	
Possible Cause	**Suggested Response**
Chemical feed systems not operating properly	Clean and calibrate probes of pH and ORP systems; adjust feed rates to target range; change target range if required; check chemical supply; consult chemical metering pumps troubleshooting guide
Low circulation flow	Consult recirculation pumps troubleshooting guide
Low make-up water flow rate	Check and adjust flow rate of makeup water system
Faulty equipment: centrifugal fans, recirculation pumps	Manually transfer from inoperable equipment to operable equipment

Comment: ho6ptg01.htm
last edited: 3/26/02

Headworks Odor Control Troubleshooting
Process Troubleshooting Guide

Symptom: Scrubber high differential pressure	
Possible Cause	**Suggested Response**
Scale build up	Check packing material of scrubber and clean if required with Hydrochloric Acid metering pump
Differential pressure monitoring system malfunction	Check differential pressure monitoring system; consult Manufacturer's manual

Comment: ho6ptg02.htm
last edited: 9/17/01

Headworks Odor Control
Alarm Summary Table

Where equal alarms exist for equal equipment, only the last three digits of the multiple alarms are listed, since that is the only change in the alarm number.

Name of Alarm	Alarm Number
Acid Containment Sump High Alarm	LAH-3501
Caustic and Sodium Hypochlorite Sump High Alarm	LAH-3502, 3503
Caustic and Sodium Hypochlorite Storage Tank Level High Alarm	LAH-3504, 3505A, 3505B
Caustic and Sodium Hypochlorite Storage Tank Level Low Alarm	LAL-3504, 3505A, 3505B
Caustic and Sodium Hypochlorite Storage Tank Level Low-Low Alarm	LALL-3504, 3505A, 3505B
Hydrochloric Acid Pump Trouble Alarm	XA-3511A/B/C
Metering Pump Trouble Alarm	XA-3512A/B, 3513A/B, 3514A/B, 3515A/B
Scrubber Sump High-High Level Alarm	LAHH-3521, 3522
Scrubber Sump Low-Low Level Alarm	LALL-3521, 3522
Differential Pressure High Alarm	PDAH-3525, 3526
Recirculation Pump Trouble Alarm	XA-3541, 3542
Smoke High Alarm	AAH-3550
Centrifugal Fan Trouble Alarm	XA-3551, 3552
Recirculation Pumps Containment Sump Pump Trouble Alarm	XA-3570

Comment: ho6ast01.htm
last edited: 3/26/02

Acid Containment Sump High Level
LAH-3501

Alarm annunciation/illumination locations:

1. Headworks Odor Control Panel
2. DCS

Possible Cause	Suggested Response
1. Sump level high	1. Check that acid tank drain valve is not open or leaking
2. Faulty connection	2. Check instrumentation wiring

Comment: ho6arg01.htm
last edited: 9/17/01

Caustic and Sodium Hypochlorite Sump High Alarm
LAH-3502, 3503

Alarm annunciation/illumination locations:

1. Headworks Odor Control Panel
2. DCS

Possible Cause	Suggested Response
1. Sump level high	1. Check that chemical tank drain valve is not open or leaking
2. Faulty connection	2. Check instrumentation wiring

Comment: ho6arg02.htm
last edited: 9/17/01

Caustic / Sodium Hypochlorite Storage Tank Level High Alarm LAH-3504, 3505A, 3505B

Alarm annunciation/illumination locations:

1. Headworks Odor Control Panel
2. DCS

Possible Cause	Suggested Response
1. Chemical level in the storage tank has reached the high set point.	1. Stop filling tank if in filling mode.
2. Faulty connection	2. Check instrumentation wiring

Comment: ho6arg03.htm
last edited: 3/26/02

Caustic/Sodium Hypochlorite Storage Tank Level Low Alarm
LAL-3504, 3505A, 3505B

Alarm annunciation/illumination locations:

1. Headworks Odor Control Panel
2. DCS

Possible Cause	Suggested Response
1. Chemical level in the storage tank has reached the low set point.	1. Prepare order for chemical.
2. Faulty connection	2. Check instrumentation wiring

Comment: ho6arg04.htm
last edited: 9/17/01

Caustic / Sodium Hypochlorite Storage Tank Level Low-low Alarm LALL-3504, 3505A, 3505B

Alarm annunciation/illumination locations:

1. Headworks Odor Control Panel
2. DCS

Possible Cause	Suggested Response
1. Chemical level in the storage tank has reached the low-low set point.	1. Prepare order for chemical; manually shut down metering pumps if not in auto mode to prevent damage to pump
2. Faulty connection	2. Check instrumentation wiring

Comment: ho6arg05.htm
last edited: 3/26/02

Metering Pump Trouble Alarm
XA-3512A/B, 3513A/B, 3514A/B, 3515A/B

Alarm annunciation/illumination locations:

1. Headworks Odor Control Panel
2. DCS

Possible Cause	Suggested Response
1. High Discharge Pressure	1. Isolate pump and check for blockage in hose. Clean hose, if necessary. Check that the pump discharge valve is open. Open immediately, if necessary. Check that the pump discharge line is not obstructed. Flush and drain line, if necessary.
2. Hose fail	2. Check flood head pump head chamber through cover view port for hose failure. If so, drain pump head chamber fluid and do not reuse contaminated lubricant. Remove and replace ruptured hose.
3. Low lubricant level	3. Verify level through the lubricant level sight hose. Refill lubricant to the proper level. If lubricant is leaking, replace the seal through which the lubricant is leaking.
4. Trouble switch triggered on Pump Control Panel	4. Check connection at Pump Control Panel

Scrubber Sump High-High Level Alarm
LAHH-3521, 3522

Alarm annunciation/illumination locations:

1. DCS

Possible Cause	Suggested Response
1. Make-up water flow rate set too high	1. Check that makeup water flow control valve is set correctly for recommended rate
2. Blow down flow rate too low	2. If makeup water flow is set as per manufacturer recommended rate, increase blow down
3. Level sensor/transmitter has malfunctioned	3. Inspect level sensor and transmitter; recalibrate if necessary
4. Incorrect high level set point	4. Check that high level alarm set point is as recommended by manufacturer

Comment: ho6arg07.htm
last edited: 3/26/02

Scrubber Sump Low-Low Level Alarm
LALL-3521, 3522

Alarm annunciation/illumination locations:

1. DCS

Possible Cause	Suggested Response
1. Make-up water flow rate set too low	1. Check that makeup water flow control valve is set correctly for recommended rate
2. Blow down flow rate too high	2. If makeup water flow is set as per manufacturer recommended rate, decrease blow down
3. Level sensor/transmitter has malfunctioned	3. Inspect level sensor and transmitter; recalibrate if necessary
4. Incorrect low-low level set point	4. Check that low level alarm set point is as recommended by manufacturer
5. Scrubber sump drain valve is open	5. Check that the drain valve is closed

Comment: ho6arg08.htm
last edited: 3/26/02

Differential Pressure High Alarm
PDAH-3525, 3526

Alarm annunciation/illumination locations:

1. DCS

Possible Cause	Suggested Response
1. Fouling of packing	1. Perform acid cleaning procedure of scrubber
2. Lines clogged or damaged	2. Clean lines upstream or downstream of pressure differential gage
3. Level sensor/transmitter has malfunctioned	3. Inspect level sensor and transmitter; recalibrate if necessary
4. Differential pressure alarm set point too low	4. Field adjust set point that triggers alarm

Comment: ho6arg09.htm
last edited: 9/17/01

Recirculation Pump Trouble Alarm
XA-3541, 3542

Alarm annunciation/illumination locations:

1. Headworks Odor Control Panel
2. DCS

Possible Cause	Suggested Response
1. Closed discharge valve or obstruction in discharge line.	1. Inspect valve. Flush line, if necessary.
2. Impeller thermal protectors.	2. Inspect heater or thermal overload.
3. Speed too high.	3. Check electrical system.
4. Head lower than rated, pumping beyond design point.	4. Check scrubber nozzles.
5. Mechanical defect: bent shaft, misalignment, rotating element bind.	5. Check and repair, as needed.

Comment: ho6arg10.htm
last edited: 9/18/02

Smoke High Alarm
AAH-3550

Alarm annunciation/illumination locations:

1. Headworks Odor Control Panel
2. DCS

Possible Cause	Suggested Response
1. Smoke in air duct from Headworks facility processes	1. Notify supervisor.
2. Sensor malfunction.	2. Notify proper personnel.
3. Smoke in scrubbers.	3. Notify proper personnel.

Comment: ho6arg11.htm
last edited: 9/18/02

Centrifugal Fan Trouble Alarm
XA-3551A/B, 3552A/B

Alarm annunciation/illumination locations:

1. Headworks Odor Control Panel
2. DCS

Possible Cause	Suggested Response
1. Trouble switch triggered at MCC	1. Check at MCC panel

Comment: ho6arg12.htm
last eidted: 3/26/02

Recirculation Pumps Containment Sump Pump Trouble Alarm XA-3570

Alarm annunciation/illumination locations:

1. Headworks Odor Control Panel
2. DCS

Possible Cause	Suggested Response
1. Trouble switch activated at MCC	1. Check MCC panel

Comment: ho6arg13.htm
last edited: 3/26/02

Hydrochloric Acid Pump Trouble Alarm
XA-3511A/B/C

Alarm annunciation/illumination locations:

1. Pump Control Panel
2. Headworks Odor Control Panel
3. DCS

Possible Cause	Suggested Response
1. Trouble switch triggered on Pump Control Panel	1. Check connection at Pump Control Panel

Comment: ho6arg14.htm
last edited: 3/26/02

Back

B EQUIPMENT-HEADWORKS

1 SCRUBBERS

- A Fabrication Certification
- B Process Settings
- C Equipment Handling, Installation, and Maintenance Instructions
- D Packing and Internals Handling and Installation Instructions
- E Resin Recommendations
- F Material Data
- G Indusco Drawings
- H Airol Drawings (Demister)
- I Warranties
- J Spare Parts and Material Turnover List
- K Odor Control Test Report

2 FIBERGLASS REINFORCED PLASTIC EXHAUST FANS

- A Installation and Maintenance
- B Balancing, Inspection, and Certification Procedures
- C Material Data
- D Motor Data
- E Vibration Isolators
- F Warranties
- G Spare Parts and Material Turnover List

3 RECIRCULATION PUMPS

- A Pump Data
- B Motor Data
- C Motor Wiring Diagram
- D Warranties

4 ACID METERING PUMPS

- A Cover Sheet
- B Instruction Manual
- C Pulsation Damper Data
- D Warranties
- E Spare Parts and Material Turnover List

5 NaOH AND NaOCI METERING PUMPS

- A Cover Sheet

ODOR CONTROL SYSTEMS

[redacted]

TABLE OF CONTENTS

ODOR CONTROL SYSTEMS

[redacted]

TABLE OF CONTENTS

Back

ODOR CONTROL SYSTEMS

[redacted]

TABLE OF CONTENTS

A

INDUSCO
ENVIRONMENTAL

March 9, 2000

Mr. Ron Kress
Western Summitt/Pizzagalli Construction
2561 Chatahoochee Cir.
Atlanta, GA 30318

REF: RM Clayton Water Reclamation Expansion, phase 3, WS/PC job No. 11317- PSI job No. 41190
Indusco Environmental Service Job No. IE20119

Dear Mr. Kress,
This letter is to certify to you, as required in the submittal, that the FRP odor control scrubbers will be fabricated in accordance with the provision and requirements outlined in section 11255 of the contract documents.

Sincerely,

Michael D. Harman
Indusco Environmental Service

B

Indusco Environmental Service Inc.
P.O. Box 723365
Atlanta, Georgia 31139
(770) 739-5929 - Fax (770) 739-6139

Scrubber Unit Control Flow and Process Settings

Customer: Western Summitt/Pizzagalli
Customer Purchase Order Number: PS 00316, Job No. WS/PC 41190- PSI Job No. 11317

Project: RM Clayton Water Reclamation Center Expansion
Location: 2561 Chattahoochee Cir, Atlanta, GA
Project Number: Indusco Environmental Services Project No: IE20119
Application: Municipal Odor Control System
Unit No's: 10 SCRH 1 3525, 10 SCRH 2 3526
Scrubber Diameter: 12'-O"
Scrubber Bed Depth: 10'-O" minimum
Scrubber Type Packing: 2" HI-Flow, Polyethylene
Air Flow Rate: 49,400 scfm
Scrubber Gas Inlet Temperature: 80 deg. F
Scrubber Gas Density: 0.070 lbs/cf
Contaminate: 100 ppm Hydrogen Sulfide
Unit Removal Efficiency: 99.95% removal efficiency.
Scrubber Recirculation Flow: 750 gpm
Scrubber Chemical Solutions: NaOH and NaOCl
Scrubber Chemical Controls: pH and ORP
PH Setting: 10-11 pH
ORP Setting: 450-600 mv
Chemical Consumption NaOH (estimated): 8 gph
Chemical Consumption NaOCl (estimated): 11 gph
Scrubber Sump Capacity: 2,277 U.S. Gallons
Scrubber Overflow (blow-down): <18 gpm first stage, ≤ 5gpm second stage
Scrubber Pressure Drop (clean): 0.12"s.p.w.c./ft
Scrubber Pressure Drop (clean): 3.25"s.p.w.c. maximum
Pressure In Vessel: 1 atm
Scrubber Inlet Gas Velocity: 2,600 ft/min
Scrubber Vertical Gas Velocity: 438.29 ft/min
Scrubber Gas Outlet Velocity: 2,650 ft/min
Vessel Percent Flooding: 55 %

C

EQUIPMENT HANDLING INSTRUCTIONS:

The following precautions should be taken when handling:

1. Operators of hoist equipment should follow proper rigging procedures at all times. Care should be taken to prevent the materials from swinging out of control.
2. Always lift never roll or slide FRP material.
3. When moving, do not drop or allow hard impact.
4. Never let tools strike or drop on either the inside or outside.
5. Any ladders placed against or in the equipment should be wood or have rubber protectors.
6. When lifting never use cables or chains around the equipment.
7. When lifting never use any fittings other than lift lugs.
8. Do not allow cables, hooks or spreader bar to swing against the equipment.

EQUIPMENT INSTALLATION:

Scrubber shall be mounted outside of structural steel members designed to match the anchor hole layout on the scrubber support lugs. Provisions should be made to protect the bottom reservoir section of the scrubber, pump, recirculation, makeup and solution piping from freezing during cold weather. Normally, if warm room air is being scrubbed, this heat is sufficient to keep the solution free from freezing except during shutdown periods.

Make certain that the scrubber is completely drained when not in use. Pipe lines and pump supplying the scrubbing solution should be arranged so as to permit draining of lines and pump during winter shutdowns. Other normal precautions should be taken to prevent pipes and other accessories from freezing up.

The drain and overflow outlet should be piped to the sewer and should always be open. No valves or other restrictions should normally be placed in these lines to prevent inadvertent closing. These lines should be arranged so as to form a liquid seal to prevent air from entering the scrubber. The gas inlet duct connection to the scrubber is a large rectangular or large round flanged connection. The external duct connection to the inlet should slope down toward the scrubber for drainage of condensate, etc. from the duct system into the scrubber. The gas inlet duct connection to the scrubber is a large rectangular or large round flanged connection. The external duct connection to the inlet should slope down toward the duct connection to the inlet of the scrubber for drainage of condensate, etc.; from the duct system into the scrubber. The downward slope of this duct toward the scrubber also prevents scrubbing solutions from splashing and running back down the duct system in the event that the fan should fail to operate while liquid is still applied to the scrubber irrigation system. (fig. 1-1)

PACKING SUPPORT PLATE:

The packing support plate must be installed inside the scrubber at the level immediately above the gas inlet. Make sure that the support plate is installed on top of the support beam members in a perpendicular orientation. Gravity and the weight of the packing will hold the support plate grid unit in place. (fig 1-2) Be careful when standing on the support grate prior to installing all pieces. The grate may move and fall off of the support ring.

PACKING MATERIAL:

The proper handling and installation of random packings is a prerequisite for the start up of a packed tower to be successful and trouble free. By following the guidelines for the handling, storage, and installation of plastic random packings given below, one should experience a troublefree installation process.

Plastic packings are shipped in cardboard boxes or nylon 160 cft. bulk bags. The cardboard boxes are not capable of withstanding exposure to water and will deteriorate if they get wet and the nylon bulk bags will not protect the random packing from the effects of ultraviolet light. Therefore, it is recommended that all random packing be stored indoors. If the packing must be stored outside it is recommended that it is covered with black plastic or canvas and stacked on pallets to keep the packing off of the ground.

The packing should be stacked no higher than 3 boxes high and should be taped together. The entire area of the bottom boxes should be supported by the pallets and should not over hang the pallets in a manner that may cause the boxes to be unstable. The boxes will not support any load and no water, ice, snow, or any other foreign material should be allowed to sit on top of the covered boxes. No one should walk or stand on top of stored boxes.

Installation

Installation procedures for plastic random packings are dependent on several factors: column diameter, packing size, packed bed height, and placement of internals. For small columns, those of diameters less than 32 inches, it tends to be easier to load the packing using a flexible tube of 6 to 9 inches in diameter. The end of the chute is controlled using a rod attached to the tube. This allows one to control the placement of the packing within the tower from a side manway or from the top of the tower. The packing should be dumped at a relatively slow rate, approximately 2 cubic feet per minute.

In larger towers, it is frequently possible for a man to be inside the tower to dump boxes of random packing. Caution should be used in this procedure to make sure that the packing support is designed to hold a load greater than the combined weight of the packing and the personnel within the tower.

If gas injection support beams are to be used, caution should be used in this procedure. To avoid falling, a piece of plywood can be laid on top of the support beams. A man standing on the support beams should pour a 1 foot layer of the packing on top of the support beams. The weight of the personnel in the tower should be dispersed across as large of an area as possible to eliminate the potential for the packing to be crushed directly under the workers weight.

For large diameter towers Rauschert Industries can provide bulk bags containing 160 cubic feet of random packing. This bag is equipped with top and bottom lifting straps and a chute that allows a quick and efficient loading of the random packings. If bulk bags are to be used, a chute should be constructed and mounted at an incline to allow the bulk bags to be dumped through the manholes in the side of the tower. This significantly reduces the time required to install the random packings in large towers. The following installation procedure should be followed.

1. After a 1 foot layer of packing has been placed on the support, random packings can be dumped from higher levels using a wooden chute. Packing should be distributed in a random manner and should never be allowed to fall more than the distances specified int he table below. When the temperature is below 45 F (7 C), plastic packings should be handled gently since the ductibility of plastic is reduced at low temperatures. Never manually stack individual packing pieces. This can result in channeling and reduced mass transfer efficiency.

Material	Warm (75 F or 25 C)	Cold (45 F or 7 C)
pp	15 ft	6 ft
PPH	15 ft	6 ft
PVC	15 ft	6 ft
C-PVC	5 ft	5 ft
HDPE	15 ft	10 ft

2. Make sure that the random packing completely fills all the space in the packed bed section of the tower including all manways.

3. If sensors are present, their position should be checked when the packing covers them. Packing should not be dropped directly onto installed sensors or sensitive process equipment.

4. Any personnel in the tower should distribute their weight by standing on as large of a sheet of plywood or particle board as possible. An intense direct load should never be exerted on a few pieces of packing (i.e. a workers foot).

5. Before completing installation of the packing, the installation instructions for the bed limiter and liquid distributor should be checked to determine if partial installation of these components is necessary prior to the completion of packing installation.

6. No foreign objects should be left in the packed bed. Make sure all plywood, plastic sheets, and cardboard have been removed. If any assembly work needs to be done above the packed bed, it is best to keep the bed covered with a canvas. The top of the packed bed should be as flat as possible.

7. Final Inspection. Make sure at all points the top of packed bed is approximately seven (7) inches below the bottom of liquid distributor support ring.

DEMISTER (MESH PAD) ASSEMBLY:

Install demister sections (polypropylene mesh) on top of the demister support ring and beam. The sections should be a pressed fit. The Unit can be held in place by gravity however, it is best to use polypro or titanium tie wraps to attach sections to the support beam. (fig. 1-3)

The mist eliminator will arrive in sections. Each section will consist of a polypropylene mesh pad with 1.25 inch thick FRP top and bottom support grids. .The mesh pad is slightly oversized to provide a compression fit between sections and the vessel wall. No gaps should be present in a properly installed pad. Support grids will not be as wide as the mesh sections and have a nominal 3/41, clearance from the vessel wall. The mist eliminator should be installed in the following manner:

A. Remove any projections or obstructions which could prevent proper installation or good fit between mesh and vessel wall.

B. Mesh should be 1 to 1.5 percent larger than vessel diameter for 7.5 through 12 pound density mesh and 2 to 3 percent larger for 5 through 7 pound density mesh to insure proper seal between sections and around outside of pad.

C. All mesh sections will be tagged for ease of installation. Place sections in vessel starting from outside and working toward center. A minimum of two inches clearance above the top grid is required. Compress the sections together slightly as they are installed so that each section is close to its final location. Do not permanently secure mesh until all sections are in place. The final two sections can usually be installed by tilting mesh as shown on the below, (Figure 5) and gently pulling down on the bottom support grid.

D. Secure mesh to annular ring and beams with polypropylene tie wire.

MAIN DISTRIBUTION HEADER:
After installing the packing, check the PVC plastic pipe distributor and make sure the pipe has not been damaged in shipment. The pipe elbow should be pointed down towards the top of the packing. Field install the male NPT nozzle in the threaded connection of the header elbow. (fig 1-4)

START-UP:
System should be completely flushed to remove all debris prior to start up. Check for leaks and tighten any loose bolts and connections.

Turn on scrubbing solution then start system fan.

Simultaneous starting of fan and liquid is entirely satisfactory unless there are electrical load considerations in starting the fan and pump together. Use an amp meter on the fan to make sure that the fan is not overloading, if overloading is experienced shut back dampers to restrict the volume of air and or increase the amount of liquid being recirculated. If the fan is still being overloaded call your Indusco representative.

There will frequently be a white plume of condensing water vapor at the discharge of the scrubber stack. If proper control is maintained of the scrubbing liquid rate and pH, the plume will be neutral and will be harmless.

SHUT DOWN:
Turn Off the recirculation pump and let fan run for 5 minutes then shut-down fan.

If the shut down is prolonged, steps should be taken to drain the caustic solution supply lines, if freezing weather is anticipated.

MAINTENANCE:

There is practically no maintenance required on an Indusco Packed column scrubber. An occasional check of the irrigation system, piping and to make certain that no plugging exists is all that is required. An increase in total static pressure will be a indication that the packing is plugging. Check the sump area for solid build-up and flush and recirculate the scrubber unit with fresh water until the pressure drop is at an acceptable level.

If the scrubber is in service handling heavy loads that would tend to clog the demister, the demister may occasionally have to be flushed with water. In the most severe cases of clogging, the internals may be removed, cleaned and reinstalled. The irrigation piping can be easily removed from the scrubber by unbolting the double flanged nozzle or cutting the plastic pipe on the inside of the scrubber. All components can be cleaned mechanically or chemically, taking care not to damage plastic components.

Periodic Check List

A. Open upper manway access and inspect header liquid flow through slotted openings. If liquid is not flowing properly out of slots, clean out holes with a brush.

B. Packing is scaled over or packing is plugged. Flush with fresh water and 5-10% hydrochloric acid solution, if problem still exist, remove packing and clean manually.

C. Demister plugging and high pressure drop through unit. Use hose to spray under demister assembly and flush out contaminates. If unit is severely plugged, remove unit and manually wash using 5-10% Hydrochloric solution.

D

Handling and Installation
Instructions for Rauschert Plastic
Random Packings and Internals

Before random packings or intervals are placed in the tower, all welding and other work that may emit hot sparks should be completed. Hot sparks can cause the plastic packing and internals to catch on fire.

I. Support Plate

There are two basic types of supports, the gas injection beam and the support grate. The gas injection beam is more open and will demonstrate a lower pressure deferential than the support grate.

A. Gas Injection Beam

1. Make sure support ring and beam are clean (no debris or obstructions).

2. The support plate is manufactured in sections. Each section is marked to identify its position within the tower. See Figure 1 on the following page.

3. Each individual section will be passed through the manhole (avoid scraping sections on the manhole opening) and placed in its proper position according to the placement drawing (Figure 1).

Note: Due to the height of the support ring from the vessel bottom, special scaffolding or other arrangements should not be required.

4. Final Inspection. Make sure that all sections are properly aligned and that the system is sealed (No openings that will allow packing to fall through).

B. Support Grate

Follow the same basic steps as outlined above, bolting sections together as they are brought into the tower. Do not
stand on the support grate until at least half of the grate has been installed. Movement of the support grid can cause it to slip from the support ring and fall.

II. Random Packings

The proper handling and installation of random packings is a prerequisite for the start up of a packed tower to be successful and trouble free. By following the guidelines for the handling, storage, and installation of plastic random packings given below, one should experience a troublefree installation process.

Plastic packings are shipped in cardboard boxes or nylon 160 cft. bulk bags. The cardboard boxes are not capable of withstanding exposure to water and will deteriorate if they get wet and the nylon bulk bags will not protect the random packing from the effects of ultraviolet light. Therefore, it is recommended that all random packing be stored indoors. If the packing must be stored outside it is recommended that it is covered with black plastic or canvas and stacked on pallets to keep the packing off of the ground.

The packing should be stacked no higher than 3 boxes high and should be taped together. The entire area of the bottom boxes should be supported by the pallets and should not over hang the pallets in a manner that may cause the boxes to be unstable. The boxes will not support any load and no water, ice, snow, or any other foreign material should be allowed to sit on top of the covered boxes. No one should walk or stand on top of stored boxes.

B. Installation

Installation procedures for plastic random packings are dependent on several factors: column diameter, packing size, packed bed height, and placement of internals. For small columns, those of diameters less than 32 inches, it tends to be easier to load the packing using a flexible tube of 6 to 9 inches in diameter. The end of the chute is controlled using a rod attached to the tube. This allows one to control the placement of the packing within the tower from a side manway or from the top of the tower. The packing should be dumped at a relatively slow rate, approximately 2 cubic feet per minute.

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3. If sensors are present, their position should be checked when the packing covers them. Packing should not be dropped directly onto installed sensors or sensitive process equipment.

4. Any personnel in the tower should distribute their weight by standing on as large of a sheet of plywood or particle board as possible. An intense direct load should never be exerted on a few pieces of packing (i.e. a workers foot).

5. Before completing installation of the packing, the installation instructions for the bed limiter and liquid distributor should be checked to determine if partial installation of these components is necessary prior to the completion of packing installation.

6. No foreign objects should be left in the packed bed. Make sure all plywood, plastic sheets, and cardboard have been removed. If any assembly work needs to be

done above the packed bed, it is best to keep the bed covered with a canvas. The top of the packed bed should be as flat as possible.

7. Final Inspection. Make sure at all points the top of packed bed is approximately seven (7) inches below the bottom of liquid distributor support ring.

III. Redistributors

Note: The redistributors consist of interlinking troughs. The side walls of the troughs are not the same height. The troughs are linked together by placing the tall side wall over the short side wall of the adjacent trough.

A. Make sure support ring and beams are clean (no debris or obstructions.)

B. Determine where highest point of the distributor will be. (Use level and aluminum profile).

C. Based on the highest point, select other points (x) and determine how far below the high point they are. Cut shims to be placed in locations that are more than 0.0625 inch below the highest point in the support system (support beam and support ring).

D. Individual troughs are passed into the column via the manhole located just above the support beam. Troughs are to be installed in the following order:

1. Place one of the shortest troughs against the outer wall of the vessel. The tall side of the trough should be towards the wall. Level the troughs to the highest point using plastic shims (refer to Figure 2).
2. Place the next trough in such a manner that the tall side wall overlaps the interior side of the first trough. Repeat this process for all the troughs to go on one side of the vessel.
3. Repeat steps 1 & 2 for all troughs on the other side of the vessel.
4. The center three troughs consist of 3 sections. Place the outer sections of the center troughs in place. They should extend from the outer support

Leveling of Redistributor ring to the support beam. Be sure troughs are properly interlocked. Install center sections of the troughs.

E. Visually inspect the redistributor for any points through which packing could pass.

IV. Bed Limiter.

The bed limiter is composed of 3 sections. These sections are assembled in the vessel as shown in Figure 3 on the following page. Each section consists of four (4) pieces +which are to be bolted together using 3/811 PP bolts w/PP washers. ,End Control: Ensure that there are no openings where packings can fit through.

V. Liquid Distributor

Note: The liquid distributor consists of distribution troughs and one or two parting boxes.

A. Make sure support ring and beams are clean (no debris or obstructions).

B. Determine where highest point of the distributor will be. (Use level and aluminum profile).

C. Based on the highest point, select other points (x) and determine how far below the high point they are (Refer to Figure 4).

D. Pass the individual troughs into the column via the upper manhole. Troughs are marked and laid out as follows:

1. Lay all troughs which are to lie to the right of the center (AR1 thru AR6) of the supports to the right most side of the tower. Level the troughs to the highest point using plastic shims. Repeat for 411 troughs on the left (ALl thru AL6).

2. Lay the longest, center trough (AC) in the center of the tower.

3. Space troughs such that all troughs are spaced approximately 4.25" apart (side to side).

E. Bring in the parting boxes and triangular supports for inlet feed pipe through the manhole. Triangular supports should be installed first. The parting boxes are connected by bolts to individual troughs. (Do not tighten bolts until all pieces are in place.)

VI. Inlet Feed Pipe

A. Bring in main feed pipe.

B. Bolt main feed pipe to inlet flange (EPDM gasketing is used.) Mechanically secure feed pipe to the triangular supports.

C. Install diaphragms and downcomer pipe sections.

D. Visually inspect the system.

VII. MIST ELIMINATOR, MESH PAD TYPE

The mist eliminator will arrive in sections. Each section will consist of a polypropylene mesh pad with 1.25 inch thick FRP top and bottom support grids. The mesh pad is slightly oversized to provide a compression fit between sections and the vessel wall. No gaps should be present in a properly installed pad. Support grids will not be as wide as the mesh sections and have a nominal 3/41, clearance from the vessel wall. The mist eliminator should be installed in the following manner:

A. Remove any projections or obstructions which could prevent proper installation or good fit between mesh and vessel wall.

B. Mesh should be 1 to 1.5 percent larger than vessel diameter for 7.5 through 12 pound density mesh and 2 to 3 percent larger for 5 through 7 pound density mesh to insure proper seal between sections and around outside of pad.

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D. Secure mesh to annular ring and beams with polypropylene tie wire.

E

P.O. Box 2219
Columbus, OH
Phone: (614) 790-3483
Fax: (614) 790-6157
E-mail: mgstevens@ashland.com

Ashland Specialty Chemical Company

Fax

To:	Mike Harman Indusco Environmental Services, Inc.	**From:**	Michael G. Stevens Technical Service Chemist
Fax:	(770) 739-6139	**Pages:**	1
Phone:	(770) 739-5929	**Date:**	04/12/00
Re:	Resin Recommendation	**CC:**	Dave Harris

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

This letter is in response to your request for a resin recommendation for an odor control application where hydrogen sulfide gas will be removed using sodium hydroxide and sodium hypochlorite in water at a max temperature of 100°F. The resin that I would recommend for this application would be HETRON® FR992 epoxy vinyl ester resin. The corrosion barrier should consist of a minimum of 1 layer of Nexus veil backed by a minimum of 125 mils of chopped strand E-glass mat. A post cure is recommended for the laminate.

This recommendation is made assuming that fabrication is performed according to industry accepted standards.

If you have any questions, give me a call at (614) 790-3483.

Sincerely,

Michael G. Stevens
Technical Service Chemist

TECHNICAL DATA

HETRON® FR 992
Epoxy Vinyl Ester Resin

Composite Polymers • Division of Ashland Specialty Chemical Co. • Division of Ashland Inc.
Box 2219, Columbus, Ohio 43216 • (614) 790-3333

NOVEMBER 2000

FLAME RETARDANT[1], CORROSION RESISTANT, EPOXY VINYL ESTER RESIN

DESCRIPTION:

HETRON FR 992 resin is a low viscosity, unpromoted, flame retardant patented epoxy vinyl ester with F-Cat technology. Laminates made with HETRON FR 992 resin exhibit a flame spread of ≤ 25 (ASTM E-84) when 3% antimony trioxide is added and a flame spread of ≤ 75 without antimony trioxide.

PERFORMANCE:

- Excellent flame retardancy
- High strength characteristics
- Excellent impact strength and toughness
- Fast wet-out and low drainage
- Excellent corrosion resistance to acidic and alkaline enviroments

Patented chemistry results:

- No foaming
- Exotherm control
- Industry-leading storage stability

SUGGESTED USES:

HETRON FR 992 resin can be used for corrosion resistant, reinforced thermosetting plastic equipment including filament wound, hand lay-up and spray-up tanks, pipes, ducts, stacks, scrubbers, linings or other equipment handling corrosive gases, vapors or liquids where a high degree of flame retardancy is required.

ALTERNATIVE PRODUCTS:

HETRON 922 resin is a non-flame retardant epoxy vinyl ester. HETRON 942/35 and HETRON 980/35 resins are non-flame retardant, low styrene epoxy vinyl esters for applications requiring higher operating temperatures and greater resistance to organic solvents.

TYPICAL * LIQUID PROPERTIES AT 77°F (25°C)

Percent Solids	57.5
Viscosity - Brookfield, cps	
#2 Spindle @ 30 rpm	425
Color – Gardner	< 5
Pounds Per Gallon	9.7
Flash Point Range, °F	73-100

** Typical Values: Based on material tested in our laboratories but varies from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specification items.*

STANDARD PACKAGE:	55-Gallon Drum, Non-Returnable, Net Wt. 500 Lbs.
DOT LABEL REQUIRED:	Flammable Liquid
PRODUCT CODE:	566-621

[1]HETRON polyester resin will burn if provided with a sufficient amount of heat and oxygen. The degree of flame retardancy of the cured polyester resin is characterized by the ASTM E-84 tunnel test. This test is performed under strictly controlled conditions where a flame spread rating is assigned according to comparisons with test set-point materials. The behavior of the cured composite under these controlled conditions can vary from an actual fire situation.

F

To: Michael D. Harman
Company: Indusco Environmental
Phone: (770) 739-5929
Fax: (770) 739-6139
Date: 04/13/00
Pages: 3 (includes this page)

From: Paul Bowers
Rauschert Process Technologies Group
351Industrial Park Road
Madisonville, TN 37354
Phone: (423) 442-4471, ext. 25
Fax: (423) 442-8660
Email: paulb@rauschertus.com
Website: www.rauschertus.com

Design and Technical Summary for H_2S Absorption Towers (IND0229)

The following tables list the operating parameters and the hydraulic estimations for three H_2S scrubbers.

System 1

Operating Conditions	Stage 1	Stage 2
Temperature (°F)	68	68
Pressure (atm)	1.0	1.0
Liquid Composition	NaOH and NaOCl Solution	
pH	≥ 11.0	
Flow Rate (gpm)	679	679
Gas Composition	H_2S in Air	
Inlet H_2S (ppm)	100	3
Outlet H_2S (ppm)	3	0.05
Inlet Temperature	68 °F	
Flow Rate (cfm)	49,400	49,400

Tower Dimensions – Stages 1 & 2	
Diameter	12 feet
Packed Bed Height	10 feet
Volume of Packing Material	1,131 ft^3
Packing Material	Hiflow 50-0 Polyethylene

Hydraulic Estimations – Stages 1& 2	
Irrigated Pressure Drop	0.197 inWC/ft
Total Pressure Drop	1.97 inWC
Liquid Load	6.0 gpm/ft^2
F-Factor	1.99 $ft/s(lbs/ft^3)^{0.5}$

Rauschert
Process Technologies

Rauschert Industries, Inc.
351 Industrial Park Road, Madisonville, TN 37354
Phone (423) 442-4471 Fax (423) 442-8660

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Diameter	12 feet
Packed Bed Height	10 feet
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Packing Material	Hiflow 50-OPolyethylene

Hydraulic Estimations – Stages 1& 2	
Irrigated Pressure Drop	0.198 inWC/ft
Total Pressure Drop	1.98 inWC
Liquid Load	6.0 gpm/ft^2
F-Factor	1.99 $ft/s(lbs/ft^3)^{0.5}$

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Process Technologies

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Physical Data for Thermoplastic Hiflow® Rings

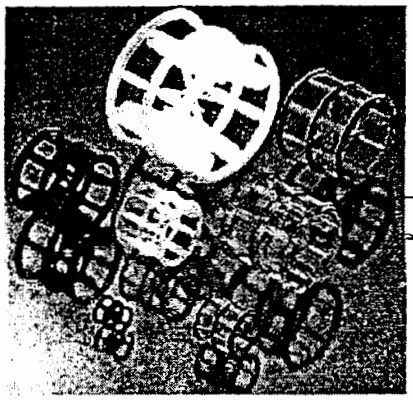

Table 1.1

Type	Nominal Size (mm)	Nominal Size (in)	Weight * kg/(m^3)	Weight * lb/(ft^3)	Surface Area (m^2)/(m^3)	Surface Area (ft^2)/(ft^3)	Void Space %
15-7	15	5/8	80	4.96	313	95.15	91
25-7	25	1	79	4.9	214	65.06	92
38-1	38	1 1/2	58	3.62	125	38.1	94
50-0	50	2	54	3.35	110	43.7	94
50-6	50	2	49	3.04	83	25.23	94
90-6	90	3 1/2	41	2.54	65	19.76	95

*Above weights are for polypropylene material only.

To calculate the packing weight for other thermoplastic materials, take the weight (metric or English) from Table 1.1 and multiply by the weight factor (Table 1.2) for the material desired.

Table 1.2

Material	Symbol	Weight Factor	Specific Gravity g/cm3	Specific Gravity lb/ft3	Temperature Rating* Celsius	Temperature Rating* Fahrenheit
Polypropylene	PP	-	0.9 - 0.92	56.2 - 57.4	80	176
Polypropylene (heat stabilized)	PPH	1.00	0.915	57.12	100	212
Polypropylene (talc-filled)	PP-talc	1.40	1.280	79.91	80	176
Polypropylene 20% Glass Filled	PPG-20	1.14	1.04	64.93	135	275
Polyvinyl chloride	PVC	1.51	1.380	86.15	60	140
Polyvinyl chloride, postchlorinated	C-PVC	1.69	1.550	96.77	100	212
High-Density Polyethylene	HDPE	1.04	0.955	59.62	60	140
Fluorine-containing polymers:						
	PVDF	1.95	1.78	111.13	140	284
	PFA	2.35	2.15	134.22	232	450
	ETFE	1.87	1.71	106.75	150	302
	ETFE-GF	1.99	1.82	113.62	176	350
	ECTFE	1.84	1.68	104.88	150	302

Also available in other thermoplastic materials.

* Temperature is for long-term maximum operating conditions in a non-corrosive environment. Actual operating temperature limits may vary depending on system factors like packed bed depth and operating environment.

Rauschert Process Technologies

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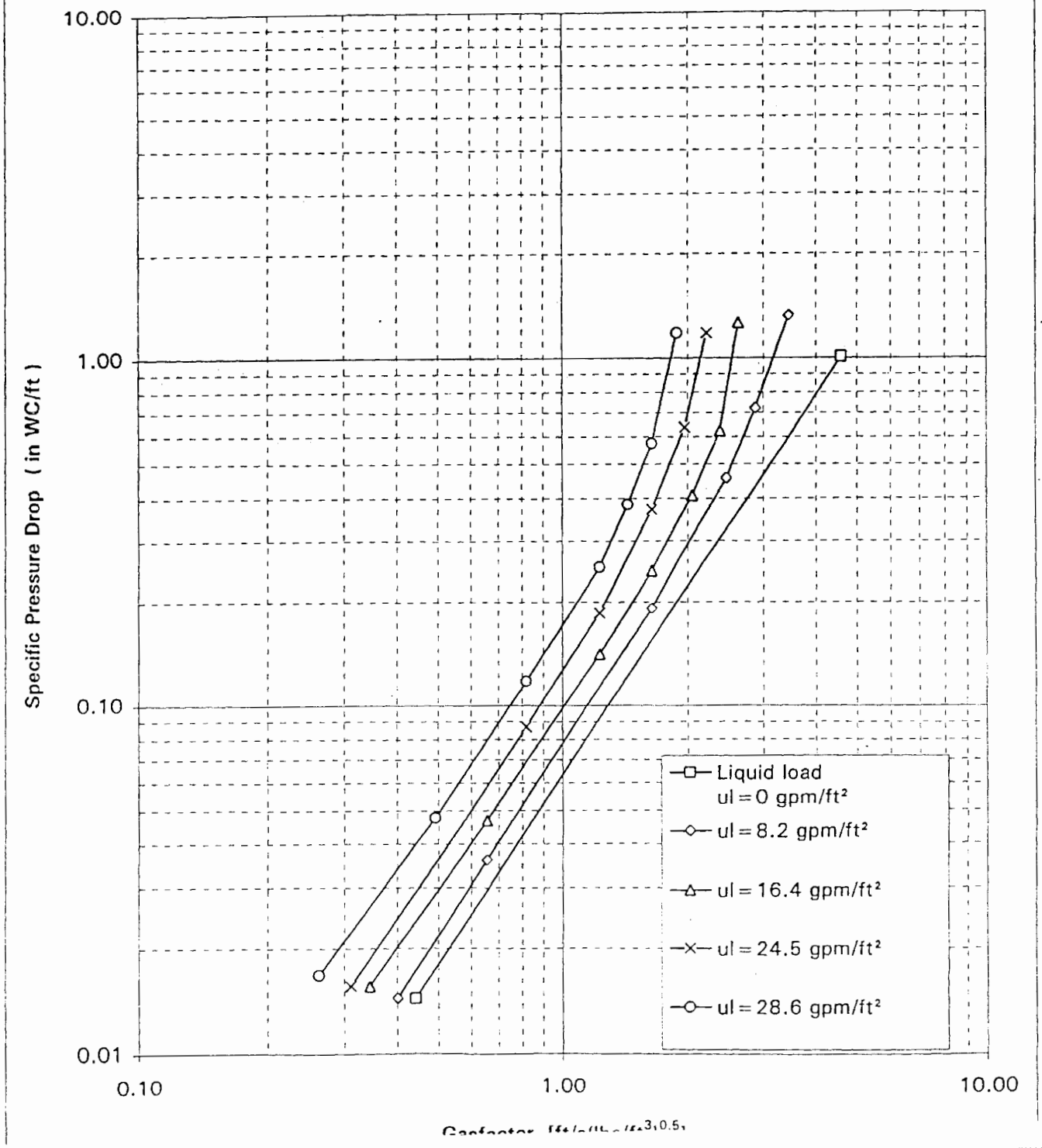
Pressure Drop
2" Hiflow (50-0)
Plastic



Rauschert
Process Technologies

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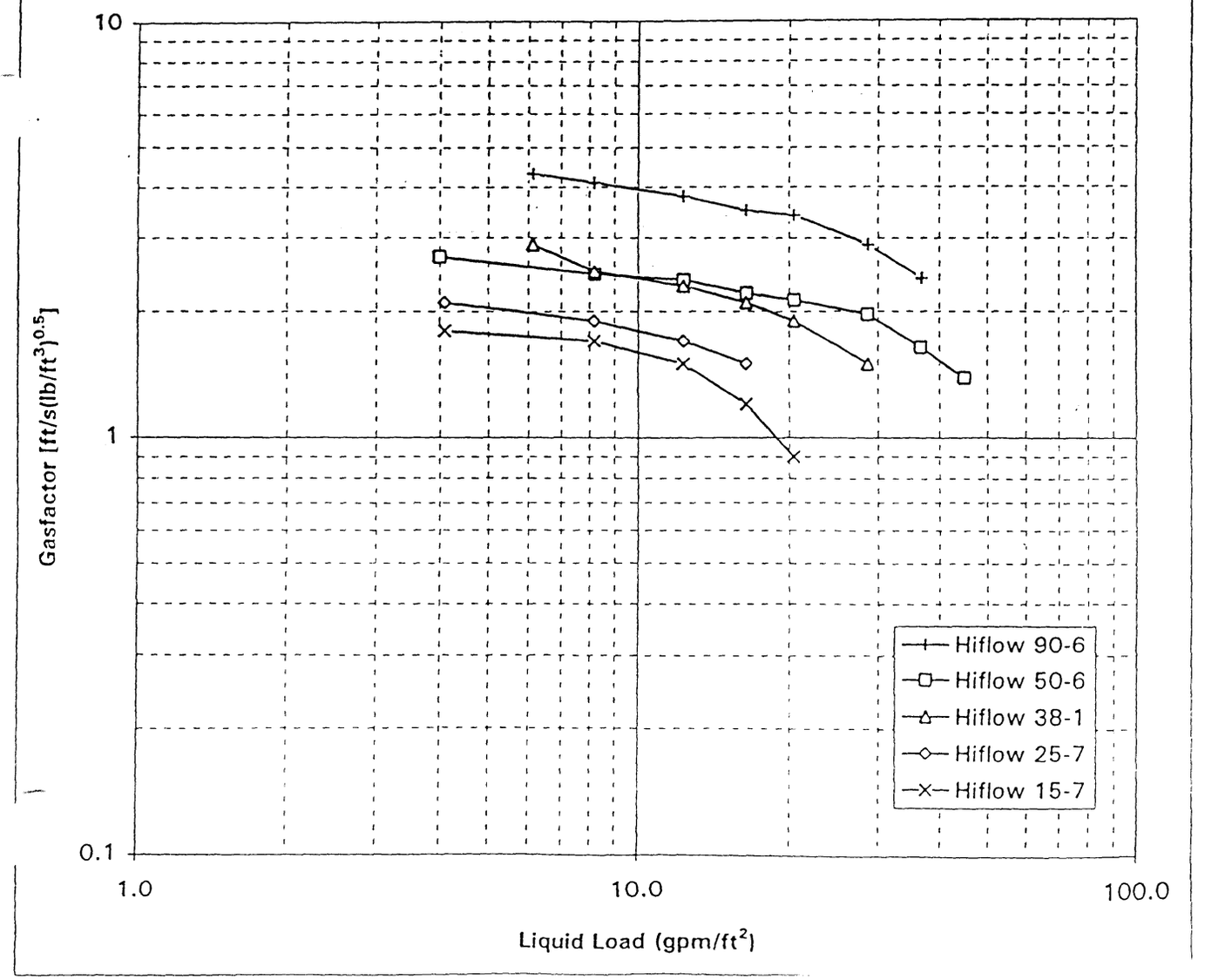
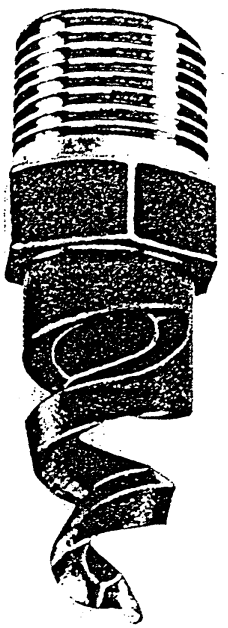
Flooding Curves
Plastic Hiflow®
15-7, 25-7, 38-1, 50-6, and 90-6



SPIRAL

TF

Wide Range of Flows and Angles



60°, 90°, 120° Metal

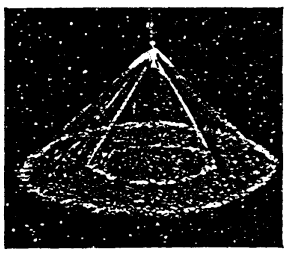
DESIGN FEATURES

- The original spiral nozzle
- High energy efficiency
- One piece/no internal parts
- Clog-resistant performance
- High discharge velocity
- Male connection standard; female connection available by special order

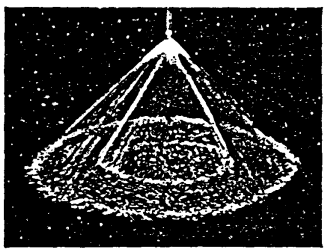
SPRAY CHARACTERISTICS

- Wide range of flow rates and spray angles
- Fine atomization

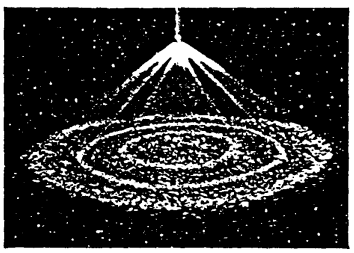
Spray patterns: Full and Hollow Cone
Spray angles: 50° to 180°
Flow rates: .7 to 3350 gpm
(Higher flow rates available)



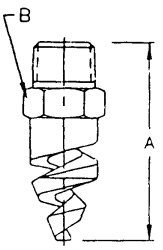
Full Cone 60° (NN)



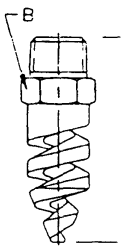
Full Cone 90° (FCN)



Full Cone 150°/170°



60°, 90°, 120°



150°, 170°

TF Full Cone Flow Rates and Dimensions

Full Cone, 60° (NN), 90° (FCN or FFCN), 120° (FC or FFC), 150° and 170° Spray Angles, 1/8" to 4" Pipe Sizes

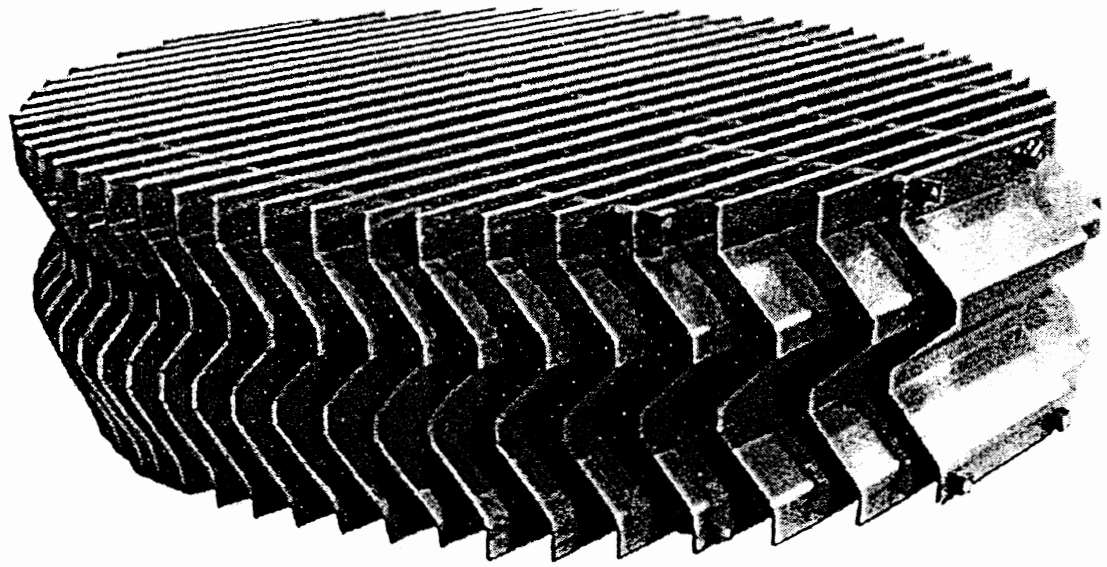
Male Pipe Size	Nozzle Number	Available Spray Angles 60° 90° 120° 150° 170°	K Factor	GALLONS PER MINUTE @ PSI 5 PSI	10 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI	80 PSI	100 PSI	High PSI operation recom. for Metal Only 200 PSI	400 PSI	Approx. (in.) Orif. Dia.	Free Pass. Dia.	Dim. (in.) for Metal Only* A	B	C	Wt. (o. 60° 9(120° Metal P
1/8	TF6	60° 90° 120°	0.221		0.70	0.99	1.21	1.40	1.57	1.71	1.98	2.21	3.13	4.43	0.09	0.09	1.69	0.56		1.00 0
	TF8	60° 90° 120°	0.411		1.30	1.84	2.25	2.60	2.91	3.18	3.68	4.11	5.81	8.22	0.13	0.13				
1/4	TF6	60° 90° 120°	0.221		0.70	0.99	1.21	1.40	1.57	1.71	1.98	2.21	3.13	4.43	0.09	0.09				
	TF8	60° 90° 120°	0.411		1.30	1.84	2.25	2.60	2.91	3.18	3.68	4.11	5.81	8.22	0.13	0.13	1.88	0.56		1.25 0
	TF10	60° 90° 120°	0.632		2.00	2.83	3.46	4.00	4.47	4.90	5.66	6.32	8.94	12.6	0.16	0.13				
3/8	TF6	60°	0.221		0.70	0.99	1.21	1.40	1.57	1.71	1.98	2.21	3.13	4.43	0.09	0.09				
	TF8	60°	0.411		1.30	1.84	2.25	2.60	2.91	3.18	3.68	4.11	5.81	8.22	0.13	0.13				
	TF10	60°	0.632		2.00	2.83	3.46	4.00	4.47	4.90	5.66	6.32	8.94	12.6	0.16	0.13				
	TF12	60° 90° 120° 150° 170°	0.949		3.00	4.24	5.20	6.00	6.71	7.35	8.49	9.49	13.4	19.0	0.19	0.13	1.88	0.69	2.38	1.63 0
	TF14	60° 90° 120° 150° 170°	1.28		4.05	5.73	7.01	8.10	9.06	9.92	11.5	12.8	18.1	25.6	0.22	0.13				
	TF16	60° 90° 120° 150° 170°	1.68		5.30	7.50	9.18	10.6	11.9	13.0	15.0	16.8	23.7	33.5	0.25	0.13				
	TF20	60° 90° 120° 150° 170°	2.61		8.25	11.7	14.3	16.5	18.4	20.2	23.3	26.1	36.9	52.2	0.31	0.13				
1/2	TF24	60° 90° 120° 150° 170°	3.81	8.52	12.1	17.0	20.9	24.1	26.9	29.5	34.1	38.1	53.9	76.2	0.38	0.19	2.50	0.88	3.06	3.00 0
	TF28	60° 90° 120° 150° 170°	5.22	11.7	16.5	23.3	28.6	33.0	36.9	40.4	46.7	52.2	73.8	104	0.44	0.19				
3/4	TF32	60° 90° 120° 150° 170°	6.64	14.8	21.0	29.7	36.4	42.0	47.0	51.4	59.4	66.4	93.9	133	0.50	0.19	2.75	1.13	3.50	5.50 0
1	TF40	60° 90° 120° 150° 170°	10.6	23.7	33.5	47.4	58.0	67.0	74.9	82.1	94.8	106	150	212	0.63	0.25	3.63	1.38	4.38	8.50 2
	TF48	60° 90° 120° 150° 170°	15.0	33.6	47.5	67.2	82.3	95.0	106	116	134	150	212	300	0.75	0.25				
1 1/2	TF56	60° 90° 120° 150° 170°	20.4	45.6	64.5	91.2	112	129	144	156	182	204	288	408	0.88	0.31			5.38	
	TF64	60° 90° 120° 150° 170°	26.7	59.7	84.5	120	146	169	189	207	239	267	378	534	1.00	0.31	4.38	2.00	5.38	22.0 4
	TF72	60° 90° 120° 150° 170°	30.4	67.9	96.0	136	166	192	215	235	272	304	429	607	1.13	0.31			5.63	
2	TF88	90° 120° 150° 170°	44.3	99.0	140	198	242	280	313	343	396	443	626	885	1.38	0.44	5.63	2.50	6.88	46.0 8
	TF96[1]	90° 120° 150° 170°	55.9	125	177	250	306	354	395	433	500	559	791	1120	1.50	0.44	6.94	2.50	7.00	54.0 9
3	TF112[1]	90° 120°	81.0	181	256	362	443	512	572	627	724	810	1150	1620	1.75	0.56	8.63	3.50		114 2
	TF128[1]	90° 120°	107	239	339	480	588	679	759	831	960	1070	1510	2150	2.00	0.56				
4	TF160[1]	90° 120°	166	371	525	742	909	1050	1170	1290	1480	1660	2350	3320	2.50	0.63	10.1	4.50		169 2

Flow Rate (GPM) = $K\sqrt{PSI}$ *Dimensions are for bar stock, cast sizes may vary [1] Three turn nozzles

Standard Materials: Brass, 316 Stainless Steel, PVC, Polypropylene and Teflon® (Poly. not available for TF6 &TF8) See chart on page 17 for complete list

TO ORDER, specify pipe size, connection type, nozzle number, spray angle, and material.

AIROL™ CHEVRON MIST ELIMINATORS



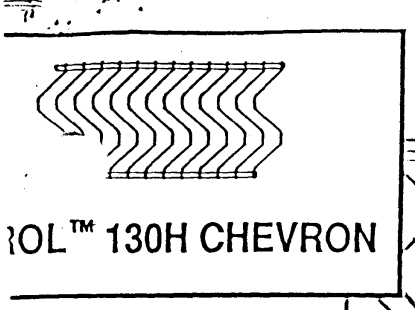
COASTAL TECHNOLOGIES, INC.

SCALE	1/2" = 1'-0"	APPROVED BY	DRAWN BY
DATE	10-2-91		MKR

FOR ALL LIQUID/GAS SEPARATION

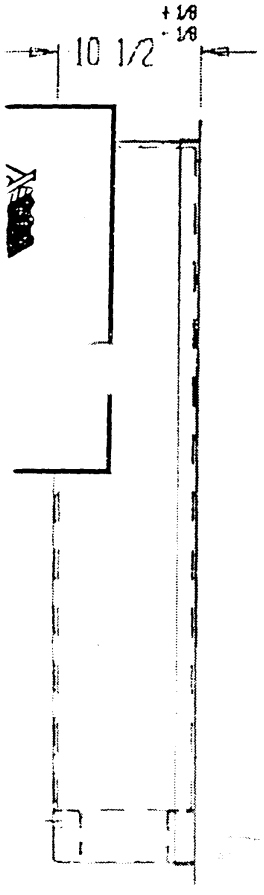
AIROL™ VERTICAL AND HORIZONTAL FLOW MIST ELIMINATORS

DRAWING No.

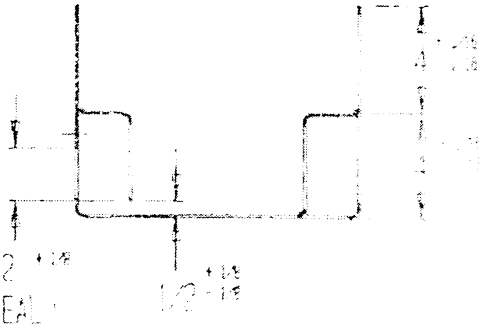


ROL™ 130H CHEVRON

SECTION "A-A"



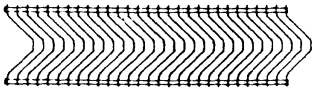
DE ELEVATION



NOTES:

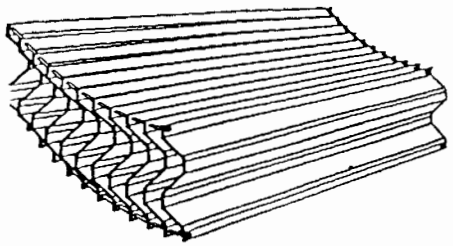
NOTES

1. Coastal Technologies manufactures ten AIROL™ chevron mist eliminator profiles in stainless alloys, F.R.P. and thermoplastics.
2. Coastal Technologies provides their AIROL™ chevron profiles in custom designed and manufactured mist eliminator systems including flange-to-flange housings, support beams, spray systems and other ancillary equipment.
3. The AIROL™ Chevron Mist Eliminator captures liquid droplets through centrifugal separation and impaction of droplets on the surfaces of each of its passes. Liquid drainage is facilitated through the use of a positive disengaging corner (versus smooth radiused corners of many conventional designs which allow creeping of droplets further along the profile) and a long leading edge.

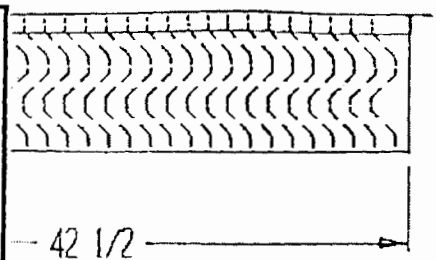


AIROL™ 120H CHEVRON

COASTAL TECHNOLOGIES, INC.



AIROL™ 130H RADIAL



1 1/2 x 1 1/2 x 1/8 MIN.
THICKNESS ANGLE, TYP.

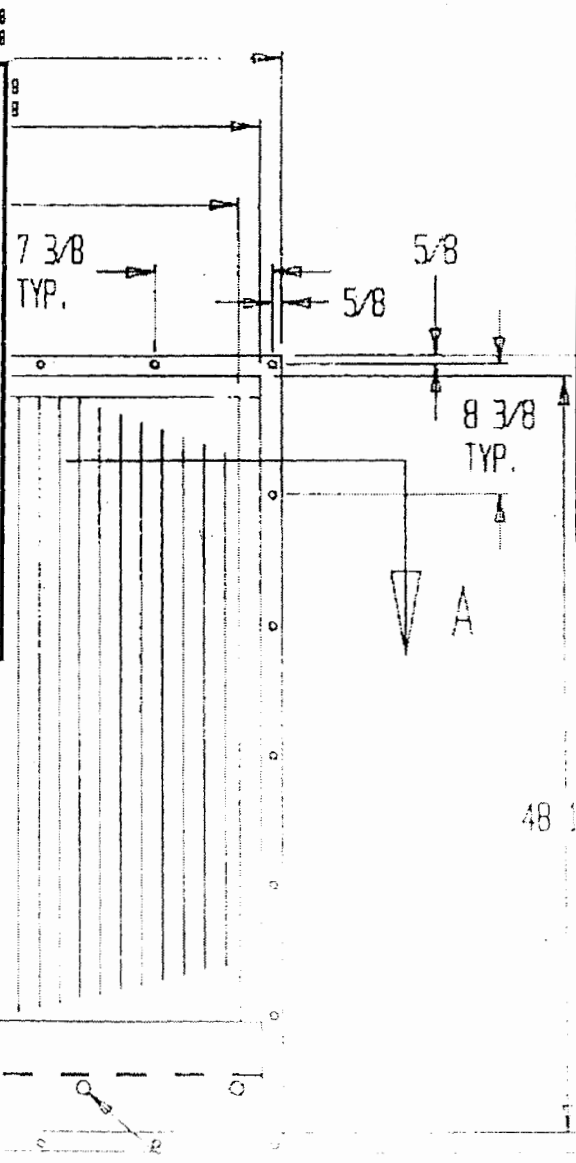
PLAN VIEW

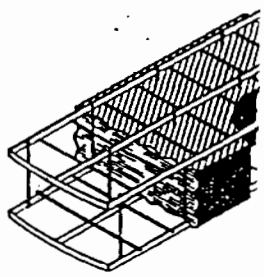
APPLICATIONS

1. Wet Scrubbing
   - FGD Scrubbers
   - Hazardous Waste Incineration
   - Primary Metals Furnace Scrubber

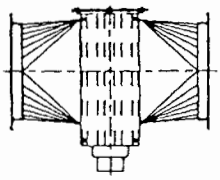
2. Heat Exchange/Energy Recovery
   - Evaporation Systems
   - Concentrators
   - Dryers

3. Gas Washers
   - In-Line Separators
   - Air Wash Systems

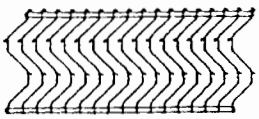




C.T.I. ME



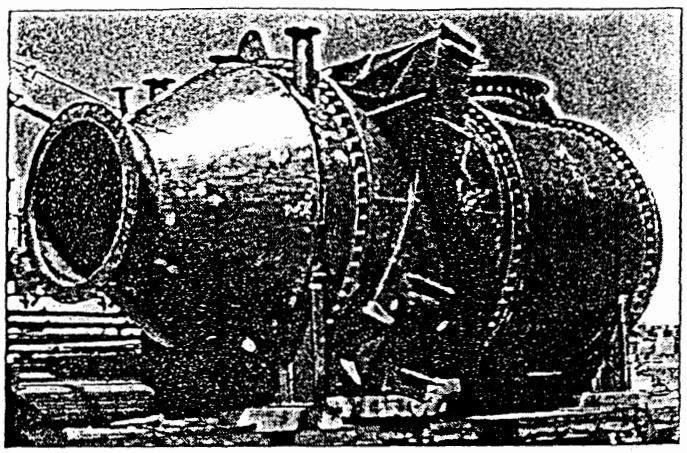
AIROL™ 430H HOUSING

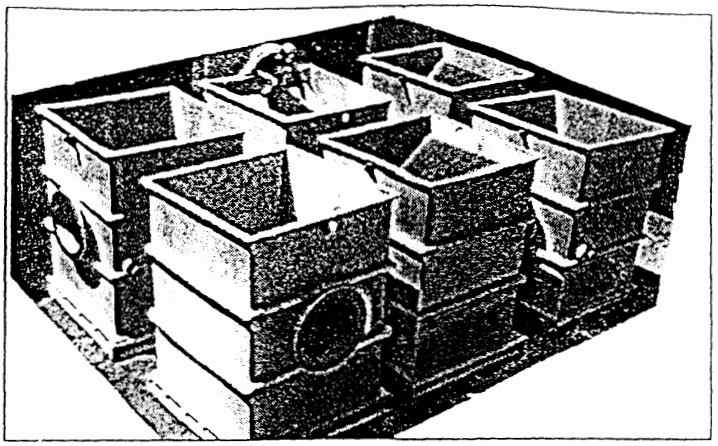


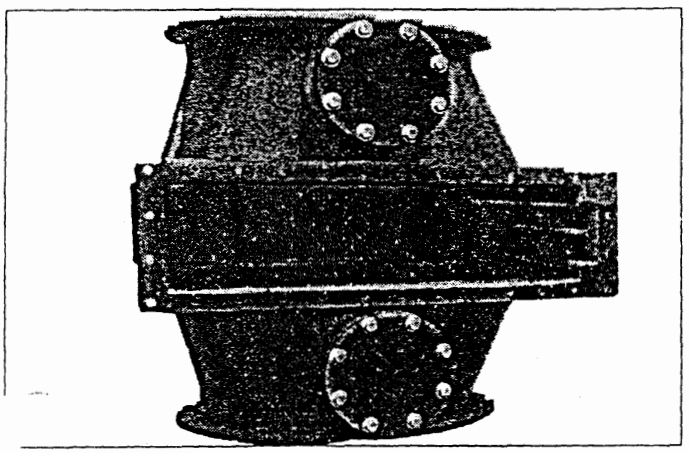
AIROL™ 430H CHEVRON

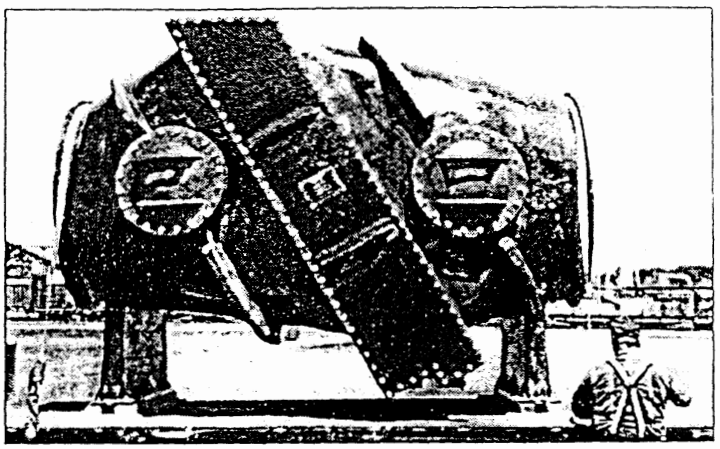
ON

DRAINAGE HOLES
TYP.









CLIENT LIST

COASTAL TECHNOLOGIES, INC.

SCALE: 1/8" = 1'-0"	APPROVED BY:	DRAWN BY: MJR
DATE: 10-2-91		

P.O. BOX 624 HAMPTON, S.C. 29924
803-943-4822 FAX 803-943-4744

MIST ELIMINATORS

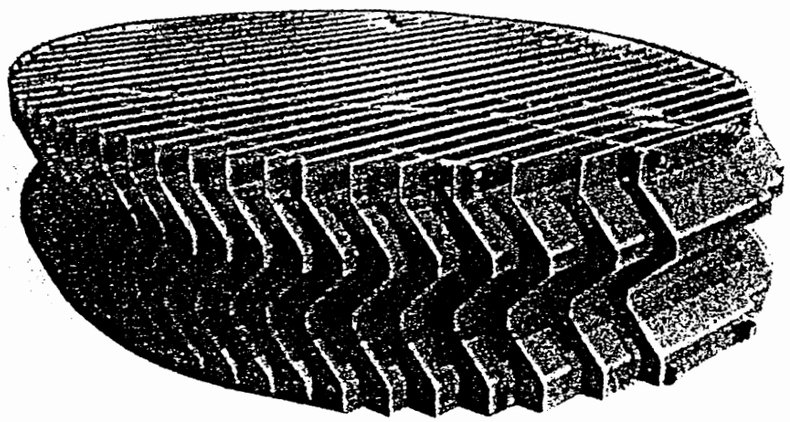
AIROL™

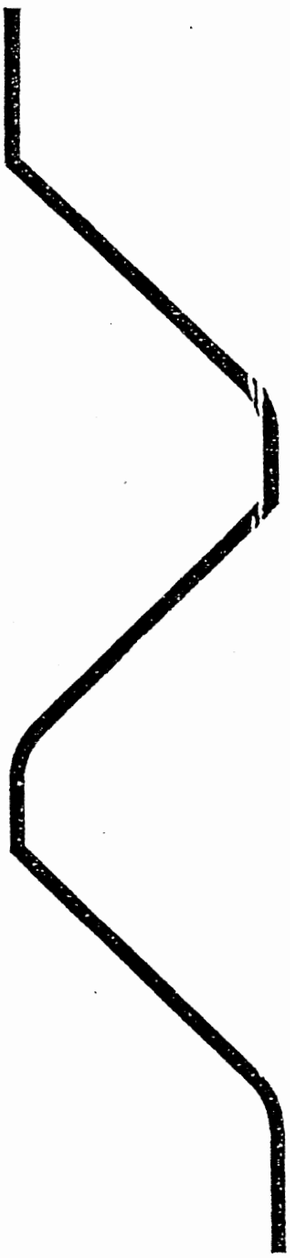
130H FGD CHEVRON MIST ELIMINATOR

The AIROL™ 130H FGD chevron was developed specifically for use in potentially fouling Lime and Limestone slurry FGD scrubbers. The essentially open assembly using rods and spacers combined with uniquely designed corners to eliminate dead spots and the absence of collection hooks or grooves make this chevron profile highly resistant to plugging and readily accessible to automatic and manual wash sprays.

The AIROL™ 130H FGD chevron captures liquid droplets through centrifugal separation and impaction of droplets on the surfaces of each of its 3 passes. Liquid drainage is facilitated through the use of a positive disengaging corner (versus smooth radiused corners of many conventional designs which allows creeping of droplets further along the profile) and a long leading edge.

The AIROL™ 130H FGD utilizes a rounded corner following the disengaging corner to reduce turbulence and pressure drop thereby increasing throughput capacity and efficiency.





MECHANICAL SPECIFICATIONS:

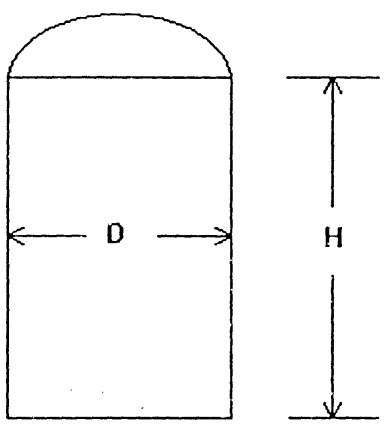
Blade Profile height: 10.63"
Profile Depth (draw): 2.25"
Blade Spacing: 1.25" – 2.25"
Materials of Construction: FRP, Polypropylene and Alloy
Blade Material Thickness: FRP and Polypropylene: 0.13" nominal
Alloy: 16 and 20 gauge
Module Sizes: Designed to suit existing or planned beam spacing

oastal Technologies, Inc.

P. O. Box 624 · Hampton, S. C. 29924
209 Rentz Street · Varnville, S. C. 29944

Phone: (803) 943-4822
Fax.: (803) 943-4744

INDUSCO ENVIROMENTAL SERVICES INC. FOR:
WESTERN SUMMITT, INC.
RM CLAYTON WATER RECLAMATION CENTER EXPANSION, ATLANTA GA.
DESIGN CALCULATIONS



I. 12' DIA. VERTICAL COUNTER CURRENT PACKED TOWER SCRUBBER #1 & #2

DESIGN CONDITIONS

D := 12	FT	VESSEL INSIDE DIAMETER
H := 22.75	FT	VESSEL HEIGHT
Ll := 4.875	FT	MAXIMUM LIQUID LEVEL
SG := 1.20		SPECIFIC GRAVITY
Pe := 0.54	PSI	EXTERNAL PRESSURE
Pl := 0.208	PSI	LIVE LOAD

WIND LOAD 80 MPH

SEISMIC ZONE 2

NOTE: FLAT BOTTOM IS NOT DESIGNED FOR EXTERNAL PRESSURE. A MINIMUM OF 15" OF FLUID SHOULD BE IN THE VESSELS AT ANY TIME VACUUM CONDITIONS EXIST.

GEORGIA REGISTERED No. 24424 Professional ENGINEER Alfred L. Newberry
3/23/00

A. SHELL CALCULATIONS

PHYSICAL PROPERTIES

$t := 0.50$ IN

$tcb := 0.10$ IN

$tfw := 0.40$ IN

$Ehcb := 0.90 \cdot 10^6$ PSI

$Eacb := 0.90 \cdot 10^6$ PSI

$Ehfw := 3.40 \cdot 10^6$ PSI

$Eafw := 1.0 \cdot 10^6$ PSI

$$Eh := \frac{tcb}{t} \cdot Ehcb + \frac{tfw}{t} \cdot Ehfw \qquad Eh = 2.9 \times 10^6 \text{ PSI}$$

$$Ea := \frac{tcb}{t} \cdot Eacb + \frac{tfw}{t} \cdot Eafw \qquad Ea = 9.8 \times 10^5 \text{ PSI}$$

1. INTERNAL PRESSURE HYDROSTATIC HEAD

$$treqd := \frac{((0.036 \cdot SG \cdot 12 \cdot LI)) \cdot 12 \cdot D}{2 \cdot Eh \cdot 0.001} \qquad treqd = 0.063 \text{ IN OK}$$

2. EXTERNAL PRESSURE

$Dol := 12 \cdot D + 2 \cdot t$ $\quad Dol = 145$ IN OUTSIDE DIAMETER

$L := 91$ IN LENGTH BETWEEN STIFFENERS

$F := 5$ SAFETY FACTOR

$$Pa := \frac{\frac{2.6 \cdot Ea}{F} \cdot \left(\frac{t}{Dol}\right)^{2.5}}{\left(\frac{L}{Dol}\right) - 0.45 \cdot \left(\frac{t}{Dol}\right)^{0.5}} \qquad Pa = 0.592 \text{ PSI} > Pe \text{ OK}$$

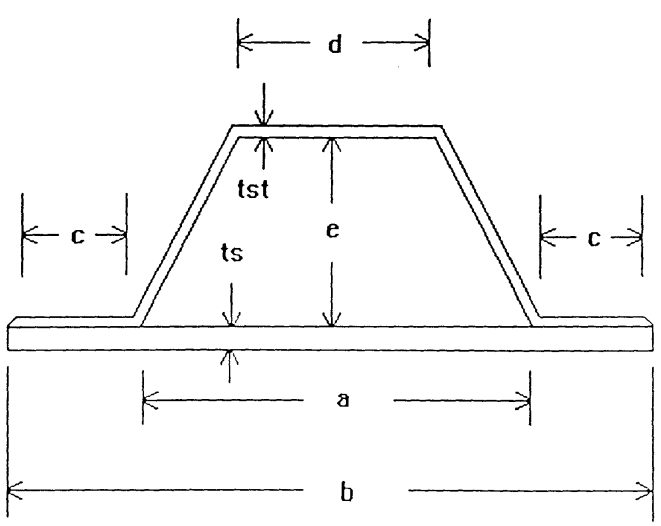
MOMENT OF INERTIA REQUIRED

$Eh := 1.5 \cdot 10^6$ PSI HOOP TENSILE MODULAS OF STIFFENER OVERLAY

$$Ireqd := \frac{Pe \cdot L \cdot Dol^3 \cdot F}{24 \cdot Eh} \qquad Ireqd = 20.807 \qquad IN^4$$

USE 4" X 4" X 1" TRAPAZOIDAL STIFFENER W/ 5/16" OVERLAY

TRAPAZOIDAL STIFFENER



$a := 4$ IN

$ts := 0.50$ IN

$b := 12$ IN

$c := 3.75$ IN

$d := 1$ IN

$e := 4$ IN

$tst := 0.375$ IN

$A1 := b \cdot ts$ $A1 = 6$ IN^2

$A2 := 2 \cdot c \cdot tst$ $A2 = 2.813$ IN^2

$A3 := 2 \cdot e \cdot tst$ $A3 = 3$ IN^2

$A4 := d \cdot tst$ $A4 = 0.375$ IN^2

$At := A1 + A2 + A3 + A4$ $At = 12.188$ IN^2

$y1 := \frac{ts}{2}$ $y1 = 0.25$ IN

$y2 := ts + \frac{tst}{2}$ $y2 = 0.688$ IN

$y3 := ts + \frac{e}{2}$ $y3 = 2.5$ IN

$y4 := ts + e + \frac{tst}{2}$ $y4 = 4.688$ IN

$I1 := \frac{1}{12} \cdot b \cdot ts^3$ $I1 = 0.125$ IN^4

$I2 := \frac{1}{12} \cdot c \cdot tst^3$ $I2 = 0.016$ IN^4

$I3 := \frac{1}{12} \cdot tst \cdot e^3$ $I3 = 2$ IN^4

$I4 := \frac{1}{12} \cdot d \cdot tst^3$ $I3 = 2$ IN^4

$ycl := \frac{A1 \cdot y1 + A2 \cdot y2 + A3 \cdot y3 + A4 \cdot y4}{At}$ $ycl = 1.041$ IN

$It := I1 + A1 \cdot (ycl - y1)^2 + \left[I2 + A2 \cdot (ycl - y1)^2 \right] \cdot 2 + \left[I3 + A3 \cdot (ycl - y3)^2 \right] \cdot 2 + I4 + A4 \cdot (ycl - y4)^2$

$It = 29.194$

3. WIND LOAD

$Pw := 17$ PSF WIND PRESSURE

$Cq := 0.8$ SHAPE FACTOR

$Ce := 1.2$ COMBINED GUST, HEIGHT, & EXPOSURE FACTOR

$Do := D + \frac{2 \cdot t}{12}$ $Do = 12.083$ FT OUTSIDE DIAMETER

$A_{dish} := 0.15 \cdot D^2$ $A_{dish} = 21.6$ ft^2

$V := Pw \cdot Cq \cdot Ce \cdot \left(Do \cdot H + A_{dish} \right)$ $V = 4.839 \times 10^3$ LBS

$Mw := V \cdot \left(\frac{H}{2} \right)$ $Mw = 5.504 \times 10^4$ FT-LBS

$\sigma w := \frac{12 \cdot Mw}{\pi \cdot \left(\frac{D \cdot 12}{2} \right)^2 \cdot t}$ $\sigma w = 81.112$ PSI OK

3. SEISMIC LOAD : ZONE 2A PER UBC 97

Importance Factor $Imp := 1.0$ Seismic Coefficient from Table 16Q $C_a := 0.19$

Horizontal Force Factor $R := 2.2$

Calculate the Seismic Shear & Moments

$W_{sh} := 3900$ $W_{th} := 450$ $W_{pack} := 21000$ $W_{liq} := 41000$ $CG_{pack} := 15.0$

$$V_s := \frac{3.0 \cdot Imp \cdot C_a}{R} \cdot \left(W_{sh} + W_{th} + W_{pack} + W_{liq}\right) \qquad V_s = 1.719 \times 10^4$$

$$M_s := \frac{3.0 \cdot Imp \cdot C_a}{R} \cdot \left(W_{sh} \cdot \frac{H}{2} + W_{th} \cdot H + W_{pack} \cdot CG_{pack} + W_{liq} \cdot \frac{LI}{2}\right) \qquad M_s = 1.217 \times 10^5$$

$$\sigma s := \frac{12 \cdot M_s}{\pi \cdot \left(\frac{D \cdot 12}{2}\right)^2 \cdot t} \qquad \sigma s = 179.275 \quad \text{PSI} \quad \text{OK}$$

4. CRITICAL BUCKLING

$$R := \frac{D \cdot 12}{2} \qquad R = 72 \quad \text{IN}$$

$$\sigma c := \frac{1.4 + 0.16 \cdot \ln\left(\frac{R}{t}\right)}{12 \cdot D} \cdot Ea \cdot t \qquad \sigma c = 7.47 \times 10^3 \quad \text{PSI}$$

$$\sigma max := if\left(\sigma s > \sigma w, \sigma s, \sigma w\right)$$

$$SF := \frac{\sigma c}{\sigma max} \qquad SF = 41.666 \quad > 5 \text{ TO } 1 \quad \text{OK}$$

B. DOME TOP CALCULATIONS

1. MAN LOAD - 250# ON A 16 SQ IN AREA

FROM ROARK AND YOUNG FORMULAS FOR STRESS AND STRAIN 5TH EDITION TABLE 31 CASE 2 PAGE 476.

$r := 2.25$	IN	RADIUS ON WHICH LOAD IS APPLIED
$\nu := 0.3$		POISSONS RATIO
$t := 0.375$	IN	DOME TOP THICKNESS
$W := 250$	LBS	MAN LOAD
$Rh := 138$	IN	DISH RADIUS OF DOME TOP
$E := 1.50 \cdot 10^6$	PSI	MODULAS OF ELASTICITY
$Su := 15000$	PSI	ULTIMATE TENSILE STRESS
$F := 5$		SAFETY FACTOR

$$Sa := \frac{Su}{F} \qquad Sa = 3 \times 10^3 \quad \text{PSI} \quad \text{ALLOWABLE TENSILE STRESS}$$

$$\mu := r \cdot \left[\frac{12 \cdot \left(1 - \nu^2\right)}{Rh^2 \cdot t^2} \right]^{0.25} \qquad \mu = 0.569$$

$i := 1 .. 7$

SOLVE FOR "A"

$vx_i := 0.2 \cdot i$

$vy_i := rnd(1)$

$vx_i :=$	$vy_i :=$
0.2	0.425
0.4	0.408
0.6	0.386
0.8	0.362
1.0	0.337
1.2	0.311
1.4	0.286

$A := linterp(vx, vy, \mu) \qquad A = 0.389$

SOLVE FOR "B"

$vx_i := 0.2 \cdot i$

$vx_i :=$

0.2
0.4
0.6
0.8
1.0
1.2
1.4

$vy_i :=$

0.212
0.204
0.193
0.181
0.168
0.155
0.143

$vy_i := rnd(1)$

$B := linterp(vx, vy, \mu)$ $B = 0.195$

SOLVE FOR "C"

$vx_i := 0.2 \cdot i$

$vx_i :=$

0.2
0.4
0.6
0.8
1.0
1.2
1.4

$vy_i :=$

1.064
0.739
0.554
0.429
0.337
0.266
0.211

$vy_i := rnd(1)$

$C := linterp(vx, vy, \mu)$ $C = 0.583$

$$y := -A \cdot \frac{W \cdot Rh \cdot \sqrt{(1 - \nu^2)}}{E \cdot t^2}$$ $y = -0.061$ IN DEF. < 1/2% OF SPAN OK

$$\sigma m := -B \cdot \frac{W \cdot \sqrt{(1 - \nu^2)}}{t^2}$$ $\sigma m = -330.239$ PSI MEMBRANE STESS OK

$$\sigma b := -C \cdot \frac{W \cdot (1 + \nu)}{t^2}$$ $\sigma b = -1.348 \times 10^3$ PSI BENDING STRESS OK

2. EXTERNAL PRESSURE

$F := 5$

$Pa := 0.36 \cdot \frac{E}{F} \cdot \left(\frac{t}{Rh}\right)^2$ $Pa = 0.797$ PSI > Pe OK

3. LIVE LOAD

$F := 5$

$Pa := 0.36 \cdot \frac{E}{F} \cdot \left(\frac{t}{Rh}\right)^2$ $Pa = 0.797$ PSI > Pl OK

C. ANCHOR BOLT DESIGN

$N := 6$ NUMBER OF LUGS

$W := W_{sh} + W_{th} + W_{pack}$ $W = 2.535 \times 10^4$ LBS WEIGHT

$d := 154$ IN ANCHOR BOLT CIRCLE

$Sa := 15000$ PSI ALLOWABLE TENSILE STRESS FOR ANCHOR BOLT

$Mmax := if(Mw > M_s, Mw, M_s)$

$Fl := \frac{4 \cdot 12 \cdot Mmax}{d \cdot N} - \frac{W}{N}$ $Fl = 2.095 \times 10^3$ LBS/LUG

$Ab := \frac{Fl}{Sa}$ $Ab = 0.14$ IN^2

3/4" ANCHOR BOLT HAS A ROOT AREA OF 0.302 IN^2 OK

D. HOLD DOWN LUG OVERLAY

$h := 12$	IN	OVERALL HEIGHT OF LUG
$h1 := 11.5$	IN	HEIGHT OF LUG ABOVE LEG
$w := 6$	IN	WIDTH OF LUG
$tov := 0.375$	IN	OVERLAY THICKNESS
$e := 1.0$	IN	ECCENTRICITY
$Rm := 72.875$	IN	MEAN RADIUS OF OVERWIND
$tk := 0.875$	IN	KNUCKLE THICKNESS

$Wmax := \frac{3 \cdot Fl \cdot e}{h^2}$ $Wmax = 43.638$ lb/in

$P := \frac{Wmax \cdot h}{2}$ $P = 261.829$ lb

$Per := 2 \cdot h1 + w$ $Per = 29$ in

$TPI := \frac{P}{Per}$ $TPI = 9.029$ lb/in < 50 lb/in OK

$T := \frac{P \cdot Rm}{w}$ $T = 3.18 \times 10^3$ lb

HOOP OVERWIND TENSILE STESS

$\sigma h := \frac{T}{h1 \cdot tov}$ $\sigma h = 737.421$ psi < 3900 OK

SHEAR ACROSS VESSEL WALL

$\tau w := \frac{P}{tk \cdot w}$ $\tau w = 49.872$ psi < 1500 OK

$$\beta := \frac{1.28}{(Rm \cdot tk)^{0.5}} \qquad \beta = 0.16$$

$$p := \frac{P}{w} \qquad p = 43.638 \quad lb/in$$

$$Max := \frac{p}{4 \cdot \beta} \qquad Max = 68.06 \quad in\text{-}lb/in$$

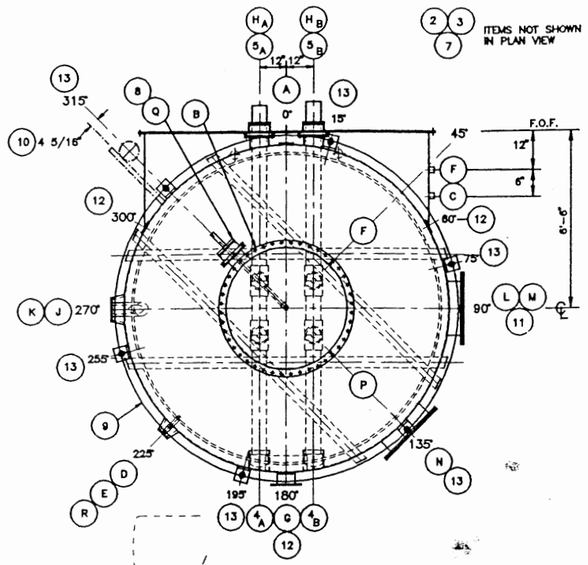
$\upsilon := 0.3$ POISSON'S RATIO

$$Mhp := \upsilon \cdot Max \qquad Mhp = 20.418 \quad in\text{-}lb/in$$

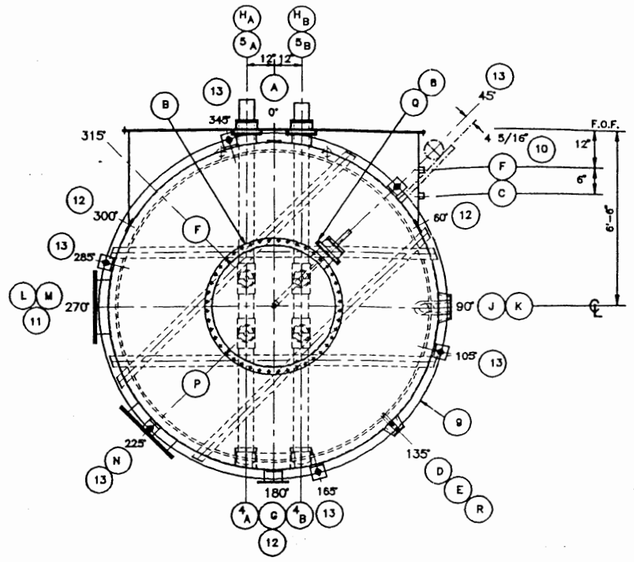
$$\sigma ax := \frac{6 \cdot Max}{tk^2} \qquad \sigma ax = 533.365 \quad psi \quad < 3900\ psi \quad OK$$

$$\sigma hp := \frac{6 \cdot Mhp}{tk^2} + 0.036 \cdot SG \cdot 12 \cdot Ll \cdot \frac{D \cdot 12}{2} \qquad \sigma hp = 342 \quad psi \quad < 3900\ psi \quad OK$$

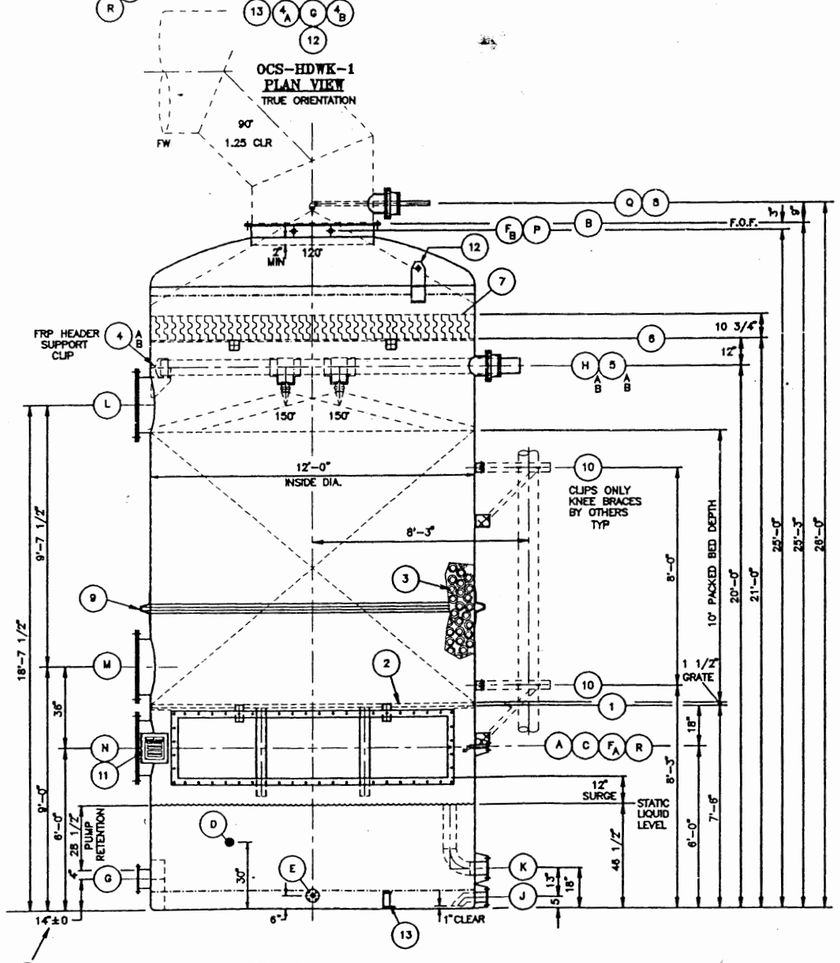
G



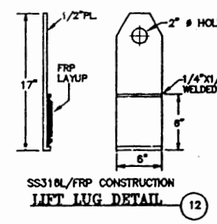
OCS-HDWK-1
PLAN VIEW
TRUE ORIENTATION



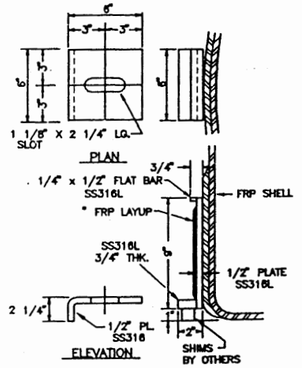
OCS-HDWK-2
PLAN VIEW
TRUE ORIENTATION



SIDE ELEVATION
SEE PLAN VIEW FOR TRUE ORIENTATION



SS316L/FRP CONSTRUCTION
LIFT LUG DETAIL (12)



SS316L & FRP CONSTRUCTION
HOLD DOWN W/DOG CLIP (13)

NOTE : THIS DETAIL IS NOT TO BE USED FOR DETERMINING EXACT ANCHOR BOLT CIRCLE. IT IS SUGGESTED, FIELD DRILLED CONCRETE PAD AND EPOXY ANCHORS BE INSTALLED. (BY OTHERS) SHIM UNDER HOLD DOWN LUGS, BEFORE ANCHORING.

	ITEM	QTY.	DESCRIPTION	SIZE & TYPE	DIAMETER FLANGE	THICKNESS FLANGE	DIAMETER BOLT CIRCLE	NUMBER BOLTS	DIAMETER HOLES	DIAMETER BOLT
SEE DWG IE20119-12	A	1	AIR INLET W/(2) SUPPORT POST	27"x120" RECT	33"x126"	5/8	30.5"x123.5"	52	5/8	1/2
SEE DWG IE20119-12	B	1	AIR OUTLET	54 DUCT	60 3/8	5/8	58	44	5/8	1/2
SEE DWG IE20119-12	C	1	AIR SAMPLE CONNECTION	3/4" FNPT FRP ENCAPSULATED CPVC FULL COUPLING						
SEE DWG IE20119-12	D	1	ACID WASH FEED	3/4 150LB	3 7/8	1/2	2 3/4	4	5/8	1/2
SEE DWG IE20119-12	E	1	LEVEL LEVEL CONNECTION	2 150LB	6	1/2	4 3/4	4	3/4	5/8
SEE DWG IE20119-12	F A B	2	DIFFERENTIAL PRESSURE	3/4" FNPT FRP ENCAPSULATED CPVC FULL COUPLING						
SEE DWG IE20119-12	G	1	PUMP SUCTION W/VORTEX BREAKER	8 150LB	13 1/2	3/4	11 3/4	8	7/8	3/4
SEE DWG IE20119-11 & 13	H A B	2	RECIRC. LIQUID INLET	8 150LB	13 1/2	3/4	11 3/4	8	7/8	3/4
SEE DWG IE20119-12	J	1	SIPHON DRAIN	4 150LB	9	9/16	7 1/2	8	3/4	5/8
SEE DWG IE20119-12	K	1	OVERFLOW W/INTERIOR O.F. TUBE	8 150LB	11	5/8	9 1/2	8	7/8	3/4
SEE DWG IE20119-12	L	1	UPPER MANWAY W/CLEAR PVC COVER	24 SPECIAL	32	3/4	29 1/2	20	5/8	1/2
SEE DWG IE20119-12	M	1	MID MANWAY W/CLEAR PVC COVER	24 SPECIAL	32	3/4	29 1/2	20	5/8	1/2
SEE DWG IE20119-12	N	1	SUMP MANWAY W/CLEAR PVC COVER	24 SPECIAL	32	3/4	29 1/2	20	5/8	1/2
SEE DWG IE20119-12	P	1	AIR SAMPLE CONNECTION	3/4" FNPT FRP ENCAPSULATED CPVC FULL COUPLING						
SEE DWG IE20119-12 & 15	Q	1	DEMISTER CLEANING NOZZLE	8 150LB	13 1/2	3/4	11 3/4	8	7/8	3/4
SEE DWG IE20119-12	R	1	FILL W/DOWNWARD 90° ELBOW	1 1/2 150LB	5	1/2	3 7/8	4	5/8	1/2
SEE DWG IE20119-11	1	1	PACKING SUPPORT RING: 3" WIDE x 1" THK. FRP W/ TWO CENTER SUPPORT BEAM 4" x 8" x 7/16" THK FRP							
(1) SEE DWG IE20119-11	2	1	PACKING SUPPORT PLATE: XCR GRATE 1 1/2" x 1 1/2" x 1 1/2" SECTIONALIZED 143" O.D.							
(1)	3	1130 ft³	PACKING MEDIA: RAUSCHERT 2" HI-FLOW, POLYETHYLENE							
SEE DWG IE20119-13	4 A B	2	LIQUID DISTRIBUTOR HEADER SUPPORT: FRP PIPE CLIP							
(1) SEE DWG IE20119-13	5 A B	2	LIQUID DISTRIBUTOR: LANCE TYPE, 8" SCH 80 CPVC W/(4 TOTAL) SPRIAL SPRAY NOZZLES, BETE TF-112 x 150°FC, 3" MNPT, TEFLON							
SEE DWG IE20119-11	6	1	DEMISTER SUPPORT: RING 4" WIDE x 5/8" THK.FRP W/TWO CENTER SUPPORT BEAMS 6" x 4" x 3/8" THK.FRP.							
(1) SEE DWG IE20119-15	7	1	DEMISTER: CHEVRON TYPE, POLYPROPYLENE, AIROL #130H150 W/TOP & BOTTOM RODS & SPACERS							
(1) SEE DWG IE20119-14	8	1	DEMISTER WASH: LANCE TYPE, 2" SCH 80 CPVC, W/(1) SPRAY NOZZLE, BETE TF-72 x 120°FC, 1 1/2" MNPT, TEFLON							
SEE DWG IE20119-12	9	1	FRP STIFFENER RIBB							
(1) SEE DWG IE20119-16	10	4	FRP PIPE SUPPORT CLIPS (KNEE BRACES BY OTHERS)							
SEE DWG IE20119-12	11	1	FRP BRACKET W/ INDUSCO NAMEPLATE							
	12	3	LIFT-LUGS: 316L SST							
(1)	13	6	HOLD-DOWN W/ DOG CLIP 316L SST							

NOTES:
(1) = FIELD INSTALLED ITEM

FRP FABRICATION NOTES & COMMENTS

1. NOZZLES ARE FRP "FLANGE ON PIPE" TYPE PER NBS PS 15-69 STANDARD WITH 150 LB. ANSI B16.5 CLASS DRILLING AND 50 PSI RATING. UNLESS NOTED.
2. NOZZLE RADIAL ORIENTATIONS ARE LOCATED IN PLAN VIEW ONLY.
3. FLANGE BOLT HOLES TO STRADDLE VESSEL NATURAL CENTERLINES.
4. FLANGES TO BE FULL FACE & BACKED FACED FOR SAE WASHERS.
5. PLATE TYPE GUSSETS ARE REQUIRED ON NOZZLES 8" AND UNDER.
6. EXTERIOR NOZZLE F.O.F. PROJECTIONS TO BE 6" FROM INTERIOR WALL WITH MINIMUM 2" INTERIOR PROJECTION, UNLESS NOTED ON SHOP DRAWINGS.
7. PROTECT NOZZLE FLANGES WITH PLYWOOD COVERS DURING TRANSIT AND STORAGE.
8. DIMENSIONS ARE MEASURED FROM SUPPORT LINE OF SCRUBBER UNIT.
9. EXTERIOR (DRY TO PROCESS) METAL HARDWARE SHALL BE 316L STAINLESS STEEL. INTERIOR (WET TO PROCESS) METAL HARDWARE SHALL BE HASTALLOY C
10. GASKETS SHALL BE 1/8" THK. FULL FACE, 40-50 DUROMETER HYPALON
12. STRUCTURAL SCRUBBER DESIGN HEREIN IS BASED UPON A FREESTANDING SCRUBBER SYSTEM WITH NO SURCHARGE LOADING FROM ADJACENT STRUCTURES, EQUIPMENT AND/OR DUCT SYSTEMS. SCRUBBER BOTTOM MUST BE FULLY SUPPORTED AND PAD MUST REMAIN LEVEL WITHIN 1/8" OVER A TEN FOOT SPAN.
13. ALL INSTALLATION HARDWARE, SUPPORTS, BOLTS, GASKETS, PIPING, WIRING, SUPPLIED BY OTHERS UNLESS OTHERWISE SPECIFIED.

NAMEPLATE / DESIGN DATA

PROJECT NUMBER: IE20119
CUSTOMER/COMPANY: PROCUREMENT SOLUTIONS, INC.
LOCATION: LAWRENCEVILLE, GA.
PURCHASE ORDER: PS 00316
OWNER: CITY OF ATLANTA, COA PROJECT No.: FC-6893-97
ENGINEER/ARCHITECT: CAMP DRESSER & McKEE INC./HARRINGTON, GEORGE & DUNN, P.C., JOINT VENTURE
PROJECT: RM CLAYTON WATER RECLAMATION CENTER EXPANSION PHASE III
PROJECT No.: PSI No.: 41189 WS/PC No.: 11317
SPEC.SECTION: 11256-10
EQUIPMENT NAME: VERTICAL COUNTER CURRENT PACKED TOWER SCRUBBERS
EQUIPMENT NUMBERS: OCS-HDWK-1 & OCS-HDWK-2
LOCATION: OUTSIDE
ELEVATION: +777.0 Ft MSL
LOCATION TEMP: 50-105 DEG F.
DESIGN ACFM: 40,400 ACFM
DESIGN PRESSURE: -15" S.P.W.G.
DESIGN DP: 3.25" S.P.W.G. MAX
DESIGN AIR STREAM: 100ppm HYDROGEN SULFIDE, WATER, TRACE ORGANICS
DESIGN HYDROGEN SULFIDE REMOVAL EFFIENCY: 99.95%
DESIGN AIR STREAM TEMP.: 50-105 DEG. F.
DESIGN RELATIVE HUMIDITY: UP TO 100%
DESIGN WIND LOAD: 80 MPH
DESIGN SEISMIC ZONE: 2
SOLUTION RECYCLE FLOW: 750 GPM @ 70 Ft TDH
SOLUTION TEMP.: AMBIENT
SOLUTION: Na_2OH, Na_2OCL, HCL
SOLUTION pH: 7 TO 13
SOLUTION ORP: ≤600mV
SOLUTION BLOWDOWN: 5-30 GPM
SUMP CAPACITY: 2277 GALLONS (TOTAL)
SUMP CAPACITY: 1385 GALLONS (USABLE PUMP SUCTION)
MINIMUM WALL THICKNESS: PER ENGINEERING DESIGN (3/8"MIN)
MINIMUM BOTTOM THICKNESS: PER ENGINEERING DESIGN
MINIMUM DOME HEAD THICKNESS: PER ENGINEERING DESIGN @ 30 lb/sqft LIVE LOAD
FRP MATERIAL OF CONSTRUCTION: PER PS15-69, ASTM 3299-88, ASTM E 84.
FRP CORROSION LINER: 100-120 MILS NEXUS, HETRON FR992, MEKP CURE
FRP STRUCTURAL TYPE: FILAMENT WOUND, HETRON FR992, MEKP CURE W/ 3-5% ANTIMONY TROXIDE
FRP EXTERIOR FINISH/COLOR: SMOOTH WHITE, W/UV-9 ← ? COLOR
PACKING SUPPORT PLATE TYPE: XCR GRATE, 1 1/2"x 1 1/2" x 1 1/2"
PACKING MEDIA/TYPE: RAUSCHERT 2"HI-FLOW, POLYETHYLENE
LIQUID DISTRIBUTOR: (2) LANCE TYPE, 8"SCH 80 CPVC, W/(4 TOTAL) SPRAY NOZZLES BETE 150°FC TF-112 x 3"MNPT, TEFLON
DEMISTER: AIROL, CHEVRON TYPE, POLYPROPYLENE
DEMISTER WASH: (1) LANCE TYPE, 2"SCH 80 CPVC W/(1) SPRAY NOZZLE BETE 120°FC TF-72 x 1 1/2"MNPT, TEFLON
SHIP WEIGHT, VESSEL: 20,000 LBS (ESTIMATED)
OPERATIONAL WEIGHT: 65,000 LBS (ESTIMATED)

REV.	DATE	DRAWING STATUS	BY
		DRAWING RELEASED FOR APPROVAL	GS
		DRAWING RELEASED FOR FABRICATION	
		DRAWING RELEASED FOR CONSTRUCTION	

DRAWINGS & NOTES

RELEASE FOR APPROVAL (0)
BY: G.Sealock DATE: 03/10/00

INDUSCO ENVIRONMENTAL SERVICES INC.

P.O. BOX 723368
ATLANTA, GA. 31139
(770) 736-9928

DRAWN: G.SEALOCK
CHECKED: M.HARMAN
APPROVED: D.VAUGHAN

CUSTOMER: PROCUREMENT SOLUTIONS, INC
RM CLAYTON WATER RECLAMATION
P.O. No.: PS 00316

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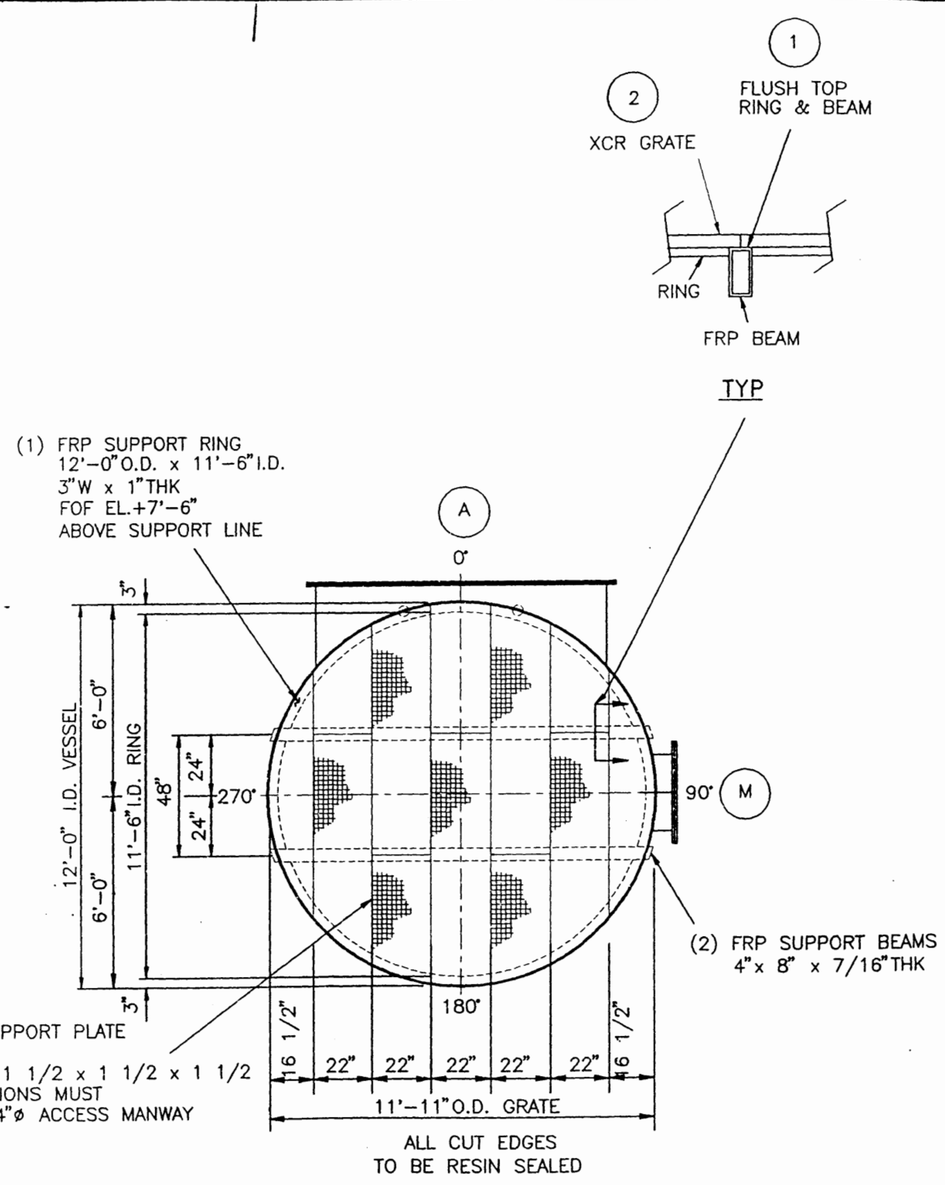
TITLE: ODOR CONTROL SCRUBBERS
OCS-HDWK-1 & OCS-HDWK-2
GENERAL ARRANGEMENT

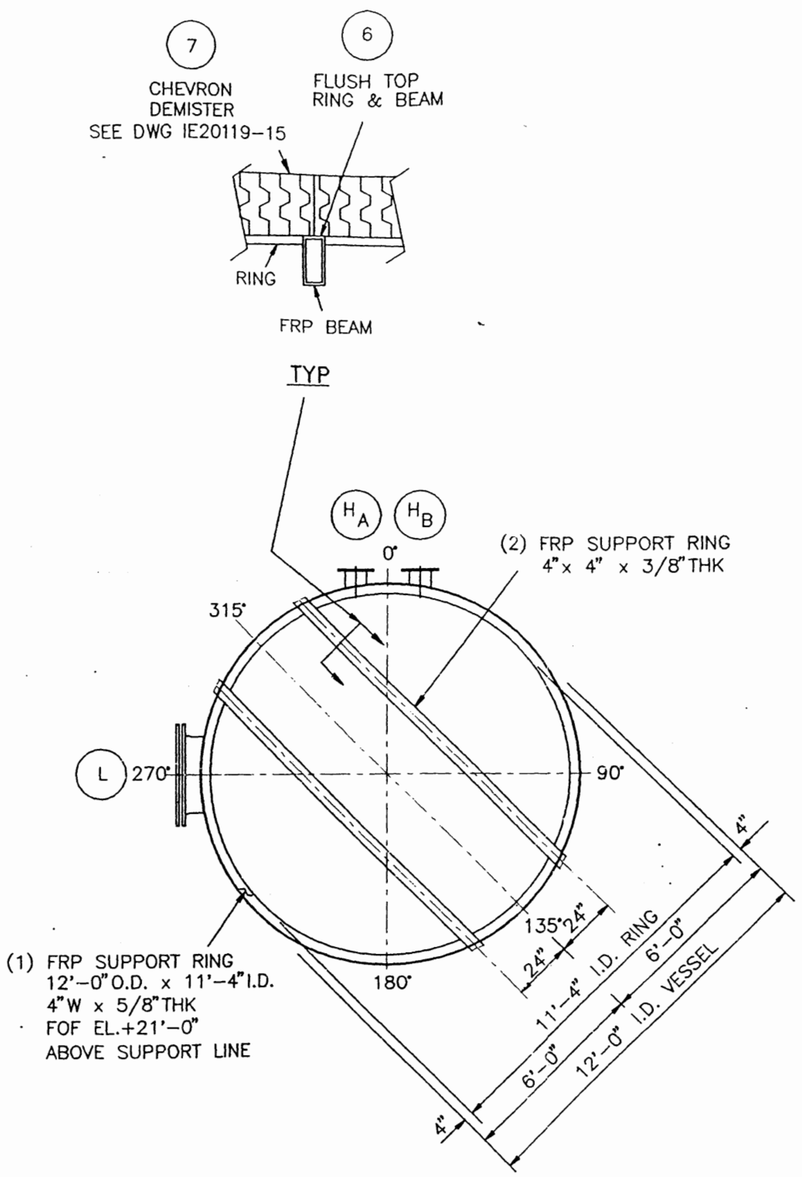
SCALE: 1-25 | SHT. 1 OF 1
RELEASE DATE: 03/10/00 | DWG No. IE20119-10 | REV. (0)



PACKING SUPPORT RING & BEAMS (1)

TRUE ORIENTATION

NOT TO SCALE



DEMISTER SUPPORT RING & BEAMS (6)

TRUE ORIENTATION

(1) REQD. AS SHOWN EACH SCRUBBER

NOT TO SCALE

RELEASE FOR APPROVAL (0)
BY: G.Sealock DATE: 03/10/00

REV.	DATE	DRAWING STATUS	BY
		DRAWING RELEASED FOR APPROVAL	GS
		DRAWING RELEASED FOR FABRICATION	
		DRAWING RELEASED FOR CONSTRUCTION	

DRAWING IS METRIC

INDUSCO ENVIRONMENTAL SERVICES INC.

P.O. BOX 723368
ATLANTA, GA. 31139
(770) 736-9929

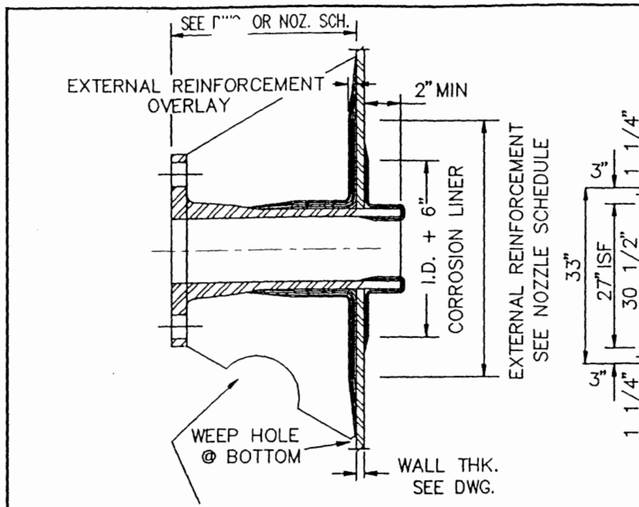
DRAWN: G.SEALOCK
CHECKED: M.HARMAN
APPROVED: D.VAUGHAN

CUSTOMER: PROCUREMENT SOLUTIONS, INC
RM CLAYTON WATER RECLAMATION
P.O. No.: PS 00318

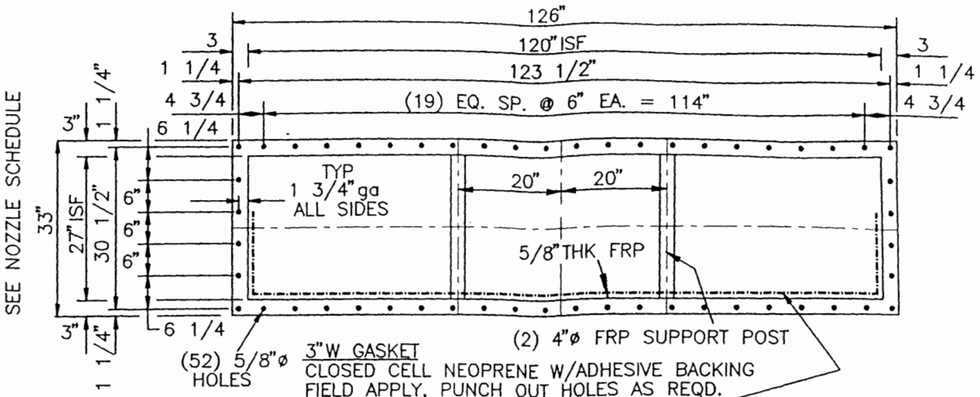
TITLE: ODOR CONTROL SCRUBBERS
OCS-HDWK-1 & OCS-HDWK-2
DETAILS

SCALE: 1-25 | SHT. 1 OF 1

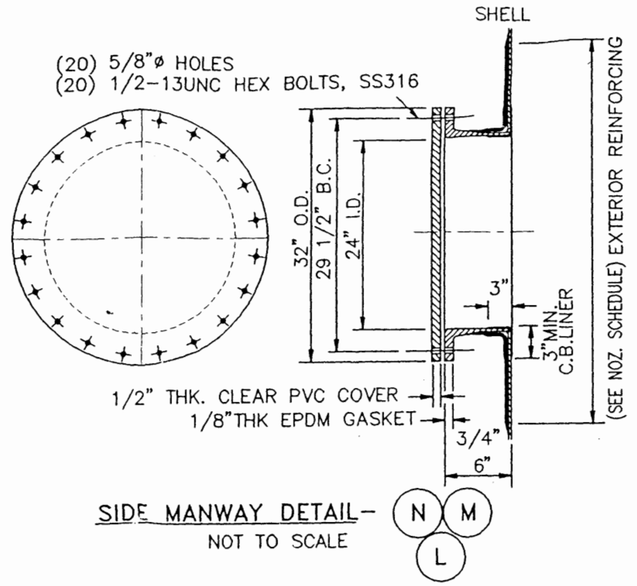
RELEASE DATE: 03/10/00 | DWG No. IE20119-11 | REV. 0



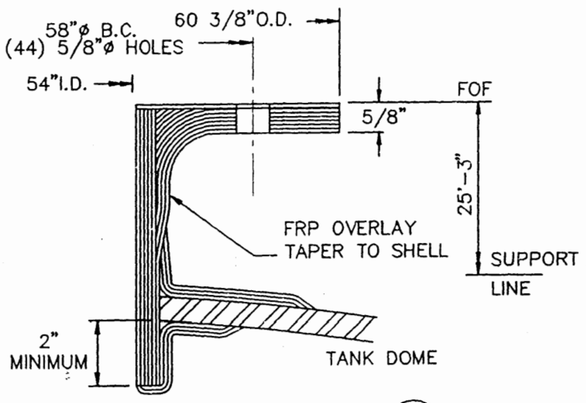
TYP. FLANGE ON PIPE NOZZLE DETAIL– (—)
NOT TO SCALE



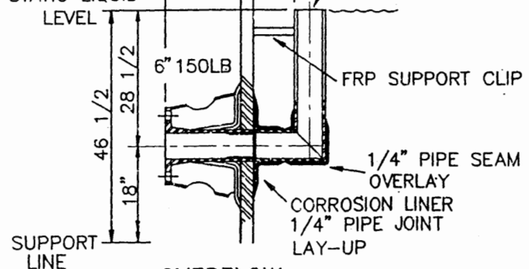
AIR INLET DETAIL– (A)
NOT TO SCALE



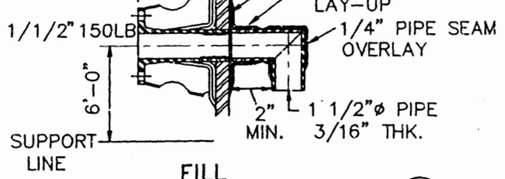
SIDE MANWAY DETAIL– (N) (M) (L)
NOT TO SCALE



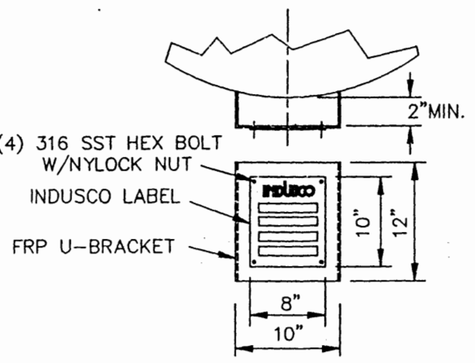
OUTLET FLANGE DETAIL– (B)
NOT TO SCALE



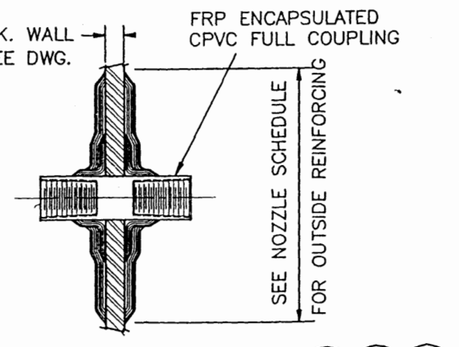
OVERFLOW
w/INTERIOR O.F. TUBE– (K)
NOT TO SCALE



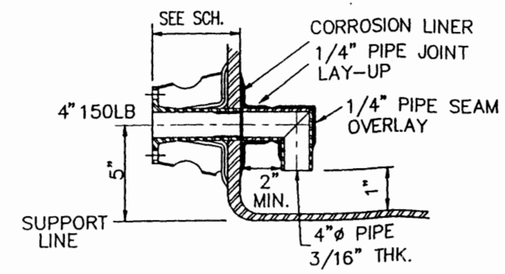
FILL
w/DOWNWARD 90° ELBOW– (R)
NOT TO SCALE



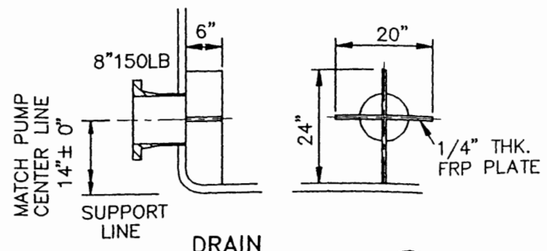
INDUSCO NAME
PLATE MOUNTING – (11)
NOT TO SCALE



FULL COUPLING DETAIL– (C) (F A B) (P)
NOT TO SCALE



SIPHON DRAIN– (J)
NOT TO SCALE



DRAIN
w/VORTEX BREAKER– (G)
NOT TO SCALE

RELEASE FOR APPROVAL (0)
BY: G. Sealock DATE: 03/10/00

REV.	DATE	DRAWING STATUS	BY
		DRAWING RELEASED FOR APPROVAL	
		DRAWING RELEASED FOR FABRICATION	
		DRAWING RELEASED FOR CONSTRUCTION	

DRAWINGS & NOTES

INDUSCO ENVIRONMENTAL SERVICES INC.

P.O. BOX 723585
ATLANTA, GA. 31139
(770) 730–5929

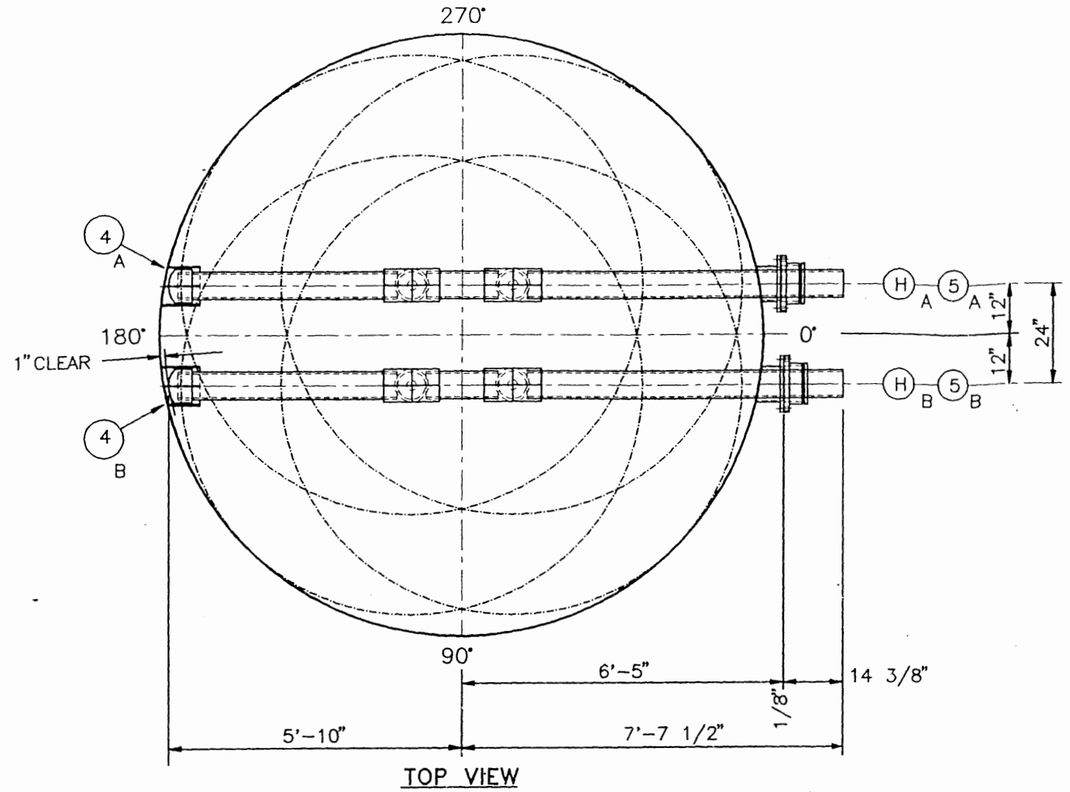
DRAWN: G.SEALOCK
CHECKED: M.HARMAN
APPROVED: D.VAUGHAN

CONFIDENTIAL INFORMATION
THIS DRAWING AND ALL INFORMATION THEREON IS THE PROPERTY OF INDUSCO ENVIRONMENTAL SERVICES INC. IT IS CONFIDENTIAL AND PROPRIETARY AND MUST NOT BE USED, MADE PUBLIC OR COPIED UNLESS AUTHORIZED IN WRITING BY INDUSCO ENVIRONMENTAL SERVICES INC. IT IS TRANSMITTED TO YOU WITH EXPLICIT UNDERSTANDING THAT IT IS SUBJECT TO RETURN UPON REQUEST.

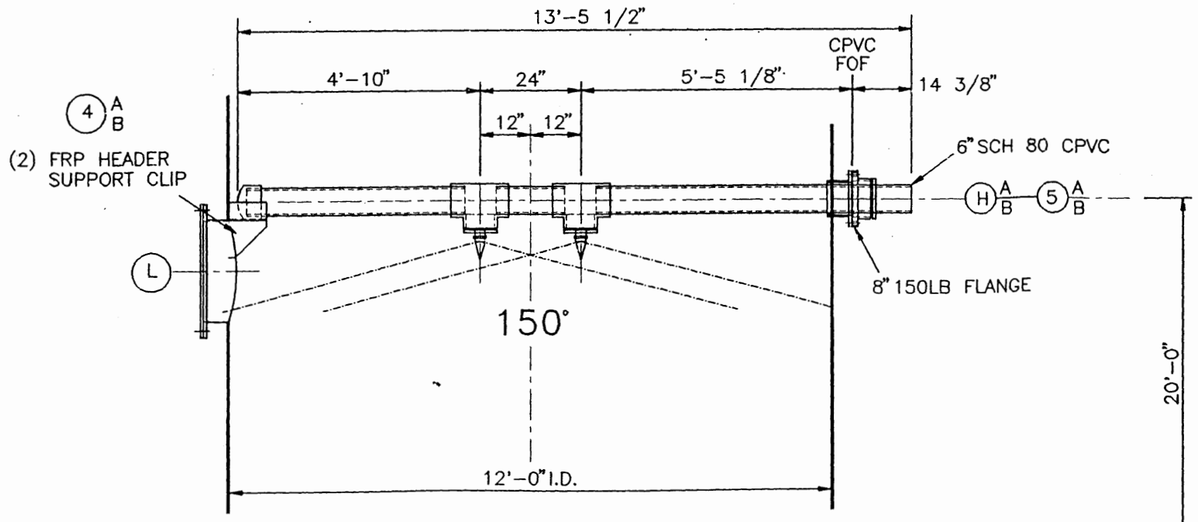
CUSTOMER: PROCUREMENT SOLUTIONS, INC
RM CLAYTON WATER RECLAMATION
P.O. No.: PS 00318

TITLE: ODOR CONTROL SCRUBBERS
OCS–HDWK–1 & OCS–HDWK–2
DETAILS

SCALE: 1–25 | SHT. 1 OF 1
RELEASE DATE: 03/10/00 | DWG No.: IE20119–12 | REV. 0



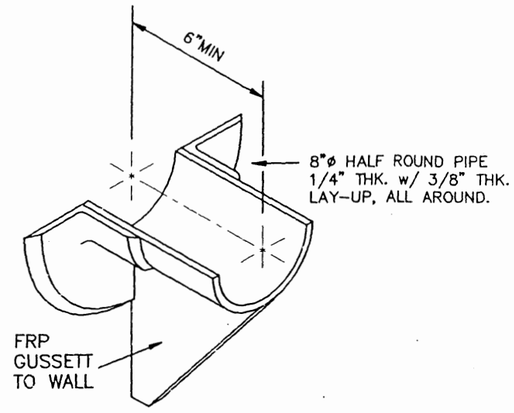
TOP VIEW



SECTIONAL SIDE VIEW
(2) LANCES REQD. EACH SCRUBBER

ITEMS SHIPPED LOOSE
TOTAL REQD. EACH SCRUBBER
ALL SCH 80 CPVC (U.N.)

(2) SPRAY LANCES CONSISTING OF:
- (2) FLANGE 8" 150LB x S
- (2) RED.BUSHING 8"x6" SxS (MODIFIED FOR PASS THRU)
- (2) PIPE 6" x 13'-5 1/2"LG
- (4) TEE 6" SxSxS
- (4) RED.BUSHING 6"S x 3"FNPT
- (2) 6"CAP x S
- (4) SPRAY NOZZLES, TEFLON BETE TF112 x 150°FC, 3"MNPT
- (2) FULL FACE FLANGE GASKET 8" EDPM
- (16) 3/4-10 UNC x 3 1/4"LG SS316 HEX BOLT
- (16) 3/4-10 UNC FRP SS316 NUTS
- (32) 3/4" SS316 WASHERS



FRP HEADER SUPPORT CLIP- 4 A B
(2) REQD. EACH SCRUBBER

(2) SCRUBBERS REQD. TOTAL

RELEASE FOR APPROVAL 0
BY: G.Sealock DATE: 03/10/00

REV.	DATE	DRAWING STATUS	BY
		DRAWING RELEASED FOR APPROVAL	
		DRAWING RELEASED FOR FABRICATION	
		DRAWING RELEASED FOR CERTIFICATION	

CHANGES & NOTES

INDUSCO ENVIRONMENTAL SERVICES INC.

P.O. BOX 723346
ATLANTA, GA. 31139
(770) 736-9929

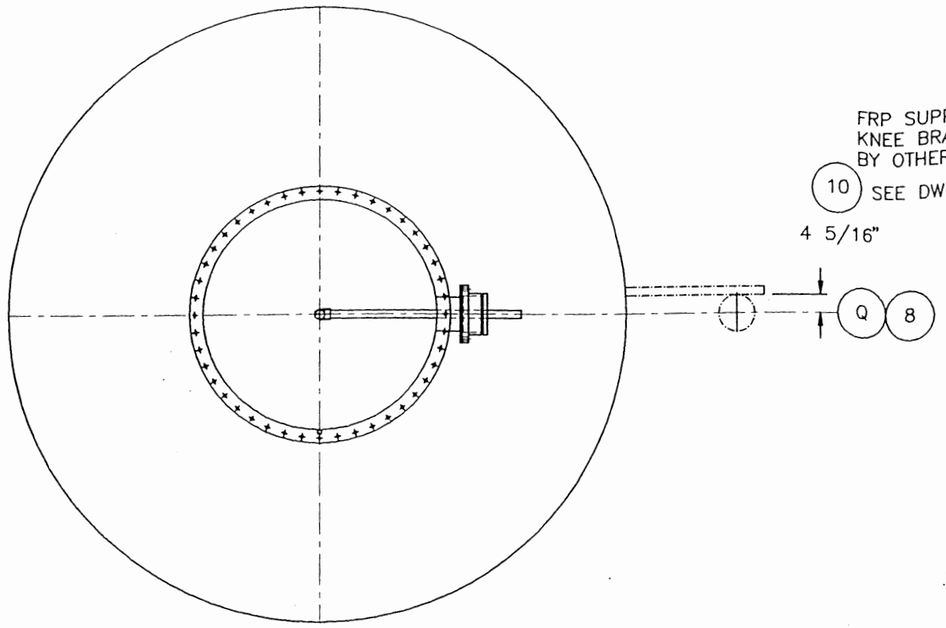
DRAWN: G.SEALOCK
CHECKED: M.HARMAN
APPROVED: D.VAUGHAN

CUSTOMER: PROCUREMENT SOLUTIONS, INC
RM CLAYTON WATER RECLAMATION
P.O. No.: PS 00318

TITLE: ODOR CONTROL SCRUBBERS
OCS-HDWK-1 & OCS-HDWK-2
LIQUID DISTRIBUTOR

SCALE: 1-16 SHT. 1 OF 1

RELEASE DATE: 03/10/00
DWG No. IE20119-13
REV. 0



FRP SUPPORT CLIPS ONLY
KNEE BRACE & PIPE
BY OTHERS

(10) SEE DWG IE20119-16

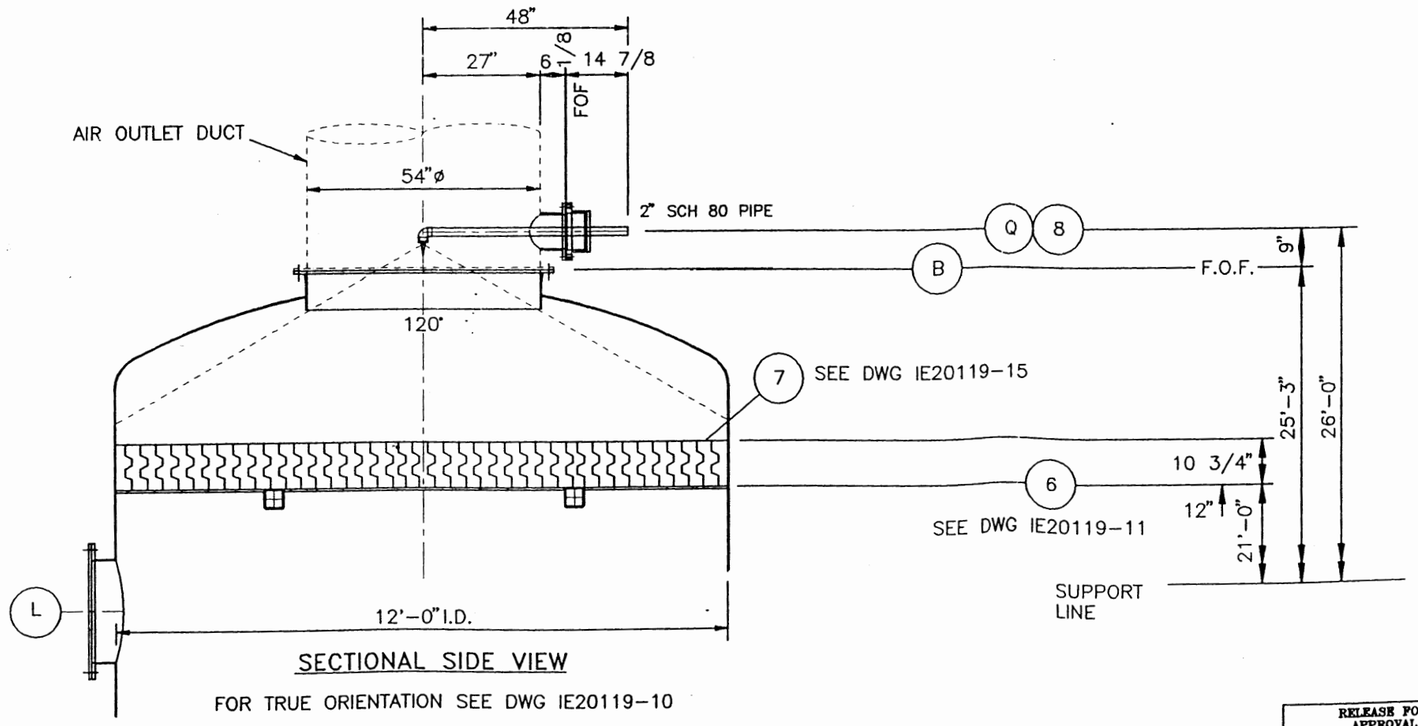
4 5/16"

(Q) (8)

TOP VIEW

ITEMS SHIPPED LOOSE
TOTAL REQD. EACH SCRUBBER
ALL SCH 80 CPVC (U.N.)

(1) SPRAY LANCES CONSISTING OF:
- (1) 8" 150LB FLANGE x S
- (1) 8" x 2" RED. BUSHING SxS (MODIFIED FOR PASS THRU)
- (1) 2" PIPE x 48" LG
- (1) 2" x 90° ELBOW SxS
- (1) 2" x 1 1/2" RED. BUSHING SxFNPT
- (1) SPRAY NOZZLES, TEFLON BETE TF-72 x 120°FC, 1 1/2" MNPT
- (1) 8" EPDM FULL FACE FLANGE GASKET
- (8) BOLTS: 3/4-10 UNC x 3" LG SS316
- (8) WASHERS: 3/4" SAE SS316
- (8) NUTS: 3/4-10 UNC FRP SS316



SECTIONAL SIDE VIEW

FOR TRUE ORIENTATION SEE DWG IE20119-10

(2) SCRUBBERS REQD. TOTAL

RELEASE FOR APPROVAL (0)
BY: G. Sealock DATE: 03/10/00

REV.	DATE	DRAWING STATUS	BY
		DRAWING RELEASED FOR APPROVAL	
		DRAWING RELEASED FOR FABRICATION	
		DRAWING RELEASED FOR CONSTRUCTION	
		DRAWING & NOTES	

INDUSCO ENVIRONMENTAL SERVICES INC.

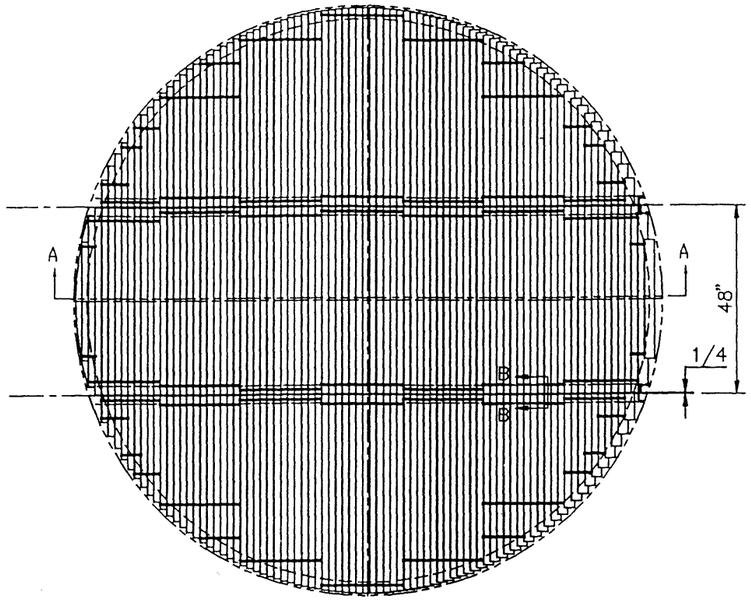
P.O. BOX 723365
ATLANTA, GA. 31139
(770) 736-9229

DRAWN: G.SEALOCK
CHECKED: M.MARSHAN
APPROVED: D.VAUGHAN

CUSTOMER: PROCUREMENT SOLUTIONS, INC
RM CLAYTON WATER RECLAMATION
P.O. No.: PS 00318

TITLE: ODOR CONTROL SCRUBBERS
OCS-HDWK-1 & OCS-HDWK-2
DEMISTER WASH

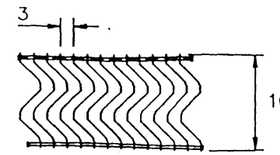
SCALE: 1=16
SHT. 1 OF 1
RELEASE DATE: 03/10/00
DWG No. IE20119-14
REV. (0)



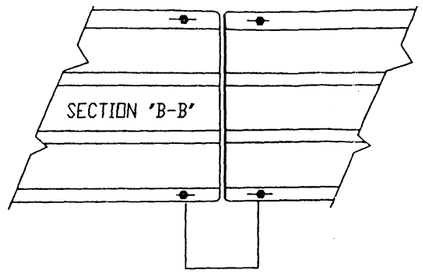
PLAN VIEW INSTALLED CHEVRON

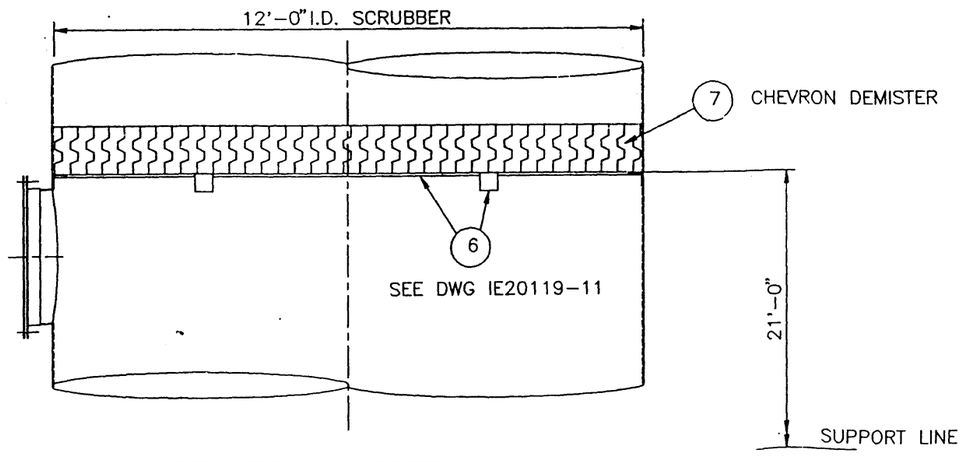
SECTION 'C–C'

AIROL 130H150



TYPICAL MODULE DETAIL
143"O.D.
SECTIONS TO FIT THRU
24"DIA ACCESS MANWAY





SECTION VIEW 'A–A'

(2) REQD. TOTAL

NOTES

1. SHALL PROVIDE (2) 143 DD x 10 3/4, POLYPROPYLENE, AIROL 130H150 CHEVRON MIST ELIMINATOR ASSEMBLIES EACH FURNISHED AS MODULES.
2. PERFORMANCE AT DESIGN: 99% ALL DROPLETS LARGER THAN 42 MICRONS
   0.11" WC MAX CLEAN DIFFERENTIAL PRESSURE DROP
3. MATERIAL OF CONSTRUCTION: POLYPROPYLENE THROUGHOUT
4. APPROXIMATE WEIGHTS: 400 LBS TOTAL NET EACH (WET)

RELEASE FOR APPROVAL 6
BY: G.Sealock DATE: 03/10/00

REV.	DATE	DRAWING STATUS	BY
		DRAWING RELEASED FOR APPROVAL	GS
		DRAWING RELEASED FOR FABRICATION	
		DRAWING RELEASED FOR CERTIFICATION	

CONSULTING & NOTES

INDUSCO ENVIRONMENTAL SERVICES INC.

P.O. BOX 723368
ATLANTA, GA. 31139
(770) 736-9929

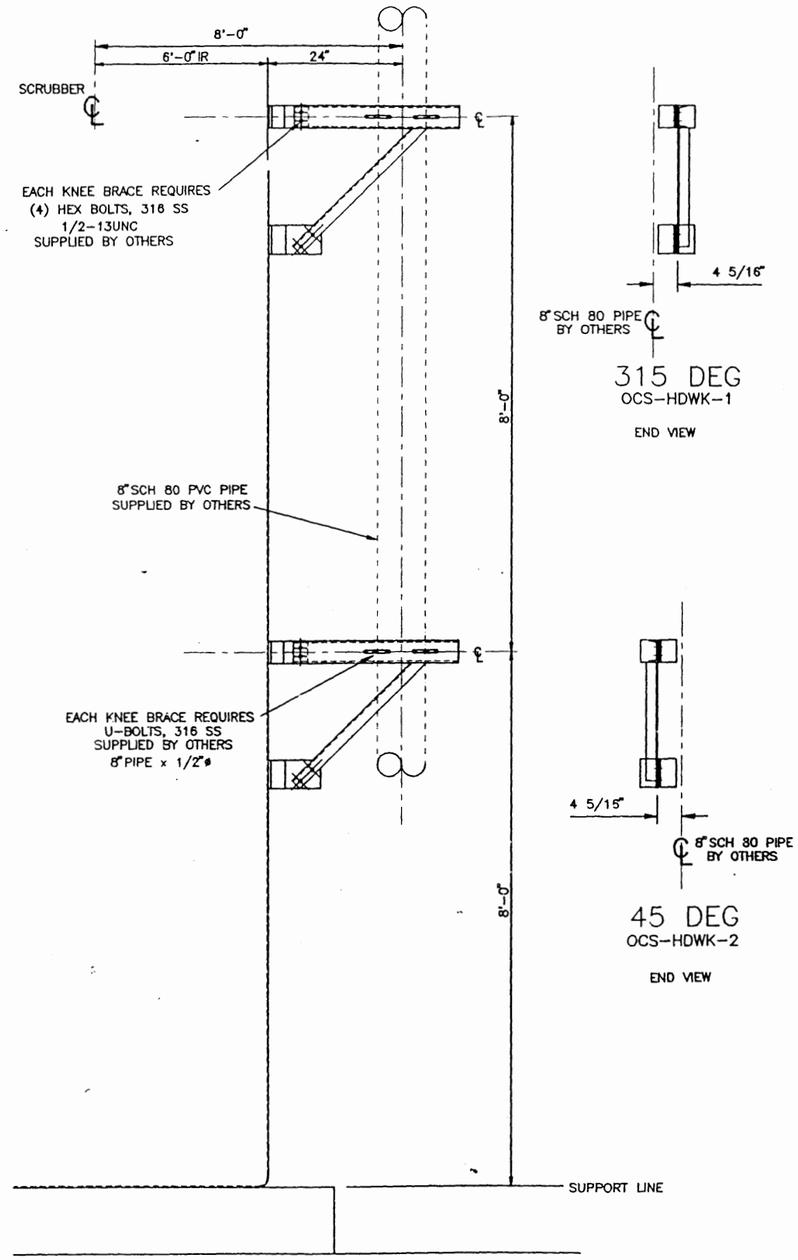
DRAWN: G.SEALOCK
CHECKED: M.HARMAN
APPROVED: D.VAUGHAN

CUSTOMER: PROCUREMENT SOLUTIONS, INC
RM CLAYTON WATER RECLAMATION
P.O. No.: PS 00316

TITLE: ODOR CONTROL SCRUBBERS
DCS–HDWK–1 & DCS–HDWK–2
CHEVRON DEMISTER

SCALE 1–25 | SHT. 1 OF 1

RELEASE DATE 03/10/00 | DWG No. IE20119–15 | REV. 6



315 DEG
OCS-HDWK-1

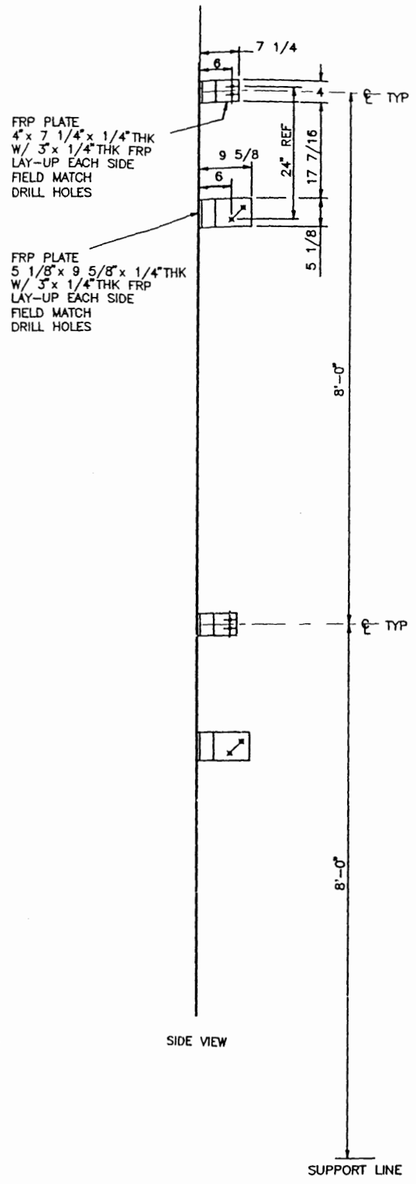
END VIEW

45 DEG
OCS-HDWK-2

END VIEW

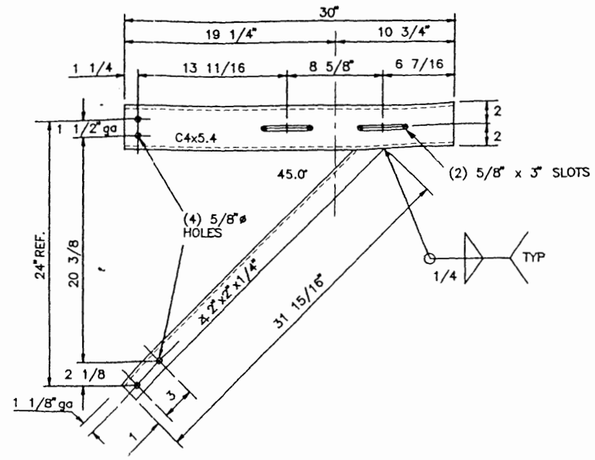
PIPE SUPPORT ASSEMBLY

SEE DWG IE20119-10 PLAN VIEW FOR TRUE ORIENTATION



FRP CLIPS

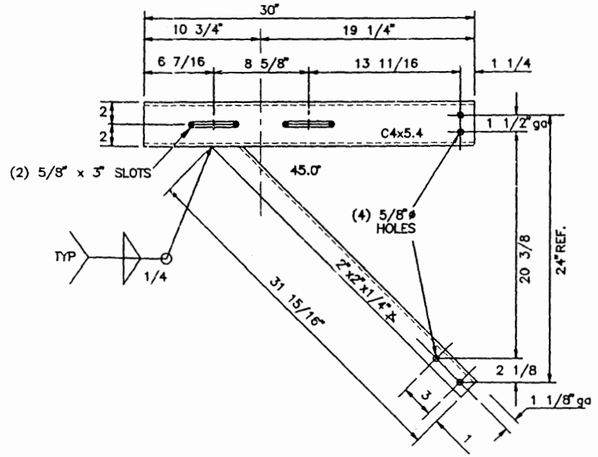
SUPPLIED BY FRP FABRICATOR



KNEE BRACE

GALVANIZED A36MS
NOT TO SCALE
(2) REQD. FOR OCS-HDWK-1

SUPPLIED BY OTHERS



KNEE BRACE

GALVANIZED A36MS
NOT TO SCALE
(2) REQD. FOR OCS-HDWK-2

SUPPLIED BY OTHERS

RELEASE FOR APPROVAL
BY: G.Sealock DATE: 03/10/00

REV.	DATE	DRAWING STATUS	BY
		DRAWING RELEASED FOR APPROVAL	GS
		DRAWING RELEASED FOR FABRICATION	
		DRAWING RELEASED FOR CERTIFICATION	

COMMENTS & NOTES:

INDUSCO ENVIRONMENTAL SERVICES INC.

P.O. BOX 723346
ATLANTA, GA. 31139
(770) 736-9929

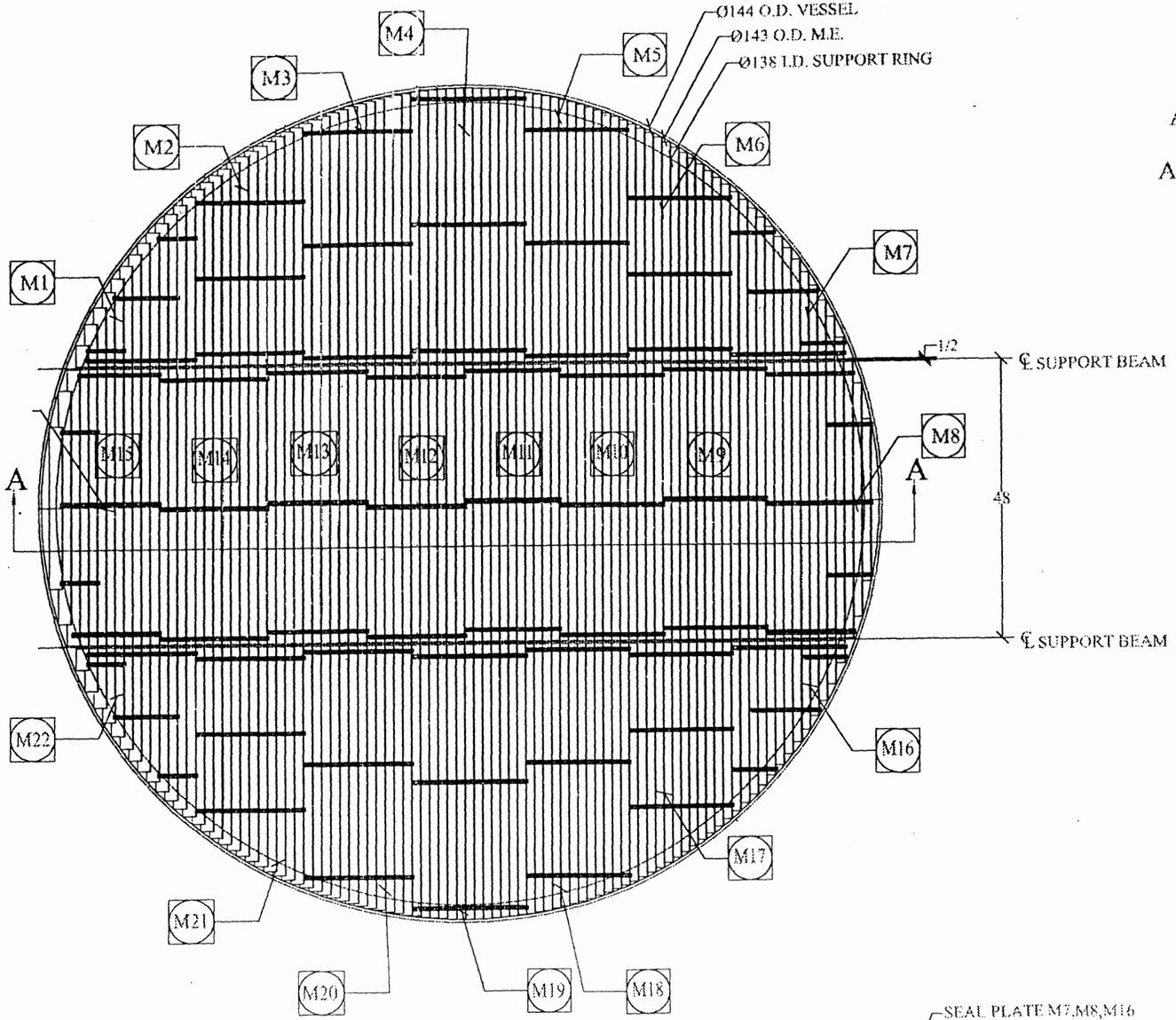
DRAWN: G.SEALOCK
CHECKED: M.HARMAN
APPROVED: D.VAUGHAN

CUSTOMER: PROCUREMENT SOLUTIONS, INC
RM CLAYTON WATER RECLAMATION
P.O. No.: PS 00318

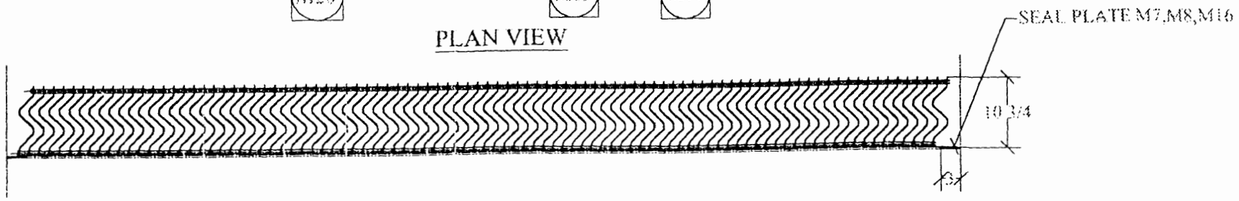
TITLE: ODOR CONTROL SCRUBBERS
OCS-HDWK-1 & OCS-HDWK-2
PIPE SUPPORT DETAILS

SCALE: 1-12 | SHT. 1 OF 1
RELEASE DATE: 03/10/00 | DWG No. IE20119-16 | REV. A

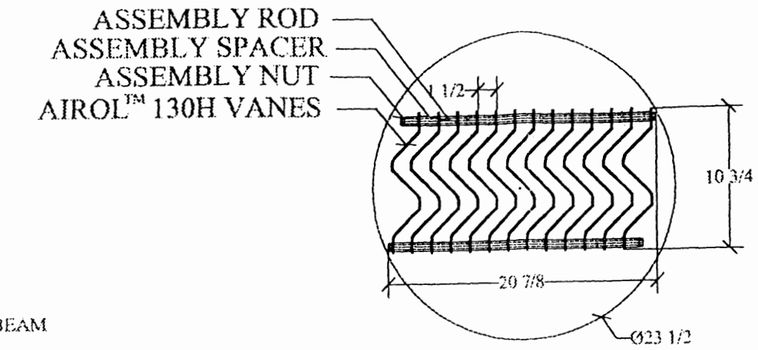
H



PLAN VIEW



INSTALLED ELEVATION SECTION A-A



TYPICAL MODULE DETAIL

NOTES

1. COASTAL SHALL PROVIDE (2) 143" OD x 10 3/4, AIROL™ 130H150 CHEVRON MIST ELIMINATOR ASSEMBLIES, EACH FURNISHED AS (22) MODULES. EACH MODULE SHALL BE SIZED TO PASS THROUGH A 24" ID MANWAY.

2. MATERIALS OF CONSTRUCTION: VANES AND ASSEMBLY SPACERS: POLYPROPYLENE ASSEMBLYRODS AND NUTS: T316 S/S

3. APPROXIMATE WEIGHTS: 625 LBS NET ASSEMBLY; 40 LBS MAX PER MODULE 1850 LBS GROSS SHIPPING

4. INDUSCO PO NO IE20119; CTI JOB NO 20001020

REVISION	DESCRIPTION	DATE	BY	APP'D
00	SUBMITTED FOR CUSTOMER APPROVAL	05-24-00	WKM	HWW

COASTAL TECHNOLOGIES, INC.

SCALE | APPROVED BY | DRAWN BY | DATE 05-04-00

INDUSCO ENVIRONMENTAL SERVICES, INC

AIROL™ 130H150

DRAWING NO: 20001020-02-00

I

Rauschert
Process Technologies

Rauschert Industries, Inc.
351 Industrial Park Road, Madisonville, TN 37354
Phone (423) 442-4471 Fax (423) 442-8660

I. Workmanship and Materials

Rauschert Industries, Inc. warrants that both workmanship and materials of random packings supplied to Indusco Environmental Inc. be of good quality as regularly practiced by Rauschert Industries, Inc. and that the random packing will give reasonable service under normal operating conditions as specified by Indusco Environmental Inc.. Rauschert Industries, Inc. further agrees to replace, free of charge any part or parts which may prove defective due to workmanship or material problems during a period of two years after date of startup. Under no circumstances shall this guarantee be interpreted to extend longer than 30 months from date of shipment. Rauschert Industries, Inc. reserves the right of final determination of liability and the buyer agrees to furnish accurate and reasonable information in the event that materials or workmanship quality problems occur. Rauschert Industries, Inc. reserves the right of inspection at the installation where such failure occurred. Rauschert Industries' liability shall be limited to replacement of the defective part or parts only.

II. Process Performance Warranty

If Rauschert Industries, Inc. random packings (2" (50-O) Hiflow Rings) are utilized in the R.M. Clayton Hydrogen Sulfide Scrubbers, the following can be guaranteed:

1. Turndown.
   Stable operation can be maintained at 60% gas load.

2. Maximum continuous operating temperature of our polyethylene packing is 140 F.

3. Pressure Drop.
   The pressure drop per foot of packed bed depth will not exceed the values listed for each system for the corresponding operation conditions listed at the beginning of this document.
   A performance warranty for (3) is null and void if any one or a combination of the following occurs:

   A. Packed bed becomes fouled (plugged or partially plugged) as listed at the beginning of the document by any forms of solids deposition.
   B. The Hydrogen Sulfide scrubbers are operated outside the specified operating parameters.
   C. Grid support section of the scrubber becomes fouled or partially fouled.

4. Removal Efficiency
   The required removal efficiency will be met (99.95% Removal in System 1; 99% removal in Systems 1 and 2).

A performance warranty for (4) is null and void if any one or a combination of the following occurs:

A. Packed bed becomes fouled (plugged or partially plugged) by any form of solids deposition.
B. The Hydrogen Sulfide scrubbers are operated outside the specified operating parameters as listed at the beginning of this document.
C. Contaminant concentrations vary from those listed at the beginning of this document.

J

MATERIAL TURNOVER LIST

Project: R.M. Clayton Water Reclamation Center, Phase III – Plant Expansion

Contractor: Western Summit / Pizzagalli Construction, a Joint Venture

Equipment Name: Odor Control Scrubbers

Equipment Tag Number(s): 10-SCRH-1-3525, 10-SCRH-2-3526, 30-SCR1-1-3607, 30-SCR1-2-3608, 30-SCR2-1-3633, 30-SCR2-2-3636

Specification Section: 11255

Manufacturer/ Phone No.: Ceilcote Air Pollution Control
14955 Sprague Rd., Suite 250
Strongsville, OH 44136
216-243-9854

Service Rep./ Phone No.: Indusco Environmental
PO Box 703365
Atlanta, GA 31139
770-739-5929

Quantity	Part Number	Description	Replacement Cost	Units	Turned Over by WS/PC	Received by City
		Spare Parts for 12 ft. Dia. Scrubber at Headworks				
2	24/48	Gaskets for manways	$200 / unit	Set		
1	SPA-1-10	Spray nozzle assembly	$1850.00	Ea.		
8	3/4NW/LW	Internal bolts and fasteners for wetted service	$100 / unit	Set		
680	50-6 2"	Packing (20% of 1130 CF)	$7.50	CF		
1	TF48FC	Demister Spray nozzle	$450.00	Ea.		
		Spare Parts for 8 ft. Dia. Scrubber at BNR1/2				
2	24/48	Gaskets for manways	$200 / unit	Set		
1	SPA-1-08	Spray nozzle assembly	$1850.00	Ea.		
8	3/4NW/LW	Internal bolts and fasteners for wetted service	$100 / unit	Set		
100	50-6 2"	Packing (20% of 502 CF)	$7.50	CF		
1	TF48FC	Demister Spray nozzle	$450.00	Ea.		

Quantity	Part Number	Description	Replacement Cost	Units	Turned Over by WS/PC	Received by City
		Special Tools				
		No special tools required				
		Lubricants				
		No lubricants required				

Signatures (Do not initial):

COA Representative: _____ Date: _____

Engineer: _____ Date: _____

Contractor: _____ Date: _____

K

City of Atlanta
R. M. Clayton WRC
Expansion Phase 3

Submittal Review Comments

SD - 803A

Submittal Title	Headworks Odor Control	General Contractor:	WS/PCC
	Performance Test Report	Supplier/Vendor	Indusco Enviro
Reviewed By:	City of Atlanta	GC Submittal No:	11255-012A
	Construction Management Group	Spec/Dwg Ref:	11255

City of Atlanta
Construction Management Group, Wastewater Services Division

	APP (Code 1)	No exceptions taken
X	**AAN (Code 1C)**	Approved with minimal comments, resubmittal not required.
	ANR (Code 2)	Make corrections noted. Resubmittal Req'd
	DIS (Code 3)	Amend and Resubmit.
	REJ (Code 4)	Rejected - See Remarks.
	Information Only	Receipt Acknowledged

By: S. Grove Date: 8/14/01

The Engineers' review of drawings, data and samples submitted by Contractor will cover only general conformity to the specifications. The Engineers' review and exception, if any, will not constitute an approval of dimensions, quantities, and details of the material, equipment, device, or item shown. GC-31.1.D

Comments:

1. **Repair the leaking bypass damper between the two stages.**

Construction Management Group
2440 Bolton Road
Atlanta, GA 30318

Western Summit / Pizzagalli Construction

A Joint Venture

2961 Chatahoochee Cir.
Atlanta, GA 30318

SUBMITTAL TRANSMITTAL

R3T-1306

August 01, 2001

RECEIVED
C O A - C M G
AUG 0 1 2001
R.M. CLAYTON
PHASE 3

City of Atlanta
860 Lake Mirror Road
College Park, GA 30349-

ATTN: Rod Hardeman

PROJECT:

SUBMITTAL NO.: 803A

SUBJECT: HW - Odor Control

REFERENCE:

BID ITEM NO.:

SPEC. SECTION: 11255

CPM ID NO.:

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
☑ Shop Drawings	☑ Approval	☐ Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as Noted
☐ Prints	☑ As Requested	☐ Returned After Loan
☐ Change Order	☐ Review and Comment	☐ Resubmit
☐ Plans		☐ Submit
☐ Samples	**SENT VIA:**	☐ Returned
☐ Specifications	☑ Attached	☐ Returned for Corrections
☑ Other: Made from Submittal	☐ Separate Cover Via: Mail	☐ Bids Due:

COPIES	NUMBER	PC Sub. No.	DESCRIPTION	STATUS
6 5	803A	11255-012A	Performance Test Report	NEW

Remarks:

CC: Read, COA Corresp.
Submittal File

PROJECT NO: 11317

SUB/VENDOR: ~~Indusco Environmental~~

REV'D/APP'D BY: Ron Kress

DEVIATIONS:

PRIORITY:

Western Summit / Pizzagalli Constr.

2561 Chatahoochee Cir.
Atlanta, GA 30318

Phone: 404 351 0401
Fax: 404 351 8028

SUBMITTAL NO. 11255-012

PACKAGE NO: 11255

TITLE: HW - Odor Control

PROJECT:

DRAWING: 11255

STATUS: NEW

BIC: COA

REQUIRED START:

REQUIRED FINISH: 11/17/99

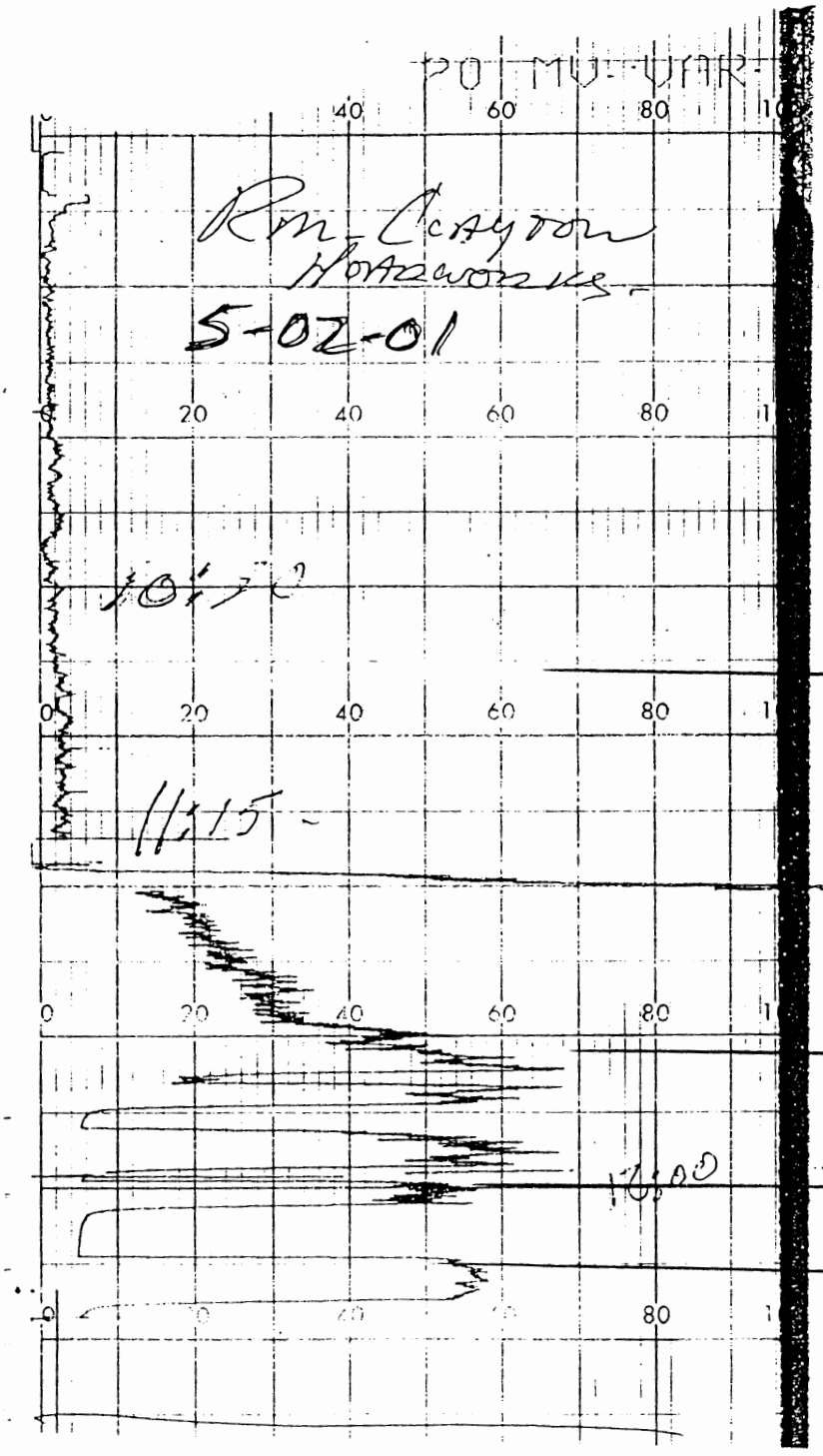
DAYS HELD: 0

DAYS ELAPSED: 1

DAYS OVERDUE: 623

RECEIVED FROM		SENT TO		RETURNED BY		FORWARDED TO	
INE	MH	COA	RH	COA	RH	INE	MH

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Sepias	Prints	Drawing Date	Held	Elapsed
A	Performance Test Report	7/31/01	8/1/01			NEW	0	6		0	1

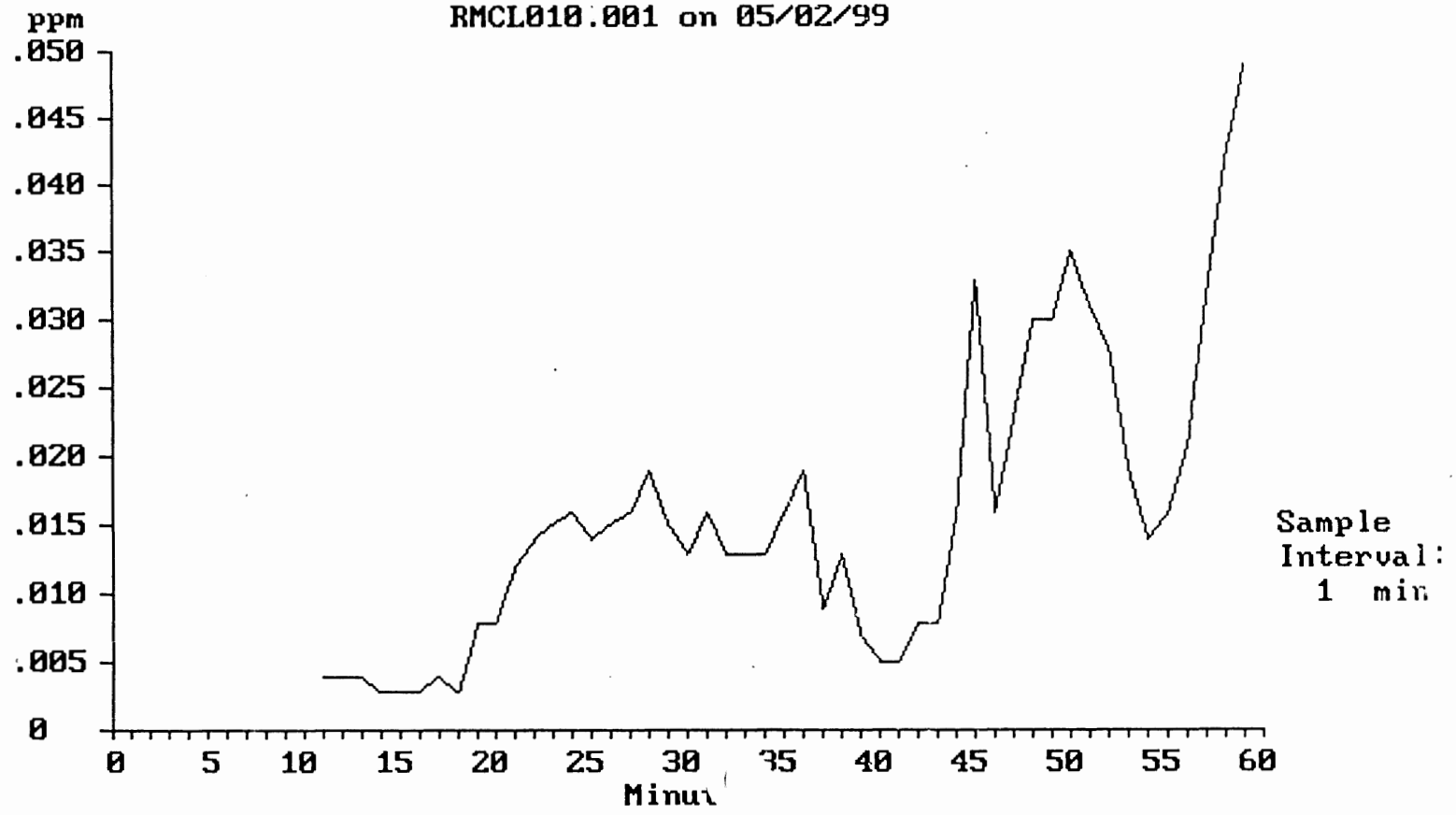


PM10, ORP 550

PM9, ORP 250

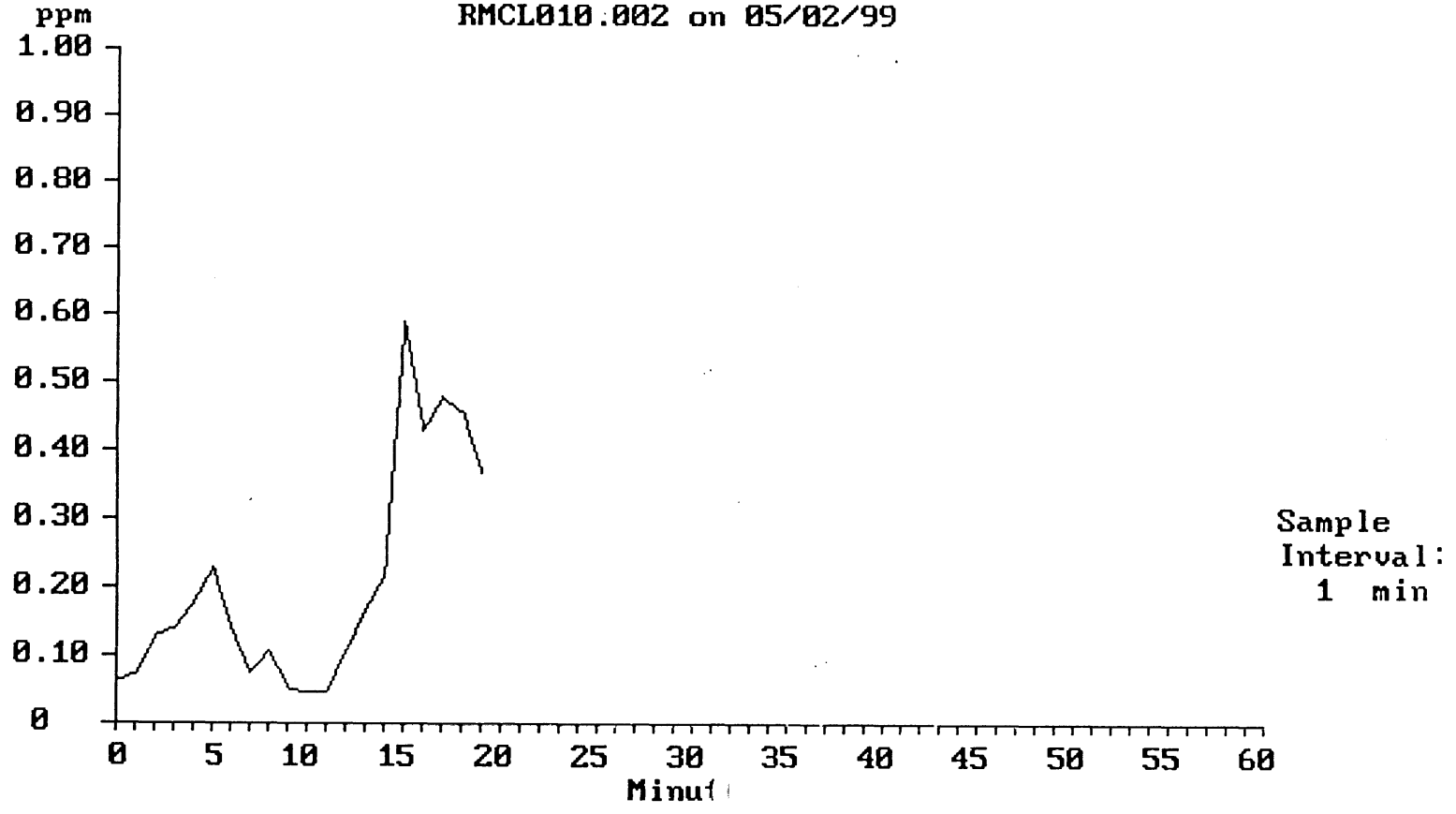
PM9, ORP 100

PM9, ORP 2


RMCL010.001 on 05/02/99
ppm
.050
.045
.040
.035
.030
.025
.020
.015
.010
.005
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Minut
Sample
Interval:
1 min

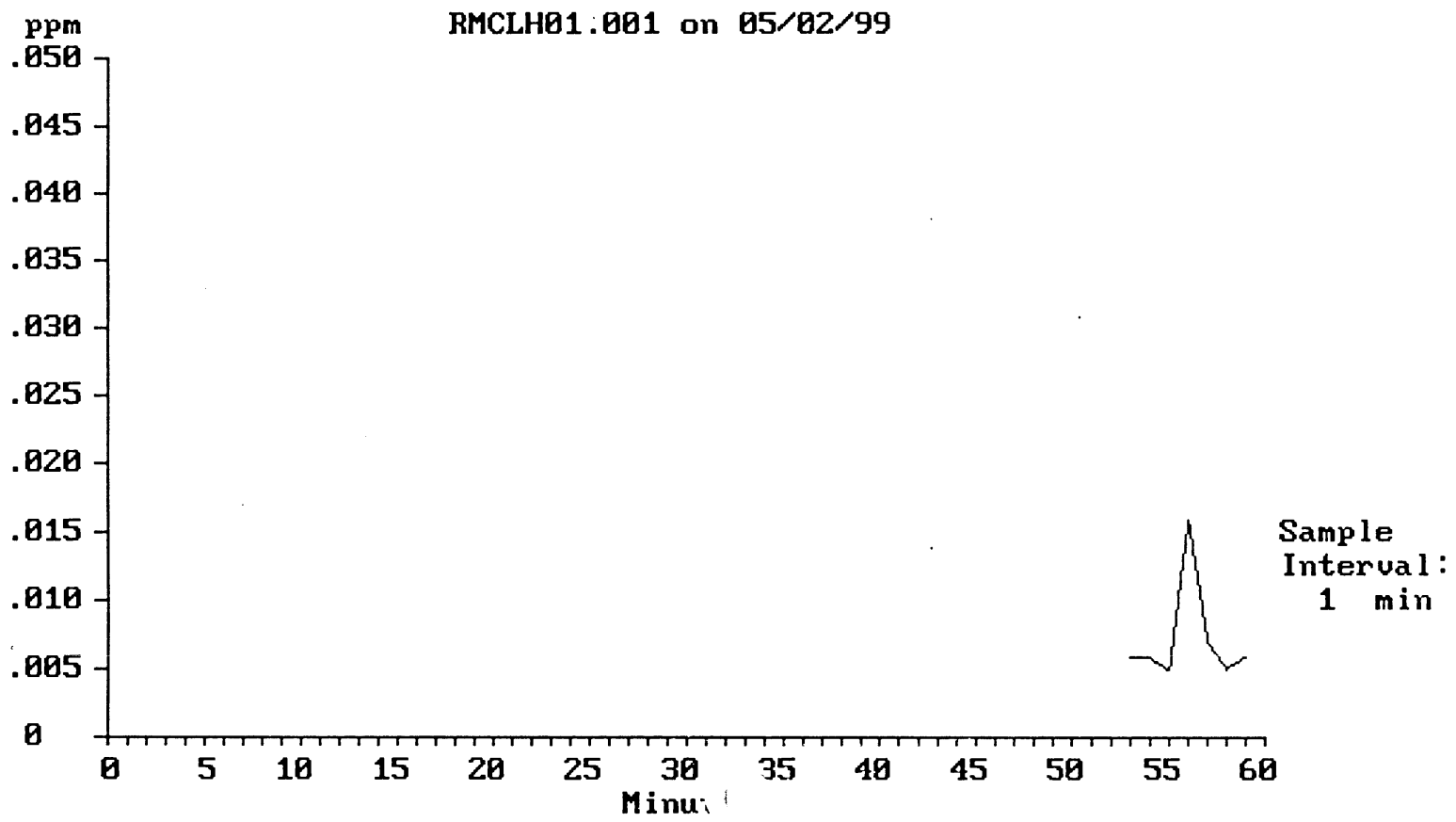
File Name: RMCL010.001 Page: 1

ppm	Time	Date	Min.	Max.	Mean	Note
.004	11:11:36	05/02/99	.004	.004	.004	
004	11:12:36	05/02/99	.004	.004		
.004	11:13:36	05/02/99	.004	.004		
.003	11:14:36	05/02/99	.003	.004		
.003	11:15:38	05/02/99	.003	.004		
.003	11:16:38	05/02/99	.003	.004		
.004	11:17:38	05/02/99	.003	.004		
.003	11:18:40	05/02/99	.003	.004		
.008	11:19:40	05/02/99	.003	.008		
.008	11:20:40	05/02/99	.003	.008		
.012	11:21:42	05/02/99	.003	.012		
.014	11:22:42	05/02/99	.003	.014		
.015	11:23:42	05/02/99	.003	.015		
.016	11:24:44	05/02/99	.003	.016		
.014	11:25:44	05/02/99	.003	.016		
.015	11:26:44	05/02/99	.003	.016		
.016	11:27:46	05/02/99	.003	.016		
.019	11:28:46	05/02/99	.003	.019		
.015	11:29:48	05/02/99	.003	.019		
.013	11:30:48	05/02/99	.003	.019		
.016	11:31:48	05/02/99	.003	.019		
.013	11:32:50	05/02/99	.003	.019		
.013	11:33:50	05/02/99	.003	.019		
.013	11:34:50	05/02/99	.003	.019		
.016	11:35:52	05/02/99	.003	.019		
.019	11:36:52	05/02/99	.003	.019		
.009	11:37:52	05/02/99	.003	.019		
.013	11:38:54	05/02/99	.003	.019		
.007	11:39:54	05/02/99	.003	.019		
005	11:40:54	05/02/99	.003	.019		
005	11:41:56	05/02/99	.003	.019		
.008	11:42:56	05/02/99	.003	.019		
.008	11:43:56	05/02/99	.003	.019		
.016	11:44:58	05/02/99	.003	.019		
.033	11:45:58	05/02/99	.003	.033		
.016	11:46:58	05/02/99	.003	.033		
.03	11:48:00	05/02/99	.003	.033		
.03	11:49:00	05/02/99	.003	.033		
.035	11:50:00	05/02/99	.003	.035		
.031	11:51:02	05/02/99	.003	.035		
.028	11:52:02	05/02/99	.003	.035		
.019	11:53:02	05/02/99	.003	.035		
.014	11:54:04	05/02/99	.003	.035		
.016	11:55:04	05/02/99	.003	.035		
.021	11:56:04	05/02/99	.003	.035		
.032	11:57:06	05/02/99	.003	.035		
.042	11:58:06	05/02/99	.003	.042		
.049	11:59:06	05/02/99	.003	.049		


ppm
RMCL010.002 on 05/02/99
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Minut
Sample
Interval:
1 min

File Name: RMCL010.002 Page: 1

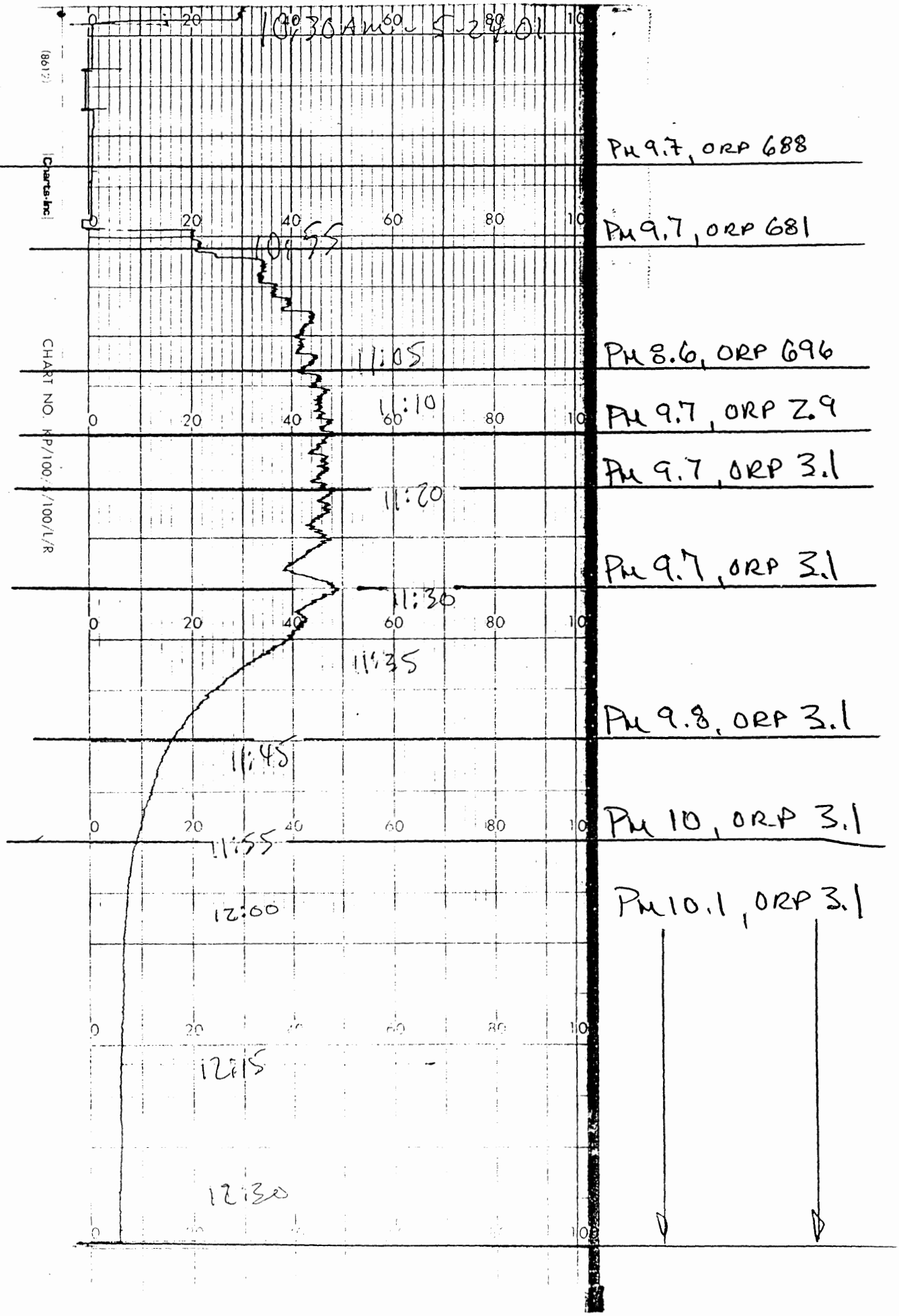
ppm	Time	Date	Min.	Max.	Mean	Note
.061	12:00:08	05/02/99	.061	.061	.061	
072	12:01:08	05/02/99	.072	.072		
13	12:02:02	05/02/99	.072	.13		
.14	12:03:02	05/02/99	.072	.14		
.18	12:04:04	05/02/99	.072	.18		
.23	12:05:04	05/02/99	.072	.23		
.14	12:06:04	05/02/99	.072	.23		
.076	12:07:10	05/02/99	.072	.23		
.11	12:08:06	05/02/99	.072	.23		
.056	12:09:12	05/02/99	.056	.23		
.049	12:10:12	05/02/99	.049	.23		
.047	12:11:14	05/02/99	.047	.23		
.11	12:12:08	05/02/99	.047	.23		
.17	12:13:10	05/02/99	.047	.23		
.22	12:14:10	05/02/99	.047	.23		
.59	12:15:10	05/02/99	.047	.59		
.43	12:16:12	05/02/99	.047	.59		
.48	12:17:12	05/02/99	.047	.59		
.46	12:18:12	05/02/99	.047	.59		
.37	12:19:14	05/02/99	.047	.59		

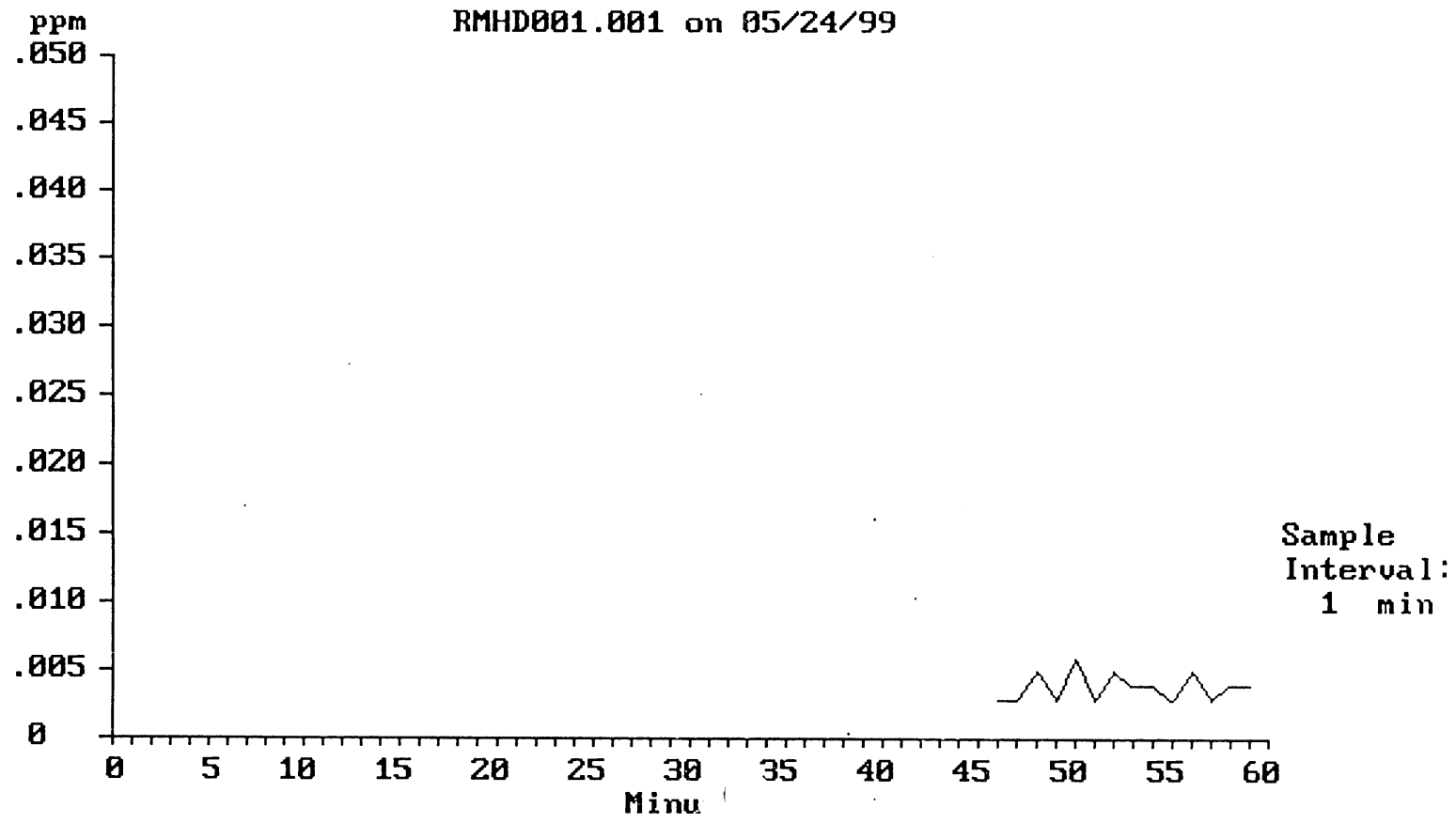

RMCLH01.001 on 05/02/99
ppm
.050
.045
.040
.035
.030
.025
.020
.015
.010
.005
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Minu
Sample
Interval:
1 min

File Name: RMCLH01.001 Page: 1

ppm	Time	Date	Min.	Max.	Mean	Note
.006	10:53:04	05/02/99	.006	.006	.006	
006	10:54:04	05/02/99	.006	.006		
005	10:55:06	05/02/99	.005	.006		
.016	10:56:06	05/02/99	.005	.016		
.007	10:57:06	05/02/99	.005	.016		
.005	10:58:08	05/02/99	.005	.016		
.006	10:59:08	05/02/99	.005	.016		

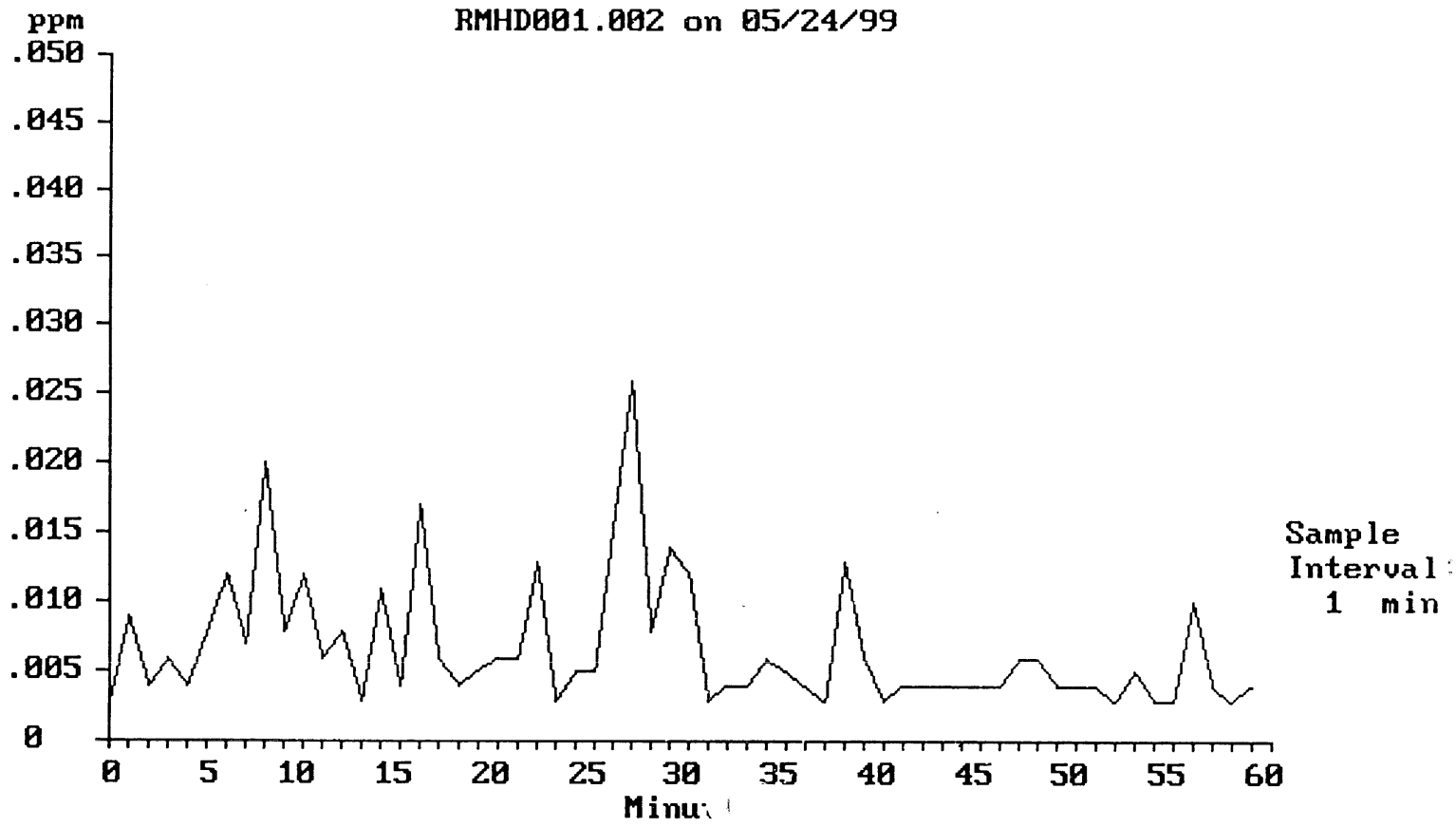
K.M. CLAYTON - HEADWORKS - 5-24-01




ppm
RMHD001.001 on 05/24/99
.050
.045
.040
.035
.030
.025
.020
.015
.010
.005
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Minu
Sample
Interval:
1 min

File Name: RMHD001.001 Page: 1

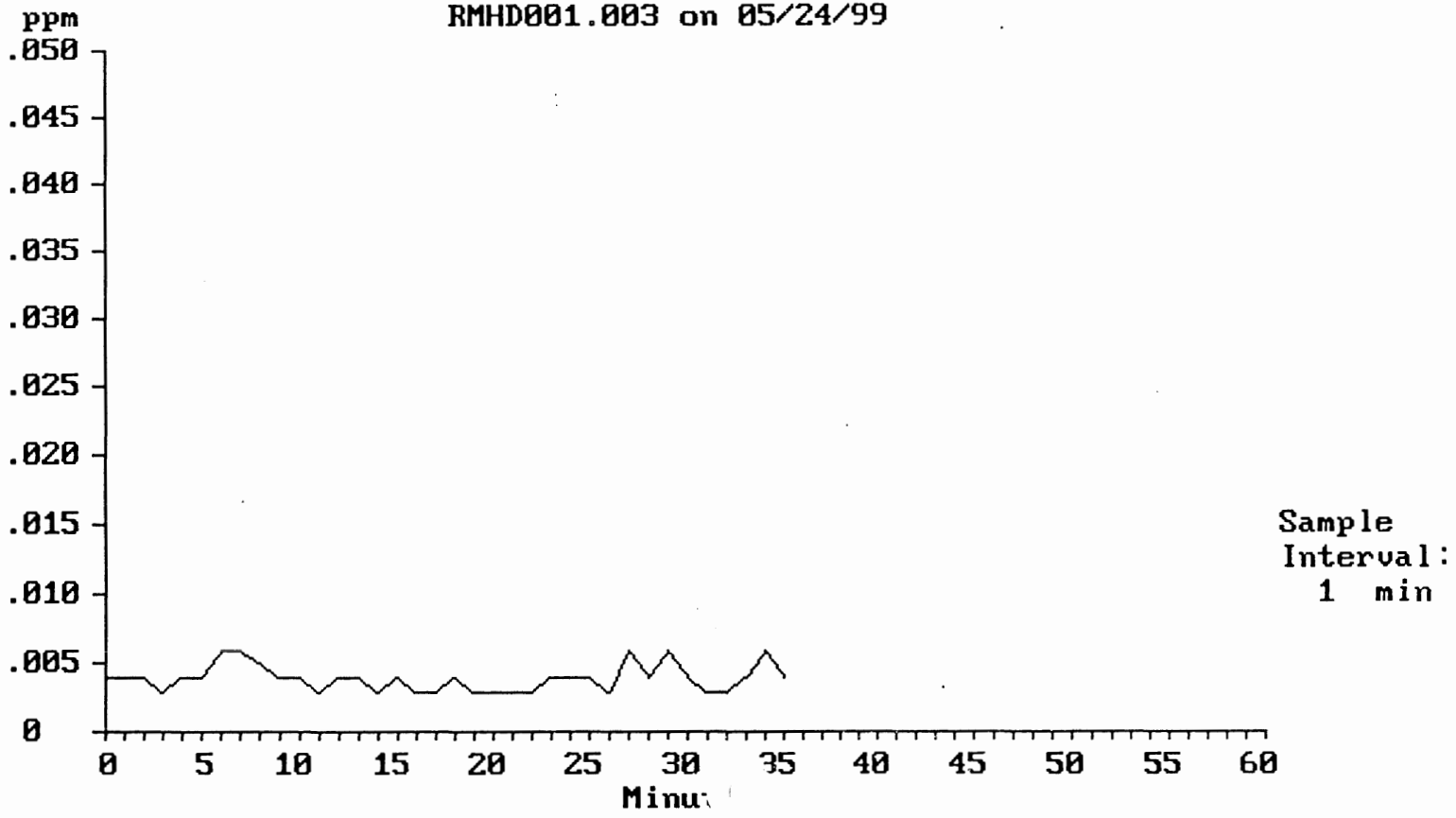
ppm	Time	Date	Min.	Max.	Mean	Note
003	10:46:32	05/24/99	.003	.003	.003	
003	10:47:34	05/24/99	.003	.003		
005	10:48:34	05/24/99	.003	.005		
.003	10:49:34	05/24/99	.003	.005		
.006	10:50:36	05/24/99	.003	.006		
.003	10:51:36	05/24/99	.003	.006		
.005	10:52:36	05/24/99	.003	.006		
.004	10:53:38	05/24/99	.003	.006		
.004	10:54:38	05/24/99	.003	.006		
.003	10:55:38	05/24/99	.003	.006		
.005	10:56:40	05/24/99	.003	.006		
.003	10:57:40	05/24/99	.003	.006		
.004	10:58:40	05/24/99	.003	.006		
.004	10:59:42	05/24/99	.003	.006		


ppm
RMHD001.002 on 05/24/99
.050
.045
.040
.035
.030
.025
.020
.015
.010
.005
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Minu
Sample
Interval
1 min

File Name: RMHD001.002 Page: 1

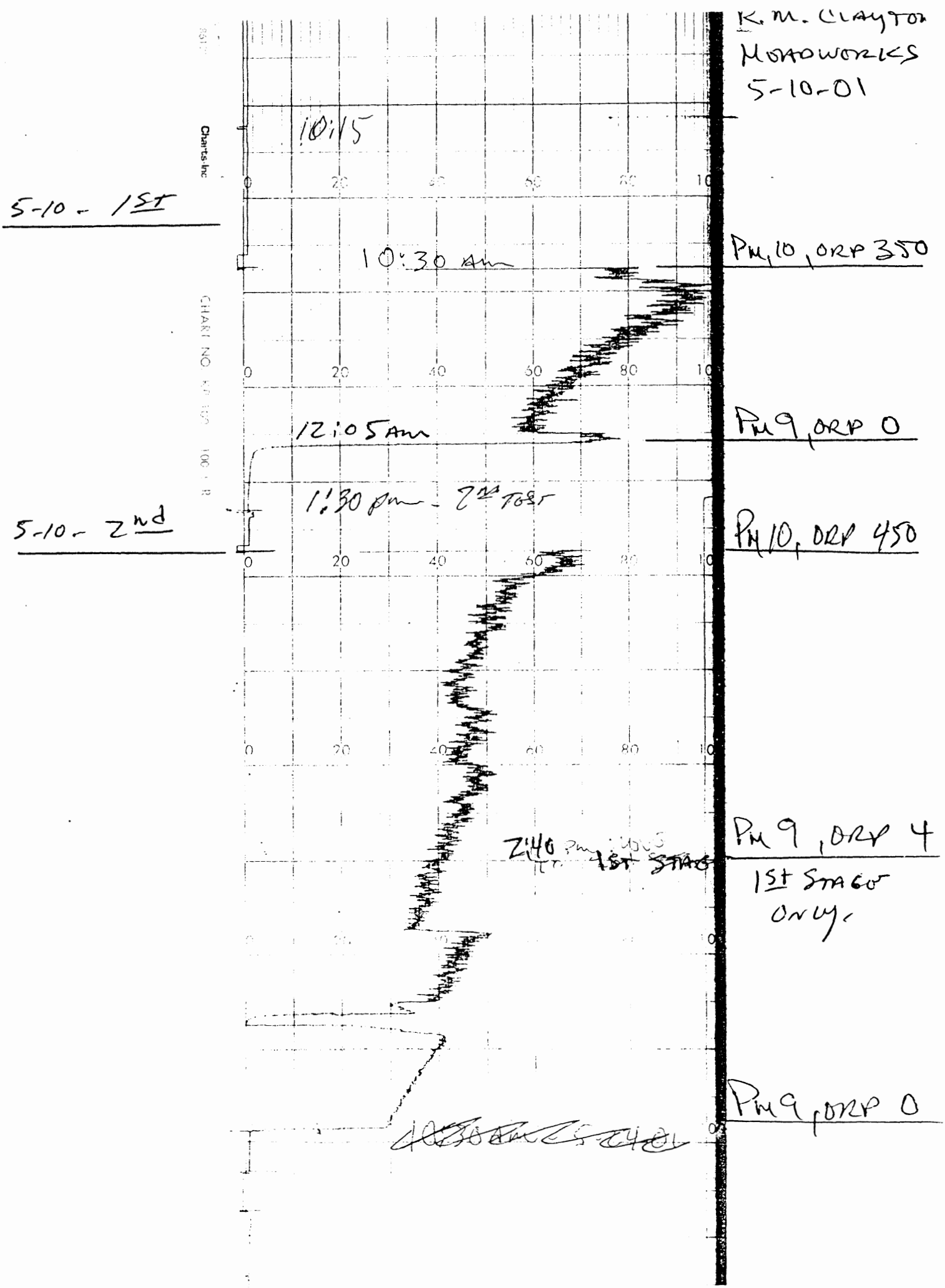
ppm	Time	Date	Min.	Max.	Mean	Note
.003	11:00:42	05/24/99	.003	.003	.003	
.009	11:01:42	05/24/99	.009	.009		
.004	11:02:42	05/24/99	.004	.009		
.006	11:03:44	05/24/99	.004	.009		
.004	11:04:44	05/24/99	.004	.009		
.008	11:05:44	05/24/99	.004	.009		
.012	11:06:46	05/24/99	.004	.012		
.007	11:07:46	05/24/99	.004	.012		
.02	11:08:46	05/24/99	.004	.02		
.008	11:09:48	05/24/99	.004	.02		
.012	11:10:48	05/24/99	.004	.02		
.006	11:11:48	05/24/99	.004	.02		
.008	11:12:50	05/24/99	.004	.02		
.003	11:13:50	05/24/99	.003	.02		
.011	11:14:50	05/24/99	.003	.02		
.004	11:15:52	05/24/99	.003	.02		
.017	11:16:52	05/24/99	.003	.02		
.006	11:17:52	05/24/99	.003	.02		
.004	11:18:54	05/24/99	.003	.02		
.005	11:19:54	05/24/99	.003	.02		
.006	11:20:54	05/24/99	.003	.02		
.006	11:21:56	05/24/99	.003	.02		
.013	11:22:56	05/24/99	.003	.02		
.003	11:23:56	05/24/99	.003	.02		
.005	11:24:58	05/24/99	.003	.02		
.005	11:25:58	05/24/99	.003	.02		
.026	11:27:00	05/24/99	.003	.026		
.008	11:28:00	05/24/99	.003	.026		
.014	11:29:00	05/24/99	.003	.026		
)12	11:30:02	05/24/99	.003	.026		
)03	11:31:02	05/24/99	.003	.026		
.004	11:32:02	05/24/99	.003	.026		
.004	11:33:04	05/24/99	.003	.026		
.006	11:34:04	05/24/99	.003	.026		
.005	11:35:04	05/24/99	.003	.026		
.004	11:36:06	05/24/99	.003	.026		
.003	11:37:06	05/24/99	.003	.026		
.013	11:38:06	05/24/99	.003	.026		
.006	11:39:08	05/24/99	.003	.026		
.003	11:40:08	05/24/99	.003	.026		
.004	11:41:08	05/24/99	.003	.026		
.004	11:42:10	05/24/99	.003	.026		
.004	11:43:10	05/24/99	.003	.026		
.004	11:44:10	05/24/99	.003	.026		
.004	11:45:12	05/24/99	.003	.026		
.004	11:46:12	05/24/99	.003	.026		
.006	11:47:12	05/24/99	.003	.026		
.006	11:48:14	05/24/99	.003	.026		
.004	11:49:14	05/24/99	.003	.026		
.004	11:50:14	05/24/99	.003	.026		
.004	11:51:16	05/24/99	.003	.026		
.003	11:52:16	05/24/99	.003	.026		
.005	11:53:18	05/24/99	.003	.026		
.003	11:54:18	05/24/99	.003	.026		
.003	11:55:18	05/24/99	.003	.026		

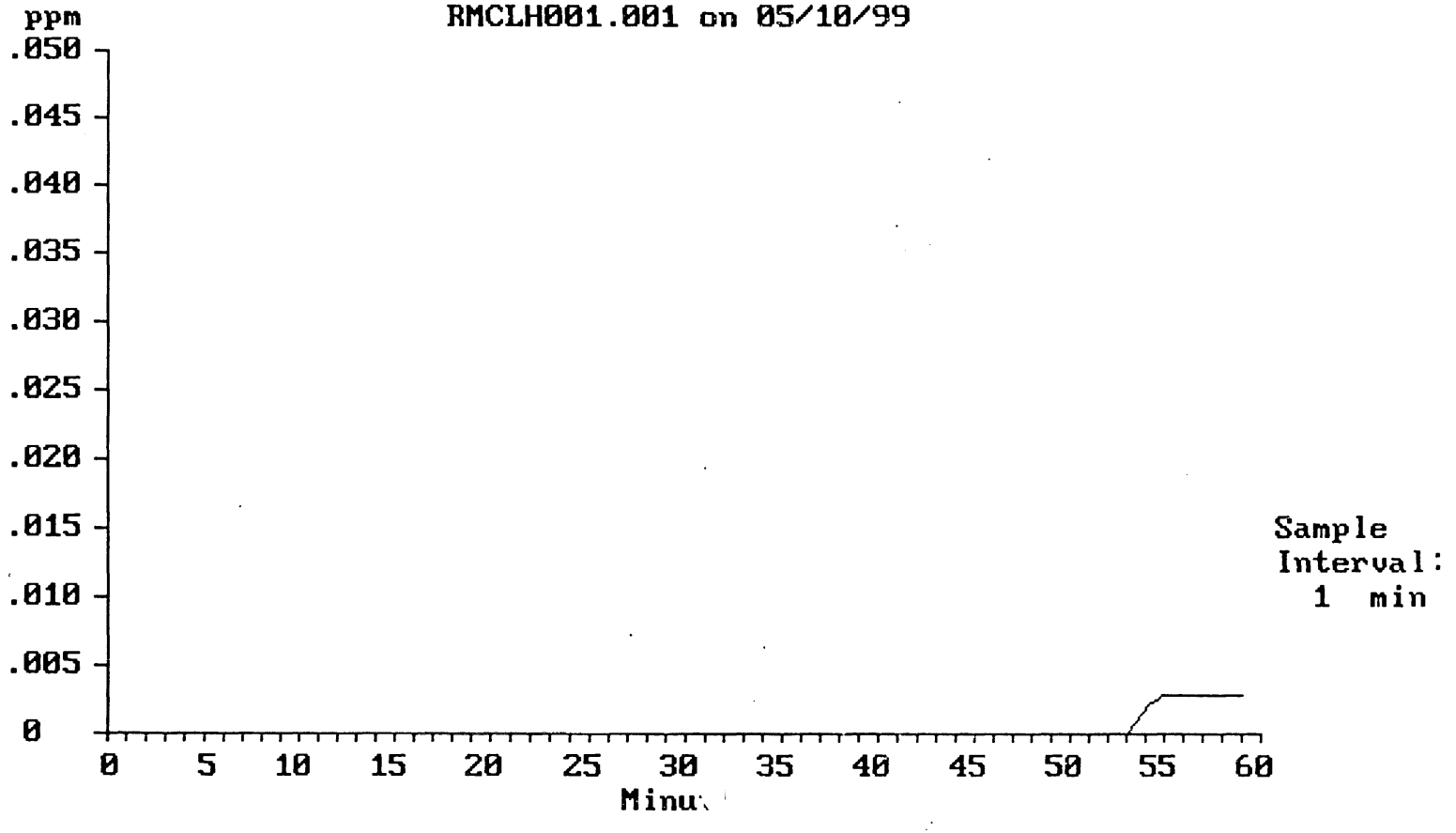
ppm	Time	Date	Min.	Max.	Mean	Note
.01	11:56:20	05/24/99	.003	.026		
.004	11:57:20	05/24/99	.003	.026		
.003	11:58:20	05/24/99	.003	.026		
.004	11:59:22	05/24/99	.003	.026		


RMHD001.003 on 05/24/99
ppm
.050
.045
.040
.035
.030
.025
.020
.015
.010
.005
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Minu
Sample
Interval:
1 min

File Name: RMHD001.003 Page: 1

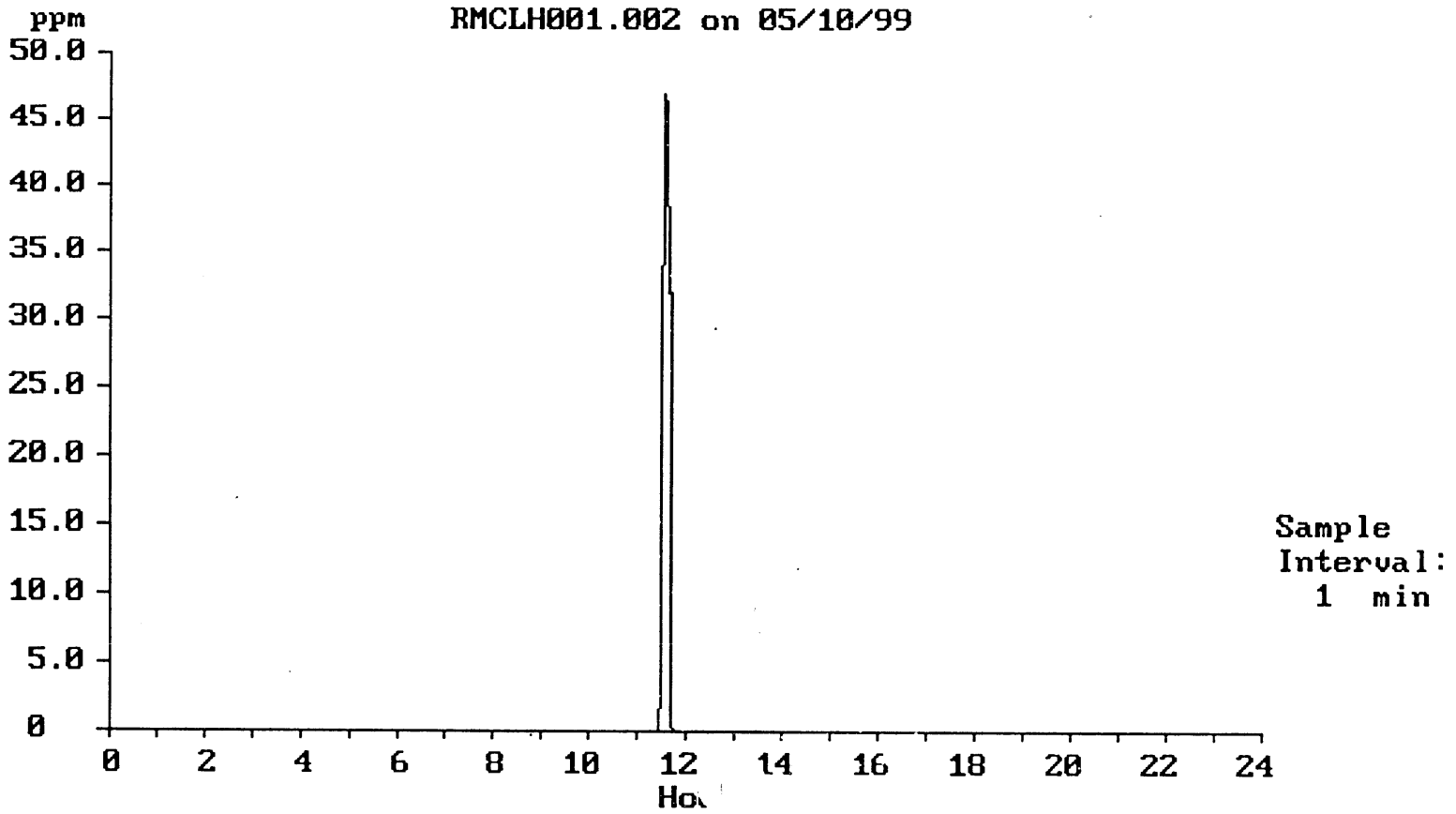
ppm	Time	Date	Min.	Max.	Mean	Note
.004	12:00:22	05/24/99	.004	.004	.004	
.004	12:01:22	05/24/99	.004	.004		
004	12:02:22	05/24/99	.004	.004		
.003	12:03:24	05/24/99	.003	.004		
.004	12:04:24	05/24/99	.003	.004		
.004	12:05:24	05/24/99	.003	.004		
.006	12:06:26	05/24/99	.003	.006		
.006	12:07:26	05/24/99	.003	.006		
.005	12:08:26	05/24/99	.003	.006		
.004	12:09:28	05/24/99	.003	.006		
.004	12:10:28	05/24/99	.003	.006		
.003	12:11:28	05/24/99	.003	.006		
.004	12:12:30	05/24/99	.003	.006		
.004	12:13:30	05/24/99	.003	.006		
.003	12:14:30	05/24/99	.003	.006		
.004	12:15:32	05/24/99	.003	.006		
.003	12:16:32	05/24/99	.003	.006		
.003	12:17:32	05/24/99	.003	.006		
.004	12:18:34	05/24/99	.003	.006		
.003	12:19:34	05/24/99	.003	.006		
.003	12:20:34	05/24/99	.003	.006		
.003	12:21:36	05/24/99	.003	.006		
.003	12:22:36	05/24/99	.003	.006		
.004	12:23:36	05/24/99	.003	.006		
.004	12:24:38	05/24/99	.003	.006		
.004	12:25:38	05/24/99	.003	.006		
.003	12:26:40	05/24/99	.003	.006		
.006	12:27:40	05/24/99	.003	.006		
.004	12:28:40	05/24/99	.003	.006		
006	12:29:42	05/24/99	.003	.006		
004	12:30:42	05/24/99	.003	.006		
.003	12:31:42	05/24/99	.003	.006		
.003	12:32:44	05/24/99	.003	.006		
.004	12:33:44	05/24/99	.003	.006		
.006	12:34:44	05/24/99	.003	.006		
.004	12:35:46	05/24/99	.003	.006		


K. M. CLAYTON
MOTOWORKS
5-10-01
10:15
5-10 - 1ST
10:30 AM
PM, 10, ORP 350
12:05 AM
PM 9, ORP 0
1:30 PM - 2ND TOST
5-10 - 2nd
PM 10, ORP 450
2:40 PM 1ST STAGE
PM 9, ORP 4
1ST STAGE ONLY.
PM 9, ORP 0


RMCLH001.001 on 05/10/99
ppm
.050
.045
.040
.035
.030
.025
.020
.015
.010
.005
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Minu
Sample
Interval:
1 min

File Name: RMCLH001.001 Page: 1

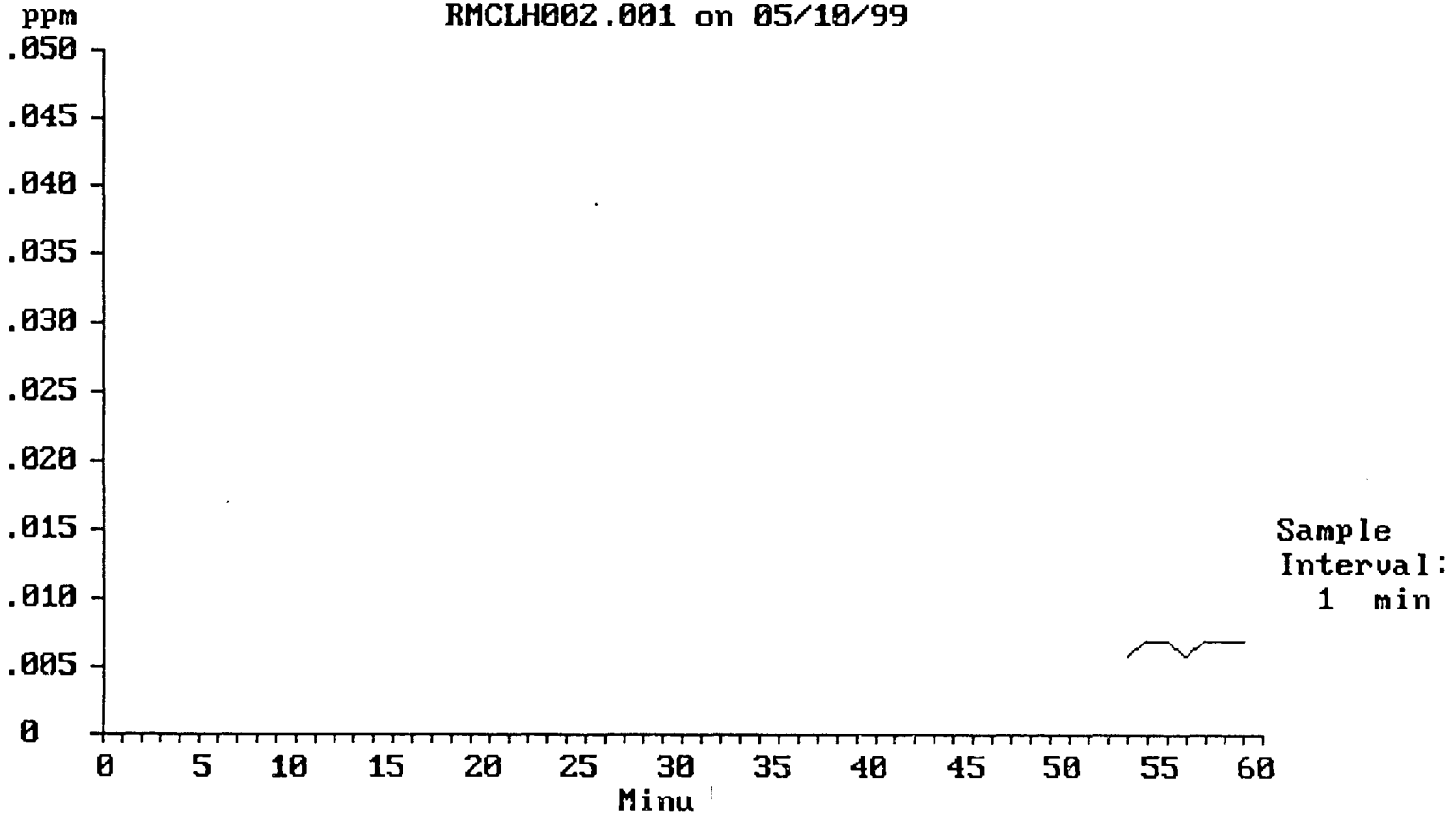
ppm	Time	Date	Min.	Max.	Mean	Note
000	10:53:28	05/10/99	0	0	0	
002	10:54:30	05/10/99	.002	.002		
.003	10:55:30	05/10/99	.002	.003		
.003	10:56:30	05/10/99	.002	.003		
.003	10:57:30	05/10/99	.002	.003		
.003	10:58:32	05/10/99	.002	.003		
.003	10:59:32	05/10/99	.002	.003		


ppm
RMCLH001.002 on 05/10/99
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0
0
2
4
6
8
10
12
14
16
18
20
22
24
Sample
Interval:
1 min

File Name: RMCLH001.002 Page: 1

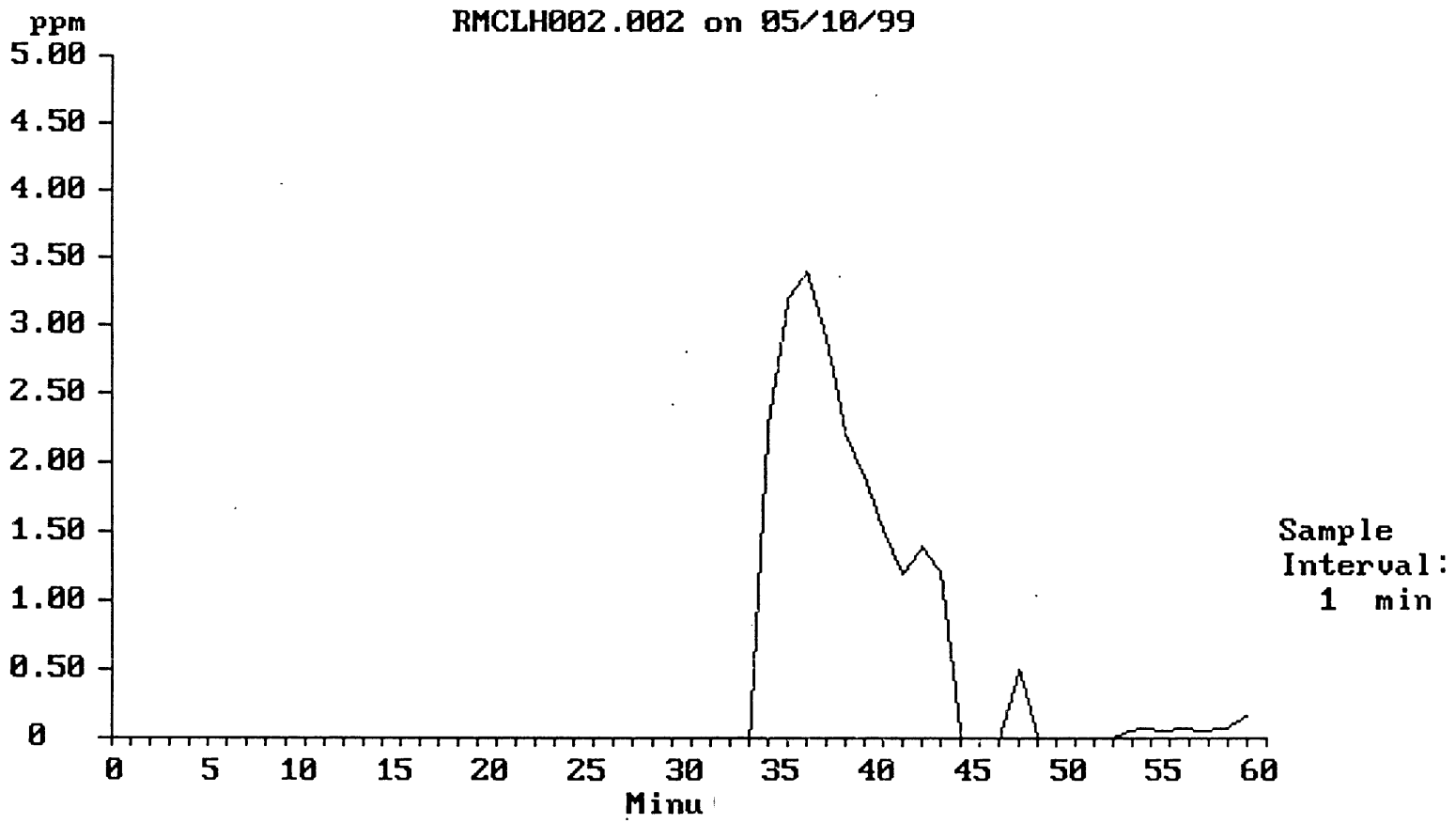
ppm	Time	Date	Min.	Max.	Mean	Note
.004	11:00:34	05/10/99	.004	.004	.004	
.004	11:01:34	05/10/99	.004	.004		
	11:02:12	05/10/99	55	55		Bridge Adjust Needed
	11:03:14	05/10/99	55	55		Bridge Adjust Needed
	11:04:14	05/10/99	55	55		Bridge Adjust Needed
	11:05:14	05/10/99	55	55		Bridge Adjust Needed
	11:06:16	05/10/99	55	55		Bridge Adjust Needed
	11:07:16	05/10/99	55	55		Bridge Adjust Needed
	11:08:16	05/10/99	55	55		Bridge Adjust Needed
	11:09:18	05/10/99	55	55		Bridge Adjust Needed
	11:10:18	05/10/99	55	55		Bridge Adjust Needed
	11:11:18	05/10/99	55	55		Bridge Adjust Needed
	11:12:20	05/10/99	55	55		Bridge Adjust Needed
	11:13:20	05/10/99	55	55		Bridge Adjust Needed
	11:14:20	05/10/99	55	55		Bridge Adjust Needed
	11:15:22	05/10/99	64	64		Data Not Received
.003	11:25:46	05/10/99	.003	64		
.003	11:26:48	05/10/99	.003	64		
.003	11:27:48	05/10/99	.003	64		
.003	11:28:48	05/10/99	.003	64		
.014	11:29:50	05/10/99	.003	64		
6.7	11:30:36	05/10/99	.003	64		
16	11:31:32	05/10/99	.003	64		
32	11:32:34	05/10/99	.003	64		
40	11:33:34	05/10/99	.003	64		
47	11:34:34	05/10/99	.003	64		
47	11:35:36	05/10/99	.003	64		
45	11:36:36	05/10/99	.003	64		
43	11:37:36	05/10/99	.003	64		
2	11:38:38	05/10/99	.003	64		
.9	11:39:38	05/10/99	.003	64		
37	11:40:40	05/10/99	.003	64		
35	11:41:40	05/10/99	.003	64		
32	11:42:40	05/10/99	.003	64		
32	11:43:42	05/10/99	.003	64		
.52	11:44:56	05/10/99	.003	64		
.13	11:45:56	05/10/99	.003	64		
	11:46:56	05/10/99	.003	64		Sensor Saturated
	11:47:42	05/10/99	.003	64		Sensor Saturated
	11:48:42	05/10/99	.003	64		Sensor Saturated
	11:49:34	05/10/99	.003	64		In Sensor Regen.
	11:50:36	05/10/99	.003	64		In Sensor Regen.
	11:51:36	05/10/99	.003	64		In Sensor Regen.
	11:52:36	05/10/99	.003	64		In Sensor Regen.
	11:53:38	05/10/99	.003	64		In Sensor Regen.
	11:54:38	05/10/99	.003	64		In Sensor Regen.
	11:55:38	05/10/99	.003	64		In Sensor Regen.
	11:56:40	05/10/99	.003	64		In Sensor Regen.
	11:57:40	05/10/99	.003	64		In Sensor Regen.
	11:58:40	05/10/99	.003	64		In Sensor Regen.
	11:59:42	05/10/99	.003	64		In Sensor Regen.
.007	12:01:12	05/10/99	.003	64		
.008	12:02:12	05/10/99	.003	64		
.022	12:03:12	05/10/99	.003	64		
.01	12:04:14	05/10/99	.003	64		

ppm	Time	Date	Min.	Max.	Mean	Note
	12:05:14	05/10/99	.003	64		Data Not Received


RMCLH002.001 on 05/10/99
ppm
.050
.045
.040
.035
.030
.025
.020
.015
.010
.005
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Minu
Sample
Interval:
1 min

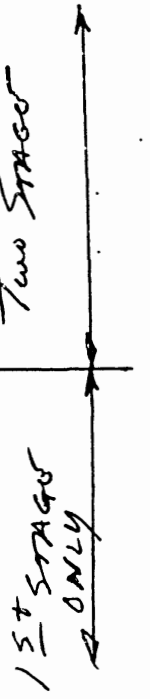
File Name: RMCLH002.001 Page: 1

ppm	Time	Date	Min.	Max.	Mean	Note
	13:44:50	05/10/99	0	0	0	Bridge Adjust Needed
	13:45:50	05/10/99	0	0	0	Bridge Adjust Needed
	13:46:52	05/10/99	0	0	0	Bridge Adjust Needed
	13:47:52	05/10/99	0	0	0	Bridge Adjust Needed
	13:48:52	05/10/99	0	0	0	Bridge Adjust Needed
	13:49:54	05/10/99	0	0	0	Bridge Adjust Needed
	13:50:54	05/10/99	0	0	0	Bridge Adjust Needed
	13:51:54	05/10/99	0	0	0	Bridge Adjust Needed
.006	13:53:16	05/10/99	.006	.006		
.007	13:54:16	05/10/99	.006	.007		
.007	13:55:18	05/10/99	.006	.007		
.006	13:56:18	05/10/99	.006	.007		
.007	13:57:18	05/10/99	.006	.007		
.007	13:58:20	05/10/99	.006	.007		
.007	13:59:20	05/10/99	.006	.007		


RMCLH002.002 on 05/10/99
ppm
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Minu
Sample
Interval:
1 min

File Name: RMCLH002.002 Page: 1

ppm	Time	Date	Min.	Max.	Mean	Note
.008	14:00:20	05/10/99	.008	.008	.008	
.007	14:01:22	05/10/99	.007	.007		
.007	14:02:22	05/10/99	.007	.007		
.007	14:03:22	05/10/99	.007	.007		
.006	14:04:22	05/10/99	.006	.007		
.006	14:05:24	05/10/99	.006	.007		
.007	14:06:24	05/10/99	.006	.007		
.007	14:07:24	05/10/99	.006	.007		
	14:08:04	05/10/99	.006	.007		Sensor Saturated
.009	14:09:26	05/10/99	.006	.009		
.008	14:10:26	05/10/99	.006	.009		
.007	14:11:28	05/10/99	.006	.009		
.007	14:12:28	05/10/99	.006	.009		
.007	14:13:28	05/10/99	.006	.009		
.007	14:14:30	05/10/99	.006	.009		
.007	14:15:30	05/10/99	.006	.009		
.007	14:16:30	05/10/99	.006	.009		
.008	14:17:32	05/10/99	.006	.009		
.008	14:18:32	05/10/99	.006	.009		
.008	14:19:32	05/10/99	.006	.009		
.007	14:20:34	05/10/99	.006	.009		
.006	14:21:34	05/10/99	.006	.009		
.007	14:22:34	05/10/99	.006	.009		
.009	14:23:36	05/10/99	.006	.009		
.007	14:24:36	05/10/99	.006	.009		
.009	14:25:36	05/10/99	.006	.009		
.008	14:26:38	05/10/99	.006	.009		
.008	14:27:38	05/10/99	.006	.009		
.007	14:28:38	05/10/99	.006	.009		
.007	14:29:40	05/10/99	.006	.009		
.008	14:30:40	05/10/99	.006	.009		
.006	14:31:40	05/10/99	.006	.009		
.007	14:32:42	05/10/99	.006	.009		
.01	14:33:42	05/10/99	.006	.01		
2.3	14:34:28	05/10/99	.006	2.3		
3.2	14:35:28	05/10/99	.006	3.2		
3.4	14:36:30	05/10/99	.006	3.4		
2.9	14:37:30	05/10/99	.006	3.4		
2.2	14:38:30	05/10/99	.006	3.4		
1.9	14:39:32	05/10/99	.006	3.4		
1.5	14:40:32	05/10/99	.006	3.4		
1.2	14:41:32	05/10/99	.006	3.4		
1.4	14:42:34	05/10/99	.006	3.4		
1.2	14:43:34	05/10/99	.006	3.4		
.008	14:44:50	05/10/99	.006	3.4		
.006	14:45:50	05/10/99	.006	3.4		
.006	14:46:50	05/10/99	.006	3.4		
.51	14:47:46	05/10/99	.006	3.4		
.006	14:48:52	05/10/99	.006	3.4		
.005	14:49:52	05/10/99	.005	3.4		
.006	14:50:54	05/10/99	.005	3.4		
.007	14:51:54	05/10/99	.005	3.4		
.01	14:52:54	05/10/99	.005	3.4		
.065	14:53:56	05/10/99	.005	3.4		
.077	14:54:56	05/10/99	.005	3.4		



ppm	Time	Date	Min.	Max.	Mean	Note
.062	14:55:56	05/10/99	.005	3.4		
081	14:56:58	05/10/99	.005	3.4		
.059	14:57:58	05/10/99	.005	3.4		
.074	14:58:58	05/10/99	.005	3.4		
.17	14:59:54	05/10/99	.005	3.4		

Back

ODOR CONTROL SYSTEMS

(Headworks, BNR-1, BNR-2, and Flowspliter)

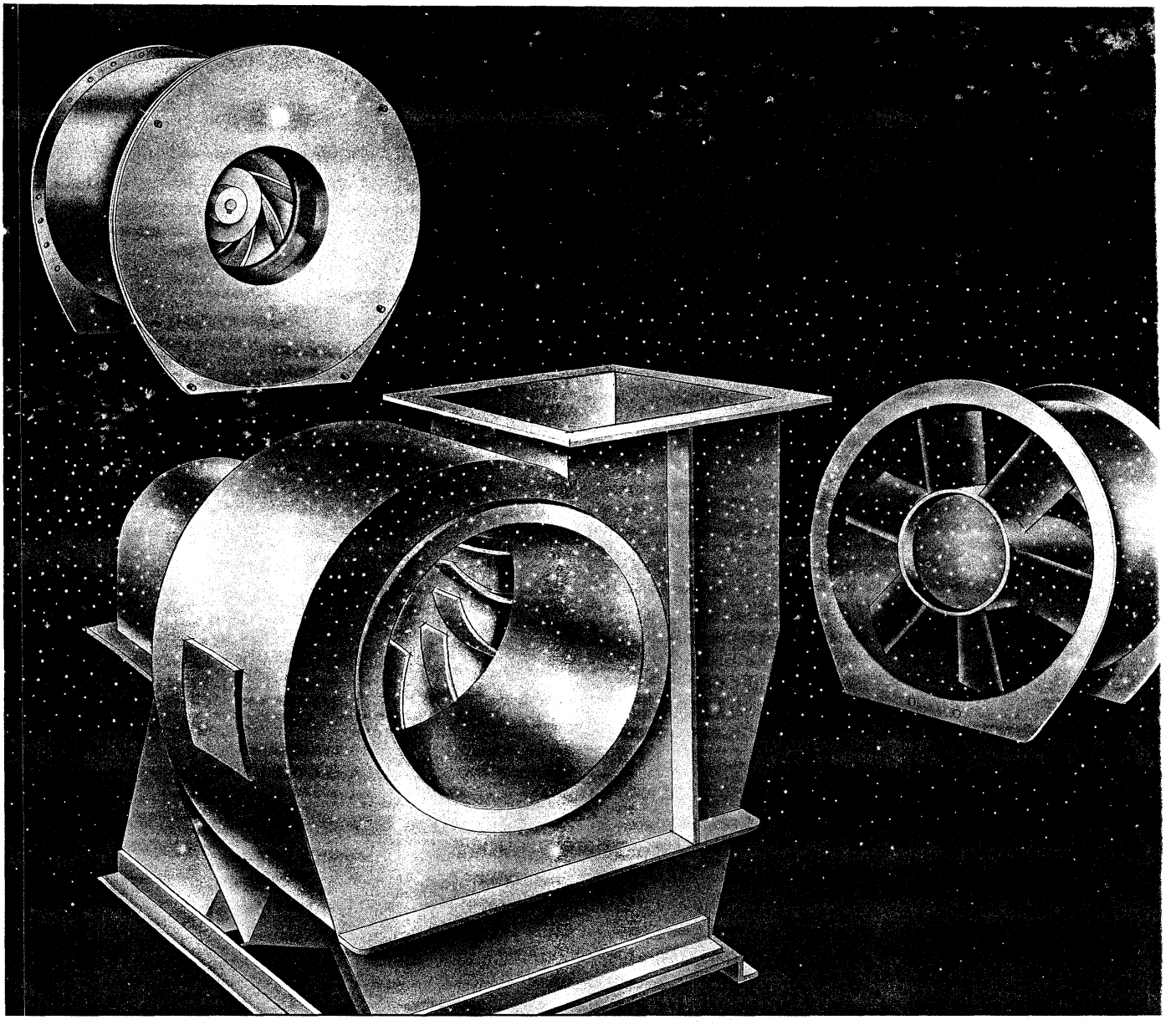
RM Clayton WRC Expansion Phase 3
Spec. Section 11255

TABLE OF CONTENTS

Back

Ceilcote Air Pollution Contro
Air-Cure Technologies, Inc.

Table of Contents



Installation & Maintenance Manual for Centrifugal and Axial Fans

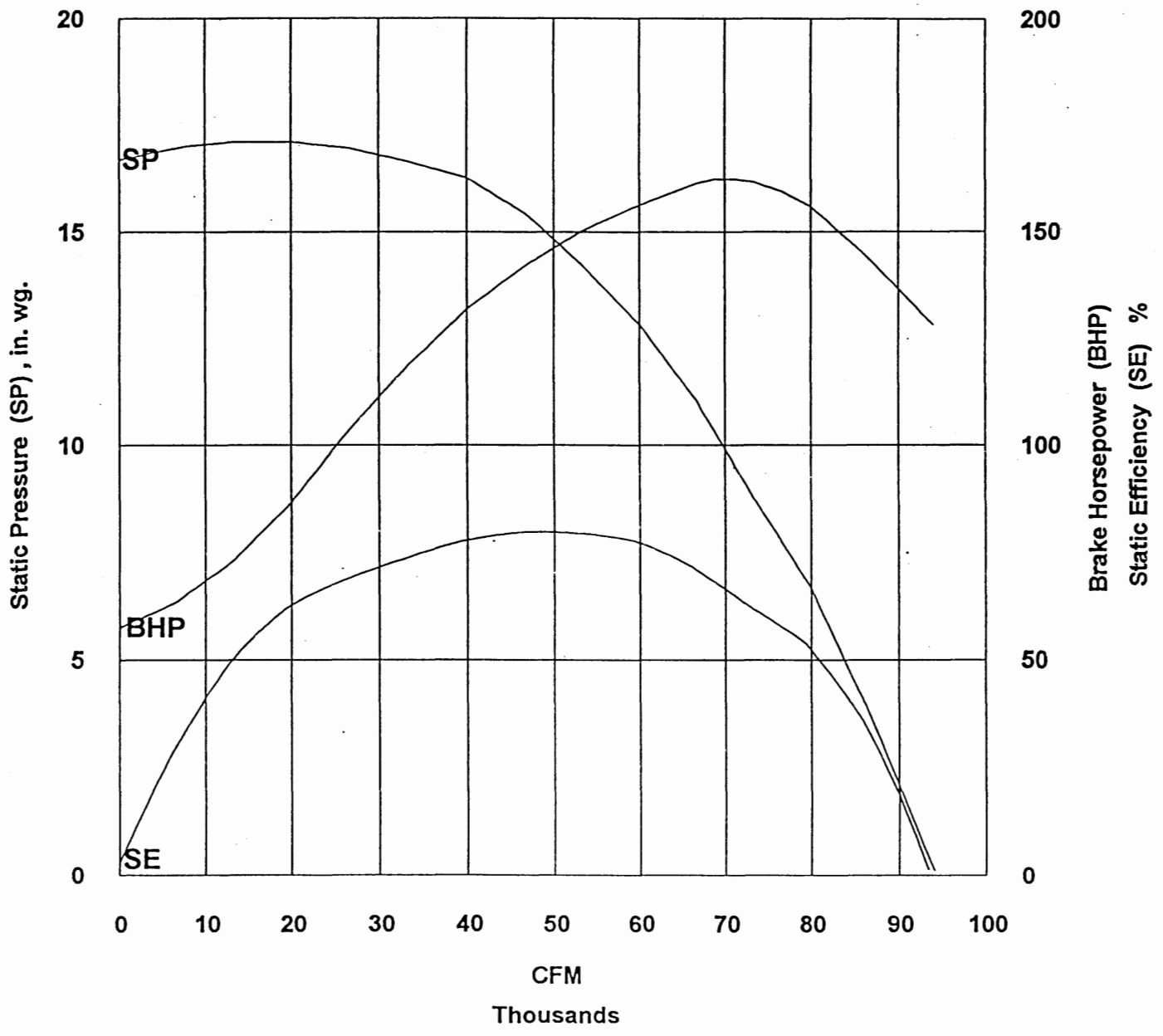
Bulletin 11-20

Ceilcote Air Pollution Control
800-554-8673; x264

21-Jan-00

CLUB 5425 Fan

At 1155 rpm and 0.075 lb/cf density



Design Conditions: 49,400 ACFM at 15.0" SP and ambient F
145.9 BHP at 0.075 lb/cf

CEILCOTE AIR POLLUTION CONTROL FAN SELECTION

Customer:
Quote:
Order No.:
Rev.:
Date: 01-21-2000
Time: 9:54:40 AM

Corrected Density - 0.072 lbs/cu. ft.

Temperature - 68.0 F
Elevation - 0 ft

CLUB Fan Size	5425
Operating Conditions:	
Volume (ACFM)	49,400
Static Pressure (in. W.C.)	15.00
Brake Horsepower	145.99
RPM	1,155
Standard Conditions:	
Static Pressure (in. W.C.)	15.57
Brake Horsepower	151.58
Outlet Velocity (ft/min)	3,123
Tip Speed (ft/min)	16,402
Static Efficiency (%)	79.9
Class	4

Premium Efficiency
Totally Enclosed Fan Cooled (TEFC)
Types RGZESD / RGZZESD / RGZESDX

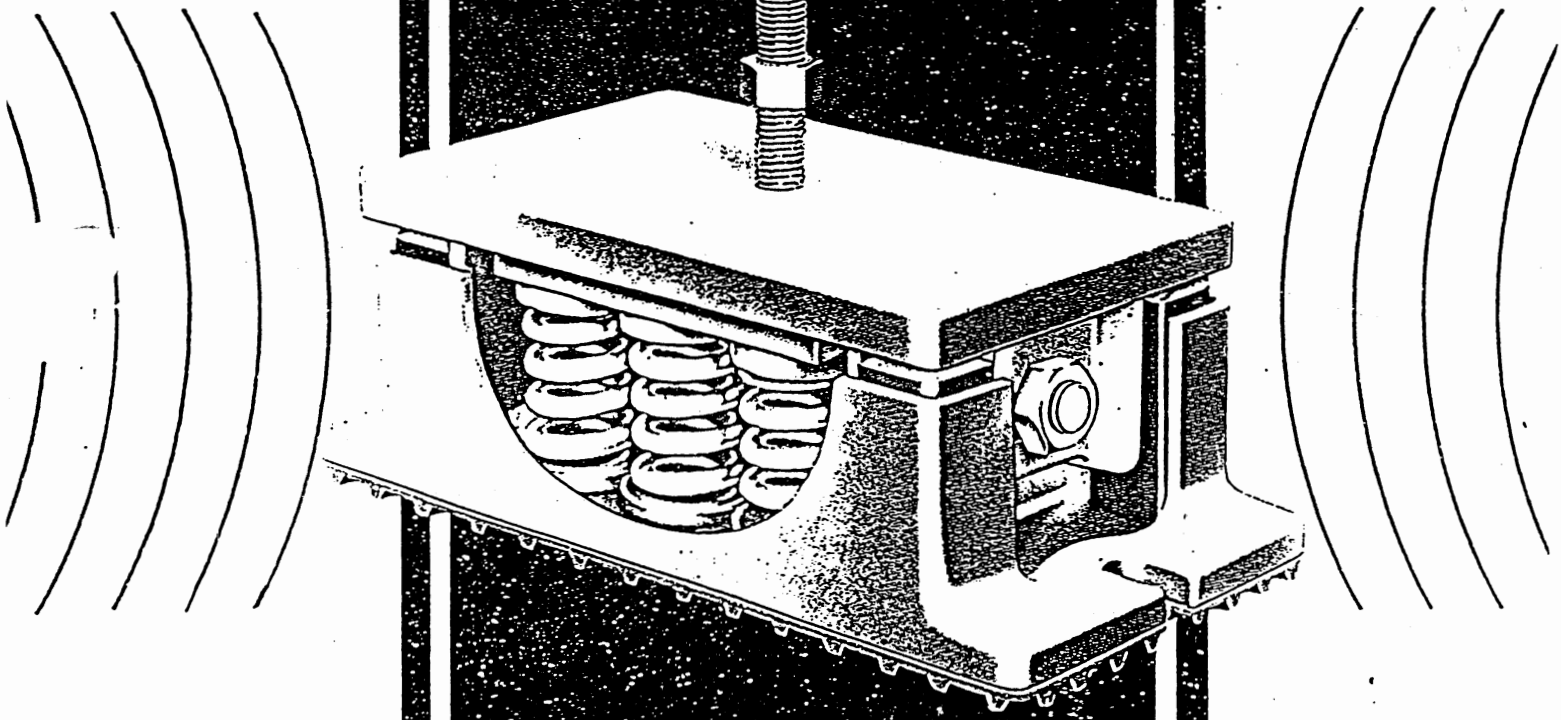
460 Volts, NEMA Design B, 40° C Ambient

				Current (A)			KVA/	Nominal Efficiency			Power Factor			Torque			LR Stall Time		Winding
HP	Synch RPM	F.L. RPM	Frame	No Load	Full Load	Locked Rotor	HP Code	1/2	3/4	Full Load	1/2	3/4	Full Load	Full Load (Lb-Ft)	Locked Rotor	Break-Down	Hot (Sec)	Cold (Sec)	Connection
1.0	3600	3490	143T	0.8	1.3	11	K	73.7%	78.3%	80.0%	77%	88%	90%	1.5	280%	340%			
1.0	1800	1745	143T	1.1	1.5	11	K	78.7%	81.8%	82.5%	52%	66%	76%	3.0	290%	320%	14	30	wye
1.0	1200	1140	145T	1.3	1.8	9	J	76.4%	78.8%	80.0%	42%	56%	65%	4.6	230%	290%	19	40	wye
1.0	900	860	182T	1.2	1.8	8	H	76.6%	78.9%	78.5%	42%	54%	63%	6.1	220%	260%	20	40	wye
1.5	3600	3485	143T	0.9	2.0	16	K	78.0%	82.0%	82.5%	69%	79%	85%	2.3	270%	320%	13	28	wye
1.5	1800	1740	145T	1.4	2.2	17	K	80.7%	83.5%	84.0%	54%	67%	76%	4.5	290%	320%	13	29	wye
1.5	1200	1160	182T	1.5	2.3	16	K	81.6%	84.2%	85.5%	50%	63%	71%	6.8	280%	320%	22	33	wye
1.5	900	860	184T	1.8	2.6	13	H	78.0%	80.4%	80.0%	45%	58%	68%	9.2	220%	270%	18	30	wye
2.0	3600	3495	145T	1.1	2.5	22	K	79.9%	83.2%	84.0%	73%	83%	89%	3.0	270%	320%	15	33	wye
2.0	1800	1735	145T	1.9	2.9	21	K	80.7%	83.6%	84.0%	52%	67%	77%	6.1	290%	310%	12	25	wye
2.0	1200	1160	184T	1.9	3.0	22	K	84.5%	86.0%	86.5%	50%	63%	72%	9.1	220%	300%	21	32	wye
2.0	900	865	213T	2.2	3.3	17	H	80.0%	82.0%	82.5%	46%	60%	69%	12.0	200%	290%	18	30	wye
3.0	3600	3510	182T	1.7	3.6	32	K	83.8%	86.2%	86.5%	75%	84%	90%	4.5	290%	320%	15	34	wye
3.0	1800	1740	182T	1.8	3.9	30	K	87.5%	88.0%	87.5%	65%	76%	82%	9.1	260%	300%	16	35	wye
3.0	1200	1165	213T	2.3	4.0	32	K	85.8%	87.6%	87.5%	58%	73%	80%	14.0	210%	300%	17	35	wye
3.0	900	865	215T	3.1	4.7	26	H	82.5%	84.2%	84.0%	48%	62%	71%	18.0	190%	280%	15	32	wye
5.0	3600	3490	184T	1.8	5.8	46	J	86.5%	87.8%	87.5%	82%	89%	92%	7.5	260%	320%	12	26	wye
5.0	1800	1730	184T	3.2	6.5	46	J	87.5%	88.2%	87.5%	63%	75%	82%	15.0	260%	300%	17	36	wye
5.0	1200	1160	215T	3.3	6.8	46	J	89.0%	89.7%	88.5%	59%	71%	78%	23.0	210%	300%	14	29	wye
5.0	900	865	254T	4.1	7.5	40	H	86.0%	87.0%	86.5%	53%	66%	72%	30.0	180%	260%	13	25	wye
7.5	3600	3515	213T	3.4	8.8	64	H	87.0%	88.0%	88.5%	77%	86%	90%	11.0	190%	280%	11	25	wye
7.5	1800	1750	213T	4.2	9.5	64	H	89.0%	90.0%	89.5%	66%	77%	83%	23.0	210%	270%	14	29	wye
7.5	1200	1170	254T	4.5	9.8	60	H	90.6%	90.9%	90.2%	59%	72%	78%	34.0	180%	250%	18	35	wye
7.5	900	865	256T	6.6	12.0	64	H	87.0%	88.0%	87.5%	49%	61%	69%	46.0	190%	260%	15	30	wye
10.0	3600	3505	215T	4.0	12.0	81	H	89.0%	89.8%	89.5%	80%	89%	87%	15.0	190%	260%	14	29	wye
10.0	1800	1750	215T	5.4	13.0	81	H	89.5%	90.0%	89.5%	68%	79%	84%	30.0	210%	270%	15	30	wye
10.0	1200	1165	256T	5.0	13.0	75	G	91.7%	91.5%	90.2%	65%	75%	80%	45.0	170%	250%	18	35	wye
10.0	900	875	284T	9.1	15.0	81	H	89.4%	90.9%	91.0%	50%	61%	69%	60.0	150%	220%	15	30	delta
15.0	3600	3530	254T	5.0	17.0	116	G	88.5%	90.0%	90.2%	84%	90%	92%	22.0	190%	260%	17	31	wye
15.0	1800	1760	254T	7.3	19.0	116	G	91.7%	92.1%	91.7%	68%	78%	82%	45.0	190%	260%	18	35	wye
15.0	1200	1175	284T	10.0	20.0	116	G	91.0%	91.7%	91.0%	57%	71%	77%	67.0	160%	270%	20	45	delta
15.0	900	875	286T	14.0	23.0	116	G	90.1%	91.4%	91.0%	50%	60%	67%	90.0	150%	220%	18	35	delta
20.0	3600	3525	256T	7.4	23.0	145	G	88.3%	89.9%	90.2%	82%	86%	90%	30.0	180%	260%	17	25	wye
20.0	1800	1755	256T	9.1	26.0	145	G	92.1%	92.4%	91.7%	67%	76%	80%	60.0	190%	270%	18	35	wye
20.0	1200	1175	286T	12.0	26.0	145	G	92.1%	92.4%	91.7%	62%	73%	79%	89.0	160%	250%	19	43	delta
20.0	900	880	324T	18.0	31.0	145	G	90.0%	91.2%	91.0%	50%	61%	67%	119.0	140%	200%	15	35	delta
25.0	3600	3525	284TS	8.0	29.0	183	G	92.0%	92.2%	91.7%	80%	85%	88%	37.0	160%	250%	16	30	delta
25.0	1800	1765	284T	13.0	29.0	183	G	93.3%	93.6%	93.0%	72%	82%	87%	74.0	220%	280%	19	40	delta
25.0	1200	1180	324T	15.0	33.0	183	G	92.2%	92.7%	92.4%	57%	69%	77%	111.0	170%	240%	25	50	delta
25.0	900	880	326T	22.0	38.0	183	G	89.2%	90.5%	90.2%	50%	61%	68%	149.0	150%	200%	22	40	delta
30.0	3600	3525	286TS	9.5	34.0	218	G	92.0%	92.2%	91.7%	84%	89%	90%	45.0	160%	250%	16	30	delta
30.0	1800	1765	286T	15.0	35.0	218	G	93.2%	93.6%	93.0%	71%	82%	86%	89.0	220%	280%	19	40	delta
30.0	1200	1180	326T	19.0	39.0	218	G	92.6%	92.9%	92.4%	58%	70%	78%	134.0	170%	240%	25	50	delta
30.0	900	885	364T	26.0	47.0	218	G	89.9%	91.3%	91.0%	50%	62%	66%	178.0	150%	200%	22	40	delta

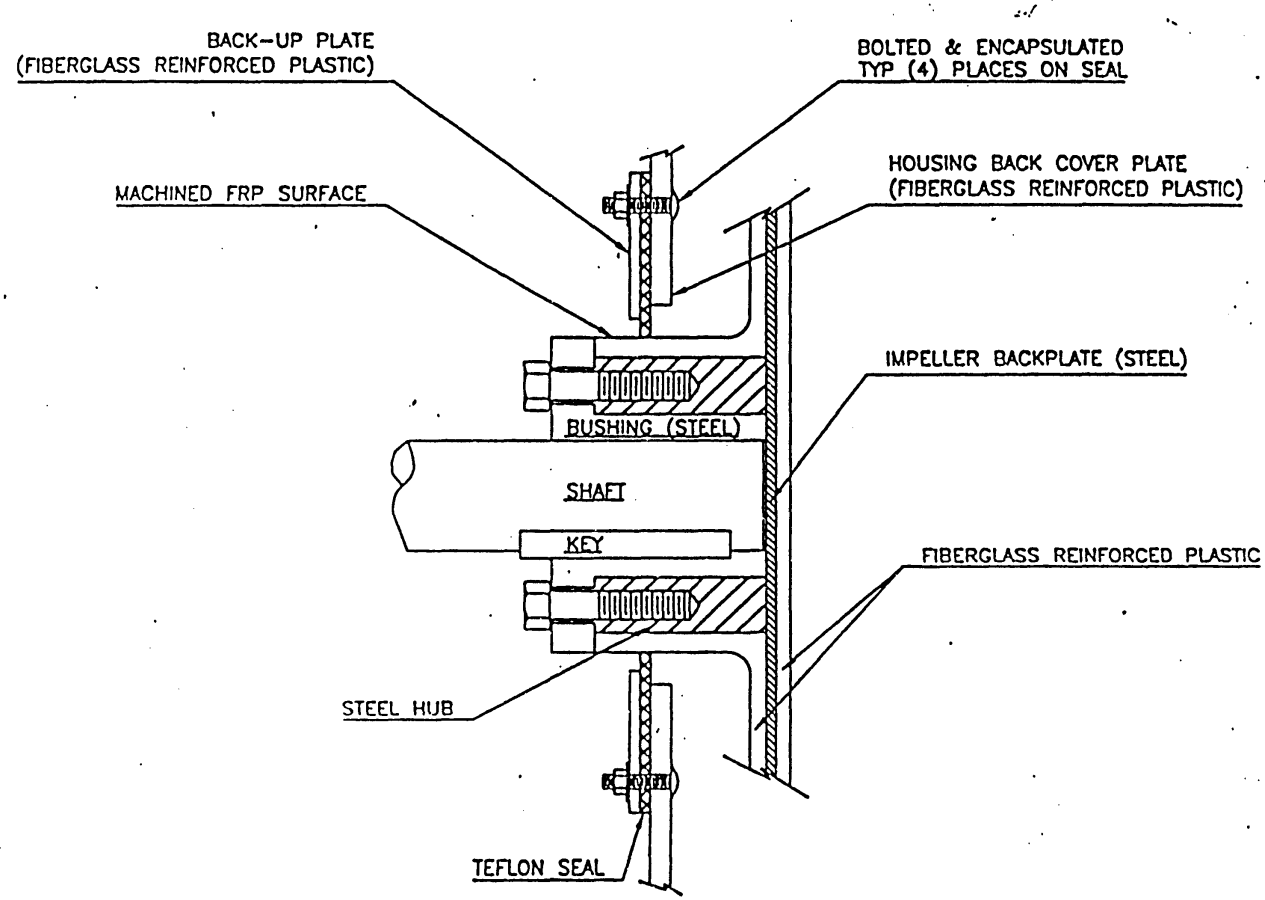
2E

Bulletin K3J

SERIES L
STEEL SPRING VIBRATION ISOLATORS
30 - 23,000 LB. LOAD RANGE



"total concept engineering"



REV.	DATE	DESCRIPTION	DRWN	CHK'D

TITLE
SINGLE TEFLON SEAL
IMPELLER HUB & SEAL DETAIL

CUSTOMER

SCALE: NONE

NOTICE:

APPROVED:

DATE:

SHT.: 1 OF 1

CEILCOTE AIR POLLUTION CONTROL
AIR-CURE DYNAMICS, INC.

DRAWN: CMD	CHK'D.:	SK811	REV. 0
DATE: 8-12-97	DATE:		

CAD File: SK811.DWG

[X] CUST. [ ] SUB.

SECTION III

TABLE A

CAPACITY & CHARACTERISTICS

Data Applies to Types LK, LI, LN & LO

ISOLATOR		MAX. CAPACITY IN POUNDS (2)		ISOLATOR CONSTANT LBS./INCH (3)	FREE HEIGHT (5) INCHES		MINIMUM WORKING HEIGHT (4)	QUANTITY OF SPRINGS
HOUSING SIZE	SPRING NUMBER (1)	MAX. STEADY	MAX. IMPACT		LK & LN	LI & LO		
AA	1	116	—	78	3¾"	—	3"	↑1
	2	210	—	184				
	45	325	—	440	3⅞"	—		
	46	450	—	800				
A	50	50	—	25	5½"	6"	4⅞"	1
	51	125	—	62.5				
	52	200	—	120				
	53	300	—	190				
	54	500	—	345				
	55	700	—	560				
	56	1,200	—	1,650				
	45	325	260	440	4¾"	4¾"	4¾"	
	46	450	360	800				
	47	600	480	1,225				
	57	1,100	825	2,130				
	68	1,300	1,225	2,650		5"		
D	50	100	—	50	5¾"	6½"	4½"	2
	51	250	—	125				
	52	400	—	240				
	53	600	—	380				
	54	1,000	—	690				
	55	1,400	—	1,120				
	56	2,400	—	3,300				
	45	650	520	880	4⅞"	5⅛"		
	46	900	720	1,600				
	47	1,200	960	2,450				
	57	2,200	1,650	4,260				
	68	2,600	2,450	5,300	4¾"	5½"		
E	50	200	—	100	5¾"	6¾"	4⅝"	4
	51	500	—	250				
	52	800	—	480				
	53	1,200	—	760				
	54	2,000	—	1,380				
	55	2,800	—	2,240				
	56	4,800	—	6,600				
	45	1,300	1,040	1,760	4¾"	5¾"		
	46	1,800	1,440	3,200				
	47	2,400	1,920	4,900				
	57	4,400	3,300	8,520	5"	5¾"		
	68	5,200	4,900	10,600				
G	50	450	—	225	6¼"	7¼"	4¾"	9*
	51	1,125	—	563				
	52	1,800	—	1,080				
	53	2,700	—	1,710				
	54	4,500	—	3,105				
	55	6,300	—	5,040				
	56	10,800	—	14,850				
	45	2,925	2,340	3,960	4¾"	5¾"		
	46	4,000	3,200	7,200				
	47	5,400	4,320	11,025				
	57	9,900	7,425	19,160	4⅞"	5⅞"		
	68	11,700	11,025	23,850	5¼"	6¼"		
H	756	11,450	8,580	17,320	7¼"	8⅜"	6¾" LKH 7¾" LIH	6 7 8 9
	757	13,370	10,000	20,200				
	758	15,300	11,460	23,090				
	759	17,200	12,900	25,970				
J	7512	22,900	17,160	34,640		8¾"	8¼	12

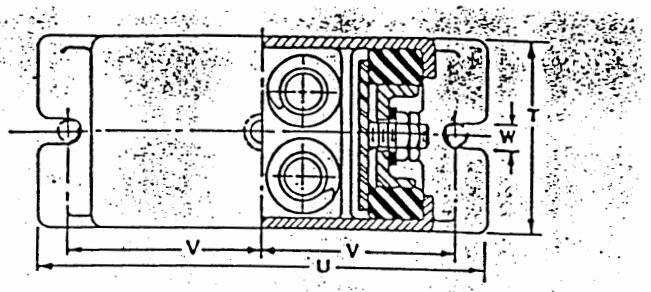
First 2 digits indicate spring designation number. Additional digits, if any, indicate quantity of springs used. Different springs may be combined in an isolator for special conditions; for example, LKE 552-562 has two #55 and two #56 springs.

(2) Ratings listed under "STEADY" are maxima for steady running applications (no impact). Ratings listed under "IMPACT" are maxima for impact applications on punch presses, hammers, and pulverizers.

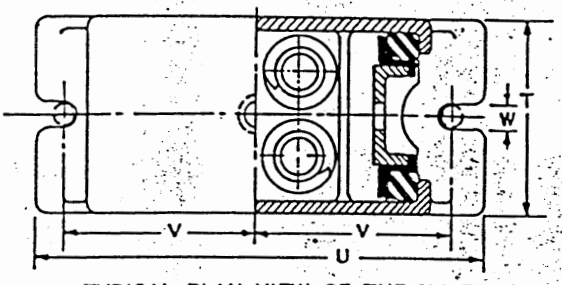
(3) Static spring deflection in inches = load ÷ isolator constant.

(4) Minimum operating height = free height − spring deflection, or dimension shown in referenced column, whichever is greater.

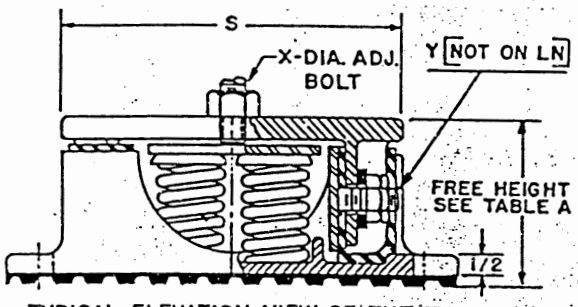
(5) Free height tolerance ± 1/4 inch.



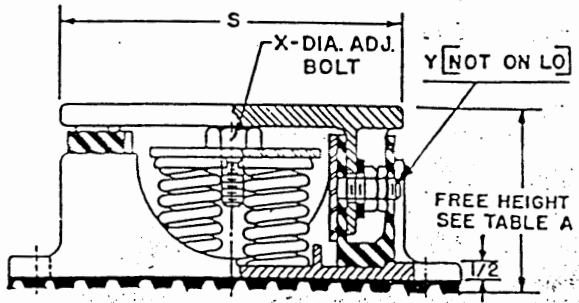
TYPICAL PLAN VIEW OF THE TYPES LK & LI ISOLATOR, SIZE E SHOWN



TYPICAL PLAN VIEW OF THE TYPES LN & LO ISOLATOR, SIZE E SHOWN



TYPICAL ELEVATION VIEW OF THE TYPES LK & LN ISOLATOR, SIZE E SHOWN

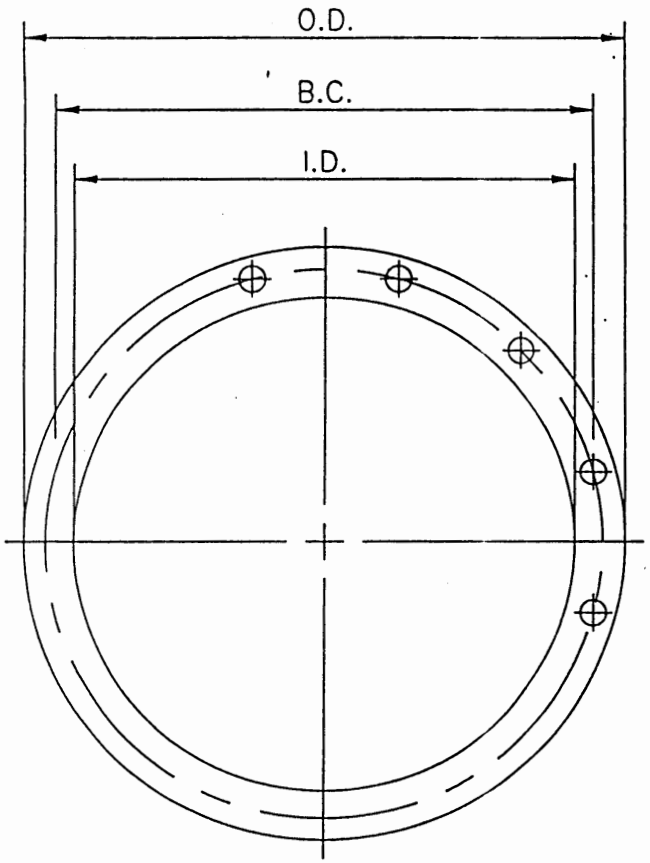


TYPICAL ELEVATION VIEW OF THE TYPES LI & LO ISOLATOR, SIZE E SHOWN

TABLE B

DIMENSIONS & SHIPPING WEIGHTS

Dimen. Letter	Isolator Housing Size						
	AA	A	D	E	G	H	J
S	3-1/4"	4"	6-7/8"	9-1/8"	11-1/2"	11-1/2"	13-3/4"
T	2	2-1/2	5	5	7	7	7
U	5-1/8	6-7/8	9-1/2	11-3/4	14	14	16-1/4
V	2-1/4	2-3/4	4	5-1/8	6-1/4	6-1/4	7-3/8
W	5/16	9/16	9/16	11/16	13/16	13/16	13/16
X	3/8	1/2	5/8	3/4	1	1-1/4*	1**
Y	—	5/16	5/8	5/8	3/4	3/4	3/4
Shipping Wt. lbs.	4	7	20	25	55	80	120



FAN SIZE	I.D.	O.D.	B.C.	HOLES		THK
				QTY	DIA	
6	6	10 3/8	9	8	7/16	1/4
8	8	12 3/8	11	8	"	"
10	10	14 3/8	13	12	"	3/8
12	12	16 3/8	15	12	"	"
14	14	18 3/8	17	12	"	"
16	16	20 3/8	19	16	"	1/2
18	18	22 3/8	21	16	"	"
20	20	24 3/8	23	20	"	"
24	24	28 3/8	27	20	"	"
30	30	34 3/8	33	28	"	"
36	36	40 3/8	39	32	"	"
42	42	46 3/8	45	36	"	5/8
48	48	54 3/8	52	44	9/16	"
54	54	60 3/8	58	44	"	"
60	60	66 3/8	64	52	"	"
72	72	78 3/8	76	60	"	3/4

NOTES

1. ALL DIMENSIONS ARE IN INCHES.
2. FLANGE DIMENSIONS ARE IN ACCORDANCE WITH TABLE–2 IN PRODUCT STANDARD PS 15–69.
3. FLANGES ARE FURNISHED DRILLED ONLY WHEN SPECIFIED ON THE FAN DRAWING.
4. BOLT HOLES STADDLE NATURAL CENTERLINES.

	DESCRIPTION	DRWN	CHK'D	

TITLE INLET FLANGES

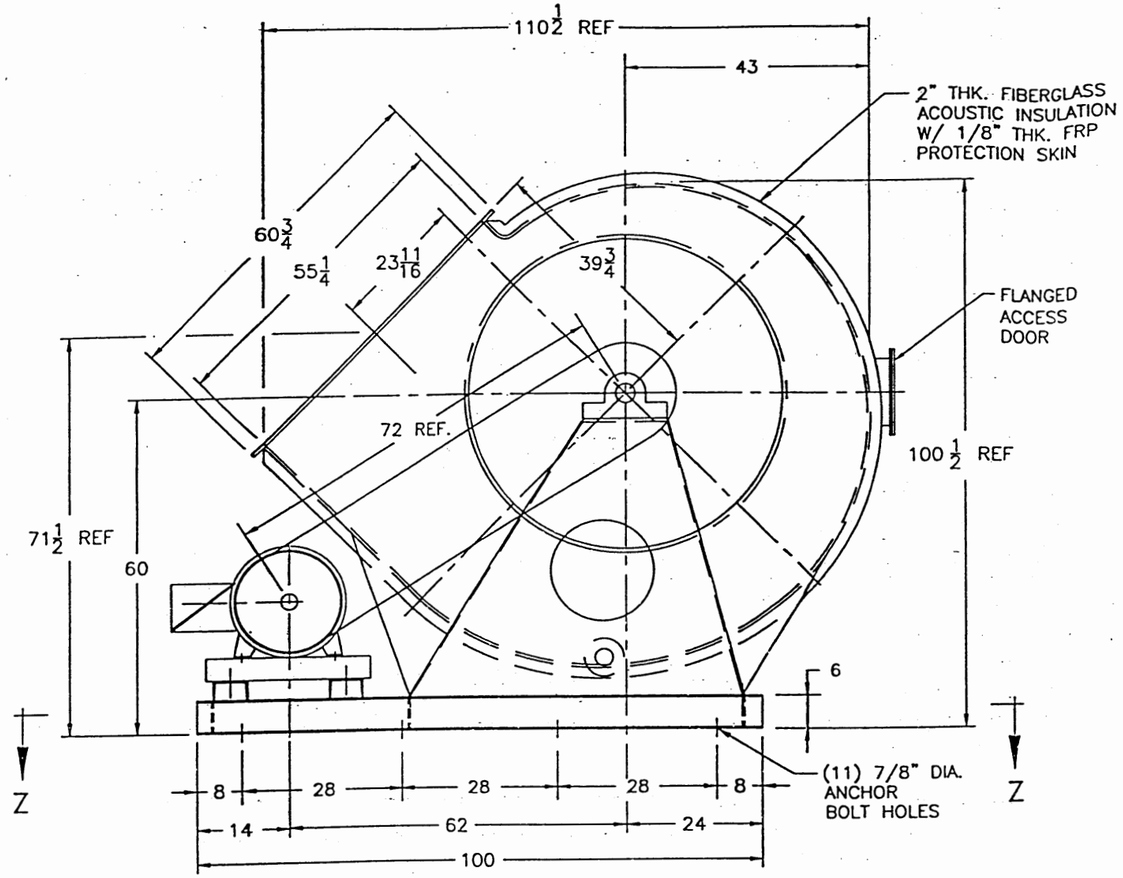
CUSTOMER

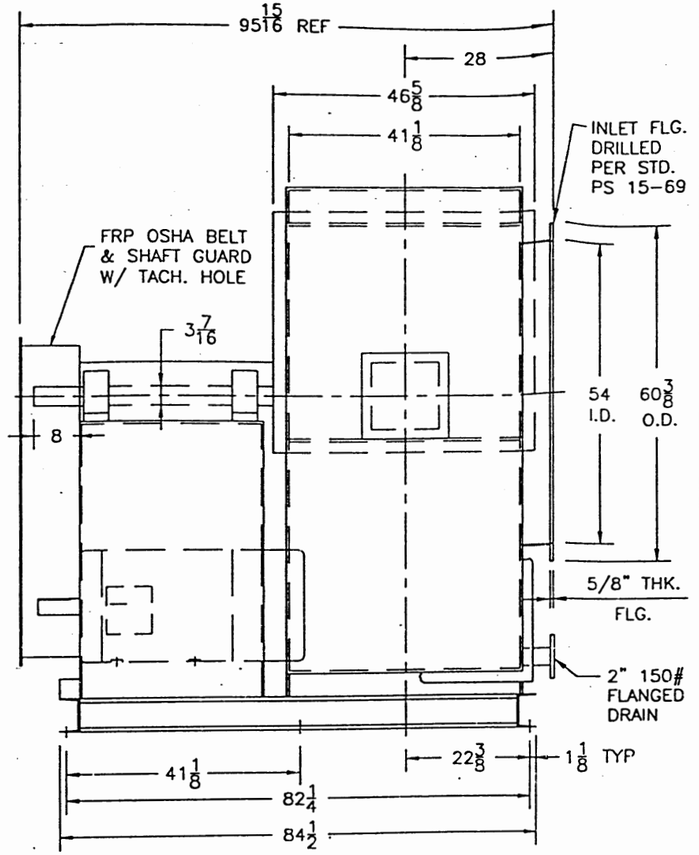
SCALE: NONE

APPROVED: DATE: SHT.: 1 OF 1

CEILCOTE AIR POLLUTION CONTROL
AIR–CURE DYNAMICS, INC.

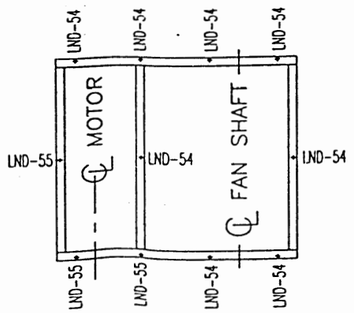
DRAWN: CMD	CHK'D.:	FAN STD F–1	REV. 0
DATE: 5–21–98	DATE:		





FAN SPECIFICATION			
FAN MODEL	CLUB-5425		
NO. REQ'D.	TWO (2)		
ROTATION	CW		
DISCHARGE POS.	BAU		
ARRANGEMENT	1E UNITIZED		
HOUSING MATERIAL	DION 9300 W/ NYA		
IMPELLER MATERIAL	ATLAC 580		
CONSTRUCTION	CLASS IV (W/ CENTER STIF		
COLOR GREEN			
CFM 49,400		RPM 1155/1175 M	
TEMPERATURE: 68 Deg F DB		68 Deg F	
	ACTUAL	STD (70°	
AIR DENSITY	0.072 LB/CF	0.075 LB/	
STATIC PRESS	15.0" W.G.	15.57" W.(	
BHP	145.9 BHP	151.6 BHF	
FAN ACCESSORIES			
INLET FLANGE X	OUTLET FLANGE X		
FLANGE DRILLING	X INLET	X OUT	
FLEX. CONNECTOR	– INLET	– OUT	
SHAFT MATERIAL	CARBON STEEL		
SHAFT SEAL	YES		
GUARD:	X BELT	X SHAFT	
MTR. & DR. CANOPY	NONE		
ACCESS DOOR	YES – FLG'D EXTENDED		
INTEGRAL DISCHARGE	– TYPE 1	– TYPI	
FLANGED DISCHARGE	– TYPE 3	– TYPI	
TRANS. DRILLING	– INLET	– OUT	
TRANS. ATTACHMENT	BOLTING NONE		
MOTOR RAILS	YES – ADJUSTABLE		
DRIVE	FIXED V-BELT – S.F. 1.5		
VIBRATION MOUNTS	(8)LND-54 & (3)LND-		
MOTOR SPEC		STANDARDS	
HP 200 (BY OTHERS)		x INLET FLG. F-	
RPM 1800		x OUTLET FLG. F	
FRAME SIZE 447T		- TRANSITIONS T	
VOLTAGE			
PHASE			
CYCLE			
ENCLOSURE			
WEIGHT LBS.			
CUSTOMER INFORMATION			
P.O. NO.	IE20119		
TAG:	(1) OCF-HW-1 & (1) OCF-HW-		
F.O./S.O. NO.	66368 / 7766		

NOTES:
1. ALL TABLED DIMENSIONS ARE IN INCHES.
2. ALL DISCHARGE POSITIONS & ROTATIONS ARE VIEWED FROM THE SHAFT END.
3. FAN BASE SANDBLASTED AND EPOXY COATED PER CEILCOTE STANDARD TYPE "B" PROCEDURE.
4. FAN TESTED AND BALANCED AT OPERATING SPEED. BALANCE TOLERANCE NOT TO EXCEED 0.078 IN/SEC VELOCITY.
5. EXTENDED GREASE FITTINGS.
6. GASKET MATERIAL EPDM, ALL HARDWARE 316 S.S.
7. ALL INTERNAL SURFACES COATED WITH CARBON GEL WITH EMBEDDED S.S. GROUNDING LUG STRAPPED TO BASE.
8. BEARINGS – DODGE SAF – 200,000 HRS L-10 LIFE.
9. MOTOR BY INDUSCO, INC., MOUNTING BY CEILCOTE.
10. MOTOR, VANE DAMPERS & FLEXIBLE CONNECTORS BY OTHERS.
11. ADJUSTABLE SHEAVE DRIVE NOT RECOMMENDED ON MOTORS 25 HP & OVER. CEILCOTE WILL SUPPLY SECOND DRIVE, AFTER FIELD PERFORMANCE TEST, IF FAN RPM HAS TO BE ADJUSTED. DRIVE MOUNTING BY OTHERS.
12. FAN WT. = APPROX. 5,000 LBS. (LESS MOTOR).



VIEW Z-Z
ISOLATOR LAYOUT

CERTIFIED
DATE 3-8-2000
BY JEB

X	NOT APPROVED FOR FABRICATION	
	APPROVED FOR FABRICATION	/ /
DISP.	DRAWING STATUS	DATE

REV.	DATE	DESCRIPTION	DRWN	CHK'D

TITLE
CLUB-5425 FAN
UNITIZED BASE – 1E ARRANGEMENT

CUSTOMER INDUSCO ENVIRONMENTAL SERVICES, INC.
R.M. CLAYTON W.W.T.P.
ATLANTA, GA.

SCALE: N.T.S.

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APPROVED: | DATE: | SHT.: 1 OF 4

CEILCOTE AIR POLLUTION CONTROL
14955 Sprague Rd. Suite 250 Strongsville, Ohio 44136-175

DRAWN: GB	CHK'D.:	66368-1
DATE: 3/6/00	DATE:	

CAD File: 66368-1.DWG

X CUST. X S

Back

ODOR CONTROL SYSTEMS

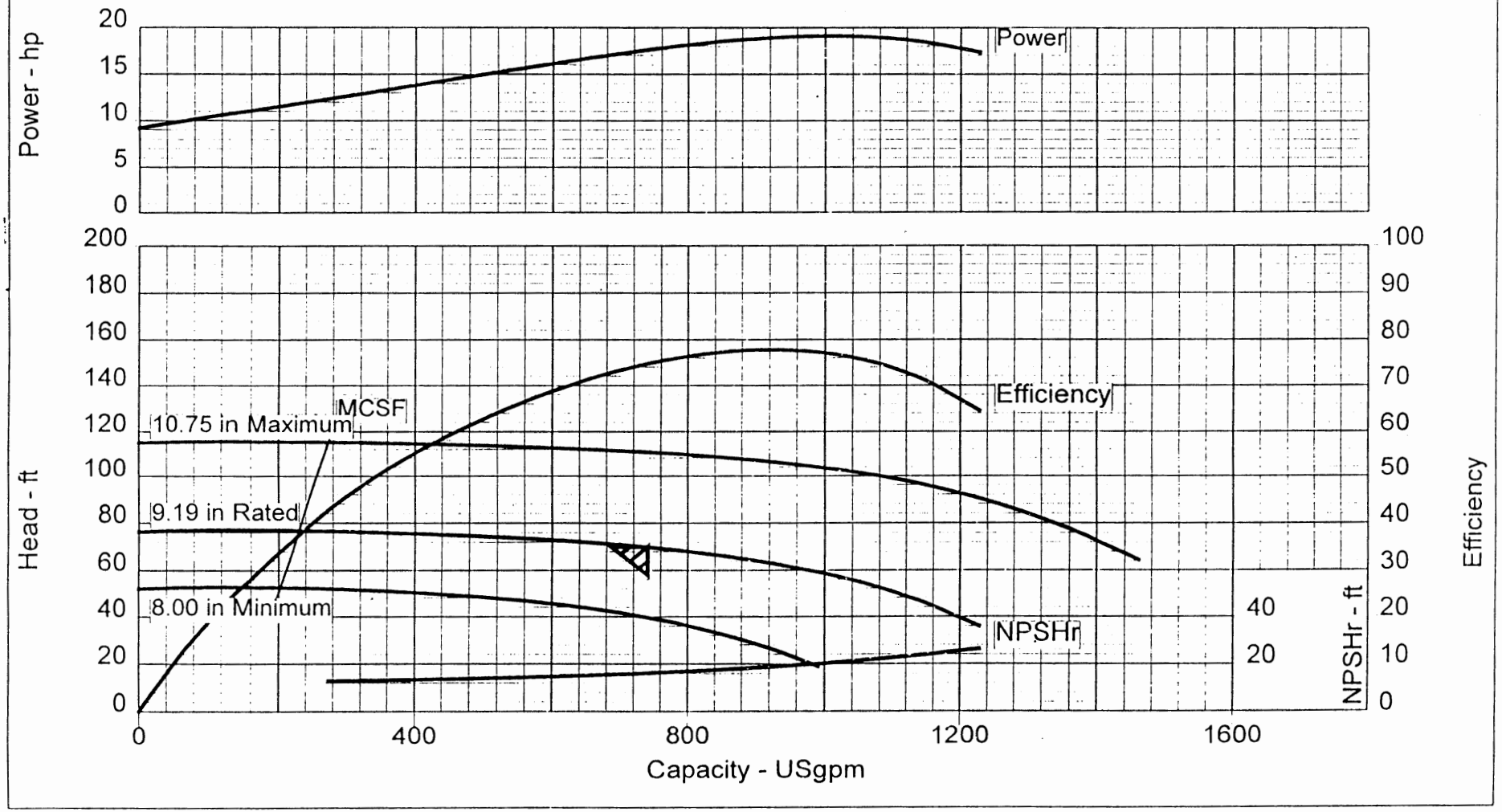
(Headworks, BNR-1, BNR-2, and Flowspliter)

RM Clayton WRC Expansion Phase 3
Spec. Section 11255

TABLE OF CONTENTS

Customer	: **Pizzagalli**	**Ingersoll-Dresser Pumps**	Pump size & type: **6X4X10 GRP**
Item number	: **Headworks**		Based on curve no.**10GRP.E1**
Service	:		Number of stages: **1**
Vendor reference	: **0653-00083**	Capacity : **741.0 USgpm** Specific gravity **1.000**	
Date	: April 14, 2000	Head : **70.00 ft** Pump speed : **1750 rpm**	

CURVES ARE APPROXIMATE, PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS, CAPACITY, HEAD, AND EFFICIENCY



Ingersoll-Dresser Pumps — **Hydraulic Datasheet**

Customer	: Pizzagalli	Pump / Stages	: 6X4X10 GRP / 1
Customer reference	:	Based on curve no.	: 10GRP.E1
Item number	: Headworks	Vendor reference	: 0653-00083
Service	:	Date	: April 14, 2000

Operating Conditions

Capacity	: 741.0 USgpm
Water capacity (CQ=1.00)	: -
Normal capacity	: -
Total Developed Head	: 70.00 ft
Water head (CH=1.00)	: -
NPSH available (NPSHa)	: Ample
NPSHa less NPSH margin	: -
Maximum suction pressure	: 0.0 psig

Liquid

Liquid type	: Water
Temperature / SG	: 60 °F / 1.000
Solids diameter	: -
Viscosity / Vapor pressure	: 1.0 cSt / -

Materials / Specification

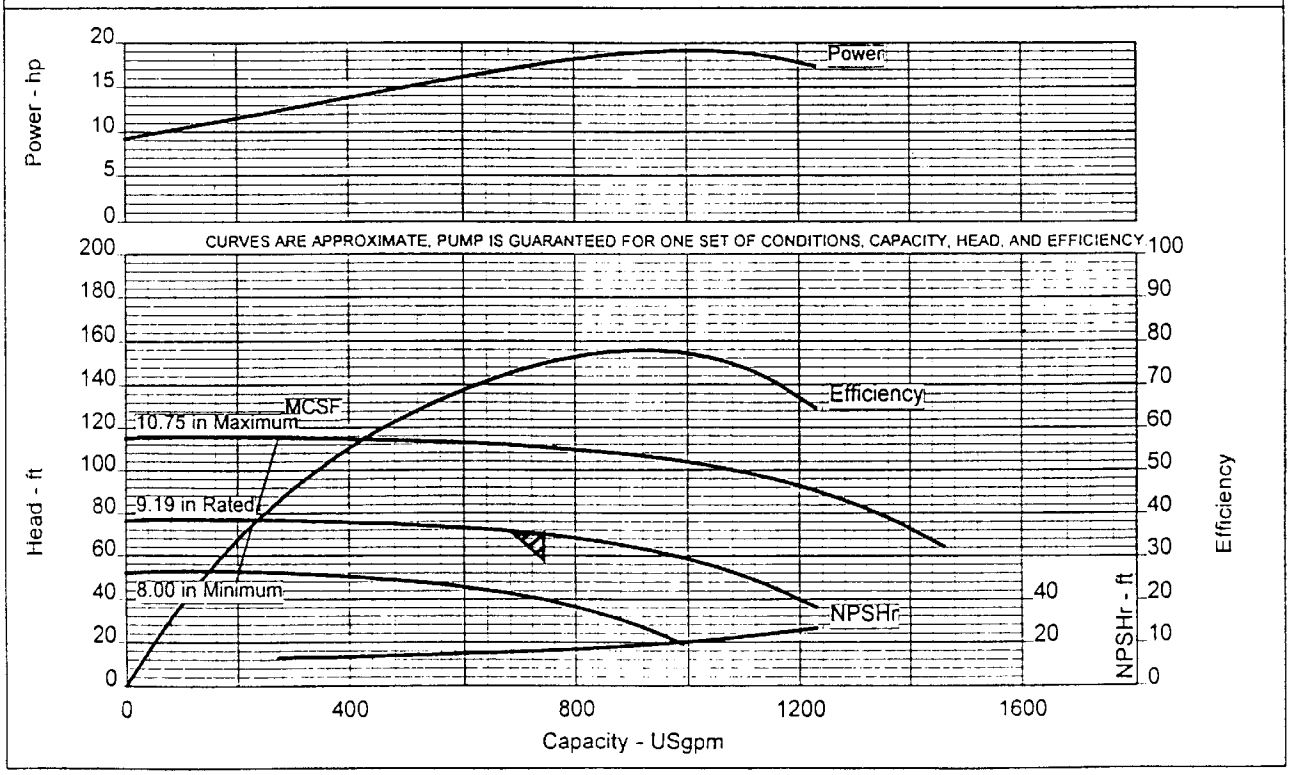
Material column code	: VE
Pump specification	:

Other Requirements

Hydraulic selection : No specification
Construction : No specification
Test tolerance : No specification
Driver Sizing : Max Power(MCSF to EOC)with SF

Performance

Hydraulic power	: 13.10 hp	Impeller diameter	
Pump speed	: 1750 rpm	Rated	: 9.19 in
Efficiency (CE=1.00)	: 74.8 %	Maximum	: 10.75 in
		Minimum	: 8.00 in
NPSH required (NPSHr)	: 16.2 ft		
Rated power	: 17.5 hp	Minimum continucus flow	: 232.4 USgpm
Maximum power	: 19.2 hp	Maximum head @ rated dia	: 76.3 ft
Driver power	: 25.0 hp / 18.6 kW	Flow at BEP	: 918.5 USgpm
Casing working pressure	: 33.0 psig	Flow as % of BEP	: 80.7 %
(based on shut off @ cut dia)		Efficiency at normal flow	: -
Maximum allowable	: 100.0 psig	Impeller dia ratio (rated/max)	: 85.5 %
Hydrostatic test pressure	: 110.0 psig	Head rise to shut off	: 9.0 %
Seal chamber pressure	: -	Total head ratio (rated/max)	: 63.2 %



Ingersoll-Dresser Pumps — **Construction Datasheet**

Customer	: Pizzagalli	Pump / Stages	: 6X4X10 GRP / 1
Customer reference	:	Based on curve no.	: 10GRP.E1
Item number	: Headworks	Vendor reference	: 0653-00083
Service	:	Date	: April 14, 2000

Construction

Nozzles	Size	Rating	Face	Pos'n
Suction	6 inch	150#	FF	End
Discharge	4 inch	150#	FF	Top

Casing mounting	: Foot
Casing split	: Radial
Impeller type	: Semi-open
Bearing Type (Rad/Thr)	: Single Row/ Double Row
Bearing lubrication	: -
Rotation (view from cplg)	: CW per Hyd. Institute

Materials

Casing	: Vinyl Ester
Impeller	: Vinyl Ester
Case wear ring	: -
Impeller wear ring	: -
Inducer	: -
Shaft	: 316SS
Sleeve	: Ryton

Baseplate, Coupling and Guard

Baseplate type	: Molded w/ drip pan
Baseplate material	: [redacted] Polymer Concrete
Coupling manufacturer	: T.B. Woods
Coupling size	: -
Coupling / Shaft guard	: Steel

Weights (Approx.)

Bareshaft pump(nett)	: 195.0 lb
Baseplate(nett)	: [redacted] 400 lb
Driver(nett)	: 390.0 lb
Shipping gross weight/vol.	: 985 lb / 0.01 cu.ft

Driver Information

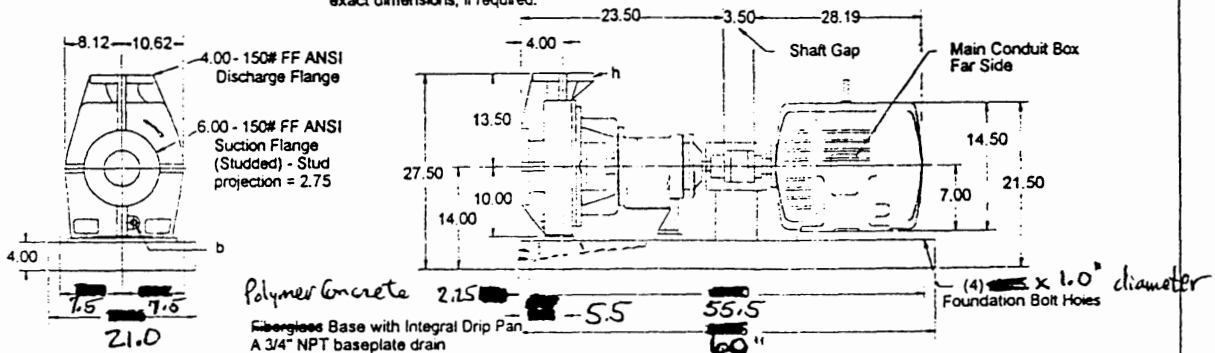
Manufacturer	: -
Power	: 25.0 hp / 18.6 kW
Service factor	: 1.15
Speed	: 1800 rpm
Orientation / Mounting	: Horizontal / Foot
Driver Type	: NEMA
Frame-size / material	: 284T / Iron
Enclosure	: TEFC-PE
Hazardous area class	: - DIV 2 CLASS I GROUP D
Explosion 'T' rating	: - T2B
Volts / Phase / Hz	: 230/460 / 3 / 60
Amps-full load/locked rotor	- / -
Motor starting	: Direct on line (DOL)
Insulation	: Cl.F
Temperature rise	: 80 °C
Motor mounted by	: Others

Seal, Gland and Piping

Arrangement	: Single outside
Size	: 1.875 inch
Manufacturer / Type	: Durametallic / RAC
Material code (Man'f/API)	: E75-[redacted] / -
Internal neck bushing	: None
Gland material	: VinylEster
Flush	: 0.25 inch NPT
Vent	: -
Drain	: -
Auxiliary sealing device	: N/A
Seal flush plan	: None
Seal flush material	: -
Aux seal flush plan	: None
Aux seal flush material	: -

NOTES:
1. Consult the instruction book before installing the pump.
2. Allow 6mm (0.25 inch) for variation of nozzle faces, centerline height, foundation holes, and other nominal dimensions.
3. Use full face gaskets on suction and discharge flanges (.12" min. thickness). Gasket hardness must be 60 to 70 durometer.
4. Do not torque external fasteners and pump connections to more than 30 foot-pounds.
5. Use flat washers behind flanges.
6. All holes in flanges straddle the centerlines.
7. Do not install metal fittings directly into pipe taps on nonmetallic parts.
8. Foundation bolts and piping should not be set rigidly until receipt of equipment.
9. Allow a minimum of 19mm (0.75 inch) under baseplate for adjustment and grouting.
10. Motor dimensions shown are maximum expected. Refer to a certified motor drawing for exact dimensions, if required.
11. Piping, foundations, and system design are the responsibility of others. Ingersoll-Dresser Pump data and comments are offered as an aid, but Ingersoll-Dresser Pump cannot assume responsibility for the system design or operation. It is recommended that a specialist skilled in this area be consulted to ensure a successful installation.

AUXILIARY CONNECTIONS
b- 1/2" NPT Casing Drain Tap
h- 3/8" NPT Discharge Gage Tap



Fiberglass Base with Integral Drip Pan. A 3/4" NPT baseplate drain tap connection is located above the bottom of the baseplate at the center of the pump end.

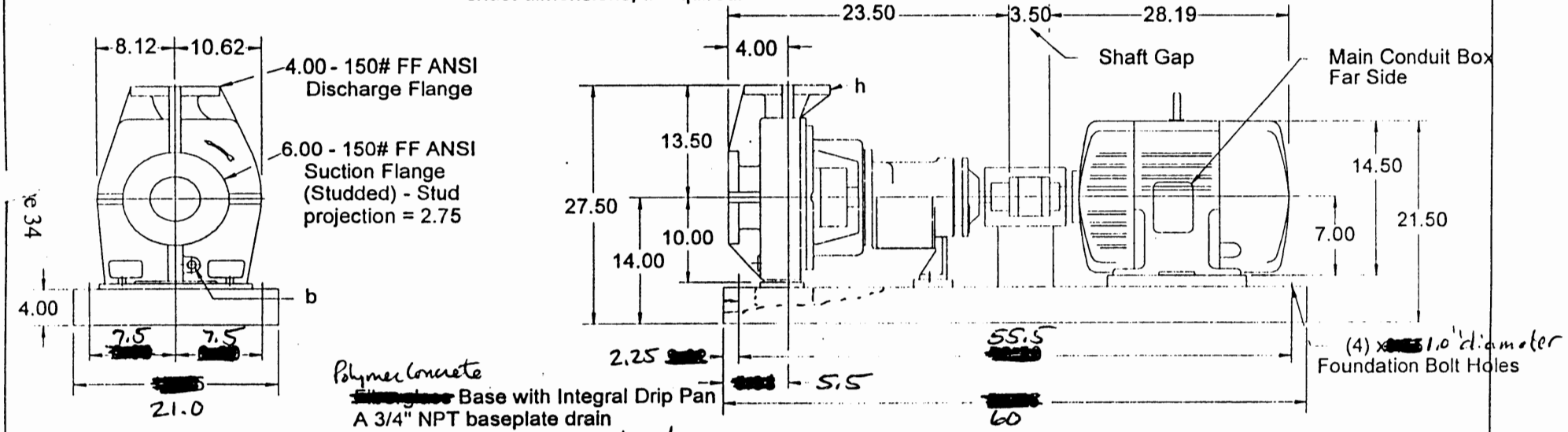
REFER TO FACTORY FOR ANY (*) DIMENSIONS

All dimensions are in inches unless otherwise specified

Ingersoll-Dresser Pumps Full Page GA Drawing

NOTES:
1. Consult the instruction book before installing the pump.
2. Allow 6mm (0.25 inch) for variation of nozzle faces, centerline height, foundation holes, and other nominal dimensions.
3. Use full face gaskets on suction and discharge flanges (.12" min. thickness). Gasket hardness must be 60 to 70 durometer.
4. Do not torque external fasteners and pump connections to more than 30 foot-pounds.
5. Use flat washers behind flanges.
6. All holes in flanges straddle the centerlines.
7. Do not install metal fittings directly into pipe taps on nonmetallic parts.
8. Foundation bolts and piping should not be set rigidly until receipt of equipment.
9. Allow a minimum of 19mm (0.75 inch) under baseplate for adjustment and grouting.
10. Motor dimensions shown are maximum expected. Refer to a certified motor drawing for exact dimensions, if required.
11. Piping, foundations, and system design are the responsibility of others. Ingersoll-Dresser Pump data and comments are offered as an aid, but Ingersoll-Dresser Pump cannot assume responsibility for the system design or operation. It is recommended that a specialist skilled in this area be consulted to ensure a successful installation.

AUXILIARY CONNECTIONS
b- 1/2" NPT Casing Drain Tap
h- 3/8" NPT Discharge Gage Tap



Polymer Concrete Base with Integral Drip Pan
A 3/4" NPT baseplate drain tap connection is located at end of the baseplate at the center of the pump end.

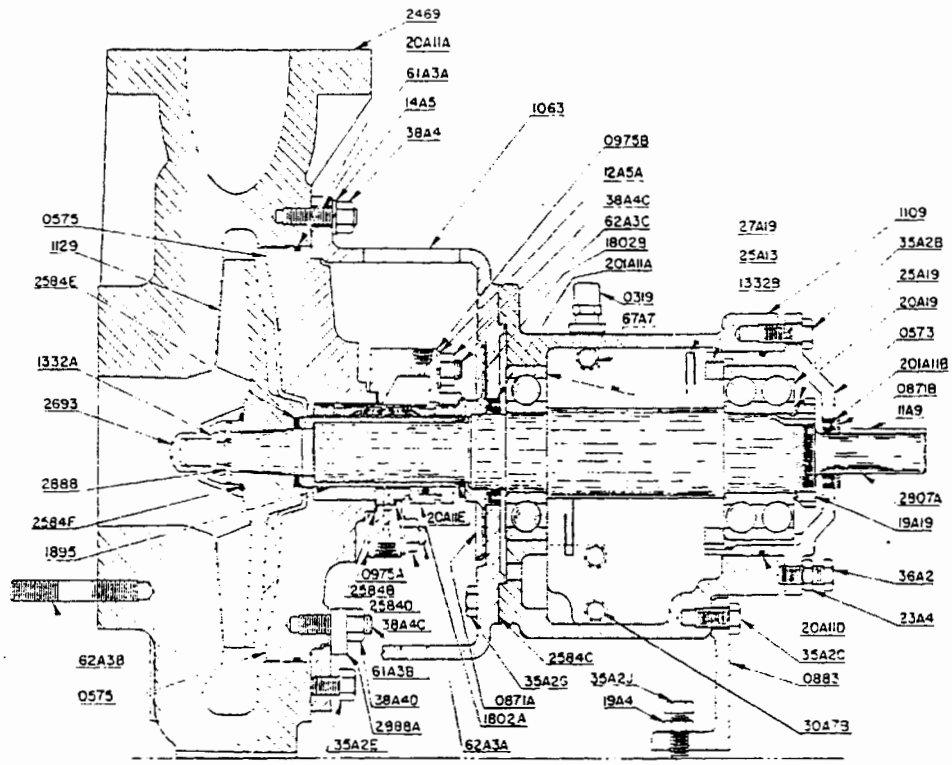
DIMENSIONS CERTIFIED FOR CONSTRUCTION WHEN PROPERLY ENDORSED BELOW
REFER TO FACTORY FOR ANY (*) DIMENSIONS

All dimensions are in inches unless otherwise specified

Customer	: Pizzagalli	Pump size & type	: 6X4X10 GRP	Drawing number	
Item number	: Headworks	Pump speed / Stages	: 1750 rpm / 1	Date	: April 14, 2000
Service	:	Flow / Head	: 741.0 USgpm / 70.00 ft	Certified by / Date	:
Customer PO #	:	Driver power / Frame	: 25.0 hp / 18.6 kW / 284T	Seal type	: RAC
Vendor reference	: 0653-00083 Rev. A	Volts / Phase / Hz	: 230/460 / 3 / 60	Seal flush plan	: None

GRP FIBERGLASS PUMPS

GROUP 2 ~~3x1.5x10 GRP~~ ~~4x3x10 GRP~~ 6x4x10 GRP

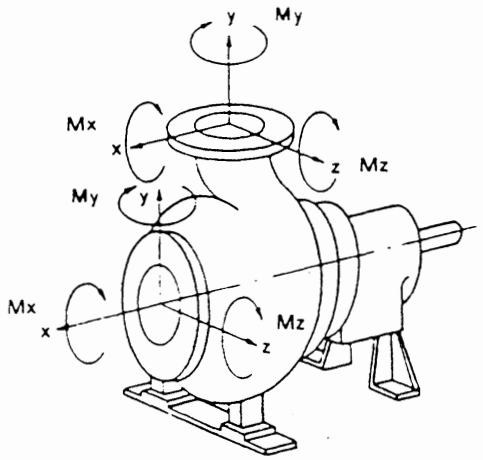


PART. NO.	DESCRIPTION
0319	VENT
0573	BEARING END COVER
0575	COVER-SHORT
0871A	FLINGER-PUMP END
0871B	FLINGER-COUPLING END
0883	BEARING HOUSING FOOT
0975A	GLAND-CLAMPED SEAT
~~0975B~~	~~GLAND-LONG~~
1063	SUPPORT HEAD
1109	BEARING HOUSING
1129	IMPELLER
11A9	COUPLING KEY
12A5A	WASHER-GLAND
1332A	LOCKNUT-IMPELLER
1332B	LOCKNUT-BEARING END COVER
14A5	LOCKWASHER-CASING
1802A	MECHANICAL SEAL-OUTSIDE
~~1802B~~	~~MECHANICAL SEAL-INSIDE~~
1895	SLEEVE
19A19	LOCKNUT
19A4	JAM NUT-BRG. HSG. FOOT
201A11A	LIPSEAL-PUMP END
201A11B	LIPSEAL-COUPLING END
20A11A	O-RING-COVER
20A11D	O-RING-BRG. END COVER
20A11E	O-RING-FLINGER
20A19	LOCKWASHER-BEARING
23A4	JAM NUT-BRG. END COVER
2469	CASING
2584B	GASKET-COVER NOSE

PART. NO.	DESCRIPTION
2584C	GASKET-BRG. HSG. TO SUPP. HD.
2584D	GASKET-SEAT TO GLAND
2584E	GASKET-IMPELLER TO SLEEVE
2584F	GASKET-IMPELLER NUT
25A13	SLINGER
25A19	THRUST BEARING
2693	IMPELLER NUT
27A19	RADIAL BEARING
2807A	SHAFT
2888	WASHER-IMPELLER
2888A	WASHER-ECCENTRIC
30A7B	PLUG-BRG. HSG. DRAIN
35A2A(1)	BOLT-BRG. HSG. FT. TO BED
35A2B	BOLT-BRG. END CVR.
35A2C	BOLT-FOOT TO BRG. HSG.
35A2E	BOLT-JACK-COVER
35A2G	BOLT-SUPP. HD. TO COVER
35A2J	BOLT-BRG. HSG. FOOT-JACK
36A2	BOLT-BRG. END CVR.-JACK
38A4	NUT-CASING
38A4C	NUT-GLAND
38A4D	NUT-ECCENTRIC WASHER
61A3A	STUD-CASING TO SUPP. HD.
61A3B	STUD-ECCENTRIC WASHER
62A3A	STUD-CLAMPED SEAT GLAND
62A3B	STUD-SUCTION FLG.
~~62A3C~~	~~STUD-LONG GLAND~~
67A7	STREET ELL-VENT

NOTE: (1) Not shown on the drawing.

GRP FIBERGLASS PUMPS
PUMP NOZZLE LOADING
GROUTED NON-METALLIC BEDPLATES



PUMP		Forces-Lbs.			Moments-Ft. Lbs.		
		Fx	Fy	Fz	Mx	My	Mz
1½ × 1 × 6	Suction	100	100	200	100	150	80
	Disch.	80	300	100	100	150	100
3 × 1½ × 6	Suction	150	130	265	210	205	105
	Disch.	120	400	120	210	100	115
3 × 2 × 6K	Suction	200	200	300	300	150	100
	Disch.	100	300	200	100	150	100
1½ × 1 × 8	Suction	150	100	200	100	150	100
	Disch.	80	300	100	100	150	150
3 × 1½ × 8	Suction	150	100	200	200	200	80
	Disch.	90	200	100	150	100	100
3 × 2 × 8	Suction	180	140	230	245	230	85
	Disch.	110	275	115	325	130	115
4 × 3 × 8	Suction	250	200	300	300	300	150
	Disch.	140	400	200	300	250	170
2 × 1 × 10	Suction	115	35	135	130	150	65
	Disch.	45	180	110	130	60	35
3 × 1½ × 10	Suction	160	130	250	200	200	80
	Disch.	60	250	150	200	150	120
4 × 3 × 10	Suction	250	200	300	300	300	150
	Disch.	130	400	200	300	250	150
6 × 4 × 10	Suction	300	200	400	300	350	160
	Disch.	150	400	200	300	250	200
3 × 1½ × 13	Suction	140	130	250	200	200	80
	Disch.	55	245	140	200	115	120
4 × 3 × 13	Suction	250	200	300	320	300	150
	Disch.	130	400	200	320	235	150
8 × 6 × 13	Suction	300	500	500	500	350	350
	Disch.	200	400	350	500	250	250
12 × 10 × 15, 12 × 10 × 15M	Suction	320	585	585	500	200	400
	Disch.	230	340	300	500	145	350

Values given are for forces or moments acting alone at the suction or discharge flange. In combination forces and moments must be reduced so that:

$$\frac{|Fxd|}{Fxd_{max}} + \frac{|Fyd|}{Fyd_{max}} + \frac{|Fzd|}{Fzd_{max}} + \frac{|Mxd|}{Mxd_{max}} + \frac{|Myd|}{Myd_{max}} + \frac{|Mzd|}{Mzd_{max}} + \frac{|Fxs|}{Fxs_{max}} + \frac{|Fys|}{Fys_{max}} + \frac{|Fzs|}{Fzs_{max}} + \frac{|Mxs|}{Mxs_{max}} + \frac{|Mys|}{Mys_{max}} + \frac{|Mzs|}{Mzs_{max}} \leq 1.0$$

MOTOR PERFORMANCE

7970 MCD	C25P2C	3	TCE	284T

	--------		---	5579

HP:	25
POLES:	4
VOLTS:	460
HZ:	60
SERVICE FACTOR:	1.15
EFFICIENCY (%):	
S.F.	92.6
FULL	93.6
3/4	94.0
1/2	93.8
1/4	90.8
POWER FACTOR: (%)	
S.F.	86.3
FULL	85.4
3/4	83.5
1/2	76.7
1/4	57.5
NO LOAD	5.5
LOCKED ROTOR	38.7
AMPS:	
S.F.	34
FULL	29.3
3/4	22.4
1/2	16.3
1/4	11.2
NO LOAD	8.9
LOCKED ROTOR	182.3
NEMA CODE LETTER	G
NEMA DESIGN LETTER	B
FULL LOAD RPM	1775
NEMA NOMINAL EFFICIENCY (%)	93.6
GUARANTEED EFFICIENCY (%)	92.4
MAX KVAR	6
AMBIENT (¤C)	40
ALTITUDE (FASL)	3300
SAFE STALL TIME-HOT (SEC)	30
SOUND PRESSURE (DBA @ 1M)	70.2
TORQUES:	
BREAKDOWN{% F.L.}	250
LOCKED ROTOR{% F.L.}	180
FULL LOAD{LB-FT}	74

The Above Data Is Typical, Sinewave Power Unless Noted Otherwise

NAMEPLATE DATA

CATALOG NUMBER:				C25P2C			
MODEL	7970 MCD	FR	284	T	TYPE	TCE	ENCL	TE
SHAFT END BRG	6310-2Z-J/C3				OPP END BRG	6210-2Z-J/C3		
PH	3	MAX AMB	40°C		ID#			
INSUL CLASS	F				DUTY	CONT		

HP	25	RPM	1775		HP		RPM		
VOLTS	460				VOLTS				
FL AMPS	29.3				FL AMPS				
SF AMPS	34.0				SF AMPS				
SF	1.15	DESIGN	B	CODE G	SF		DESIGN		CODE
NEMA NOM EFFICIENCY	93.6	NOM PF	85.4		NEMA NOM EFFICIENCY		NOM PF		
GUARANTEED EFFICIENCY	92.4	MAX KVAR	6.0	HZ 60	GUARANTEED EFFICIENCY		MAX KVAR		HZ

UL DATA (IF APPLICABLE):					
DIVISION	2	CLASS I	✓	GROUP I	D
TEMP CODE	T2B	CLASS II		GROUP II	

VFD DATA (IF APPLICABLE):			
VOLTS			
AMPS			
TORQUE 1		TORQUE 2	
VFD LOAD TYPE 1		VFD LOAD TYPE 2	
VFD HERTZ RANGE 1		VFD HERTZ RANGE 2	
VFD SPEED RANGE 1		VFD SPEED RANGE 2	

			499495
		1V MULTI LD DOL	

U.S. ELECTRICAL MOTORS
DIVISION OF EMERSON ELECTRIC COMPANY
ST. LOUIS, MO

TYPICAL NAMEPLATE DATA
ACTUAL MOTOR NAMEPLATE LAYOUT MAY VARY
SOME FIELDS MAY BE OMITTED

Home Email

Back

ODOR CONTROL SYSTEMS

(Headworks, BNR-1, BNR-2, and Flowspliter)

RM Clayton WRC Expansion Phase 3

Spec. Section 11255

TABLE OF CONTENTS

Data Sheet

Series C
Electronic Metering Pumps

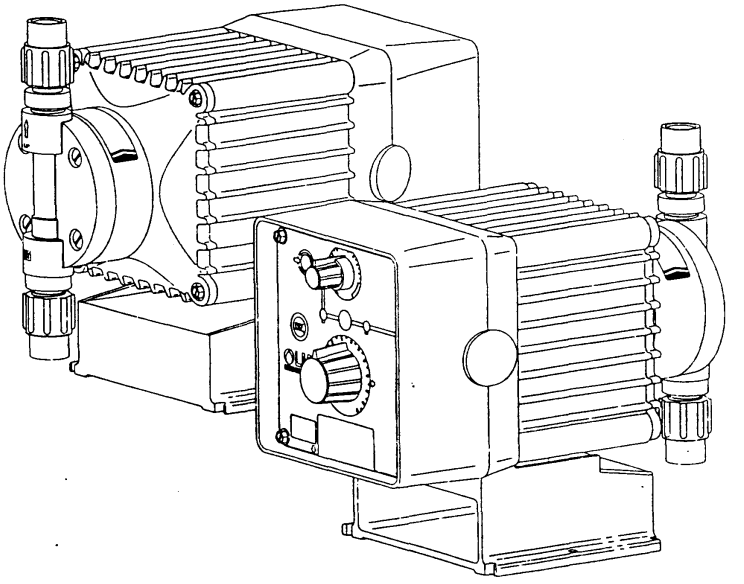
Configuration Data

Model

Control & Output Code
Manual Control
Speed (stroking frequency) and stroke length manually adjustable.
C10 — 1.3 GPH (4.9 l/h) ... 300 psi (20.7 Bar)
C11 — 2.5 GPH (9.5 l/h) ... 150 psi (10.3 Bar)
C12 — 4.0 GPH (15.1 l/h) ... 100 psi (6.9 Bar)
C13 — 8.0 GPH (30 l/h) ..... 60 psi (4.1 Bar)
C14 — 20 GPH (76 l/h) ..... 25 psi (1.7 Bar)
Instrument Responsive/Manual Control
Manual adjustment features of C1 Series plus switch conversion to external control for automatic systems.
C71 — 2.5 GPH (9.5 l/h) ... 150 psi (10.3 Bar)
C72 — 4.0 GPH (15.1 l/h) ... 100 psi (6.9 Bar)
C73 — 8.0 GPH (30 l/h) ..... 60 psi (4.1 Bar)
C77 — 10 GPH (38 l/h) ..... 80 psi (5.5 Bar)
C91 — 2.5 GPH (9.5 l/h) ... 150 psi (10.3 Bar)
C92 — 4.0 GPH (15.1 l/h) ... 100 psi (6.9 Bar)
C93 — 8.0 GPH (30 l/h) ..... 60 psi (4.1 Bar)
C94 — 20 GPH (76 l/h) ..... 25 psi (1.7 Bar)

Voltage Code
1 ------- 120 VAC US Plug
2 ------- 220-240 VAC DIN Plug
5 ------- 240-250 VAC, UK Plug
6 ------- 240-250 VAC, AUST/NZ Plug
7 ------- 220-240 VAC, SWISS Plug

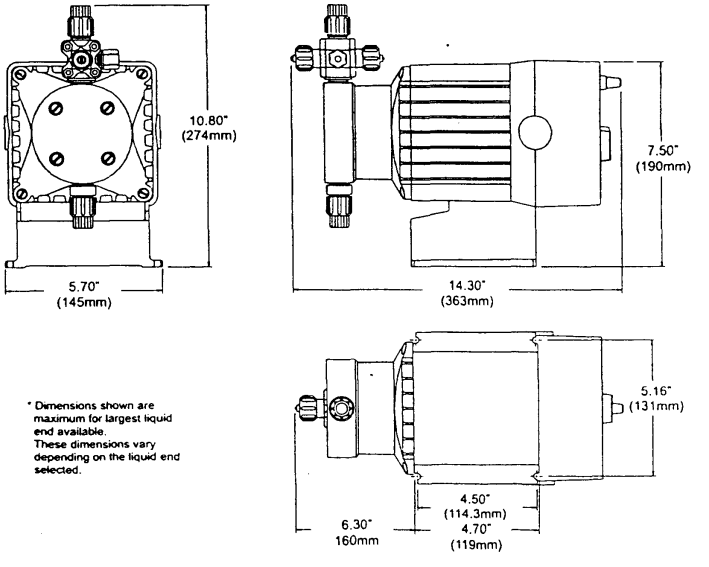
Liquid End
See next page for complete liquid end specifications and selection.



Specifications

Series	Strokes Per Minute (Adjustable) Min	Max	Stroke Length (Adjustable) Recommended Minimum	Average Input Power @ Max Speed	Shipping Weight
C10, C70, C90 C11, C71, C91 C12, C72, C92 C13, C73, C93 C14, C74, C94	1	100	10%	44 watts	20 lbs (9.1 kg)
C77	1	100	10%	87 watts	28 lbs (12.7 kg)

Dimensions



* Dimensions shown are maximum for largest liquid end available. These dimensions vary depending on the liquid end selected.

LMI
MILTON ROY

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http://www.lmipumps.com

Replaces same of Rev.C 9/97
1712.D 10/99

Configuration Data & Materials of Construction

Drive Assembly	Liquid End No.	Size Code	Materials of Construction: Head & Fittings	Balls	Liquifram™	Seal Ring	Accessory	Tubing & Connections: Discharge	Suction
C90 ☐ -									
C70 ☐ -	297	0.9	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	
C10 ☐ -	94S**	0.9	PVC	Ceramic	Fluorofilm™	PTFE	4FV	Pipe 1/4" NPT M	
	360SI †	1.8	Acrylic/PGC	Ceramic	Fluorofilm™	PGC / Polyprel®	4FV	PE .375" O.D.	
	361SI †	1.8	PGC/PGC	Ceramic	Fluorofilm™	PGC / Polyprel®	4FV	PE .375" O.D.	
C91 ☐ -	362SI †	1.8	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF/ Polyprel®	4FV	PE .375" O.D.	
C92 ☐ -	363SI †	1.8	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF/ PTFE	4FV	PE .375" O.D.	
C71 ☐ -	277	1.8	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	
C72 ☐ -	71FS	1.8	Acrylic/PVDF	PTFE	Hypalon®	Hypalon®	4FV	PE .5" O.D.	Vinyl .5" O.D.
C11 ☐ -	71S †	1.8	Acrylic/PVC	Ceramic	Fluorofilm™	PTFE	4FV	PE .5" O.D.	Vinyl .5" O.D.
C12 ☐ -	72S †	1.8	PVC	Ceramic	Fluorofilm™	PTFE	4FV	PE .5" O.D.	
	74S**	1.8	PVC	Ceramic	Fluorofilm™	PTFE	4FV	Pipe 1/4" NPT M	
	75HV	1.8	Polypropylene	316 S.S.	Fluorofilm™	PTFE		PE .5" O.D.	Vinyl .938" O.D.
	75S †	1.8	Polypropylene	Ceramic	Fluorofilm™	PTFE	4FV	PE .5" O.D.	
	76	1.8	Acrylic/PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D.	Vinyl .938" O.D.
	79	1.8	UHMW PE	Ceramic	Hypalon®	Hypalon®		PE .5" O.D.	Vinyl .5" O.D.
	310SI †	3.0	Acrylic/PGC	Ceramic	Fluorofilm™	PGC / Polyprel®	4FV	PE .375" O.D.	
	311SI †	3.0	PGC/PGC	Ceramic	Fluorofilm™	PGC / Polyprel®	4FV	PE .375" O.D.	
	312SI †	3.0	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF/ Polyprel®	4FV	PE .375" O.D.	
C93 ☐ -	313SI †	3.0	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF / PTFE	4FV	PE .375" O.D.	
C73 ☐ -	20HV	3.0	Acrylic/PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D.	Vinyl .938" O.D.
C13 ☐ -	20S**	3.0	Acrylic/PVC	Ceramic	Fluorofilm™	Hypalon®	4FV	PE .5" O.D.	Vinyl .5" O.D.
	24	3.0	PVC	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	25HV	3.0	Polypropylene	316 S.S.	Fluorofilm™	PTFE		PE .5" O.D.	Vinyl .938" O.D.
	25P	3.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	25T	3.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
	26S**	3.0	PVC	Ceramic	Fluorofilm™	Viton®	4FV	PE .5" O.D.	
	27	3.0	316 S.S.	316 S.S.	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	29	3.0	UHMW PE	Ceramic	Fluorofilm™	Hypalon®		PE .5" O.D.	
	30	6.0	Acrylic/PVC	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	Vinyl .5" O.D.
C94 ☐ -	32	6.0	PVDF	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
C78 ☐ -	34	6.0	PVC	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
C74 ☐ -	35P	6.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
C14 ☐ -	35T	6.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
	36	6.0	PVC	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
	37	6.0	316 S.S.	316 S.S.	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	25HV	3.0	Acrylic/PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D.	Vinyl .938" O.D.
	26S**	3.0	PVC	Ceramic	Fluorofilm™	Viton®	4FV	PE .5" O.D.	
C77 ☐ -	27	3.0	316 S.S.	316 S.S.	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	29	3.0	UHMW PE	Ceramic	Fluorofilm™	Hypalon®		PE .5" O.D.	

☐ See front page for voltage code specifications.

** These Liquid Ends are available without a 4FV, simply drop the 'S' at the end of the Liquid End number to order the model without a 4FV.

† To specify ¼" NPT male, change 'I' to 'P'. To specify black, UV resistant tubing, change 'I' to 'U'. To specify Bleed 4FV, change 'S' to 'B'. To specify 3FV, change 'S' to'T'.
Fluorofilm™ is a copolymer of PTFE and PFA.
Polyprel® is an elastomeric PTFE copolymer.

4FV indicates that the pump is equipped with an LMI Four Function Valve. This diaphragm type anti-syphon/pressure relief valve is installed on the pump head. It provides anti-syphon protection and aids in priming, even under pressure.

Output Information

Series	Gallons per Hour Min	Gallons per Hour Max	Liters per Hour Min	Liters per Hour Max	mL/cc per Minute Min	mL/cc per Minute Max	mL/cc per Stroke Min	mL/cc per Stroke Max	Maximum Injection Pressure
C10, C70*, C90*	0.001	1.3	0.005	4.9	0.08	82	0.08	0.82	300 psi (20.7 Bar)
C11, C71*, C91*	0.003	2.5	0.010	9.5	0.16	158	0.16	1.58	150 psi (10.3 Bar)
C12, C72*, C92*	0.004	4.0	0.015	15.1	0.25	252	0.25	2.52	100 psi (6.9 Bar)
C13, C73*, C93*	0.006	8.0	0.030	30	0.51	505	0.51	5.05	60 psi (4.1 Bar)
C14, C74*, C94*	0.020	20.0	0.076	76	1.26	1262	1.26	12.62	25 psi (1.7 Bar)
C77*	0.010	10.0	0.038	38	0.63	631	0.63	6.31	80 psi (5.5 Bar)
C78*	0.025	25.0	0.095	95	1.58	1577	1.58	15.77	30 psi (2.07 Bar)

Minimum output is based on 1 stroke per minute and 10% stroke setting, minimum output can be reduced further in external mode. Series C9 pumps may be programmed for strokes per hour for lower outputs.

Back

Table of Contents

Instruction Manual

Electronic Metering Pumps

Please record the following data:

(Information on Pump Box and Pump Data Plate)

Pump Model Number:
Pump Serial Number:
Installation Date:
Installation Location:

When ordering replacement parts for your LMI Metering Pump or accessory, please include the complete model number and serial number of your unit.

LMI
MILTON ROY

8 Post Office Square • Acton, MA 01720 USA
TEL: (978) 263-9800 • FAX: (978) 264-9172
http://www.lmipumps.com

Printed in USA
All Prices FOB Acton, MA - Subject to change without notice

Replaces same of Rev. L 2/00
1615 R[redacted]8/00

1.0 Introduction

LMI is the world's most versatile manufacturer of economical and efficient metering pumps. This manual addresses the installation, maintenance and troubleshooting procedures for manually and externally controlled pumps. LMI has a worldwide network of stocking representatives and authorized repair centers to give you prompt and efficient service.

Please review this manual carefully. Pay particular attention to warnings and precautions. Always follow good safety procedures, including the use of proper clothing, eye and face protection.

This manual is for Series A, B, C, [illegible], J5, and P pumps.

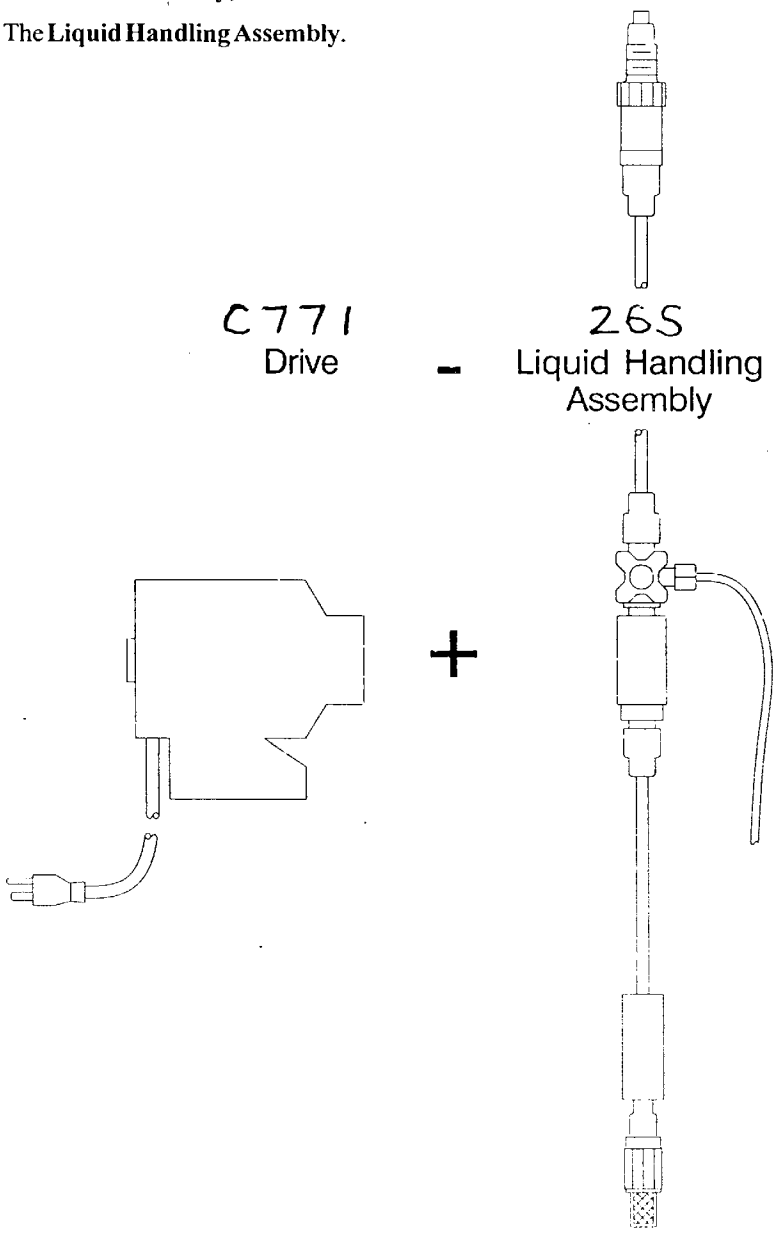
1.1 Spare Parts

LMI recommends replacing the elastomeric components of the pump on an annual basis. RPM Pro Pacs™ and spare part kits are available from your local LMI Master Stocking Distributor.

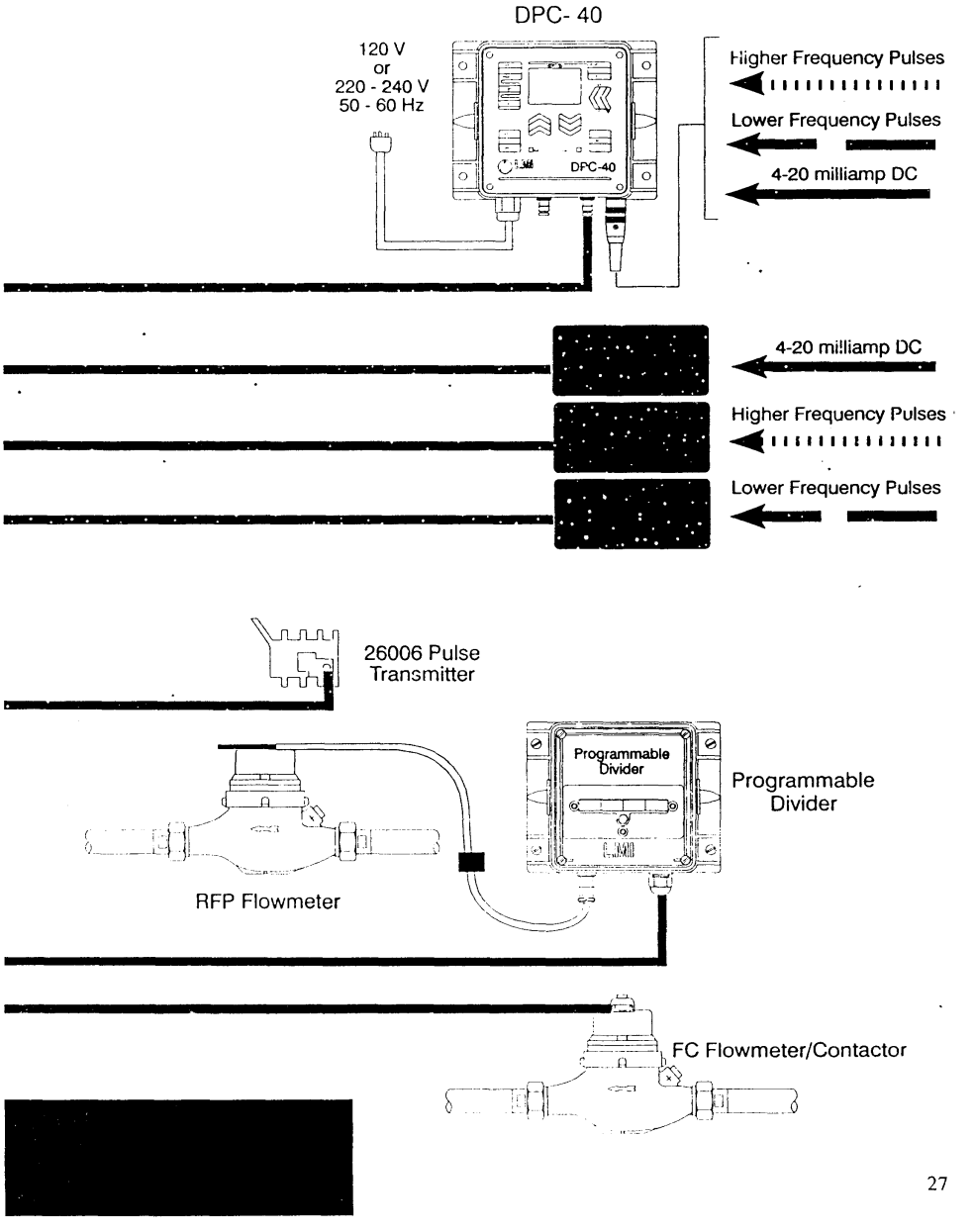
Example:

Your pump consists of two main components:

1. The **Drive Assembly**; and
2. The **Liquid Handling Assembly**.



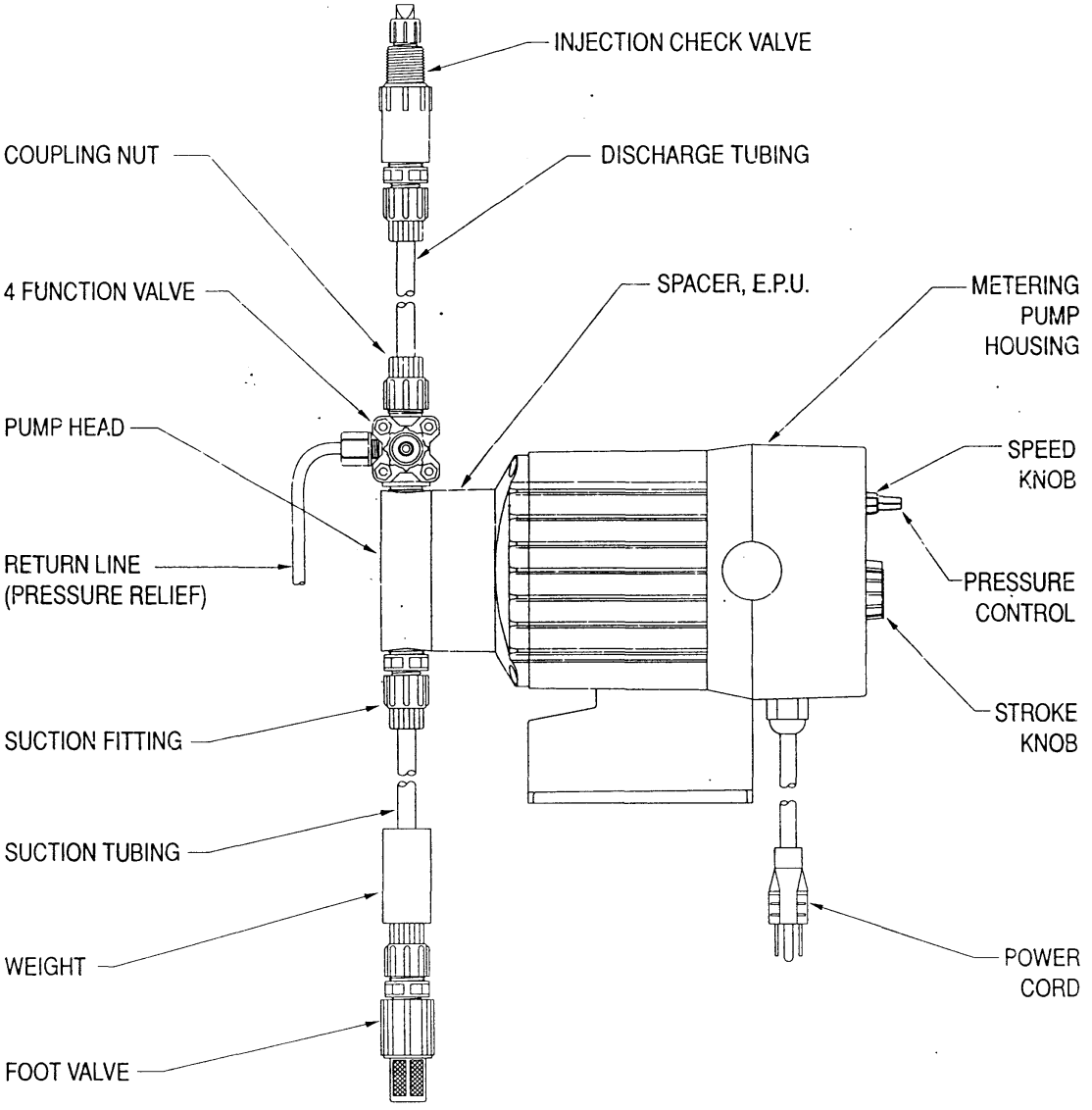
or Pacing A7, B7, C7 and P7 Pumps



Back

Instruction **Supplement**

Series C7
Electronic Metering Pump



Metering Pump Component Diagram

LMI
LIQUID METRONICS DIVISION
MILTON ROY
A unit of Sundstrand Corporation

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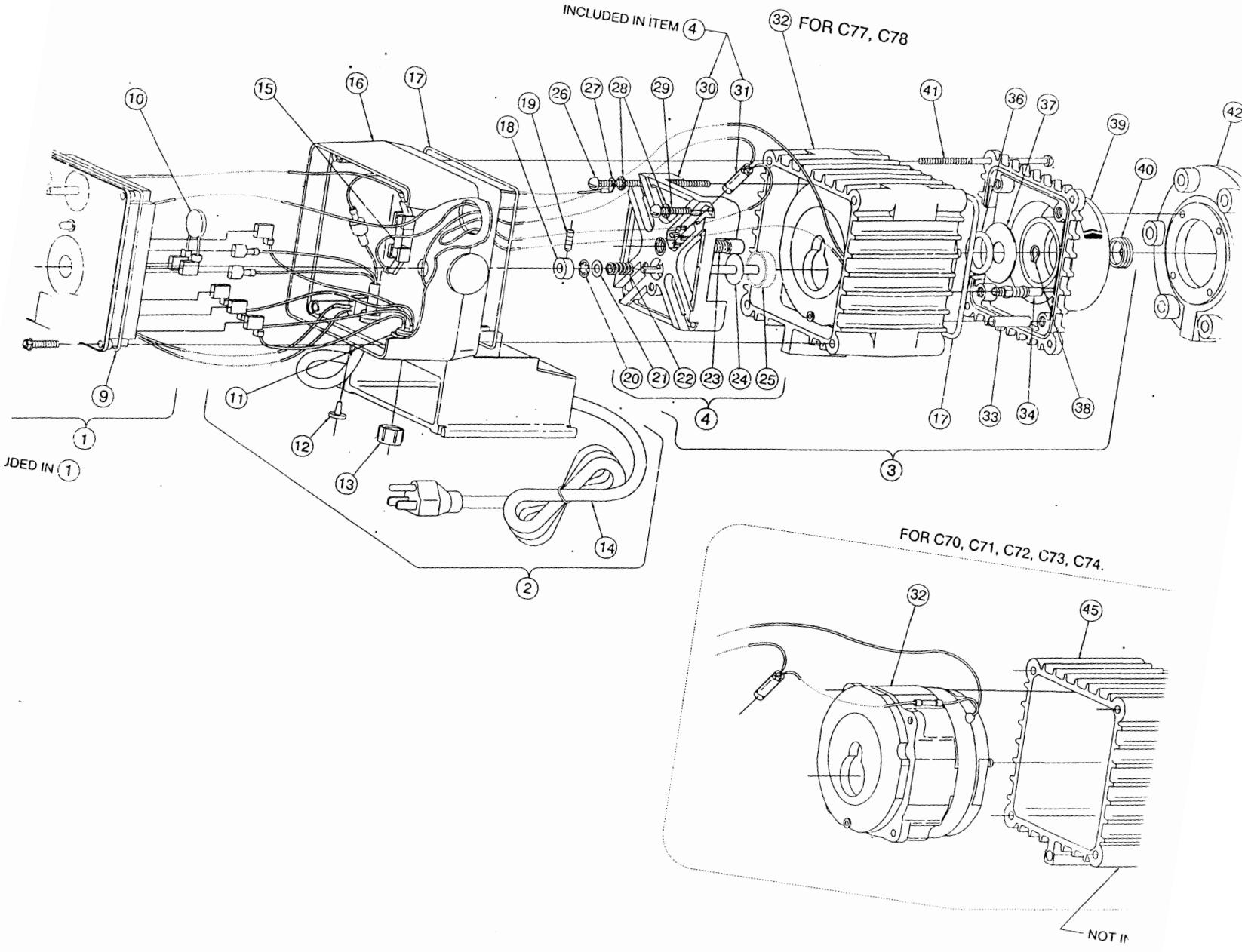
Acton, MA 01720 USA
TEL: (978) 263-9800
FAX: (978) 264-9172
http://www.lmipumps.com

Replaces same of Rev.E 5/97
1716.F 12/97

Series C7 Drive Assembly Exploded View Diagram

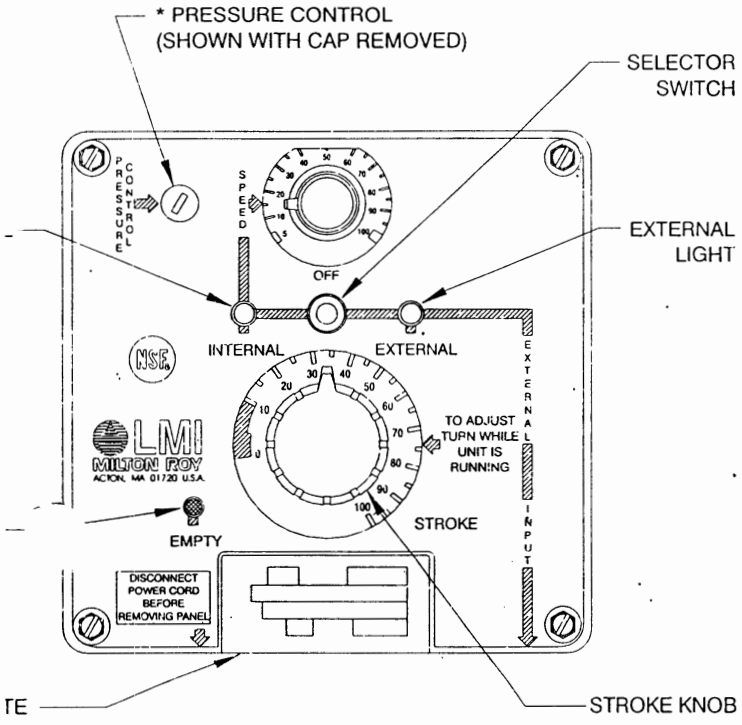


Series C7 Drive Assembly Parts List

Model Series	Part No.	Description	Qty
C701, C711	33814	Control Panel Assembly, 120V	1
C703, C705, C706, C707 C713, C715, C716, C717	33815	Control Panel Assembly, 240V	1
C721	33816	Control Panel Assembly, 120V	1
C723, C725, C726, C727	33817	Control Panel Assembly, 240V	1
C731	33818	Control Panel Assembly, 120V	1
C733, C735, C736, C737	33819	Control Panel Assembly, 240V	1
C741	33820	Control Panel Assembly, 120V	1
C743, C745, C746, C747	33821	Control Panel Assembly, 240V	1
C771	33211	Control Panel Assembly, 120V	1
C773, C775, C776, C777	33212	Control Panel Assembly, 240V	1
C781	33822	Control Panel Assembly, 120V	1
C783, C785, C786, C787	33823	Control Panel Assembly, 240V	1
C711, C721, C731, C741	32401	Housing Assembly, 120V	1
C712, C722, C732, C742	32402	Housing Assembly, 240V	1
C713, C723, C733, C743	32403	Housing Assembly, 220-240V	1
C715, C725, C735, C745	32404	Housing Assembly, 220-240V, U.K.	1
C716, C726, C736, C746	32405	Housing Assembly, 220-240V, Aust.	1
C717, C727, C737, C747	32406	Housing Assembly, 220-240V, SWISS	1
C771, C781	32252	Housing Assembly, 120V	1
[illegible], C782	32502	Housing Assembly, 240V	1
C783	32253	Housing Assembly, 220-240V	1
[illegible], C785	32503	Housing Assembly, 220-240V, U.K.	1
C776, C786	32504	Housing Assembly, 220-240V, Aust.	1
C777, C787	32505	Housing Assembly, 220-240V, SWISS	1
C701	32532	EPU & Spacer Asm, w/Stroke Adj.,120V	1
C703, C705, C706,C707	32533	EPU & Spacer Asm, w/Stroke Adj., 240V	1
C711, C721	32534	EPU & Spacer Asm, w/Stroke Adj., 120V	1
C713, C715, C716, C717 C723, C725, C726, C727	32535	EPU & Spacer Asm, w/Stroke Adj., 240V	1
C731, C741	32536	EPU & Spacer Asm, w/Stroke Adj., 120V	1
2, C733, C735, C737, -2, C743, C745, C747	32537	EPU & Spacer Asm, w/Stroke Adj., 240V	1
C771	32329	EPU & Spacer Asm, w/Stroke Adj.,120V	1
C773, C775, C776, C777	32330	EPU & Spacer Asm, w/Stroke Adj., 240V	1
C781	32331	EPU & Spacer Asm, w/Stroke Adj., 120V	1
C783, C785, C786, C787	32332	EPU & Spacer Asm, w/Stroke Adj.,240V	1
C7	32251	Stroke Bracket Assembly	1
C7	31891	Knob, Stroke	1
C7	30709	Knob, Speed	1
C7	30306	Screw, 10 x 1PH S.S.	4
C7	10166	O-Ring	1
C7X1	10626	MOV Assembly, 120V	1
C7X3, C7X5, C7X6, C7X7	10627	MOV Assembly, 220-240V	1
C7	25907	Jack Assembly	1
C7	30307	Plug	1
C7	25930	Cover	1
C7X1	26293	Power Cord Assembly, 120V	1
C7X2	26296	Power Cord Assembly, 240V	1
C7X3	26297	Power Cord Assembly, 220-240V, DIN	1

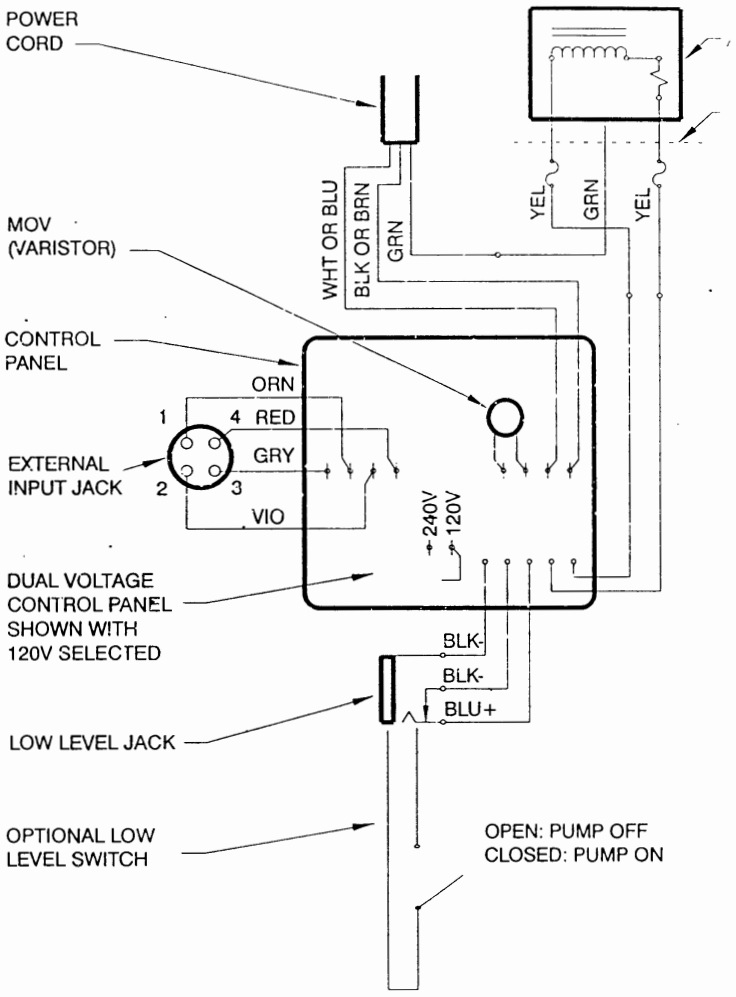
Key No.	Model Series	Part No.	Description
14	C7X5	26817	Power Cord Assembly, 220
	C7X6	26818	Power Cord Assembly, 220-2
	C7X7	27701	Power Cord Assembly, 220-2
15	C701, C711, C721, C731, C741	25825	Fuse, 4A Rectifier
	C771, C781	32254	Fuse, 10A Rectifier
	C70, C71, C72 , C73, C74 All models rated 220-240 Volts	25824	Fuse, 2A Rectifier
	C77, C78 All models rated 220-240 Volts	32255	Fuse,5A Rectifier
16	C7	28925	Housing
17	C7	35269	O-Ring
18	C7	25424	Collar
19	C7	25423	Set Screw
20	C7	10462	Retaining Ring
21	C7	32302	Washer
22	C7	32221	Spring
23	C7	32578	Pinion
24	C7	25121	Gasket
25	C7	31770	Shaft Assembly
26	C7	27552	Screw, 10-24x4.0
27	C7	27693	Ground Wire Assembly (GR
28	C7	10415	Washer
29	C7	27551	Screw, 10-24x1.25
30	C7	12064	Bracket *(without mating part*
31	C7	27501	Thermostat
32	C701, C711, C721, C731, C741	32158	EPU Assembly, 120V
	C70, C71, C72 , C73, C74 All models rated 220-240 Volts	32159	EPU Assembly, 240V
	C771	32239	EPU Assembly, 120V
	C77, All models rated 220-240 Volts	32240	EPU Assembly, 240V
	C781	32314	EPU Assembly, 120V
	C78, All models rated 220-240 Volts	32315	EPU Assembly, 240V
33	C70, C71, C72 , C73, C74	27187	Spacing Stud
	C77, C78	32247	Spacing Stud
34	C70, C71, C72	27641	Stud Assembly
	C73, C74, C77, C78	27641-1	Stud Assembly
35	C7	30803	Gasket
36	C7	26983	O-Ring
37	C7	27586	Shim
38	C7	27253	Retaining Ring
39	C70	27515	Spacer, 0.9 SI
	C71, C72	27516	Spacer, 1.8 SI
	C73, C74	27517	Spacer, 3.0 SI
	C77, C78	35839	Spacer, 3.0 SI
40	C7	10973	Seal
41	C7	25127	Screw, RH Slotted, S.S.
42	C74, C78	25887	Spacer Adapter, 6.0 SI
43	C7	10598	Screw
44	C70, C71, C72 , C73, C74	25068	Sleeve, EPU
not shown	C7	25849	Bushing, Unipulser
46	C7	29093	Cap

Series C7 Control Panel Detail



adjust pressure control: Remove yellow cap. With small
wdriver, and the pump running, turn the pressure control
ıstment slowly counterclockwise until pump just begins
:all. From this stall point, turn clockwise approximately
legrees. This is the optimum pressure control setting for
r application.

Series C7 Wiring Diagram



Liquid End **Sheet**

LE-26S

When pumping solutions, make certain that all tubing is securely attached to the fittings. It is recommended that tubing or pipe lines be shielded to prevent possible injury in case of rupture or accidental damage. Always wear protective clothing and face shield when working on or near your metering pump.

Note: See parts list for materials of construction

A. INSTALLING INJECTION CHECK VALVE

1. The purpose of the injection check valve is to prevent backflow from the treated line.
2. A 1/2" NPT female fitting with sufficient depth will accept the injection check valve.
3. To insure correct seating of the ball inside the injection check valve, the injection check valve should be installed upwards (vertically) into bottom of the pipe.

B. CONNECTING DISCHARGE TUBING

NOTE: *Cut tubing to length needed for discharge line.*

1. Route tubing from the injection check valve to the metering pump, making sure it does not touch hot or sharp surfaces, or is bent so sharply that it kinks.
2. Slide the small end of the coupling nut onto tubing, then slide on the clamp ring.
3. Push tubing on the valve housing nozzle so that tubing flares out and butts up against valve housing and will not go any further.
4. Slide the clamp ring and coupling nut to the threads and engage. While pushing the tubing on to the valve housing nozzle, tighten the coupling nut by hand until tubing is held securely in place.

Excessive force will crack or distort fittings. DO NOT USE PIPE WRENCH.

C. CONNECTING SUCTION TUBING

1. Cut suction tubing to a length so that the foot valve hangs just above the bottom of the solution container. Max. recommended vertical suction lift is 5 ft (1.5 m).
2. Follow same procedure in connecting suction tubing to suction valve and foot valve (see **B. Connecting Discharge Tubing**).

D. PRIMING

1. Connect pressure relief tubing to pressure relief port on the four function valve.
2. Route tubing to solution reservoir and anchor with a plastic tie. Do NOT submerge tubing in solution.
3. Correct position of relief and anti-syphon knobs are: anti-syphon arrow must be vertical (word "anti-syphon" is upright). Relief arrow must be horizontal (word "relief" is upright).

NOTE:

At injection pressures below 25 psi (1.75 kg/cm²) a slight buzzing noise may be made by the anti-syphon valve during each stroke of the metering pump. This is normal.

4. Start pump. Set at 80% speed and 100% stroke.
5. When solution begins to flow through the return tubing, rotate relief arrow to the vertical position.
6. The pump is now primed.

NOTE:

*(a) Pump is normally self-priming if suction lift is not more than 5 ft (1.5 m). valves in the pump are wet with water (pump is shipped from factory with water in pump head) and the above steps (**D. Priming**) are followed.*

*(b) If the pump does not self prime, remove discharge valve housing and ball and pour water or solution slowly into discharge port until head is filled. Follow step **D. Priming** thereafter.*

E. DEPRESSURIZING DISCHARGE LINE

1. It is possible to depressurize the discharge line and pump head without removal of tubing or loosening of fittings.

Be sure injection check valve is properly installed and is operating. If a gate valve or globe has been installed downstrean of injection check valve, it should be closed. Be certain relief tubing from the four function valve is connected and run to solution reservoir.

2. Rotate both anti-syphon and relief arrows so they are in a horizontal position.
3. The discharge line is now depressurized.
4. If injection check valve is of higher elevation than pump head, disconnecting tubing at injection check valve end will allow air to enter and cause solution to drain back to tank.

LMI
LIQUID METRONICS DIVISION
MILTON ROY
A unit of Sundstrand Corporation

8 Post Office Square
Acton, MA 01720 USA
TEL: (508) 263-9800
FAX: (508) 264-9172
http://www.lmipumps.com

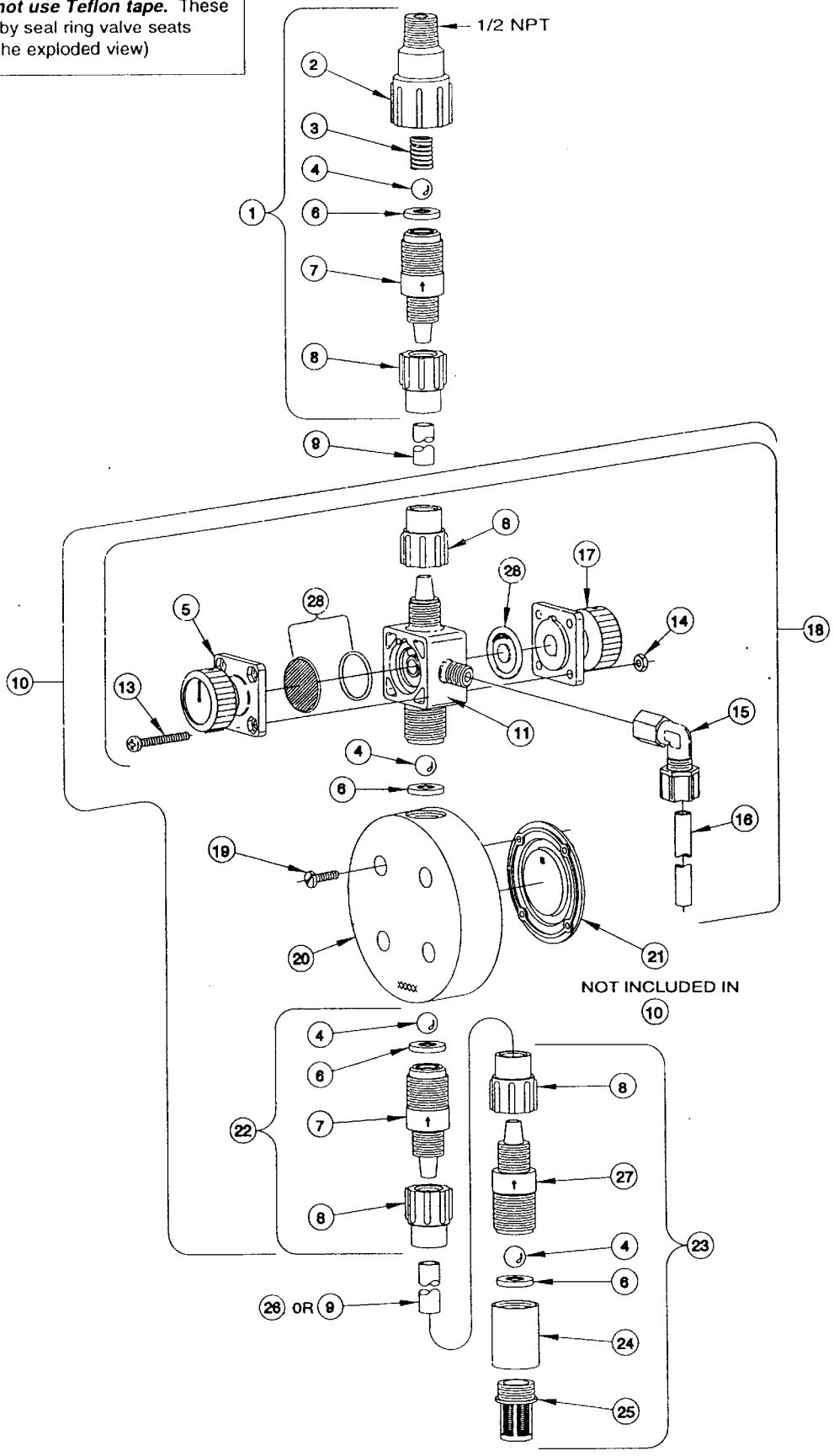
Replaces same of Rev M. 11/96
1042.M 3/97

KEY NO.	PART NO.	DESCRIPTION	QUANTITY	
			~~LE-20S~~	LE-26S
1	26851	Injection Check Valve Assembly		
	26751	Injection Check Valve Assembly		1
2	25108	Injector Fitting, PVC		1
3	10339*+	Spring PVDF		1
4	10138*+	Ball, Ceramic .500		4
5	34615	Cap Assembly, Anti-Syphon		1
6	10128*	Seal Ring, Hypalon		
	10228+	Seal Ring, Viton		4
7	10206	Valve Seat, PVC		2
8	10411	Coupling Nut		4
9	10142-10	Tubing, Polyethylene, .5" O.D.		
	10142-16	Tubing, Polyethylene, .5" O.D.		1
10	10588	Head Assembly, LE-20S, Acrylic		
	10589	Head Assembly, LE-26S, PVC		1
11	34610	Valve Body, ASM, PVDF		1
13	34679	Screw, 10-24 x 1 5/8"		4
14	10143	Nut, 10-24		4
15	10587	Elbow Connector, Polypropylene		1
16	10342-10	Return Tubing, Polyethylene, .375" O.D.		1
17	32115	Cap Assembly Relief		1
18	34626	Anti-Syphon Valve Assembly		1
19	10340	Screw, 10-24 x 3/4", S.S.		4
20	10524	Head, 3.0 SI, Acrylic		
	10525	Head, 3.0 SI, PVC		1
21	31419*+	Liquifram, 3.0 SI, Fluorofilm		1
22	10562	Suction Valve Assembly		
	10564	Suction Valve Assembly		1
23	10153	Foot Valve Assembly		
	10253	Foot Valve Assembly		1
24	25600	Foot Valve Seat, Polypropylene		1
25	10123	Strainer, Polypropylene		1
26	10141-06	Tubing, Vinyl, .5" O.D.		
27	10273	Valve Housing, PVC		1
28	34613	Seal Repair Kit		1
	32700	Suction Tubing Straightener (Not Shown)		1

* Parts included in Spare Parts Kit 20S
+ Parts included in Spare Parts Kit SP-26S

NOTE:

Threaded connections into pump head are 1"-12 straight threads. ***Do not use Teflon tape.*** These joints are sealed by seal ring valve seats (item 6 on the exploded view)



Model #CTP1010A Blacoh Pulsation Dampner (Sentry III), capacity 10 cubic inches, PVC

PARTS LIST

BLACOH FLUID CONTROL, INC.
PHONE: (909) 342-3100
FAX: (909) 342-3101

The following part listing for the Blacoh Pulsation Dampener specified below.

SENTRY MODEL:	**CTP1010A**
WETTED MATERIAL:	**PVC**
NON-WETTED MATERIAL:	**PVC**
BLADDER:	**AFLAS**
AIR CONTROL:	**CHARGEABLE**
INLET:	**½" NPT(F)**
ASSEMBLY DRAWING:	**3-3**

ITEM#	Fig.	PART #	QTY	DESCRIPTION
1D	D	1010-27	1	Bottom, PVC, Threaded, ½" Flo-Thru NPTF, III
	B	1010-24	1	Dome Top, PVC, III
3	B	1000-31	1	Bladder, Viton, III (rev.1)
5	B	1000-43	1	Fastener Assembly
		Assembly Includes the Following:		
		1000-44	6	6/32 SS Phillips Pan Head Bolt, 1¼"
		10-72	6	Nylok Nut, #6
6	B	101-20	1	Gauge, 1/8" CBM, Plastic
7	B	1000-46	1	Tee, 1/8" Steel
8	B	1000-70	1	Fill Valve and Cap, 1/8", Brass

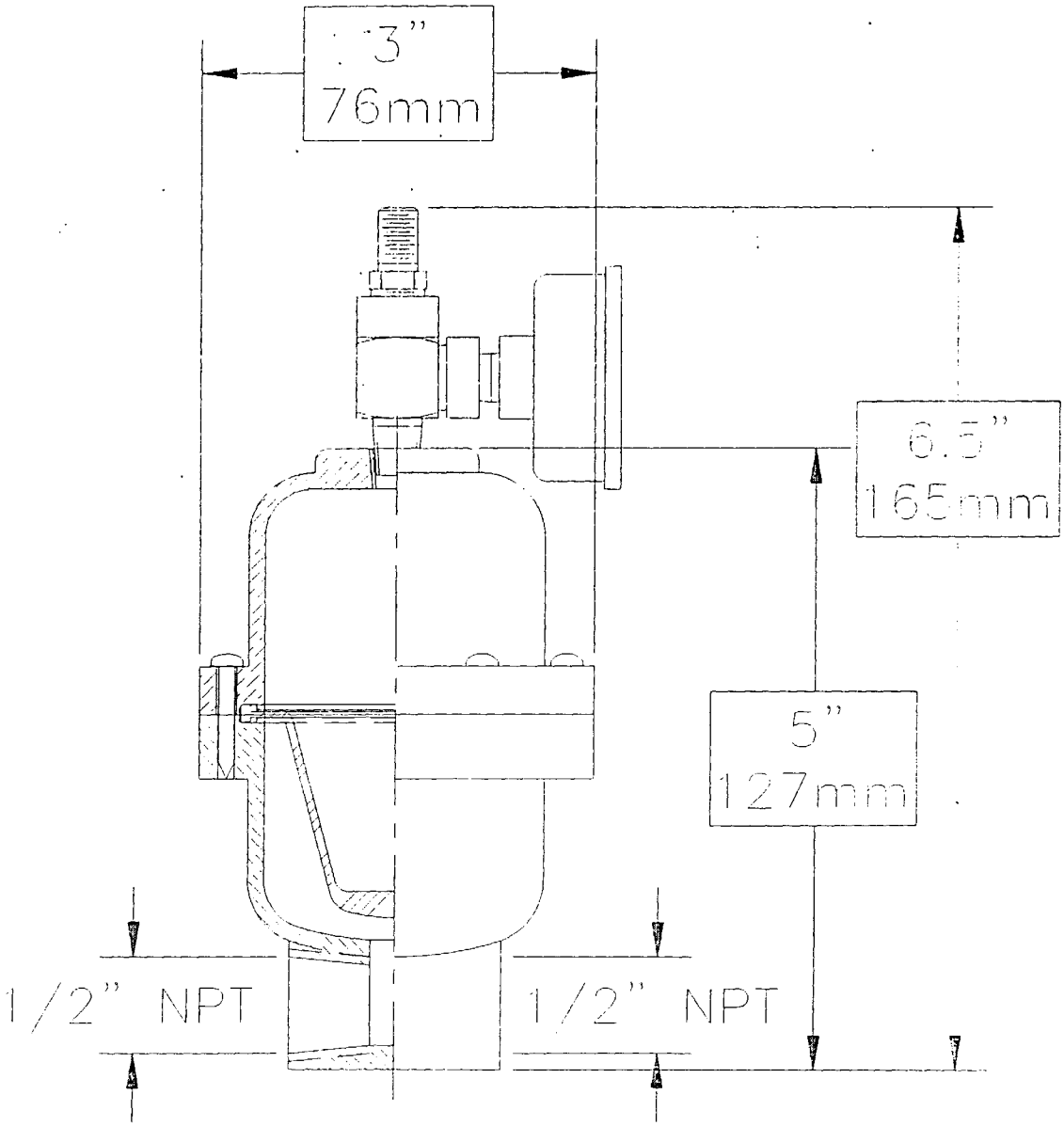
DIMENSIONAL DRAWING

BLACOH FLUID CONTROL CERTIFIED DIMENSIONAL DRAWING ESP

Blacoh Fluid Control, Inc.

SENTRY III DOME TOP
CHARGEABLE UNIT
1/2" NPTF FLOW THROUGH INLET / OUTLET
10 CUBIC INCH CAPACITY
WEIGHT: 2 LBS.
MODEL #: CTP1000_, CTP1010_, CTK1000_, CTD1000_

TOLERANCE: ± .25" (6.4mm)



1221 DODSON WAY, RIVERSIDE, CA 92507 PHONE: (909) 342-3100 & (800) 603-7867 FAX: (909) 342-3101

FIGUR	DESCRIPTION
A	ADJUSTABLE ASSEMBLY
B	UNIT AND CHARGEABLE ASSEMBLY
C	TEFLON BELLOWS ASSEMBLY
D	FLOW THROUGH ASSEMBLY
E	FLANGED BOTTOM ASSEMBLY

Blacoh Fluid Control, Inc.

SENTRY III DOME TOP ASSEMBLY DRAWING 3-3

FIG. A

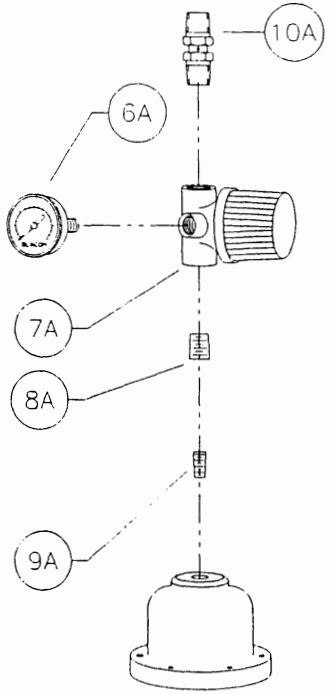


FIG. B SENTRY III PLASTIC DOME TOP

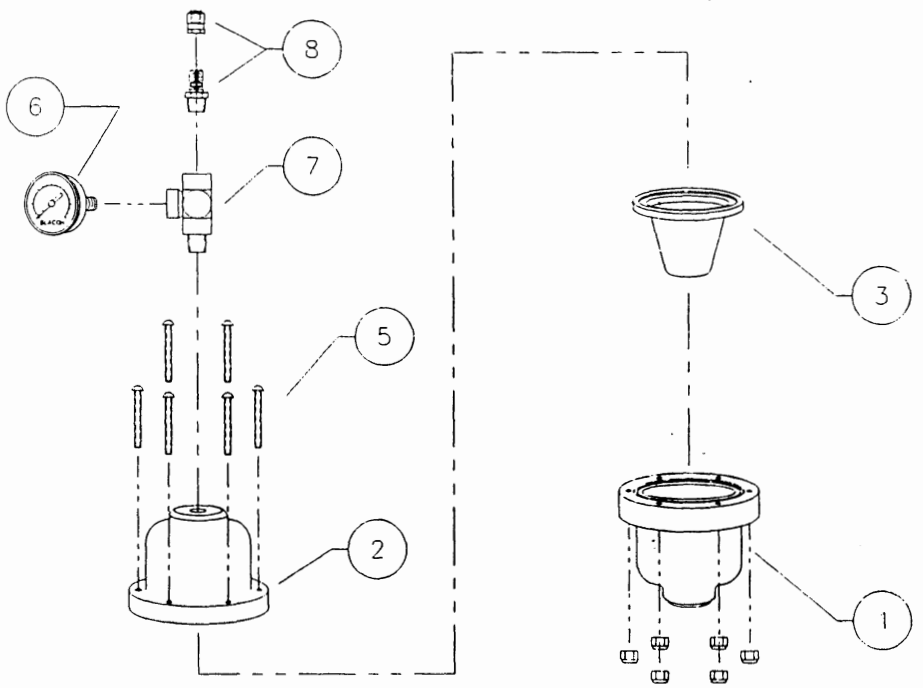


FIG. C

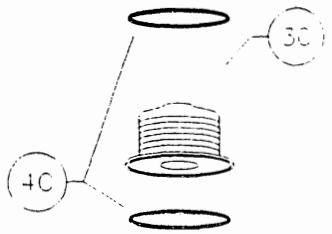


FIG. D

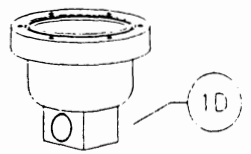
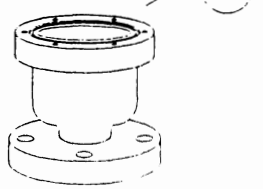


FIG. E



1221 DODSON WAY, RIVERSIDE, CA 92507 PHONE: (909) 342-3100 & (800) 603-7867 FAX: (909) 342-3101

ODOR CONTROL SYSTEMS

(Headworks, BNR-1, BNR-2, and Flowspliter)

RM Clayton WRC Expansion Phase 3
Spec. Section 11255

TABLE OF CONTENTS

Headworks Odor Control
Sodium Hydroxide (Caustic) Metering Pumps
Design and Operating Criteria

Location	Headworks Building		
Units	1 (and one uninstalled spare)		
Equipment Number	10CMP1		
Associated Auxiliary Systems	Caustic Storage Tank, Scrubber Recirculation Pump		
Function	Feed caustic to the recirculated chemical solution in the lead scrubber		
Flow Stream	Sodium Hydroxide (50 percent)		
Design Criteria	Manufacturer		
	Model		
	Type	Hose	
	Size - diaphragm diameter		
	Material of construction (wetted metal parts)		
	Capacity - min/max gph	1.3/13.4	
	Discharge pressure, min psig	100	
	Drive Motor		
	Manufacturer		
	Horsepower	1/4	
	RPM	39	
	Frame		
	Volts/Phase/Hertz	SCR	
Effect of Failure	Reduced efficiency of scrubber operation due to lack of caustic		
Response Time/Action	Priority 1 - Replace scrubber associated with failed metering pump. Operate complementary scrubber and associated equipment in single stage mode. Repair/replace failed metering pump.		

Headworks Odor Control
Sodium Hydroxide (Caustic) Metering Pumps
Design and Operating Criteria

Location	Headworks Building	
Units	1 (and one uninstalled spare)	
Equipment Number	10CMP2	
Associated Auxiliary Systems	Caustic Storage Tank, Scrubber Recirculation Pump	
Function	Feed caustic to the recirculated chemical solution of the lag scrubber	
Flow Stream	Sodium Hydroxide (50 percent)	
Design Criteria	Manufacturer	
	Model	
	Type	Hose
	Size - diaphragm diameter	
	Material of construction (wetted metal parts)	
	Capacity - min/max gph	0.4/3.9
	Discharge Pressure, min psig	100
	Drive Motor	
	Manufacturer	
	Horsepower	1/4
	RPM	12
	Frame	
	Volts/Phase/Hertz	SCR
Effect of Failure	Reduced efficiency of scrubber operation due to lack of caustic	
Response Time/Action	Priority 1 - Bypass scrubber associated with failed metering pump. Operate complementary scrubber and associated equipment in single stage mode. Repair/replace failed metering pump.	

Headworks Odor Control
Sodium Hypochlorite Metering Pumps
Design and Operating Criteria

Location	Headworks Building	
Units	2 (and one uninstalled spare)	
Equipment Number	10SHMP1, 10SHMP2	
Associated Auxiliary Systems	Sodium Hypochlorite Storage Tank, Scrubber Recirculation Pump	
Function	Feed Sodium Hypochlorite to the recirculated solution in the scrubber	
Flow Stream	Sodium Hypochlorite (15 percent)	
Design Criteria	Manufacturer	
	Model	
	Type	Hose
	Size - diaphragm diameter	
	Material of construction (wetted metal parts)	
	Capacity - min/max gph	1.6/16.4
	Discharge pressure-min psig	100
	Drive Motor	
	Manufacturer	
	Horsepower	1/4
	RPM	48
	Frame	
	Volts/Phase/Hertz	SCR
Effect of Failure	Reduced efficiency of scrubber operation due to lack of Sodium Hypochlorite	
Response Time/Action	Priority 1 - Bypass scrubber associated with failed metering pump. Operate complementary scrubber and associated equipment in single stage mode. Repair/replace failed metering pump.	

ATTACHMENT NO. 5

Appendix B – Insurance and Bonding Requirements
FC-8155, RM Clayton WRC Headworks Improvement
Maintenance Project

APPENDIX B

INSURANCE & BONDING REQUIREMENTS

FC-8155, RM Clayton WRC Headworks Improvement **Maintenance** Project

A. Preamble

The following requirements apply to all work under the agreement. Compliance is required by all Contractors/Consultants. **To the extent permitted by applicable law, the City of Atlanta ("City") reserves the right to adjust or waive any insurance or bonding requirements contained in this Appendix B and applicable to the agreement.**

1. Evidence of Insurance Required Before Work Begins

No work under the agreement may be commenced until all insurance and bonding requirements contained in this Appendix B, or required by applicable law, have been complied with and evidence of such compliance satisfactory to City as to form and content has been filed with City. Contractor/Consultant must provide City with a Certificate of Insurance that clearly and unconditionally indicates that Contractor/Consultant has complied with all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement. If the Contractor/Consultant is a joint venture, the insurance certificate should name the joint venture, rather than the joint venture partners individually, as the primary insured. In accordance with the solicitation documents applicable to the agreement at the time Contractor/Consultant submits to City its executed agreement, Contractor/Consultant must satisfy all insurance and bonding requirements required by this Appendix B and applicable by law, and provide the required written documentation to City evidencing such compliance. In the event that Contractor/Consultant does not comply with such submittal requirements within the time period established by the solicitation documents applicable to the agreement, City may, in addition to any other rights City may have under the solicitation documents applicable to the agreement or under applicable law, make a claim against any bid security provided by Contractor/Consultant.

2. Minimum Financial Security Requirements

All companies providing insurance required by this Appendix B must meet certain minimum financial security requirements. These requirements must conform to the ratings published by A.M. Best & Co. in the current Best's Key Rating Guide - Property-Casualty. The ratings for each company must be indicated on the documentation provided by Contractor/Consultant to City certifying that all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement have been unconditionally satisfied.

For all agreements, regardless of size, companies providing insurance or bonds under the agreement must meet the following requirements:

i) Best's Rating not less than A-,
ii) Best's Financial Size Category not less than Class VII, and

iii) Companies must be authorized to conduct and transact insurance contracts by the Insurance Commissioner, State of Georgia.

iv) All bid, performance and payment bonds must be underwritten by a U.S. Treasury Circular 570 listed company.

If the issuing company does not meet these minimum requirements, or for any other reason is or becomes unsatisfactory to City, City will notify Contractor/Consultant in writing. Contractor/Consultant must promptly obtain a new policy or bond issued by an insurer acceptable to City and submit to City evidence of its compliance with these conditions.

Contractor/Consultant's failure to comply with all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement will not relieve Contractor/Consultant from any liability under the agreement. Contractor/Consultant's obligations to comply with all insurance and bonding requirements set forth in Appendix B and applicable to the agreement will not be construed to conflict with or limit Contractor/Consultant's/Consultant's indemnification obligations under the agreement.

3. Insurance Required for Duration of Contract

All insurance and bonds required by this Appendix B must be maintained during the entire term of the agreement, including any renewal or extension terms, and until all work has been completed to the satisfaction of City.

4. Notices of Cancellation & Renewal

Contractor/Consultant must, notify the City of Atlanta in writing at the address listed below by mail, hand-delivery or facsimile transmission, within 2 days of any notices received from any insurance carriers providing insurance coverage under this Agreement and Appendix B that concern the proposed cancellation, or termination of coverage.

Enterprise Risk Management
68 Mitchell St. Suite 9100
Atlanta, GA 30303
Facsimile No. (404) 658-7450

Confirmation of any mailed notices must be evidenced by return receipts of registered or certified mail.

Contractor/Consultant shall provide the City with evidence of required insurance prior to the commencement of this agreement, and, thereafter, with a certificate evidencing renewals or changes to required policies of insurance at least fifteen (15) days prior to the expiration of previously provided certificates.

5. Agent Acting as Authorized Representative

Each and every agent acting as Authorized Representative on behalf of a company affording coverage under this contract shall warrant when signing the Acord Certificate of Insurance that specific authorization has been granted by the Companies for the Agent to

bind coverage as required and to execute the Acord Certificates of Insurance as evidence of such coverage. City of Atlanta coverage requirements may be broader than the original policies; these requirements have been conveyed to the Companies for these terms and conditions.

In addition, each and every agent shall warrant when signing the Acord Certificate of Insurance that the Agent is licensed to do business in the State of Georgia and that the Company or Companies are currently in good standing in the State of Georgia.

6. Certificate Holder

The **City of Atlanta** must be named as certificate holder. All notices must be mailed to the attention of **Enterprise Risk Management** at **68 Mitchell Street, Suite, 9100, Atlanta, Georgia 30303.**

7. Project Number & Name

The project number and name must be referenced in the description section of the insurance certificate.

8. Additional Insured Endorsements Form CG 20 26 07 04 or equivalent

The City must be covered as Additional Insured under all insurance (except worker's compensation and professional liability) required by this Appendix B and such insurance must be primary with respect to the Additional Insured. **Contractor/Consultant must submit to City an Additional Insured Endorsement evidencing City's rights as an Additional Insured for each policy of insurance under which it is required to be an additional insured pursuant to this Appendix B. Endorsement must not exclude the Additional Insured from Products - Completed Operations coverage. The City shall not have liability for any premiums charged for such coverage.**

9. Mandatory Sub-Contractor/Consultant Compliance

Contractor/Consultant must require and ensure that all subContractor/ Consultants/subconsultants at all tiers to be sufficiently insured/bonded based on the scope of work performed under this agreement.

10. Self Insured Retentions, Deductibles or Similar Obligations

Any self insured retention, deductible or similar obligation will be the sole responsibility of the contractor.

B. Workers' Compensation and Employer's Liability Insurance

Contractor/Consultant must procure and maintain Workers' Compensation and Employer's Liability Insurance in the following limits to cover each employee who is or may be engaged in work under the agreement. :

Workers' Compensation. . . . . **Statutory**
Employer's Liability:
Bodily Injury by Accident/Disease **$1,000,000 each accident**
Bodily Injury by Accident/Disease **$1,000,000 each employee**
Bodily Injury by Accident/Disease **$1,000,000 policy limit**

C. Commercial General Liability Insurance

Contractor/Consultant must procure and maintain Commercial General Liability Insurance on form (CG 00 00 01 or equivalent) in an amount not less than **$1,000,000 per occurrence subject to a $2,000,000 aggregate**. The following indicated extensions of coverage must be provided:

- ☒ Contractual Liability
- ☒ Broad Form Property Damage
- ☒ Premises Operations
- ☒ Personal Injury
- ☒ Fire Legal Liability
- ☒ Medical Expense
- ☒ Independent Contractor/Consultants/SubContractor/Consultants
- ☒ Products – Completed Operations
- ☒ Pesticide or Herbicide Applicator Coverage
- ☒ Explosion, Collapse and Underground (XCU) Liability
- ☒ Additional Insured Endorsement* (primary& non-contributing in favor of the City of Atlanta)
- ☒ Waiver of Subrogation in favor of the City of Atlanta

D. Commercial Automobile Liability Insurance

Contractor/Consultant must procure and maintain Automobile Liability Insurance in an amount not less than **$1,000,000** Bodily Injury and Property Damage combined single limit. The following indicated extensions of coverage must be provided:

- ☒ Owned, Non-owned & Hired Vehicles
- ☒ Waiver of Subrogation in favor of the City of Atlanta

If Contractor/Consultant does not own any automobiles in the corporate name, non-owned vehicle coverage will apply and must be endorsed on either Contractor/Consultant's personal automobile policy or the Commercial General Liability coverage required under this Appendix B.

E. Excess or Umbrella Liability Insurance

Contractor/Consultant shall procure and maintain a policy providing Excess or Umbrella Liability Insurance which is at least as broad as the underlying policy. This insurance, which shall be maintained throughout the life of the contract, shall be in an amount of not less than **$5,000,000 per occurrence**.

- ☒ Coverage must follow form with primary policy
- ☒ May be used to achieve minimum liability limits
- ☒ Coverage must be as broad as primary policy

F. Property Coverage/Inland Marine

Contractor/Consultant shall procure and maintain all risk property coverage in an amount equal to replacement value for all equipment, furniture, fixtures, machinery and/ or personal property.

G. Professional Liability Insurance

Contractor/Consultant shall procure and maintain during the life of this contract Professional Liability Insurance in an amount of **$1,000,000** per occurrence and annual aggregate. The policy will fully address the Contractor/Consultant's professional services associated with the scope of work contained in this document. The policy will include at least a three year Extended Reporting Provision.

H. Pollution Liability

Contractor/Consultant must procure and maintain Pollution Liability Insurance in an amount not less than **$1,000,000** each occurrence/aggregate. Completed operations coverage shall remain in effect for no less than three (3) years after final completion. This coverage can also be satisfied with an endorsement to the General Liability policy.

I. Performance Bond and Payment Bond

Contractor/Consultant shall furnish a Payment Bond and a Performance Bond to the City in an amount equal to **100 percent of the total Annual contract value** and for the duration of the entire term.

The person executing the Bonds on behalf of the surety shall file with the Bonds a general power of attorney unlimited as to amount and type of bonds covered by such power of attorney, and certified by an official of said surety. **Be a U.S. Treasury Circular 570 listed company.**

ATTACHMENT NO. 6

Draft Payment and Performance Bond Forms

Payment Bond

INSTRUCTIONS

1. This form is required for use in connection with the Agreement identified on its face. There shall be no deviation from this form without approval by the City.

2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of the form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an office of the corporation involved, evidence of this authority must be furnished.

3. Corporation executing the bond as surety must be among those appearing on the U.S. Treasury Department's most current list of approved sureties and must be acting within the amounts and limitations set forth therein.

4. Corporate surety shall be duly authorized by the Commissioner of Insurance of the State of Georgia to transact surety business in the State of Georgia.

5. Do not date this bond. The City will date this bond the same date or later than the date of the Agreement.

6. The Surety shall attach a duly authorized power-of-attorney authorizing signature on its behalf of any attorney-in-fact.

7. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Seal."

8. The name of each person signing this bond shall be typed or printed in the space provided.

Payment Bond

"City" City of Atlanta

"Project" _____

"FC No." _____

"Principal" (Legal Name and Business Address), _____

_____

_____

Type of Organization ("X" one): _____ Individual
_____ Partnership
_____ Joint Venture
_____ Corporation

"Surety:" (Name and Business Address) _____

_____

duly authorized by the Commissioner of Insurance of the State of Georgia to transact surety business in the State of Georgia.

"Agreement:" Agreement between Principal and City, dated _____ day of _____, 20___, regarding performance of Work relative to the Project.

"Penal Sum:" _____ Dollars ($).

KNOW ALL MEN BY THESE PRESENTS, that we, the Principal and Surety hereto, as named above, are held and firmly bound to the City in the above Penal Sum for the payment of which well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, jointly and severally.

WHEREAS, the Principal and the City entered into the Agreement identified above;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal shall make payment of all Subcontractors and all persons supplying labor, Materials, machinery and Equipment for the performance of said work, this obligation shall be void; otherwise of full force and effect.

And the Surety to this bond, for value received, agrees that no modification, change, extension of time, alteration or addition to the terms of the Agreement or to the Work to be performed thereunder shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such modification, change, extension of time, alteration or addition to the terms of the Agreement or the Work.

It is agreed that this bond is executed pursuant to and in accordance with the provisions of O.C.G.A. Section 36-91-1 *et seq.* and is intended to be and shall be construed to be a bond in compliance with the requirements thereof, though not restricted thereto.

IN WITNESS WHEREOF, the Principal and the Surety have caused these presents to be duly signed and sealed this _____day of _____, 20___.

PRINCIPAL:_____

_____
President/Vice President (Sign)

_____
President/Vice President (Type or Print)

Attested to by:

_____
Secretary/Assistant Secretary (Seal)

SURETY:_____

By: _____
Attorney-in-Fact (Sign)

_____
Attorney-in-Fact (Type or Print)

APPROVED AS TO FORM

_____
Associate/Assistant City Attorney

APPROVED

_____
City's Chief Financial Officer

Performance Bond

INSTRUCTIONS

1. This form is required for use in connection with the Agreement identified on its face. There shall be no deviation from this form without approval by the City.

2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of the form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an office of the corporation involved, evidence of this authority must be furnished.

3. Corporation executing the bond as surety must be among those appearing on the U.S. Treasury Department's most current list of approved sureties and must be acting within the amounts and limitations set forth therein.

4. Corporate surety shall be duly authorized by the Commissioner of Insurance of the State of Georgia to transact surety business in the State of Georgia.

5. Do not date this bond. The City will date this bond the same date or later than the date of the Agreement.

6. The Surety shall attach a duly authorized power-of-attorney authorizing signature on its behalf of any attorney-in-fact.

7. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Seal."

8. The name of each person signing this bond shall be typed or printed in the space provided.

Performance Bond

"City" City of Atlanta

"Project" _____

"FC No." _____

"Principal" (Legal Name and Business Address) _____

_____

_____

Type of Organization ("X" one): _____ Individual
_____ Partnership
_____ Joint Venture
_____ Corporation

"Surety:" (Name and Business Address) _____

_____

_____,

duly authorized by the Commissioner of Insurance of the State of Georgia to transact surety business in the State of Georgia.

"Agreement:" Agreement between Principal and City, dated _____ day of _____, 20___, regarding performance of Work relative to the Project.

"Penal Sum:" _____.

KNOW ALL MEN BY THESE PRESENTS, that we, the Principal and Surety hereto, as named above, are held and firmly bound to the City in the above Penal Sum for the payment of which well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, jointly and severally.

WHEREAS, the Principal and the City entered into the Agreement identified above;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal shall faithfully and fully comply with, perform and fulfill all of the undertakings, covenants, conditions and all other of the terms and conditions of said Agreement, including any and all duly authorized modifications of such Agreement, within the original term of such Agreement and any extensions thereof, which shall include, but not be limited to any obligations created by way of warranties and/or guarantees for workmanship and materials which warranty and/or guarantee may extend for a period of time of one year beyond completion of said Agreement, this obligation shall be void; otherwise, of full force and effect.

And the Surety to this bond, for value received, agrees that no modification, change, extension of time, alteration or addition to the terms of the Agreement or to the Work to be performed thereunder shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such modification, change, extension of time, alteration or addition to the terms of the Agreement or the Work.

It is agreed that this bond is executed pursuant to and in accordance with the provision of O.C.G.A. Section 13-10-1 and 36-91-1, *et seq.* and is intended to be and shall be construed to be a bond in compliance with the requirements thereof, though not restricted thereto.

IN WITNESS WHEREOF, the Principal and the Surety have caused these presents to be duly signed and sealed this _____ day of _____, 20___.

PRINCIPAL:_____

_____
President/Vice President (Sign)

_____
President/Vice President (Type or Print)

Attested to by:

_____
Secretary/Assistant Secretary (Seal)

SURETY:_____

By: _____
Attorney-in-Fact (Sign)

_____
Attorney-in-Fact (Type or Print)

APPROVED AS TO FORM

_____
Associate/Assistant City Attorney

APPROVED

_____
City's Chief Financial Officer

ATTACHMENT NO. 7

Response to Questions

ATTACHMENT NO. 7
Response to Questions

1. **Question**
   Will the City provide RFP Part 4 – Required Procurement Documents in an electronic and editable format for Design-Builder's use?

   Answer
   No. The Department of Procurement does not release Required Procurement Document Forms in editable format.

2. **Question**
   RFP Part 2, 3.2.9 states the Warranty shall extend for a period of five (5) years from the date of Substantial Completion. Part 5, Exhibit A, Standard Form of General Conditions of Contract between Owner and Design-Builder, 2.10 states a correction period of one (1) year from the date of Substantial Completion of the Work, or within such longer period to the extent required by any specific warranty included in the Contract Documents.

   a. Please confirm which is correct.

   Answer
   The five (5) year term applies to the equipment warranty only. See Addendum No. 4, Item 6.

   b. If a five (5)-year Warranty is to apply, does this Warranty apply to the entire scope of furnished and installed work, or does it only apply to specific components of the work (such as manufactured process equipment), and all other work remains at the 1-year warranty?

   Answer
   See 2.10.3 for clarification of one (1) year correction period.

3. **Question**
   Part 5, Exhibit A, Standard Form of General Conditions of Contract between Owner and Design-Builder, 4.1.1 describes procedures for encountering Hazardous Conditions. Please confirm the Owner (City of Atlanta) will be named as the Generator of hazardous waste in this instance.

   Answer
   Yes, the City will be the generator of hazardous waste.

4. **Question**
   RFP Part 4, "Statement of Proponent's Qualifications", Item 5 on page 1 of 4, states, "Using the forms provided in this Section, list previously completed or current projects..." We do not find these referenced forms in the RFP. Please provide the referenced forms to be used for completed or current projects.

Answer
Forms were provided previously. See Attachment No. 2 to Addendum No. 2.

5. **Question**
RFP Part 2, 3.2.3.1 states to Identify and complete the Key Personnel Experience Form for the individuals… RFP Part 4, "Statement of Proponent's Qualifications", Item 7 on page 2 of 4, states, "Using the forms provided in this Section, provide information for key project personnel…" We do not find these referenced forms in the RFP. Please provide the referenced forms to be used for Key Personnel.

Answer
Forms were provided previously. See Attachment No. 2 to Addendum No. 2.

6. **Question**
RFP Part 4, Safety Record Form asks for detailed Safety Program information. Is it also required to submit a full copy of our Safety Program, or will the Table of Contents from our Safety Program suffice?

Answer
Proponent is required to submit a full copy of its Safety Program as well as the Safety Record Form in Part 4.

7. **Question**
RFP Part 1, 14.1 states that we are required to use 12-point font in our Informational Proposal. Is it acceptable to use 10-point font for graphics and charts?

Answer
Yes, it is acceptable to use 10-point font on graphics and charts **only.** All other documentation should use 12-point font.

8. **Question**
RFP Part 1, 14.1 states that each Informational Proposal must be submitted on 8½ X 11 pages. In order to enhance readability and provide the detail sufficient to meet RFP requirements, can we utilize 11X17 pages for large graphics?

Answer
Yes.

9. **Question**
RFP Part 2, 2.1 suggests a 50 page limit. Please confirm that this limit does not include resumes.

Answer
Suggested page limit is inclusive of resumes.

10. **Question**
In order for our design-build team to have adequate time to review the project documents, analyze the information gathered at the site visit, receive answers to questions, and

conduct value engineering and constructability reviews required to find the most innovative approach that will meet the project needs, we will need a total of eight weeks. If the City can allow this additional time on the front end, history shows that we can deliver a better project and save much more time on the back end. From what we are hearing there are other D-B teams who need this additional time as well. We think that in order for the City to receive the most innovative remedies from more qualified teams it would be beneficial to the City to grant this extension. Is it possible to extend the due date to allow a total of 8 weeks from the date the extension is granted to prepare our proposal?

Answer
The due date was extended via Addendum No. 3 to June 1, 2015.

11. **Question**
Is there additional technical information for the existing odor control system available to the D-B teams?

Answer
Yes, see Addendum No. 4, Item 2 and Attachment No. 4.

12. **Question**
Our team requests that the proposal due date be extended past June 20th? The requisite amount of time is needed to prepare a highly competitive, competent and well thought out proposal. This project is a design-build and requires more time to adequately develop the design and resulting proposal, as compare to a hard bid project. The City has asked the proponents to provide outside the box" thinking and develop a plan that draws from the experience of the Design-Builders. This can only be done with numerous target strategies developed within the teams and that takes time. Likewise, not allowing enough time may restrict and impact the ability to effectively incorporate the AABE and FBE firms that should be participating in the project. Not allowing enough time to properly contemplate and develop the design will result in higher design and construction costs all of which will be passed on and paid for by the City and the taxpayers.

Because three of the teams proposing had previous engagement with the project prior to this advertisement, they have been afforded additional valuable time that the rest of the marketplace has not. Thus, providing those three firms a distinct and keen advantage over all of the other proponents including their EBO team members.

We understand extending the solicitation process by thirty (30) days may be viewed as extending the overall project completion, however, by allowing all of the proponents adequate time to develop their design and resulting construction strategy should easily allow all proponents to capture those 30 days on the backend of the schedule, thereby, maintaining the same contract completion date and reducing construction costs. Simply said, affording more planning on the front end will save substantial costs and time on the back end. If a confirmed time extension past June 20th cannot be provided in the next five (5) business days, then our team will regrettably have to pass on this solicitation.

Unfortunately, this will result in 2 less competition in the marketplace and potentially the City may not receive the benefit of the most creative technical solution along with the best overall value.

Answer
See response to Question No. 10 above.

13. **Question**
Will the City require any on-site laboratory for this project?

Answer
No.

14. **Question**
Referencing Section 3.2.4.2 of the RFP, we hereby request the partnering requirements apply only to the prime contractor. We pride ourselves in our experience with formal partnering not only with City of Atlanta but many of our clients, both municipal and private. The prime Contractor is responsible for implementing, communicating and managing the formal partnering and ensuring its success, therefore the partnering requirements should rest solely on that of the prime contractor.

Answer
Partnering requirements shall be provided as listed in Section 3.2.4.2.

15. **Question**
Part 1, Section 14.1 states to submit (1) original and seven (7) copies of the Informational Proposal. However, in Part 4, Form 9 Submittal Checklist states to include (1) original and six (6) copies of the proposal. Does the City require 6 copies or 7 copies?

Answer
Please include one (1) original and seven (7) copies. See Addendum No. 4, Item 4.

16. **Question**
Are the stop logs for the screenings channels available for the contractor to use during construction activities? Please quantify the size/vertical footage available.

Answer
No. The Design Builder ("D/B") must include stop logs for construction if required as per their Proposal.

17. **Question**
Is it acceptable for the Proponent to allow its vendors to use their standard Programmable Logic Controller (PLC) and Operator Interface Terminal (OIT), provided the vendors' PLC will interface with the area PLC supplied by the Proponent? Thus, the vendor PLC will not need to communicate with the Foxboro system while the area PLC provided will interface with the plant SCADA system (Foxboro).

Answer
No, please provide as per Section 3.6.3 of Exhibit C-1, Design Criteria Package.

18. **Question**
Part 5, Exhibit C-1, Section 2.0 – Process Design Criteria: Table 2-1 Headworks Coarse Screen System Design Requirements (Page 2-2) indicates a Max Screenings Loading, cy/hr of 20. Please verify if this 20 cy/hr is per screen (at 80 MGD) or per total flow (at 240 MGD)?

Answer
The max screening loadings (20 cy/hr) listed is for one (1) screen passing 80 mgd.

19. **Question**
Article 3.2.4.8 of the RFP requires the Proponent, including all team members identified in the Proposal, to provide a completed SAFETY RECORD FORM (4 page form). Please confirm this requirement is to be limited to the Proponent (Majority and Minority JV Team) only.

Answer
Requirement is confirmed as stated; Safety Record Forms are required for the Majority and Minority Joint venture team members only.

20. **Question**
Article 3.2.4.9 of the RFP requires the Proponent, including all team members, to provide their Workman's Compensation Ratings and that they must not exceed 1.0 for any year during the last three (3) years. Please confirm this requirement is to be limited to the Proponent (Majority and Minority JV Team) only.

Answer
Requirement is confirmed as stated; Safety Record Forms are required for the Majority and Minority Joint venture team members only.

21. **Question**
Article 3.2.4.9 of the RFP requires the Proponent, including all team members, to provide their OSHA Incident Ratings (Total Recordable Case Rates, Injuries and Illness with Lost Work Days, and Injuries and Illness with Job Transfer or Restricted Work Days). Please confirm this requirement is to be limited to the Proponent (Majority and Minority JV Team) only.

Answer
Requirement is confirmed as stated; Safety Record Forms are required for the Majority and Minority Joint venture team members only.

22. **Question**
Standard Form of General Conditions of Contract Between Owner and Design-Builder, 4.1 – Hazardous Conditions: GC 4.1.1 calls for the Design-Builder to ensure that Hazardous Conditions are remediated or rendered harmless should such conditions be encountered. Although Design-Builder will solicit and engage the services of licensed hazardous substance abatement subcontractors, please confirm that the City will remain

responsible, will be considered the generator, and will sign all manifests for any Hazardous Substances not brought to the site by the Design-Builder or anyone else for which the Design-Builder is responsible.

Answer
See response to Question No. 3 above.

23. **Question**
Standard Form of General Conditions of Contract Between Owner and Design-Builder, 4.1 – Hazardous Conditions: GC 4.1.4 provides that the Design Builder will be entitled to an equitable adjustment in the Contract Time(s) and Contract Price in the event Hazardous Conditions are encountered that impact the critical path of Design Builder's schedule. Please confirm that Design Builder's right to an equitable adjustment to the Contract Time(s) and Price in the event a Hazardous Condition is encountered would apply in all situations and not just when the critical path is impacted.

Answer
The General Conditions remain unchanged.

24. **Question**
Proponent understands the existing Vortex Grit structure excavation, when built, encountered solid rock requiring blasting along the entirety of the south side of the excavation, essentially from current finished grade down to subgrade of bottom slab. This is not representative in the provided GeoTech Report. Does the City intend to perform and provide any additional boring information further south of the existing structure?

Answer
No additional boring information shall be provided. The Proponent shall be responsible for obtaining any and all additional borings required for design and completion of the Project, pursuant to Section 4.2 of the Standard Form of General Conditions.

25. **Question**
Standard Form of General Conditions of Contract Between Owner and Design-Builder, 4.2 – Design-Builder's Investigation of Site Conditions, GC 4.2 and 4.3 contemplates the Proponents performing additional subsurface conditions exploration, which is not practical or feasible to accomplish prior to the Proposal due date. The paragraph also states that *"No claims shall be made by Design-Builder based on [claims]...which were reasonably discoverable..."* As such, would the Owner consider including a Differing Site Conditions provision and allowing for an equitable adjustment in Contract Time(s) and Contract Price, as the case may warrant, for the following conditions: *"Concealed or latent physical conditions or subsurface conditions at the Site that (1) differ materially from those indicated in the Contract Documents, or (2) are of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in Work."*

Answer
The General Conditions remain unchanged.

26. **Question**
Part 4, Cost Proposal Form - We assume the value to be inserted on the "Annual Maintenance Agreement" line is the Proponent's estimated cost for the first year of the Maintenance Agreement, and which would ultimately be inserted into Paragraph 1.2 of the Master Services Agreement (Maintenance Agreement). The Annual Maximum Payment Amount for subsequent years would then be established on an annual basis by the City. Please confirm or clarify.

Answer
The Maintenance Agreement shall have a term of five (5) years (commencing at substantial completion) and shall have up to three (3), five (5) year renewal options at the City's sole discretion. The cost for the five (5) year maintenance term identified in the Proponent's Proposal response shall include any adjustment required for subsequent renewals. The Maintenance Agreement will specify a not to exceed amount for the five (5) year term.

27. **Question**
Exhibit D, Maintenance Agreement, Section 16 states the Service Provider shall comply with the insurance and bonding requirements set forth on Appendix B. Appendix B in the Maintenance Agreement is blank and provides no insurance requirements. Please clarify what insurance requirements the Service Provider will be required to provide under Exhibit D Maintenance Agreement.

Answer
Please see Addendum No. 4, Item 3 as well as Attachment No. 5.

28. **Question**
Exhibit D, Maintenance Agreement, Section 16 states the Service Provider shall comply with the insurance and bonding requirements set forth on Appendix B. If the RFP Appendix B Insurance and Bonding Requirements are required, the Service Provider should not be required to provide Professional Liability Insurance because the Service Provider will not be providing true professional services covered under a Professional Liability policy. The Service Provider's General Liability policy will provide coverage for professional services provided under the maintenance agreement. Please confirm.

Answer
Service Provider will be required to provide Professional Liability Insurance. See Attachment No. 5 of Addendum No. 4.

29. **Question**
Exhibit D, Maintenance Agreement, Section 16 states the Service Provider shall comply with the insurance and bonding requirements set forth on Appendix B. If the RFP Appendix B Insurance and Bonding Requirements are required, the Service Provider

should not be required to provide Builders Risk insurance because once the project is complete; the City's property policy will provide coverage for services being performed under the maintenance agreement. Please confirm.

Answer
The Appendix - B, Insurance and Bonding Requirements, for the **Maintenance Agreement** does not require Builders Risk insurance coverage. See Attachment No. 5 of Addendum No. 4.

30. **Question**
Exhibit D, Maintenance Agreement, Section 16 states the Service Provider shall comply with the insurance and bonding requirements set forth on Appendix B. Please clarify how the City expects the maintenance agreement to be bonded and please provide copies of the bond forms that are expected to be used during the maintenance period. Since the City has the option to renew or not renew annually, please confirm the bond should be provided on an annual basis only.

Answer
As per Appendix B - Insurance and Bonding Requirements for the **Maintenance Agreement**, Service Provider is required to furnish a Payment Bond and a Performance ("**P&P**") Bond to the City in an amount equal to 100 percent of the **total Annual** contract value. See Attachment No. 5 of Addendum No. 4, Paragraph I. Also, see Attachment No. 6 for Draft P&P Bond Forms.

31. **Question**
Part 1 Section 25.1 states "Wages under this Agreement must not be less than the minimum wage rates specified for Atlanta-funded projects as set forth in these documents." Please provide or direct us to the specified wage rates.

Answer
Proponents must comply with applicable Georgia State minimum wage laws.

32. **Question**
On the walk-through, it appears some of the existing gas monitoring is not working. Does the City desire that the gas monitoring in the existing Headworks Building be repaired and be in compliance with Exhibit C-1, Section 2, article 2.2.6.1 on page 2-8? If so, please provide specific scope of what equipment is working and acceptable as currently installed, and what needs to be replaced.

Answer
Proponents should assume the existing system must be replaced and integrated into the Proponent's overall Project approach. See Exhibit C-1 Design Criteria Package for additional information.

33. **Question**
The Master Service Agreement, Section 3.2 references Appendix B Insurance and Bonding Requirements. Paragraph, F Builders Risk/Installation Floater and Paragraph G

Property Coverage/Inland Marine requires the Contractor/Consultant to procure and maintain all risk property coverage in the amount equal to replacement cost of…

Typically the Owner would assume the responsibility of insuring the completed project. Is it the Owners intention that the Service Provider (Contractor/Design Builder) continue to insure the project after the work has been completed and the Owner is in operation of the project? We request this requirement be deleted from the service agreement as we are unable insure the completed project as it is the property of the City of Atlanta.

Answer
See Response to Question No. 29 above.

34. **Question**
Exhibit D, Maintenance Agreement, Master Service Agreement, Section 3.2 references Appendix B Insurance and Bonding Requirements. Paragraph, J, Performance Bond and Payment Bond requires the Contractor/Consultant to furnish a Payment Bond and Performance Bond to the City in the amount equal to 100 percent of the total contract value and for the duration of the entire term. All major surety companies (Travelers and Chubb) have taken exception to this bonding requirement to be tied to Performance Bond and Payment Bond during the maintenance period and will not provide this as one bond because there is no product available for 5 years of performance and payment bond while also allowing for additional extensions. Therefore we intend to provide a payment and performance bond for the Design Build portion of the work only at this time, please confirm this is acceptable.

Answer
See Response to Question No. 30 above.

35. **Question**
The requirement for an original plus 7 copies is on page 4, paragraph 14.1 of the RFP. There is also a requirement for an original plus 6 copies on Form 9 - Required Proposal Check List. What number of copies will be required?
Answer
See Addendum No. 4, Item 4.

36. **Question**
Page 5 of 10, paragraph 18.0 indicates that a Letter of Credit may be required for performance guarantee. Is a letter of Credit required and if so, to what value?

Answer
No letter of credit is required for this Project.

37. **Question**
Due to the nature of this delivery method as Design Build, can at least one member of the Joint Venture hold a General Contractor's License in lieu of all members of the Joint Venture?

Answer
Only one (1) member of the Joint Venture team is required to hold a Georgia Utility Contractor's License.

CONTRACT QUESTIONS:

38. **Question**
Who is providing Builders' Risk Insurance?

Answer
See Appendix B.

39. **Question**
Will Owner maintain generator status and indemnify DB for pre-existing hazardous material? (GC4)

Answer
Owner will not indemnify DB for pre-existing hazardous materials.

40. **Question**
Will the Owner indemnify DB for use of the Work Product on other projects? (Article 4)

Answer
No.

41. **Question**
What is the time duration after Substantial Completion for LDs to start for Final Completion? (Article 5.5)

Answer
Zero (0) days.

42. **Question**
Will Owner agree to payment in 30 days in lieu of 45 days? (Article 7.1)

Answer
No.

43. **Question**
Will Owner agree to pay any costs due to termination in the event of termination for convenience? (Article 8.1)

Answer
See Standard Form of General Conditions, Article 11, Stop Work and Termination for Cause.

44. **Question**
The standard of care in Article 2.3.1 of the GCs is unattainable and may be uninsurable. Will you agree to replace the word "highest" with "normal"?

Answer
No.

45. **Question**
Will you agree that DB is only responsible for building permits and all other permits are the responsibility of the Owner? (GC 2.6)

Answer
All permits required for the Project shall be obtained by the DB.

46. **Question**
Will you agree to change 3 days to 7 days in the first line of Article 2.10.2 of the GCs?

Answer
No.

47. **Question**
Based on Article 3.3.1 of the GCs, DB shall not be required to proceed with any changes under any article of the Agreement unless and until approved by the City Council and Mayor.

Answer
No question posed.

48. **Question**
Will you agree DB shall only be required to indemnify and defend Owner for claims and liens to the extent of payment received from Owner. (GC6.5 and 7.3.1)

Answer
No. See Standard Form of General Conditions.

49. **Question**
Will you agree that if DB is delayed in the performance of the Work not due to the fault of DB, the DB shall be equitable compensated for Time and money due to the impact of such delay? (GC 9)

Answer
No.

50. **Question**
Will you agree that the prevailing party shall be entitled to legal fees and costs of dispute? (GC 10.3 and 10.4)

Answer
No.

51. **Question**
Will you agree to change 7 days to 14 days in Article 11.2.2 of the GCs?

Answer
No.

52. **Question**
Will you agree to delete Article 13.10.1 of the GCs?

Answer
No.

53. **Question**
Due the nature of Design Build, scope of work certainty and price certainty at the time of the proposal, with regard to subcontractors is unknown, we request that we commit to the Minority and Female Business enterprise goals without naming specific firms. We will work through the final design and after selection and then offer finite scopes of work to qualified AABE and FBE Certified contractors at the time of 100% design completion 100 days after Notice-to-Proceed. Please confirm?

Answer
The Office of Contract Compliance measures M/FBE participation based on a prime contractor's submission of certified M/FBE subcontractors and suppliers. A prime contractor's submission of certified M/FBEs must outline the work to be performed, the dollar amount and/or percentage amount of work for each subcontractor. Consideration will not be given to interested bidders for the submission of their certified M/FBE subcontractors, sub-consultants or suppliers after the Proposal due date.

54. **Question**
Question 5 of the Statement of Qualification Form states that if the proponent is a joint venture, to list projects separately for each member of the joint venture. However, due to the requirement to have an AABE partner as part of the JV, not all members of our joint venture have project experience that meet the requirements outlined in the Statement of Qualifications form and Section 3.2.4.1 of the RFP. Will Question 5 be amended to request project experience for only the lead design and construction partners within the JV?

Answer
Each member of the JV team is required to submit Qualification Forms, however the minimum qualification projects can be met by one (1) or more members of the JV team.

55. **Question**
Section 3.2.4.1 of the RFP requests at least three projects be submitted by the "Proponent." Will this section be amended to request at least three projects from the contractor portion of the JV?

Answer
No. See Response to Question No. 54 above.

56. **Question**
Page 3-2, Design Criteria, 3.1.3.4, the information given with regard to quantity and quality of flow(s) must be part of the design of this project and we will rely upon that information. Please confirm that the information given is the design criteria we are to meet.

Answer
Proponents must provide a Headworks system designed to handle the flows identified in the Design Criteria Package, including but not limited to maintaining minimum channel velocities, sufficient screenings and grit removal capacities etc.

57. **Question**
Page 4-33, 4.12 Maintenance Agreement, refers to extensions to the agreement. Will the renewal agreement contain an opportunity to re-negotiate the price?

Answer
See Response to Question No. 26 above.

58. **Question**
With regard to the Maintenance Agreement, who will be responsible for Operating the Headworks Facility?

Answer
The Owner will operate the facility upon final acceptance and training of Owner employees.

59. **Question**
Design Criteria Package 2.2.4: What flow rate is expected through each Stacked Tray Vortex GRU unit? How many units will be required?

Answer
Proponent is responsible for proposing the number of grit units and flow rate through each unit required to meet the Project design criteria.

60. **Question**
Depending on where the effluent from the Grit Washer, Grit Dewatering Escalator is piped (upstream vs downstream of the Stacked Tray Vortex GRU influent), these efficiencies may accumulate against each other (85-95%). If the Grit Washer, Dewatering/Escalator effluent is piped back to the Stacked Tray Vortex GRU influent influent, the "System Removal Efficiency" would be equivalent to (90-95%) that of the Stacked Tray Vortex GRU. Where will the degritted effluent of the washing/dewatering equipment be directed, upstream or downstream of the influent to the Stacked Tray Vortex GRU units?

Answer
Proponent shall be responsible for proposing the effluent discharge location of the washing/dewatering equipment in their Proposal.

61. **Question**
Table 2-2: See above Stacked Tray Vortex GRU remove performance statements and the system performance statements. The Stacked Tray Vortex GRU statement will be different than the complete system statement depending on how the Grit Washer, Dewatering/Escalator effluent is piped. Where will the degritted effluent of the washing/dewatering equipment be directed, upstream or downstream of the influent to the Stacked Tray Vortex GRU units?

Answer
See response to Question 60 above.

62. **Question**
Table 2-2: The headloss through the Stacked Tray Vortex GRU is defined as the water level upstream of the influent duct to the water level inside the Stacked Tray Vortex GRU tank. It does not account for the head required to drive the flow over the weir and into the effluent channel. See attached (not included in the Addendum) Stacked Tray Vortex GRU hydraulics brochure. Is the headloss listed in this table only from the water level upstream of the influent duct to the water level inside the tank?

Answer
The Proponent is responsible for completing the detailed Headworks hydraulic analysis and shall determine the headloss requirements for the Project to maintain adequate flow through the WRC. See Exhibit C-1, Design Criteria Package.

63. **Question**
Design Criteria Package 2.2.4 States that the GRU shall remove particles 0.15mm (100 mesh) and larger. The performance requirements outlined later in the document differ. Which is correct?

Answer
Grit removal efficiencies identified in Table 2-2 are correct. See Addendum No. 4, Item 5.

64. **Question**
Design Criteria Package 2.2.4: This section indicates that the Stacked Tray Vortex GRU System Manufacturer is to hire a 3rd party to performance test the GRU's. It is not clear on if this is just testing of the Stacked Tray Vortex GRU units, if this is the system as a whole (all Stacked Tray Vortex GRU, grit washing/dewatering equipment), or a single "train" of equipment consisting of (2) Stacked Tray Vortex GRU (2) grit washing units, (1) grit dewatering unit.). What is expected?

Answer
The Proponent must hire a 3rd party testing agency in accordance with Part 2, Section 3.2.4.5 of the RFP. The performance test must verify that the guaranteed performance of **all** grit removal units is achieved.

65. **Question**
Design Criteria Package 2.2.4: There is reference to a paint filter test. The sample should be taken from the grit dumpster and the dumpster should have a drain. Is this acceptable?

Answer
No. Samples are to be taken at the discharge point to the dumpsters. Dumpsters are standard City bins and will not have drains.

66. **Question**
Exhibit B 01650 – It is not clear in this section when the Stacked Tray Vortex GRU manufacturer needs to be on site. There are a number of miles stones (pre-op checkout, functional testing, performance testing, operation testing, acceptance test). Our typical site time is 2 trips for a total of 4 days. How many days and trips and what milestones will the equipment manufacturer need to be on site?

Answer
The number and duration of manufacturer site visits shall be determined by the Proponent as defined in their technical approach for the Project.

67. **Question**
Exhibit B 01650, Part 1-1.06.2: This section indicates that EACH grit unit (what does "unit" mean?) will be performance tested to confirm achievement of the grit removal performance criteria specified in Design Criteria. This would be a lot of testing of identical pieces of equipment and could be quite costly. In most cases, we would test one "train" of equipment - (1) Stacked Tray Vortex GRU (1) grit washing units, (1) grit dewatering unit. Is this acceptable?

Answer
No. All units shall be tested as specified.

68. **Question**
Exhibit B 01650, Part 3-4.06: This section indicates that the functional testing includes the performance testing that needs to be on each unit for at least 6 hrs. Typically functional testing is more the mechanical side of things and Performance testing is the qualitative analysis of the removal performance of the system. How many days is the equipment manufacturer required to be on site for specified testing?

Answer
See response to Question 66 above.

69. **Question**
Exhibit C – 1.2.1: Based on the specified Future Total Flow with All units in Operation (360 mgd), each Stacked Tray Vortex GRU would treat 36 mgd. Performance for the Stacked Tray Vortex GRU unit (12' diameter – 12 tray) would be 95% of all grit (S.G. 2.65) 150 micron and larger which does not meet the specified cut point size. Is our understanding of the requirements incorrect?

Answer
Yes. The Concept plan is one example of how to approach the project. The Concept plan includes a new micron system train in addition to replacement of the existing grit removal system. The number of units and capacity per each required for replacement of the existing system was not defined in the Concept plan and is to be determined by the Proponent and should be represented in the Proponents Project approach. The City encourages Proponents to submit an innovative design approach.

70. **Question**
Exhibit C – 2.2.6.2: This section indicates there is to be local monitoring and control for the following grit removal components. Are these items for the existing GRU equipment or the new Stacked Tray Vortex GRU equipment?

Answer
All grit removal systems require local monitoring and controls.

71. **Question**
Are these items to be furnished by the equipment manufacturer of the Stacked Tray Vortex GRU in a local control station at the equipment or will these be supplied by others?

Answer
The Proponent shall determine the scope of supply by the equipment manufacturers.

72. **Question**
Exhibit C – 3.6.3.2: This section indicates that the vendor supplied control panels shall be AB ControlLogix PLC with 17" OIU, UPS, multiple Ethernet ports, surge suppression. Typically we recommend a lower level AB PLC like MicroLogix or CompactLogix PLC as they are more than enough to control our equipment and interface with the plant SCADA system and a smaller OIU (typically 6" in lieu of 17"). Is a lower level PLC and smaller HMI is acceptable?

Answer
No. Control panels shall be supplied as specified.

73. **Question**
Exhibit C – 3.6.9.5: This section lists the type of enclosures for the controls. I am not able to find what specific type is required for the grit system. Our standard offering is a 304 SS NEMA 4X enclosure. What is required for the grit system main panels as well as any local stations?

Answer
Refer to Design Criteria Package page 3-92 for panel enclosure requirements.

74. **Question**
HW Preliminary Concept Report page 230: This table indicates only (6) Stacked Tray Vortex GRU units are to be installed in the new Headworks building with a total capacity

of 138.6 mgd which doesn't appear to agree with Table 2-2 in section 2.2.4 indicating 240 mgd. Which section is overriding?

Answer
See Response to Question 69 and the Design Criteria Package.

75. **Question**
Headworks Preliminary Concept Report page 234 – drawing: This drawing shows six (6) Stacked Tray Vortex GRU's now and six (6) at a future date. Please clarify flow rates (min, average, peak) to be addressed for this project Additionally, starting from the left most Stacked Tray Vortex GRU units, Stacked Tray Vortex GRU #1, #3, #5 on both trains have the underflow collector discharging in the wrong orientation and the piping should be mirrored so the grit slurry flow out of the unit is in the same rotational pattern as flow pattern created by the Stacked Tray Vortex GRU influent duct (CW on the north row and CCW on the South row). Will this drawing be updated with the correct underflow layout?

Answer
No. See response to Question No. 69 above and the C-1 Design Criteria Package. Proponent shall propose a GRU capacity that maximizes the total installed capacity of the headworks system as a whole.