

RGF[®]

ENVIRONMENTAL GROUP, INC.

HVTWS



Operations Manual



1101 West 13th Street
Riviera Beach, Florida 33404
Phone: 1-561-848-1826
Fax: 1-561-848-9454

Contents

Section 1: Overview	9
Introduction.....	9
How to Use This Manual	9
How This Manual Is Organized	10
Section 1: Overview	10
Section 2: Shipment Inspection/ Receipt Checklist	10
Section 3: Safety	10
Section 4: The HV-TWS Ultrasorb System	10
Section 5: Installation	10
Section 6: System Startup and Operation	10
Section 7: Preventative Maintenance Schedule	10
Section 8: Controlling Water Quality	10
Section 9: General Theory	10
Section 10: Engineering Drawings	10
Section 11: Troubleshooting	10
Sources of Help.....	11
Section 2: Shipment Inspection	13
Shipment Inspection.....	13
Pre-Installation Checklist.....	13
Section 3: Safety	15
Labeling Conventions in This Manual	15
General Safety Issues	16
Section 4: The HVTWS System	17
The Vision 2000 concept	17
Unit Familiarization / Flow Diagram	18
Typical Layout.....	18
Basic System Components	18
Process Skid.....	18
HVTWS Components	19
CCC 600	21
Section 5: Installation	23
Installation Requirements	23
Installation Procedure	24
Equipment Placement	24
Electrical Connection.....	24
Section 6: System Startup and Operation	29
System Startup	29
CCC – 600 Systems:	29
Process System:	29
CFC System:	30
Start-Up	30
Process System:	31
Start-up	31
System Operation & Control.....	32
Operational Notes	33

Section 7: Preventative Maintenance Schedule	35
Overview.....	35
Required Tools and supplies	35
Preventive Maintenance Schedule (PMS).....	36
Trenches, Sumps, Pits, and Clarifiers	36
WEEKLY MAINTENANCE	36
Wash Water Tanks	36
WEEKLY MAINTENANCE	36
Process System.....	36
Process Equipment Skid	Error! Bookmark not defined.
Multi-Media Filter.....	37
WEEKLY MAINTENANCE	37
Polishing Filters	37
WEEKLY MAINTENANCE	37
Programmable Auto-Backwash	38
UV/O3 TurboHydrozone Chambers	39
DAILY MAINTENANCE.....	39
AS REQUIRED MAINTENANCE.....	39
PERIODIC MAINTENANCE.....	39
Section 8: Controlling Water Quality	41
Overview.....	41
PH / Alkalinity	42
pH	42
Total Alkalinity.....	42
Oxidizers.....	43
Hydrogen Peroxide	43
Ozone.....	43
Ultraviolet Light	43
Dissolved and Suspended Solids.....	43
Total Dissolved Solids (T.D.S.).....	43
Total Suspended Solids (T.S.S.).....	44
Section 9: General Theory	45
Overview.....	45
Series II Equipment Skid	45
Process System	45
Supply Header	45
Continuous Flow Control System (CFC System)	46
CFC Pump	46
Catalytic Oxidation Process (CO3P System).....	46
UV/O3 Catalytic Chamber.....	46
Section 10: Engineering Drawing	49
Process P&ID	50
Electrical Ladder.....	51
ELECTRICAL POWER DISTRIBUTION	52
ELECTRICAL CONTROL PANEL LAYOUT	53
ELECTRICAL DISTRIBUTION PANEL LAYOUT	54
ELECTRICAL RELAY TIMING	55

Section 11: Troubleshooting	57
Flow	57
Electrical	59
Chemistry	60
System Warranty	61
Product Registration and Return Forms	69

Section 1: Overview

Introduction

About *RGF*

Congratulations on the purchase of your new *RGF* Ultrasorb water treatment system. For over 20 years *RGF* Environmental Systems Inc. has been the industry leader in industrial wash water treatment systems, with thousands of installations worldwide.

RGF Environmental Group, Inc. is committed to helping industry comply with strict EPA regulations. Founded in 1985, *RGF* pioneered the development of heavy equipment zero discharge wash water recycling systems. Since then, *RGF* has continuously expanded to encompass the entire scope water treatment concerns of industry. Today *RGF* offers a verity of products and services that is among the widest available in the pollution control equipment industry.

How to Use This Manual

As with any piece of new equipment, the first thing you should do is obtain a complete understanding of the operation and maintenance of the system before you begin. The best way to do this is to read the manual and associated documentation sent with the unit well before it is scheduled to be installed. *RGF* has invested a great deal of effort to make our manuals as informative and user friendly as possible to make the task of learning about your new system as enjoyable as possible.

This manual contains information on system installation, start-up, operation, and maintenance. As well as containing useful information on controlling water quality, training bulletins, and the theory behind how the Ultrasorb® System operates.

How This Manual Is Organized

This manual is divided into the following major sections.

Section 1: Overview

Section 2: Shipment Inspection/ Receipt Checklist

This section should be read immediately upon receipt of your system.

Section 3: Safety

A description of the labeling conventions employed in the manual to point out specific items relating to issues of personnel safety and proper operation of the system. General safety concerns and overall operational guidelines for the system.

Section 4: The HV-TWS Ultrasorb System

Unit familiarization, basic system information and system flow diagrams. Covers the overall concepts of the Ultrasorb System.

Section 5: Installation

Provides important information to ensure proper equipment placement and connection.

Section 6: System Startup and Operation

Contains the steps required to properly start up your new system. The Operating Instructions outline the normal course of action for the routine operation of the system.

Section 7: Preventative Maintenance Schedule

Recommended periodicity's for maintenance routines are located in this section. Personnel who will be maintaining the unit should familiarize themselves fully with this section.

Section 8: Controlling Water Quality

Without proper water chemistry control, even the most sophisticated systems will fail to perform to expectations. This section covers important topics which must be continually considered for proper system operation.

Section 9: General Theory

A description how the *RGF* Ultrasorb system actually separates clarifies and treats the waste stream. In depth explanations of the processes and supporting information to help operators understand the physics and chemistry of the system.

Section 10: Engineering Drawings

Reference drawings and schematics of the system.

Section 11: Troubleshooting

This section provides possible remedies for unusual operating conditions that occur from time to time.

Sources of Help

If you are unable to answer questions you have about your system from the information in this manual, *RGF* provides the following additional sources of help.

- 1) Your local **RGF licensed distributor**; He has a service support staff that are trained on all systems.
- 2) **RGF Web site Help Page** provides answers to commonly asked questions and late breaking information concerning system operation and maintenance.

<http://www.rgf.com>

- 3) If you still have questions or have comments, the **RGF Service Department** can be contacted by e-mail at:

e-mail: requests@rgf.com

E-mail queries receive first priority through the service department. Please include as much information as possible so our service staff can quickly return an answer.

Section 2: Shipment Inspection

Shipment Inspection

Immediately upon receipt of the **RGF® System**, you are responsible as the purchaser to take the shipping container(s) off the truck and inspect the equipment, storage tanks, and parts for damage.

IF ANY VISIBLE DAMAGE TO THE EQUIPMENT IS EVIDENT:

- Notify the driver for the courier company **immediately** and write on the Bill of Lading what is damaged or missing.
- Call your distributor and **RGF** immediately at **(800)-842-7771**, **(561)-848-1826 (FL)**, or **FAX (561)-848-9454** a copy of the Bill of Lading with damage or missing items to **RGF**.

Pre-Installation Checklist

Remove the **RGF PACKING SLIP** and the **BILL OF LADING**. Verify the condition and presence of all the parts and components found on the pallets and skids. Remove the **LOOSE PARTS CHECKLIST** from inside of the **LOOSE PARTS BOX** and verify the condition and presence of all the parts and components within the box. If any of the items are missing, please contact your distributor immediately or **RGF** at **(800)-842-7771**, **(561)-848-1826 (FL)**, or **FAX (561)-848-9454**.

Section 3: Safety

Labeling Conventions in This Manual

Certain information contained in this manual is **VERY IMPORTANT**. In addition, there are varying degrees of importance of this special information. Since most of the special information regards safety related issues, this section explains the conventions used throughout this manual. The following information explains the various conventions used to highlight important information.



This statement directly regards an immediate **RISK TO LIFE**.



This designation, along with its associated graphical representation, denotes information that must be completely understood and heeded in order to prevent **Serious Personal Harm** or **Significant Environmental Consequences**.



This designation brings special attention to information that sensitizes the reader to the importance of following the instructions carefully. Typically used for information that reduces the risk of equipment damage or increases personal safety of the operator.

Note:

This designation clarifies or brings attention to particularly useful information that increases unit performance or reduces operating costs.

General Safety Issues

- All operating procedures, cautions, and warnings **MUST** be adhered to when operating the **RGF®** system and when using the recycled water processed through the system.
- All OSHA guidelines should be followed and material safety data sheets (MSDS) for all chemicals being used to treat the recycled water should be posted by the owner or operator of the system in a conspicuous place for all persons coming into contact with the system.
- Appropriate personal protective equipment **MUST** be used by all persons utilizing chemicals when maintaining and operating the system to avoid personal injury.
- Ensure all areas surrounding the system are adequately ventilated.
- Avoid adding excessive chemicals to the recycling system. (Refer to section 6.0, controlling water quality).

Note:

Additional safety precautions are listed throughout the manual.

Section 4: The HVTWS System

The Vision 2000 concept

The Ultrasorb® systems are designed with modularity in mind, to suit each individual waste stream properly. **RGF** has available several standard models that may be integrated together as shown in Figure 1.1. However, depending on how your particular waste stream needs to be treated, your distributor or system integrator may have added additional components to the standard systems. If additional components have been added, it is important to become familiar with the components names and functions; and where they will fit into the waste streams flow throughout the system.

Unit Familiarization / Flow Diagram

Typical Layout

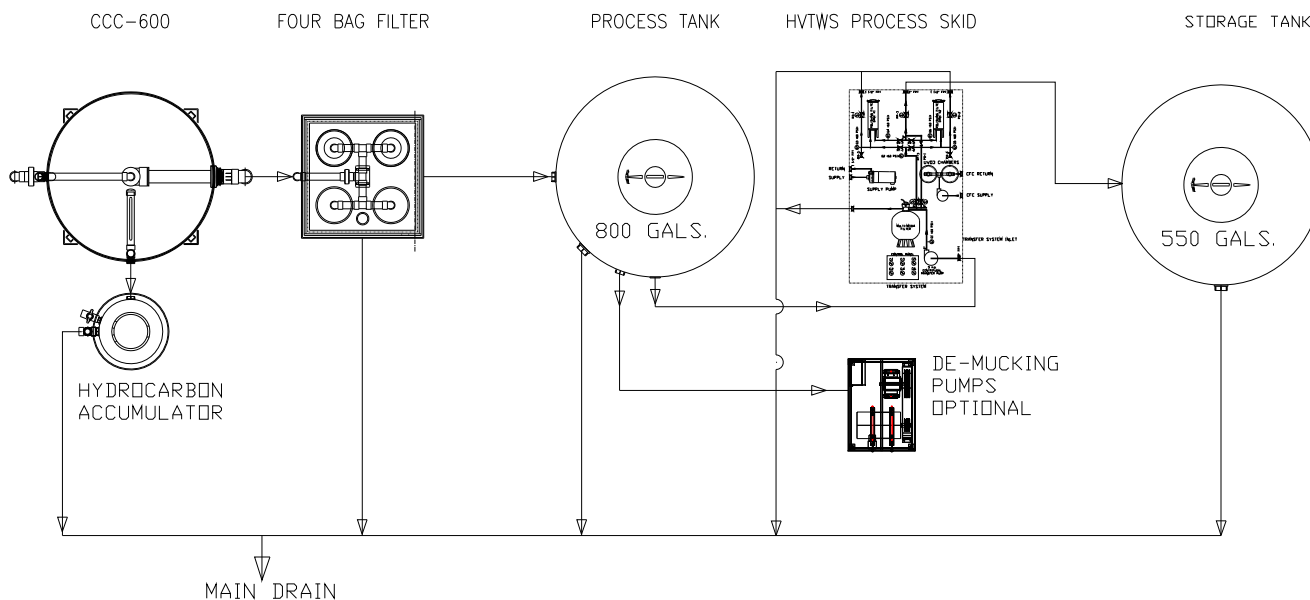


Figure 7

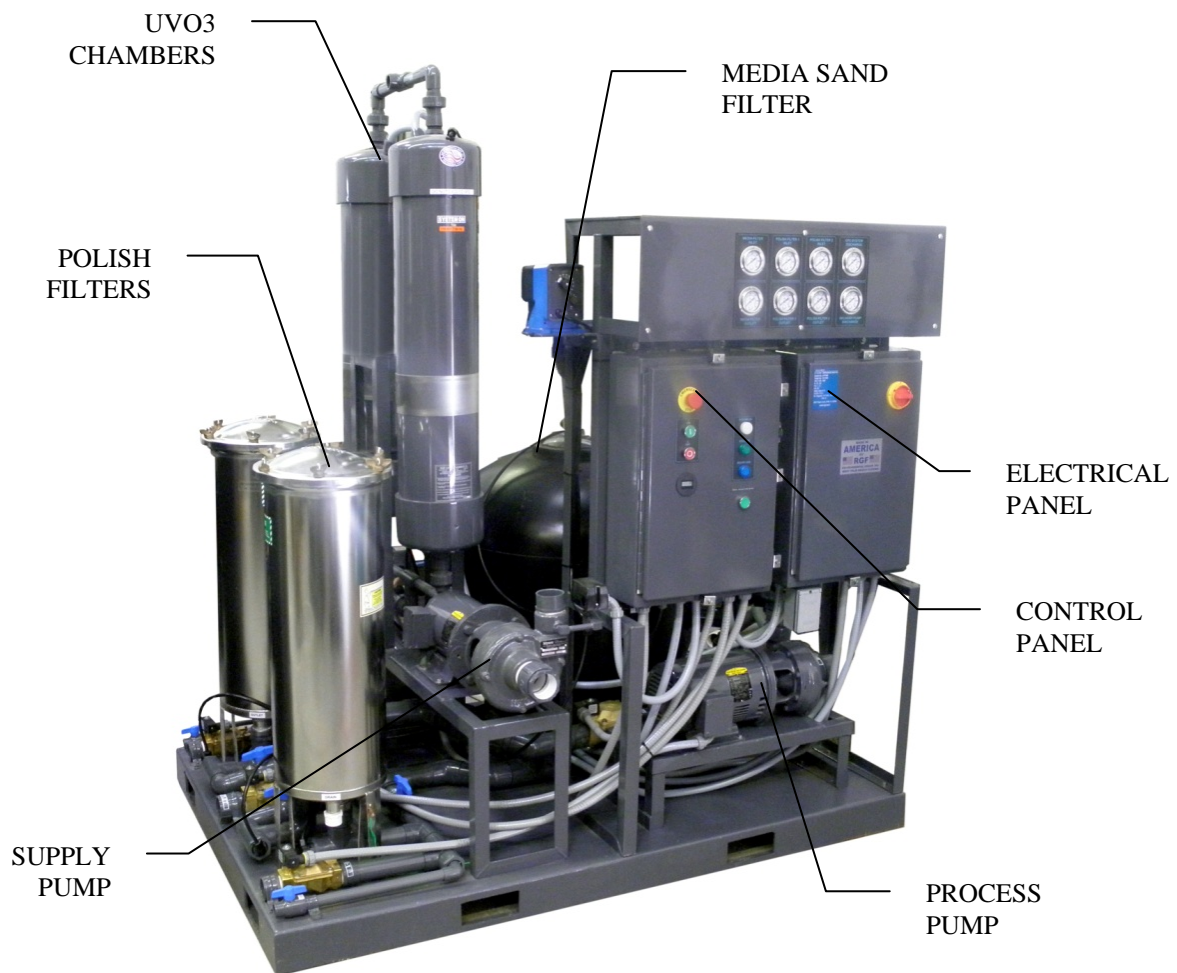
NOTE: For illustration only, for system specific drawings see Drawing Section of this manual.

Basic System Components

Process Skid

The Process Skid is made up of the primary components used to mechanically filter the recycled water. The water to be processed enters the Process Skid via the Process tank to the suction of the process pump. The pump discharge passes through the Multi-Media Filter, which removes large particles and absorbs chemical contaminants from the water before flowing through to the Polishing Filters. These filters polish the water with fine filters before it is sent to the Storage Tanks.

HVTWS Components



Front View of HVT-WS Process Skid and Control Panel

UVO3
CHAMBERS

CHEMICAL
INJECTION PUMP

MEDIA SAND
FILTER



ACTUATOR
MOTOR

BACKWASH
SLIDE VALVE

PROCESS
PUMP



CCC 600

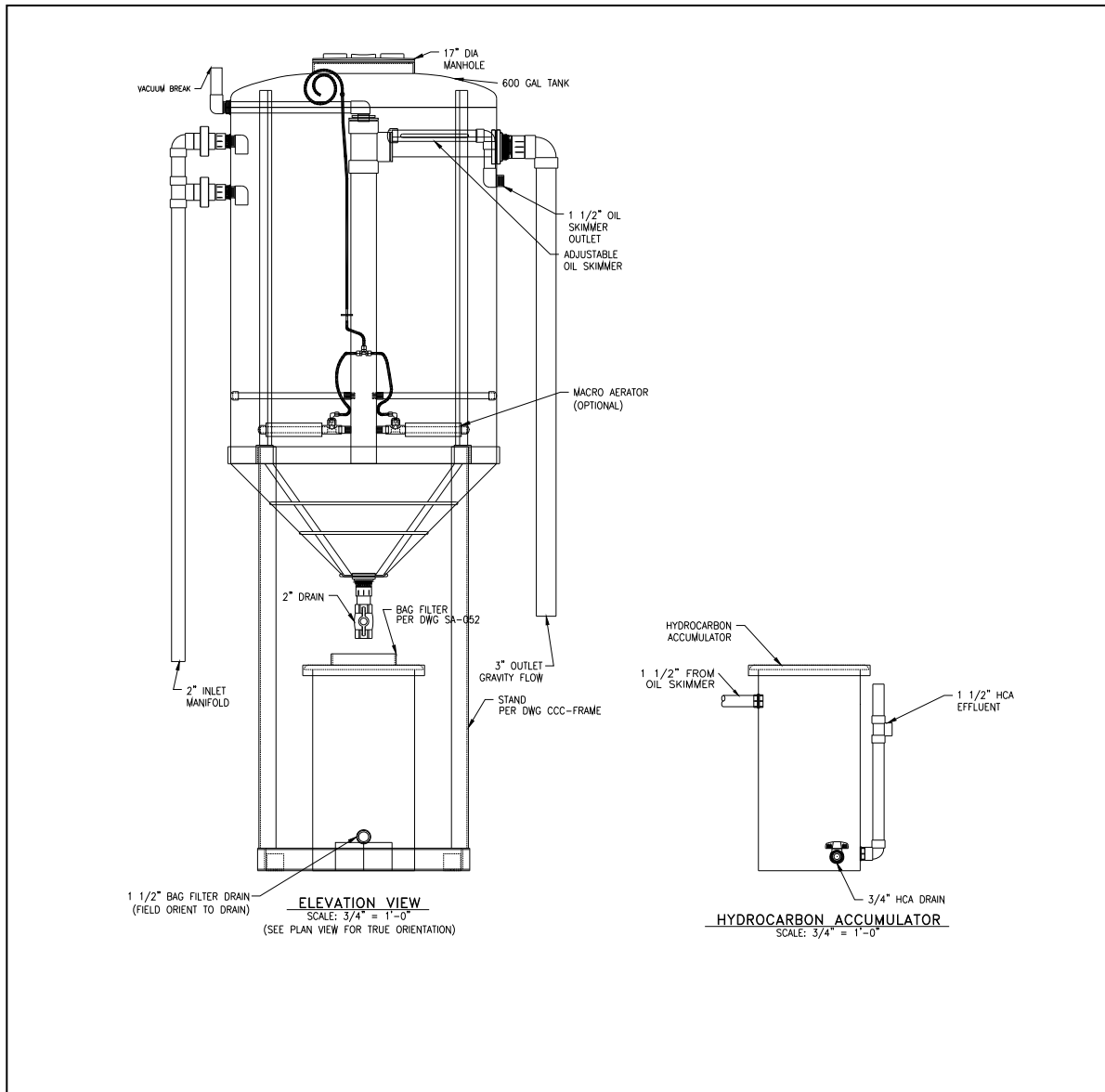
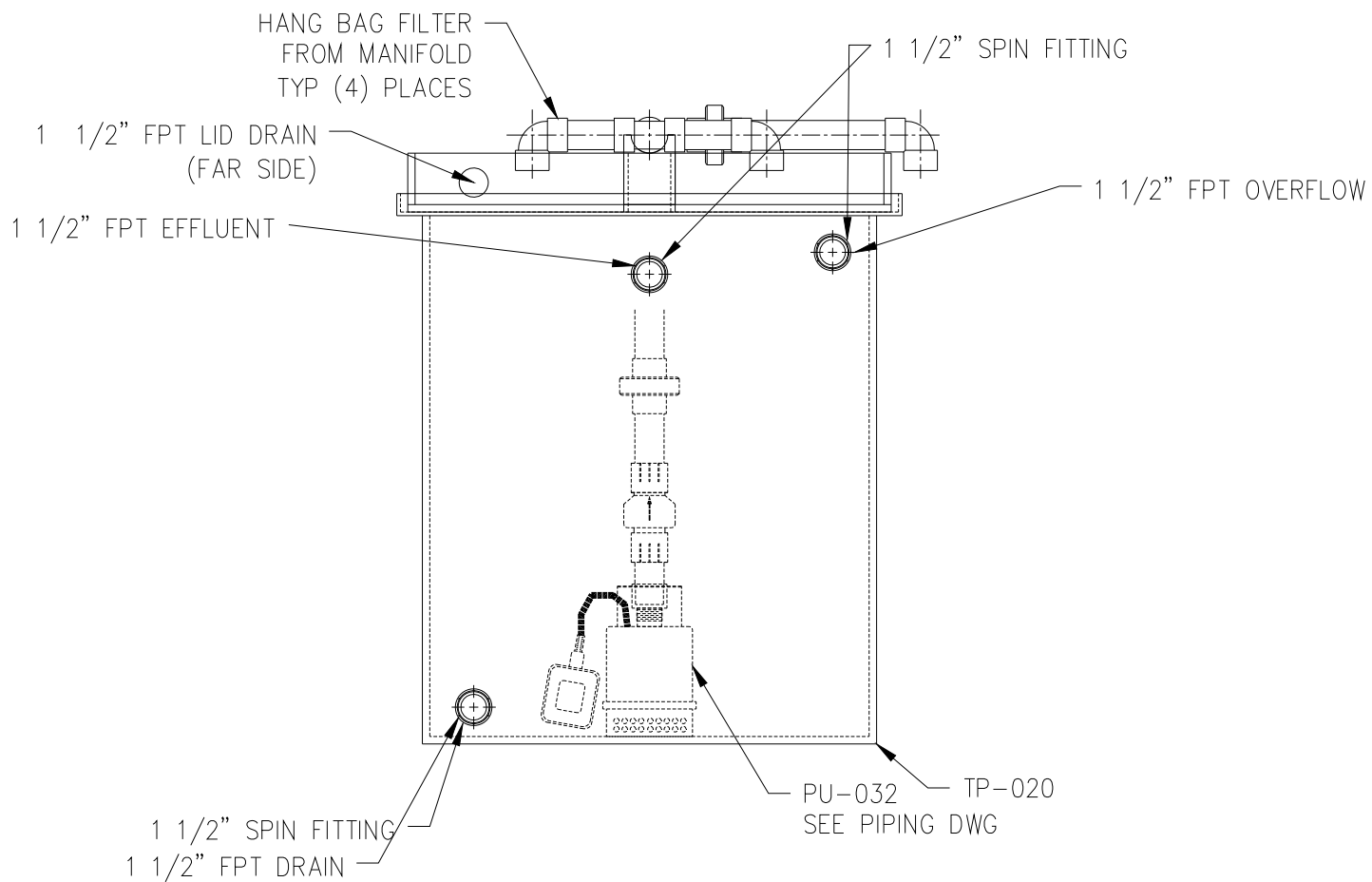


Figure 3

Primary Function: Solids Separation and Free Oil Skimming

FOUR BAG FILTER SYSTEM



Section 5: Installation

Installation Requirements

The ULTRASORB® System must be installed in compliance with these procedures in order for the warranty to be activated. The purchaser is responsible for bringing the required utilities (i.e. water, electricity, and drainage) to the system and connecting them according to local codes. If the System must be modified by **RGF** or the distributor in order to meet the requirements of local codes, the purchaser will be required to pay the modification costs. When the purchaser has completed all of the above, a field representative will be furnished by the **RGF** distributor (in continental U.S.). He will provide of installation check-out, testing, and training

NOTE:

Please read the installation procedure completely and thoroughly before installing and operating the unit.

IT IS THE RESPONSIBILITY OF THE PURCHASER TO ENSURE ALL ELECTRICAL AND PLUMBING CONNECTIONS ARE MADE UNDER THE DIRECT SUPERVISION OF A LICENCED ELECTRICAL AND/ OR PLUMBING CONTRACTOR AND MUST MEET OR EXCEED LOCAL CODES.

Installation Procedure

It is important to fully understand Section 4 to help become familiar with all of the major components and equipment names of your particular system for installation, start up, operating, and maintenance procedures.

Equipment Placement

- A. **Always use good engineering practices and proper rigging procedures while loading and unloading Equipment from transportation vehicles.**
- B. Place Equipment on the concrete pad as desired and bring to a level condition. Concrete Pad design must provide full load support of the Equipment and any Auxiliary Equipment during normal system operations. Allow a minimum of 2' clearance between additional components for access ways.

Electrical Connection

- A. **MAIN ELECTRICAL JUNCTION** for the particular system components should be planned into the equipment pad prior to system installation. Refer to Section 10 for exact power requirements. Most installations will require 460 VAC, 40 amps, 3 phase, 60 Hz with a neutral and a ground as a minimum.

Coalescing Centrifugal Clarifier (CCC)

Inlet Connection

- A. Disconnect the two unions with MPT (male pipe thread) from the supplied **INLET MANIFOLD** and connect to the two inlet connections on the side of the cone tank. Reconnect the two unions to the inlet manifold.
- B. Plumb from the sump to the **INLET CONNECTION** on the **INLET MANIFOLD**. This line requires the use of an isolation / throttle ball valve for flow control adjustment and check valve.

Outlet Connection

- A. Connect the supplied **OUTLET MANIFOLD** to the outlet connection (highest connection) on the side of the tank.
- B. Plumb from the **OUTLET CONNECTION** to the next component.

Solids Bag Filter Tank / Drain Connection

- A. Place the **SOLIDS BAG FILTER TANK** directly under the cone of the tank. Attach the lid and bag filter to the tank.
- B. Attach the supplied 2" **DRAIN BALL VALVE** with MPT to the 2" FPT fitting on the bottom of the cone tank. Connect the supplied pipe so it is directed down into the bag filter (either do not glue this connection or attach with a union so the bag filter can be removed for maintenance).
- C. Plumb the Drain Connection of the Tank to the **MAIN DRAIN RETURN LINE**.

Hydrocarbon Accumulator

- A. Assemble the supplied **ACCUMULATOR STAND**. Place and level the Accumulator stand near the Oil Skimmer Outlet on the tank and place the **HYDROCARBON ACCUMULATOR TANK** on the stand. Assemble the internals, inlets, and outlets of the Accumulator Tank.
- B. Attach the supplied **OIL SKIMMER MANIFOLD** to the Oil Skimmer Connection on the side of the tank. Plumb the Oil Skimmer Manifold into the Inlet on the Hydrocarbon Accumulator.
- C. Plumb the **ACCUMULATOR RETURN LINE** to the **MAIN DRAIN RETURN LINE**.

Gravity Bag Filter

Tank Assembly

- A. Place the **TANK LID** on the top of the tank with the overflow containment side up. Place the **FILTER BAGS** in the cradles of the lid.

Inlet Connection

- A. Place the supplied **DISTRIBUTION HEADER** on the Lid and plumb to the Upstream Component Outlet. A PVC union must be installed in this line in order for the lid to be removed for maintenance.

Outlet Connection

- A. Plumb the **OUTLET** from the Tank Outlet to the Process Tank Inlet.

Tank Overflow / Drain Connection

- A. Plumb the **TANK OVERFLOW** to the **MAIN DRAIN RETURN LINE**.
- B. Plumb the **LID OVERFLOW** to the **MAIN DRAIN RETURN LINE**.
- C. Attach the 1 1/2" **BALL VALVE** to the 1 1/2" **FPT DRAIN CONNECTION**. Plumb the **TANK DRAIN** to the **MAIN DRAIN RETURN LINE**.

Series II Equipment Skid

Inlet Connection

- A. Plumb from the Process Tank or underground sump to the Series II Inlet. This line should include the supplied Y-Strainer and ball valve.
- B. The Y-Strainer should be connected as indicated below or can be located between the Process Tank and Series II as desired.
 - Attach the supplied 6" x 1 1/2" threaded nipple into the female adapter on the inlet of the Series II.
 - Attach the Y-Strainer onto the nipple with the indicator arrow facing towards the Series II. The ideal position for the Y-Strainer is in the straight down position or at a 45° from the ground.
 - Connect the supplied male adapter into the remaining end of the Y-strainer, then continue plumbing to the Series I.

Polish Filter Product Connection

- A. Plumb the **PRODUCT OUTLET** to the **SERIES III STORAGE TANK PRODUCT INLET** (1 1/2" Product Inlet hole on top of the Storage Tank)

Polish Filter Backwash Connection

- A. Plumb the **BACKFLUSH OUTLET TO THE MAIN DRAIN RETURN LINE.**

CFC System Inlet / Outlet Connection

- A. Plumb from the **CFC SYSTEM INLET** to the **SERIES III STORAGE TANK OUTLET**. This line requires the use of an isolation ball valve.
- B. Plumb from the **CFC SYSTEM RETURN** from the 3/4" fitting on top of the UV/O³ Catalytic Chamber to the **SERIES III STORAGE TANK CFC SYSTEM RETURN INLET**.

Delivery System Inlet / Outlet Connection

- A. Plumb the **DELIVERY SYSTEM INLET** to the **STORAGE TANK DELIVERY OUTLET**. This line requires the use of an isolation ball valve.
- B. Plumb the **DELIVERY SYSTEM OUTLET** to the desired wash equipment.

Drain Return Connections

- A. Plumb the 3/4" **CLEANING TANK DRAIN** to the **MAIN DRAIN RETURN LINE**.
- E. Plumb the 1 1/2" **MULTI-MEDIA FILTER DRAIN** to the **MAIN DRAIN RETURN LINE**.

Peristaltic Chemical Injection Pump

- A. Use the supplied 1/4" **POLYETHYLENE HOSE** for chemical suction from the chemical tank. Attach the chemical hose to the surgical hose connection on the bottom rear of the chemical injection pump.
- B. The hydrogen peroxide container should be located as close to the equipment skid as possible. It is recommended to use a container no larger than 5 gallons in order to prevent accidental over injection. Place the suction line of the chemical pump down into the chemical container.

Multi-Media Filter

- A. The supplied media for the Multi-Media Filter needs to be installed by first loosening the unions at the multi-valve head. Then, removing the head assembly of the filter by total loosening the clamp. Remove the head from the body assembly being careful not to lose the o-ring.
- B. Tape over the stand pipe with duct tape inside of the body of the filter to prevent media from falling inside during installation. Ensure the stand pipe is properly installed on top of the alignment pin located at the bottom of the filter.
- C. Fill the media filter with water to just above the lateral to prevent damage during media installation.
- D. Make a funnel out of card board to help install the media. First install all of the rock media in the bottom of the housing. Ensure the stand pipe remains centered firm on the bottom of the housing. Level out the fist layer of media. Next, install all of the sand media into the housing, leveling upon completion. Then, install all of the anthracite carbon media, leveling upon completion.

- E. Remove the duct tape from the stand pipe, reinstall the filter head and reconnect the unions to the head, ensuring the o-rings to the unions are intact.

IMPORTANT:

Do not turn on the power to the unit until all connections are made and the system is prepared for startup. Damage to the system pumps will result otherwise.

Section 6: System Startup and Operation

System Startup

BEFORE YOU BEGIN

The following startup procedures must be followed thoroughly in order to prevent damage to the system components. Remember:



Do not apply power to the system until directed to do so in the specific startup procedure!

CCC – 600

FILLING THE SYSTEM

- A. Close the drain valve at the bottom of the tanks and close the system drain valves.
- B. Fill the CCC Tank with water to the normal operating level, as indicated by the water starting to flow out the tank overflow connection.
- C. Turn on the sump pump and adjust the Oil Skimmer so it will skim the surface of the water in the tank when the pump is in operation. It may be necessary to restrict inlet water flow to the CCC 600 Tanks by partially closing the inlet valve; this is to maintain proper water level and prevent overflowing.

Gravity Bag Filter

- A. Close all **DRAIN VALVES** (i.e. Bag Filter Drain Valve) and open all **ISOLATION VALVES** (i.e. Outlet Isolation Valve).
- B. Fill the Bag Filter Tank approximately 3/4 full with water.
- C. Check the **FLOAT SWITCH** on the tank to ensure it is free to swing. Adjust the tether length of the float switch to obtain the proper pumping range (approx. 12").

Process System:

FILLING THE SYSTEM

- A. Close all **DRAIN VALVES**.
- B. Ensure all Polish Filters are installed and the lids are hand tightened.
- C. Prime the Process Pump by removing the union at the discharge of the Process Pump housing and fill the pump head with water from a hose.
- D. Open all of the purge valves to vent the air from the system as the system fills with water. Close vent valve when air no longer is venting.
- E. Fill the De-Mucking Tank with water until all floats are floating. The Process Tank is the 800 gallon round tank.
- F. Recheck all unions to ensure they are all hand tightened.



NOTE:

Proper priming of this pump is of extreme importance. Failure to ensure proper priming will inhibit proper operation of the pump and destroy it.

CFC System:

Start-Up

- A. Close all drain valves.
- B. Open all of the isolation ball valves between the components of the system and the Storage Tank.
- C. Prime the CFC Pump by disconnecting the union at the pump discharge housing and fill the pump head with water from a hose.



NOTE:

Proper priming of this pump is of extreme importance. Failure to ensure proper priming will inhibit proper operation of the pump and destroy it.

D. POWER CAN NOW BE APPLIED TO THE CFC SYSTEM COMPONENTS.

- E. Start the CFC system by placing the pump on /off switch in the on position. When the CFC System is properly started, the System On light and UV/O³ Catalytic Chamber indicator (blue light on the side of the chamber) should be illuminated indicating that power has been applied to the CFC System. Also, the CFC Pumps will run continuously. If in the event the system Storage Tank loses water

level, the Storage Tank Low Water Level Float Switch and Alarm Circuit will shut off the CFC pump to prevent equipment damage.

Process System:

Start-up

The Process System is controlled by the **PROCESS SWITCH** located on the Control Panel and the float switches located in the Process Tank and Storage tanks. The Process Switch can be turned to the ON position for automatic operation of the system. The Process Pump will begin processing the water through the filters of the system until all of the water from the Process tank has been cleaned and transferred to the storage tank (or until the storage tank has reached the high level).

System Operation & Control

Process System:

System Operation

The Process System is designed to transfer large volumes of water while performing an initial water polishing. This system transfers the waste water from the Cone Tank to the Wash Tank at a rate of 100 GPM per process skid. The water is moved through the process skid using a 5 hp centrifugal pump that sends the water through the Multi-Media Filter before it passes through the two Polishing Filters.

The Multi-Media Filter utilizes three different layers of media to pre-filter the water before primary filtration of the Polishing Filters occurs. The first layer of the media filter is the Anthracite layer which removes light traces of hydrocarbons and trace heavy metals as well as helping to control odor. The second layer is the sand filter layer which is a depth filter that filters the water as it passes through the sand. The third and final layer of the Multi-Media Filter is the filter substrate that prevents filter media from passing through the filter housing.

The two Polishing Filters further filter the water before the water leaves the equipment skid and is transferred to the Storage Tank. The filters are automatically back flushed via several flow control solenoids and a programmable timer.

System Control

The Process System is controlled by a Process Switch located on the Process Skid Control Panel and Float switches located in the Process Tank and Storage Tank. With the Process control switch in the ON position the system will automatically process water from the Process tank to the Storage tank, whenever necessary (i.e. when the floats are satisfied). Also, the Programmable Auto Back Flush Timer is activated which will automatically back flush the Polishing Filters, one filter bank at a time (using a flip flop timer), at the pre-set time sequence, then returning to Process Operation. The Auto Back Flush sequence can be changed by adjusting the time cycle on the Programmable Auto Back Flush Timer (refer to the Preventive Maintenance Section for instructions).

Pressing the Green Button on the right side of the Process Control Panel causes the control system to perform a system Backwash. This over-rides the normal process controls and directs the system through a normal backwash, then returns the system back to normal processing operations. The 5 horse power process pump is equipped with a pump start delay timer, to prevent damage to the pump upon start-up and delay in between modes of operation.

Operational Notes

- ALL OPERATING PROCEDURES, CAUTIONS, AND WARNINGS SHOULD BE ADHERED TO WHEN OPERATING THE ULTRASORB® SYSTEM AND WHEN USING THE RECYCLED WATER THEREIN.
- ALL OSHA GUIDELINES SHOULD BE FOLLOWED AND MATERIAL SAFETY DATA SHEETS (M.S.D.S.) FOR ALL CHEMICALS BEING USED TO TREAT THE RECYCLED WATER SHOULD BE POSTED BY THE OWNER OR OPERATOR OF THE SYSTEM IN A CONSPICUOUS PLACE FOR ALL PERSONS COMING INTO CONTACT WITH THE SYSTEM.
- PROTECTIVE CLOTHING FOR ALL EXPOSED BODY AREAS SHOULD BE WORN BY ALL PERSONS UTILIZING CHEMICALS WHEN MAINTAINING THE SYSTEM TO AVOID PERSONAL INJURY.
- ENSURE ALL AREAS SURROUNDING THE SYSTEM ARE ADEQUATELY VENTILATED.
- PRECAUTIONS SHOULD BE TAKEN TO AVOID ADDING EXCESSIVE CHEMICALS TO THE RECYCLING SYSTEM. (REFER TO SECTION 4.0, CONTROLLING WATER QUALITY)
- DO NOT TOUCH THE UV/O3 CHAMBER WHILE POWER IS SUPPLIED TO THE SYSTEM. THE UV/O3 CHAMBER OPERATES UNDER HIGH VOLTAGES WHICH CAN CAUSE SEVERE ELECTRICAL SHOCK.
- DO NOT BREATHE OR INHALE THE OZONE GAS.
- DO NOT SHUT OFF THE FLOW TO THE SYSTEM WHEN PUMPS ARE RUNNING.
- ALL ELECTRICAL POWER SHOULD BE REMOVED FROM THE SYSTEM BEFORE SERVICING.



- **UV/O3 Catalytic Chamber**

- 1) DO NOT look at the UV light in the UV/O3 Chamber. PERMANENT DAMAGE OR BURNS TO EYES OR SKIN MAY RESULT.
- 2) DO NOT run the UV/O3 Chamber without water flow through the Chamber; the UV bulb needs water flow to keep it cool. DAMAGE TO THE BULB WILL RESULT.
- 2) DO NOT open or attempt to repair the UV/O3 Catalytic. If problems occur, call your serviceman or distributor for further instruction.
- 3) DO NOT BREATHE or INHALE THE OZONE GAS. PROLONGED BREATHING OF NOTICEABLE AMOUNTS OF OZONE may result in: respiratory irritation to nasal passages, throat, bronchial and pulmonary membranes; headache; nausea; burning, watery irritated eyes. In some instances (such as enclosed spaces and tanks) significant concentrations of ozone may collect. Adequately vent all tanks and enclosed spaces before entering for maintenance or repair until the level of ozone has depleted down to acceptable levels (<0.1 ppm). If an ozone odor is still noticeable continue ventilating until the odor is non-detectable. Ozone odor is similar to the smell near copy machines when making copies or Mig and Tig welders in operation and is the "fresh air" odor one sometimes notices after a thunderstorm.

General Note:

At a level of 1 ppm, ozone becomes intolerable to humans. A human's reaction to this level is the same as the reaction to a strong bleach or ammonia odor. Usually, the nose will indicate discomfort.



- **POLISHING FILTER**

- 1) Before Servicing be sure to RELIEVE THE PRESSURE on the Polishing Filter(s) by using the drain valve and bleed valve or PERSONAL INJURY COULD RESULT!!!.
- 2) RGF Filters have been lab tested and time tested – KNOCK- OFF FILTERS HAVE BEEN KNOWN TO BREAKUP OR DISSOLVE THEREBY PLUGGING OTHER PARTS OF THE UNIT CAUSING EXCESSIVE PRESSURE AND EQUIPMENT DAMAGE!!!



- **Multi-Media Filter:**

- 1) TO PREVENT EQUIPMENT DAMAGE AND POSSIBLE INJURY, ALWAYS TURN THE PUMP OFF BEFORE CHANGING THE VALVE POSITION.
- 2) REFER TO THE SAND FILTER MANUAL IN THE SUB-COMPONENT INSTRUCTIONS SECTION OF THIS OPERATIONS MANUAL FOR FURTHER WARNINGS AND PRECAUTIONS.



- **Process Pump:**

- 1) TO PREVENT DAMAGE TO THE PROCESS PUMP DO NOT OPERATE without sufficient prime and net positive suction head (NPSH).

Section 7: Preventative Maintenance Schedule

Overview

The following section is developed to keep the **ULTRASORB® System** in top working order. It is **NECESSARY** to follow the maintenance procedures below precisely as stated. The lack of maintenance, in the long run, will reduce productivity and can be both costly and time consuming. It is recommended that this format be copied and incorporated as a regular work routine.



Turn off all power and release pressure before servicing the system.
All gauges must read zero!

Required Tools and supplies

- | | | |
|---------------------------------|--|--|
| ✓ Hammer | ✓ Adjustable End Wrench | ✓ 5 H.P. Shop VAC For Extracting Old Media |
| ✓ Garden Hose For Back Flushing | ✓ Tube Brush For UV/O ³ Chamber Cleaning | ✓ Ph Test Strips |
| ✓ Garden Hose Nozzle | ✓ #1 Flat Head Screw Driver For Venturi Adjustment If Needed | ✓ Garbage Bag For Proper Filter Disposal |
| ✓ Rubber Boots And Gloves | ✓ Proper Safety Equipment | ✓ Square Head Shovel For Digging Out Trench Valley |

Preventive Maintenance Schedule (PMS)

The following section is developed to keep the **ULTRASORB[®] System** in top working order. It is **NECESSARY** to follow the maintenance procedures below precisely as stated. The lack of maintenance, in the long run, will reduce productivity and can be both costly and time consuming. It is recommended that this format be copied and incorporated as a regular work routine. **Refer to the P&ID engineering diagrams for referencing to specific valves and components.**



TURN OFF ALL POWER AND RELEASE PRESSURE BEFORE SERVICING THE SYSTEM. ALL GAUGES MUST READ ZERO!

Trenches, Sumps, Pits, and Clarifiers

WEEKLY MAINTENANCE

Weekly, or as required, the trenches, sumps, pits, and clarifiers of the pad need to be checked for sediment level. The trenches' sediment level should not be more than half of the depth of the trench. Dig out the trench using a shovel and dispose of the waste accordingly. The sumps and pits should be dug out if there is at least 1/4 of the depth full of sediment. The clarifiers should be removed and dug out on a weekly basis or as required regardless of the amount of sediment.

IMPORTANT

DIG OUT THE TRENCHES, SUMPS, PITS, AND CLARIFIERS AS REGULARLY AS POSSIBLE. KEEPING THEM CLEARED OF SEDIMENT BUILD UP WILL RESULT IN BETTER WATER QUALITY THROUGHOUT THE ENTIRE SYSTEM.

Wash Water Tanks

WEEKLY MAINTENANCE

- A. Open the drain valve to the Wash Water Tank and allow draining for 1 minute to remove any accumulated solids from the bottom of the tank.
- B. Check inside the tank to ensure the float switch(s) are free to swing. Remove any accumulated debris or scum from the surface of the tank water.

Process System

Daily System Check

Daily, with the system running, log the pressure gauge readings. Check the status of the indicator lights & hour meter. Check the water level in the Transfer Tank. Keep an accurate record of all of the readings and indicators to determine when certain systems of the equipment skid will need maintenance.

Use the following as a general rule:

Multi-Media Filter Gauges

If the pressure difference for the Multi-Media Filter gauges (Media Filter inlet and outlet gauges) is 30 psi or more the filter needs to be back flushed according to the Multi-Media Filter Back flush procedure.

Polish Filter Gauges

If the pressure difference for the Polishing Filters is 10 psi or more the filters need to be manually back flushed by using the Process Control switch or manually cleaned (if manually back flushing does not remedy the problem) according to the Polishing Filter Manual Cleaning Procedure.

Multi-Media Filter

WEEKLY MAINTENANCE

Weekly or if the inlet and outlet pressure difference on the Multi-Media Filter is greater than 20 psi, the media needs to be back flushed by the following procedure:

AUTOMATIC MULTI-MEDIA FILTERS

Backwashing the Multi-Media Filter

- A.** The Process Control Switch must remain in the **PROCESS** position for this operation.
- B.** Ensure there is sufficient water in the De-mucking Tank to perform a sufficient backwash.
- C.** Initiate a manual backwash cycle by pressing and releasing the **START BACKWASH** switch.

Polishing Filters

WEEKLY MAINTENANCE

Weekly, or if the inlet and outlet pressure gauges for the Polishing Filters are greater than 15 psi, the filters need to be removed and manually cleaned by the following procedure:

Manual Cleaning the Polishing Filter

- A.** Turn the Process Control Switch to **OFF**.
- B.** **OPEN** the Polishing Filters drain valves.
- C.** Allow to drain and relieve all pressure. **The Pressure Gauges Should Read Zero.**
- D.** Remove the Polishing Filter Lids by loosening and the wing nuts on top of the filter canisters, then removing the lids.
- E.** Remove and manually clean the Polishing Filter assemblies using a fresh water hose to remove all debris. Also, flush out the inside of the filter housings to remove any accumulated debris. Replace filters to the housings. Ensure the filter seals are in place on the filter assembly (i.e. standpipe o-ring and filter assembly gasket).
- F.** Replace the lids and wing nuts to the housing. Hand tighten the wing nuts evenly around the filter housing.
- G.** **SHUT** the Polishing Filter drain.

H. Turn the Process Control Switch to **PROCESS**.

NOTE:

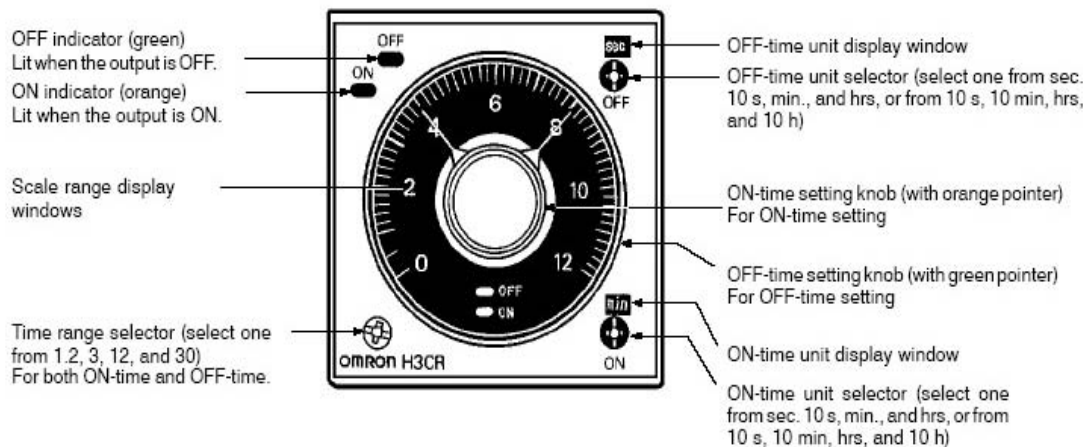
EACH FILTER BANK OF THE TRANSFER SKID CAN BE MANUALLY CLEANED INDIVIDUALLY WITHOUT SHUTTING DOWN THE SYSTEM BY CLOSING VALVES PF-1, PP-1, AND OPENING PD-1 FOR BANK 1, OR CLOSING VALVES PF-2, PP-2, AND OPENING PD-2 FOR BANK 2. (Refer to the Transfer Skid P&ID for details)

Programmable Auto-Backwash

Change the Programmable Auto-Backwash sequence if the polishing filters need to be back flushed more frequently. (Indications would be the Polishing Filters plugging rather quickly after a recent manual cleaning)

- A. Turn **OFF** the **MAIN POWER** to the Equipment Skid.
- B. Open the Electrical Junction Box and locate the Auto-Backwash timer.
- C. The dials on the relay control the amount of time between back flushes (T OFF dial) and the amount of time the back flush is performed (T ON dial).

To change the amount of time between back flushes, turn the **T OFF** dial to the desired amount of time (scale is in hours). To change the amount of time the back flush is performed, turn the **T ON** dial to the desired amount of time (scale is in minutes).



If more than 10 minutes of back flushing is preferred, it will be necessary to change the time scales of the relay. On the face of the relay are the OFF-time and ON-Time unit selector settings which control the scale of the time OFF and time ON functions of the relay. They are factory set so the relay time OFF dial is in hours and the time ON dial is in minutes. To change them, rotate the dip switch to the desired time scale (hours, minutes, and seconds) and the multiplier scale (1 or .1) as indicated.

NOTE:

If the power to the system is turned OFF, the timer restarts its cycle from zero. The timer relay does not retain its time cycle during power OFF.

UV/O3 TurboHydrozone Chambers

DAILY MAINTENANCE

Ensure the UV Chamber indicator lights on the sides of the outlet collars on the chambers (at the top) are illuminated. Refer to Trouble Shooting if one or both of the indicators is not working properly.



SHUT OFF ALL POWER TO THE SYSTEM BEFORE ATTEMPTING TO SERVICE OR REPAIR THE UV/O3 CATALYTIC CHAMBER. THE CHAMBER OPERATES UNDER HIGH VOLTAGE WHICH CAN CAUSE SEVERE SHOCK IF END CAPS ARE TOUCHED WHILE POWER IS APPLIED.

AS REQUIRED MAINTENANCE

Once a month, or as required, the UV/O3 TurboHydrozone Chamber needs to be cleaned by the following procedure:

Cleaning the UV/O3 TurboHydrozone Chamber

- A.** Turn the Process Control Switch to **OFF**.
- B.** Disconnect the inlet and outlet unions from the UV/O3 chambers. Drain all of the fluid from inside.

NOTE:

USE CAUTION IN HANDLING THE UV/O3 STERILIZATION CHAMBER. THE UV BULB IS EXTREMELY FRAGILE AND WILL BREAK IF THE CHAMBER IS MISHANDLED.

- C.** Scrub the inner quartz tube using a one inch diameter bottle brush and simple green cleaner.
- D.** Reconnect the inlet and outlet.
- E.** Return the Process Control Switch to **PROCESS**.

PERIODIC MAINTENANCE

Changing the UV bulb

- A.** Turn the Process Control Switch to **OFF**.
- B.** Disconnect the inlet and outlet unions from the chambers. Disconnect the bulb caps from the ends of the chambers. Disconnect the bandit clamps from around the chambers and remove from the skid. Follow the handling caution as stated above.
- C.** Place the chambers on a good flat surface, unscrew and remove the compression fittings from the ends.
- D.** Remove the rubber bushing from the ends of the bulb. Remove the bulb from the chambers.
- E.** Clean the removed bulb with a glass cleaner. Clean the inside of the chambers according to As Required Maintenance for the UV Chamber.
- F.** Replace the UV bulb, rubber bushing, and compression fittings to the chambers. The bulb must be exactly centered when replaced, or damage to the bulb will result.
- G.** Replace the chambers to the skid, replace the pipe clamps and reconnect the inlet and outlet unions.
- H.** Turn the Process Control Switch to **PROCESS**.

Section 8: Controlling Water Quality

Overview

Controlling the waste water quality on the **ULTRASORB® System** is a very important process that can greatly enhance the quality of your recycled water. By controlling the pH level, Total Alkalinity, the amount of oxidizers and soaps that are used, you will be able to improve the quality of water in your system. There are many factors which control the water quality. These factors are listed below in order of their appearance in the following section:

pH / Alkalinity

6.1.1 pH

6.1.2 Total Alkalinity

Oxidizers

Hydrogen Peroxide

Ozone

Ultra Violet Light

Solids

Total Dissolved Solids (T.D.S.)

Total Suspended Solids (T.S.S.)

PH / Alkalinity

pH

pH (potential hydrogen) is a relative measure to indicate how acidic or alkaline a substance is. Thus, it denotes the degree or strength of alkaline or acidity. Some acids or alkaline substances are stronger than others and, in order to compare them, the pH scale has been devised. The pH numerical index ranges from 1.0 (extremely acidic) to 14.0 (extremely alkaline). The midpoint of 7.0 indicates that the solution is neutral. That is, it is neither acidic nor alkaline. Pure distilled water is a neutral solution. Note: High pH's tend to emulsify oils and reduce the efficiency of the unit, the use of high pH cleaners should be minimized.

The pH scale is a logarithmic scale and even though the difference from 0 to 14.0 doesn't seem very great, every unit on the pH scale is a difference of 10 times, and every two units is a difference of 100. For example, if you have an alkaline cleaning solution of 10.0 and increase it to 11.0, you are making that solution 10 times more alkaline. If you go up two degrees to a pH of 12.0, the solution becomes 100 times more alkaline, and so on.

CONTROLLING PH:

To Raise pH:

One chemical usually added to raise the pH level is Sodium Carbonate. How much to add is basically a trial and error operation, but a general rule of thumb that is good to follow is to add 1/4 pounds of Soda Ash for every 1,000 gallons of water within the system. After adding the Soda Ash, wait for about an hour before re-checking the pH level. Take whatever further action is indicated by the test.

To Lower pH:

The chemical normally added to lower the pH level is called Muriatic Acid, which is actually a dilute form of the more hazardous hydrochloric acid and comes in liquid form. Another acid product is the so-called Dry Acid or Sodium Sulfate, which comes in a granular form. **Acid of any type should always be added directly to the water, NEVER the water to the acid! The amount of acid required is determined by performing an acid demand test with the water test kit.**

Total Alkalinity

Total Alkalinity is the measure of the total amount of alkaline chemicals in the water and **not** the same as pH. pH measures the **strength** of an alkaline (or acid), while alkalinity measures the **amount** of alkali's present. While pH and Total Alkalinity are not the same thing, **Total Alkalinity can have an effect on how fast or easily changes in pH can be accomplished.**

Controlling Alkalinity

For our purposes, the **Total Alkalinity should be kept at about 150 ppm.** In general, alkalinity has not been a problem for recycling, providing you are using a **neutral soap.** If you have a drum of water and introduce a scoop of alkaline clearer, you may change the pH and get a reading of 12. That does not mean that if you add a second scoop of cleaner, you will get a different reading - in fact, it will probably be identical. What will change is the Total Alkalinity.

Oxidizers

Hydrogen Peroxide

Hydrogen peroxide is an oxidizer that exhibits outstanding purifying characteristics. It is not affected by the pH level and the only byproducts after oxidation are oxygen and water. Also, the hydrogen peroxide level does not need to be closely controlled. It can have levels ranging from 1 - 10 ppm. It will significantly reduce the amount of B.O.D. (biological oxygen demand) and C.O.D. (chemical oxygen demand) and will also remove any odors that may be present and increase the clarity of the water.

Ozone

Ozone is another oxidizer that exhibits outstanding purifying characteristics. Ozone is different than hydrogen peroxide in that it is not in a liquid form. Ozone is produced by a unique process developed by **RGF** in which a special chamber called the **TurboHydrozone®** uses air as its agent to produce the ozone. A simple look at the blue indicator light on the chamber assures ozone is being produced. The ozonated air is then bubbled inside of the storage tank or is vacuum dragged into the CO³P System by the Ozone Venturi, which agitates the water thus oxidizing it, which reduces B.O.D.'s and C.O.D.'s, removes odors, and improves water clarity.

Ultraviolet Light

Ultraviolet (UV) light is the third oxidizer used by **RGF** to complete the catalytic oxidation process (CO³P). UV light is a sterilizer which kills organics by emitting ultraviolet light inside of the UV Catalytic Chamber. This ultraviolet energy is also used to excite the hydrogen peroxide and the ozone that is already in the water to enhance their individual oxidation potentials.

Dissolved and Suspended Solids

Total Dissolved Solids (T.D.S.)

T.D.S. represents the total conductive material actually dissolved in the water (refer to Section 11.0 Addendum's / Training Bulletin - TB 001). It is the same as salt or sugar dissolved in water and should not be confused with suspended solids or turbidity. Total dissolved solids can include both organic and inorganic materials. Inorganic materials can be soluble in many cases and add to T.D.S. Any chemical addition to the water will increase T.D.S. (except hydrogen peroxide). Water treatment chemicals often solve one problem but create another problem. While an addition of a flocking agent may remove suspended solids and turbidity, it may drastically increase T.D.S.

Eventually a solution with increasing T.D.S. will reach a level where it is considered to be saturated (i.e. it has reached its solubility constant). Saturation is when the addition of a soluble or dissolved solid reaches the maximum ability of the water to hold it in solution at a given temperature. When the T.D.S. level exceeds this level, the material comes out of solution and either settles or forms crystals, which is how rock candy is made.

T.D.S. is measured by a special conductivity meter which works on the principle that "pure" water has no conductivity of electrical current. The addition of material such as T.D.S. increases the electrical conductivity, therefore; the higher the reading, the higher the T.D.S. level. Readings are in microsiemens - a unit of low electrical current.

Total Suspended Solids (T.S.S.)

T.S.S. represents the total amount of fine colloidal particles floating in a liquid, too small to settle out but, kept in motion by Brownian movement (refer to Section 11.0 Addendum's / Training Bulletins - TB 002). Brownian movement is the rapid vibratory motion of particles suspended in a liquid, caused by the bombardment of the particle by the moving molecules of the liquid. The velocity varies inversely with the size of the particles and also depends on the viscosity of the medium. T.S.S., unlike T.D.S. (Total Dissolved Solids), does not dissolve in water and are deemed important because these solids will create unsightly conditions, sludge deposits, and a demand for oxygen. Suspended solids can be organic or inorganic.

The standard way of testing waste water for suspended solids is to filter the waste water through a 0.45 μm (1 micron = 1 millionth of a meter) porosity filter. Anything on the filter paper after drying at a temperature of approximately 103°C is considered a portion of the suspended solids. Another way to measure suspended solids is by a device called a spectrophotometer. This device is used to measure photo metrically, the quantity of light of a particular wavelength (S.S. = 810 nm) that is absorbed by the suspended solids in solution.

Section 9: General Theory

Overview

The Piping and Instrumentation Diagram in the Engineering Diagram Section outlines the path that the waste stream takes as it is recycled. The General Theory section explains each process of the recycling process. A comprehensive understanding of theory of the **HVTWS System** should be achieved to assist in the proper installation, operation and maintenance of the system.

Series II Equipment Skid

Process System

The process water enters the Process System of the HVTWS Equipment Skid by the suction of the Process Pump. The water is filtered through the Multi-Media Filter removing large particulate from the waste stream then passed through the first Polishing Filter for initial polishing of the water. The Multi-Media and Polishing Filters are periodically backwashed to remove accumulated particulate. The water is then placed in the 2000 gallon storage tank.

Supply Header

The supply header comprises a manifold of piping and valves, which allows the operator to select the water source to be supplied to the wash equipment. The operator may select either wash or rinse water to be delivered to the wash equipment. Rinse water typically is municipally supplied 40-60 psig "tap" water. Recycled wash water will come from one of the following sources depending on system parameters:

Continuous Flow Control System (CFC System)

The CFC system consists of the CFC Pump, the UV/O³ Chamber, and the venturi injector. The CFC System circulates the stored water through the UV/O³ chamber then back to the storage tank. The purpose of the system is to continuously circulate water through the Catalytic Oxidation Process (CO³P). Although the terms CFC and CO³P are related and the systems utilize the same components, CFC refers to the mechanism for the hydraulic delivery system, and CO³P refers to the chemical and photochemical process for water treatment.

CFC Pump

The CFC Pump is a 1/2 Hp. centrifugal circulation pump that pumps the processed water from the storage tank through the CO³P system.

Catalytic Oxidation Process (CO³P System)

The Catalytic Oxidation Process is designed to reduce the Biologic Oxygen Demand (B.O.D.) and Chemical Oxygen Demand (C.O.D) of the recycled water. This is accomplished through the contact with ozone and ultraviolet light. The tri-reaction is completed when the ultraviolet light (catalyst and oxidizer) in the chamber excites the ozone (oxidizer) and to cause them to react faster in the aqueous solution. Ultraviolet light is also a remarkable sterilizer of living organics such as bacteria and algae. In turn, the three works together in breaking down organics to clarify the water before it is reused. This is all accomplished by the CFC system, which transfers the water from the tank passing it by ozone injection and through the UV/O³ Catalytic Chamber and returning it back to the tank.

UV/O³ Catalytic Chamber

A cylindrical vessel used to produce Ozone (O₃) which is venturi injected in the CFC system, to prevent bacteria or algae growth. The chamber also produces ultraviolet light, which is a sterilizer used to UV destruct organics and excite ozone in the Catalytic Oxidation Process (CO³P) as the water passes through the chamber (refer to figure UV/O³-1).

UV/O3 Catalytic Chamber

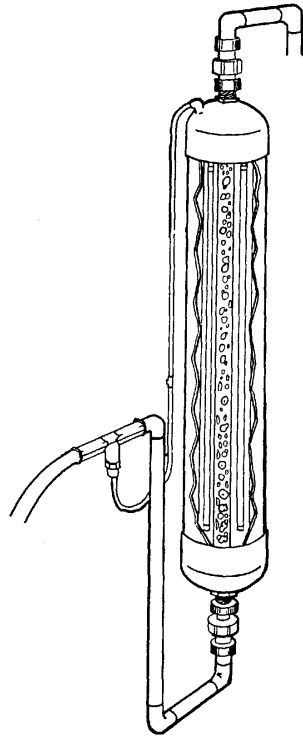


Figure UV/O3-1

Section 10: Engineering Drawing

HVTWS Process PID

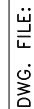
HVTWS Ladder Diagram

ELECTRICAL POWER DISTRIBUTION

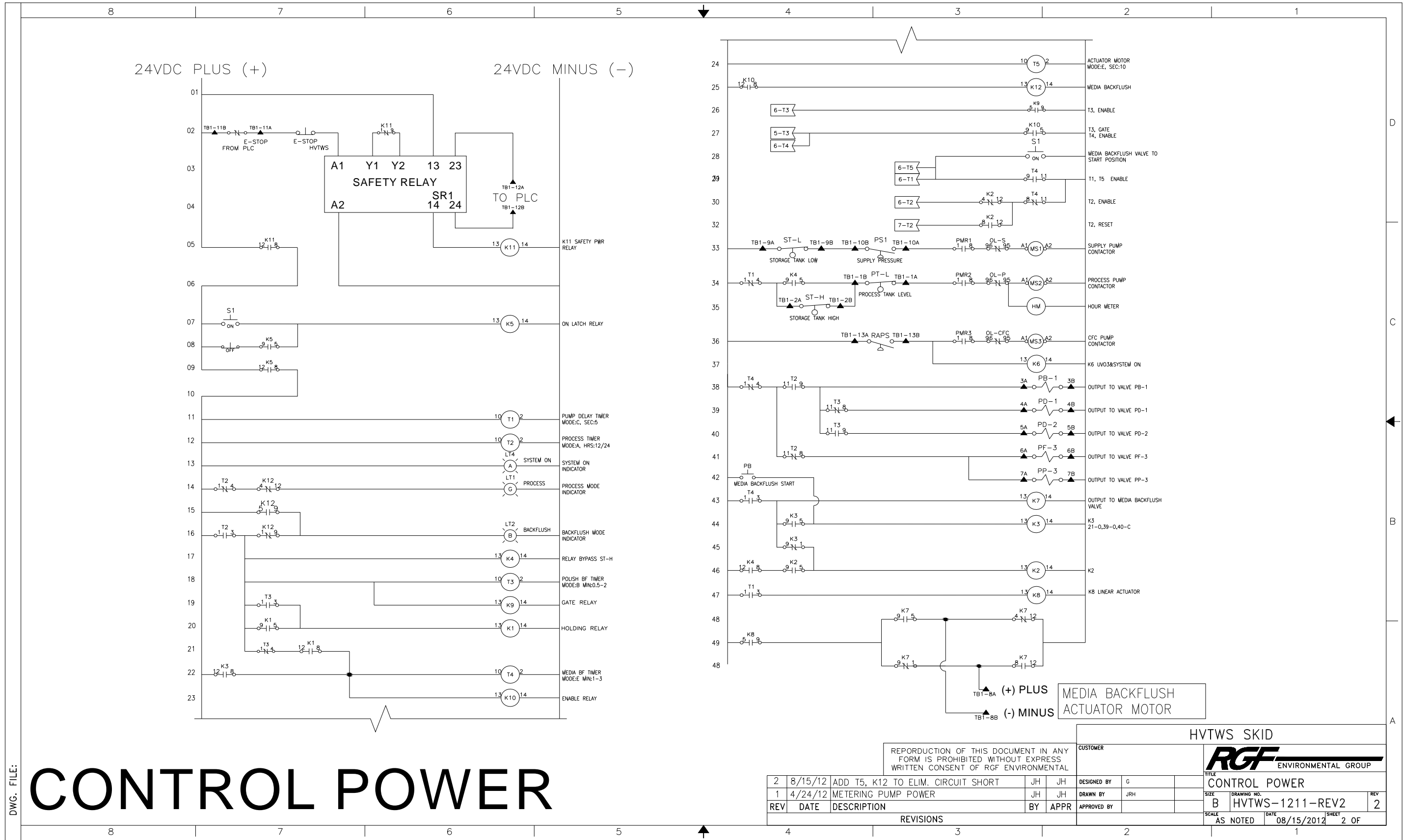
ELECTRICAL CONTROL PANEL LAYOUT

ELECTRICAL DISTRIBUTION PANEL LAYOUT

ELECTRICAL RELAY TIMING



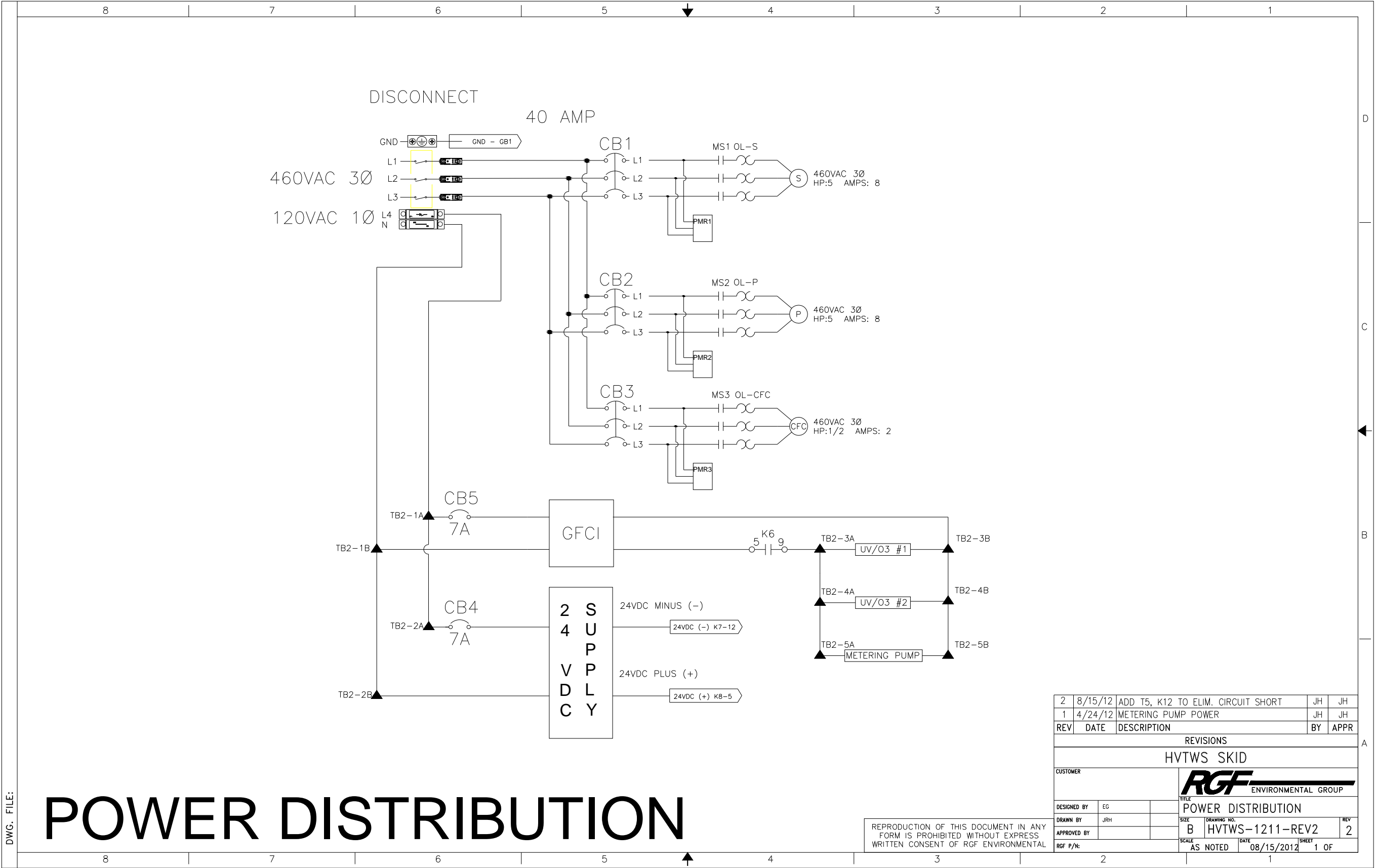
Electrical Ladder



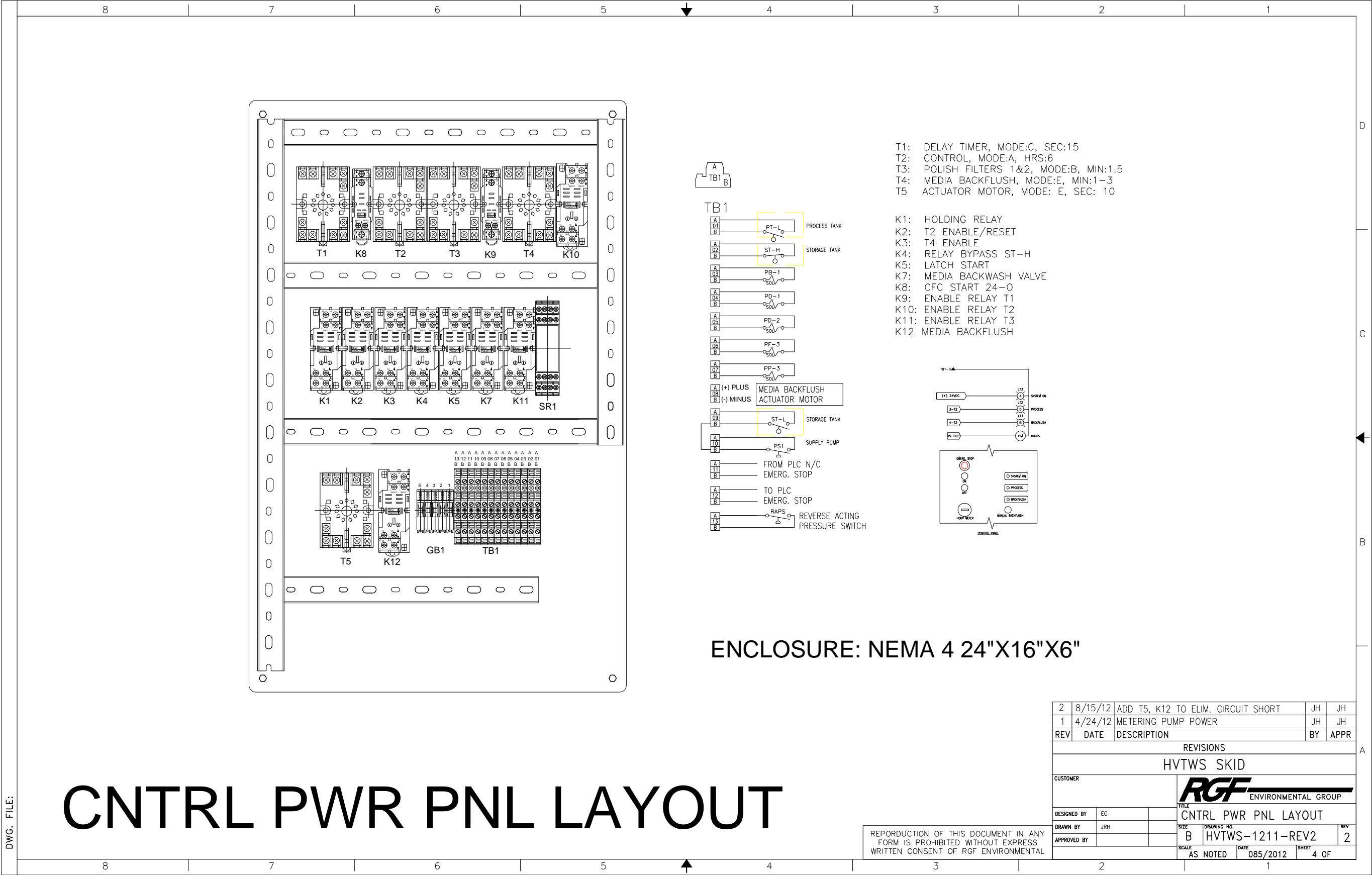
DWG. FILE:

CONTROL POWER

ELECTRICAL POWER DISTRIBUTION



ELECTRICAL CONTROL PANEL LAYOUT



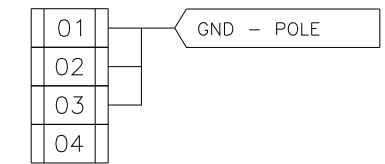
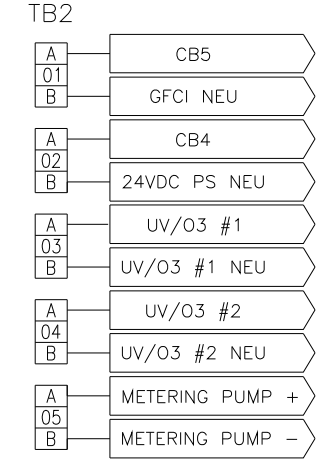
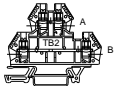
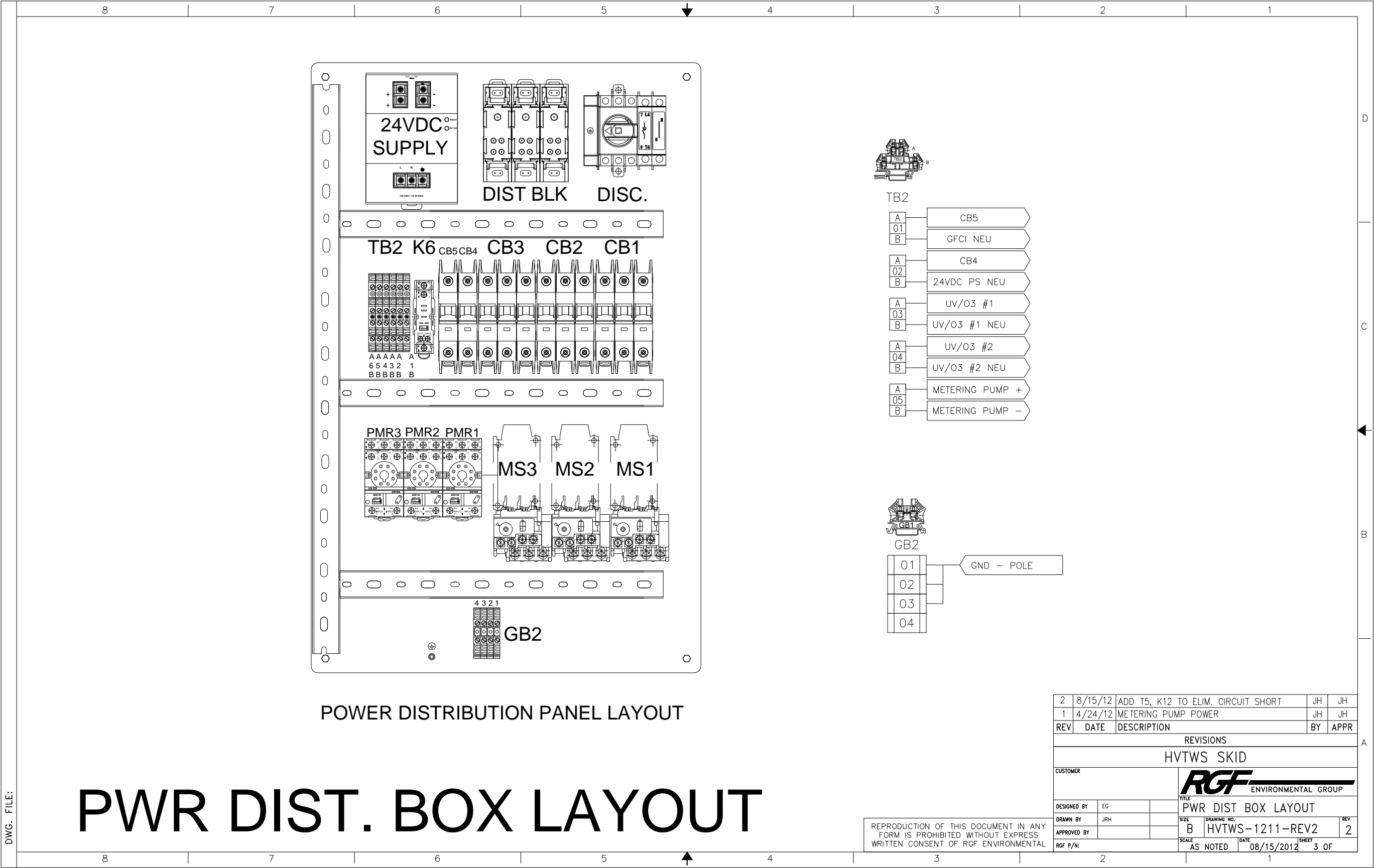
ENCLOSURE: NEMA 4 24"X16"X6"

CNTRL PWR PNL LAYOUT

2	8/15/12	ADD T5, K12 TO ELIM. CIRCUIT SHORT	JH	JH
1	4/24/12	METERING PUMP POWER	JH	JH
REV	DATE	DESCRIPTION	BY	APPR
REVISIONS				
HVTWS SKID				
CUSTOMER		RGF ENVIRONMENTAL GROUP		
DESIGNED BY	EG	TITLE		
DRAWN BY	JRH	CNTRL PWR PNL LAYOUT		
APPROVED BY		SIZE	DRAWING NO.	REV
		B	HVTWS-1211-REV2	2
SCALE		AS NOTED	DATE	SHEET
			085/2012	4 OF

REPRODUCTION OF THIS DOCUMENT IN ANY FORM IS PROHIBITED WITHOUT EXPRESS WRITTEN CONSENT OF RGF ENVIRONMENTAL

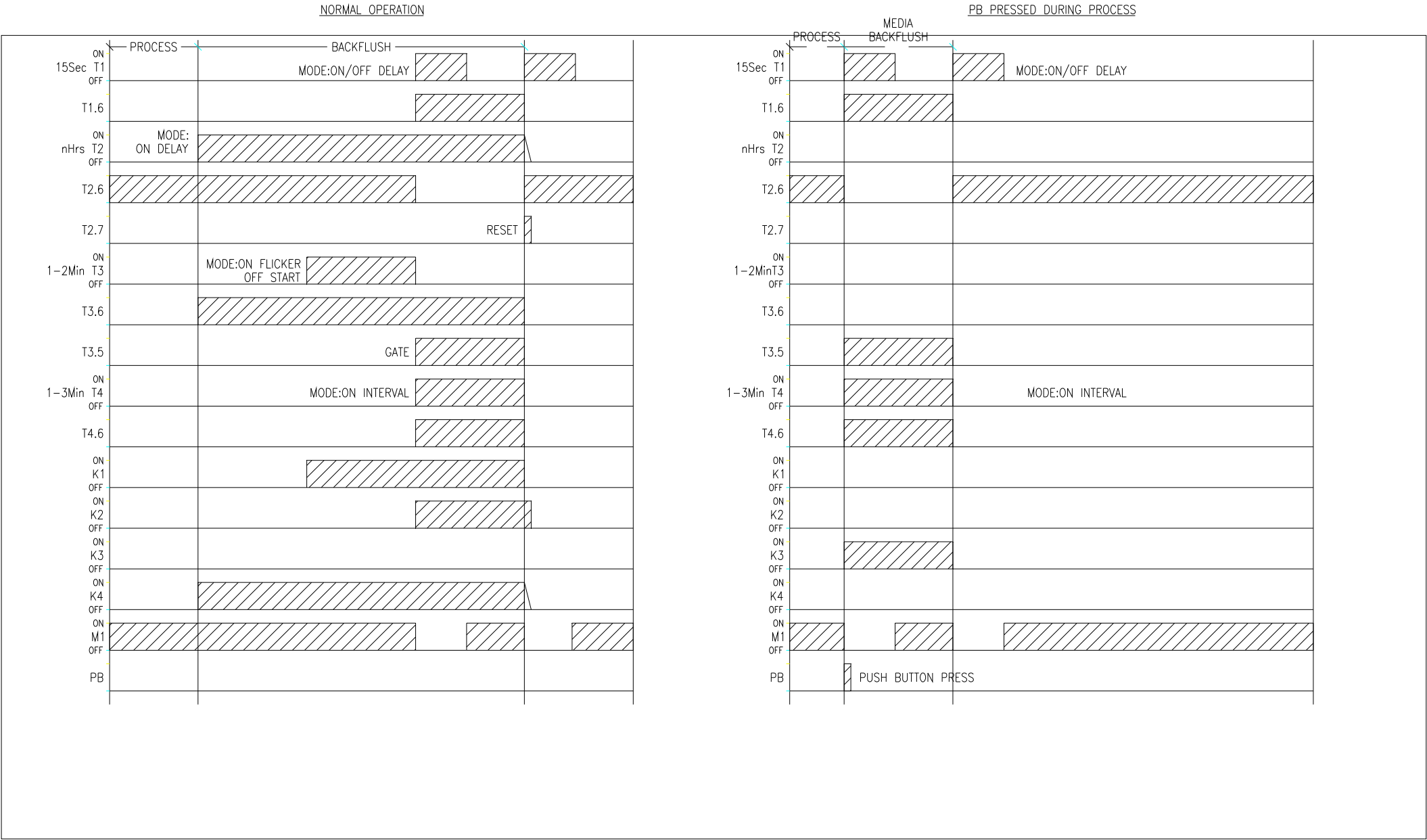
ELECTRICAL DISTRIBUTION PANEL LAYOUT



2	8/15/12	ADD T5, K12 TO ELIM. CIRCUIT SHORT	JH	JH
1	4/24/12	METERING PUMP POWER	JH	JH
REV	DATE	DESCRIPTION	BY	APPR
REVISIONS				
HVTWS SKID				
CUSTOMER		RGF ENVIRONMENTAL GROUP		
DESIGNED BY	EG	TITLE		
DRAWN BY	JRH	PWR DIST BOX LAYOUT		
APPROVED BY		SIZE	DRAWING NO.	REV
		B	HVTWS-1211-REV2	2
RGF P/N:		SCALE	DATE	SHEET
		AS NOTED	08/15/2012	3 OF

REPRODUCTION OF THIS DOCUMENT IN ANY FORM IS PROHIBITED WITHOUT EXPRESS WRITTEN CONSENT OF RGF ENVIRONMENTAL

ELECTRICAL RELAY TIMING



DWG. FILE:

REPRODUCTION OF THIS DOCUMENT IN ANY
FORM IS PROHIBITED WITHOUT EXPRESS
WRITTEN CONSENT OF RGF ENVIRONMENTAL

HVTWS		
CUSTOMER		RGF [®] ENVIRONMENTAL GROUP
DESIGNED BY	FKC	TITLE
DRAWN BY	FKC	CONTROL TIMING
APPROVED BY		SIZE
		B HVT_EL.DWG
		DRAWING NO.
		0
		REV
		0
		SCALE
		1:1
		DATE
		08/04/04
		SHEET
		3 OF 3

Section 11: Troubleshooting

Flow

SYMPTOM	PROBABLE CAUSE	SOLUTION
PROCESS SYSTEM		
1. PROCESS PUMP NOT OPERATING	<p>A) POWER IS NOT APPLIED TO PUMP</p> <p>B) PUMP HAS LOST PRIME</p> <p>C) SYSTEM VALVES ARE IMPROPERLY ALIGNED</p>	<p>A) VERIFY POWER IS APPLIED; THE PROCESS SYSTEM CONTROL SWITCH IS IN THE PROCESS POSITION AND THE BREAKER IS SHUT. ENSURE FLOAT SWITCHES ARE PROPERLY POSITIONED, UNOBSTRUCTED AND FREE TO SWING AND ADEQUATE WATER IS IN BOTH SUCTION AND DISCHARGE TANKS. ENSURE THE PROPER ELECTRICAL CONNECTIONS WERE MADE TO THE SYSTEM. REFER TO THE PROCESS PUMP COMPONENT MANUAL.</p> <p>B) VERIFY SYSTEM LINEUP. ENSURE UNOBSTRUCTED FLOW TO PUMP SUCTION. REPRIME PUMP ENSURING THAT PUMP CASING IS WATER FILLED. OPEN THE PRIMING PLUG AND RE-PRIME PUMP.</p> <p>C) CONDUCT VALVE LINEUP WITH P&ID.</p>
2. NO OR LOW FLOW THROUGH PROCESS SYSTEM	A) POLISH FILTERS ARE CLOGGED WITH PARTICULATE	A) PERFORM A POLISHING FILTER BACK FLUSH IN ACCORDANCE WITH PMS. IF THIS DOES NOT REMEDY PROBLEM THEN FILTERS ARE FOULED AND NEED TO BE REPLACED.
2. NO OR LOW FLOW THROUGH PROCESS SYSTEM	<p>A) MULTI-MEDIA FILTER IS CLOGGED WITH PARTICULATE</p> <p>B) POLISH FILTERS ARE CLOGGED WITH PARTICULATE</p>	<p>A) PERFORM A MULTI-MEDIA FILTER BACK FLUSH IN ACCORDANCE WITH PMS. IF THIS DOES NOT REMEDY PROBLEM THEN FILTER IS FOULED AND NEEDS TO BE REPLACED.</p> <p>B) PERFORM A POLISHING FILTER BACK FLUSH IN ACCORDANCE WITH PMS. IF THIS DOES NOT REMEDY PROBLEM THEN FILTERS ARE FOULED AND NEED TO BE REPLACED.</p>

CFC SYSTEM		
1. CFC PUMP NOT OPERATING	<p>A) POWER IS NOT APPLIED TO PUMP</p> <p>B) PUMP HAS LOST PRIME</p> <p>C) SYSTEM VALVE IS IMPROPERLY ALIGNED</p>	<p>A) VERIFY POWER IS APPLIED; BREAKER IS SHUT. ENSURE THE PROPER ELECTRICAL CONNECTIONS WERE MADE TO THE SYSTEM. REFER TO THE CFC PUMP COMPONENT MANUAL.</p> <p>B) CHECK WATER LEVEL IN STORAGE TANK. ENSURE UNOBSTRUCTED FLOW TO PUMP SUCTION. REPRIME PUMP ENSURING THAT PUMP CASING IS WATER FILLED. CONDUCT VALVE LINEUP WITH P&ID.</p> <p>C) CONDUCT VALVE LINEUP WITH P&ID.</p>
2. UV/O3 CHAMBER ON HOUSING IS OFF	A) OZONE GENERATOR IS DEFECTIVE	A) CALL YOUR DISTRIBUTOR OR RGF FOR FURTHER TROUBLESHOOTING ADVICE.
3. UV/O3 CHAMBER LEAKS	<p>A) UV BULB RUBBER GROMMET IS IMPROPERLY SEATED.</p> <p>B) UV CHAMBER IS OVER PRESSURIZED</p> <p>C) INNER CHAMBER GLASS IS CRACKED OR BROKEN.</p>	<p>A) RE-SEAT BULB INTO GROMMET.</p> <p>B) ENSURE UNOBSTRUCTED FLOW. CONDUCT VALVE LINEUP WITH P&ID.</p> <p>C) INNER CHAMBER MUST BE REPLACED.</p>
4. CHEMICAL INJECTION PUMP NOT OPERATING CORRECTLY.	<p>A) POWER IS NOT APPLIED TO PUMP</p> <p>B) LOW OR EMPTY CHEMICAL CONTAINER.</p> <p>C) SUCTION AND DISCHARGE HOSES ARE KINKED.</p> <p>D) PUMP IS NOT RUNNING.</p>	<p>A) CHECK FOR POWER TO THE PUMP.</p> <p>B) FILL CHEMICAL CONTAINER WITH APPROPRIATE MIXTURE.</p> <p>C) CHECK HOSES FOR KINKS. REMOVE PUMP FLEXIBLE HOSE REALIGN AND REPLACE.</p> <p>D) CHECK CHEMICAL METERING KNOB FOR SETTING. IF NOT OFF, AND PUMP STILL NOT RUNNING, THEN PUMP IS DEFECTIVE.</p>

Electrical

The Ultrasorb® system should be installed by a licensed Electrician and should have a properly sized over current protection (i.e. circuit breaker) device installed upstream of the device. Electrical Troubleshooting should be conducted by an electrically trained individual after he has carefully reviewed the electrical drawing in Section 8.3. All indications should be considered: LED illumination, pump rotation, and fluid flow.

SYMPTOM	PROBABLE CAUSE	SOLUTION
PROCESS SYSTEM		
1. INDICATOR LIGHTS NOT OPERATING	A) POWER IS NOT APPLIED B) LIGHT IS BLOWN OUT C) LOOSE WIRES D) BAD GROUND	A) VERIFY POWER IS APPLIED; THE SYSTEM B) CONSULT TECHNICIAN OR REMOVE 4X4 ELECT. BOX FROM REAR OF PANEL AND REPLACE LIGHT. C) CHECK ALL WIRE CONNECTIONS WITH MAIN POWER TURNED OFF AND TIGHTEN IF LOOSE. D) OPEN MAIN ELECT. BOX, CHECK GROUND STRIPS FOR LOOSE WIRE THEN TIGHTEN, IF NECESSARY
2. PROCESS SWITCHES NOT OPERATING	A) POWER IS NOT APPLIED B) LOOSE WIRES C) BAD GROUND D) BLOWN SWITCH	A) VERIFY POWER IS APPLIED; THE SYSTEM CONSULT TECHNICIAN OR REMOVE 4X4 ELECT. BOX FROM REAR OF PANEL AND REPLACE. B) CHECK ALL WIRE CONNECTIONS WITH MAIN POWER TURNED OFF AND TIGHTEN IF LOOSE. C) OPEN MAIN ELECT. BOX, CHECK GROUND STRIPS FOR LOOSE WIRE THEN TIGHTEN IF NECESSARY D) REMOVE 4X4 BOX ON REAR OF PANEL AND REPLACE PER ELECT. DIAGRAM.
3. UV/O3 LIGHT NOT OPERATING	A) GFI BLOWN BREAKER B) GFI LOOSE WIRES C) BURNED OUT BULB	A) OPEN GFI COVER AND PRESS RESET B) CHECK ALL WIRE CONNECTIONS WITH MAIN POWER TURNED OFF AND TIGHTEN IF LOOSE. C) CALL RGF OR YOUR DISTRIBUTOR

Chemistry

SYMPTOM	PROBABLE CAUSE	SOLUTION
CHEMICAL		
1. EFFLUENT RECYCLED WATER SMELLS	A) OXYPUCK FEED SYSTEM SOLUTION IS LOW OR EMPTY. B) OXYPUCK FEED SYSTEM IS NOT WORKING PROPERLY. C) UV/O3 CHAMBER NOT OPERATING.	A) REFILL OXYPUCK FEED SYSTEM. B) REFER TO THE LMI PUMP OPERATION MANUAL. C) SEE ELECTRICAL: UV/O3 CHAMBER NOT OPERATING.
2. EFFLUENT RECYCLED WATER IS VERY CLOUDY.	A) OXYPUCK FEED SYSTEM SOLUTION IS LOW OR EMPTY. B) OXYPUCK FEED SYSTEM IS NOT WORKING PROPERLY. C) UV/O3 CHAMBER NOT OPERATING. D) THE WATER CONDITIONER (WC-1, OPTIONAL) HAS NOT BEEN ADDED OR RESIDUAL LEVEL IS LOW.	A) REFILL OXYPUCK FEED SYSTEM. B) REFER TO THE LMI PUMP OPERATION MANUAL C) SEE ELECTRICAL: UV/O3 CHAMBER NOT OPERATING. D) INCREASE THE WC-1 INJECTION RATE.

NOTE:

If repeated attempts to reduce smell or clear up the recycled water fail to improve the water quality, or if the amount of soap needed to clean adequately rises to an unacceptable level, the water has become over burden with dissolved and suspended solids. The system should be drained and the spent water disposed of in accordance with local, state, and federal regulations.

System Warranty



ULTRASORB® System Limited Warranty

This warranty supersedes and replaces any warranty statements orally made by the Sales Person, Distributor, or Dealer or contained in written instructions or other Brochures or informational documents in relation to this product.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF

The Manufacturer Warrants, parts only for a period of twelve (12) months from the time of startup, not to exceed fourteen (14) months from the date of shipment, the new **ULTRASORB®** System to be free from defects in material and workmanship under the normal use and service when operated and maintained in strict accordance with the **ULTRASORB®** System operating instructions.

The Manufacturer's obligations under this warranty is being limited to repairing or replacing any part found to its satisfaction to be so defective, provided that such part is, upon request, returned to the Distributor or Manufacturer, with freight prepaid. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, abuse, or any other than its intended use, accident, neglect, or from improper operation, maintenance, installation, modification or adjustments.

This warranty does not cover parts or equipment used with the **ULTRASORB®** System that are not made by the manufacturer, since these items are covered by warranties from the respective manufacturer. The Manufacturer makes no warranty as to electrical apparatus or other materials not of its manufacturer.

The Manufacturer's sole responsibility shall be limited to repair or replacement of the equipment within the terms stated herein above.

The Manufacturer shall not be liable for consequential or punitive damages whether or not caused by manufacturer's negligence or resulting from any expressed or implied warranty or breach thereof. Consequential damages for the purpose of this agreement shall include, but are not limited to, the loss of use, income or profit, or loss of or damage to property occasioned by or arising out of in-operation, use, the operation, installation, repair, or replacement of the equipment or otherwise.

It is understood that any controversy or claim arising out of or relating to the **ULTRASORB® System Warranty** herein or the alleged breach thereof, shall be settled by arbitration in accordance with the rules of the Arbitration Association of America, Palm Beach County, Florida, and judgment upon the award rendered by the arbitrator(s) may be entered in any court baring jurisdiction thereof.

PROCESS PERFORMANCE WARRANTY

The Manufacturer Warrants that when installed and operated in accordance with the Manufacturer's written instructions, the **ULTRASORB®** System will remove dirt, oil, and grease from wash water. No other warranty expressed or implied should be considered valid. There are numerous operating conditions which will affect the efficiency of the **ULTRASORB®** System, thereby making any general water quality statement unrealistic.

WARRANTY SERVICE

In order to validate your warranty, fill out the **Warranty Validation Form** and return to **RGF** at the address below:

RGF WARRANTY DEPARTMENT

Outside of Florida (800) - 842 - 7771

In Florida (561) - 848 - 1826

FAX (561) - 848 - 9454

To obtain warranty service contact **RGF** and a warranty representative will help with the warranty problem and determine the status and a **Warranty Authorization Number** will be given at that time. Be prepared to answer specific questions on the problem at hand. If there are warranted parts that need to be returned, fill in the **Warranty Authorization Number on the Warranty Request Form** along with the items being submitted for warranty and an brief explanation of the problem or defect and return it and the part(s) to:

RGF Environmental Group, Inc

c/o Warranty Department

1101 W 13th Street

Riviera Beach, Florida 33404



ULTRASORB® System Limited Warranty Policy

RGF ENVIRONMENTAL GROUP, INC. ["Manufacturer"] Warrants the **ULTRASORB® System** to be free from DEFECTS in Material and Workmanship.

HOW LONG IS THE WARRANTY?

- For twelve (12) months from the date of initial startup of the system; not to exceed fourteen (14) months from the date of delivery.
- The Installation / Startup Record and Warranty Registration Form should be signed and dated by an authorized officer or employee of the customer and returned to RGF promptly to activate the warranty.

HOW DO I CONTACT RGF ENVIRONMENTAL GROUP ABOUT MY WARRANTY, A QUESTION, OR A COMPLAINT?

- A question or a complaint may be addressed directly by your local Distributor or dealer.
- If they cannot answer the question or complaint directly, then call or FAX the Warranty Department at RGF at:

RGF WARRANTY DEPARTMENT
Outside of Florida (800) - 842 - 7771
In Florida (561) - 848 - 1826
FAX (561) - 848 - 9454

ARE THERE ANY PARTS THAT ARE NOT COVERED BY THIS WARRANTY? (That the Manufacturer will not repair or replace)

- Parts that are damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, abuse, any other than its intended use, accident, neglect, or from improper operation, maintenance, installation modification or adjustments.
- Parts not made by the Manufacturer, such as the electric pressure pump motor or other materials not of its manufacturer. However, RGF will process the claim with the pump or other manufacturer.

WHAT SHOULD BE DONE IN THE EVENT THAT THE EQUIPMENT IS DAMAGED BY SHIPPING?

- Immediately upon receipt of the system, the purchaser is responsible to take the shipping containers off of the truck and inspect the equipment and parts for damage.
- If there is any visible damage to the equipment:
 1. Notify the driver of the courier company immediately and write on the Bill of Lading what is damaged or missing.
 2. Call **RGF** immediately at **1 - (800) - 842 - 7771** outside of Florida, **1 - (561) - 848- 1826** in Florida, or **FAX 1- (561) - 848 - 9454**.

WHAT IF DAMAGE IS FOUND ON THE EQUIPMENT AFTER THE COURIER HAS LEFT?

- Claims for concealed shipping damage must be reported to the courier and a copy sent to RGF in writing via **FAX 1 - (561) 848 - 9454** or certified U.S. mail within fifteen (15) days from the date of delivery.

NOTE:

The courier company will not cover the damages if the foregoing steps are not adhered to.

STEPS THAT SHOULD BE TAKEN IF WARRANTY WORK OR REPLACEMENT IS NEEDED.

- Call your local distributor or RGF Warranty Department and notify them of the problem or malfunction. Be prepared to be very descriptive with the problem.
- If it is determined that a part has malfunctioned due to defect, a **Warranty Authorization Number** will be given for tracking the part. Fill out the **Warranty Request Form** along with the Warranty Authorization number and return it along with the defective part prepaid to:

**RGF Environmental Group, Inc
c/o Warranty Department
1101 W 13th Street
Riviera Beach, Florida 33404**

THINGS THAT SHOULD BE DONE TO HELP KEEP THE ULTRASORB SYSTEM RUNNING EFFICIENTLY.

- Read the Operations Manual thoroughly.
- Make sure all of the employees who operate the system are fully trained on the procedures for operating the system and follow preventive maintenance routines strictly.
- Do not run water that has contaminants through the system that it is not designed to remove.
- Make sure the system is operated in accordance with the Manufacturer's suggested instructions.
- Replace filters as recommended in the Operations Manual.
- Control the water quality in accordance with RGF's suggested guidelines.
- Keep sump pits, trenches, and weirs cleared of heavy sediment build up. Heavy solids build up will cause the sump pump to overheat and fail to operate properly. Failure to prevent this will void the sump pumps warranty.

- Lack of a water clarifier (such as hydrogen peroxide, chlorine, WC-1, Ozone, etc.) will cause algae to grow resulting in plugged filters and foul smell.

WHAT SERVICE IS EXPECTED FROM THE DISTRIBUTOR?

- The Distributor will install, perform the initial startup, and train your personnel.

Should there be any questions relating to this warranty policy information, please feel free to contact our customer service representative at:

RGF Customer Service

Outside of Florida (800) - 842 - 7771

In Florida (561) - 848 - 1826

FAX (561) - 848 - 9454

or Write

RGF Environmental Group, Inc.

c/o Customer Service Dept.

1101 W 13th Street

Riviera Palm Beach, FL 33404

Product Registration and Return Forms



**ULTRASORB® System
Warranty Request Form**

NOTE: THIS FORM MUST BE COMPLETED AND ACCOMPANY ALL RETURNED ITEMS

Warranty Authorization Number: **W-**_____

CUSTOMER: NAME _____
 ADDRESS _____
 PHONE _____ FAX _____

DISTRIBUTOR: NAME _____
 ADDRESS _____
 CONTACT _____

UNIT: MODEL _____
 SERIAL # _____
 DATE OF PURCHASE _____

ITEMS BEING SUBMITTED FOR WARRANTY:

PLEASE LIST THE PARTS AND GIVE A BRIEF DESCRIPTION OF THE PROBLEM.

ITEMS

- 1) _____
2) _____

DESCRIPTION (COMMENTS)

- 1) _____
2) _____
3) _____

SHIP TO: ***RGF ENVIRONMENTAL GROUP, INC.
c/o WARRANTY DEPARTMENT
1101 W 13th STREET
RIVIERA BEACH, FLORIDA 33404
FAX 561-848-9454***

(FOR RGF USE ONLY)

DATE ITEMS RECV'D _____
RECEIVED BY _____
REPLACEMENT PART SENT/WARRANTY APPROVED ☐ WARRANTY DENIED ☐



ULTRASORB® System Warranty Validation Form

To validate the Warranty for the system, this form must be read, signed and returned to:

*RGF Environmental Group, Inc
c/o Warranty Department
1101 13th Street
Riviera Beach, Florida 33404
FAX 561-848-9454*

1. I have inspected the system upon arrival for shipping damage and have reported any problems to the local distributor, the Courier Company, or *RGF* within the required time period.
2. I have been provided with training on the operation and procedures for the system by the distributor or *RGF* representative, during the installation and startup of the system.
3. I understand it is the customer's responsibility to:
 - Regularly monitor and maintain the water chemistry of the system and to utilize properly only any chemicals or cleaning agents that are compatible with the equipment.
 - To regularly clean out the sump pit and perform suggested preventive maintenance on the system in order to keep the system in good working order. I understand that failing to do so will adversely effect the efficiency of the system. I also understand, that it is my responsibility to properly dispose of the used filters, pit sediment, and any other by-products accordingly.
 - Protect the system from extreme (high/low) temperatures to prevent damage to the components and piping of the system.
 - Notify the local distributor or *RGF* Warranty Dept. immediately upon any malfunction of the system in order to receive warranted work or parts.
4. I understand that any controversy or claim arising out of or relating to the **ULTRASORB® System Warranty** herein or the alleged breach thereof, shall be settled by arbitration in accordance with the rules of the Arbitration Association of America, Palm Beach County, Florida, and judgment upon the award rendered by the arbitrator(s) may be entered in any court baring jurisdiction thereof.

I hereby acknowledge the above.

Customers Name _____
Address _____

Signature _____ **Date** _____



ULTRASORB® System Installation / Startup Record

Model Number _____ Installation Date _____
Serial Number _____ Start-Up Tech. _____
Distributor _____
Customer _____
Address _____
Phone () _____ FAX () _____ Contact _____

Names of Trainees	Position	Initials
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

What is Being Cleaned _____ Hr's. Per Day _____

Washpad Design & Const. By? _____

Is the Washpad Satisfactory? Yes ____ No ____ If No, Explain _____

Was the Unit Missing Parts? Yes ____ No ____ If Yes, Explain _____

Did the Unit Have Shipping or Hidden Damage? Yes ____ No ____ If Yes, Explain _____

List Any Options/Modifications with this Unit. _____



ULTRASORB® System Installation / Startup Checklist

MAINTENANCE PROCEDURES, CHECK IF COVERED & APPLICABLE

- | | |
|---|---|
| <input type="checkbox"/> Overall System Description | <input type="checkbox"/> Sump Pump & Maintenance |
| <input type="checkbox"/> EPA & Sewer Rules | <input type="checkbox"/> Electrical, Shutoffs, Etc. |
| <input type="checkbox"/> Wash Pad Maintenance | <input type="checkbox"/> Centrifugal Separator |
| <input type="checkbox"/> Solids Cleaning Procedure | <input type="checkbox"/> Oil Accumulator |
| <input type="checkbox"/> Bleed Lines | <input type="checkbox"/> Coalescing Tubes |
| <input type="checkbox"/> Solids Grid | <input type="checkbox"/> Hydrocarbon Absorber II |
| <input type="checkbox"/> Filter Media | <input type="checkbox"/> Centrifugal Pump |
| <input type="checkbox"/> Hydrocarbon Absorber III | <input type="checkbox"/> Chlorinator |
| <input type="checkbox"/> Jet Pump and Switch | <input type="checkbox"/> Fresh Water Make-up |
| <input type="checkbox"/> TurboHydrozone | <input type="checkbox"/> Air Compressor |
| <input type="checkbox"/> Polishing Filters | <input type="checkbox"/> Pressure Gauges |
| <input type="checkbox"/> Pressure Tank | <input type="checkbox"/> 3 Way Control Valve |
| <input type="checkbox"/> Options: _____ | <input type="checkbox"/> Options: _____ |
| <input type="checkbox"/> Options: _____ | <input type="checkbox"/> Options: _____ |

CRITICAL FUNCTIONS AND PROCEDURE DISCUSSIONS

- | | |
|---|--|
| <input type="checkbox"/> Basic Water Chemistry;
pH, Alkalinity, TDS | <input type="checkbox"/> Operator Safety;
Clothing, Ventilation, Etc. |
| <input type="checkbox"/> Algae/Bacteria Control;
Chlorine, Hydrogen Peroxide | <input type="checkbox"/> Cleaning Agents; Enviro-
Control, Ultra-Safe |
| <input type="checkbox"/> Water Cycling, WC1 | <input type="checkbox"/> Water Management |
| <input type="checkbox"/> Water Testing; ETS Kit,
pH Paper, TDS Meter | <input type="checkbox"/> Recycled / Fresh Water |
| | <input type="checkbox"/> Where to Get Help; Manuals,
Distributor, RGF |

CUSTOMER HANDOUTS AND SUPPORT MATERIAL

- | | |
|--|---|
| <input type="checkbox"/> Operating Manuals | <input type="checkbox"/> Water Test Kit |
| <input type="checkbox"/> Maintenance Video | <input type="checkbox"/> Spare Parts List |

CUSTOMER EVALUATION OF START-UP TRAINING:

How Would You Rate Your Training? Good ____ Fair ____ Poor ____

General Comments _____

RGF Tech. Rep. Signature _____

Trainees Signature _____



ULTRASORB® System Client Questionnaire

Company Name _____

Contact Person _____

Location _____

Phone (____) _____

RGF Dealer/Salesman _____

Purchase Date (approx.) _____

Model _____ Serial Number _____

HOW WOULD YOU RATE THE FOLLOWING:

	GOOD	FAIR	POOR
General Operation	_____	_____	_____
Recycled Water Quality	_____	_____	_____
Quality of System	_____	_____	_____
Service & Support	_____	_____	_____
Warranty	_____	_____	_____
Installation / Training	_____	_____	_____
Safety	_____	_____	_____
RGF Dealer / Salesman	_____	_____	_____
Value	_____	_____	_____

Would you purchase another RGF System? Yes ____ No ____

Comments _____

Completed By: _____ Date _____

Please return this form to:

RGF Environmental Group, Inc
c/o Customer Service Dept.
1101W 13th Street
Riviera Beach, FL 33404
Fax: 516-848-9454