Reclaim Filters and Systems, Inc.

Twin Hydrocyclone System Manual

Twin Hydrocyclone System

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Table of Contents

Chapter 1

Introduction

General Information

This manual is intended to give you the information needed to use the RECLAIM Twin Hydrocyclone water reclaim system. The sections detail: System Description, Installation, Operation and Maintenance.

Warnings, Cautions, and Notes

As you read the manual, these symbols will let you know to pay special attention to the CAUTION, WARNING, and NOTE messages. These help to identify important safety issues or other important items.

CAUTION Information that could prevent system damage or minor personal injury.

WARNING Information that can prevent injury or death.

NOTE Just an FYI. Useful or interesting information.

System Description

THe Twin Hydrocyclone water reclamation and filtration system removes dirt and debris from recycled water, it also contains a recirculation system to keep the water fresh and odor free. The system comes standard with biological odor control and is available with ozone as an option for the cleanest water possible..

THE SYSTEM CONSISTS OF THE FOLLOWING:

- Electrical Control Panel w/ VFD control for Process Pump
- COARSE STRAINER Basket
- 3HP Three Phase Process Pump
- Twin Hydrocyclone Particle Separators
- BLU-BIO™ DOSING Waste Water Inoculant
- MAZZEI INJECTOR for mass air injection
- Injector Bypass Solenoid Valve for flow control
- Injector Bypass Ball valve for line tune adjustment
- 1-1/2" Brass Filtered Water Outlet Valve for flow and pressure adjustment
- 1" Circulation Outlet Valve for flow and pressure adjustment
- (1) 1-1/2" PVC Valve for Hydrocyclone Drains
- Input and Output Pressure gauges

STATEMENT OF USE:

The 3-Phase pump is powered by the VFD and supplies water from the reclaim pits to the unit. There is a COARSE STRAINER Basket to remove large debris that may damage the pump. Customer supplied 115VAC voltage is used to power the control unit. There is a 2-Position switch to control the pump. This switch does not control the three-phase power. The 3-Phase disconnect supplies the power to the VFD and Pump Motor.

DO NOT USE THE 3-PHASE DISCONNECT TO TURN PUMP ON/OFF. Severe damage to VFD will occur if 3-Phase disconnect is switched to rapidly. Always wait for VFD screen to go blank before turning 3-Phase back on.

With 3-Phase on and pump switch ON, the unit will run in HIGH SPEED when there is a demand for filtered water and will switch to LOW SPEED circulation when there is no demand. When the unit is in HIGH SPEED it will supply filtered water through BOTH HYDROCYCLONES to point of use. When the unit is in LOW SPEED the check valves isolate flow through ONE HYDROCYCLONE. This allows for the water to be continually treated through ONE HYDROCYCLONE in this low flow mode. This control is supplied by the PRESSURE SWITCH on the filtered water outlet. The PRESET BIO DOSING pump will continually dose the proper amount of BLE-BIO™ Waste Water Inoculant into the circulation stream. The MAZZEI INJECTOR will supply mass air injection into the circulation stream to feed the BLU-BIO and aerate the pits.

Chapter 2 Specifications:

DIMENSIONS:

Height:	54”
Width:	28”
Depth:	34”
Weight:	350 lbs

ELECTRICAL REQUIREMENTS:

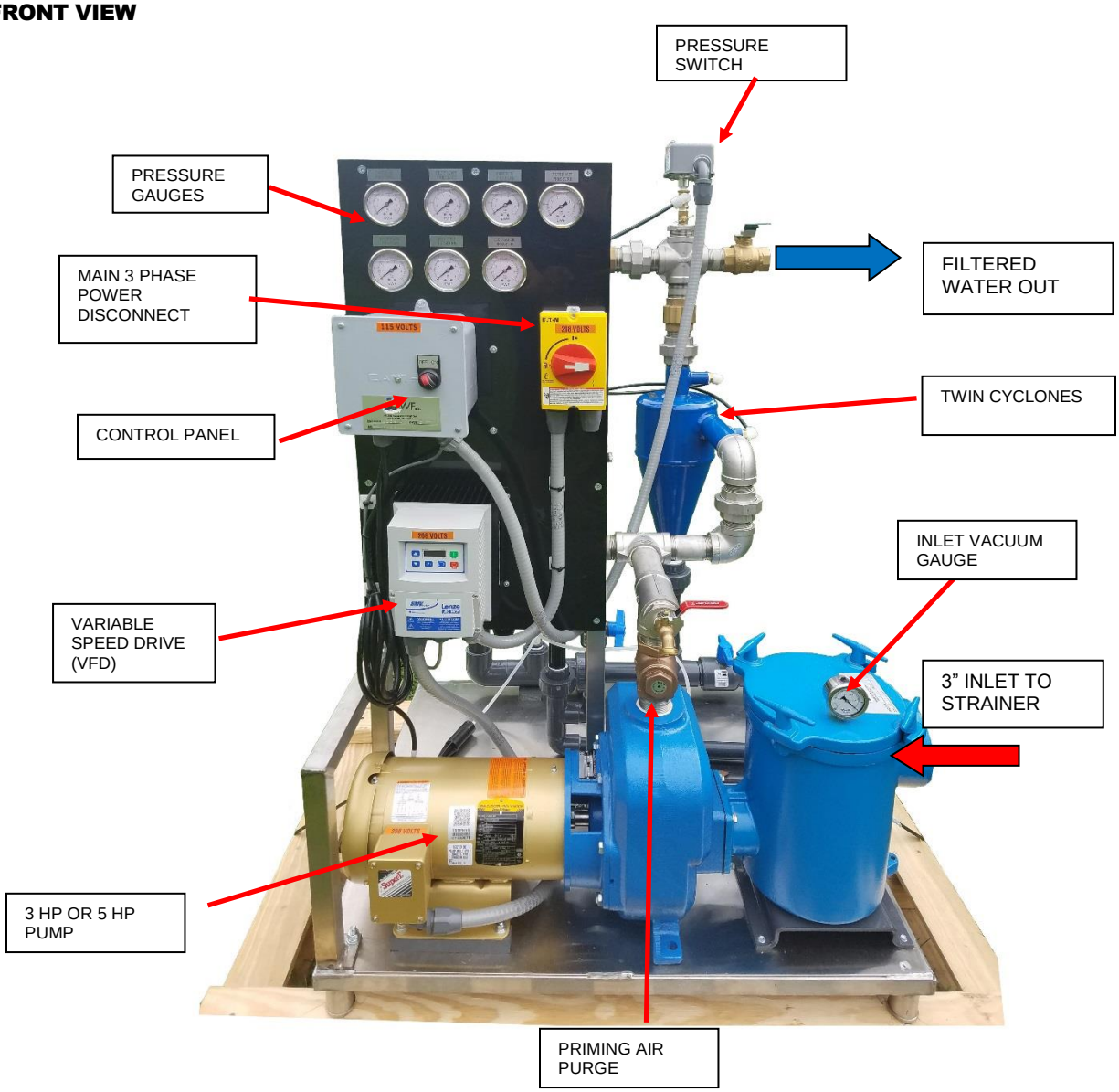
280/230/480 Three Phase @ 20amps (Customer to specify)
115VAC @ 15amps

PLUMBING REQUIREMENTS:

3” SCH 80 PVC Suction Inlet/ FLAPPER CHECK VALVE
2” SCH 80 PVC may be used on 3 HP pumps
1-1/2” Filtered water outlet Plumbed to Point of Use
1-1/4” Circulation Line Plumbed to Reclaim Pits
1-1/2” HYDROCYCLONE Drain Line Plumbed to Reclaim Pits

Chapter 3 Installation:

TWIN HYDROCYCLONE SYSTEM
FRONT VIEW



Installation Cont.

Site Evaluation

- **Verify Storage Tanks are Free of Construction Debris or Clean Thoroughly if an Existing Site**
- **Verify Proper Piping Exists:**
    - Two 2" **SCH 80 PVC Suction Lines, one for spare (Direct Line from Last Holding Tank)**
      The Suction Lines should be as short and direct as possible, use Check Valve supplied with System. **Place Check Valve on the bottom of suction line 18" From bottom of tank.**
    - **1-1/2" Filtered Water Outlet Line** Plumbed to Point Use
    - **1-1/4" PVC Circulating Line** (terminate with a PVC Tee 2/ below the Water Line in second chamber of Tank One.)
    - **1-1/2" Hydrocyclone Drain Line** Plumbed to first chamber of tank one or carwash sump/ trench.

SEE TYPICAL LAYOUT (Page 7)

Un-crating and Installation

- **Verify the Water Recovery Equipment is Free of Shipping Damage or has not been Dropped**
- **Open carton shipped with reclaim equipment containing Check Valve Assembly**
- **Connect Suction Pipe to reclaim recovery Unit**
    1. **Avoid and Fittings which can be a source for suction type leaks**
    2. Proper Installation of Suction – **(See Bullet 4 of this page)**
    3. Use **Teflon tape** or proper **pipe thread sealer** on all threaded fittings.
- **Connect Filtered water outlet Line to reclaim unit** (Avoid too many elbows which result in loss of flow/pressure)
- **Connect Circulating/Drain Line from System to existing 1-1/4" PVC Lines**
- **Connect BLU-BIO dosing pump per Stenner Pump manual. Pump is preset for dosing.**
- **Connect Three Phase and Single Phase Electrical Wires to Termination's in the Electrical Control Panel**
- **A Detailed Wiring Diagram is included in this manual. (pg. 8)**

System Startup

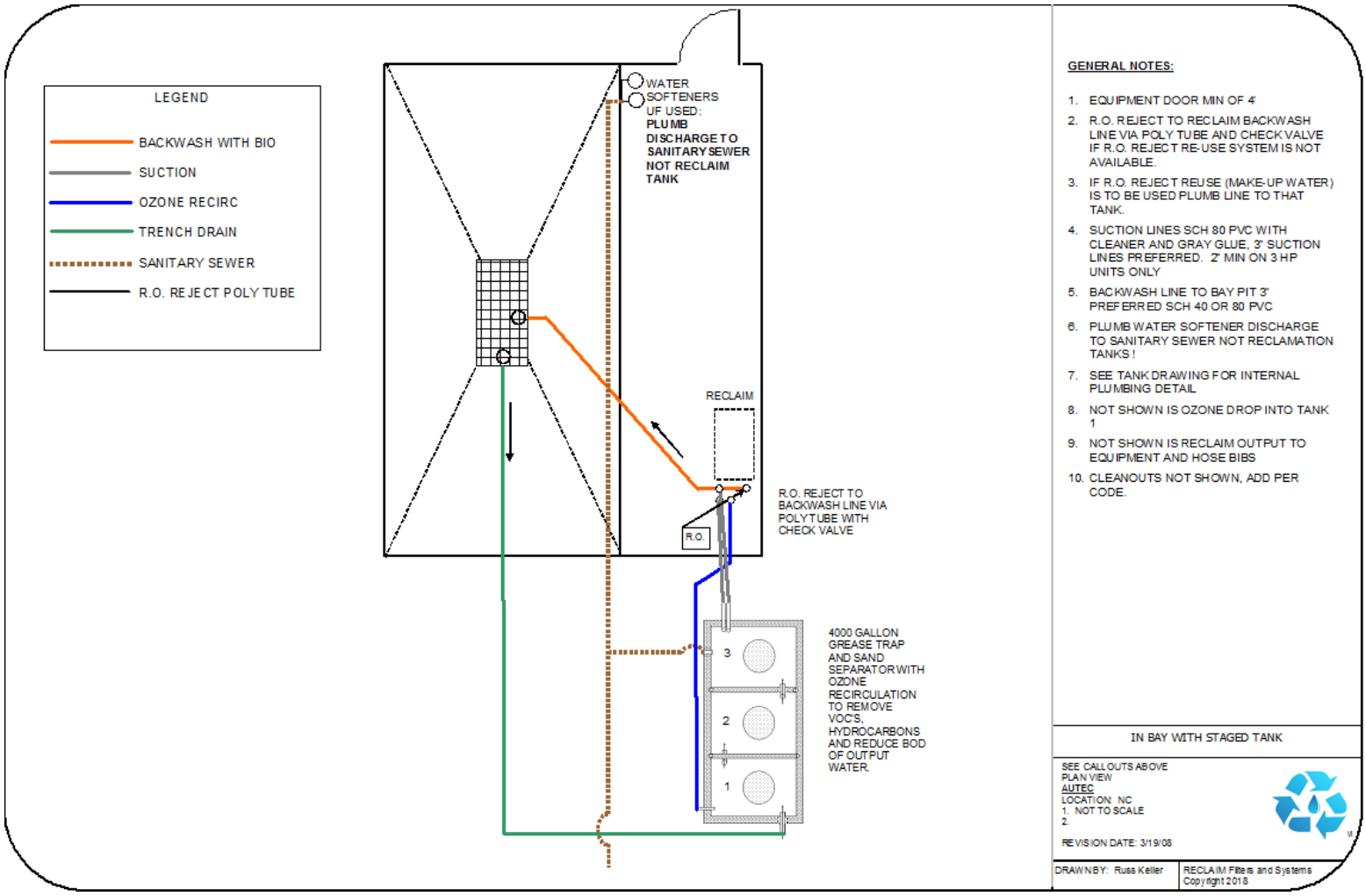
- **Fill all System Storage Tanks full of Water**
- **Make sure Pump Switch is OFF. Turned RED 3-Phase disconnect ON**
- **VERIFY PROPER ELECTRICAL ROTATION ON PUMP MOTOR** (Rotation arrows are stamped on the Pump Casting)
    - Proper Rotation is **Counter Clockwise** while facing pump head.
    - Rotation is verified by bumping the Motor Switch to ON and watching the rotation direction of the motor shaft. **DO NOT RUN PUMP MOTOR MORE THAN A FEW SECONDS WITHOUT WATER.**
- **Manually fill the Priming Basket and Pump Casting Full of Water**
- **Make sure there is open flow past the reclaim Unit**
- **Turn Pump Motor to ON POSITION to initiate the Priming Process**
    - Run Pump ON. (NO LONGER THAN 30 SECONDS) until pressure is registered on the system input and output gauges. Re-prime as necessary until pressures are steady.
- **With System in HIGH SPEED (VFD reading 60) set 1-1/2" Filtered Water Outlet valve so there is 35-40PSI on the Filtered Water Outlet gauge. There should be a 2-4 psi differential between the IN/OUT pressure of each Hydrocyclone.**
- **While system is in low speed (re-circulation mode VFD reading 45), adjust Blue Handled, Grey, PVC Ball valve to ensure there is suction on the MAZZIE INJECTOR.**

a. Installation should only be performed by a licensed electrician

b. Plumbing connections by licensed plumber

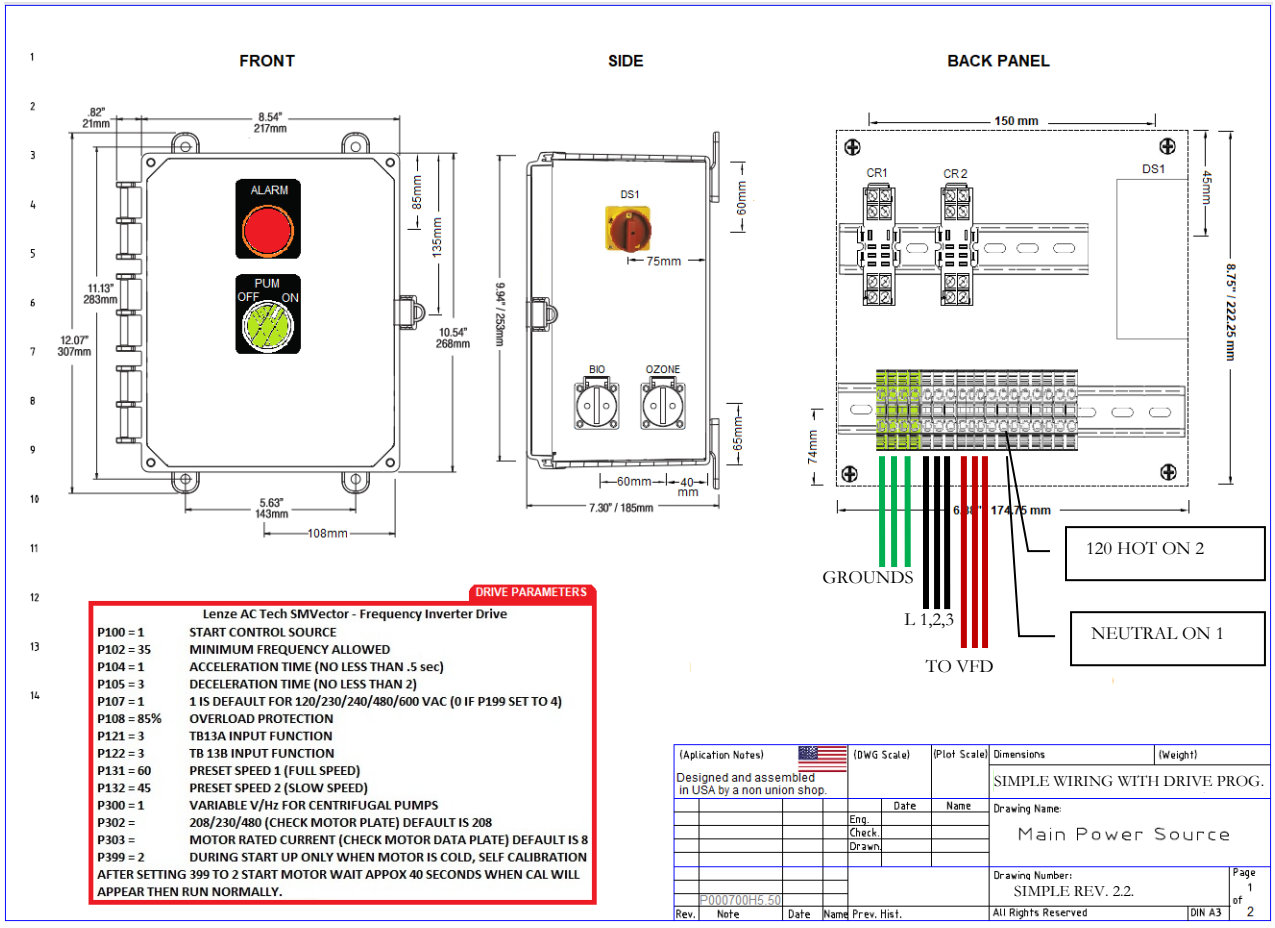
Installation Cont.

Typical Layout:



Installation Cont.

ELECTRICAL PANEL (2019)

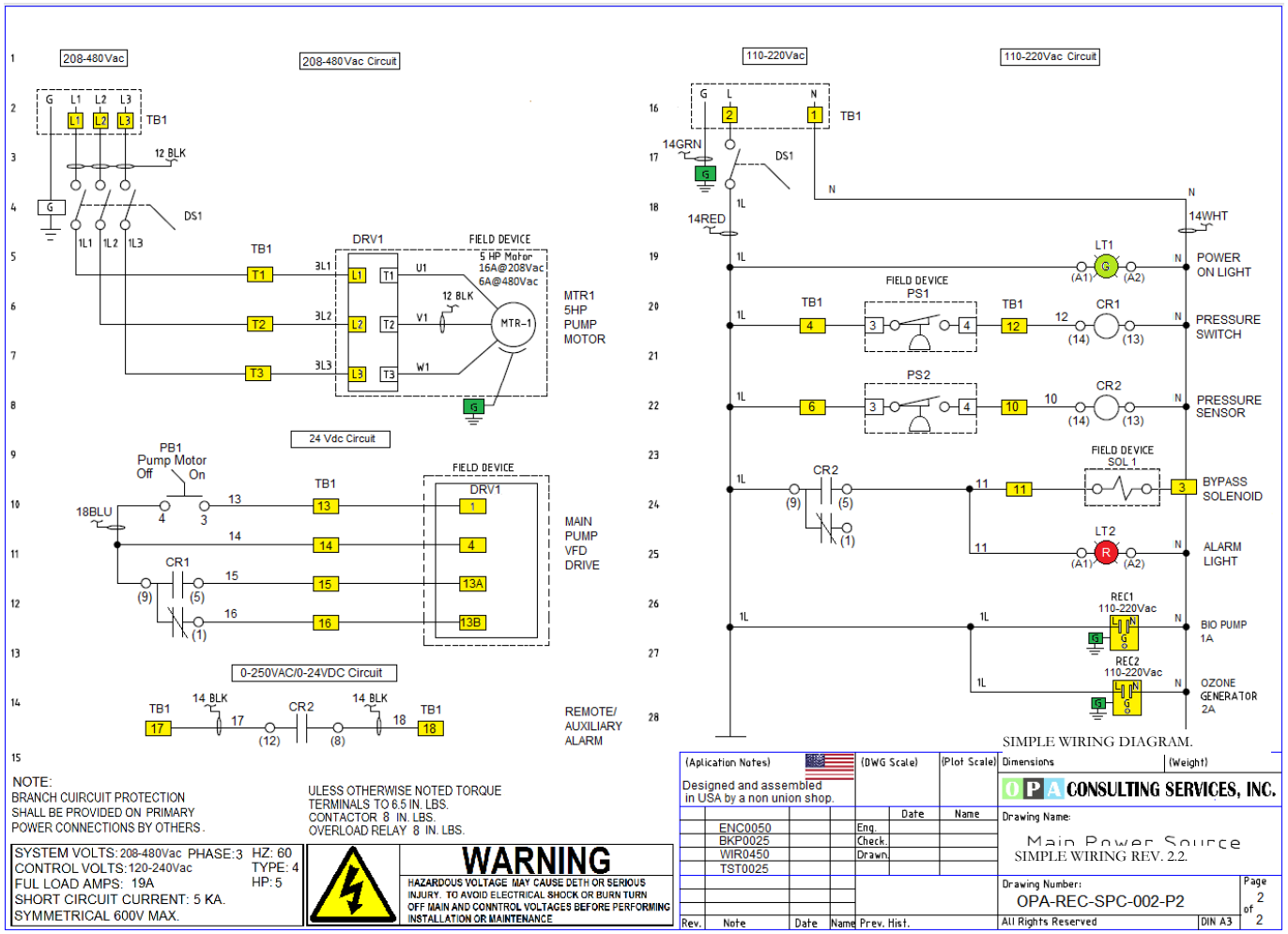


Aux. Electronics

OZONE GENERATOR AND OXYGEN CONCENTRAOTR 120VAC output is from waterproof outlet on OSHA switch main disconnect side. A splitter is required to run both from the same outlet. The outlet is fed through the main box disconnect above and should be wired to a 15 amp breaker from the equipment rooms electrical panel.
BLU-BIO pump is plugged into side waterproof outlet. Like the ozone and oxygen the bio outlets power is removed when the main disconnect is turned OFF.

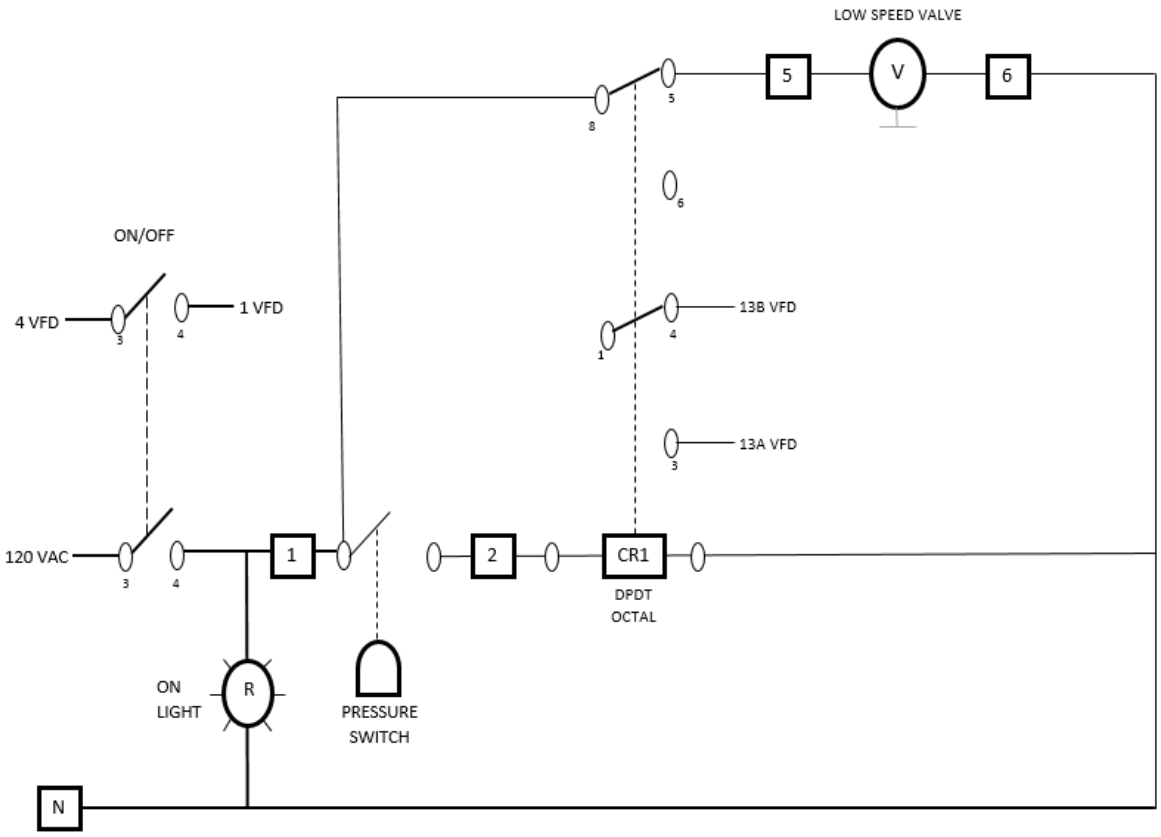
Installation Cont.

ELECTRICAL PANEL WIRING DIAGRAM (2019)



Installation Cont.

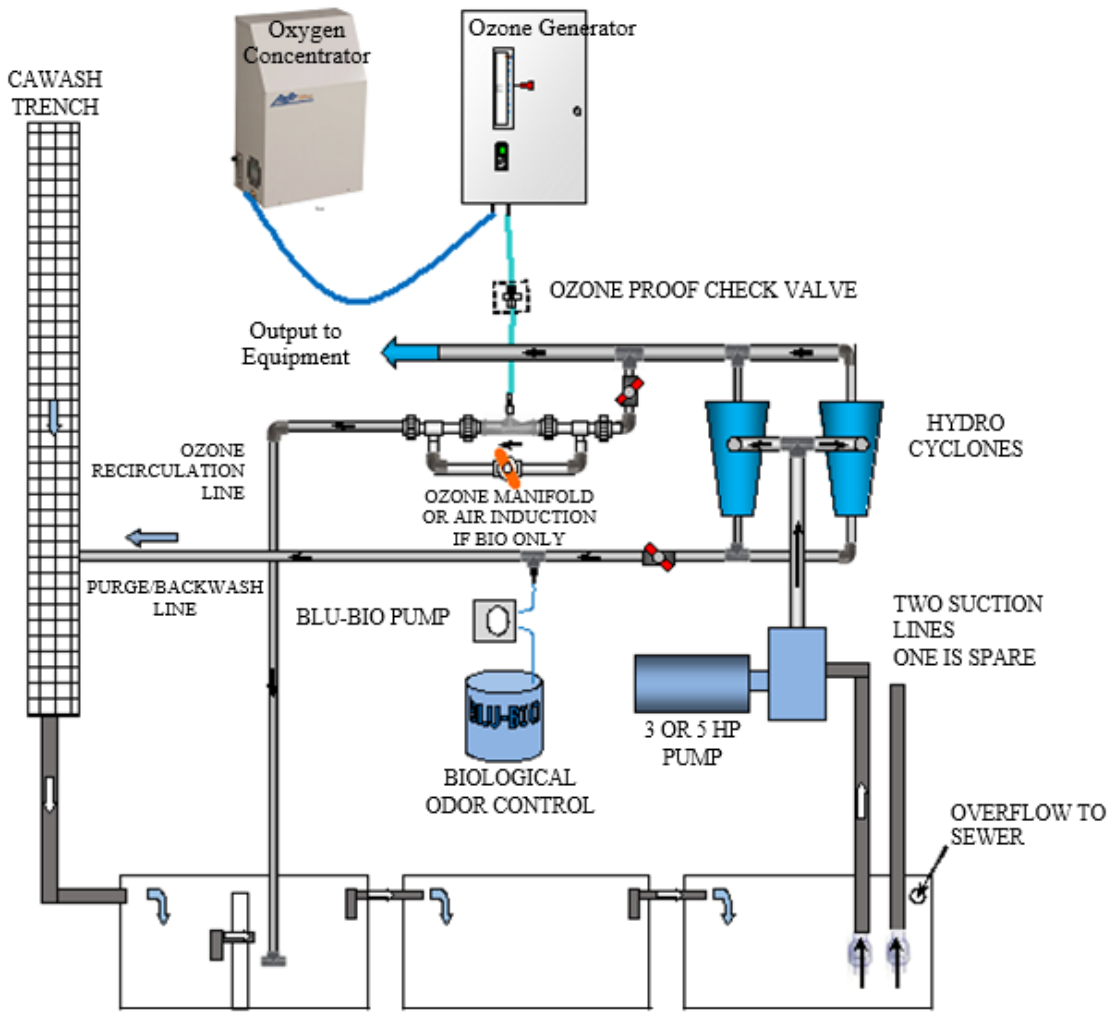
2017/ 2018 SYSTEM ELECTRICAL wiring (obsolete after 10/2018)



L1	N	G	1	2	G	3	4	G	5	6	G	13A	13B	1
120 VAC 1 PH INPUT			PRESSURE SWITCH			BIO			LOW SPEED VALVE			VFD CONTROL		

Installation Cont.

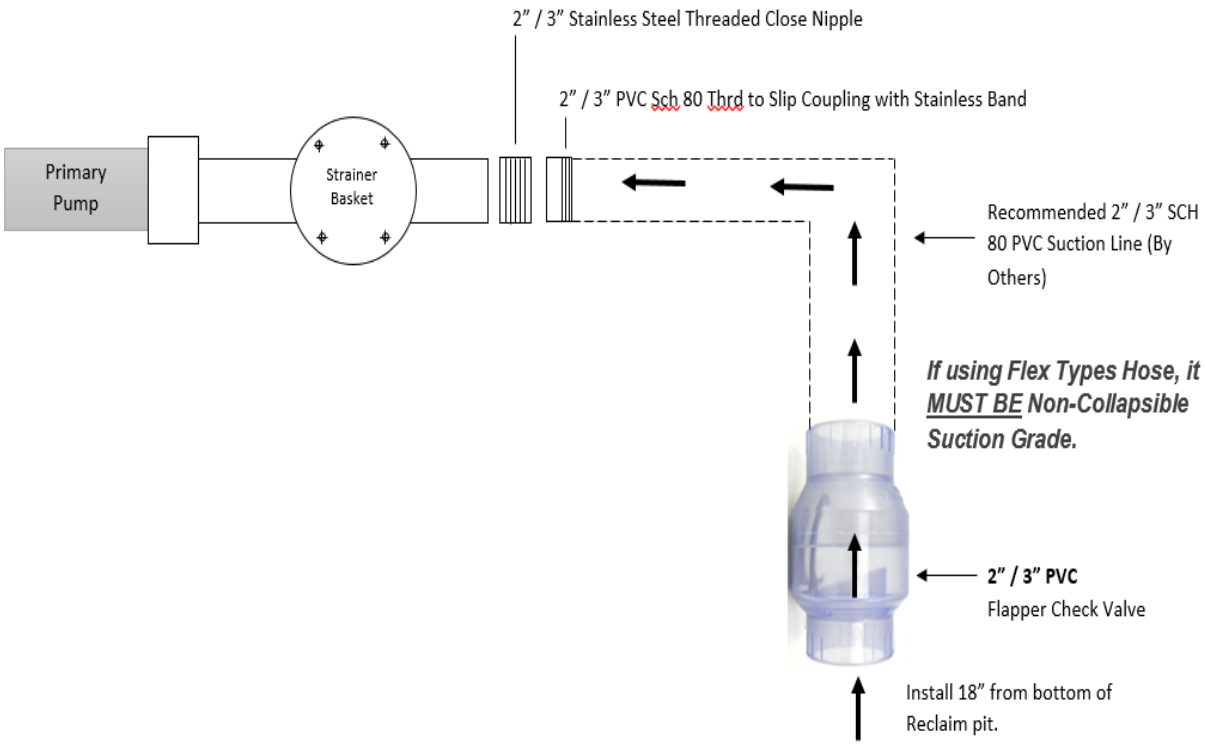
FLOW DIAGRAM



Installation Cont.

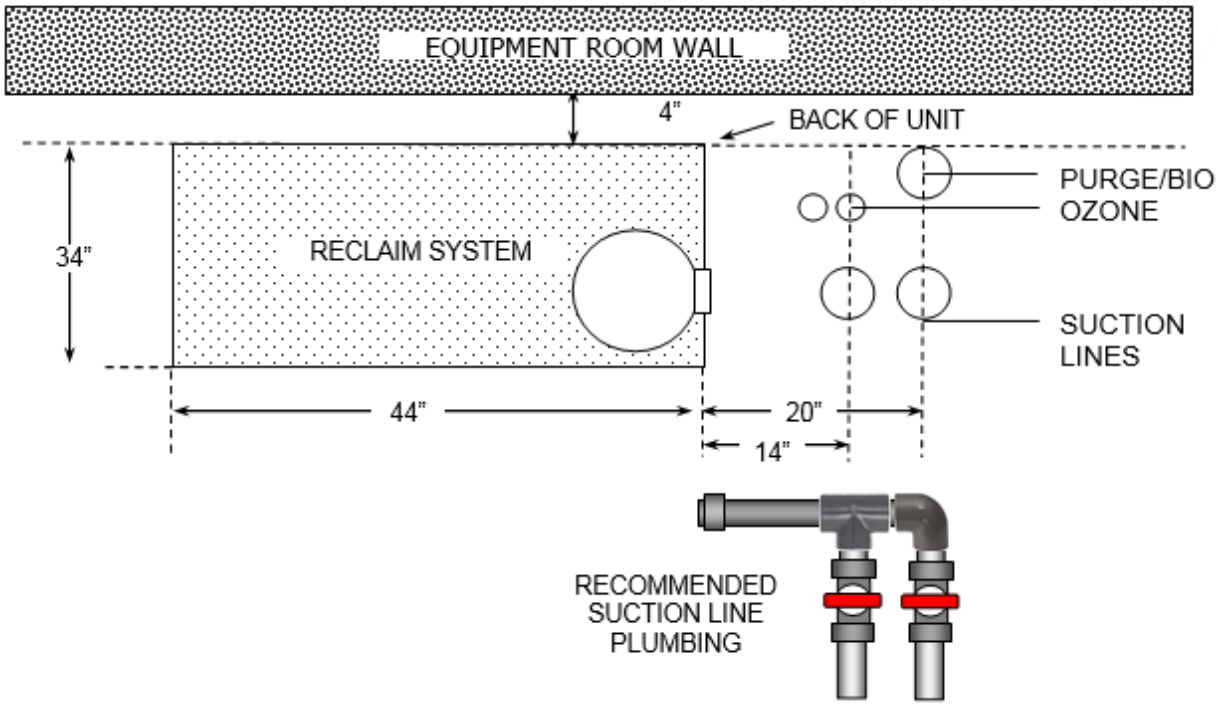
2”/3” SUCTION PACKAGE CONTENTS

(3” is recommended for Systems 5HP or Larger)



Installation Cont.

Stub-ups Drawings:



DIMENSIONS FROM CENTER OF PIPE

A. DISCHARGE LINE 3" PVC SCH 40 OR 80
   - 2" FROM BACK OF UNIT
   - Minimum discharge 2"

B. OZONE OR BIO LINE 1 ¼" PVC SCH 40 OR 80
   - 6" FROM BACK OF UNIT
   - INSTALL ONE SPARE

C. SUCTION LINE 3" **SCH 80 PVC**
   - 10" FROM BACK OF UNIT
   - Min. size 2" for 3 HP pump

D. SPARE SUCTION LINE 3" SCH 80 PVC
   - 14" FROM BACK OF UNIT

GENERAL NOTES:

1. RECLAIM SHOULD SIT FOUR INCHES FROM EQUIPMENT ROOM WALL
2. **DO NOT STUB-UP PIPES TIGHT TOGETHER OR AGAINST WALL**.
3. LEAVE ROOM FOR PLUMBING TO UNIT WE RECOMMEND MIN. 14"
4. USE SCH 80 CLEANER AND GRAY GLUE FOR SUCTIN LINES. CLEANER AND GLUE ON ALL OTHERS.
5. USE OF 45° FITTINGS INSTEAD OF ELBOWS ON SUCTION AND DISCHARGE LINES WILL IMPROVE PERFORMANCE.
6. HOSE CONNECTIONS OK FROM EQUIPMENT TO STUB UPS EXCEPT OZONE. SUCTION LINE HOSE MUST BE SUCTION RATED.
7. USE SPEARS SCH80 PVC UNION WITH VITON O-RING ON OZONE LINE, SPEARS PART # 8057-012
8. NO COPPER ON OZONE OR BIO LINE
9. RECLAIM WATER CONNECTION FROM RECLAIM TO USE, IS USUALLY A BARB FITTING AFTER A BALL VALVE, AND WALL MOUNT, NOT SHOWN.

Chapter 4

System operation:

SYSTEM OPERATION

Make sure all pumping and Electrical hook ups have been properly made.

1. Turn Pump Switch OFF and Turn on 3-phase Disconnect
2. Fill Coarse Strainer with water to prime and replace lid.
3. Turn Pump Switch to ON for no more than 30 seconds or until pressure is steady at 30-40PSI.
4. If Pump is not primed. Repeat steps 2-4 until Primed. (Open Hose bib on top of pump to release air in case of air lock)
5. In High Speed (60HZ), Set 1-1/2" Brass Filtered Water Outlet Valve to show 35-40PSI on Filtered Water Outlet gauge
6. In Low Speed Set 1" Gray PVC Ball Valve to ensure Suction Through MAZZIE
7. Clean Strainer Basket at least every 3 days, Re-prime and Restart System
8. If Prime Loss occurs, turn off Pump Switch, Open Strainer and Clean, Re-prime and restart system.
9. Place suction line from Stenner Peristaltic Pump directly into Container of BLU-BIO
10. Prime per STENNER Pump Manual.

TROUBLESHOOTING

-Vacuum Gauge on COARSE STRAINER – This gauge should read -2 to -7 depending on the length of the suction line. If it is lower, possible leak in suction line. If it is higher, possible clog.

-PRIME LOSS – If the system loses pressure due to lack of water, **TURN PUMP SWITCH OFF** and open strainer basket. If water level is below the suction inlet there is a leak on the suction side of the pump. Clean Strainer Basket and re-prime per instructions.

-PUMP SWICH ON NOT LIT – 115VAC is off. Check breaker/service. CAUTION: If 3-Phase is on, Pump will start with switch in ON position when power is restored. Turn Pump Switch to OFF to stop pump. Switch RED 3-PHASE DISCONNECT to OFF to turn off 3-Phase. Troubleshoot any faults per VFD Manual.

-Low inlet/outlet pressure – Pump is starving for water. Leak in suction line. Strainer basket needs cleaning. Pump impellor is clogged.

-High inlet pressure/ low outlet pressure – Hydrocyclone clogged or 1-1/2" PVC Ball valve on drain of hydrocyclones is open too far or Adjust pressure switch shut off by unscrewing nut on top of black spring until unit switches.

-Pump will not switch from LOW to High Speed – Wash is not using water. Pressure switch port is clogged, remove and clean. Pressure switch is broken or misadjusted.

Chapter 5 Maintenance:

SUPER-STRAINER

1. Monitor dirt load weekly
2. When basket dirty
    a. De-energize system power, turn off pump by pressing Pump Off on touch screen
    b. Shut off inlet ball valve to left of super-strainer.
    c. Remove lid and pull out internal stainless basket and dump out dirt.
    d. Wash clean and replace into super-strainer.
    e. Slowly open ball valve to allow super strainer to fill to 1" of top.
    f. Check O-ring on basket and replace lid.
    g. HAND TIGHTEN EYE BOLTS ! over tightening will crush the o-ring and cause leaks.
3. Periodically check the system pressure on gauges to insure they are within tolerance.
4. Periodically check for leaks on the plumbing system and repair as needed.

SYSTEM

1. Dirt will accumulate in the in-ground tank especially in section 1.
2. Periodically (twice a year nominally) have the dirty water pumped out of the tank by a pumping service.
3. Partially refill the in-ground tank with fresh water to restart the system.
4. Monitor ozone flow rates on ozone unit to make sure it's flowing at aprox. 5 Lpm.
5. Follow ozone and oxygen instructions provided separately.
6. Refill Bio as needed. Normal usage is 10 oz. per day. If the peristaltic pump will no longer pull, it probably requires a peristaltic hose replacement. These are inexpensive items fount online or from your rep.

Replace BLU-BIO as needed DO NOT RUN OUT OF BLU-BIO. A CONSTANT SUPPLY IS NECESSARY FOR SYSTEM TO WORK PROPERLY.

Chapter

6

BIO DOSING SET UP:

1. The dosing pump has been pre-set. Set pump dial to 20%. This will dose 11 ounces/day or 2.5 gallons/month. If it is a Stenner Econ T, it will have been preprogrammed for 11 ounces per day.
2. Hook up pump suction line and feed line per manual.
3. Place suction line from dosing pump straight into container of bio-treatment solution. The suction line should be 1" off the bottom of the container. No mixing is required.
4. Prime the pump per the dosing pump manual.

We suggest pouring one full jug into the underground tanks at startup of the system.

Chapter

7

Benefits of Using Ozone and Bio Together

Maximizing your returns

Ozone:

The use of ozone for water treatment has been well established and in use since 1893. It was discovered to be 10 times more effective than chlorine in the disinfection, decoloring and deodorization of water and it has the added benefit of being nontoxic and non-carcinogenic. By definition ozone (O3) is only three molecules of oxygen held together by an electrical charge. After treating the water, it quickly reverts back into oxygen (O2). In fact it only stays ozone in the water for a very short time. It is inherently unstable and quickly loses the extra electron that holds the molecule together. That is why we have to continually add ozone to our reclaim water in order to keep it fresh. **Before ozone** was introduced, **chlorine** in the form of bleach or swimming pool tablets was used to kill the odor of recycled water. This had the effect of killing the bacteria that naturally occur to eat up contaminates in the water. It also caused corrosion of equipment, changed water PH, was dangerous to handle and store and had to be purchased on a continual basis. ***Ozone has none of these negative side effects.***

Bioremediation:

Instead of killing the odor causing bacteria some innovative companies tried to encourage this biological activity, like they do in sewage treatment plants to treat the effluent water. Since 1962 Chemists and microbiologists have been working on patented strains of organisms that are designed to eat soaps and oil. The year 1989 and the Exxon Valdez oil spill accelerated the need to find micro-organisms that could not only eat up chemical wastes and oil but survive storage and shipping. Methods discovered in the 1990's allowed large colonies of these beneficial microbes to be stored in a deactivated state for years at a time. Today we utilize these highly effective strains to eliminate the build-up of soaps and oils in order to clean carwash water and remove odor causing contaminates. Bio remediation methods need lots of oxygen and they do not remove color. There was a myriad of products like bio tabs and septic tank blends that were designed to encourage this activity. Complex plumbing and tanking was needed as well as high levels of aeration to keep the bacteria alive. Once established these systems could work but were prone to calamity. They were in effect a pet that needed to be fed, and needed a stable environment to thrive. Changes in temperature, water PH, chemical use, or any alteration of their environment could cause a die off and odor.

Symbiosis of Ozone and Bio:

When 0zone is used to treat the recirculated tank water several amazing things happen. First the ozone easily removes the color from the water. Secondly the ozone kills all bacteria in the recirculation line which means the beneficial micro organisms in the reclaim tanks do not have to compete with other strains. Thirdly and most importantly the ozone quickly returns to oxygen which the good Bio, living in the tanks, need to survive and thrive. These things in unison provide better quality water and cleaner reclaim tanks and equipment. Another benefit, users discover, is their water storage tanks are cleaner without the soap-scum-ring associated with reclaimed water and their pre-filter screens are no longer fouled with coalesced soap and wax residue. Watch and see how these two formerly competing technologies now work together saving you money by saving water.

Chapter 8 Material Safety Data Sheets:

Blu-Bio MSDS

Section I – Product Information

Manufacturer's name:	Osprey Biotechnics
Emergency Telephone Number:	(800) 553-7785
Address:	1833-A 57th Street. Sarasota. Florida 34243
Common Name:	Bacterial Inoculant for wastewater treatment
Trade Name:	**BLU-BIO**
Microbial Formulation:	The product consists of naturally occurring microorganisms

Section II – Composition/Information on Hazardous Ingredients

Basic Material: Contains no hazardous substances

Section III – Hazard Identification

Emergency Overview:	Blue liquid, earthy scent
Potential health effects:	Acute eye: Considered a slight eye irritant
	Acute skin: Not considered to be irritating to the skin
	Acute ingestion: Low order toxicity. LD50 > 5.000 mg/Kg (oral, rat)
	Acute inhalation: Not an expected route of exposure
Chronic effects:	None known

Section IV – First Aid Measures

Emergency First Aid Procedures:

Eye Contact:	Flush eyes with sterile water until irritation subsides or stops. Contact a physician.
Skin Contact:	Wash with soap and water.
Inhalation:	Although not an acute hazard as tested in rats, chronic effects are unknown. Upon prolonged or repeated respiratory exposure, contact a physician.
Ingestion:	Low order of toxicity. Upon ingestion, induce vomiting and contact a physician.

Section V – Fire Fighting Measures

Flash Point (Method Used)	N.A.
Flammable Limits	LEL N.A. UEL N.A.
Extinguishing Media	N.A.
Special Fire Fighting Procedures	None
Unusual Fire and Explosion Hazard	N.A. in liquid state

Section VI – Accidental Release Measures

Steps to e taken in case material is released or spilled: No Hazard. Wash away with plenty of water.

Section VII – Handling and Storage

Store at room temperature. Protect from freezing.

Section VIII – Exposure Controls/Personal Protection

General Precautions	Treat as you would any chemical or biochemical material
	Wear protective water resistant gloves and safety glasses with side shields
Special Precautions	This product is not intended for human or animal consumption

Section IX – Physical and Chemical Properties

Boiling Point (°F)	212 (760mm Hg) (Approx.)
Specific Gravity	1.0 (Approx.)
Vapor Pressure (mm Hg)	24.00 (Approx.)
Percent Volatile by volume (%)	N.A.
Evaporation Rate	N.K.
Solubility in Water	Soluble
Appearance and Odor	Blue color/earthy scent

Section X – Stability and Reactivity Data

Stability	Stable
Incompatibility	N.K.
Hazardous Decomposition Products	This product does not undergo spontaneous decomposition. Typical combustion products are carbon, carbon dioxide, nitrogen, and water.
Hazardous Polymerization	Will not occur

Section XI – Toxicological Information

Toxicology

Acute Studies

- Rat oral LD50 is greater the 5g/Kg of body weight as evidenced by no observed mortality after rats were dosed with g/Kg at a concentration of 500 mg **Bio-Zone**/ml of water and a dose volume of 10 ml/Kg of body weight.
- Rabbit dermal LD50 is greater than 2g/Kg of body weight; as evidenced by no observed mortality after rabbits were exposed to test material applied to abraded and non-abraded occluded skin for 24 hours. No severe dermal effects were reported at the dose site
- Eye irritation in rabbits was reported as slight. Highest observed scored out of a possible score of 110 were: 1 hour: 12; 24 hours: 8; 48 hours: 4; 72 hours: 4; 4 days: 2; 7 days: 2; 10 days: 2; 14 days: 2
- Rat inhalation of test material at an average analytical exposure concentration of 1.2 mg/1 of Bio-Zone (nominal concentration of 37 mg/l) for 6 hours produced no mortality.

Chronic Health Hazards

- Although chronic studies using Bio-Zone are not available, inhalation of this product should be prevented due to unknown long-term effects.

Special Notes Not for human and animal consumption

Section XII – Ecological Information

Acute aquatic toxicity LC50 Fathead Minnows

Not toxic at 100%

Section XIII – Disposal Considerations

Waste Disposal Method Use normal liquid waste methods in conformance with pertinent federal, state, and local regulations.

Section XIV- Transportation Information

Proper Shipping Name: Not Regulated

Special Information: None

Section XV – Regulatory Information

Workplace classification: This product is considered non-hazardous under the OSHA Hazard Communication Standard

SARA Title 3: None

TSCA Status: Listed

RCRA classification: Unknown

CERCLA reportable quantity: None Listed

Section XVI – Other Information

Notice – The information given and the recommendations made herein apply to our product(s) alone and not in combination with any other product(s). Such information and recommendations are based on our research and on data from other reliable sources and are believed to be accurate by no guarantee of their accuracy is made. In every case we urge and recommend that purchasers before using any product make their own tests to verify this data under their operating conditions and to determine to their own satisfaction whether the product is suitable for their particular purposes.

THE PRODUCT(S) DISCUSSED HEREIN ARE SOLE WITHOUT ANY WARRANTY AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED.

Ozone MSDS

Effective Date: 06/01/13
Product: Ozone

Synonyms: Triatomic oxygen

CAS No: 10028-15-6

Molecular Weight: 48.0

Chemical Formula:O_3

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2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Ozone gas	10028-15-6	1 - 15	Yes

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3. Hazards Identification

Emergency Overview

Highly reactive, can react on contact with organic substances, especially strong reducing agents.

Ozone is a powerful oxidizing agent and oxidation with ozone evolves more heat and usually starts at a lower temperature than oxidation with oxygen. It reacts with non-saturated organic compounds to produce ozonides, which are unstable and may decompose with explosive violence. Ozone is an unstable gas which, at normal temperatures, decomposes to biatomic oxygen. At elevated temperatures and in the presence of certain catalysts such as hydrogen, iron, copper and chromium, this decomposition may be explosive.

Potential Health Effects

Inhalation: Causes dryness of the mouth, coughing, and irritates the nose, throat, and chest. May cause difficulty in breathing, headache, and fatigue. The characteristic sharp, irritating odor is readily detectable at low concentrations (0.01 to 0.05 ppm).

Skin: Absorption through intact skin is not expected.

Eye Contact: Ozone is an irritant to the eyes causing pain, lacrimation, and general inflammation.

Ingestion: Not a route of exposure.

Aggravation of Pre-existing Conditions: Ozone may increase sensitivity to bronchoconstrictors including allergens.

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4. First Aid Measures

Inhalation: Remove to fresh air; if breathing is difficult a trained person should administer oxygen. If respiration stops, give mouth-to-mouth resuscitation. Get medical attention.

Ingestion: Not an expected route of exposure.

Skin Contact: Wash skin thoroughly with soap and water.

Eye Contact: Immediately flush eyes with large amounts of water for at least 15 minutes, while forcibly holding eyelids apart to ensure flushing of the entire eye surface. If irritation, pain, or other symptoms persist seek medical attention.

Acute: May cause irritation of skin, eyes, and mucous membranes of the respiratory tract. Drowsiness, dizziness, headache, and fatigue have been associated with exposure.

Chronic: Long term health effects are not expected from exposures to ozone. A partial tolerance appears to develop with repeated exposures.

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5. Fire Fighting Measures

Flash Point: N/D

Auto Ignition Temperature: N/D

Flammable Limits in Air, % by Volume - Upper: N/D, **Lower:** N/D

Extinguishing Media: Use extinguishing media suitable for surrounding fires.

Unusual Fire and Explosion Hazard: None expected. Since ozone is highly unstable and decomposes under all conditions and is not encountered except at very small levels in the immediate vicinity where formed.

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6. Accidental Release Measures

1. Evacuate danger area.

2. Consult an expert.

3. Ventilation: If ozone is a liquid or solid, allow material to evaporate and provide sufficient ventilation to dilute and disperse small amounts into the outside atmosphere.

4. Dispose of waste in accordance with Federal, State, and local regulations. (Reportable quantity = 1 pound.)

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7. Handling and Storage

Unstable gas (liquid or solid phases are even more unstable).

Ozone should be contained within a chemically compatible piping system.

Ozone is a powerful oxidizing agent and oxidation with ozone evolves more heat and usually starts at a lower temperature than oxidation with oxygen. It reacts with non-saturated organic compounds to produce ozonides, which are unstable and may decompose with explosive violence. Ozone is an unstable gas which, at normal temperatures, decomposes to biatomic oxygen. At elevated temperatures and in the presence of certain catalysts such as hydrogen, iron, copper and chromium, this decomposition may be explosive.

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8. Exposure Controls/Personal Protection

Exposure Guidelines

OSHA PEL: 0.1 ppm PEL/TLV

Ventilation Requirements: General exhaust recommended. Avoid working with ozone generating equipment in enclosed spaces.

Specific Personal Protective Equipment

Respiratory: Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations.

Only appropriate respirators shall be provided and used when the use of respirators is the only means of controlling exposure for routine operations, or during an emergency. (Refer to Table 1 of ANSUI/ASTM E591-77 for appropriate respirator selection.)

Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.

Eye: Not necessary

Gloves: Not necessary

Other Clothing and Equipment: Not necessary.

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9. Physical and Chemical Properties

Appearance: Black particulate solid, pellet, or powder.

Specific Gravity (H_2O = 1): 2.144 g/L

Molecular Weight: 48.00

Boiling Point: -111.9°C

Melting Point: -192.7°C

Vapor Pressure: N/A

Evaporation Rate (BuAc = 1): N/A

Vapor Density (Air = 1): 1.7

Solubility in H_2O, % by Weight: 0.49

Appearance and Odor: Colorless to bluish gas with a characteristic pungent odor.

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10. Stability and Reactivity

Stability: Ozone spontaneously decomposes under all ordinary conditions, so that it is not encountered except in the immediate vicinity of where it was formed. The decomposition is speeded by solid surfaces and by many chemical substances.

Hazardous Decomposition Products: Reactive singlet oxygen.

Hazardous Polymerization: Will not occur.

Incompatibilities: Ozone is a powerful oxidizing agent and reacts with all oxidizable materials , both organic and inorganic. Some reactions are highly explosive. Alkenes, benzene and other aromatic compounds, rubber, dicyanogen, bromine diethyl ether, dinitrogen tetroxide, nitrogent trichloride, hydrogen bromide, and tetrafluorohydrazine.

Conditions to Avoid: Incompatibles.

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11. Toxicological Information

Ozone is extremely irritating to the upper and lower respiratory tract. The characteristic odor is readily detectable at low concentrations (0.02 ppm to 0.05 ppm). Ozone produces local irritation of the eyes and mucous membranes and may cause pulmonary edema at high exposure. Systematically, ozone has been reported to mimic the effects of ionizing radiation, and may cause damage to chromosomal structures. A partial tolerance appears to develop with repeated exposures. Although most effects are acute, the possibility of chronic lung impairment should be considered, based upon animal experimentation.

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12. Ecological Information

Environmental Fate: No information found.

Environmental Toxicity: No information found.

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13. Disposal Considerations

Do not dispose of ozone off gas to atmosphere without properly designed off gas destruct unit. State and local disposal regulations may differ from federal disposal regulations.

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14. Transport Information

Proper Shipping Name: N/A

Hazard Class: N/A

Identification Number: N/A

Packing Group: N/A

15. Regulatory Information

SARA TITLE III: N/A

TSCA: The ingredients of this product are on the TSCA Inventory List.

OSHA: Nonhazardous according to definitions of health hazard and physical hazard provided in the Hazard Communication Standard (29 CFR 1910.1200)

16. Other Information

Label Hazard Warning: HIGHLY REACTIVE. OZONE GAS AFFECTS THE RESPIRATORY SYSTEM.

Label Precautions: Keep away from heat, sparks and flame. Avoid contact with eyes, skin and clothing. Avoid breathing. Use with adequate ventilation.

Label First Aid: If inhaled, remove to fresh air. Get medical attention for any breathing difficulty.

Product Use: Laboratory Reagent.

Revision Information: Pure. New 16 section MSDS format, all sections have been revised.

Chapter 9

Warranty Information:

Limited Warranty:
A one year limited warranty is granted from the date of sale. This warranty includes defects in materials and workmanship only. If a problem arises from these causes please ship the unit back and we will repair or replace. If the units have been subjected to abuse or mishandling the warranty is void. If the unit has been opened without the written consent and authorization of RECLAIM Filters & Systems or an Authorized Agent the warranty is void.

There is no liability for any consequential, incidental or contingent damages whatsoever.

Disclaimer:
RECLAIM Filters and Systems provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. A properly trained person using this product intends this document only as a guide to the appropriate precautionary handling of the material. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. RECLAIM Filters and Systems, Inc. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, RECLAIM Filters and Systems, Inc. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

If the unit is repaired under warranty it is RECLAIM's responsibility to return the unit (via ground service) to the customer.

Normal shipping is FedEx Ground. Expedited shipping is available at the owner's expense.

Repairs and Warranty Claim return address:
RECLAIM Filters & Systems Inc.
1129 Hidden Hills Dr.
Wake Forest, NC 27587
(919) 528-1787