

**Lee County Board Of County Commissioners
Agenda Item Summary**

Blue Sheet No. 20020931

1. REQUESTED MOTION:

ACTION REQUESTED: Approve Bid Waiver # W-020625 to waive formal quotation procedure and allow the Public Works Department (Utilities) to purchase two odor control systems from Biocube, Inc. for Master Pumping Stations 481 and 482. The Odor Control system w/carbon Std sys E for Master Pumping Station 481 will cost \$68,050.00 and the Odor Control system w/carbon Std sys D for Master Pumping Station 482 will cost \$55,613.00 which brings the total for this bid waiver to \$123,663.00. A bid waiver has been requested because Biocube, Inc. is the sole source provider for this equipment. Funding will come from the individual departments budget and they will be responsible for monitoring their own expenditures.

WHY ACTION IS NECESSARY: According to Section 9.4.1 of the Lee County Purchasing and Payment Procedures Manual, approved by the Board on 3/21/00, purchases over \$50,000.00 must be approved by the Board.

WHAT ACTION ACCOMPLISHES: To provide effective odor control to the two designated Master Pumping Stations 481 and 482.

**2. DEPARTMENTAL CATEGORY: 10
COMMISSION DISTRICT #**

A10A

3. MEETING DATE:

09-03-2002

4. AGENDA:

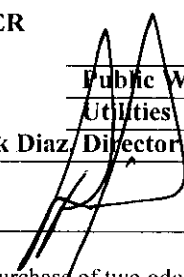
- CONSENT
- ADMINISTRATIVE
- APPEALS
- PUBLIC
- WALK ON
- TIME REQUIRED:

**5. REQUIREMENT/PURPOSE:
(Specify)**

- STATUTE
- ORDINANCE
- ADMIN. CODE *AC-4-1*
- OTHER

6. REQUESTOR OF INFORMATION:

- A. COMMISSIONER
- B. DEPARTMENT *Public Works*
- C. DIVISION *Utilities*
- BY: *Rick Diaz Director*



8/14/02

7. BACKGROUND:

On July 5, 2002, the Division of Purchasing received a request from Lee County Utilities for a bid waiver for the purchase of two odor control systems from Biocube, Inc. for Master Pumping Stations 481 and 482, inclusive of delivery, installation and start up services. Biocube is the sole source for the purchase of these patented designed biofiltration systems (US Patents #5,595,910 and #5,656,494). Purchasing has verified that Biocube, Inc is the sole provider for the above-mentioned patented systems.

Account String: 20722748730.506410

- ATTACHMENTS: (1) Division request for a Bid Waiver
(2) Biocube, Inc. Quotes
(3) Sole source letter from Biocube, Inc

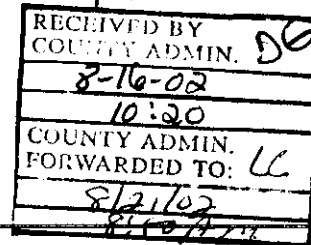
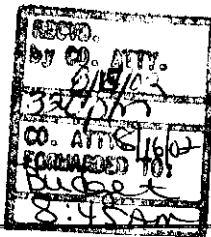
8. MANAGEMENT RECOMMENDATIONS:

9. RECOMMENDED APPROVAL:

A Department Director	B Purchasing or Contracts	C Human Resources	D Other	E County Attorney	F Budget Services			G County Manager	
<i>Dumler 8-15-02</i>	<i>(Utilities) (Public Works) 8-13-02</i> <i>8-13-02</i>	<i>N/A</i>		<i>[Signature]</i> <i>8/15/02</i>	<i>OA</i> <i>8-14-02</i>	<i>OM</i> <i>8/19/02</i>	<i>Risk</i> <i>8/20/02</i>	<i>GC</i> <i>8/19/02</i>	<i>Dumler 8-15-02</i>

10. COMMISSION ACTION:

- APPROVED
- DENIED
- DEFERRED
- OTHER





Lee County
SOUTHWEST FLORIDA

INTEROFFICE MEMORANDUM FROM PUBLIC WORKS UTILITIES

Date: July 05, 2002

To: Chris Jeffcoat
Purchasing

From: Orlando Figueroa
Fiscal Manager

02 JUL 05 AM 8:24
Orlando Figueroa

SUBJECT: Biocube, Inc. – Blue Sheet Waiver for Odor Control Systems

We have exceeded \$30,000 in expenditures with Biocube, Inc. for the purchase of Biocube media replacement parts, Biofilter odor control system parts, and lift station blowers. We are presently experiencing odor control problems with sewage pumping stations 481 and 482 and seriously need to install these Biocube systems.

The units are needed to reduce and control the amount of Hydrogen Sulfide inside these lift stations, to prolong the life of their motor control centers and other components. High concentrations of this gas will corrode metal parts and damage the equipment. The units will provide a safe environment, free of deadly Hydrogen Sulfide gas, for Lee County Utilities employees and citizens in the vicinity of the stations.

It is important for LCU to obtain these units from Biocube because:

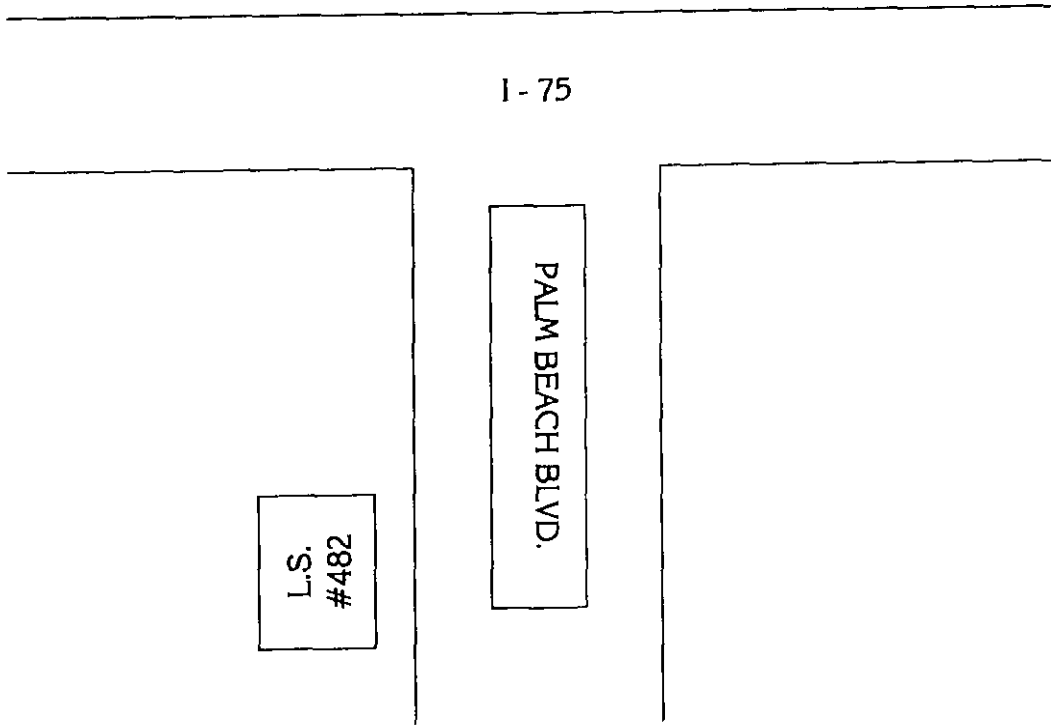
- their product meets all our specifications,
- we have used their products throughout our facilities with great success, and they have proven their reliability,
- their services have been prompt and very professional,

The account string to charge for these odor control systems will be **20722748730.506410**.

Thanks for your time and consideration in this matter. If you have additional questions or concerns, please feel free to contact us at Lee County Utilities.

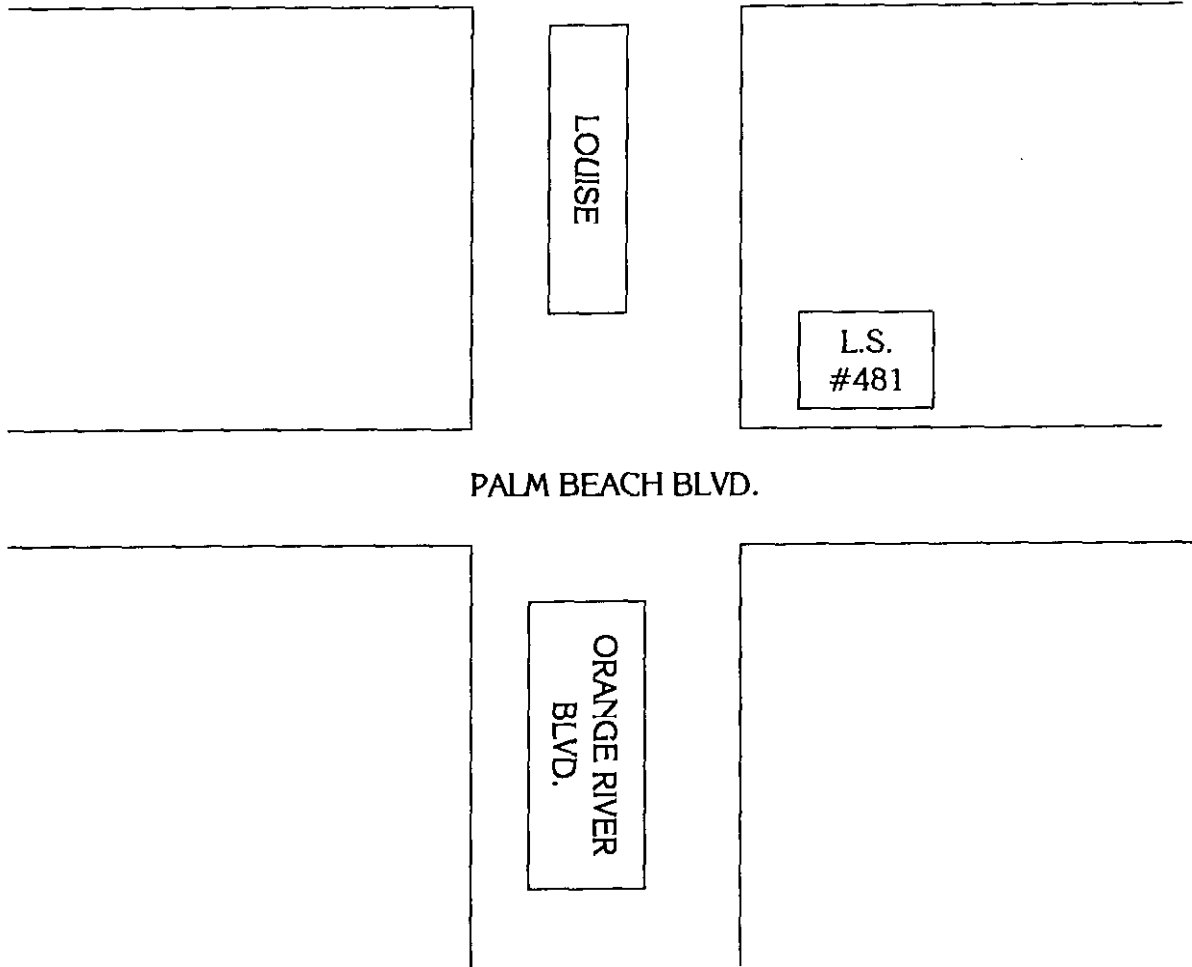
02 JUL 05 AM 8:24

LIFT STATION #482
PALM BEACH BLVD.

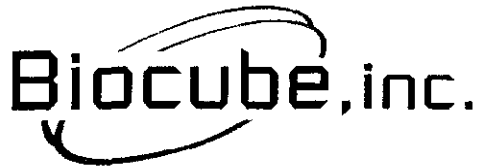


PALM BEACH BLVD., EAST LIFT STATION RIGHT SIDE OF ROAD INSIDE CHAIN
LINK FENCED AREA

LIFT STATION #481
LOUISE & PALM BEACH BLVD.



PALM BEACH BLVD, EAST, LEFT ON LOUISE STREET, LIFT STATION CORNER
OF PALM BEACH BLVD., & LOUISE STREET



100 Rawson Road, Suite 230
Victor, NY 14564
Phone: (716) 924-2220
Fax: (716) 924-8280
E-mail: rjck@biocube.com

Scope of Supply: Biocube™ Odor Control System for Lee County LS 481, Rev

A

The Biocube™ System consists of the following components:

1. 4 Biocube™ Pentpack Biofilters;
2. 1 MIB Moisture Integrator;
3. 1 MS Moisture Separator;
4. 1 Centifugal Blower with flow control valve;
5. 1 electrical control panel.

Included Accessories:

1 - 3/4" autoflush solenoid valve with timer, 4 - 4" PVC butterfly valves, 1 – 400# carbon polishing drum with 6" flanged connections.

Biocube™ Biofilter

The Biocube™ Biofilter is a modular biofilter formed by stacking several interlocking trays filled with a proprietary, biological, odor-metabolizing media. The Biocube™ Pentpack consists of Five media filled trays with one empty inverted tray acting as a lid. Each tray 72" in diameter and 13.5" high and is capable of holding approximately 20 ft³ of media. Molded from gray, UV stabilized, High Density Polyethylene (HDPE), the trays have a structural center post and a combination of concentric and radial ribs for maximum strength and rigidity. The tray sides have a corrugated outer wall for structural support and a smooth inner wall to prevent channeling. The hollow area between walls is filled with structural polyurethane foam to provide added support and a minimum of R30 insulation. The top tray has a 4" female NPT inlet connection and the bottom tray has a 4" female NPT outlet connection. The biofilter has an overall dimension of 72"W X 72"L X 82"H, and weighs approximately 4,000 lbs. Units are shipped on pressure treated wood skids and can be removed and mounted on a concrete slab.

MIB Moisture Integrator Bubbler

The MIB uses the same trays as the Biocube™ Biofilter to provide optimum biological moisture content and temperature for the biofiltration process. The MIB consists of three trays, two stacked and one inverted on top. The bottom tray serves to hold a reservoir of humidification water, and it contains an electric immersion heater that maintains a constant temperature for the entire biofiltration process. The water level is maintained within an acceptable range through an easy to maintain, externally mounted, float valve connected to the MIB with a flexible

connection. A clean water supply is required to feed the MIB. Water usage is typically less than 1 GPH / 50 CFM. The air stream enters the center tray through an 8" slip connection and diffuses through a shallow layer of water. Humidity and heat are transferred to odorous air stream through intimate contact between the air bubbles and the heated water. Air exits the top tray through an 8" slip connection. Also included in the MIB are a low-level float switch, overflow drain with check valve, and a bottom drain. The MIB/MS has an overall dimension of 72"W X 72"L X 70"H (with the moisture separator), and weighs approximately 800 lbs.

MS Moisture Separator

The MS consist of a vessel formed by two trays that are normally installed as an assembly below the MIB. The moisture separator removes condensate and excess moisture from the process stream after treatment in the Biofilter(s). It protects the blower from damage by water ingestion. A high-level float switch triggers the drain cycle through the control panel. Water collected in the moisture separator is automatically drained back to the wet well. A sight tube allows for visual inspection of the water level.

Centrifugal Fan

A Centifugal Fan, Hartzell Fan, Model 07T-171 will provide the motive force to pull air from the lift station and through the entire system. The blower has a rated capacity of 400 SCFM, draws a vacuum of 25 inches of water, and is powered by a 5 HP TEFC Mill Chem. duty motor. The blower is constructed of Stainless Steel. An aluminum impeller and 316 SS hardware are provided for added corrosion resistance. A throttling valve is also included to control the system flow rate.

Electrical Control Panel

A NEMA 4X, 316 SS, water-tight, dust-tight, corrosion-resistant control panel will be provided. The panel will provide branch circuit protection and controls for the blower, MIB and MS. Red pilot light alarm indicators are provided for high and low water fault conditions. A Hand/ Off/ Auto switch is provided with a green run pilot light indicator for blower operation. An On/Off switch with green pilot light indicator is provided for heater operation. A main, through-the-door, disconnect and security lock out are included. A dedicated 480V, 30 A, 3Ø feed is required. The panel conforms to all applicable UL standards and carries the UL label.

Piping

All piping within the outline of the slab is to be provided and installed by Biocube, Inc. in accordance with the installation drawings. All air piping is Schedule 80 PVC. Feed water and drain piping for the MIB/MS is 3/4", Schedule 40/80 PVC. All piping will be supported to prevent excessive stress on the system ports.

Wiring

All wiring (except main power supply to our control panel) external to the Biocube control panel is to be provided and installed by Biocube, Inc. This will entail wiring the electrical service, the blower, the heating element, the high-level float switch, and the low level float switch to the control panel. All wiring will be done in accordance with acceptable standards as well as all applicable code requirements and regulations.

Concrete Slab

A ~40' long x 9' wide x 8" thick reinforced concrete slab will be provided by Biocube, Inc. Any modifications to the site, other than leveling or grading, will be the responsibility of others and is not covered by this quote.

Inspection, Start-up, and Operator Training

A representative from the Biocube, Inc. shall be present to perform the required inspection, start-up, and operator training services for the system. Operator training will be scheduled immediately following the installation and start up of the system. If the owner is not present immediately following start-up, Biocube will charge an additional fee to provide operator training at a later time.

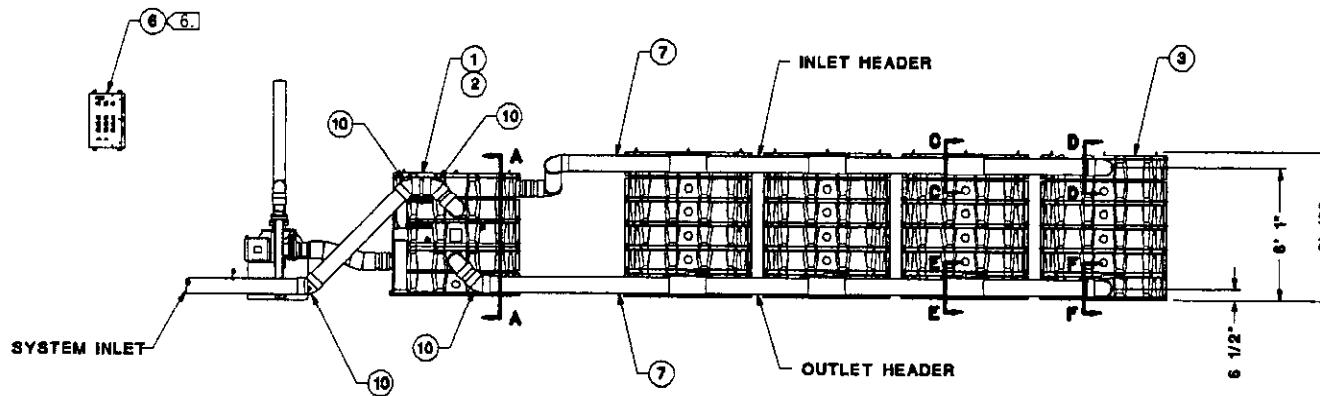
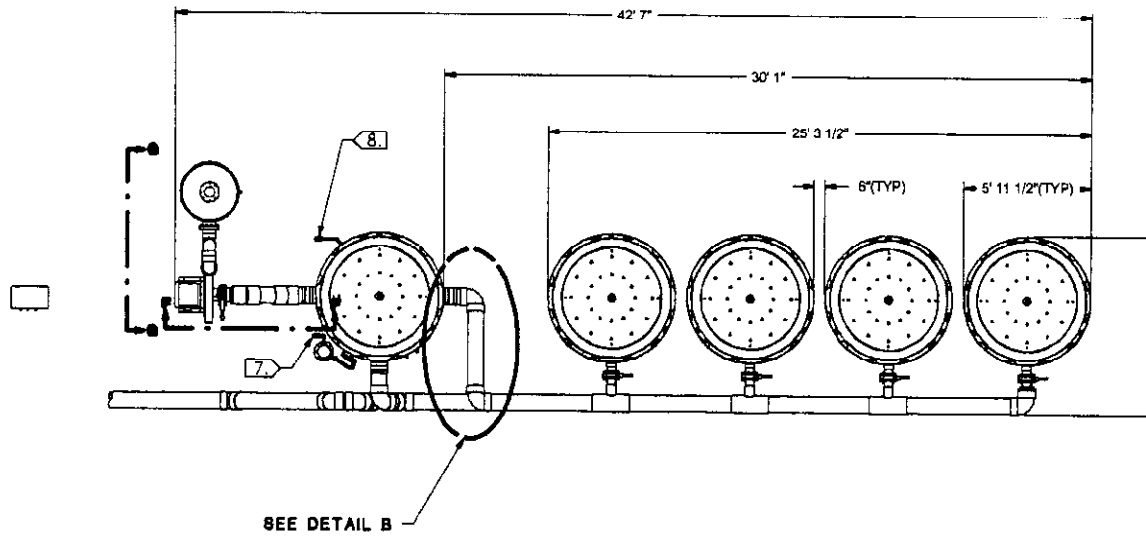
Testing

After all equipment has been completely installed according to the direction of Biocube and conducted in the presence of the Owner, tests shall be performed to indicate that the System operates satisfactorily and will meet the design criteria set forth in Section 1.03 B of the Specification. A bio-acclimation period of 2-4 weeks will be allowed. Visual inspection will be made at this time for any discrepancies, which shall be corrected. The field test shall demonstrate correct mechanical operation after system start-up. Field tests shall include all equipment included under this section.

NO.	REVISION	DATE	BY
X	X	X	X

NOTES:

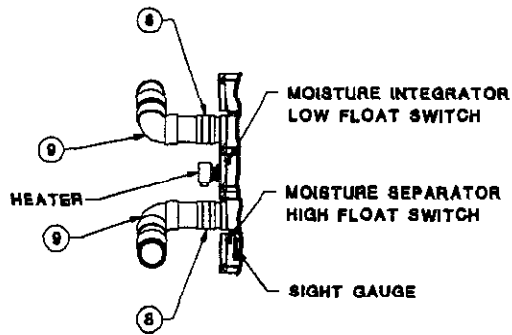
1. PIPE SUPPORTS RECOMMENDED, BUT NOT SHOWN.
2. ALL PROCESS STREAM PIPING TO BE WRAPPED IN INSULATION IF EXPOSED TO FREEZING TEMPERATURES.
3. ALL WATER AND DRAIN PIPING TO BE WRAPPED IN HEAT TRACE IF EXPOSED TO FREEZING TEMPERATURES.
4. PIPE, PIPE FITTINGS, PIPE SUPPORTS, HEAT TRACE, ELECTRICAL CONDUIT AND ELECTRICAL WIRE TO BE SUPPLIED BY OWNER/CONTRACTOR.
5. ALL PIPE AND PIPE FITTINGS TO BE SCHEDULE 80 PVC, UNLESS OTHERWISE NOTED.
6. PANEL SHOULD BE MOUNTED ON A SMOOTH, FLAT SURFACE.
APPROXIMATE PANEL WEIGHT: 90 LBS.
7. MOISTURE INTEGRATOR OVERFLOW LOCATION.
1" NPT - FEMALE CONNECTION.
8. MOISTURE SEPARATOR DRAIN LOCATION.
3/4" NPT - FEMALE CONNECTION.
9. SYSTEM WATER CONNECTION LOCATION.
3/4" NPT - FEMALE CONNECTION.



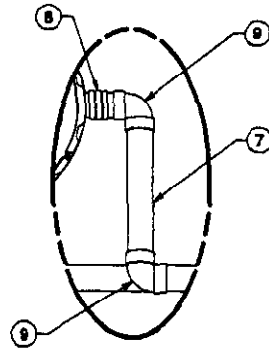
24	9	4" FLANGE	
23	8	4" MALE ADAPTER	
22	4	4" BUTTERFLY VALVE	
21	4	4" FLEXIBLE COUPLING	
20	A/R	4" PIPE	
19	2	6" X 4" REDUCING BUSHING	
18	3	6" FLANGE	
17	1	6" BUTTERFLY VALVE	
16	A/R	6" PIPE	
15	6	8" X 4" REDUCING TEE	
14	1	8" X 4" REDUCING COUPLING	
13	3	8" X 6" REDUCING BUSHING	
12	3	6" 90° ELL	
11	2	8" 15° ELL	
10	4	8" 45° ELL	
9	6	5" 90° ELL	
8	4	8" FLEXIBLE COUPLING	
7	A/R	8" PIPE	
6	1	CONTROL PANEL	NEMA 4X
5	1	CARBON UNIT	N400-XP
4	1	BLOWER	316 SS
3	4	BIOFILTER	PENTPACK
2	1	MOISTURE SEPARATOR	BOTTOM
1	1	MOISTURE INTEGRATOR	TOP
		ITEM QTY. DESCRIPTION	REMARKS

Blacube, Inc.	DRAWN BY: RWH	SYSTEM E WITH CARBON POLISH		DWG NO:
	DATE: 6/16/01	SCALE: 1/80	SHEET 1 OF 4	8Y8E

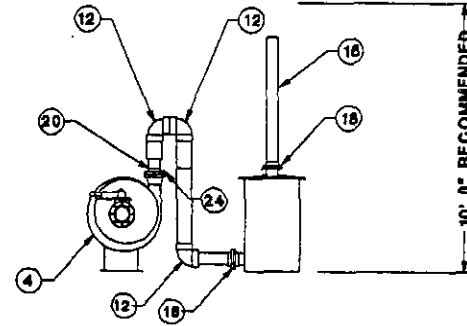
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X	X	X	X



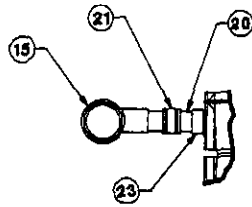
VIEW A-A
SCALE: 1/30
MOISTURE INTEGRATOR
AND MOISTURE SEPARATOR
INLET CONNECTIONS



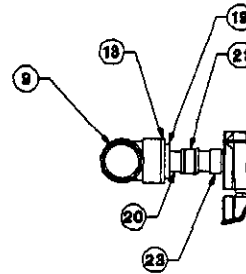
DETAIL B
SCALE: 1/30
MOISTURE INTEGRATOR
OUTLET CONNECTION



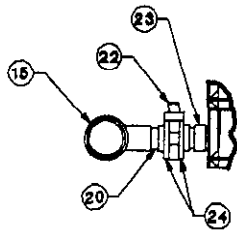
VIEW H-H
SCALE: 1/40
BLOWER TO
CARBON VESSEL
CONNECTION



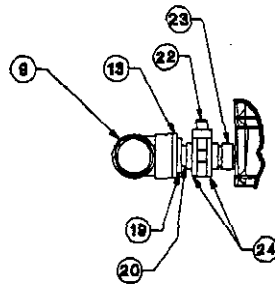
VIEW C-C
SCALE: 1/20
BIOFILTER INLET
CONNECTION
(4X)



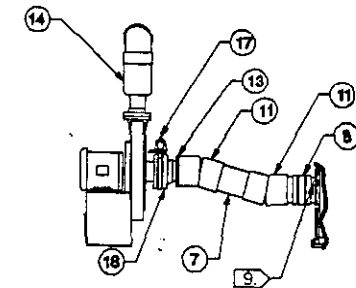
VIEW D-D
SCALE: 1/20
BIOFILTER END
STACK INLET
CONNECTION



VIEW E-E
SCALE: 1/20
BIOFILTER OUTLET
CONNECTION
(4X)



VIEW F-F
SCALE: 1/20
BIOFILTER END
STACK OUTLET
CONNECTION



VIEW G-G
SCALE: 1/30
MOISTURE SEPARATOR
TO BLOWER CONNECTION

Blocube, Inc.

DRAWN BY: RWH

DATE: 6/19/01

SYSTEM E WITH CARBON POLISH

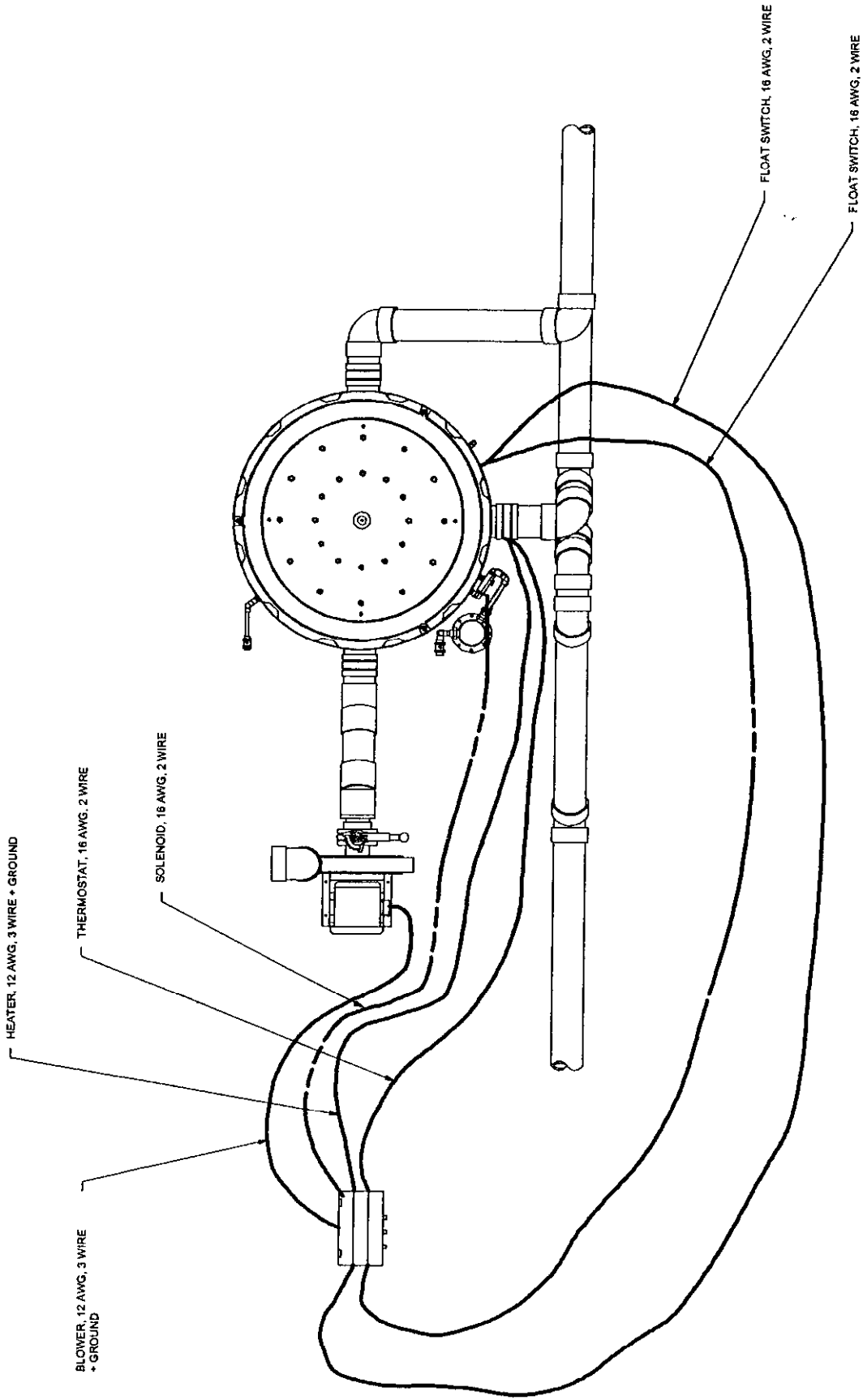
SCALE: 1/50

SHEET 2 OF 4

DWG NO:

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REV.	DATE	BY
X	X	X



ELECTRICAL LAYOUT
SCALE: 1/20



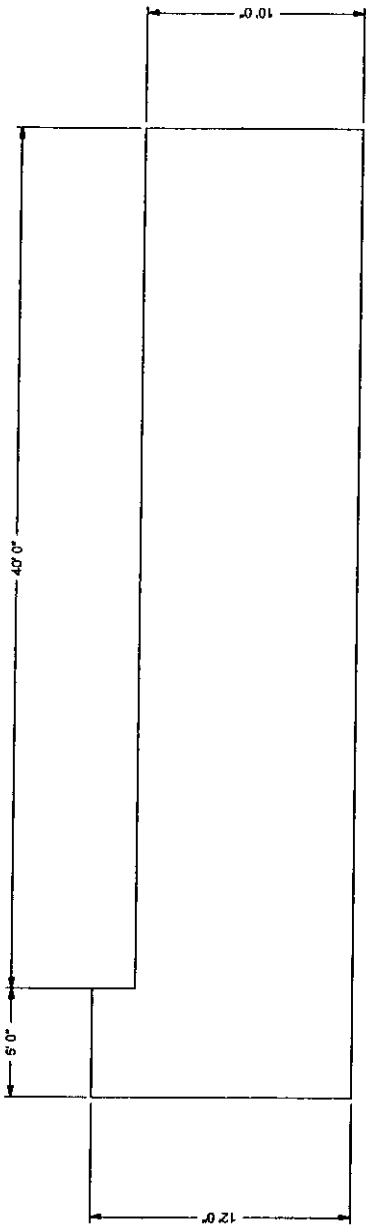
DRAWN BY: RWH
DATE: 6/18/01


SYSTEM E WITH CARBON POLISH
SCALE: 1/50

SHEET 3 OF 4

DWG NO: 8YSE

REV	DESCRIPTION	DATE	BY
X			X



	DRAWN BY: RWH	SYSTEM E WITH CARBON POLISH	DWG NO:
	DATE: 8/18/01	SCALE: 1/30	8Y8E
		SHEET 4 OF 4	

**PRE-ENGINEERED BIOFILTRATION
ODOR CONTROL SYSTEM**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish a pre-engineered Biofiltration System as hereinafter specified.
- B. These Specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment furnished. They are, however, intended to cover the furnishing and delivery and installation of all materials, equipment, and appurtenances for the complete Biofiltration System herein specified, whether specifically mentioned in these Specifications or not.
- C. The UTILITY is to purchase the pre-engineered, pre-manufactured Biofiltration System with installation to be provided by the MANUFACTURER.
- D. The UTILITY will provide the prepared installation site, main electrical service and connection to the MANUFACTURER'S control panel and ,main water supply and connection to the Moisture Integrator, and "protective fencing" (if "protective fencing" is required).

1.02 WARRANTY

- A. All equipment supplied under this Section of the Specifications shall be warranted for a period of one (1) year from date of shipment.
- B. The equipment shall be warranted to be free from defects in workmanship, design, and materials. If any part of the equipment should fail during the warranty period, it shall be covered under the terms of the MANUFACTURER'S standard warranty.

1.03 DESCRIPTION OF SYSTEM

- A. The MANUFACTURER shall furnish a complete, pre-engineered Biofiltration Odor Control System as manufactured by **Biocube, Inc.** or equivalent. The MANUFACTURER of the Biofilter shall be responsible for the design, process performance, and fabrication of the complete system within the limits specified herein. Site preparation shall be the responsibility of the UTILITY as described and as specified.
- B. The facility shall be designed in accordance with generally accepted criteria and shall meet all requirements of the State of Florida Department of Environmental Protection. The following minimum design parameters shall be incorporated into the MANUFACTURER'S design.

MINIMUM DESIGN CONDITIONS CRITERIA

1. Duty	-	Continuous
2. Ambient Environment	-	Outdoor
3. Ambient Temperature Range (degrees F.)	-	20° -120°
4. Ambient Relative Humidity %	-	10%-100%
5. Project Site Elevation (ft. MSL)	-	5 ft
6. Service	-	Odorous Air Containing Hydrogen Sulfide
7. Total Air Flow (acfm)	-	315 cfm
8. Average Influent H ₂ S Concentration (ppm)	-	30 ppm
9. Maximum Influent H ₂ S Concentration (ppm)	-	500 ppm
10. Required Effluent H ₂ S Concentration (ppm)	-	<1ppm
11. Reduced organic sulfides		<.25 ppm

1.04 QUALITY ASSURANCE

- A. To assure unity of responsibility, all equipment and material specified in this Section of the Specifications shall be furnished and coordinated by the Biofilter MANUFACTURER.

The Biofilter shall be of molded high density polyethylene construction to provide quality controlled trays with predictable joint locations. The MANUFACTURER shall be responsible for the design and fabrication of the Biofilter within the limits described herein. The MANUFACTURER shall show proof of a minimum of three (3) similar successful prior Biofiltration systems in operation in the State of Florida for no less than two (2) years; and warranties covering the Biofilter for one (1) year. Data on these three systems must reflect similar design air flows as shown under MINIMUM DESIGN CONDITIONS CRITERIA at a plus or minus 10% margin. Hydrogen sulfide loading for the three systems must also reflect proof of similar Maximum Influent H₂S levels as shown under MINIMUM DESIGN CONDITIONS CRITERIA at a plus or minus 10% margin. Required H₂S effluent records must show proof of constant discharge levels less than 1 ppm or 99.9% removal, whichever discharge level is less. Levels above 1 ppm will show non-compliance.

- A. All equipment furnished under this Specification shall be new and unused and shall be the standard product of manufacturers having a successful record of operation, manufacturing, and servicing similar equipment and systems.
- B. Systems designed for the treatment of lift station odor control using chemical masking, chemical scrubbing or chemical reaction will not be considered.
- C. The Biofiltration System shall be totally enclosed, climate controlled per the full and complete operating temperature range given in the MINIMUM DESIGN CONDITIONS CRITERIA and operate under vacuum with the blower downstream of the overall Biofiltration Treatment System. Non-enclosed systems, non-climate controlled systems, or systems operated under blower pressure in lieu of vacuum will not be considered.
- D. The Biofilter enclosures shall be constructed of high density polyethylene (HDPE). All material used shall be corrosion resistant and suitable for operation in a moist atmosphere containing hydrogen sulfide, sulfuric acid, and other corrosive compounds. Concrete vessels and vessels constructed using steel are not considered an equivalent.
- E. The MANUFACTURER shall be responsible for the structural and process integrity of the design; which must also be documented by a competent, registered professional ENGINEER. The MANUFACTURER shall provide initial gas sampling and laboratory testing for each proposed application to identify all odorous compounds and their respective levels. This shall be done at no cost to the OWNER. The test result are to be provided to

the OWNER as a part of the SUBMITTALS. Gas chromatography shall be the basis of the laboratory testing.

1.05 SUBMITTALS

- A. Copies of all materials required to establish compliance with the specifications shall be submitted to the CONTRACTOR. Submittals shall include at least the following:
1. Plan showing arrangement of treatment units and yard piping.
 2. Shop drawings including the following:
 - a) The performance and operating characteristics.
 - b) Complete detailed component list, listing the materials of construction used to make all parts or components of the biofiltration system.
 - c) Detailed physical drawings of the treatment units to include all external process piping connections and associated sizes.
 - d) Description and schematic diagrams of control systems to include overall filter wiring diagram and wire sizes.
 - e) Outline of operating and maintenance requirements.
 - f) Test results of at least 12-month's duration from similarly sized operating systems showing the influent and effluent levels of the unit per section 1.04 QUALITY ASSURANCE
 - g) A list of addresses and telephone numbers of owners of units using the proposed treatment arrangement and equipment for verification of experience, performance, operation, and maintenance considerations per section 1.04 QUALITY ASSURANCE.
 - h) All exceptions taken to the specifications shall be clearly identified.
 3. Certified shop and erection drawings showing all important details of construction, dimensions, and anchor bolt locations.
 4. Descriptive literature, bulletins, and/or catalogs of the equipment, including complete data.
 5. Data on the characteristics and performance of the blower. Data shall include guaranteed performance curves, based on actual shop tests of similar units, which show that they meet the specified requirements for pressure, capacity, efficiency, and horsepower. Curves shall be submitted on 8-1/2" x 11" sheets, at as large a scale as practical.
 6. Complete control schematics, including coordination with electrical control devices, wiring diagrams, and suitable outline drawings shall be furnished for approval before proceeding with manufacture.
 7. Complete motor data.

8. Copies of all factory test results, as specified in **PART 2 - PRODUCTS** of this Section of the Specifications.
-

- A. The submittal format shall be in the form of a booklet, suitably tabbed and divided to cover all areas noted above and for each major equipment item. The submittal booklet shall include adequate detail and sufficient information for the ENGINEER to determine that all of the equipment proposed meets the detailed requirements of the specifications. Incomplete or partial submittals will not be reviewed and shall be cause for rejection of that manufacturer's bid.

1.06 OPERATING INSTRUCTIONS

- A. Four (4) copies of an Operation Installation and Maintenance Manual shall be furnished. The Manual shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc., that are required to instruct operation and maintenance personnel unfamiliar with such equipment.
- B. A representative of the MANUFACTURER who has complete knowledge of proper operation and maintenance shall be provided to instruct representatives of the OWNER on proper operation and maintenance. This work may be conducted in conjunction with the inspection and the installation and test run as provided under **PART 3 - EXECUTION**. If there are difficulties in operation of the equipment due to the MANUFACTURER's design or fabrication, additional service shall be provided at no cost to the OWNER.

1.07 PRODUCT HANDLING

- A. All equipment items shall be properly protected so that no damage or deterioration will occur from the time of shipment until installation is completed and the units and equipment are ready for operation.
- B. Finished surfaces of all exposed blower and equipment openings shall be protected.
- C. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
- D. Proper care shall be taken to protect mechanical parts from the entrance of water during shipment, storage, and handling.
- E. Each box or package shall be properly marked to show its contents.

PART 2 - PRODUCTS

2.01 BIOCUBE™ AEROBIC BIOFILTER

The Biocube™ is a modular biofilter formed by stacking several interlocking trays filled with biologically active media. The typical Biocube™ Biofilter consists of five (5) active trays with one (1) inverted tray on top to act as a lid. Trays are approximately 6' in diameter and 14" high, are capable of holding 20 cubic feet of medium, and weigh 120 pounds empty. The trays have been designed for flow rates of between 10 and 200 SCFM. Molded from High Density Polyethylene (HDPE), each tray has an integral plenum, inlet port and outlet port (4" FNPT). The inlet port of the top tray is used for introduction of the MIB-conditioned process stream and the outlet port of the bottom tray is used as an exhaust to the Moisture Separator. Overall dimensions of the Biofilter skid are 72"W x 72"L x 82"H. Stainless steel tie rods and wing nuts shall be provided to hold the trays together.

2.02 MIB (MOISTURE INTEGRATOR BUBBLER)

The MIB uses the same trays as the Biocube™ to provide process stream humidification and temperature control prior to introduction to the Biocube™. The typical MIB consists of three (3) trays: two stacked and one inverted on top. The bottom tray serves as the reservoir for the Moisture Integration Chamber formed by the two trays above. The reservoir tray houses a thermostatically controlled heating element for control of moisture integration water temperature. A clean water supply is required to feed the MIB. Water usage is typically less than 1 gallon per 50 SCFM per hour. Overall dimensions of the MIB skid are 69"W x 72"L x 40"H. An automatic float valve system shall be provided for automated replenishing of the water reservoir. This shall also include an automated purging system to allow regular timed purging of the water with fresh water. A real time timer shall be provided in the control panel and shall be used to energize a non corrosive solenoid valve designed for use with acidic low pH liquids.

2.03 MOISTURE SEPARATOR

The Moisture Separator separates condensate and excess moisture from the process stream after treatment in the Biocube™. It protects the

blower from damage by water ingestion. Water collected in the Moisture Separator should be disposed of under normal O&M procedures. The Moisture Separator is normally mounted underneath the MIB.

2.04 CENTRIFUGAL BLOWER

A Stainless Steel Centrifugal Fan / Blower, Model 07T-181, will provide motive force to move air through the entire system. The blower weighs 200 pounds, has a capacity of 400 scfm, and a vacuum of 18 inches WG, and is powered by a 3.0 HP, TEFC, 230/460 VAC, 3ph motor. An adjustable throttling valve on the blower will be provided and be used to control the system flow rate. The blower requires a , three phase, 60 Hz, 230 VAC circuit breaker for start-up. 316 Stainless Steel discharge muffler is also included.

2.05 ELECTRICAL CONTROL PANEL

A stainless steel, NEMA 4X all-weather electrical control panel will be provided for wall mounting in a non-hazardous location. The panel will provide branch circuit protection and controls for the regenerative blower and MIB heater. Alarms are provided for high and low water fault conditions. A main disconnect and security lock out are standard features.

2.06 PROCESS STREAM PIPING

All process stream piping is to be Schedule 80 PVC, rated for temperatures to 160° F. Feed water and drain piping for the MMI are to be 3/4", Schedule 80 PVC. Piping shall be sized for minimal and negligible frictional losses and shall be provided by the MANUFACTURER. Provision of pipe supports are the responsibility of the MANUFACTURER.

2.07 SYSTEM WIRING

All wiring is to be provided by the MANUFACTURER with the exception of the main power supply and connection to the MANUFACTURER'S control panel which shall be provided by the UTILITY.

2.08 CARBON POLISHING UNIT

- A. For this application, the system shall require one (1) N400 XP vapor phase adsorber specifically designed and molded of high density

polyethylene. The highly corrosion resistant adsorber is specifically designed for use with Tigg virgin activated carbons. The adsorber is particularly useful for applications involving corrosive streams such as post treatment of air stripper exhaust or removal of hydrogen sulfide or other acid gasses.

EQUIPMENT SPECIFICATIONS SUMMARY

1.	Vessel Nomenclature:	N400XP
2.	Outer Diameter:	30.5 inches
3.	Straight Side:	52 inches
4.	Overall Height:	57 inches
5.	Design Temperature:	130° F
6.	Design Flow:	100 to 400 scfm
7.	Approximate Wall Thickness:	0.18 inches
8.	Vessel Material:	High Density Linear Polyethylene with Ultraviolet Inhibitor
9.	Lining:	Not Required (Corrosion Free)
10.	Vessel Construction:	Seamless
11.	Access:	30.5 inches (THD)
12.	Strength:	Resistance to Impact, Cold
13.	Inlet:	6 inches FLG
14.	Outlet:	6 inches FLG
15.	Carbon Type:	Tigg Type VIRGIN
16.	Carbon Fill:	400 pounds
17.	Pressure Drop:	< 6 inches
18.	Approximate Shipping Weight:	440 pounds

B. Granular Activated Carbon Description

I. Specifications:

a)	Substrate Virgin Activated Carbon	
	1) Iodine Number, mg/g, Minimum	1050

	2) Carbon Tetrachloride, wt.%, Minimum	60
	3) U.S. Sieve, 90 wt.%, Minimum	4 x 10
2.	Typical Physical Properties:	
	a) Bulk density:	
	1) g/cc	0.60
	2) lb./ft. ³	37.4
3.	Moisture (as packed), wt.%	15

PART 3 - EXECUTION

3.01 INSTALLATION

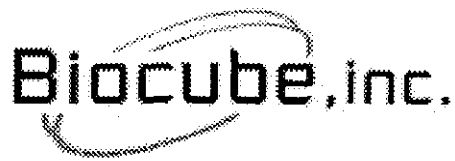
Installation by the MANUFACTURER of each equipment item shall be in strict accordance with the respective MANUFACTURER'S instructions and recommendations in the locations shown on the drawings.

3.02 INSPECTION, TESTING, AND START-UP

- A. A representative from the MANUFACTURER shall be present to perform the required Start-Up services of the system.
- B. After all equipment has been completely installed according to the direction of the MANUFACTURER, and conducted in the presence of the UTILITY, tests are necessary to indicate that the system operates satisfactorily and will meet the conditions of service specified. A bio-acclimation period of 2-4 weeks will be allowed. Visual inspection will be made at this time for any discrepancies which shall be corrected. The field test shall demonstrate correct mechanical operation after system Start-Up. Field tests shall include all equipment included under this Section.

- END OF SECTION -





100 Rawson Road, Suite 230
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Fax: (716) 924-8280
E-mail: rick@biocube.com

Scope of Supply: Biocube™ Odor Control System for Lee County LS 482

The Biocube™ System consists of the following components:

1. 3 Biocube™ Pentpack Biofilters;
2. 1 MIB Moisture Integrator;
3. 1 MS Moisture Separator;
4. 1 Centifugal Blower with flow control valve;
5. 1 NEMA 4X electrical control panel.

Included Accessories:

1 - 3/4" autoflush solenoid valve with timer, 3 - 4" PVC butterfly valves, 1 - 400# carbon polishing drum with 6" flanged connections.

Biocube™ Biofilter

The Biocube™ Biofilter is a modular biofilter formed by stacking several interlocking trays filled with a proprietary, biological, odor-metabolizing media. The Biocube™ Pentpack consists of Five media filled trays with one empty inverted tray acting as a lid. Each tray 72" in diameter and 13.5" high and is capable of holding approximately 20 ft³ of media. Molded from gray, UV stabilized, High Density Polyethylene (HDPE), the trays have a structural center post and a combination of concentric and radial ribs for maximum strength and rigidity. The tray sides have a corrugated outer wall for structural support and a smooth inner wall to prevent channeling. The hollow area between walls is filled with structural polyurethane foam to provide added support and a minimum of R30 insulation. The top tray has a 4" female NPT inlet connection and the bottom tray has a 4" female NPT outlet connection. The biofilter has an overall dimension of 72"W X 72"L X 82"H, and weighs approximately 4,000 lbs. Units are shipped on pressure treated wood skids and can be removed and mounted on a concrete slab.

MIB Moisture Integrator Bubbler

The MIB uses the same trays as the Biocube™ Biofilter to provide optimum biological moisture content and temperature for the biofiltration process. The MIB consists of three trays, two stacked and one inverted on top. The bottom tray serves to hold a reservoir of humidification water, and it contains an electric immersion heater that maintains a constant temperature for the entire biofiltration process. The water level is maintained within an acceptable range through an easy to maintain, externally mounted, float valve connected to the MIB with a flexible connection. A clean water supply is required to feed the MIB. Water usage is typically less than

1 GPH / 50 CFM. The air stream enters the center tray through an 6" slip connection and diffuses through a shallow layer of water. Humidity and heat are transferred to odorous air stream through intimate contact between the air bubbles and the heated water. Air exits the top tray through an 6" slip connection. Also included in the MIB are a low-level float switch, overflow drain with check valve, and a bottom drain. The MIB/MS has an overall dimension of 72"W X 72"L X 70"H (with the moisture separator), and weighs approximately 800 lbs.

MS Moisture Separator

The MS consist of a vessel formed by two trays that are normally installed as an assembly below the MIB. The moisture separator removes condensate and excess moisture from the process stream after treatment in the Biofilter(s). It protects the blower from damage by water ingestion. A high-level float switch triggers the drain cycle through the control panel. Water collected in the moisture separator is automatically drained back to the wet well. A sight tube allows for visual inspection of the water level.

Centrifugal Fan

A Centifugal Fan, Hartzell Fan, Model 07T-181 will provide the motive force to pull air from the lift station and through the entire system. The blower has a rated capacity of 315 SCFM, draws a vacuum of 21 inches of water, and is powered by a 3 HP TEFC Mill Chem. duty motor. The blower is constructed of Stainless Steel. An aluminum impeller and 316 SShardware are provided for added corrosion resistance. A throttling valve is also included to control the system flow rate.

Electrical Control Panel

A NEMA 4X, 316 SS, water-tight, dust-tight, corrosion-resistant control panel will be provided. The panel will provide branch circuit protection and controls for the blower, MIB and MS. Red pilot light alarm indicators are provided for high and low water fault conditions. A Hand/ Off/ Auto switch is provided with a green run pilot light indicator for blower operation. An On/Off switch with green pilot light indicator is provided for heater operation. A main, through-the-door, disconnect and security lock out are included. A dedicated 480V, 30 A, 3Ø feed is required. The panel conforms to all applicable UL standards and carries the UL label.

Piping

All piping within the outline of the slab is to be provided and installed by Biocube, Inc. in accordance with the installation drawings. All air piping is Schedule 80 PVC. Feed water and drain piping for the MIB/MS is 3/4", Schedule 40/80 PVC. All piping will be supported to prevent excessive stress on the system ports.

Wiring

All wiring (except main power supply to our control panel) external to the Biocube control panel is to be provided and installed by Biocube, Inc. This will entail wiring the electrical service, the blower, the heating element, the high-level float switch, and the low level float switch to the control panel. All wiring will be done in accordance with acceptable standards as well as all applicable code requirements and regulations.

Concrete Slab

A ~31' long x 8' wide x 6" thick reinforced concrete slab will be provided by Biocube, Inc. Any modifications to the site, other than leveling or grading, will be the responsibility of others and is not covered by this quote.

Inspection, Start-up, and Operator Training

A representative from the Biocube, Inc. shall be present to perform the required inspection, start-up, and operator training services for the system. Operator training will be scheduled immediately following the installation and start up of the system. If the owner is not present immediately following start-up, Biocube will charge an additional fee to provide operator training at a later time.

Testing

After all equipment has been completely installed according to the direction of Biocube and conducted in the presence of the Owner, tests shall be performed to indicate that the System operates satisfactorily and will meet the design criteria set forth in Section 1.03 B of the Specification. A bio-acclimation period of 2-4 weeks will be allowed. Visual inspection will be made at this time for any discrepancies, which shall be corrected. The field test shall demonstrate correct mechanical operation after system start-up. Field tests shall include all equipment included under this section.

**PRE-ENGINEERED BIOFILTRATION
ODOR CONTROL SYSTEM**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish a pre-engineered Biofiltration System as hereinafter specified.
- B. These Specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment furnished. They are, however, intended to cover the furnishing and delivery and installation of all materials, equipment, and appurtenances for the complete Biofiltration System herein specified, whether specifically mentioned in these Specifications or not.
- C. The UTILITY is to purchase the pre-engineered, pre-manufactured Biofiltration System with installation to be provided by the MANUFACTURER.
- D. The UTILITY will provide the prepared installation site, main electrical service and connection to the MANUFACTURER'S control panel and ,main water supply and connection to the Moisture Integrator, and "protective fencing" (if "protective fencing" is required).

1.02 WARRANTY

- A. All equipment supplied under this Section of the Specifications shall be warranted for a period of one (1) year from date of shipment.
- B. The equipment shall be warranted to be free from defects in workmanship, design, and materials. If any part of the equipment should fail during the warranty period, it shall be covered under the terms of the MANUFACTURER'S standard warranty.

1.03

DESCRIPTION OF SYSTEM

- A. The MANUFACTURER shall furnish a complete, pre-engineered Biofiltration Odor Control System as manufactured by **Biocube, Inc.** or equivalent. The MANUFACTURER of the Biofilter shall be responsible for the design, process performance, and fabrication of the complete system within the limits specified herein. Site preparation shall be the responsibility of the UTILITY as described and as specified.

- B. The facility shall be designed in accordance with generally accepted criteria and shall meet all requirements of the State of Florida Department of Environmental Protection. The following minimum design parameters shall be incorporated into the MANUFACTURER'S design.

MINIMUM DESIGN CONDITIONS CRITERIA

1. Duty	-	Continuous
2. Ambient Environment	-	Outdoor
3. Ambient Temperature Range (degrees F.)	-	20°-120°
4. Ambient Relative Humidity %	-	10%-100%
5. Project Site Elevation (ft. MSL)	-	5 ft
6. Service	-	Odorous Air Containing Hydrogen Sulfide
7. Total Air Flow (acfm)	-	315 cfm
8. Average Influent H ₂ S Concentration (ppm)	-	30 ppm
9. Maximum Influent H ₂ S Concentration (ppm)	-	300 ppm
10. Required Effluent H ₂ S Concentration (ppm)	-	<1ppm
11. Reduced organic sulfides		<.25 ppm

1.04

QUALITY ASSURANCE

- A. To assure unity of responsibility, all equipment and material specified in this Section of the Specifications shall be furnished and coordinated by the Biofilter MANUFACTURER.
- The Biofilter shall be of molded high density polyethylene construction to provide quality controlled trays with predictable joint locations. The MANUFACTURER shall be responsible for the design and fabrication of the Biofilter within the limits described herein. The MANUFACTURER shall show proof of a minimum of three (3) similar successful prior Biofiltration systems in operation in the State of Florida for no less than two (2) years; and warranties covering the Biofilter for one (1) year. Data on these three systems must reflect similar design air flows as shown under MINIMUM DESIGN CONDITIONS CRITERIA at a plus or minus 10% margin. Hydrogen sulfide loading for the three systems must also reflect proof of similar Maximum Influent H₂S levels as shown under MINIMUM DESIGN CONDITIONS CRITERIA at a plus or minus 10% margin. Required H₂S effluent records must show proof of constant discharge levels less than 1 ppm or 99.9% removal, whichever discharge level is less. Levels above 1 ppm will show non-compliance.
- A. All equipment furnished under this Specification shall be new and unused and shall be the standard product of manufacturers having a successful record of operation, manufacturing, and servicing similar equipment and systems.
- B. Systems designed for the treatment of lift station odor control using chemical masking, chemical scrubbing or chemical reaction will not be considered.
- C. The Biofiltration System shall be totally enclosed, climate controlled per the full and complete operating temperature range given in the MINIMUM DESIGN CONDITIONS CRITERIA and operate under vacuum with the blower downstream of the overall Biofiltration Treatment System. Non-enclosed systems, non-climate controlled systems, or systems operated under blower pressure in lieu of vacuum will not be considered.
- D. The Biofilter enclosures shall be constructed of high density polyethylene (HDPE). All material used shall be corrosion resistant and suitable for operation in a moist atmosphere containing hydrogen sulfide, sulfuric acid, and other corrosive compounds. Concrete vessels and vessels constructed using steel are not considered an equivalent.
- E. The MANUFACTURER shall be responsible for the structural and process integrity of the design; which must also be documented by a competent, registered professional ENGINEER. The MANUFACTURER shall provide initial gas sampling and laboratory testing for each proposed application to identify all odorous compounds and their respective levels. This shall be done at no cost to the OWNER. The test results are to be provided to

the OWNER as a part of the SUBMITTALS. Gas chromatography shall be the basis of the laboratory testing.

1.05 SUBMITTALS

- A. Copies of all materials required to establish compliance with the specifications shall be submitted to the CONTRACTOR. Submittals shall include at least the following:
1. Plan showing arrangement of treatment units and yard piping.
 2. Shop drawings including the following:
 - a) The performance and operating characteristics.
 - b) Complete detailed component list, listing the materials of construction used to make all parts or components of the biofiltration system.
 - c) Detailed physical drawings of the treatment units to include all external process piping connections and associated sizes.
 - d) Description and schematic diagrams of control systems to include overall filter wiring diagram and wire sizes.
 - e) Outline of operating and maintenance requirements.
 - f) Test results of at least 12-month's duration from similarly sized operating systems showing the influent and effluent levels of the unit per section 1.04 QUALITY ASSURANCE
 - g) A list of addresses and telephone numbers of owners of units using the proposed treatment arrangement and equipment for verification of experience, performance, operation, and maintenance considerations per section 1.04 QUALITY ASSURANCE.
 - h) All exceptions taken to the specifications shall be clearly identified.
 3. Certified shop and erection drawings showing all important details of construction, dimensions, and anchor bolt locations.
 4. Descriptive literature, bulletins, and/or catalogs of the equipment, including complete data.
 5. Data on the characteristics and performance of the blower. Data shall include guaranteed performance curves, based on actual shop tests of similar units, which show that they meet the specified requirements for pressure, capacity, efficiency, and horsepower. Curves shall be submitted on 8-1/2" x 11" sheets, at as large a scale as practical.
 6. Complete control schematics, including coordination with electrical control devices, wiring diagrams, and suitable outline drawings shall be furnished for approval before proceeding with manufacture.
 7. Complete motor data.

8. Copies of all factory test results, as specified in **PART 2 - PRODUCTS** of this Section of the Specifications.
-

- A. The submittal format shall be in the form of a booklet, suitably tabbed and divided to cover all areas noted above and for each major equipment item. The submittal booklet shall include adequate detail and sufficient information for the ENGINEER to determine that all of the equipment proposed meets the detailed requirements of the specifications. Incomplete or partial submittals will not be reviewed and shall be cause for rejection of that manufacturer's bid.

1.06 OPERATING INSTRUCTIONS

- A. Four (4) copies of an Operation Installation and Maintenance Manual shall be furnished. The Manual shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc., that are required to instruct operation and maintenance personnel unfamiliar with such equipment.
- B. A representative of the MANUFACTURER who has complete knowledge of proper operation and maintenance shall be provided to instruct representatives of the OWNER on proper operation and maintenance. This work may be conducted in conjunction with the inspection and the installation and test run as provided under **PART 3 - EXECUTION**. If there are difficulties in operation of the equipment due to the MANUFACTURER's design or fabrication, additional service shall be provided at no cost to the OWNER.

1.07 PRODUCT HANDLING

- A. All equipment items shall be properly protected so that no damage or deterioration will occur from the time of shipment until installation is completed and the units and equipment are ready for operation.
- B. Finished surfaces of all exposed blower and equipment openings shall be protected.
- C. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
- D. Proper care shall be taken to protect mechanical parts from the entrance of water during shipment, storage, and handling.
- E. Each box or package shall be properly marked to show its contents.

PART 2 - PRODUCTS

2.01 BIOCUBE™ AEROBIC BIOFILTER

The Biocube™ is a modular biofilter formed by stacking several interlocking trays filled with biologically active media. The typical Biocube™ Biofilter consists of five (5) active trays with one (1) inverted tray on top to act as a lid. Trays are approximately 6' in diameter and 14" high, are capable of holding 20 cubic feet of medium, and weigh 120 pounds empty. The trays have been designed for flow rates of between 10 and 200 SCFM. Molded from High Density Polyethylene (HDPE), each tray has an integral plenum, inlet port and outlet port (3" FNPT). The inlet port of the top tray is used for introduction of the MIB-conditioned process stream and the outlet port of the bottom tray is used as an exhaust to the Moisture Separator. Overall dimensions of the Biofilter skid are 72"W x 72"L x 82"H. Stainless steel tie rods and wing nuts shall be provided to hold the trays together.

2.02 MIB (MOISTURE INTEGRATOR BUBBLER)

The MIB uses the same trays as the Biocube™ to provide process stream humidification and temperature control prior to introduction to the Biocube™. The typical MIB consists of three (3) trays: two stacked and one inverted on top. The bottom tray serves as the reservoir for the Moisture Integration Chamber formed by the two trays above. The reservoir tray houses a thermostatically controlled heating element for control of moisture integration water temperature. A clean water supply is required to feed the MIB. Water usage is typically less than 1 gallon per 50 SCFM per hour. Overall dimensions of the MIB skid are 69"W x 72"L x 40"H. An automatic float valve system shall be provided for automated replenishing of the water reservoir. This shall also include an automated purging system to allow regular timed purging of the water with fresh water. A real time timer shall be provided in the control panel and shall be used to energize a non corrosive solenoid valve designed for use with acidic low pH liquids.

2.03 MOISTURE SEPARATOR

The Moisture Separator separates condensate and excess moisture from the process stream after treatment in the Biocube™. It protects the

blower from damage by water ingestion. Water collected in the Moisture Separator should be disposed of under normal O&M procedures. The Moisture Separator is normally mounted underneath the MIB.

2.04 CENTRIFUGAL BLOWER

A Stainless Steel Centrifugal Fan / Blower, Model 07T-181, will provide motive force to move air through the entire system. The blower weighs 200 pounds, has a capacity of 400 scfm, and a vacuum of 18 inches WG, and is powered by a 3.0 HP, TEFC, 230/460 VAC, 3ph motor. An adjustable throttling valve on the blower will be provided and be used to control the system flow rate. The blower requires a , three phase, 60 Hz, 230 VAC circuit breaker for start-up. 316 Stainless Steel discharge muffler is also included.

2.05 ELECTRICAL CONTROL PANEL

A stainless steel, NEMA 4X all-weather electrical control panel will be provided for wall mounting in a non-hazardous location. The panel will provide branch circuit protection and controls for the regenerative blower and MIB heater. Alarms are provided for high and low water fault conditions. A main disconnect and security lock out are standard features.

2.06 PROCESS STREAM PIPING

All process stream piping is to be Schedule 80 PVC, rated for temperatures to 160° F. Feed water and drain piping for the MMI are to be 3/4", Schedule 80 PVC. Piping shall be sized for minimal and negligible frictional losses and shall be provided by the MANUFACTURER. Provision of pipe supports are the responsibility of the MANUFACTURER.

2.07 SYSTEM WIRING

All wiring is to be provided by the MANUFACTURER with the exception of the main power supply and connection to the MANUFACTURER'S control panel which shall be provided by the UTILITY.

2.08 CARBON POLISHING UNIT

- A. For this application, the system shall require one (1) N400 XP vapor phase adsorber specifically designed and molded of high density

polyethylene. The highly corrosion resistant adsorber is specifically designed for use with Tigg virgin activated carbons. The adsorber is particularly useful for applications involving corrosive streams such as post treatment of air stripper exhaust or removal of hydrogen sulfide or other acid gasses.

EQUIPMENT SPECIFICATIONS SUMMARY

- | | | |
|-----|------------------------------|---|
| 1. | Vessel Nomenclature: | N400XP |
| 2. | Outer Diameter: | 30.5 inches |
| 3. | Straight Side: | 52 inches |
| 4. | Overall Height: | 57 inches |
| 5. | Design Temperature: | 130° F |
| 6. | Design Flow: | 100 to 400 scfm |
| 7. | Approximate Wall Thickness: | 0.18 inches |
| 8. | Vessel Material: | High Density Linear Polyethylene with Ultraviolet Inhibitor |
| 9. | Lining: | Not Required (Corrosion Free) |
| 10. | Vessel Construction: | Seamless |
| 11. | Access: | 30.5 inches (THD) |
| 12. | Strength: | Resistance to Impact, Cold |
| 13. | Inlet: | 6 inches FLG |
| 14. | Outlet: | 6 inches FLG |
| 15. | Carbon Type: | Tigg Type VIRGIN |
| 16. | Carbon Fill: | 400 pounds |
| 17. | Pressure Drop: | < 6 inches |
| 18. | Approximate Shipping Weight: | 440 pounds |

B. Granular Activated Carbon Description

I. Specifications:

- | | | |
|----|-----------------------------------|------|
| a) | Substrate Virgin Activated Carbon | |
| | 1) Iodine Number, mg/g, Minimum | 1050 |

	2) Carbon Tetrachloride, wt.%, Minimum	60
	3) U.S. Sieve, 90 wt.%, Minimum	4 x 10
2.	Typical Physical Properties:	
	a) Bulk density:	
	1) g/cc	0.60
	2) lb./ft. ³	37.4
3.	Moisture (as packed), wt.%	15

PART 3 - EXECUTION

3.01 INSTALLATION

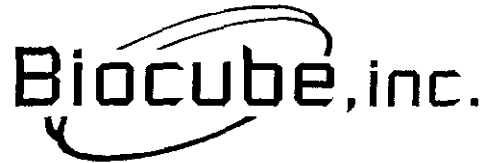
Installation by the MANUFACTURER of each equipment item shall be in strict accordance with the respective MANUFACTURER'S instructions and recommendations in the locations shown on the drawings.

3.02 INSPECTION, TESTING, AND START-UP

- A. A representative from the MANUFACTURER shall be present to perform the required Start-Up services of the system.
- B. After all equipment has been completely installed according to the direction of the MANUFACTURER, and conducted in the presence of the UTILITY, tests are necessary to indicate that the system operates satisfactorily and will meet the conditions of service specified. A bio-acclimation period of 2-4 weeks will be allowed. Visual inspection will be made at this time for any discrepancies which shall be corrected. The field test shall demonstrate correct mechanical operation after system Start-Up. Field tests shall include all equipment included under this Section.

- END OF SECTION -





Wednesday, February 20, 2002

Biocube, Incorporated is a supplier of a unique and patented biofiltration system (US Patents #5,595,910 and # 5,656,494) that has become an industry standard in odor control.

The U.S. Patents Office recognized the Biocube™ Biofiltration Process as a unique invention because it incorporates enhanced flexibility of design by using modular trays. The modular trays provide increased performance because of improved air flow and water distribution.

Biocube's proprietary and patented design has been recognized, purchased and installed by utilities throughout the world, the United States and Florida. Hillsborough County, Pasco County, City of Temple Terrace and The Jacksonville Electric Authority are examples of utilities that have standardized on this odor control system. They purchase our systems directly as sole source due to the proprietary, patented design.

There are currently over 70 Biocube™ Odor Control System installations in the State of Florida. Please do not hesitate to call for additional information.

Herbert J. Ego
President