City of Biggs

Agenda Item Staff Report
For the Regular City Council Meeting:
October 8, 2013

TO: Honorable Mayor and Members of the City Council

FROM: City Administrator

SUBJECT: Purchase Authority for Waste Water Aerators

Council is asked to grant purchase authority to the City Administrator for the purchase of (2) waste water aerators and installation labor and materials.

Background

In August the City's long standing challenges with the WWTP (Waste Water Treatment Plant) facultative pond aerators reached a new level with the failure of 2 of the 4 aerators. Because of the complete lack of screening of the influent, any material introduced into the waste water system flows unabated into the ponds. With decades of accumulation of various types of modern, strong, fibrous materials in the ponds, clogging of the aeration pumps has been a very significant problem for many years. Even with the installation of an influent screen in the Phase 1 WWTP project, under the timeline of the Phase 2 WWTP project it will be at least 2-years before the ponds can be cleaned of debris. And a funding source has not yet been identified for this maintenance function.

The failure of the aerators appears to be the result of age and metal fatigue, but is clearly exacerbated by impeller imbalance created when the never ending, significant amounts of fibrous debris in the ponds become entangled in the impellers. This near constant state of imbalance caused structural failure, and the debris spinning on the impellers wore through the metal volute of the impeller housing and into the floatation material of the float.

For these reasons, repair of the existing aerators or replacement with aerators of the existing type is not a viable option. City staff began a search for methods of delivering oxygen to the ponds that could successfully and economically operate in the existing circumstances. Two primary types of aerators emerged for consideration, one is a rotating brush, and the other is an air turbine. While the air turbine (Toring Turbine) has been used in Europe for years, it is relatively new to the US, being distributed by VaraCorp. Further details have been the subject of many weekly updates, and are also detailed in the attached Technical Memorandum.

On paper the air turbines have lower initial cost, and utilize about ½ of the energy to accomplish a greater level of aeration than the aerators currently in use at the

WWTP, and purport to do so without the clogging issues. The air turbines are about 1/3 the cost of rotating brush aerator designs that claim to be "clog free", have far fewer moving parts, and appear to require much less maintenance.

There is some concern that the air turbines might be too good to be true, and the manufacturer has not yet gone through the expense of independent testing to substantiate their claims about oxygen delivery. One interesting prospect that is being explored involves the possibility of CSU Chico and/or UCLA testing the performance of the air turbine.

Discussions with two separate plant operators in plants of similar size to Biggs where the air turbines were deployed were very enthusiastic about endorsing their performance. Both plants suffered from clogging issues with aerators of similar design to Biggs', and reported complete elimination of the clogging issue. One plant replaced 20 HP aerators with 3 HP air turbines and measured increases in DO (Dissolved Oxygen), and enjoyed a significant reduction in electricity usage. The other plant replaced 7.5 and 9 HP aerators with 3 HP air turbines and reported a very dramatic increase in DO.

Considering all of these factors the Public Works Committee supports the purchase of (2) of the 3 HP VaraCorp air turbines to replace the (2) failed aerators at the WWTP.

While CSU Chico and UCLA have indicated an interest in testing the aerator performance, at a minimum we intend to track DO (Dissolved Oxygen) levels in the ponds before and after the new aerators are installed. However, because the ponds have been starved of oxygen for so long, it is likely that there is an abundance of unprocessed solids and that DO consumption will be high for some time as aerobic digestion is increased within the ponds, until they eventually reach a new equilibrium.

The goal at this juncture is to replace both of the failed aerators as soon as practical, and then replace the remaining two aerators during the phase 1 WWTP project.

Recommendation:
Authorize the City Administrator to purchase and install (2) 3 HP VaraCorp Turbine Aeration units with the cost of materials and labor not to exceed $14,000, and to increase the Sewer Operating Fund expense budget line item 030-1232 "Plant & Pump repair & maintenance" by $14,000 to accommodate the purchase.

_____

Mark Sorensen, City Administrator

VaraCorp, LLC
13501 RR 12, Suite 103
Wimberley, Texas 78676
info@varacorp.com 800.801.6685 www.varacorp.com

Agreement
by and between
VaraCorp LLC and City of Biggs, California

Under the terms of this agreement VaraCorp LLC will provide to the City of Biggs two (2) floating Turbine Aeration Units with weather proof NEMA 4x control boxes including overloads, on/off switch, and variable frequency drives. Biggs agrees to pay for the units in full plus shipping and handling costs prior to shipment by VaraCorp LLC.

These floating aerators will serve as demonstration units for 90 calendar days from receipt by the City of Biggs for performance evaluation. At the end of the 90 days, the City of Biggs will have the option either to return the units, for any reason, or to keep them. If the units are kept by the City of Biggs, no other charges or payment will be due. If returned, Biggs agrees to pay for the return shipping cost plus shipping insurance. Once VaraCorp receives the returned units, VaraCorp will refund the payment made by the City of Biggs in full, less the initial shipping costs from VaraCorp to the City of Biggs. If the units are returned in a damaged condition, normal wear and tear excepted, then an adjustment will be made in the refund amount.

VaraCorp will cash the payment check issued by the City of Biggs but will hold the funds in reserve for 90 days. At that time the City of Biggs will notify VaraCorp of its decision by phone or by email to keep or return the units.

The price of the aeration units will be covered in a separate invoice. Payment of the invoice will be construed by VaraCorp as evidence of the City of Biggs' acceptance of this agreement.

Thank you,

S. S. Casey

Shay Casey
VaraCorp LLC
800-801-6685
shay@varacorp.com

VaraCorp

Turbine Aeration Technologies

Invoice

VaraCorp LLC
13501 Ranch Road 12 Suite 103
Wimberley, Texas 78676

SHIP TO:	Biggs Municipality 2865 W. Biggs Gridley Road Biggs, CA 95917
Contact Name	Mark Sorensen
Phone #	530-868-0100
Loading	Yes, has loading dock or fork lift

Sales Tax Rates: 0.00%

Order Number	Source-Voltage & Phase		DATE
Biggs-9-26-13	460 Volt	3 Phase	9/20/2013

PARTS USED

QTY	DESCRIPTION	UNIT PRICE	AMOUNT
2	3 H.P.1800 RPM 3 Phase 230/460V 60hz Industrial Grade Motor	$ 4,650.00	$ 9,300.00
	3.5 Foot CLC Stainless Steel Shaft / Turbine		
2	Pontoon System w// UV Protected - Polyethylene Shell - Foam Filled		
2	Nema 4x Rated Control Box w/ Main Disconnects, Fuses, On/Off on Door		
2	460V ABB Variable Frequency Drive w/Speed Control (100')		

Shipping	DATE	Weight	RATE	AMOUNT
		0.0	$0.00	
		0.0	0.00	
			TOTAL	

Sub-Total	$9,300.00
Shipping	484.00
TAX	
TOTAL DUE	**$9,784.00**

COMMENTS:

Note: If wire length is greater than 100 feet from control box (VFD) to unit please contact us for VFD upgrade.

To expedite orders ask about wiring instructions

WRIGHT
ONE ELECTRIC

P.O. BOX 401 YUBA CITY, CALIFORNIA 95992 PH. (530) 755 - 4444 FAX (530) 755-4446 LIC. #817489

PROPOSAL

September 27, 2013

Project Owner: The City of Biggs.
Project Description: Aerator Pumps.
Project Location: Biggs, Calif.

Wright One Electric is pleased to have the opportunity to be bidding on your project.

Wright One Electric is proposing to:

- **Provide and install conductors (SO cord), from the shoreline J-Box to the new Aerator VFD panels.**
- **Provide and install motor lead conductors (SO cord), from the new Aerator VFD panels to the new Aerator Pumps**

Wright One Electric's proposal includes all labor and material for a complete and operable system.

Proposal excludes, Aerator pumps, VFD Control Cabinets and the mounting of the VFD Control cabinets.

For the sum of:

Including the SO cord.	**$1,915.00**
Excluding the SO cord.	**$1,268.00**

TECHNICAL MEMORANDUM

TO:	City of Biggs – Public Works
FROM:	Steve Lamb
DATE:	September 17, 2013
SUBJECT:	Replacement of Existing Aerators
PROJECT:	City of Biggs - WWTP

BEN|EN
TRUSTED ENGINEERING ADVISORS
Bennett Engineering Services
1082 Sunrise Avenue Suite 100
Roseville, California 95661
T 916.783.4100
F 916.783.4110
www.ben-en.com

In early August 2013 the city of Biggs wastewater treatment ponds had two of the four 7.5 HP surface aerators fail during operation due to fatigue. This failure may be attributed to un-screen debris. At the request of the City Bennett engineering has obtained quotes for the replacement of the existing aerators. Due to the inability to remove the unscreened debris from the existing ponds replacement of the aerators in kind was not a viable option. Replacement utilizing a brush type horizontal aerator which has greater aeration efficiency and will reduce the potential for aerator failure due to the existing floatable debris is a viable option.

Bennett evaluated three aerators for consideration. The evaluation consisted of analyzing the test clean water output efficiency of lbs of oxygen per horsepower - hour (#'s O_2 / Hp-Hr) as provided by the manufactures, available maintenance and cost.

The first aerator is a Floating Brush Aerator by **House Industries**, Inc. (Arkansas) distributed by JBI Water & Wastewater (Roseville, California).

The House aerator output efficiency is 3.18 lbs O_2/ hp-hr SAE and has a field aeration efficiency of 2.1 lbs O_2/ hp-hr

Brush:

7.5 hp @ 3.18 lbs O_2/ hp-hr

Yields 23.85 lbs O_2

X 4 aerators = 95.4 lbs O_2 / hr

At a cost of $63,680 or $15,920 each

$667.50 / lb O_2

The distributor stated that repair and installation of the aerator if required could be handled by Double J Enterprises in Paradise, Ca. or CPM in Chico, Ca. The price for install is estimated to be $4,500 for all four. Parts would come out of Arkansas.

ECS House Industries INCORPORATED
www.houseindustriesinc.com Cherry Valley, Arkansas

The cost of four (4) 7.5hp, Floating Brush Aerators is $63,680 which includes delivery, start-up and training, but does not include taxes, electrical connectors / connections, wiring installation, control panel installation, and unit installation. The full quote and supporting information can be found at the end of this memo.

Estimated price of units including installation and miscellaneous electrical: ***$76,500***

Additional Information in appendix 1

The second aerator is a Floating Brush Aerator by **S&N Airoflo, Corp.** (Mississippi) distributed by Coombs Hopkins (Walnut Creek, California).

The S&N aerator output efficiency is 3.0 lbs O_2/ hp-hr SAE and has a field aeration efficiency of 1.9 lbs O_2/ hp-hr

Brush:

7.5 hp @ 3.0 lbs O_2/ hp-hr

Yields 22.5 lbs O_2

X 4 aerators = 90 lbs O_2 / hr

At a cost of $66,070 or $16,517.50 each

$734.11 / lb O2

The distributor stated that repair of the aerator if required could be handled by Western Water Constructors in Santa Rosa, Ca. Parts would come out of Mississippi.

Installation of the aerator if required could be handled by Double J Enterprises in Paradise, Ca. or CPM in Chico, Ca. The price for install is estimated to be $4,500 for all four

The cost of four (4) 7.5hp, Floating Brush Aerators is $66,070 which includes delivery, start-up and training, but does not include taxes, electrical connectors / connections, wiring installation, control panel installation, and unit installation. The full quote and supporting information can be found at the end of this memo.

Estimated price of units including installation and miscellaneous electrical: ***$79,000***

Additional Information in appendix 2

The third aerator is a Turbine Aerator by **VaraCorp** (Texas).

The VaraCorp Company could not provide testing data for the aerator output efficiency and therefore has no empirical data to support the SAE aeration efficiency. In an article they state output efficiency is 12 lbs O_2/ hp-hr SAE, which would be one of the most efficient aerators on the market if the claim were substantiated by the manufacture through ACSE testing.

Turbine:

3 hp @ 12 lbs O_2/ hp-hr (claimed)

Yields 36 lbs O_2

X 4 aerators = 144 lbs O_2 / hr

At a cost of $21,000 or $5,250 each (w/ estimated Shipping; $4,650 w/o shipping)

$145.83 / lb O2

The manufacturer stated that repair of the aerator if required could be handled by Staff as the unit has minimal parts. Parts would come out of Austin, Texas.

Installation of the aerator if required could be handled by Double J Enterprises in Paradise, Ca. or CPM in Chico, Ca. The price for install is estimated to be $4,500 for all four

The cost of four (4) 3 hp, Turbine Aerators is $21,000 which includes delivery, start-up and training, but does not include taxes, electrical connectors / connections, wiring installation, control panel installation, and unit installation. The full quote and supporting information can be found at the end of this memo.

Estimated price of units including installation and miscellaneous electrical: ***$28,100***

Additional Information in appendix 3

CPM Commercial Pump and Mechanical inspected the existing aerators and parts to replace the existing aerators are not currently available nor are they under warranty.

The interior volute of one pontoon was damaged and this connection is stainless steel to fiberglass which was embedded during the pontoon construction process. Repair would include a two part metal epoxy which may only work temporarily.

The approximate cost for the motor reconditioning, diffusion head and propeller would be approximately $2,400 for each aerator and does not include other minor parts, freight, materials and labor that would be required.

Due to the continued presences of material within the ponds the conditions that may have been responsible for the failure would still exist and recurring failure would be inevitable.

<u>Additional Information in appendix 4</u>

Appendix 1

House aerator Information (provided by manufacturer):

The floating brush aerator enhances oxygen transfer rates by "shearing" the water, and creating large quantities of fine bubbles for better oxygen transfer. The increased number of fine bubbles we create, compared to other types of aerators, is the key to enhanced oxygen transfer efficiency, commonly referred as the Standard Aeration Efficiency (SAE).

The immense amount of fine bubbles we create increases our overall surface area and allows our bubbles to capture the oxygen in the air, and dissolve this oxygen into the wastewater. ECS House Industries' unique blade and "tip" design, along with the rotor speed, provides the best oxygen transfer when compared to other floating brush aerators.

In addition, our pumping rates range from 3,200 gpm/hp to 3,800 gpm/hp depending on the aerator size and model. These high pumping rates lead to very efficient mixing profiles in multiple wastewater applications.

The mixing profile of the floating brush aerator moves the wastewater in a lateral pattern. This type of movement prevents short-circuiting from happening in lagoon applications. The lateral mixing circulates highly oxygenated water over the top few feet of a lagoon, significantly reducing the BOD, and creating an "oxygen cap" across the lagoon to reduce odors.

Other types of aeration equipment used in lagoons (vertical turbines, aspirators, & diffused air systems) have a significant vertical component to their discharge profile. Because of this, there is a need to apply a greater amount of horsepower in order to achieve the desired surface mixing conditions (which results in a greater vertical component of mixing, arguably disrupting the environment desired within the basin).

In contrast, the floating brush aerator discharges water primarily laterally over the surface of a lagoon. This requires less horsepower for surface agitation or mixing, thus making the floating brush aerator a much more efficient mixer than the vertical turbine or aspirating type aerator.

Other benefits for customers are that floating brush aerators can also be used strictly for evaporation to dispose of their wastewater. The shearing of the water transferring as bubbles on the surface is ideal for evaporation. This is a great benefit for some customers that need to lower their lagoon levels in order to handle excess storm water in the wet season.

If you have a liner in your lagoon, the floating brush aerator can operate to the lowest water level without damaging the liner. The cylindrical floats will rest on the liner while in operation. This insures the brushes will not come in contact with the liner. This cannot be done with a vertical turbine or aspirator aerator.

The floating brush aerator also is much quieter than aspirating or vertical turbine aerators. ECS House Industries, Inc. has performed decibel testing that classifies the floating brush aerator noise as "white noise". The low amount of noise that is generated by the floating brush aerator is usually absorbed by the levee of a lagoon.

Our floating brush aerators can be used in complete mix and partial mixed lagoons due to this lateral pattern. Besides lagoon applications, our floating brush aerators can also be used in equalization basins, aerobic digesters, oxidation ditches, and any other type of aeration basin (rectangular, circle, or square basins).

In these applications, our floating brush aerators can enhance the treatment process by operating with optional VFD's (Variable Frequency Drives) and dissolved oxygen control sensors. Aeration at a wastewater treatment plant accounts for about 40% of the plant's energy consumption. By running our floating brush aerators with a VFD and dissolved oxygen sensor, we can eliminate unnecessary run times and can reduce the overall energy consumption at the wastewater plant.

I hope you find this brief summary of our wastewater aeration equipment and its process capabilities useful and informative. We can provide certified oxygen transfer & mixing reports along with references when needed.

BIGGS, CALIFORNIA

WASTEWATER TREATMENT FACILITY:

FLOATING BRUSH AERATOR QUOTATION

Date: **September 5, 2013**

Attn: **Ray Sprague, JBI Water & Wastewater**
2323 Aldridge Lane
Roseville, California 95747

Subject: **Biggs, California WWTF: Floating Brush Aeration Quotation**

Our Ref: **09052013-022-JCH**

ECS House Industries, Inc., represented by JBI Water & Wastewater, is pleased to offer the following scope of equipment & service for the Biggs Wastewater Treatment Facility in Biggs, California.

Floating Brush Aerator

ECS House Industries will provide three (3) 7.5hp Floating Brush Aerators, model #SDB096TA325075 based on equipment build, services, and quotation enclosed. ***An optional fourth 7.5hp Floating Brush Aerator is also included in the quotation.**

Each aerator shall be equipped with:

- Nema Premium Efficient, 1800 RPM, Three Phase, 230/460 volt TEFC Electric Motor
- Triple-Sealed Drive Housing shall be constructed of ASTM A36, TGIC Powder Coated Steel
- Rotor assembly shall be constructed of ASTM A36, TGIC Powder Coated Steel
- Rotor brushes shall be constructed of ASTM A36, TGIC Powder Coated Steel
- Anchoring System shall consist of two (2) parallel mooring arms, one (1) cross-brace assembly, and two (2) vertical bank stake poles constructed of ASTM A36, TGIC Powder Coated Steel
- Anchoring System shall not restrict the aerator assembly's floatation, and shall operate continuously with 3' water fluctuations
- Aerator Main Frame shall be constructed of ASTM A36, TGIC Powder Coated Steel, Schedule 40 pipe and 7 gauge material

- Floatation Attachment Bands, Foam-Filled Floatation Tanks, Motor Shield, & Non-Drive End Bearing Cover shall be constructed from 304L Stainless Steel
- *304L Stainless Steel, foam-filled floatation tanks
- 316 Stainless Steel Drive & Non-Drive End Shafts
- Drive & Non-Drive End Shafts shall be piloted, bolted-in stub shaft assemblies
- Adjustable Linkage shall be fabricated from 304L Stainless Steel and shall be capable of changing the rotor's operating blade depth
- Dodge Gear Reducer with "quick connect" oil change system and a minimum service factor of 2.0.
- Dodge Gear Reducers shall mount to the rotor drive shaft with tapered bushings and will only use roller bearings. Input shaft and output hub seals shall be constructed with double-seals to protect against water infiltration
- Dodge Paraflex Couplers that absorb start-up forces and allow for four (4) degrees of misalignment
- Grease Lubricated Drive & Non-Drive End Bearings shall be equipped with grease lube sites
- Lifting Devices shall be welded to the main frame of the aerator in order to unload and remove the entire floating brush aerator assembly

Quality Assurance & Performance:

- ECS House Industries, Inc. Floating Brush Aerators meets all quality assurance and performance requirements.

Delivery:

- ECS House Industries, Inc. will deliver the floating brush aerator and accessories on a flatbed truck
- 7.5hp, ECS House Industries, Inc. Floating Brush Aerator:
    A) Weight: 2,200 lbs.
    B) Overall Length: 19'6"

- Biggs WWTF will be responsible for the unloading of the equipment, floatation tank attachment, final splash shield assembly, electrical termination, and placing/anchoring the aerator in the lagoon
- When the Owner is ready for start-up, JBI Water & Wastewater representative will assist in the final aerator inspection and warranty certification
- JBI Water & Wastewater representative will check the Floating Brush Aerator for proper rotor assembly rotation, and the amperage draw of the electric motor
- Each electric motor shall operate at a 90% load based on the nameplate data
- If any rotor assembly adjustments are necessary to improve the amperage draw and aerator performance, then this adjustment shall be performed by the Owner
- After the Floating Brush Aerator is operating properly, JBI Water & Wastewater representative will provide documentation to the Owner and Manufacturer certifying the Floating Brush Aerator is operating properly
- The Floating Brush Aerator and accessories shall be delivered to the Biggs WWTF 4-6 weeks after receipt of purchase order
- O&M Manuals shall be delivered to the Owner one (1) week before the Floating Brush Aerator shipment

Additional Start-Up & Training Procedures:

JBI Water & Wastewater representative will demonstrate to plant personnel how to properly maintain the Floating Brush Aerators after Start-Up is completed. They will demonstrate the following:

- Proper oil changing procedure & oil change frequency
- Proper grease lubrication procedures & lubrication frequencies
- Paraflex Coupler alignment & replacement
- Drive & Non-Drive End Bearing replacement
- Review Aerator set-up & trouble shooting guide
- Visual aerator inspection: seal surfaces, bearings, & shafts
- Rotor & blade depth adjustment

Warranty:

- The manufacturer of the aeration equipment shall warrant the equipment to be free from defects in materials and workmanship for a period of twelve (12) months after start-up & Owner acceptance

Total pricing for Scope of Equipment, including delivery and start-up & training:

Three (3) 7.5hp, Model SDB096TA3253075 Floating Brush Aerators: $51,280.00

Four (4) 7.5hp, Model SDB096TA3253075 Floating Brush Aerators: $63,680.00

Items Not Included in Pricing:

- State and/or local taxes
- Electrical connectors/connections and wiring installation
- Control Panel Installation and Pricing not included

Terms & Conditions:

- The terms & conditions of ECS House Industries, Inc. are 100% due 30 days after aeration equipment delivery.

Scope of Equipment offered by:

Chad House
CEO, ECS House Industries, Inc.
3720 Highway 1 South
Cherry Valley, Arkansas 72324

For pricing, questions, and/or comments, please contact Ray Sprague, JBI Water & Wastewater, (916) 995-5500

Appendix 2:

The Source for Floating WWT Equipment
Brush Rotors - Mixers - Polishing RBC's

QUOTE NO. SNA5811

To: Dean Boode

Date: 08.28.13

Project: Biggs, CA

Subject: S&N Airoflo Aeration Equipment for Waste Water Treatment Horizontal Floating Brush Rotor

SCOPE OF SUPPLY

S&N Airoflo™ is pleased to submit a proposal for the supply of the following equipment and/or services:

ITEM 1. - Floating Brush Rotors

Four (4) 7.5HP S&N Airoflo™ 1600 Series Hot Dipped Galvanized Floating Brush Rotors, complete with the following features and components:

- ***Motor***: 230/460 volt, 3-phase, 60 hertz, TEFC (totally enclosed fan cooled), horizontal electric motor. This motor meets the **NEMA Premium Efficiency specifications. Motor has a minimum 1.25 SF (at full load amps).**

- ***Gear Reducer***; a constant-duty, AGMA class III, gear reducer possessing a minimum 2.0 service factor at operational loads, based on rotor documentation.

  - Gear reducers are upgraded with external labyrinth style seal guards designed to protect the gear reducer seals from grit, hair and the corrosive environment.
  - Gear reducers shall be equipped with a vent breather modified for use with S&N Airoflo rotors. This device is designed to prevent water vapor from collecting in the gear reducer reservoir. This in turn will extend the life of the gear reducer lubricant.
  - Gear reducer shall be fitted with a drain hose to allow for safer, cleaner oil changes.
  - Gear reducers shall be supplied with S&N Aeration Duty Gear Lube.

- **Drive Assembly**: a shaft mounted gear using a face mounted plate, is attached to the frame with heavy pins to allow a limited amount of tri-axial movement. ***The movement allowed by the pin and plate arrangement eliminates critical alignment issues, thus eliminating misalignment pressure on the bearings in the gear reducer.*** Further reduction of possible alignment issues is greatly reduced through the use of an elastomeric coupling between the

motor & the gear.

- ***Horizontal Rotor Assembly***: shall be constructed of A36 Low Carbon Steel and hot dipped galvanized to ASTM Specification #A123/A and fitted with bolt-on stub shafts for easier O&M Procedures. The torque tube is a schedule 40 pipe and flanged to accept the eight bolt hub of the stub shaft. ***The Airoflo rotor design includes a unique blade shape with a C-shaped base and a blade placement pattern of alternating long & short blade lengths to maximize mixing and oxygen transfer.***

- ***Rotor Bearings***: UHMW polyethylene self-wastewater lubricating (non-greasing, maintenance free) rotor bearings with bi-metallic wear sleeves designed to absorb the wear and protect the stub shaft. (For more details about S&N's bearing system, please refer to our Wastewater Lubricated Bearing System brochure.)

- ***Flotation Devices***: ***Cradle Frames & Vertical Adjustable Linkage***; Stainless Steel foam filled floats are mounted to the main frame with hot dipped galvanized cradles. The connecting linkage between the cradle and the frame is adjustable to vary the rotor submergence and to control amperage.

- ***Main Frame***: The main frame is constructed primarily from structural channel and then hot-dipped galvanized after final fabrication. Non-skid platforms are welded to the drive end of the frame for secure footing and safe access during O&M inspections.

- ***Fasteners & Threaded Rods***: all bolts, threaded rods, pins and clips will be 304 Stainless Steel to prevent seizing. All adjustment rods will have brass nuts and all bolts will have brass lock nuts.

- ***Anchoring***: This system will be supplied with a Levee Anchoring System (LAS). The 30' LAS will allow the unit to float level and operate at the various water levels required for the application, while securing the unit in place and limiting lateral movement. the application, while securing the unit in place and limiting lateral movement.

- ***Shields***: Each Aerator shall be supplied with Extended Vertical Shields (EVS) on the drive end of the rotor. The EVS assembly consists of a ¼" x 54"h X 96"w HDPE Marine Board shield attached to a system of overlapping splash guards and seals ***to protect the drive assembly from splash created by the rotor and provide a cleaner dryer area for the performance of scheduled O&M inspections.***

ITEM 2. - Electrical Panels & Disconnects:

- ***Motor Control Panel:*** 3R or 4X enclosure with Allen Bradley IEC starters or Soft Starts, 24 HR clocks for cycling units and elapsed time meters mounted on a hot dipped galvanized stand
  - None Quoted

- ***Service Disconnect With a Hot Dipped Galvanized Mounting Bracket:*** full details provided upon request
  - None Quoted

ITEM 3. - Power Cable and/or Pre-wired Motors: full details provided upon request

- None quoted

ITEM 4. - EZ Access Systems: based on our 15+ years of experience, we recommend a simple access system to provide safe, easy access for O&M inspections and light repairs

- Float Mounted Platforms to access both ends of the units for O&M inspections. The FMP consists of a SS deck with a non-skid surface & hand rail on the end of each float. The non skid decks are attached to the floats with SS bands and rubber insulator straps. When the unit is pulled to the bank, the units can be safely boarded for O&M inspections.

- **Vertical Hand Holds;** (2) Per Unit. VHH's VHH is simply a vertical bar attached to the frame in a location convenient to operators for the transition step from the float platform to the frame.

ITEM 5. - Freight, Installation & Tech Service:

- ***Freight***; …FOB Origin, Freight included
- ***Installation***; ….None quoted/Delivery Only
- ***Tech Service***;…..None quoted

ITEM 6. - Maintenance and Handling Accessories:

S & N will provide the following to assist in handling the equipment and basic maintenance:

- Lifting Bar
- O&M Manuals:

ITEM 7. - Spare Parts …

- one (1) additional elastomeric coupling

*****PLEASE REFERENCE THE FOLLOWING PAGES FOR PRICING AND EXECUTION.***

PRICING AND EXECUTION

ITEMS 1, 2, 3, 4, 5, 6, & 7 Or otherwise above= $66,070.00(FOB Origin)
(Freight Included)
(Prices good for 30 days)

EXCLUSIONS: State or local taxes, if applicable; interconnecting wiring, wiring and conduit from each unit-mounted electrical device to a terminal box or control panel, piping, connections, walkways, gratings, railings, installation, or any other auxiliary equipment or service **not detailed above**.

SPECIFICALLY EXCLUDED: LIQUIDATED AND CONSEQUENTIAL DAMAGES.

VALIDITY: The above price is firm for thirty days from the date of this proposal. Pricing is based on the schedules stated within this proposal.

OWNER/CONTRACTOR RESPONSIBILITY: (*The following will be the responsibilities of the Owner/Contractor unless specified otherwise within this document*):

- Equipment for unloading, uncrating, and installation. (Note: Installation will, at a minimum, require lifting equipment rated at 2,500 lbs. at its extended reach for non-stacked units or 5000 lbs. for stacked units. Sites with limited or difficult accessibility may require a crane.)
- ***Two inspections of the units (one after 3 days of operation & one after 60 days of operation). Inspections must be documented per the proper forms supplied in the O&M manual. Forms must be returned to the manufacturer, in order to execute the warranty.***
- Electrical connection and interconnecting wiring to or from any of the following except as noted above:
  - Motor
  - Disconnect
  - Controls

DELIVERY: Eight (8) weeks after final submittal approval or Release to Manufacture.

TERMS: Net thirty (30) days after delivery.

WARRANTY: **Standard warranty terms:** S&N Airoflo™ warrants their equipment to be free from defects in material and workmanship for a period of one (1) year following operation start-up and acceptance. During this one (1) year period, S&N Airoflo™ will replace or repair (F.O.B., factory) any part (or parts) returned that have failed under normal use and service. The electric motor and gear reducer warranties shall be as stated by the manufacturers.

The S&N warranty period ends twelve (12) months after the start-up date or eighteen (18) months after delivery, whichever comes first.

Any damages resulting from acts of God, vandalism, animals, or high or low voltage will not be covered under warranty.

Thank you for your consideration and the opportunity to provide this quote.

Buster Norris
662.455.2804 S&N AIROFLO ,INC.

Appendix 3

References –

Buck Valad, PW Dir - Evart, Michigan 231-629-6196

BEN|EN spoke with Buck on 9/20/13 and he stated that he would be available for calls and questions the city may have. They have a 3 hr time difference.

Buck is the Evart, Michigan PW director. He stated that a year and a half ago they were faced with deep cuts and they needed to find away to reduce costs. They replaced 20HP surface aerators similar with 3 HP units in kind, not HP for HP. They recognized a 50% reduction in electrical costs and an increase in dissolved oxygen from 4-5 to 5-7. The city is happy with the aerator performance and they have no regrets for doing the switch.

Their treatment plant is a lagoon treatment plant that operates similar to Biggs. They use their wastewater to irrigate. In the past their surface aerators would rag up and plug with floatables much as the case in Biggs. These new aerators have not had an issue.

Alex Damon, Mayor – Cordell, Oklahoma 580-660-1398

The City of Cordell replaced 6, 7.5 HP and 9 HP "suck and spray" type aerators with the VaraCorp turbines and have increased there DO from 1-3 to 7-9. The City of Cordell has a lagoon system very comparable to Biggs and Odors were of concern, the new aerators have eliminated odor concerns since their install in May 2013. In the past their surface aerators would rag up and plug with floatables much as the case in Biggs. These new aerators have not had an issue.

Note:

Both gentlemen stated that they would be available for any further questions the city may have.

VaraCorp

Turbine Aeration Technologies

Quote

13501 Ranch Road 12 Suite 103
Wimberley, Texas 78676
800-801-6685
Fax 866-611-670

TO: **Biggs Municipality**
Attn: Mark
530-868-0100

Sales Tax Rates: 0.00%

Order Number	MODEL #	SERIAL #	DATE
			August 21, 2013

PARTS USED

QTY	DESCRIPTION	UNIT PRICE	AMOUNT
Each	3 H.P./ 220/440V 3 phase /60hz 1800 rpm /Industrial grade motor	**$ 4,650.00**	
	3.5 ft. S.Steel Shaft/ Turbine / Pontoon System		
	Custom Panel.Box: Includes a Main Disconnect, Main Fuses,		
	ABB Variable Frequency Drive,		
	Overloads, ON OFF Switch, and a Speed Control		
	on the Door, Nema 4x Rated Panel.Box		
	Electrical Wire Not Included		

Shipping	DATE	Weight	RATE	AMOUNT
		0.0	$0.00	
		0.0	0.00	
			TOTAL	

Sub-Total	
Shipping to be determined	0.00
TAX	0.00
TOTAL DUE	

Pricing good for 30 days

COMMENTS:

INTRODUCING TURBINE TECHNOLOGY SELF-ASPIRATING AERATOR

State-of-the-Art in Aeration Technology

The Turbine self-aspirating aerator was introduced into the world market in 2010 following nearly ten years of research and development. Already, it is the subject of physics forums in which professionals and laymen alike are trying to understand how it performs its amazing feat of aeration.

Simply stated, the Turbine combines the physics principles of precession (as applied to the rotation of fluids) and centrifugal force. Using precession, the rotating sub-surface disc creates a low pressure zone within its internal chamber. This zone is then filled with air forced down an air tube by surface air pressure. As this air is gathered within the disc, it is immediately expelled by centrifugal force into the surrounding water.

The result is an immediate, continuous, unbelievable barrage of dissolved oxygen that saturates the water. While other self-aspirating aerators exist, they require nearly twice the horsepower to achieve the same results as the Turbine design.

The appeal of the Turbine design is its utter simplicity combined with its durability. It overcomes many of the challenges which plague other aerators. It has no internal moving parts. It has no diffusers which can clog. It requires no loud, costly compressor. It does not roil or stir up the bottom of the treatment lagoon. It does not thrash the surface of the water. It creates a mild current within the body of water. It creates extremely small air bubbles making it appear as if an underwater cloud is being formed. It can operate at greater depths than similar aerators. And, finally, it entrains dissolved oxygen by forcing air into water, and not water into air.

Some models can discharge 16 liters of air per second into water. This volume of air is generated with two and three horsepower motors, not seven to ten horsepower motors. A newer model under development will discharge 150 liters per second.

Due to its design, efficiency, portability, and performance, the Turbine is equally at home in aquaculture settings, horticulture irrigation lagoons, golf course ponds, municipal waste treatment plants, stock ponds, lake ways and coves, confined animal feedlot waste lagoons, and black water pits, to name a few.

Efficiency in some models can exceed 7.5 kgO_2/kWhr or about 12 $lbsO_2$/hphr. Weighing barely over 100 pounds, a typical floating Toring aerator can out-perform and outlast virtually every aerator in its class.

For more information about the Toring, go to www.varacorp.com or call 1.800.801.6685.

cpm COMMERCIAL PUMP & MECHANICAL INC.
11254 Midway | 530.899.1583v
Chico CA 95928 | 530.899.7225f

September 9, 2013

Paul Pratt
Public Works Superintendent
City of Biggs
465 C Street
Biggs, CA 95917

RE: Repair of Aqua-Jet Aerators

After inspection of the aerators and research regarding repair costs and parts, we feel it is in your best interest to replace them with new aerators for the following reasons.

1 - While Aqua-Aerobic System, Inc. (the distributor for Aqua-Jet Aerators) still makes replacement parts, the exact parts are not available anymore. The existing aerators were made prior to Aqua-Aerobic's purchase of the Aqua-Jet line and because they were made by the previous company they would not be covered under warranty.

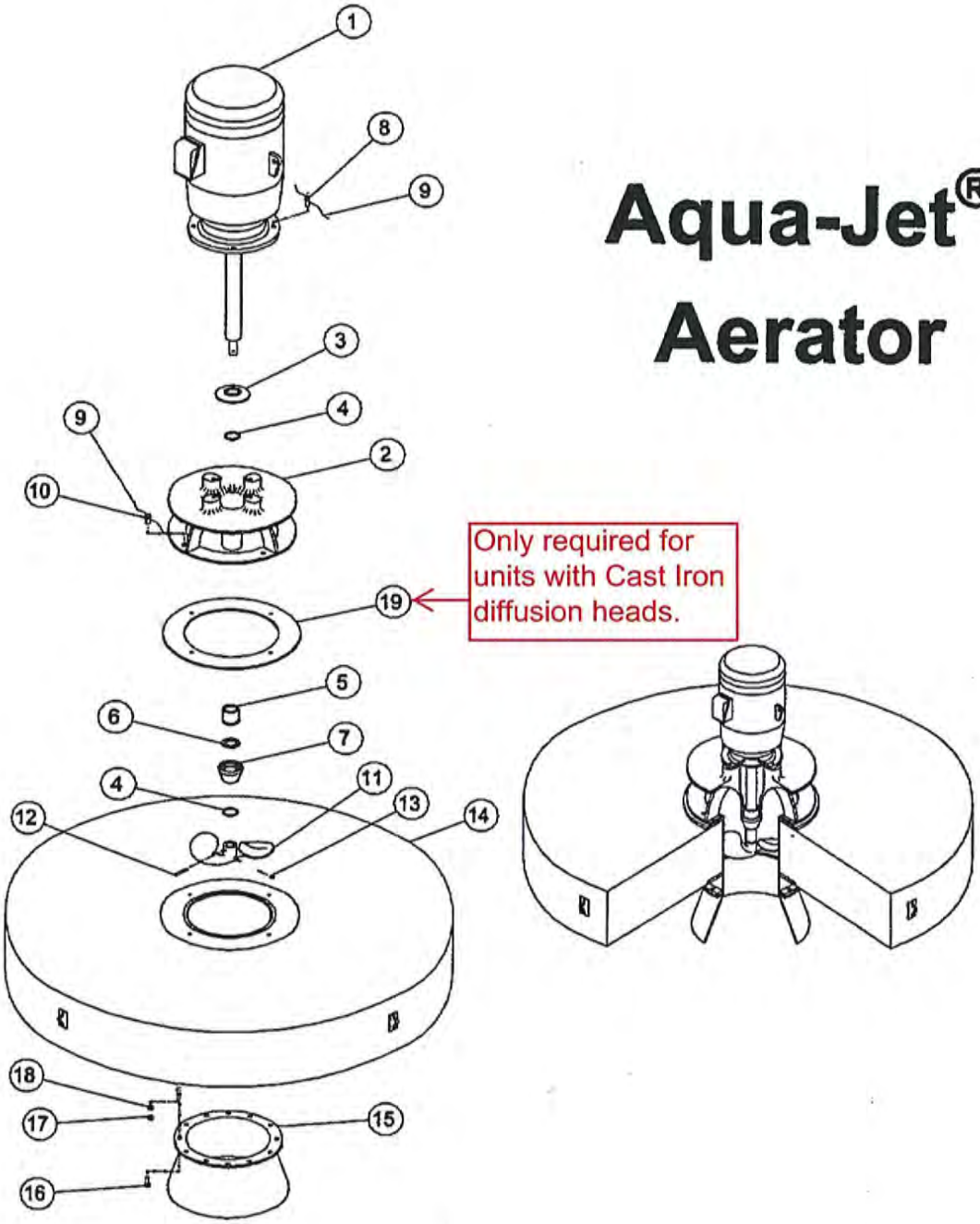
2 – The interior volute of one pontoon was damaged when the motor broke loose. The interior is stainless steel and the pontoon is fiberglass. Due to the welded fabrication, the only repair possible would be a two part metal epoxy coating. While this could work it would only be a patch and we do not recommend it. The other pontoon leaks and, although it could be sealed, there may be more interior damage that would show up at a later date. We do not recommend this either.

3 – The approximate cost for the motor recondition, diffusion head and propeller would be approximately $2400 for each aerator. This does not include other minor parts, freight, materials and labor that would be required to repair the aerators.

In conclusion, after considering the condition of the existing aerators, cost of parts and labor and the fact that the repair parts would not be covered under warranty, it is our recommendation that you replace the existing aerators. Thank you for contacting us regarding this matter and for your continued confidence in Commercial Pump and Mechanical.

Grant Stanley
Commercial Pump & Mechanical, Inc.

Aqua-Jet®
Aerator



AQUA-AEROBIC SYSTEMS, INC.

7.5 HP AquaJet® Aerator Spare Parts List

Part Number	Item Number	Description	Quantity Required	Notes	Unit Price
P24H0710	1	Motor	1	1,4	
P2500003	2	SS* Diffusion Head	1	1	$ 1,130.60
2600001	3	Labyrinth Seal Guard	1	1,2	$ 36.32
2603274	4	Hose Clamp	2	1,2	$ 1.62
2600004	5	Anti Deflection Insert	1	1,2	$ 21.22
2600005	6	Thrust Washer	1	1,2	$ 2.24
2600002	7	Fluid Deflector	1	1,2	$ 22.58
2500187	8	Motor Flange Bolts	4	1,2	$ 2.46
2600011	9	Safety Wire	8	1,2	$ .20
2502049	10	Diffusion Head Bolts	4	1,2	$ 3.40
P2600012 -LX0	11	Propeller Kit	1	1,3	$ 596.54
2519342	12	Propeller Pin	1	1,2	$ 6.54
2600233	13	Set Screw	2	1,2	$ .64
P2300511	14	SS* Float Assembly	1	4	
P2900710	14	FRP*** Float Assembly	1	4	
	15	Intake cone		5	
	16	Intake Cone Bolts		6	
	17	Intake Cone Full Nuts		6	
	18	Intake Cone Jam Nuts		6	

NOTES:
1. Part is found in complete power section.
2. Recommended spare part if repairing or replacing motor.
3. Kit includes: propeller, pin, loctite, quickmetal and installation manual.
4. Contact customer service at 1-877-869-1906 for price and delivery.
5. Included in float assembly.
6. Not required for 7.5HP units.

*SS = Stainless Steel **CI = Cast Iron ***FRP = Fiberglas

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