

Stuttgart Municipal Water Works

612 S College – PO Box 130 – Stuttgart Arkansas 72160

Phone 870-673-3246 Fax 870-673-8783

**Tommy Lawson
Manager**

October 22, 2020

Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

Attn: Robert E. Blanz, PHD, P.E.
Associate Director, Office of Water Quality
Arkansas Division of Environmental Quality

RE: Consent Administrative Order (CAO) LIS – 18-092
Permit ID AR0034380; AFIN 01-00214

Dear Mr. Blanz:

We are attaching the following:

- A. Flow Regulation Pond Operating Plan – August 2018
- B. Supplement to Flow Regulating Pond Operating and Adding Sludge Management
- C. Lagoon Master Sludge Activating Aerator Brochure
- D. Report signed by Mayor Earney of samples that did not meet permit limits and corrective action.

Monthly progress reports will be submitted by the 15th of each month.

We believe we have complied with the Corrective Action Plan with the installation of the two new gear drives on the two final clarifiers that were put back in service August 2020.

The 4 manholes that were overflowing have now been sealed and are not overflowing any longer when system surcharges.

We are submitting this letter with attachments within the 20-day deadline to first, show that the City has been working to comply with (CAO) and secondly to show compliance.

Attached is construction rehab report, plant work and costs the City of Stuttgart has incurred doing this work.

V00005WQR

POSTMARKED

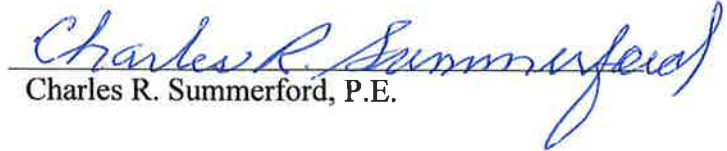
OCT 22 2020

CITY OF STUTTGART

STUTTGART MUNICIPAL WATER WORKS


David Earney, Mayor


Tommy Lawson, Manager


Charles R. Summerford, P.E.

**REPORT OF SEWER CONSTRUCTION AND REHAB WORK
FOR STUTTGART MUNICIPAL WATER WORKS
STUTTGART, ARKANSAS
FOR 10-YEAR PERIOD 2008 TO 2018
AUGUST 17, 2018
REVISED AUGUST 21, 2019**

AVAILABLE FUNDING:

Sales Tax Bond Issue by City - Water Works Allocation	\$2.5 Million
Water Works Reserve Funds from Customer Billing	\$4.0 Million
Loan Funds from USDA Rural Development	\$15.072 Million

COLLECTION SYSTEM:

- I. The work began in 2008 with water and sewer extensions in the newly annexed North Area. The project involved approximately 11,000 LF of gravity sewer, two sewerage pumping stations and force mains. Also, involved were approximately 19,400 LF of 10" and 12" fire mains with 28 fire hydrants. The project was completed in 2008 at a construction cost of \$998,600.00 using proceeds from sales tax bonds.
- II. Beumer Street Water Line Replacement and Sewer Line "F" Pipe Bursting off Meadow Lane - Replaced 1,350 LF of 2-inch rusted out galvanized water line on Beumer Street, installed a fire hydrant, and reconnected 32 water services to new 6-inch PVC water line. Also, replaced 1,000 LF of 8" gravity sewer with HDPE fused joint pipe by pipe bursting method. Project completed 2010 at a construction cost of \$123,500.00 using Tax Bond funds.
- III. Phase I-Water and Sewer Upgrades - The project involved water line and fire hydrant replacements in Downtown (Note: One of the new hydrants was used to fight the fire at Steadman's at 2nd Street and College) Debrah Street and 7th Street. Sewer line replacements were made on Porter Street from 3rd Street to 7th Street and on East 6th Street from Maple Street to near Vine Street, a distance of 4,000 LF. Also, the project involved rehabilitating the McCracken Sewer Pumping Station and 12-inch force main across town discharging into trunk sewer main just ahead of the sewerage treatment plant. Post Aeration was added to the plant. Completed 2010 at a cost of \$1,340,000 with Tax Bond funds.
- IV. Step 1-Sewer Upgrades and Improvements - The project involved rehabbing three (3) primary sewerage pumping stations, Cleveland Street, 13th Street and Lennox; installing 12" HDPE Force Main from Cleveland Street Station along 2nd Street to Prairie Street discharging into 24" trunk sewer at Prairie Street; installing 12" HDPE force main from 13th Street Station west along 13th and 12th Streets to 11th and Prairie discharging into 18" trunk sewer immediately upstream of sewer plant, completed 2013 at a cost of \$1,021,000 using USDA Rural Development loan funds and City bond funds.

- V. Sewer Lines Replacement Morgan Manor Addition - Replacing all the sewer lines in Morgan Manor Subdivision by pipe bursting and installing HDPE fused joint pipe and PVC pipe. Completed 2015. Total cost of sewer replacement \$375,000 using USDA Rural Development loan funds and City funds.
- VI. Section 1-Step 2-Sewer - Generally north of Michigan and south of Superior Street, from Buerkle to Leslie Street using pipe bursting method with HDPE fused joint pipe. After rehabbing manholes in this area, project was under running on cost; so we added an extra 450 VF of manhole rehabbing to reduce inflow. Project completed 2017 at a cost of \$823,439.88 using USDA Rural Development loan funds.
- VII. Section 2-Step 2-Sewer Upgrades and Improvements - The general work area was from East 6th Street north to 2nd Street and from Main Street east to Vine Street. The existing sewer lines were replaced using pipe bursting and HDPE pipe fused joint. All sewer users were reconnected to the new sewer lines under contract. Project completed in early 2018 at a cost of \$994,697.18 using USDA Rural Development loan funds.
- VIII. Section 3-Step 2-Sewer Upgrades and Improvements - The general work area is from East 6th Street south to 10th with few lines down to 12th and 13th Streets, then from Main Street east to Park Avenue. All sewers, except where a few replacements had been previously made, were replaced with HDPE fused joint pipe using pipe bursting method. All sewer customers were reconnected to new lines under contract. Project is substantially completed 2018 and almost ready to be finaled out. Total cost \$721,573.80 paid for from USDA Rural Development loan funds.

**REPORT CONTINUATION OF SEWER CONSTRUCTION AND REHAB WORK
FOR STUTTGART MUNICIPAL WATER WORKS
STUTTGART, ARKANSAS
FOR PERIOD 2018 THROUGH OCTOBER 2020
OCTOBER 9, 2020**

- IX. Section 4-Step 2-Sewer Upgrades and Improvements - This is the last section of a four (4) part replacement of sanitary sewers in the application for \$4,989,000 loan for sewers from USDA Rural Development. The original contract for this section was \$1,171,480.00; Change Order No. 2 added \$330,352.00 for an adjusted contract price of \$1,501,832.00; and Change Order No. 4 added \$251,640.00 in leftover funds for an adjusted contract price of \$1,753,472.00. The original contract and the Change Order No. 2 are 100% complete. We expect the Change Order No. 4 work to be completed within the next two weeks. The general work area is south of 15th Street to 22nd Street and from Beumer Street over to Crockett Street. Total cost is \$1,753,472.00 from USDA Rural Development loan funds.

Line Work - Total Construction Cost 9 Projects	\$ 8,151,262.86
Collection System	\$11,624,953.58
Treatment Facilities	<u>2,628,819.45</u>
Total	\$14,253,773.03

The City has replaced a total of 73,119 LF of gravity sewer lines in the Items II thru IX.

PUMPING STATIONS REHAB WHICH IS PART OF THE COLLECTION SYSTEM:

A.	McCracken Pumping Station Rehabbed 2010	\$ 58,000.00
	12" FM SDR-26 PVC 10,380 LF @ \$13.25	<u>137,535.00</u>
	Subtotal	\$195,535.00
B.	Cleveland Street Pumping Station Rehabbed 2013	\$ 87,900.80
	12" FM HDPE SDR-17 6,450 LF @ \$29.00	<u>187,050.00</u>
	Subtotal	\$274,950.80
C.	13th Street Pumping Station Rehabbed 2013	\$ 81,570.00
	12" FM HDPE SDR-17 5,030 LF @ \$29.00	<u>145,870.00</u>
	Subtotal	\$227,440.00
D.	Lennox Pumping Station Rehabbed 2013	<u>\$ 72,852.70</u>
	Total Cost Pumping Stations & Force Mains	\$770,778.50

The large force mains discharge into truck sewers immediately upstream ahead of the treatment plant. These force mains get the sewerage out of the small diameter sewers and more quickly to the treatment plant.

There was a total of 21,860 LF of new 12" force main laid in the projects.

LINE REPLACEMENTS AS A RESULT OF TROUBLE CALLS OR SEWERS THAT CAVED IN AND SEWER DEPARTMENT HAD TO REPLACE UNDER EMERGENCIES

<u>Year</u>	<u>Amount of Line Replaced (LF)</u>	<u>Cost</u>
2011	1,790	\$ 157,502.00
2012	2,905	233,298.00
2013	8,369	310,185.00
2014	9,288	196,879.00
2015	960	142,955.00
2016	4,414	136,180.00
2017	150	6,985.00
2018	2,781	179,454.00
2019	<u>2,283</u>	<u>135,325.00</u>
Totals	32,940 LF	\$1,498,760.00
	6.24 Mi.	

Paid for from Billing Revenue Reserves

**CONTRACT WORK AND CITY EQUIPMENT PURCHASES
AT WASTEWATER TREATMENT PLANT
STUTTGART, ARKANSAS
AUGUST 20, 2018
REVISED AUGUST 21, 2019**

I. Equipment Purchases - John Meunier, Inc.		
New Bar Screen, Roto Pac, Metcan Grit Removal and Sam Dewatering Screen		
Change Order No. 1 Adding 4'-0 Additional Length Bar Screen		
Change Order No. 1 Adding Allen Bradley Logic Controls		
Plus Sales Tax		
Cost to City		\$ 467,776.77
II. WesTech Engineering, Inc.		
Slow Speed Surface Aerator and Bridge for East Aerobic Digester		
Plus Sales Tax		<u>122,008.06</u>
Total Initial Equipment Cost to City		\$ 589,784.83
III. Contract Installation Cost to City - Bar Screen		\$ 82,200.00
Grit Chamber		247,172.00
East Aerobic Digester		<u>51,522.00</u>
Contract Installation Cost		\$ 380,894.00
Total Cost Sewerage Treatment		\$ 970,678.83
Change Order No. 1		23,517.00
New Control Package Plant Pump Station		<u>18,950.00</u>
Revised Project Cost		\$1,013,145.83
IV. West Digester Aerator & Mist Shroud		\$ 91,815.00
Installation		60,590.00
New 50 Hp Motor		<u>4,776.00</u>
Subtotal		\$ 157,181.00
Total Revised Contract Price		1,170,326.83
Engineering		<u>146,292.62</u>
Total Project Cost 12/19/14		\$1,316,619.45
V. By City - Replaced Belt Press & Dehydration Unit		1,000,000.00

**CONTRACT WORK AND CITY EQUIPMENT PURCHASES
AT WASTEWATER TREATMENT PLANT
STUTTGART, ARKANSAS
OCTOBER 9, 2020**

VI. Replacing Tertiary Pumping Equipment -		
The old worn out slanted screw pumps were removed, support framing, piping, fittings and turbine pumps added to existing pump basin. The new tertiary pumping station was placed in service in October 2016 at a contract cost of \$263,200.00.		263,200.00

VII.	Added Post Aeration in Back End of Chlorine Contact Chamber	49,000.00
VIII.	Primary Pumping Station Pump A2, a submersible 6" - 15 Hp-1150 RPM pump rated 1215 gpm at 32' TDH was replaced at a cost of \$11,682.06 and put in service August 2019.	11,682.06
IX.	The Equalization Basin Pump Back Station first pump was replaced in October 2019 at cost of \$13,039.00.	13,039.00
X.	The Equalization Basin Pump Back Station second pump was replaced in November 2019 at a cost of \$13,039.00.	13,039.00
XI.	Primary Sludge Pump #2 was replaced at a cost of \$8,570.00 April 28, 2020.	8,570.00
XII.	Began gathering data and information to replace chlorine and sulphur dioxide feeds for disinfection of fecal coliform in effluent discharge to Peracetic Acid (PAA) in Chlorine Contact Chamber.	----
	Total Cost Work at Plant	\$3,162,689.51

XIII. Obtaining and Utilizing Sludge Dewatering Press for Equalization Basin at the Stuttgart Wastewater Plant.

The City obtained a P-W Tech Mobile Press in April 2020 after receiving construction permit at a cost of \$214,000.00 and put the unit in service. The unit has now operated 436 hours and processed 177,690 gallons of sludge out of the Equalization Basin. The accumulated sludge has been processed through Belt Press and Dehydration Unit to reduce the sludge to Class "A" Sludge.

XIV. The City of Stuttgart bought two new gear drives for final clarifiers for a total cost of \$75,000.00; then, in August 2020, they hired a contractor to remove the old worn out gear drives and install the two new gear drives at a cost of \$99,270.00 each. The final clarifiers were put back in service August 2020.

XV. On a personal note, Mr. Tommy Lawson, Manager of the Stuttgart Municipal Water Works had open heart surgery for 5 bypasses the last week of March 2020. He was off recuperating for six weeks, then came back to work a half day for a couple of weeks. He seems to be doing fine now.

XVI. The City of Stuttgart believes they have completed all the maintenance work, cleaned out stopped up sludge lines, purchased and installed pumps, a sludge press for e.g. basin, and gear drives for the two final clarifiers to complete all the elements of the CAP Plan and believe the plant is operating as designed.

The above cost does not include parts, pumps and other miscellaneous items purchased with reserve funds and installed by City plant crew at Sewerage Treatment Plant. It did not include buying new tertiary filter media, the

cost to remove and reinstall new media, new gear drives which are on order or rehabilitating the two final clarifiers. The two new gear drives will cost the City \$75,000 plus the clarifiers must be cleaned and rehabbed after the gear drives are received.

**CURRENT LOANS - STUTTGART MUNICIPAL WATER WORKS
STUTTGART, ARKANSAS
AUGUST 20, 2018**

	<u>Interest Rate</u>	<u>Amount Loan</u>	<u>Monthly Payment</u>	<u>Pay Off</u>
USDA RDA Water Loan	2.75%	\$ 7,079,000	\$ 24,706	5/6/52
USDA RDA Water Loan	2.25%	954,000	3,025	6/22/56
USDA RDA Water Loan	3.125%	<u>1,050,000</u>	<u>3,843</u>	2058
Subtotals		\$ 9,083,000	\$ 31,574	
USDA RDA Sewer Loan	3.00%	\$ 1,000,000	\$ 5,760	2/27/32
USDA RDA Sewer Loan	2.25%	<u>4,989,000</u>	<u>15,816</u>	6/22/56
Subtotals		\$ 5,989,000	\$ 21,641	
Overall Totals		\$15,072,000	\$ 53,215	
Annual Debt Service			\$638,580	

Other Funding Sources that have been spent on Rehabbing Water and Sewer
 Proceeds from Sales Tax Bonds by City \$2.5± Million
 Reserve Funds from Water & Sewer Billings \$4.0± Million
 Total Overall Funding \$21,572,000

Dated October 9, 2020

CITY OF STUTTGART

STUTTGART MUNICIPAL WATER WORKS

David Earney, Mayor

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OFFICE OF:
SUMMERFORD ENGINEERING, INC.
CONSULTING ENGINEERS
ARKADELPHIA, ARKANSAS

FLOW REGULATION POND
OPERATING PLAN
STUTTGART, ARKANSAS
AUGUST 2018

The flow regulation pond at the Stuttgart Sewerage Treatment Plant has a design capacity of 48 MG of storage. The purpose of this pond is to hold excess wastewater flow in the pond until the incoming wastewater to the plant recedes to a point below the 3.5 MGD plant capacity. As the flow recedes lower than plant treatment capacity, then pump wastewater stored in pond back to head of plant for treatment.

The first step will be to place a level measurement device in the pond pump back station to continuously measure and record pond water surface level.

Then the B pumps in the primary pumping station will be monitored for run times; then with rated capacities, the amount of excess flow could be monitored that was pumped to pond

Rain gauges will be placed at the sewer plant and the four corners of the City for measuring rainfall events; then average the amounts for an average for the rainfall event.

The operator will then look at pond level and the treatment plant flow rate when the pond is above minimum level and flow in plant normal. The pump back pumps will be running or they would be turned on to continue to lower pond to minimum level.

The plant operator would be instructed to continually work to lower pond level to minimum level in anticipation of the next rainfall event.

If these plans are followed, the flow regulation pond will allow the sewerage treatment plant to treat all the Stuttgart wastewater without overflowing the pond, except in the most extreme rainfall events or combination thereof.

OFFICE OF:
SUMMERFORD ENGINEERING, INC.
CONSULTING ENGINEERS
ARCADELPHIA, ARKANSAS

**SUPPLEMENT TO FLOW REGULATING POND
OPERATING AND ADDING SLUDGE MANAGEMENT
REMOVAL AND DISPOSAL PLAN WITH MILESTONE SCHEDULE
STUTT GART, ARKANSAS
DECEMBER 2018 - JANUARY 2019**

General Situation Currently:

During the week of December 17, 2018, Stuttgart experienced a 5-inch rain event that caused inflow raising the flow regulation pond level up to maximum capacity but did not overflow the pond levee. The department personnel have installed rain gauges suggested in the original pond operating plan.

The 5-inch rainfall event came with about 3 inches of rain in first 1½ to 2 hours, then lighter rainfall over extended period. The TV meteorologist says the calendar year 2018 is the 4th highest amount of rainfall recorded since records began at about 71 inches total precipitation. Normally, Arkansas receives an average of just under 50 inches; but this year the rainfall is about 20 inches above average and is the root cause for flow regulation pond level being at maximum capacity. The plant operating staff is returning about 1.0 MGD through the treatment plant for treatment and discharge. At this rate, it will take about 30 days to lower the pond level near minimum level without any more heavy rains. This is unrealistic, but the plant staff will continue working to lower pond level barring heavy rains or equipment breakdowns.

Sludge Removal and Disposal Plan:

Another of the aspirating aerators in the flow regulation pond has failed. The wastewater manager has decided to replace the failed aspirating aerator with a Lagoon Master Sludge Activating Aerator. According to the manufacturer's literature (attached), it features only 4 Hp (3KW) at maximum energy use; no propellers or shafts underwater to foul; no belts or gearboxes to break or require maintenance; made of non-corrosive materials of construction--anodized aluminum, HDPE, and stainless steel. Benefits are continuously move the lagoon/pond water along the bottom causing vertical mixing; for complete de-stratification, oxidation and odor elimination; algae bloom reduction; and natural sludge digestion; delivers more dissolved oxygen to the water per hour (15 lbs.); lowers energy costs by up to 80%; practically maintenance free for years; eliminates trapped nitrogen and

ammonia gases; and improves BOD/COD counts. Over 9 million gallons of water movement in a 24-hour period: a) guarantees continual water turnover and de-stratification throughout the lagoon, mixes algae and eliminates blue-green algae stratification and b) moves all the lagoon's sludge in a slow, non-violent manner allowing for sludge turnover for continual degradation by indigenous bacteria. The only maintenance on a lagoon master is to clean two air intake filters annually. c) Quiescent water forces turbulent surface flowing water to fall until it hits the sludge on the bottom. This turbulence on the bottom begins sludge fluidization. Opposite shore turns water toward the intake of the aerator, which pulls 9 million gallons of water through itself per day. This flowing water completes the fluidization of the sludge. The new Lagoon Master Sludge Activating Aerator is due to arrive in Stuttgart in mid January 2019.

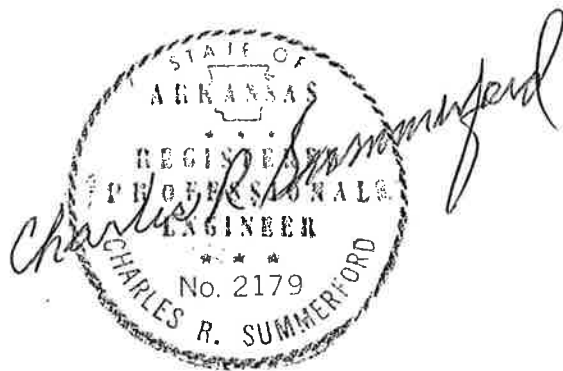
When the flow regulating pond level is down, near low level, the Lagoon Master can be turned on and begin fluidizing the sludge. Subject to the amount of rainfall, it is believed that the Lagoon Master can fluidize the sludge around the Lagoon Master after about a week continuous operation, then start pumping the fluidized sludge at about 100 to 120 gpm into contact basin mixing with cationic polymer and fresh water to improve separation of sludge from the supernatant. The supernatant will flow back into the flow regulating pond. The sludge will continue to a mobile belt press system. Here the sludge moisture will be reduced to 2 or 3% and form sludge cake to be placed temporarily on concrete drying pad for pickup by front end loader and carried to dewatering oven to convert the sludge cake to pelletized Class A soil conditioner and weak fertilizer.

Update on Local Situation:

With the amount of rainfall in December 2018 and continuing into early January, the Flow Regulation Pond is full and in danger of overtopping levee. We understand the manager is preparing to discharge partially treated wastewater to avoid overtopping the levee and will be reporting problems to ADEQ. The weather forecast for tomorrow, January 3rd is for 90% percent chance of rain with a 2-inch accumulation. To successfully remove and treat the sludge, the flow regulation pond needs to be near minimum level, which is not possible with heavy rain every two or three

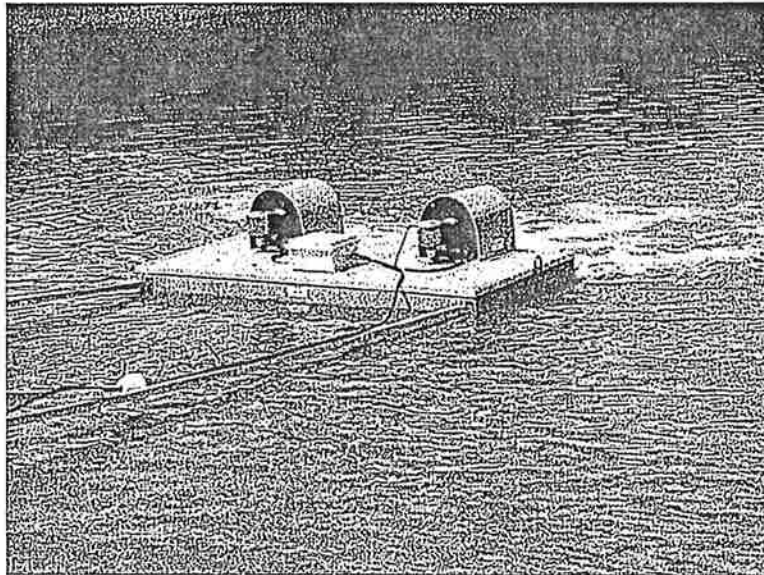
days. The rain pattern must change to drier times and allow about 30 days to pump back wastewater from pond into treatment plant, then begin effort to remove and treat sludge for another two-month period of relatively dry period. If we assume the rainy season changes to dry period in April, it would be possible to start the sludge removal process maybe in June and July with completion about end of August 2019.

OFFICE OF:
SUMMERFORD ENGINEERING, INC.
CONSULTING ENGINEERS
ARKADELPHIA, ARKANSAS



LAGOON MASTER™

Sludge Activating Aerator

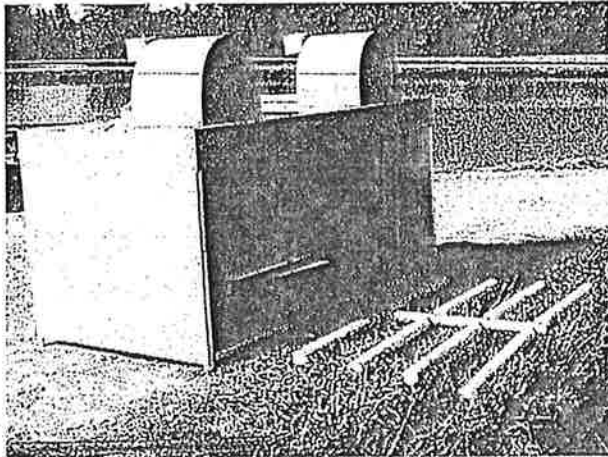


- Utilizes only 4 HP (3kW) of energy per 1 to 4 acres of water
- Moves water along the bottom to slightly lift the sludge and activate it
- Eliminates sludge gas and provides the microbes with oxygen for sludge degradation
- Provides up to 15 lbs (7kg) of DO to the sludge and water column
- Improves water quality
- Reduces maintenance costs

The Reliant **LAGOON MASTER** Water-Moving and Sludge Activating Aeration System is not just an aerator, but it continuously, and slowly, moves water along the bottom of a lagoon/pond delivering large amounts of dissolved oxygen (DO) using a minimum of energy. When compared to standard paddlewheel, vortex, hose diffusion, spray (fountain), or aspirating aerators, the **LAGOON MASTER** is more efficient, less costly to operate, and requires less maintenance.

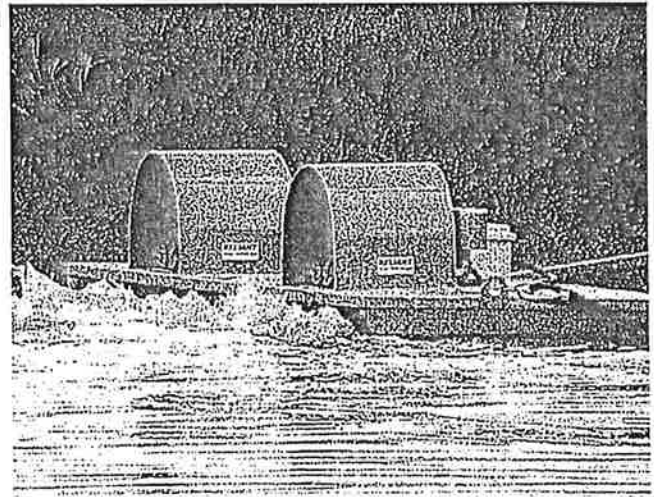
The **LAGOON MASTER** is a two-phase system which utilizes two 2 HP (1.5 kW) regenerative blowers. Phase 1, using one of the blowers, is the water moving phase, continuously pushing water along the bottom within 1 to 4 acres (.4-1.6 hectares) (depending upon water depth) of a pond or lagoon. Phase 2 is a second 2 HP (1.5 kW) blower that provides DO at a rate that exceeds other surface or diffused air aeration systems designed for shallow water ponds or lagoons.

The use of this new, proven, aeration technology will (1) provide better overall water quality through continual oxidation and the elimination of odors, (2) eliminate the zero-oxygen dead-zone on the lagoon/pond bottom, (3) provide constantly moving water to assist in organic sludge breakdown, and (4) provide dissolved oxygen at a controlled rate in order to save energy and oxidize waste gases. One 8' (2.4 meter) **LAGOON MASTER** will move over 9 million gallons (34,100 cu meters) of water in a 24 hour period.

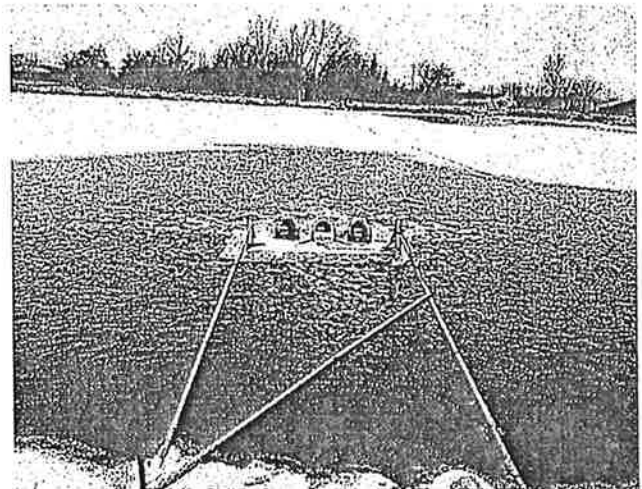


The **LAGOON MASTER** out of the water, ready for installation. Weighing less than 1100 pounds (499 kg), it is simple to install because it floats in less than 5 feet (1.5m) of water depth. It can be tethered to the bank or out in the lagoon, whichever is preferred.

In the water, the **LAGOON MASTER** provides a low profile. Notice that there is very little white water in front of the unit. An unspoken rule never heard from other aerator manufacturers is that "white water is wasted energy and oxygen." This lack of white water speaks volumes of the efficiency of this lagoon water moving and aeration system.



For ponds and lagoons that freeze during the winter, the **LAGOON MASTER** can be provided with an 'Ice Option'. This option utilizes a third blower and an extra external manifold that will provide a continuous bubble curtain around the **LAGOON MASTER** so that it floats normally, even when it is surrounded by ice.

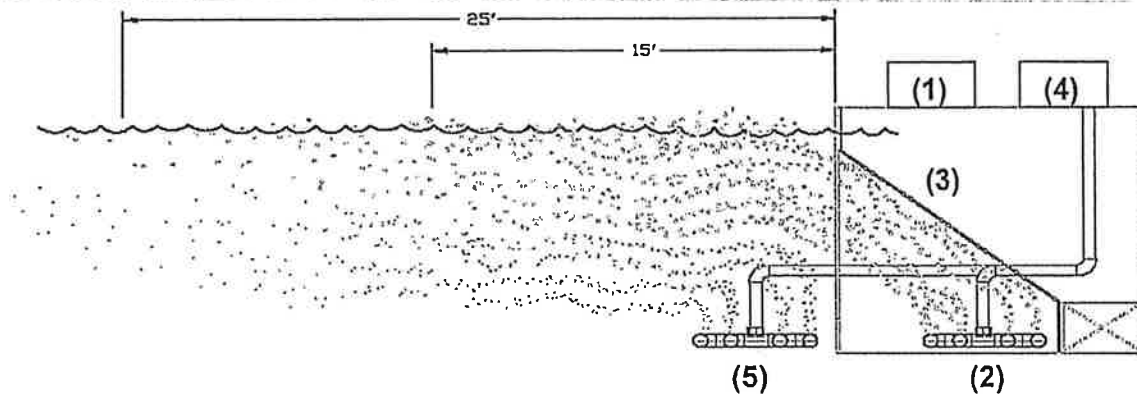


Maintenance



Blower intake filters are stainless steel and only require cleaning once or twice per year, not replaced.

HOW DOES THE *LAGOON MASTER* WORK?

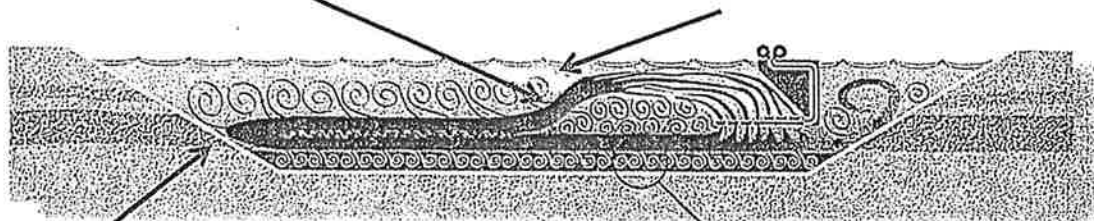


The key, and patented, elements of the *LAGOON MASTER* is its two regenerative blowers, each connected to a set of bubble-forming diffuser grids. The Phase 1 blower (1) runs 24 hours per day and feeds the rear-most diffuser grid (2) which allows large 1-2 cm. bubbles to rise quickly into a 45° baffle (3), pushing water at a velocity capable of moving over 9 million gallons (34,100 cu meters) of water per day. These large bubbles stay on the surface for up to 25' (7.6 meters) in front of the *LAGOON MASTER*. When the Phase 2 blower (4) is initiated, either manually or automatically, it feeds air to the industrial diffuser grid (5) located forward of the base of the *LAGOON MASTER*. The bubbles emitted from the diffusers are approximately .8 mm in diameter. These small bubbles are kept underwater for up to 35' (10.7 meters) due to their inability to rise above the larger, faster and horizontally moving bubbles caused by the primary, coarse bubble diffuser. The 25' to 35' (7.6 to 10.7 meters) of residence time for the small bubbles, at 1 atmosphere of pressure, allows for oxygen diffusion into the water, providing the addition of continuous increases in dissolved oxygen.

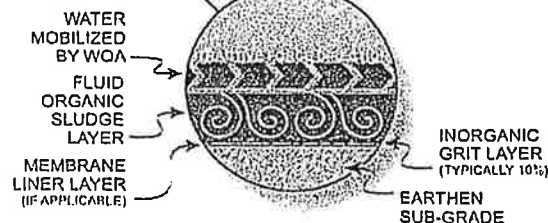
HOW THE *LAGOON MASTER*, IS DIFFERENT FROM OTHER SURFACE AERATORS

QUIESCENT WATER FORCES TURBULENT SURFACE FLOWING WATER TO FALL UNTIL IT HITS THE SLUDGE ON THE BOTTOM. THIS TURBULENCE ON THE BOTTOM BEGINS SLUDGE FLUIDIZATION. (Note how the falling flow of water drops through the oxygenated bubble plume and brings dissolved oxygen to the sludge)

FINE BUBBLES, UNABLE TO RISE ABOVE TURBULENCE OF COARSE BUBBLE FLOW, FINALLY BREAKING THE SURFACE



OPPOSITE SHORE TURNS WATER BACK TOWARD THE INTAKE OF THE AERATOR, WHICH PULLS 9 MILLION GALLONS OF WATER THROUGH ITSELF PER DAY. THIS FLOWING WATER COMPLETES THE FLUIDIZATION OF THE SLUDGE



***LAGOON MASTER* Lagoon/Pond Aerator**

Features

- Only 4 HP (3 kW) at maximum energy use
- No propellers or shafts underwater to foul
- No belts or gearboxes to break or require maintenance
- Non-corrosive materials of construction—Anodized aluminum, HDPE, Stainless Steel

Benefits

- Continuously moves the lagoon/pond water along the bottom, causing vertical mixing, for complete de-stratification, oxidation and odor elimination, algae bloom reduction, and natural sludge digestion.
- Delivers more dissolved oxygen to the water per hour
- Lowers energy costs by up to 80%
- Practically maintenance free for years
- Eliminates trapped nitrogen and ammonia gases, and improves BOD/COD counts

ADVANTAGES OVER OTHER LAGOON AERATION SYSTEMS

- Less energy usage on an annual basis - per area covered.
- Over 9 million gallons (34,100,m3) of water movement in a 24 hour period.
 - Guarantees continual water turnover and de-stratification throughout the lagoon – mixes algae and eliminates blue-green algae stratification.
 - Moves ALL the lagoon's sludge in a slow, non-violent manner – allowing for sludge turnover for continual degradation by the indigenous bacteria.
- No annual motor maintenance—oil changes, belt changes, etc. The only maintenance on a ***LAGOON MASTER*** is to clean two air intake filters annually.
- The addition of up to 15 pounds (6.8 kg) of dissolved oxygen per hour.

THE *LAGOON MASTER* LAGOON/POND AERATOR

Finally, a lagoon or pond aerator that is designed for function rather than power.

The ***LAGOON MASTER*** Water-Moving Aerator provides the ability to re-habilitate waste lagoons by providing a cost effective way to break-down sludge naturally, using minimal energy, and putting aeration throughout the water column – where it is required. Algae blooms are reduced and DO is continuously provided to the bottom sludge to enhance natural organic digestion.

ASK US ABOUT OUR MUNICIPAL/INDUSTRIAL LEASING PROGRAM

RELIANT

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