

Camaloch Association

The operation of (some history and possible ideas for the future):

“Smith Lake”

Smith Lake is a man-made lake that is solely owned and managed by the Camaloch Association. The lake functions as both a surface water retention pond for irrigating the golf course and for membership enjoyment for fishing, boating, etc.

The lake is approximately 9 acres in size, and is approximately 13 feet deep at the deepest when full. The eastern third of the lake is much shallower than the western two thirds. The deepest area is about one quarter of the way in from the western shore.

There is an overflow outlet at the western end of the lake that allows excess water to flow out from the lake through a culvert pipe system into and through the golf course ponds on the golf course before exiting the Association property into the roadside ditch on Shumway Road. There is a plumbed in 4” valve system within the overflow outlet that is designed (when opened) to allow the lake to fill to a point 8 inches shy of being full. There are also two overflow relief/drain points on the topside of this system that allows for a much greater volume of water to be released before spilling over the dike/dam (and then flowing down into another open drain location near the Chalet). This system allows for the heavier winter rains to be held back in the lake, and then released more slowly into and through the golf course ponds system, which also serve as additional retention ponds themselves. Depending on the long term weather forecast, the valve should be closed around the end of February (after the winter rains) and allowed to fill to maximum capacity for the upcoming season. Then in the early fall with the lake level well below the outflow piping, the valve can be reopened in anticipation for the coming rainier winter season again.

The Association is capable of irrigating the golf course from two sources. 1.) The normal method by pumping directly from Smith Lake. 2.) The pumping directly from the community’s domestic system.

Should there be a need to irrigate from the domestic system (in the spring before the irrigation draw piping is re-installed into the lake, or while treating for aquatic weed control), the domestic system can handle a limited amount of the irrigation, usually enough for the greens only. A line from the domestic system is plumbed into pump house at the lake (be advised, there are two back flow preventers in place to prevent any back flow).

Natural evaporation in combination with irrigating the golf course causes the lake level to drop. During the summer peak season the lake level may drop by $\frac{3}{4}$ of an inch per day. The Association offsets much of this drop by pumping $\frac{1}{2}$ an inch of water back into the lake from the domestic system through plumbing for that purpose at the pump house at the lake.

To be good stewards of our water and not pump unnecessarily from our aquifer, we try to pump the lake level down by about $2\frac{1}{2}$ to 3 feet. Rainfall then replaces this throughout the winter months. We are capable of pumping the lake down by closer to 5 feet, but it would cause the eastern third of the lake to be too shallow, and also create many more problems from aquatic plant growth, too high of water temperatures contributing to algae blooms and even fish kill. Not to mention the unsightly look and possible odors, not a good scenario for the members and their guests to look at, let alone prospective buyers.

In the future, the Association would benefit by adding another well at the east end of the lake (solely for the purpose of adding water into the lake), thereby removing the current limitations/restrictions with use from the current domestic system. If added, the well should be located (if possible) to the side of the property to minimize future possible uses for the lot.

In the future, the Association would also benefit by raising the dike/dam level by one foot, which would greatly help to keep the lake healthier. At this time it appears this could be done without greatly adversely affecting any of the lot owners on the lake, however some opinions might differ (especially where existing drain fields are concerned).

Additionally of great benefit in the longer term future (should sewers ever become a consideration or possibly mandatory some day?), the lot at the east end of Smith Lake should be retained by the Association for a potential possible future site for a treatment facility at that location. Technologies have now come along that would allow the Association to capture and re-use for golf course irrigation purposes, much of, if not most of the water now consumed by the membership throughout the year.

Aquatic weeds control: The Association currently uses Aqua Technex of Bellingham at (360) 527-5349 for our lake/ponds weed control treatments. Smith Lake has usually required treatment for aquatic weeds (pond weeds, milfoil, lily pads, etc.) from every two to three years, to every year for two or three years to get control depending on conditions. The optimum treatment time is in the springtime when the lake water temperature get over 60 degrees (mid to late April) for best results, and because the irrigation demand at that point can be handled by the domestic system since there is usually a restriction on irrigating (depending on the product used).

Fish in the lake: Every year we have planted trout that are 11+ inches in size obtained from J & D Fisheries in Darrington (360) 436-0274. Planting these larger fish about two to three weeks before the fishing derby (late March, early April) allows the fish to acclimate to the lake, and insures they'll be ample opportunity for the kids to catch a fish. The larger fish have a much greater chance of surviving the cormorants that frequent the lake. The practice of planting 6 inch trout (many years ago) in the fall; caused the population to be decimated by the cormorants. There are two predators that can wipe out a fish population, they are cormorants and otters. From bird banger exploding blank shells to powerful laser pointers, we have always made every effort to keep them out of and off the lake. The same persistence has kept the geese off of the golf course for many years now too! **Grass carp:** The Association planted triploid (sterile) carp in Smith Lake several years ago, they're numbers have now dwindled and only a few remain. If replanted you must make sure to not over populate the lake, as too many can turn the lake brown as they churn up mud. Carp will do a decent job on eating the weeds, but they usually don't eat the weeds you're trying to get rid of until eating the other weeds first.

Water oxygen level of the lake: The benefit of maintaining the oxygen levels in Smith Lake are twofold. One, the fish like it better and are more active, and two, mother nature's microbes work much harder breaking down the organic materials that are constantly being introduced into the lake from (leaves, twigs, fertilizer runoff from homeowners, not to mention the fecal matter from water fowl and even the fish). The Association purchased a Supersaturated Dissolved Oxygen System (SDOX) machine (new technology at the time) that will draw water from the lake, inject/fortify it with liquid oxygen and then return it into the lake with little to no loss of the oxygen to atmosphere. This machine has proven to be successful in substantially raising the oxygen levels in the water in the lake, and (through our golf course irrigation system) be transferred directly into the golf course ponds. Manuals for this machine are in the office and one is with the machine itself. A detailed operating procedure is also with the manuals and included as a part of the overall OPERATIONS HANDBOOK.

Here is a helpful correspondence from Scott Osborn regarding the DO level:

Scott Osborn, Ph.D., PE
President
BlueInGreen, LLC

A DO of 6 mg/L should be sufficient for the ecosystem of the pond and any oxygen much beyond that will not likely be helpful. Make sure you measure the DO in a worst case location, which will be on the bottom of the lake at a deep section. The DO could be 12 near the surface and be below 6 at the bottom. You probably have already done this, but it may be worthwhile to poke around with the DO probe and find where the lowest DO location is and monitor from that point to make sure you are making the DO acceptable there. Then the rest of the lake will be good. Forgive me if I am explaining something that you know. It is important to realize that the DO in the pond fluctuates because of the algae in the water (even if the SDOX is not being used). During daylight hours, the DO will increase and usually peak in the afternoon and can get very high (15 mg/L at the surface). Once it gets dark and sun is not shining directly on the pond, the algae will consume oxygen and the DO will drop. The lowest DO will be on the bottom of the lake right before the sun comes up. This is the key reading that you want to keep above 6 mg/L so that you don't threaten the fish or cause odor problems and you maximize your ecosystem processing in the lake.

What you want to do is oxygenate the lake so that the DO in the worst case location never goes below 6 mg/L. As long as your DO is below 20 to 25 mg/L, it won't hurt the fish since you are adding pure oxygen. If you were adding air, you could get into trouble by adding too much dissolved nitrogen (which is not present in the liquid oxygen LOX). One easy way to manage this would be to oxygenate the lake to a high enough DO before you go home for the day and then check the DO when you get in in the morning. Experiment with what DO level in the evening will keep the DO from dropping below 6 mg/L at the worst case location just before sunrise the day after your treatment. You may be able to oxygenate to a specific level and the DO will be above 6 mg/L at the worst case location for several days, so keep an eye on it. This could save you on operating costs.

Scott

The Association has been testing the DO level in the lake from the dock located at the west end; the test kit is located in the pump house at the lake. A water sample is taken from a depth of 5' which is then tested and the results recorded on a spread sheet in the office along with the additional information of the surface water temperature, the water temperature at the bottom and the outside air temperature. The date & time, weather and general overall condition (scale: 1 good to 10 bad) of the lake at the time are also recorded for future analysis. Thus far, we believe the water temperature appears to be the biggest determining factor for triggering the algae blooms. Therefore the shallower the lake water, the warmer it gets and is more conducive to algae formation. FYI, in Smith Lake, the water temperature at the surface is usually about 2 degrees warmer than as tested at the bottom at the dock. There is a definite benefit to keeping the lake water level deeper and cooler. When the lake water temperatures approach and rise above 70 degrees is when we start to see the algae formations begin.

Camaloch Association, Inc.

Operating Procedure for: Supersaturated Dissolved Oxygen (SDOX) Machine

This Machine draws water from the lake, injects liquid oxygen into it and then returns this super oxygenated water back into the lake. This supersaturated oxygenated water then causes the naturally occurring beneficial microbes to become super active in working to consume the organic materials (leaves, twigs/branches, lawn clippings, fertilizers and other debris) that wind up in the lake.

The oxygen tanks are obtained from Praxair Distribution Inc. in Everett (425) 250-0188. They deliver to Stanwood on Wednesdays and will deliver to us then too (usually in the mid to late mornings). These tanks (each) contain enough oxygen to significantly raise the oxygen level in the lake. Since gaseous my nature, this tank will naturally off-gas by itself, reportedly it will lose 1½ - 2% per day when not being used.

To ready for startup: Simply close the valve left open above the bucket.

Startup Procedure:

- a.) Hook up oxygen tank (open valve on tank).
- b.) Close large line discharge valve located on exit water pipe/line.
- c.) Prime the intake line by connecting water hose from within pump house to the hose bib attached out front before the pump, and turn on water.
- d.) Turn on the power by flipping up the large circuit breaker alongside the circuit box panel.
- e.) Push and hold the green start button (it may take a minute or more for the prime to take hold). If the unit stops when the start button is released, repeat the process. You're looking to get the water to fill the large mix tank to half full (see the water level in the glass tube/window).
- f.) When the water level shows half full, open the large discharge valve slowly to full open.
- g.) The pressure regulator is set and shouldn't need adjusting. There are sensors in the tank that turn the oxygen flow on and off to the system. When the tank fills to slightly above half full a sensor will turn on the pressurized oxygen which will slowly work to push the water out of the tank. When the tank's water level gets slightly below half full another sensor will shut off

the pressurized oxygen, which then allows the tank to again begin to slowly refill. This process will then repeat over and over until the oxygen/pressure in the tank is depleted. There are additional safety sensors that shut the system down when the tank gets too full or too empty. At startup, the tank tends to fill well beyond the half full mark and it is usually necessary to reduce the volume into the tank (maroon gate valve) until the pressure builds, pushing the water level lower. The equalization process usually takes about 5 – 10 minutes to slowly return the gate valve back to its usual setting.

- h.) Once settled out and in normal operation, close the hose bib valve from the primer hose. Remove the hose and return to the pump house, and **(important)** be sure to disconnect the hose from the source connection within the pump house.
- i.) When shutting down the system with the intent of restarting it within a week or two, to keep the mix tank from draining, close the valve on exit water pipe/line and then push the “Red” shutoff button on the front of the circuit panel box, then flip the circuit breaker arm to the off position. Closing the discharge valve maintains the water level in the mix tank so it won’t have to be refilled again. The intake line usually maintains its prime for quite some time, however should the prime have been lost when restarting, simply repeat steps (c.) & (d.).

Winterization Procedure:

- a.) Open (and leave open) the discharge valve on the exit side.
- b.) Open the valve atop the line between the pump and the mix tank, this will allow the intake line and pump to drain. Also open the hose bib gate valve (used for priming).
- c.) Place the bucket under the valves beneath the glass tube/window, open both to drain, then close.
- d.) Place the bucket under the lowest valve beneath the line between the pump and the mix tank, open valve and drain. Empty bucket, then replace beneath opened valve and leave throughout the winter.
- e.) You’re done!

Smith Lake; continued:

The Association paid for and self-installed a lake aeration system designed by Vertex Water Features from Florida in the summer of 2006. The system is designed to circulate the water in Smith Lake and help prevent temperature layering within the water column.

The double compressor pumps for the system are housed in a metal cabinet located inside the pump house at the west end of Smith Lake. Four weighted air lines (two from each compressor) extend out into the lake to separate diffuser stations (see following two pages). These diffuser stations are spread out across the lake in a manor designed to best aerate the lake.

This extremely low maintenance system, requiring only periodic checking and even less maintenance. Vertex reported to us that these systems can operate for several years before needing any maintenance. We have two maintenance kits (one for each compressor) located in the pump house. When a kit(s) are used, replacements are ordered from Vertex and placed on the shelf for the next time.



Vertex Water Features

Lake Aeration Systems & Floating Fountains

With
Vertex
MicronBubble™
Technology

B O T T O M A E R A T I O N



AIR 4XL™

The Vertex Air 4XL™ is a super-efficient, affordable and safe system for circulating up to 32,760 GPM. In a typical lake with 8 foot depths, an Air 4XL™ can aerate approximately 10 acres depending on dissolved oxygen demand and other factors. Two 1/3 hp piston compressors, housed in our rustproof outdoor cabinet, feed four bottom mounted AirStationXL™ Diffusers each utilizing Vertex's MicronBubble™ technology. The majority of bubbles are only 500 to 1000 microns in diameter. As bubble size decreases, oxygen transfer rates increase dramatically. The rising force of millions of bubbles circulates the entire water column, entraining bottom water up to the surface allowing vital oxygen to be absorbed. Oxygen levels are increased and kept constant throughout the entire lake, preventing drastic O₂ swings that can lead to fish-kills. With no electricity in the water, Vertex's aeration systems are safe for any type of water recreation. Our self-cleaning AirStationXL™ Diffusers allow for years of high performance, reliability, low maintenance and are covered under our five-year warranty.

Features

AIRSTATIONXL™

- ◆ Sixteen 9" flexible membrane discs with MicronBubble™ technology
- ◆ Self-cleaning, low maintenance, & five-year warranty
- ◆ Rugged EPDM construction
- ◆ Four vacuum formed & sonic welded HDPE base units
- ◆ Hollow design for sand ballast
- ◆ Lipped edge prevents sinking into soft bottom sediments

BROOKWOOD™ COMPRESSOR

- ◆ U.L. listed
- ◆ (2) 1/3 hp for exceptionally low monthly electrical costs
- ◆ Thermal overload protection
- ◆ 115 volt operation
- ◆ One-year warranty

QUIETAIR™ CABINET

- ◆ "Class A" GFCI protection on all circuits
- ◆ Powder coated for durable, attractive finish
- ◆ Heavy duty cooling fan rated at 290 CFM
- ◆ Rustproof aluminum construction
- ◆ Easy plug-in connection to waterside electrical service
- ◆ Equipped with barrel lock for increased security

BOTTOMLINE™ TUBING

- ◆ Self-weighted for easy installation
- ◆ Heavy duty wall thickness (0.24") for durability
- ◆ Available in 100' increments
- ◆ Remains flexible in cold temperatures

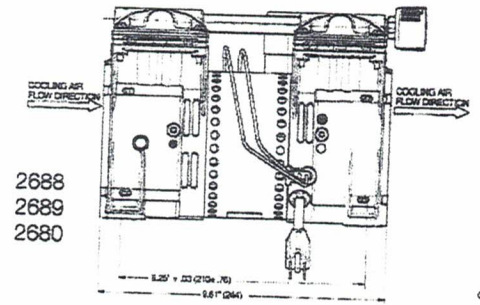
BENEFITS TO THE LAKE

- ◆ Air4XL™ systems circulate the entire water column — up to 32,760 gallons per minute depending on diffuser depth
- ◆ Increased dissolved oxygen
- ◆ Stops oxygen related fish kills by raising entire water column oxygen levels
- ◆ Reduces nutrient levels and associated algae growth
- ◆ Ends thermal stratification
- ◆ Improves fisheries by expanding oxygenated habitat
- ◆ Reduces aquatic midge and mosquito insect hatches
- ◆ Eliminates foul odors from undesirable dissolved gases
- ◆ SAFE — no electricity in the water and full GFCI protection on all circuits

specifications: Air 4XL™ lake aeration system

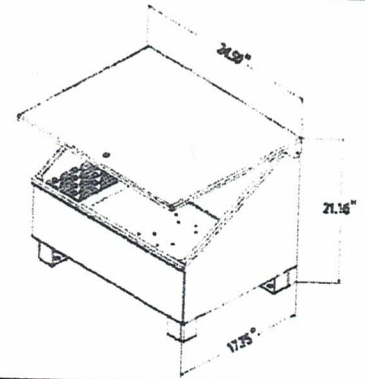
BROOKWOOD™ COMPRESSOR

(2) 1/3hp, 115v, 1 phase. Piston type built for continuous operation and equipped with thermal overload protection. Unit shall be oil-free and require no scheduled maintenance other than periodic cleaning of included air filter. Piston cups shall be carbon type for automatic adjustment and lubrication during operation to maintain optimum compressor efficiency. Unit equipped with a muffler for quiet operation, four brass outlet valves for regulation of airflow and brass pressure relief valve to prevent excessive wear on the compressor. Compressors shall produce 8.8 CFM @ 20PSI, 10.6 running amps @ 115 volt.



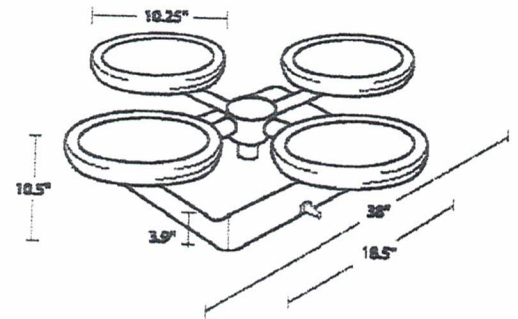
QUIETAIR™ CABINET

Enclosure comes equipped with barrel lock for security, fully gasketed and constructed of aluminum with gray electrostatically-bonded powder coating to provide lifetime warranty against rust. Enclosure furnished with stamped ventilation or grill to insure forced air circulation and an integral cooling fan with thermal protection, producing 290 CFM to guard against excessive compressor operating temperatures. Cabinet provided with HDPE mounting pad (24" x 24" x 2"). ENCLOSURE COMES WITH CLASS A GFCI PROTECTION ON BOTH THE COMPRESSOR AND FAN CIRCUITS.



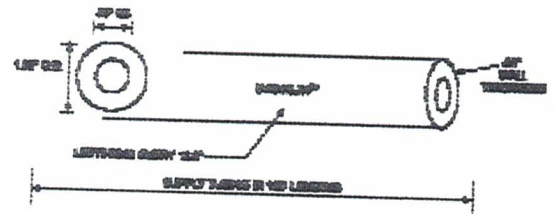
AIRSTATIONXL™ ASSEMBLY

Diffuser station shall consist of four self-cleaning, 9" diameter, flexible membrane diffusers of EPDM compound with 100% rebound memory, each producing millions of fine 500 to 3000 micron bubbles – the majority 500 to 1000 microns. Each diffuser station shall be equipped with vacuum-formed HDPE base, sonic spot-welded to provide unit integrity. Base unit (17.25"L x 13.25"W x 3.35"D) shall be of hollow chamber design for the addition of inert pea gravel ballast and have lipped design to prevent settling into soft bottom sediments.



BOTTOMLINE™ SUPPLY TUBING

Self-weighted, direct burial submersible tubing for connection from compressor to diffuser stations. Tubing shall be of flexible PVC composite construction for use with standard PVC solvent weld cement and 0.5" insert fittings. Tubing shall have 0.55" I.D. and 0.24" wall thickness for long term durability and protection against punctures. Remains flexible in cold temperatures.



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Install all electrical equipment in accordance with Article 680 of the National Electrical Code and all local codes. Vertex Water Features reserves the right to improve and change our designs and/or specifications of our aerators without notice or obligation.
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ation Design

Street

Satellite

Station
Air Cabinet
Line Tubing

500'

700'

900'

1100'

0ft

100m

