



THM Removal Systems Comparison Table

	Medora Corporation GridBee® Spray Aeration THM Removal System	Competitor Spray Aeration THM Removal System (modified wastewater floating aerator)	Competitor Passive THM Removal System (water mixer plus a fan in the headspace)
Anchoring, to Prevent Machine from Spinning & Wrapping up Power Cord	<p>The floating THM stripping machine weighs approx. 400 lbs. Since most weight is beneath the floats, it is stable. Only a small rotational torque is generated, which is easily handled by two pendulum weights suspended from the ceiling.</p> <p>There is no need to make any holes in the floor of the tank, and the simple pendulum cables have not had any headspace corrosion issues.</p>	<p>The floating aerator weighs approx. 1100 lbs. Since much of the weight is above the floats, it is top-heavy. The top-heavy nature can cause a tipping and “motorboat” effect with large rotational torque generated. To counteract the torque, these aerators need long tethers, used in wastewater systems or, like the first potable tank models, two very sturdy vertical sliderrails and a hatch above each machine.</p> <p>The latest mounting system consists of two floor-to-ceiling cables. It may not have the long-term strength needed to hold the machine in place, and also is apt to have headspace corrosion problems at the sliding spring tensioner near the ceiling.</p> <p>Also, with either the slide rails or cables, the tank needs to be drained and dried out for installation so that the floor anchors can be put into place.</p>	<p>A small tripod water mixer is fastened to the floor so it does not “walk around” in the tank. The mixer may require holes in the floor or welding to the floor. One or more roof openings are made to mount fans to clear out headspace air more often.</p>
ANSI/NSF Certification	Yes, contaminants are so low that these spray aerators can be used in tanks down to 10,000 gallons in size.	Yes, but these aerators are limited to tanks 100,000 gallons and higher.	Yes, for mixer, the fan does not need it since is not in water.
Cost	Lower, the most cost effective solution for THM removal. Just one vendor involved.	Higher, more vendors in the supply chain buying and reselling the same items.	Low cost to match low performance, just passive THM removal with no added surface area from spray droplets or air bubbles.
Draining the Tank for Installation/Placement	No need to drain the tank, units can be placed into the tank with the tank still on-line.	Need to drain the tank for machine placement and to install the bottom anchoring system.	Need to drain tank for installing mixer(s) at bottom, or else use divers. May also need to take tank offline for fan installation.
Droplet Size, Effectiveness	The best nozzles in the industry are used, with uniform droplet sizes and the highest possible surface area. Droplets have the same “hang time” regardless of how full the tank is.	Droplets of all sizes are produced, many of which are too large for effective THM volatilization. Also, when the tank is full, some droplets hit the roof.	No droplets. It is based on using the existing surface area of the water in the tank, but renewing the surface area more often to try to get THMs exposed.

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Energy Usage	The best in the industry. Each machines has an efficient pump, operated continuously at the most efficient operating point, and the nozzles are the best in the industry for maximum THM volatization. Also, water from the bottom of the tank, which usually has the highest THMs, is continuously being sent to the nozzle.	There are inefficiencies caused by droplets not being uniform in size, and some droplets hitting the ceiling of the tank. Also, importantly, the suction side of the aerator draws in shallow water from 2-6 ft below the surface, and which likely had been treated earlier, instead of pulling in untreated water from the bottom of the tank, so less THMs are removed compared to drawing in untreated water.	Low energy to match low performance. Just a mixer and a fan.
Equipment Basic Design	These machines were designed from the ground up for THM removal. They have energy efficiency, reliability, no regular maintenance requirements, and a long life.	These machines were designed for adding oxygen to outdoor wastewater basins. They were adapted to try to overcome corrosion and tethering problems when used in potable tanks. They require regular maintenance several times per year, by tank entry and/or by removal from the tank.	No special equipment for THM removal, just use mixer in water and fan in headspace.
Erosion Damage to Ceiling and Walls	No damage. The spray nozzles are about two feet above the water, and spray downward and radially outward. The spray pattern is mostly contained within the float footprint, which is about 10 ft diameter.	Damage is possible. The spray is uncontained and can cause erosion problems, particularly on the ceiling when the tank is full.	No damage.
Factory Service & Support	Medora's engineering department is available at all times to provide support for the machinery, controls, and SCADA connectivity. In addition, Medora has 12 field service crews in the US that can place and service its GridBee THM removal systems.	Less support.	Less support.
Hatch(s) Required	One hatch per tank, regardless of how many machines are in the tank, @ 24-inch diameter minimum.	Multiple hatches per tank, one for each machine @ 36 inch diameter minimum.	One hatch to get mixer into tank. Plus one or more openings in roof for adding fans.
Headspace Required	30 inches or less, so virtually the entire tank volume can be used.	60 inches, so part of the tank capacity is often lost.	Minimal, just enough for fan(s) in roof.
Maintenance	None	The motor requires new grease lubrication several times per year, either by tank entry and/or by removal and re-installation of the machine.	The tripod mixer has a short life, will need changing periodically.
Motor Cooling	The submersible motor is located in cool water, plus the intake hose directs the nozzle flow past the motor for proper cooling.	The above-water motor is subect to headspace conditions which can be extremely hot (over 100°F), humid and corrosive.	Tripod mixer is prone to motor failure, could be a cooling issue but most likely is caused by large over-hung load of the propeller.
Motor Corrosion	None. The submersible 316L stainless steel mo- tor is under the water, so there is no corrosion.	The above-water motor was not made to handle the severe corrosion and humidity found in the headspace of potable tanks. Though it is sheathed in 304 stainless steel, it is still likely to have corrosion problems.	Information not available.
Plugging or Clogging	No plugging of the spray nozzles has ever occurred.	This is a wastewater solids handling machine, so plugging is not likely.	Plugging is not likely.

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Responsibility for Results	Medora has sole responsibility for the system design, equipment performance, usually the placement of the equipment, and all results; everything except the power wiring performed by a local electrician. So there are usually no “gray” areas of responsibility; if a problem arises, Medora will solve it.	Responsibility is “shared” between the design company, the wastewater equipment manufacturer, the contractor that installed the equipment, and the local electrician. Often “shared” responsibility means “no” responsibility if a problem arises.	For a guarantee of performance, customer needs to show conditions matched exactly the design parameters calling for little flow-through and only light THM removal.
Removal %	Any % of THM removal can be designed for.	Actual results can vary due to design problems, mentioned below, relating to tank inflow and the water source for the aerator.	Very little THMs removed. This system only works for tanks with little or no turnover, and/or systems where only a small reduction of THM is required. In general, new water will enter and leave the tank without ever being treated since the bottom 3 ft of the tank is never even mixed.
Sizes Available, HP per Unit	Available in 3 to 15 hp per unit. Multiple units usually required on large systems.	Available in 1 to 15 hp per unit. Multiple units usually required on large systems.	One small mixer and one small fan, but multiples may be recommended.
Tank Inflow Rate Design Issue	All systems pull the entire tank inflow water off the floor and send it upward, into either the nozzle spray (by the THM removal machine, first choice) or else into the prior-treated water (by supplemental mixers). No new water can ever enter the tank and then leave the tank without being treated. Operating results have been strong, usually far exceeding expectations.	The aerator only pulls in shallow water from near the top of the tank and the supplemental mixers on the floor may not match the incoming flow rate to the tank, and do not pull in the bottom 3 feet of the tank water. The combined result is that much of the tank inflow water may not be treated before it is sent back out into the distribution system.	The mixer does not affect the bottom 3 ft of the tank, so new water enters and leaves the tank without any mixing or THM reduction. No attention is paid to the inflow rate to the tank versus the mixing that occurs from 3 ft upwards. Net result has been very poor outcomes in all but the smallest systems.
Trust by the Industry	The overwhelming choice for THM removal in the US. Hundreds of systems have been installed. All are meeting or exceeding expectations. Regular repeat sales occur with cities and engineering firms.	Fewer systems installed.	Fewer systems installed.
Ventilation System	One or more GridBee 2 hp regenerative turbines are supplied for most tanks; can also supply tank or ground-mounted 3-5 hp turbines.	Often need one large fan opening above each aerator.	One or more fans.
Water Source for the Spray Nozzles	The spray nozzles are always supplied with water from the bottom of the tank, which is usually where the new untreated inflow water accumulates. Since this is the highest THM water, the nozzles can strip the most THMs from this water. The end result is faster and more consistent THM reduction by the nozzles	The aerator pulls water in from only 2-6 ft below the surface. So water which was treated earlier can be a large share of the water being pulled into the aerator again, which lowers the stripping efficiency. Some water near the surface may be treated 3 times while other water, for instance the bottom 10-20 feet of the tank which might be high-THM inflow water, may never be treated before it is sent back into the distribution system.	No spray nozzle is involved, there is no increase in surface area of the water.
Warranty	100% satisfaction guarantee, two year equipment warranty.	Equipment warranty varies.	Usually very poor, and usually applies only to a minimal THM reduction. Customer will likely need to prove compliance with the design conditions of little or no flow through the tank. Vendor may not return calls when system fails.