

**DO2E PATENT  
AERATION TECHNOLOGY  
FOR  
ENVIRONMENTAL REMEDIATIONS**

**By:**

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**Abstract:**

**This is an introduction to the DO2E Patented Advanced Aeration technology. Perhaps the most technological advancement in aeration in over 70 years. We will discuss how this technology works along with a variety of applications including: environmental remediations, polishing ponds for municipal and industrial sites. The unique advantages of this patented technology are examined at length.**

**The DO2E Aerators are designed to aerate and mix various water impoundments or streams and at virtually any depth. These may be in wastewater lagoons, tailing ponds, reservoirs, waste-streams, waste**

**treatment plants, or elsewhere. They may be equipped with an ozone delivery unit for advanced aeration. The primary functionality of these Aerators is to; 1) deliver dissolved oxygen to water columns, and 2) cost effectively move high volumes of water from various water depths. These aerators can be easily modified to effect a variety of other outcomes such as, On-site sludge digestion, Oxidation of heavy metals, removal of H<sub>2</sub>S, pharmaceuticals, Odor Control, BOD & COD reduction, environmental remediation, algae removal, only to name a few. In most of these cases, ozone can add to target a specific remediation. An ozone system is easily added and highly desirable addition to this particular remediation. Example; In a similar situation, toxic sludges may cause a problem by the release of noxious compounds, usually H<sub>2</sub>S. Ozone rapidly removes hydrogen sulfide via oxidation.**

**Ozone also referred to as Advanced Oxidation Processing or AOP react in the GASEOUS state almost**

**instantaneously with hydrogen sulfide. In most, if not all, sulfide-containing sludges, the sulfides are in STABLE metallic compounds.**

**Sulfides are insoluble in most wastestreams arising from sludge deposits. Properly mixed, prevelant ones are easily oxidized by even a small amount of ozone.**

**These aeration units are equipped with a mixing chamber and air manifold system that is exclusive to them. These Aerators draw water at a minimum depth of 46" (3.833' or 1168 mm), sending it through the air-mixing chamber where it is injected with atmospheric oxygen. Then, the effluent is then discharged into the surface column of water. This mixing enables destratification of the liquid column. Regenerative Air Blowers are employed as the source of Low Pressure, High Volume air flow and is used for injecting atmospheric oxygen. The combination of air pressure and water pressure with in the confines of the air chamber, maximizes the oxygen transfer efficiency.**

**A combination of coarse and fine air bubbles are used for dual reasons: (1) The fine bubbles result in maximum O<sub>2</sub> transfer, and (2) the coarse bubbles increase the velocity at which the air bubbles move through the mixing chamber. The velocity of the water moving through the mixing chamber is a function of several factors; 1) blower output 2) manifold modifications, 3) bubble selection, 4) water density, and 5) temperature. Enhanced velocity further increases the oxygen transfer. As the bubbles travel up and out of the chamber, the void created is filled with water entering from the bottom of the aeration chamber, creating a Venturi (vacuum-type) system. Design modifications have been added to the lower intake chamber to prevent it from becoming clogged with rags.**

**This highly oxygenated water increases in density, and the horizontally directed effluent from this stream results in a deep-water drawing effect. The specific curvature within the mixing chamber results in highly accelerated discharge**

**of the effluent stream propelling them both vertically and horizontally. The combination of air pressure and water pressure released within the confines of each chamber maximizes the oxygen transfer rate. This unique combination along with the high volume water flow makes this patent technology the most advance aeration technical break through in over 70 years. In summary, these Aerators draw water in from lower water levels, injecting it with atmospheric O<sub>2</sub> or Ozone, and discharging it horizontally at the surface.**

**Most other aeration systems use mechanical aeration, often referred to as "surface aeration." Surface aerators only aerate the top 4'-5' of the water column, but they are incapable of remediating sludge deposits from the bottoms of lagoons or other water impoundments or streams. Mechanical aerators are expensive to operate and maintain. Steel blades and other moving parts associated with mechanical aerators are a danger to humans, wildlife and are NOT**

**environmentally friendly.  
The DO2E Patent aeration technology  
addresses all the aspects of aeration  
and mixing with minimal cost and  
maintenance.**

**About the authors:**

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