

ECO₂ COMPANY PROFILE

Water Quality — Lake and River Oxygenation

ECO₂ SuperOxygenation systems for water and wastewater treatment are designed and produced by Eco-Oxygen Technologies, LLC, an independent company headquartered in Indianapolis, Indiana. The technology is the pioneering effort of Dr. Richard Speece, Centennial Professor Emeritus of Civil and Environmental Engineering at Vanderbilt University, who invented the Speece Cone, a device originally used to add oxygen to the bottom of lakes to enhance downstream fisheries.

The Speece Cone is part of **ECO₂**'s innovative SuperOxygenation system now in use across the country solving lake and river oxygenation, industrial and municipal water problems. **ECO₂** systems are an economical method of supplementing the oxygen in impaired lakes and rivers and meeting Dissolved Oxygen discharge compliance requirements.

Conventional aeration systems elevate D.O., but at prohibitively high energy costs and with limits to the D.O. boost that can be achieved. The **ECO₂** SuperOxygenation system achieves D.O. concentrations of 40 to 150 mg/l with 90% oxygen absorption efficiency. With this system, it is now possible to pull a small sidestream from a river or lake, superoxygenate it and dilute it back into the main river or lake to satisfy D.O. deficiencies without treating the entire body of water.

The **ECO₂** SuperOxygenation system can be installed in a small footprint, in a lift station, adjacent to an effluent tank, above or below water lines or even mounted on barges which can then be moved wherever and whenever needed. The flexibility and efficiency of the **ECO₂** system make it the technology of choice for meeting D.O. discharge requirements and aiding in the recovery of impaired rivers and lakes. The **ECO₂** SuperOxygenation system, a simple process with no chemicals and no moving parts other than standard industrial water pumps results in a robust, reliable, flexible, economically competitive and environmentally-friendly technology.



GPA Savannah Harbor ReOx Demonstration Project

*The Savannah Harbor demonstration project, being done in conjunction with MACTEC Engineering, includes barge-mounted **ECO₂** SuperOxygenation cones with the goal of mitigating the oxygenation capacity lost due to the planned Harbor deepening project.*

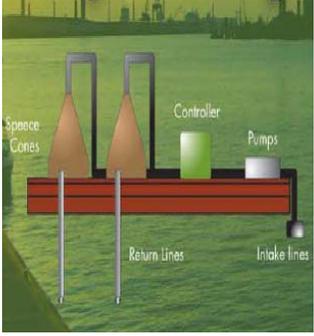
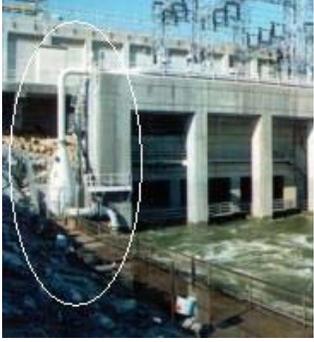
NON-POINT SOURCE — D.O. COMPLIANCE — POINT SOURCE

Lake and river applications for **ECO₂**'s innovative SuperOxygenation technology include oxygenation depletion mitigation for impaired lakes and rivers, D.O. discharge compliance for paper mill waste, supplemental oxygenation below powerhouse dams, and injection into the hypolimnion of reservoirs to improve fish habitats and reduce algae blooms. The **ECO₂** technology has a relatively small footprint and can often be used in place of costly tertiary treatment systems.

ECO₂'s SuperOxygenation technology is a practical solution to Total Maximum Daily Load (TMDL) regulations. The **ECO₂** process was recently identified by the U.S. Army Corps of Engineers as the best way, out of 25 D.O. improvement techniques evaluated, to comply with impending TMDL D.O. standards in Savannah Harbor. The GPA Savannah Harbor ReOx Demonstration Project was completed in Fall 2007.

ECO₂ technology will be featured in the technical program during the 2008 Odor and Air Emissions specialty conference hosted by the Water Environment Federation and Air & Waste Management Association.



LAKE AND RIVER REOXYGENATION	<p>GPA SAVANNAH HARBOR ReOx DEMONSTRATION PROJECT — Savannah, Georgia</p> <p>MACTEC Engineering and Consulting Inc. (MACTEC) through the Georgia Port Authority is conducting the Savannah Harbor ReOxygenation Demonstration Project using ECO₂'s proprietary Speece Cone technology. The system design includes two ECO₂ Speece Cones mounted on a stationary barge just upstream of the Westin Hotel and Convention Center with bulk pure liquid oxygen stored on shore nearby. The system dissolves up to 30,000 pounds per day of pure oxygen into a 22 mgd sidestream.</p> <p>The ECO₂ Speece Cone was chosen for this study from a field of 25 technologies ranging from physical alterations to oxygen injection and selected based upon its proven performance, flexibility and economic feasibility.</p>	
D.O. DISCHARGE COMPLIANCE	<p>KENNEBUNK SEWER DISTRICT, Kennebunk, Maine</p> <p>The Maine DEP is determining D.O. discharge requirements for the Kennebunk Sewage District's 1.3 MGD wastewater treatment plant in an effort to maintain river quality and decrease the negative impacts of algae growth.</p> <p>In conjunction with Woodard & Curran Engineers, ECO₂ designed a SuperOxygenation system that increases effluent dissolved oxygen to reduce the discharges impact on the river, particularly during the summer when wastewater flow is heavier.</p> <p>The installation successfully achieved its performance specifications during initial start-up and testing in April 2006.</p>	
D.O. DISCHARGE COMPLIANCE	<p>WEYERHAEUSER PAPER, Valliant, Oklahoma</p> <p>The discharge permit for the paper mill's 21 MGD activated sludge treatment plant mandates a positive Dissolved Oxygen in the effluent at its discharge point into the local river. Even though there is a positive D.O. in the treatment plant's effluent, of major concern was the detention time and resulting hydrogen sulfide formation in the 5-mile long discharge pipeline.</p> <p>To solve this problem, the Weyerhaeuser mill elected to use ECO₂'s SuperOxygenation technology and installed two 8' diameter ECO₂ cones in two caissons adjacent to an effluent holding tank. The effluent is pumped through the cones and out to the 42", 5-mile long discharge pipe, raising the D.O. to approximately 85 mg/l. This process prohibits H₂S formation and maintains a positive dissolved oxygen throughout the effluent pipeline.</p>	
LAKES AND RIVERS OXYGENATION	<p>LOGAN MARTIN DAM—Alabama Power Company, Alabama</p> <p>The Coosa River fishery below the Logan Martin Powerhouse is considered excellent for hybrid striped bass and catfish. Seasonally, spotted and largemouth bass also inhabit the tailrace. Low levels of D.O. in the leakage water coming from the dam were one probable cause of recurring fish kills. Alabama Power opted to install an ECO₂ SuperOxygenation cone below the Logan Martin Dam and about 30 miles east of Birmingham to solve the fish kill problem.</p> <p>The ECO₂ "Speece" cone is 9 feet in diameter at the bottom and treats approximately 14 MGD. The D.O. at the discharge is 51 mg/l in 86°F water. The system dissolves about 6,000 pounds of oxygen per day and achieves approximately 90% oxygen absorption.</p>	
LAKES AND RIVERS OXYGENATION	<p>CAMANCHE RESERVOIR—East Bay Municipal Utility District, CA</p> <p>The East Bay Municipal Utility District (EBMUD) supplies drinking water to 1.2 million people in the Oakland, California metropolitan area from the Mokelumne River watershed. During the 1980's, poor water quality resulted in significant fish kills partially as a result of the presence of hydrogen sulfide in Camanche Reservoir releases to the river. High levels of H₂S in the reservoir's hypolimnion layer occurred during the warmest months and scientists recommended installation of a large-scale hypolimnetic oxygenation system to inject oxygen into the cold, dense layer of water.</p> <p>The ECO₂ SuperOxygenation system, operational since 1994, includes a 24 ft. high, 12 ft. diameter cone. The system processes 19 MGD, utilizing 16,000 lbs of oxygen per day to raise the D.O. to 100 mg/l. The highly oxygenated water is discharged through a diffuser line at the bottom of the lake</p>	