

## GREENHOUSE GAS REDUCTION BENEFITS DERIVED FROM A FULL SCALE AEROBIC LANDFILL BIOREACTOR

By  
Mark P. Hudgins  
Environmental Control Systems, Inc.  
Aiken, South Carolina

and

George H Barstar  
Gannett Fleming, Inc.  
Valley Forge, Pennsylvania

The Cumberland County Solid Waste Improvement Authority in southern New Jersey is embarking on the permitting and construction of the largest aerobic landfill bioreactor project in North America, with construction scheduled to begin in spring 2003. This presentation will address the design and regulatory approval process as well as strategic planning of using aerobic bioreactor technology to increase the life of the landfill and to move toward waste sustainability.

Further, the Aerobic Landfill (AL) directly addresses Greenhouse gases (GHGs) and climate change. Although its primary application is to rapidly stabilize and detoxify landfill wastes, a side benefit of the process is the virtual elimination of methane and other landfill gases via natural processes.

By direct injection of air and recirculation of leachate into the landfilled waste, organic compounds found in the leachate such as VOCs, food waste, and greenwastes are either reduced to less harmful constituents such as carbon dioxide, water, or salts, instead of methane. Also due to the evaporative effects of the AL process, treated leachate is evaporated via vent pipes to the atmosphere, where it is less of a threat to groundwater.

Thus, as the AL process has inherent financial benefits on its own as an improvement in landfill operation, the life-cycle benefit for this process as a GHG control technology is significant. Even as a stand-alone GHG control technology, the EPA has stated that, the Aerobic Landfill “is expected to become a prime candidate technology for landfills in the US and elsewhere that can not generate LFG in sufficient quality or quantity to economically recover the associated energy.”

The Authority is obtaining initial regulatory approval of an 15-acre portion of its landfill as an aerobic landfill with the goal of recapturing airspace and refilling the landfill for this and subsequent sections of the landfills as the sections are sequentially aerobically treated and mined. The development of the master plan to extend life of the landfill will be discussed and the proposed sequence of landfilling will be presented. A discussion of the construction, operational and avoided costs associated with the life of the landfill and the reduction of post closure care requirements will be presented. Lastly, The close working relationship and approval process with the New Jersey Department of

Environmental Protection and the US EPA are also discussed, as well as the creation of GHG emission reduction credits.

## BIOGRAPHICAL SKETCHES

### *Key Presenter:*

Mr. Hudgins is Vice President of Environmental Control System's (ECS's) Landfill Technology Division. In this capacity, Mr. Hudgins directs all aspects of ECS's landfill biotechnology programs and related business development. He is the lead inventor of "The Aerobic Landfill" process (*USPTO Number 6,024,513 and 6,364,572*) and has presented the results of several successful projects at ISWA, EPA, and SWANA conferences in the US, Sweden, Russia, and Japan.

Mr. Hudgins' professional career has primarily been involved with the assessment and remediation of hazardous wastes, and the development and implementation of various biological treatment systems. In addition, Mr. Hudgins has led numerous waste treatment programs, including hazardous waste remediation at RCRA and petroleum sites, bioremediation of contaminated soil, biofiltration of industrial emissions and odors, and groundwater treatment programs. He is a 1985 graduate of the Citadel, and holds a Bachelor of Science in Civil Engineering.

Mark P. Hudgins, Vice President  
Environmental Control Systems, Inc.  
1120 Edgefield Highway  
Aiken, South Carolina 29801  
803.643.1755  
803.643.1756 fax  
[markh@aerobiclandfill.com](mailto:markh@aerobiclandfill.com)

George H. Barstar, P.E. is a landfill design team lead engineer and project manager at Gannett Fleming, Inc., Valley Forge, Pennsylvania. He holds a M.S. in Civil Engineering and B.S. in Civil Engineering from Drexel University. George is a SWANA Certified Landfill Manager and a member of American Society of Civil Engineers. For 19 years he has designed, permitted and overseen construction of solid waste facilities. The focus of his practice is municipal waste landfills in the mid-Atlantic region with a recent emphasis on bioreactor projects. He has participated in over fifty solid and hazardous waste disposal facility and transfer station projects in eleven states.