Agro-Enviro Consultants, Inc.

Integrated Watershed Management

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EXECUTIVE SUMMARY

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WATER POLICY INTERIM COMM.
APRIL 29, 2008
EXHIBIT 7

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WETLAND SEWAGE TREATMENT SYSTEMS FOR SMALL URBAN COMMUNITIES AND AGRICULTURE CAFO WASTE MANAGEMENT

A Natural Alternative: Wetland Sewage Treatment Systems

R. Gene Gilbert, Ph. D., President
Agro-Enviro Consultants, Inc.

Introduction: Natural wetland treatment systems are in operation in many locations and diverse climates throughout the world. Treatment effectiveness has been shown to be equal to (or better than in many cases) traditional, costly treatments facilities.

Wetland Sewage Treatment Systems (WSTS) have many of the characteristics of a natural wetland while offering greater control with the treatment of wastewater. Typically, constructed wetlands will perform better than natural wetlands of equal area since the bottom is graded and the hydraulic regime of the system is controlled. They offer greater flexibility for design and management while providing superior performance and reliability.

WSTS for wastewater treatment are one way of treating our wastes as a resource. WSTS create ecosystems that can purify wastewater by natural process. Some benefits of WSTS include:

1. Providing passive cost effective and efficient sewage treatment technology.

2. Eliminating the need for construction of expensive and high maintenance centralized treatment facilities; thus promoting the decentralization of treatment and centralization of management planning and operational processes.

3. The wetland sewage treatment process treats water and provides for water resource recovery and recycling for beneficial uses.

4. The primary anaerobic digester completely digests the sewage biosolids, and eliminates sludge production; thus, the current sludge disposal practices and associated environmental and human health hazards are removed.

5. The primary anaerobic digester produces methane, which may be used to co-generate energy, if desired.

Wetland Systems treat wastewater naturally. By imitating and enhancing the natural cleansing functions performed by wetland ecosytems, WSTS can successfully treat a variety of wastewaters. Agro-Enviro Consultants, Inc., is implementing and directing the application of new applied technologies to optimize and enhance efficiencies of WSTS for treatment of small community and agriculture sewage effluents, as well as, acid mine drainage, and other heavy metal-bearing utility wastewaters.

Description of Technology: Patented technology licensed by Agro-Enviro Consultants, Inc., provides an affordable and effective treatment of high strength organic waste streams. The system is non-odorous, reliable, environmentally appropriate, safe and cost effective for treating organic wastes in solids/aqueous solution. In addition, it does not require separate treatment of the solids and liquid portions of the waste stream. Nor the addition of chemicals in order to render the reclaimed water suitable for discharge to the environment or for other desired beneficial uses.

An important aspect of the technology is that it provides a method for the reduction in the biological oxygen demand of high strength organic wastewaters. The primary anaerobic digester (Fig. 1A) metabolizes the organic wastes, digesting of the biosolids content completely and producing byproducts during anaerobic digestion, such as methane gas, for on-site use and co-generation of energy.

The surface liquid effluent of the anaerobic digester is discharged into subsurface WSTS (Fig. 1B). The WSTS includes a wetland cell containing a porous media, an inlet manifold for introducing the primary sewage effluent, and an outlet for discharge or reuse of the treated water. The inlet distribution manifold distributes the primary sewage effluent into the wetland cell. The primary sewage effluent first flows over a hydraulic upflow structure before flowing by a gravity gradient horizontally through the porous media. At the distal portion of the WSTS, the treated sewage effluent collects in a level control structure, where it is discharged safely into the environment or recycled and reused, as a beneficial water resource.

The need for research, technology development, and implementation of affordable, and effective, sewage treatment systems of high-strength organic waste streams is one of global proportions. This patented, biologically based wetland sewage treatment technology provides local and site specific solutions to global wastewater problems: Keeping environments and people healthy.

Attachments:

Figs. 1A and 1B

Brief Resume: Dr. R. Gene Gilbert

SEWAGE/SEPTAGE WETLAND TREATMENT SYSTEM

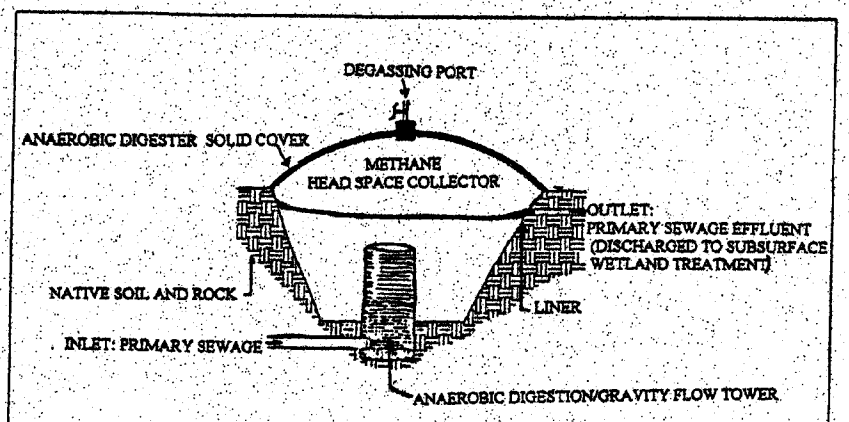

FIG 1A: PRIMARY ANAEROBIC DIGESTER SYSTEM

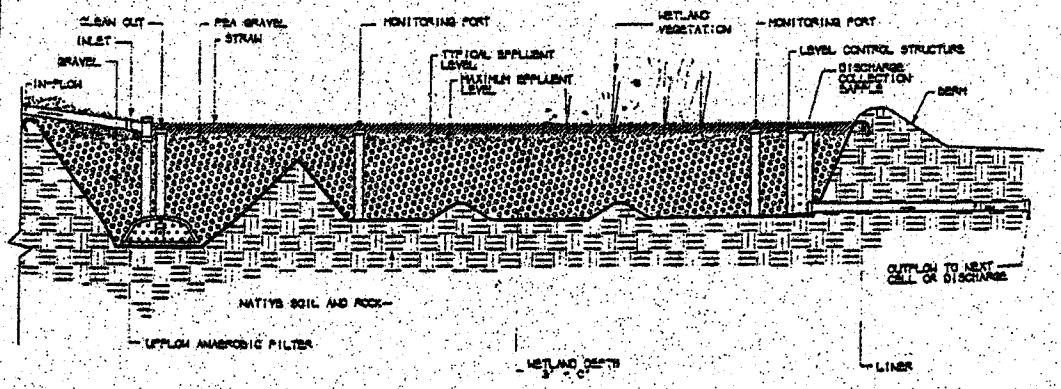

FIG. 1B: SUBSURFACE SEWAGE WETLAND TREATMENT SYSTEM

Brief Resume

Professional Biography: Dr. R. Gene Gilbert served with the U.S. Department of Agriculture for 32 years; 28 years with the Agriculture Research Service and 4 years with the Soil Conservation Service. Dr. Gilbert's scientific expertise and versatility have been demonstrated by research accomplishments in several scientific disciplines including plant pathology, soil microbial and environmental ecology, soil chemistry and biochemistry, soil and aquatic microbiology, and water conservation and irrigation technology. From 1989 to 1993, Dr. Gilbert served as National Agrichemical Specialist with the USDA-SCS Washington, DC. He provided national leadership that directly influenced agency-wide policy operations and recommendations for nutrient and pest/pesticide management programs. He led the technical coordination and development of environmental ecology and resource conservation standards and practices to assure proper management and utilization of organic wastes, agricultural and urban; and management and use of agrichemicals, fertilizers and pesticides for the protection of the Nation's surface and ground water resources. From 1993 to 1995, Dr. Gilbert served with the American Association of Retired People as a contract employee to EPA Region 8 in Denver. As a Wetlands Specialist, he provided technical assistance for the implementation of the Interagency Agriculture Wetlands Memorandum of Agreement with the Natural Resource Conservation Service. Currently Dr. Gilbert directs his own consulting business, Agro-Enviro Consultants, Inc. His environmental science consulting services provide technical development and transfer of innovative remediation and conservation practices for the protection of natural resources. Areas of expertise include: design of natural microbial biological systems for treatment and resource recovery of agricultural, industrial, and urban wastewater; design of bioremediation process involving high strength organic waste streams; and application of environmental models and risk assessment processes used at field and watershed levels to determine the fate and transport of hazardous substances, e.g., organic wastes, fertilizers, pesticides, heavy metals, etc.

Academic Degrees: Ph.D. in Plant Pathology and Soil Microbiology - Colorado State University. MS in Botany and Plant Pathology, and Soil Microbiology - Colorado State University. BS in Physical Sciences and Education - Colorado State University

Professional Associations: American Society of Agronomy; American Phytopathological Society; Soil Science Society of America; Independent Agricultural Consultants of Colorado.

Publications: Author and co-author for more than 100 publications.