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2010

AMERICAN ACADEMY OF ENVIRONMENTAL ENGINEERS®

THE 2010 KAPPE LECTURER

MORTON A. BARLAZ, PH.D., P.E., BCEE
Professor, Civil Engineering, North Carolina State University

EDUCATION

University of Michigan-Ann Arbor	1978	BS	Chemical Engineering
University of Wisconsin-Madison	1985	MS	Civil & Environmental Engineering
University of Wisconsin-Madison	1988	Ph.D.	Civil & Environmental Engineering

PROFESSIONAL CREDENTIALS

Registered Professional Engineer in North Carolina
Board Certified Environmental Engineer, American Academy of Environmental Engineers

PROFESSIONAL ASSOCIATIONS

American Society of Civil Engineers
American Society for Microbiology
American Chemical Society
Sigma Xi
Association of Environmental Engineering and Science Professors
International Solid Waste Management Association
Solid Waste Association of North America

PROFESSIONAL AWARDS

Distinguished Service Award, AEESP, 2003 & 2009
Distinguished Individual Achievement Award, SWANA, 2004
Outstanding Paper, 7th International Waste Management & Landfill Symposium, Cagliari, Italy, 1999
Samuel Arnold Greeley Award, ASCE, 1997
National Science Foundation Presidential Faculty Fellow, 1992-1997
Department of Energy Junior Faculty Enhancement Award, 1992
American Chemical Society Graduate Student Award, 1987

Dr. Morton A. Barlaz is a Professor in the Department of Civil, Construction, and Environmental Engineering at North Carolina State University. He received a B.S. in Chemical Engineering from the University of Michigan and an M.S. and Ph.D. in Civil and Environmental Engineering from the University of Wisconsin. He has been involved in research on various aspects of solid waste since 1983. Over this time, he has conducted research on biological refuse decomposition, methane production, and the biodegradation of hazardous wastes in landfills. He has participated in two state-of-the-practice reviews of bioreactor landfills. His research forms the basis for much of the work done to assess the impact of landfills on methane emissions inventories.

Dr. Barlaz also conducts research on the use of life-cycle analysis to evaluate environmental emissions associated with alternate solid waste management strategies. Dr. Barlaz is the author of over 75 peer-reviewed publications and has made over 150 presentations at conferences throughout the world. In 1992, he was awarded a Presidential Faculty Fellowship from the National Science Foundation.

Dr. Barlaz has been active in service throughout his career. He is an Associate Editor for two journals (*Waste Management* and *Journal of Environmental Engineering*) and serves as co-chair of the bi-annual Intercontinental Landfill Research Symposium. He has served as chair of the Government Affairs Committee and the Lectures Committee for the Association of Environmental Engineering and Science Professors. Finally, he serves on the Science Advisory Committee for the International Waste Working Group.

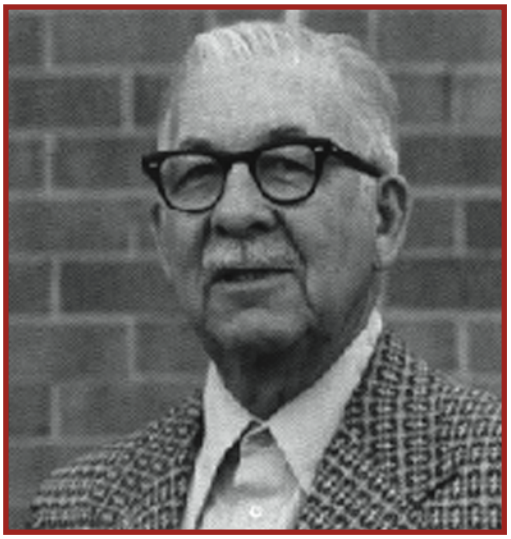
ABSTRACTS OF LECTURES OFFERED

Development of a Carbon Footprint Model for Landfill Disposal of Solid Waste

Over half of all solid waste generated in the U.S. is disposed of in landfills, and landfills are likely to be a dominant factor in solid waste management for the foreseeable future. Landfills are an anaerobic ecosystem in which biogenic carbon decomposes to methane and carbon dioxide. As a result, landfills are scrutinized as a leading source of anthropogenic methane emissions in the U.S. and globally. A landfill carbon balance includes gas production and collection, the biological oxidation of methane in landfill cover soils, fugitive emissions, carbon sequestration and avoided emissions when methane is recovered for beneficial reuse. The state-of-knowledge for each aspect of a landfill carbon balance will be presented, including the results of current research and how this information can be utilized in practice. Methane production modeling is uncertain, in part due to the difficulty in obtaining reliable field data for model verification. This uncertainty is exacerbated by the lack of detailed information on waste composition and field-scale biodegradability. While numerous methods are available for measurement of fugitive emissions, each method has its own limitations and here, too, there remains uncertainty in the measured values. A fraction of landfill methane that is not collected is oxidized by methanotrophic bacteria in landfill cover soils and this fraction will vary as a function of both climatic factors and the methane flux. Thus, there is also uncertainty in the appropriate oxidation factor for a landfill carbon balance. Biogenic carbon that does not decompose is said to be sequestered, and landfills represent a sink for some biogenic carbon. Finally, methane is utilized as an energy source at about 500 landfills in the U.S., and it is estimated that there are an additional 500 landfills at which energy recovery is viable. Energy recovery results in avoided emissions. A spreadsheet model was developed to explore the sensitivity of various input parameters to the overall carbon footprint. Realistic ranges for key inputs will be presented along with the results of model simulations.

The Use of Life-Cycle Analysis for the Study of Alternatives for End of Life Materials Management

Solid waste management (SWM) is an integral component of civil infrastructure. The cost and environmental implications (e.g., energy consumption, greenhouse gas (GHG) emissions) of SWM are important societal issues. SWM costs are borne by the public, either through use fees or taxes. SWM has environmental impacts resulting from waste collection, separation, treatment processes such as composting and waste-to-energy combustion, and landfill disposal. The beneficial use of waste, either for energy recovery or material recovery, can result in both revenue and avoided emissions. Thus, policymakers face the challenge of developing and implementing integrated SWM programs that represent an appropriate use of public funds in consideration of emissions and energy consumption. Mathematical models of integrated SWM are important planning tools given the complexity of the solid waste system, the interactions among the numerous components that constitute the system, and the number of potential SWM alternatives. Over the past decade, we have used an integrated solid waste management life-cycle model to evaluate waste management alternatives for a variety of cases. In one application, alternative plans for integrated SWM in the State of Delaware were evaluated considering cost and environmental performance, particularly GHG emissions. In a second study, three alternatives for the management of commercial food waste were evaluated including aerobic composting, landfill disposal, and in-vessel anaerobic digestion. Each case study presents unique challenges due to constraints associated with the solid waste system under study. This presentation will describe the SWM life-cycle model and present key results from two case studies. Model results will be put into the context of SWM practice.



"A man's debt to his profession is to help those that follow"

STANLEY E. KAPPE, P.E., DEE, a successful environmental engineer, believed he owed a debt to the profession that rewarded him so well. During his life, he gave of himself to his university and to his profession through countless hours of volunteer activity. And, through this Lecture Series, he continues to share his good fortune with tomorrow's environmental engineers.

He graduated from Pennsylvania State University in 1930 with a bachelor's degree in sanitary engineering. He served with the Pennsylvania State Health Department and the U.S. Army Corps of Engineers before joining the Chicago Pump Company as its Eastern Regional Manager in 1935. In 1945, he founded Kappe Associates, Inc., a water supply and wastewater equipment company headquartered in Rockville, Maryland, and continued as its Chief Executive Officer until his death in 1986.

His peers recognized his contributions to the profession by numerous awards, including the AWWA Fuller Award, the WPCF Arthur Sidney Bedell Award, the WPCAP Ted Moses and Ted Haseltine Awards, and the AAEE Gordon Maskew Fair Award. In 1985, Pennsylvania State University named him Outstanding Engineer Alumnus.

Stanley E. Kappe was an activist member and leader in several national and Chesapeake region professional societies. He served as the Executive Director of the American Academy of Environmental Engineers from 1971 to 1981.

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