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Waste-To-Energy Residues – The Search for Beneficial Uses

KARSTEN MILLRATH[1], FRANK J. ROETHEL[2], DAVID M. KARGBO[3]

[1] *Earth Engineering Center, Columbia University*
500 W 120th Street, 918 Mudd
New York, NY 10027
Tel: (212) 854-2142 *e-mail: km516@columbia.edu*
[2] *Marine Sciences Research Center, State University Of New York At Stony Brook*
[3] *Department of Civil and Environmental Engineering, Temple University*

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Abstract

In the U.S., about 28.5 million tons of municipal solid waste are combusted annually in waste-to-energy facilities that generate 25-30% of ash by weight of the MSW feed. Since some residues were found to contain high levels of lead and cadmium prior to the 1990s, they were commonly associated with environmental pollution. However, for the last years nearly all ash samples have been tested non-hazardous. Research on the beneficial use of combustion residue has been conducted for the past few decades yet the actual ash reuse rate in the U.S. has remained close to 10%. Currently most of the ash is landfilled at considerable cost to the waste-to-energy industry. A consortium of researchers at Columbia University, the State University of New York at Stony Brook, Temple University, and other institutions seeks to develop and to advance the beneficial uses of combustion residues, such as in construction materials or remediation of contaminated abandoned mines and brownfields. This paper describes the search for beneficial use applications and provides an overview of the first year of this consortium.

Introduction

In 2002, approximately 28.5 million tons or 7.7% of the 370 million tons municipal solid waste (MSW) in the U.S. were combusted in Waste-to-Energy (WTE) facilities for the generation of electricity and heat [1]. During the process about 25-30% of solid residues (by weight, or 10-12% by volume of the MSW) is produced in form of bottom and fly ash, which are mostly combined in the plant. Since 1996, there have been no new WTE facilities in the U.S. because of environmental and political pressure. The major concern has been the perceived release of hazardous toxic substances into the environment. In the past, primary focus of environmental groups has been on air emissions, especially of dioxins/furans and heavy metals. However, after the U.S. EPA enforced the implementation of the Maximum Available Control Technology (MACT) regulations in the 1990s, WTE emissions have been reduced to a point that the U.S. EPA named waste-to-energy "one of the cleanest sources of energy" [2].

Prior to the 1990s, combined WTE ash was found to contain high levels of lead and cadmium