

RECYCLING OF BOILER AND INCINERATOR ASH INTO VALUE ADDED GLASS PRODUCTS

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ABSTRACT

The disposal of industrial solid wastes presents a major challenge to industrialized nations. Boiler ash and incinerator ash represents a major portion of the solid wastes which must be ultimately reused or landfilled. This paper discusses the recycling of coal-fired boiler and incinerator ashes into value added glass products via the use of a newly developed, fossil fuel fired, high temperature melting process. The patented technology is based on advanced in-flight suspension glass melting technology which has been developed by Vortec Corporation with funding support from the U.S. Department of Energy and the Environmental Protection Agency. The Vortec patented Cyclone Melting System (CMS™) has a number of significant advantages for recycling solid wastes including: the oxidation of organic and metal contaminants, formation of non-leachable glasses which can be sold as value added products, high melting efficiencies, multi-fuel capability, low operating and maintenance costs and low NO_x emissions. This paper summarizes some of the challenges facing process industries and utilities in the recycling and reuse of industrial solid wastes. The results of laboratory and pilot scale testing with several pulverized coal-fired boiler ashes, several municipal solid waste incinerator ashes, and a sewage sludge incinerator ash are summarized. Information on ash properties, melting characteristics, system performance, toxicity characteristics leaching

procedure (TCLP) testing results, flue gas emissions, recycled products, and economics are presented. The application of the CMS™ to the production of several value added glass and ceramic products is also discussed.

INTRODUCTION

Boiler and incinerator ashes represent major solid waste streams for the United States. More than 80 million tons of coal-fired boiler ash and flue gas desulfurization (FGD) sludge are generated annually. In addition, approximately 200 million tons/year of municipal wastes are generated, most of which are landfilled. Only 15% or 30 million tons/year of municipal solid waste (MSW) is incinerated, resulting in approximately 9 million tons/year of ash. The ash generated from sewage sludge incinerators amounts to about 1 million tons/year. The incineration of solid wastes in municipal solid waste incinerators, sewage sludge incinerators, and hazardous waste incinerators provides an effective means of reducing landfill space requirements. The ashes which are generated by these incineration processes, however, still leave significant waste disposal problems. The ashes produced tend to have low bulk densities, can have significant levels of unburned organics or carbon, and can have heavy metal concentrations which render them hazardous by their leaching characteristics [boiler ashes typically pass the TCLP tests for Resource Conservation and Recovery Act (RCRA) metals].