

Bituminous Pavement Constructed with Municipal Solid Waste Combustor Ash: Construction, Performance, and Economic Issues

Samuel P. Lucido
Wenck Associates, Inc.
1800 Pioneer Creek Center
PO Box 249
Maple Plain, Minnesota. 55359-0249
lucido@pro-ns.net

Willard Wilson
Polk County Solid Waste Department
Fosston Industrial Park
PO Box 605
Fosston, Minnesota. 56542

1.0 Introduction

The Polk County Solid Waste Department, located in Polk County Minnesota, participates in a complete integrated solid waste management program that includes four other counties in northwest Minnesota. One component of the integrated solid waste management program includes the operation of a municipal waste combustor (MWC) that combusts approximately 65 tons per day of processed solid waste. The starved air design of the combustor causes low turbulence in the primary burning chamber minimizing particulate carryover through the system. This results in generation of approximately 12 tons per day of combined ash comprised of 98 to 99 percent bottom ash and 1 to 2 percent fly ash, by weight.

In 1996 the facility installed an up-front separation facility, or materials recovery facility (MRF), that removes recyclable materials as well as non-processible or objectionable materials prior to combustion. The energy produced is sold in the form of steam to businesses adjacent to the facility. The ash generated by combustion prior to the 1996 installation of the MRF is referred to as "old ash" and was landfilled in a MWC ash landfill permitted by the Minnesota Pollution Control Agency (MPCA). The ash generated since installation of the MRF is referred to as "new ash", and is also placed in the permitted landfill. The chemical and physical differences between the new and old ash are important enough to warrant the two ashes being addressed separately for purposes of this utilization demonstration project.

In 2000 and 2001, Polk County performed a demonstration of the feasibility of utilizing combined MWC ash as a partial replacement of aggregate in bituminous paving materials. The demonstration consisted of building and evaluating a section of county road using the MWC ash-amended bituminous.

This paper presents the performance, construction and economics issues and results of this demonstration. The up-front environmental evaluations performed as part of this demonstration were previously presented by Lucido and Wilson¹. The final environmental evaluations of this demonstration are presented in this paper. Therefore, after a summary of the following relevant publications, the remainder of this paper will focus on the structural performance, construction and economics issues and results of this demonstration.

The project was approved by the MPCA and supported by the Minnesota Resource Recovery Association, the Association of Minnesota Counties, the Minnesota Office of Environmental Assistance, the Minnesota State Representative for District 2A, the four partner counties adjacent to Polk County, the Polk County Board, the Polk County Highway Department, and the citizens of Polk County.

2.0 Background

NATIONAL/WORLDWIDE

In 1999, 102 MWCs were in operation in the United States, serving the disposal needs of more than 37 million people. These facilities generated about 2800 MW of electricity from the combustion of 30 million tons of MSW. In the process, about 7 million tons of ash were produced. Most was used as landfill daily cover, as roadbed, or was disposed of in landfills². Enabling the beneficial use of ash will assure the continued operation of MWCs, promote landfill abatement and decrease the use of more valuable resources such as natural aggregates.

The ash from MWCs is an excellent resource material that has proved to be of particular benefit in the construction of roads and highways. Field tests and demonstration projects show that processed ash can be successfully used in road base, bituminous paving, and concrete products. Substituting ash for rock aggregate