Grinder Reduces Solid Waste, Offers Recyclables
Test completed at Fort Benning

by Dana Finney, ERDC-CERL

A research team ran a demonstration at Fort Benning, GA, in June to assess whether a new technology can successfully reduce the volume of municipal solid waste (MSW) while providing useful end products. The novel solid waste processing system is designed to shred mixed household garbage and greatly reduce the waste volume. A lightweight cellulose "fluff" byproduct may have beneficial use as a soil amendment, while the remaining material has potential reuse in building products such as recycled plastic lumber.

Nitrocellulose "Fluff" may have beneficial use as a soil amendment.

The Engineer Research and Development Center's Construction Engineering Research Laboratory (CERL) is demonstrating the technology in partnership with Headquarters, U.S. Army Forces Command, Fort Benning's Directorate of Facilities Engineering and Logistics, and Bouldin & Lawson Worldwide, Inc.

Cities across the nation face a huge challenge in managing municipal solid waste, and the problem is growing as landfills reach capacity. Military installations, like cities, are responsible for proper disposal of MSW produced on post. Army installations disposed of 1.2M tons of garbage during the first three quarters of FY99 at a cost of $53.2M. Fort Benning alone landfills a whopping 20 tons/day of MSW.

The solid waste processing system has several stages. First the MSW goes into a low-speed, high-torque shredder. Next are two grinding processes, followed by a trip through a magnetic separator that removes ferrous metals from the material. After that, it enters a hydrolyzer before final drying and separation steps. The hydrolyzer is like a giant pressure cooker that uses extreme heat, steam, and pressure to break down carbon bonds in the material.

At the end of treatment, byproducts include a cellulose pulp (called "fluff") and separate, low-volume residues of metal, glass and plastic. A second part of the Benning project, slated for the fall planting season, will be to apply the cellulose pulp to two test plots. The goal is to see if nutrients left in the material can benefit plant growth or if the substance can serve as a soil stabilizer. The fluff will first be analyzed to ensure it is environmentally safe to use. The material will be screened for lead, pesticide, herbicide, PCB, and dioxin contamination.

A third phase of the project will evaluate the feasibility of using the remaining course material to make useful products such as recycled plastic lumber. The contractor developed samples from Benning's plastic byproducts using extrusion. CERL will test them for properties critical to producing good quality recycled plastic lumber, such as flexural and compressive strength, density, and thermal expansion. If the waste holds up to the standards, there may be a market for it in the recycled plastic lumber industry. Waste metals will also be examined for possible sale to the Defense Reutilization and Marketing Organization.

The demonstration at Fort Benning was a follow-on to one at Fort Campbell, KY, last year. The first field trial led to recommendations from CERL for improving the equipment, and the system used at Benning included modifications that the manufacturer incorporated as a result. Air emissions also were evaluated at Benning.

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