Section A7
Alternative 7, Gypsum Recycling

7

A BRIEF HISTORY

ergeron dreamed of recycling gypsum wallboard for more ars. He envisioned a process of recycling that would remove erials from the gypsum. In a workshop at his home in Tonawanda, New York, he invented the machine that brought his dreams to reality.
His invention, the patented Mobile Gypsum Recycling Unit, will completely recycle millions of tons of gypsum board and virtually eliminate gypsum board waste disposal while providing several valuable by-products.

Gyp-Pack Container, Inc. was incorporated on Janurary 5, 1993 and has a patent on its Mobile Gypsum Recycling Unit and four patents pending. Since its inception, the company has been perfecting its equipment and patents. Gyp-Pack Container, Inc.'s primary objective is to be a world leader in the recycling of scrap gypsum board. The company's goal is to license exclusive territories for the use of the recycling machinery and/or technology throughout the world.

A grant from the New York State Energy, Research and Development Authority (NYSERDA) has been awarded to Gyp-Pack to evaluate the use of recycled gypsum to improve the composition of biodegradable materials.

Gyp-Pack Container, Inc. is a timely business that will meet the ever increasing need to provide a cost saving, income producing, and efficient alternative to wallboard scrap disposal.

Currently, Canada has banned wallboard from its landfills. Many states are expected to do the same since wallboard scrap causes problems in landfills.

Gyp-Pack Container, Inc. has seen an increasing demand for its services and expects sales to reach $88 million by the year 2002.

Gyp-Pack Home Page

From Waste to Economic Opportunity

By Bobbi Tousey

Last year, the N.C. Office of Waste Reduction produced a report entitled Assessment of the Recycling Industry and Recycling Materials in North Carolina- 1995 Update (the Study). The Study compiled and analyzed supply and demand data for 36 commodities, including construction and demolition (C&D) waste. Although the study did not focus directly on how to reduce construction waste, it provides valuable information regarding economic opportunities of C&D recovery.

Little information exists about how much C&D waste is generated in North Carolina each year. For the purposes of the study, the supply of C&D waste was assumed to be the amount of material disposed of in N.C. landfills; approximately 7.8% of the total waste stream or about 721,000 tons per year, smaller than the 20% rate which is commonly cited. It may be that some waste is being transported out of the state, recovered for other purposes or discarded illegally. Not surprisingly, over 65% of C&D waste is generated by the central area of the state with the remainder spread evenly over the other regions.

Wood makes up the largest component of C&D waste at 30%, while asphalt shingles make up 23%. Sheet rock comprises 18% of the waste stream followed by asphalt (5%), brick (3%) and "other" materials (20%). The following examples illustrate the potential of recovering and reusing building wastes.

Some C&D waste is being increasingly collected and reused. Wood scraps, for example, are being recovered from building sites by several NC businesses and resold. Small pieces of wood are being collected, chipped and shredded for a variety of markets including pulp, mulch, compost and composites. This represents a savings for builders who do not have to pay to have the material hauled away and for those looking for alternatives to increasingly expensive new building materials.
In the past, used asphalt shingles have had few markets. The study indicates that contractors would be willing to recycle shingle wastes, reducing landfill costs.

Recently, the N.C. Recycling Business Assistance Center (RBAC) funded research to test whether asphalt shingles can be added to pavement for use by the N.C. Department of Transportation (NC DOT). If the tests are satisfactory, NC DOT will utilize most of the used shingles currently being discarded in the state.
Gypsum wallboard is composed primarily of gypsum (calcium sulfate) with a paper backing. After separating the paper from the gypsum, the paper is recycled for use in other paper products. In the past, gypsum has been used successfully as a soil amendment, acting much like limestone. Because gypsum is highly absorbant of odors and liquids, much like cat litter, the RBAC has contracted with the NCSU Department of Animal and Poultry Waste Management Center to find out if gypsum can be used as a dry bed system in swine houses, thereby eliminating lagoons. If tests are positive and cost-effective, commercial trials will begin.

It is clear that companies are discovering that C&D wastes are valuable commodities which should not be discarded, but reused or remanufactured into new products. The next five years may see the disappearance of mounds of debris at construction sites, benefitting builders, manufacturers, and the environment.

For more information, contact Bobbi Tousey of the RBAC at (919) 715-6522.

North Carolina Green Building Council

SCRAP CONSTRUCTION WALLBOARD AS A SOIL AMENDMENT

Construction of the average single family home results in approximately one pound of scrap wallboard for each square foot of construction. Thus, a 2,000 sq ft home produces about 1 ton of scrap wallboard. Placement of wallboard scraps in landfills is not only becoming expensive as tipping fees increase but also certain municipalities are prohibiting landfilling. This prohibition is due to the difficulty in compaction and, more seriously, production of hydrogen sulfide gas if the conditions within the landfill turn anaerobic. The sulfide is generated since wallboard contains predominantly calcium sulfate. Currently, there are no known permitted uses of scrap wallboard as a soil amendment. This project, funded by the Gypsum Association in Washington, D.C., is directed at simulating the application of pulverized wallboard as a soil amendment around construction sites.

New home construction generates a number of wastes including gypsum wallboard.

There are three major components of the one year study which compares scrap wallboard and agricultural gypsum: (1) as applied to an established turf field; (2) growth of tomatoes and lettuce in potted soils, and (3) soil columns studies looking at the leaching of calcium and boron. The replicated turf plots that we will visit today were surfaced amended in the winter with the equivalent of 5 dry tons per acre of pulverized wallboard or agricultural gypsum along with an unamended control. Soil samples will be obtained periodically throughout the study. An initial turf clipping sample was obtained in late May and two additional samples will be obtained for analysis during the growing season.

Mined gypsum (calcium sulfate) has been used as an agricultural soil amendment for over two hundred years. The benefits derived from the use of gypsum include: increase soil water infiltration since calcium aids in soil aggregation; deeper root penetration due to the solubility of gypsum and the movement of calcium down the soil profile which can assist in alleviation of subsoil acidity problems and/or increased soil porosity, and as a source of the essential plant nutrients - calcium and sulfur.

The ability to show a beneficial use of the applied wallboard or, due to the short-term nature of the project, the ability to demonstrate comparative results between wallboard and agricultural gypsum will be a necessary step to make this recycling method an acceptable use of what is now considered to be a 'waste' material.

POTENTIAL APPLICATIONS: Utilization of scrap wallboard around single family home construction sites can be a beneficial use of a material that is currently landfilled. Other construction sites such as town homes, apartment buildings and commercial construction will require other utilization options due to limited areas around these sites. We are currently considering other options for these types of construction sites. The most promising may be transporting the scrap wallboard to compost sites where the material could be utilized in the compost process or blended into a finished compost.

Final report of 3-year study will be available 4/01/97.

Return to : **Korcak** | **PSI**

Current CWC Projects

Listed below are some of the CWC projects currently under progress.

The Use Of Gypsum Wallboard As A Bulking Agent In Composting For Odor Control And Product Enhancement

The state of Washington produces approximately 70,000 tons of gypsum wallboard from construction and demolition projects annually. However, central and rural areas of the state have no market outlet for material that is recovered through recycling efforts. This project will examine the use of chipped recycled gypsum wallboard as a bulking agent in municipal and commercial composting. The goal of the project is to validate the potential benefits of this end-use application, including: acting as an additional carbon supplement to traditional bulking agents; buffering the pH of the compost to minimize odors from the process; and enhancing end product quality for use on acidic soils. Project participants will determine appropriate bulking agent ratios, determine three mixes to test (plus one without gypsum), and conduct a bin study to determine the effects of the four design mixes on odor production and end product quality. The project will provide valuable information to existing and future compost facility operators looking for suitable bulking agents. A successful project outcome has the potential to direct recycled gypsum wallboard, recovered in areas with no new wallboard manufactuirng, into use as a compost bulking agent. In turn, the gypsum-amended compost may gain expanded use in Washington due to its ability to improve the pH and health of soils.

CWC Contact: Wendy Butcher

Anticipated Completion Date: June 1997

Recycled Wood Waste Size Reduction Technology Study

Much of today's wood waste recycling infrastructure was developed to serve biomass fuel markets. Recent developments in processing technologies have allowed the penetration of some wood waste into higher value fiber markets, including pulp and paper, and panelboard applications. However, a significant portion of the wood waste processed for recycling does not adequately meet the needs of the mills consuming that fiber. In four stages, this project will examine re-chipping as a wood waste size reduction strategy that may better meet mill needs. The project will evaluate primary size reduction alternatives; conduct an overview of screening and separation technologies; identify end-use sizing specifications; and finally, evaluate re-chipping technologies and processes by testing a pilot-scale system for design integrity. Ultimately, the project will help elevate processed wood waste to a higher level of refinement as a market commodity and create a practical opportunity for creating additional value in the wood recycling industry.

CWC Contact: Paul Harshman

Anticipated Completion Date: June 1997

Decision-Tree Development To Evaluate The Feasibility Of Mid-Scale Composting

Many types of institutions generate significant volumes of food scraps and other organic materials that could be composted on-site for beneficial reuse. Lack of knowledge, resources, or a combination of both often prevents this mid-scale composting from taking place. This project will develop a decision-tree guide that can help schools, institutions, and businesses understand their options and optimize the technology selection for mid-scale food waste composting. The guide will provide a step-by-step process designed to help choose materials to compost; select appropriate systems or level of technology for composting; identify capital, labor, space, and feedstock requirements for the selected technology; identify beneficial compost end-uses; and understand applicable regulations, and zoning and weather considerations. Ultimately, the guide will make it easier for organic waste generators to make the commitment to initiate composting.

CWC Contact: Carol Brown

Anticipated Completion Date: June 1997

Compost "Tea" Marketing Evaluation and Dewatering Demonstration

Runoff from composting facilities is currently viewed as a waste product and presents substantial collection and handling costs to a compost facility. Yet, the inherent qualities of this runoff have been shown in some tests to be of substantial benefit to plant growth. This project seeks to demonstrate the feasibility of dewatering the runoff for the production of a product to be sold commercially as a companion product to compost. A pilot scale system using the residual heat from the composting process will be tested to determine equipment needs, energy consumption, and labor required. A bench-scale growth trial with the dewatered material will compare the product with other commercially available plant foods. This project also will demonstrate the feasibility of agricultural application of unadulterated compost runoff. Finally, an economic analysis will determine the feasibility of applying the unadulterated material to agricultural fields, and dewatering and marketing the compost tea product. A successful project will enable composting facilities statewide to better market and sell compost by generating additional revenue, saving disposal charges, and recycling valuable materials.

CWC Contact: Wendy Butcher

Anticipated Completion Date: June 1997

Molded Packaging Products from Waste Mill Fiber:

The purpose of this project is to test mill residue as a feedstock for molded pulp products. The project will develop pulp specifications suitable for a range of molded products; characterize a minimum of three mill residuals; and process residuals to produce suitable pulp for producing prototypes. Successful development of this molded pulp material will provide higher value-added applications than the current uses of waste mill fiber: incineration, composting, landfill capping, and soil reclamation. In addition, the products developed from this material could potentially reduce demand on higher value waste streams like recycled old corrugated containers (OCC), and old-newspaper (ONP).

CWC Contact: Mary Lynch

Street Wastes Reprocessing and Reuse Project:

This project will evaluate existing, cost effective technologiesfor physically separating street sweepings and vactor grit into their basic components (organics, sand and gravel, litter). The project also will develop viable reuse alternatives for the sand and gravel (and possibly organic) components. Alternative end-uses include use as fill, street traction sand, or in concrete or asphalt products, provided they meet certain criteria. The expectation is that these materials will prove to be suitable substitutes for virgin sand and gravel materials. Additionally, successful separation and reuse could reduce the amount of this material that is landfilled, saving both municipalities and private vendors considerable cost.

CWC Contact: Wendy Butcher

Testing Fused Tile Pavers:

The purpose of this project is to optimize the use of mixed color recycled soda-lime glass in indoor/outdoor paving applications. The process to be used fuses glass and tile pavers from finely ground glass, binders, and water. The project will document process temperature profiles to determine their optimal effect on end-product compressive strength and absorption performance, and tensile/flexural strength. Completion of the project will aid in the development of higher value local uses for mixed color recycled glass.

CWC Contact: Joe Divinagracia

Mixed Wood Waste End-User Requirements Analysis:

This project will develop technical information that will helpbridge the gap between the processing of mixed wood wastes and the subsequent use of the product by the composite wood, pulp and paper, and biomass energy industries. The project will characterize the processing, and manufacturing constraints and methods that influence end-uses for mixed woodwaste such as painted, treated and wood with other contaminants. A protocol for characterizing the properties of woodwaste produced by several Washington processors will be developed and tested. Specific recommendations will be developed to improve wood waste products to meet manufacturer specifications. Completion of this project will help create a strategic opportunity for the use of mixed wood wastes as a feedstock for higher-end manufacturing industries and as a combustible fuel.

CWC Contact: Joe Divinagracia

Fiber, Pulp, and Black Liquor Properties from Commercial Pacific Northwest Wheat Species for Use in Fine Writing Papers:

The purpose of this contract is to characterize Eastern Washington cereal straw; and prepare and evaluate cereal straw pulps and pulp blends with recycled old corrugated containers (OCC), as a furnish for printing and writing grade papers. Successful production of the short fiber straw pulp and its deployment with long fiber pulp would mean that printing and writing papers can be produced totally independent of wood forests while minimizing the impact of fluctuations in OCC supply and cost. Further, utilization of straw for fiber could convert an underutilized resource to higher value and minimize crop disease and air pollution problems associated with present methods used to dispose of excess straw.

CWC Contact: Mary Fabien

Manufacture and Testing of Fire-Resistant Doors using Recycled De-Inker Sludge

The purpose of this project is to develop manufacturing procedures and perform fire resistance testing of fire door core material made from recycled de-inker sludge and pulped

mixed waste paper. Approval of the core material after testing will allow the fire-resistant doors to be approved by code for use in commercial construction. This application adds a high degree of value to industrial by-product that is typically disposed of in landfills.

ReTAP Contact: Paul Harshman
