

SECTION 1.0 INTRODUCTION

1.1 Background

Alachua County developed this project, *Composting Institutional Food Waste, Paper, Yard Trash, and Municipal Biosolids*, to demonstrate the benefits of in-vessel composting of food waste, contaminated paper, yard trash, and municipal biosolids. This project was funded by the Florida Department of Environmental Protection (DEP) through its 1998-99 Innovative Recycling Grants Program. The project was managed and administered by Alachua County and implemented at Alachua County's Leveda Brown Environmental Park (LBEP), a newly-developed, integrated solid waste management facility designed to deliver comprehensive solid waste services. These services include education, waste transfer services, recovered materials processing, household hazardous waste management, and yard trash processing.

The project was conducted in cooperation with Tacachale, a licensed specialty hospital offering a wide range of medical, therapeutic, and social services to approximately 450 mentally impaired or disabled residents. The facility has over 100 buildings located on a 100-acre campus setting just east of Gainesville and only 2.5 miles from the Environmental Park. The institution's staff of 1,400 supplies maintenance, dietary and food services, and operational support services. The institution's central food service prepares and serves approximately 1,500 meals each day. In addition, Alachua County worked with the University of Florida (UF) to help UF resolve a historical recycling problem involving low grade mixed paper.

1.2 Project Objectives

The main project objective was to demonstrate the benefits and determine the feasibility for Florida counties of using in-vessel composting technology to recover food waste, paper, yard trash, and municipal biosolids. While accomplishing this objective, Alachua County would also recycle non-traditional materials such as contaminated paper, and institutional food waste. In addition, Alachua County committed to providing educational information about composting to the public and to other Florida counties.

1.3 Description of Project Innovation

According to DEP estimates, the compostable fraction of Florida's municipal solid waste (MSW) stream (*i.e.*, food, paper, and yard trash) made up 46 percent of total MSW collected in 1998. Conventional recycling programs are widely available to recycle the portion of the organic fraction made up of office paper and corrugated paper, and many Florida counties process yard trash to produce mulch. On the other hand, food waste, contaminated paper, and low-grade mixed paper are not commonly recovered, and these materials are excellent targets for waste reduction efforts. In Alachua County, organics constitute the largest fraction (over 30 percent) of the institutional/government waste stream, and the largest organic components are food-contaminated paper (about 20 percent) and food waste (about 7 percent). Therefore, institutions that generate large quantities of food waste at a single location, such as Tacachale, offer promising opportunities for innovative recovery programs.

The project also employed innovative uses of advanced technology and processing. The project incorporated in-vessel composting technology not commonly used in Florida. As of 1999, Florida has only ten permitted composting facilities, and only one of these ten facilities (Sumter County Solid Waste Facility) uses in-vessel technology. Furthermore, while a number of yard trash composting facilities operate throughout the state, food waste composting represents an advanced process that is not in common use statewide in jurisdictions of similar size or demographics.

The project used advanced in-vessel composting technology to add value to materials not commonly processed in combination in Florida. Separately, food waste and contaminated and unrecyclable paper represent a negative value, and yard trash mulch often has little commercial value. In combination, however, these materials constitute an excellent composting feedstock. Thus, the proposed project will not only divert substantial quantities of food waste and waste paper, but will also add value to these materials and to yard trash mulch by generating a high quality compost product, a valuable amendment for Florida's poor soils.

In-vessel composting, the most advanced composting technology available, offers substantial advantages over conventional windrow processing. The selected composting system manufactured by Wright Environmental Management, Inc. (WEMI) provides favorable aerobic conditions to promote rapid biological decomposition while controlling odor, leachate and vectors and eliminating airborne dust and pathogens. In addition, less area is required for this in-vessel composting technology than for windrow processing.

1.4 Formal Presentation of Project Results

Alachua County presented an overview of the project at the 5th Annual Statewide Pollution Prevention Conference and discussed the project and project findings at the 2001 Solid Waste Association of North America (SWANA) Recycling Coordinator Training. The County will also plan to present an overview of the project and project findings at another upcoming trade conference or other appropriate forum. The presentation will include a discussion of project activities and results in order to facilitate information and technology transfer.

SECTION 2.0 PROJECT IMPLEMENTATION

2.1 Equipment Purchased and Use

Table 2.1, *Equipment Purchased and Description of Use*, lists the items purchased during the project and explains how the equipment was utilized. Alachua County purchased the in-vessel composting system, in which food waste, paper, and yard trash would be processed, and other items used to store and process material prior to composting. Figure 2.1, *Containers for Food Waste Source Separation and Collection*, shows the 35-gallon containers procured by the County for collecting source-separated food waste. In addition, modifications to the composting site were necessary prior to implementing the composting system. These modifications included pouring a concrete pad on which to locate the system, extending water, sewer, and electrical lines to the site, and constructing a road to the system. A chipper/shredder was also purchased in order to shred pizza boxes prior to loading into the composting system.



Figure 2.1 Containers for Food Waste Source Separation and Collection

TABLE 2.1 LIST OF EQUIPMENT PURCHASED WITH GRANT FUNDS AND DESCRIPTION OF USE	
EQUIPMENT ITEM	DESCRIPTION OF USE
35-gallon containers labeled “Food Waste Only”	Used by Tacachale for collection of food waste.
Wright Environmental 600 pound-per-day Composting System	Located at Alachua County’s Leveda Brown Environmental Park and used to compost food waste, wood chips, and contaminated paper.
Troybuilt Shredder	Used for shredding pizza boxes from UF prior to loading into the composting system.
Site Modifications	Modifications to site at the LBEP necessary to prepare the selected site for the composting system. Included pouring a concrete pad and installing electrical transformer and water connections.

2.2 Local Cooperative Recycling Effort

Tacachale, located near Alachua County’s LBEP, participated in this study by separating its kitchen food waste from other garbage. The material was stored in 35-gallon containers in a cold room and picked up daily for transport to the composting system at the LBEP. In addition, the University of Florida’s fraternities and sororities, located in Gainesville, participated in the study by collecting pizza boxes that would otherwise have been discarded for processing in the composting system at the LBEP.

2.3 Project Elements and Timeline

This project was organized into four elements: Technology Review, Food Waste from Tacachale, Pizza Boxes from Dormitories at UF, and Yard and Wood Waste Currently Processed at the LBEP. An additional element, Biosolids from the City of Trenton, Gilchrist County, was not conducted due to problems discussed in Section 2.4, *Problems Encountered and Solutions Developed*. Each of these elements are described in the following subsections.

2.3.1 Technology Review

In order to select the most appropriate system for Alachua County's specific needs and objectives, a technology review of available composting systems was conducted. First, Alachua County developed criteria to evaluate the technologies, such as compatibility of equipment size with available site area, capacity of the equipment, and capital cost of the equipment. Then, the County collected information about composting technologies and compared the information received to the County's criteria. The technologies were ranked based on the County's evaluation criteria. County staff participated in site visits to operational composting facilities as well. Finally, the County chose the Wright Environmental Management, Inc., 600 pound per day (WEMI 600) composting system.

2.3.2 Food Waste From Tacachale

At Tacachale, kitchen staff separates food waste discards from other garbage. The food waste is placed in 35-gallon carts and wheeled to the food service loading dock, where it is temporarily stored in a large, walk-in cooler until it is collected. Approximately 400 pounds per day, or 1.2 tons per 6-day work week, of food waste is collected and processed in the composting system at the LBEP. Excess food waste is given to a local hog farmer.

2.3.3 Pizza Boxes from Dormitories at UF

Currently, the UF recycling program collects mixed paper at university dormitories. Historically, the most significant and troublesome contaminant in this paper stream has been pizza boxes. This project proposed to recover this material at four UF dormitories that house 4,200 residents. Designated pizza box recycling containers provided by the UF recycling program were placed at paper recycling areas throughout the dorms. Recycling containers are to be serviced as needed, probably weekly or biweekly. Preliminary estimates suggest that eventually up to 300 pounds of pizza boxes per week could be recovered from this source.

A targeted group of fraternity and sorority houses were also to be included in this pilot recycling program. Recycling containers provided by UF for these locations will be serviced by student volunteers. Pizza boxes recovered from the four dorms and from the fraternity and sorority houses will be collected by the County's collection service contractor and transported to the LBEP where they will be shredded for use as compost feedstock. Alachua County

developed an educational newsletter that was distributed to students in the dorms and fraternities and sororities at UF.

2.3.4 Yard Waste Currently Processed at the LBEP

The County processes about 1,200 tons per year of yard waste, producing a mulch product that is distributed without charge to residents. Figure 2.2, *Mulched Yard Trash*, shows the yard trash material after it is processed into mulch. The County's current contractor for processing the yard and wood waste into mulch has agreed to process the material to a size of about 2 inches or less, which was determined to be the size necessary for use in the WEMI 600. Composting adds substantial value to processed yard and wood waste and enhances product marketability.



Figure 2.2 Mulched Yard Trash

2.3.5 Timeline

The original timeline for this project was one year for project initiation, project activities, report preparation and a presentation of results. The timeline was modified based on delays

described in Section 2.4, *Problems Encountered and Solutions Developed*. The project was extended for one additional year.

2.4 Problems Encountered and Solutions Developed

Delays with procuring the composting system and site work forced the extension of the project timeline. During the technology review, the County determined that site visits were necessary for a thorough evaluation of the two highest ranked composting systems. However, coordinating staff schedules for the site visits and finalizing itineraries proved difficult and resulted in the delay of the technology review process. This delay occurred during the first reporting period of the project.

During the second reporting period of the project, the location for the composting system within the LBEP was chosen and plans were drawn for site work to begin. However, other construction projects and additional growth at the LBEP required County engineers to revise the site plans and relocate the composting site. The newly-developed LBEP is still expanding. At the time, the County was constructing an 18,000 square-foot Recovered Materials Processing Facility at the LBEP, and due to increased volumes of incoming material, additional space for transfer trailers and other equipment was needed. Therefore, the County had to revise the site plan for the composting system twice before the location was finalized. This resulted in major delays during the second reporting period of the project.

In addition, after the County selected the Wright Environmental system, negotiations began for either the purchase of a new 500 pound-per-day system, the purchase of a refurbished 500 pound-per-day system, or the lease of a refurbished or new system. The negotiations took some time, after which the County decided to purchase a new 500 pound-per-day system. Also, because Wright Environmental Management, Inc. is a Canadian company, inclusion of import fees and tariffs in addition to negotiating purchasing agreement language caused a delay in processing of the purchase agreement through the County's legal and purchasing divisions. Due to these delays, the County requested a six-month extension of the project.

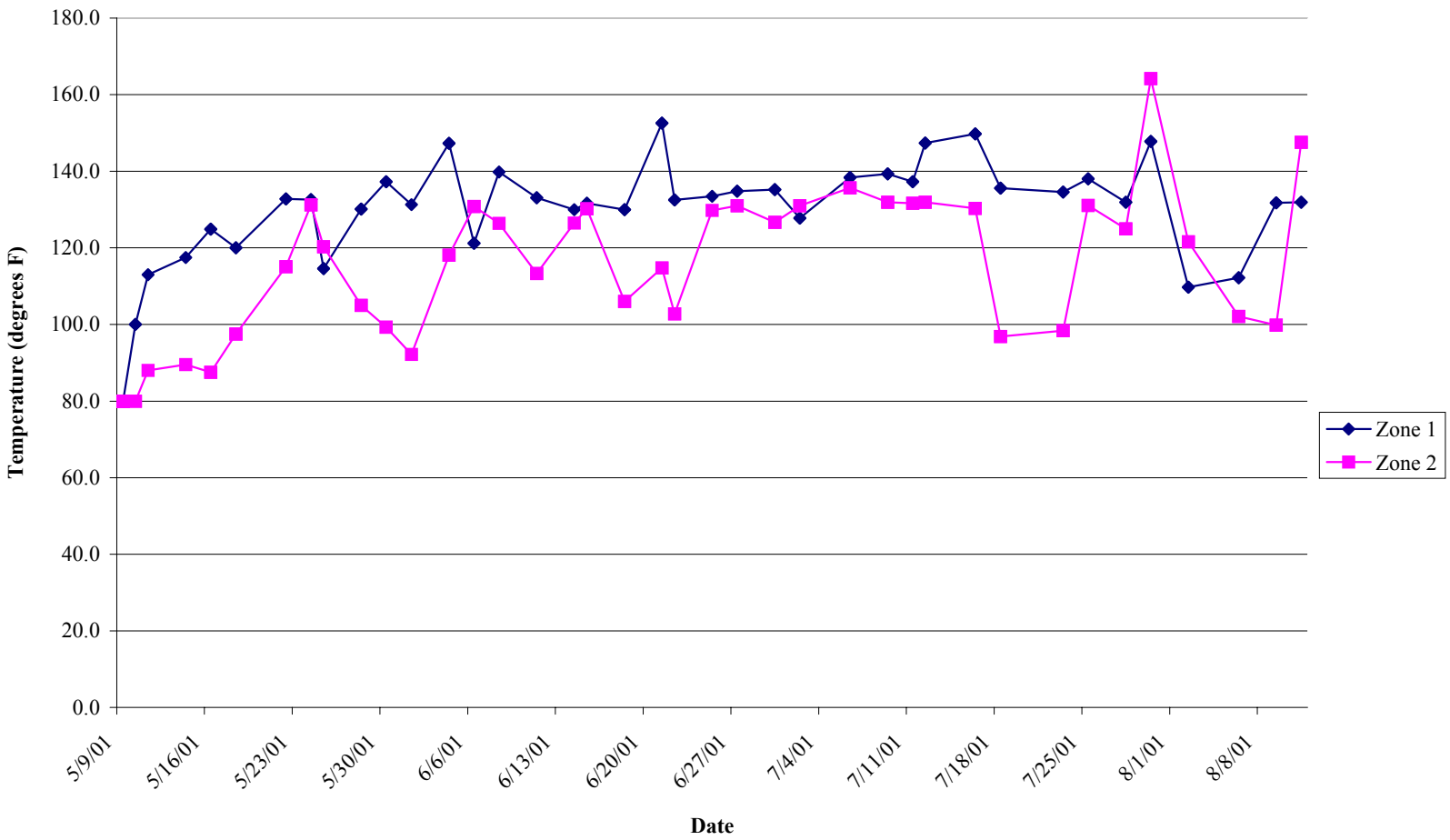
During the third reporting period of the project, Wright Environmental discontinued its 500 pound-per-day system and replaced it with a 600 pound-per-day system with new features and improvements. Site specifications changed as a result of this, and additional changes at the LBEP required the County's engineer to redraw site plans and reevaluate the location of the

system. Also, the purchase agreement had to be revised again and resubmitted to the County's legal and purchasing departments. Due to these delays, the County requested an additional six-month extension of the project timeline during the fifth reporting period of the project.

During the final six months of the project, additional delays in site work continued to push back the starting date for composting. These delays involved utility hookups for electricity, water, and sewer and resulted from other construction issues at the LBEP. To accommodate the additional electricity needed to operate the WEMI 600, the County added an additional electrical transformer at the LBEP.

Despite these delays, the County initiated training for the composting system on May 9, 2001. The initial process of loading the system included four days of loading only wood chips, after which a mixture of food waste and bulking agent was loaded daily. As with all new composting operations, the County experienced a number of initial problems in the composting process. Finding the best mixture of food waste and bulking agent has been the biggest challenge. The moisture content of the food waste was not consistent from day to day, which resulted in low temperatures in the composting system when the ratio of food waste to bulking agent was not sufficient to account for the moisture content of the food waste. This learning curve is normal and, once the Cherry Tree Recycling operators become comfortable with the feedstock mixture, this should not present a further problem. Also, Tacachale has cooperated by reducing the amount of grease and liquid in the food waste it sends to the County. This ensures a more consistent moisture content. Figure 2.3, *Summary of Compost Temperatures in WEMI 600 Zones 1 and 2 (May 9 – August 11, 2001)*, shows the fluctuation in temperatures resulting from moisture content problems.

The County also experienced some problems with its bulking agents. The shredder purchased to reduce the particle size of both pizza boxes and wood chips has not reduced the particle size small enough. Once composted material was discharged from the composting system, the County realized that feedstock material greater than 1 inch is not composted to a smaller particle size by the time it is discharged from the system. To address this problem, the County asked its wood processing contractor to grind wood waste to 2 inches or less in size. The wood processor will also provide the County with its processing fines. The County is currently investigating other methods for reducing the particle size of the shredded pizza boxes, including a shredding system that could attach to the loading area of the WEMI 600.



**Figure 3.3 Summary of Compost Temperatures in WEMI 600 System Zones 1 and 2
(May 9 - August 11, 2001)**

Because of the issue of particle size, the County has not been able to recover the tonnages of pizza boxes originally anticipated. In addition, pizza boxes were not available from UF during the summer months. While the County has produced finished compost, there has been an additional six weeks cure time to achieve a mature product.

Despite these problems, the County has produced mature compost and plans to test the compost to determine its classification according to DEP compost classification. The County is committed to operating the composting system for at least six months utilizing the current feedstock to determine the feasibility of composting food waste, paper, yard and wood waste in Alachua County. After six months, the County has committed to funding the and experimenting with the compost project for at least one and a half years with a variety of feedstocks and bulking agents, such as food waste from restaurants, schools, and hospitals. The County also hopes to process biosolids in the composting systems, as originally proposed. The delays during this project could not have been anticipated or avoided.

SECTION 4.0 HOW THE PROJECT ENHANCED MARKETABILITY OF NON-TRADITIONAL MATERIALS

Food waste is the third largest component by weight of waste generated nationally and, because it is not typically targeted for recovery, it is the largest component by weight of disposed waste. Florida generates large amounts of food waste compared to other states because of its growing population, large tourism industry, and large agriculture industry. Food waste generation in Florida is expected to increase as population and tourism increase. Also, food processing residuals are generated at a high rate in Florida because of its citrus industry and vegetable production. Despite this growing problem of food waste generation, the composting rate for food waste in Florida is low.

A 1998 food waste diversion report submitted to the DEP estimated that institutions in Florida like Tacachale generated approximately 60,110 tons per year of food waste. This material is not typically targeted for recovery. In addition, contaminated paper, such as pizza boxes, are not traditionally recycled. In fact, this material often contaminates paper recycling streams and has a negative value. This project targeted food waste and pizza boxes for recovery to add value to traditionally negative-value materials. Yard trash and wood waste were also targeted during this project, because they add bulk and carbon to the compost feedstock. As a compost feedstock, yard trash and wood waste's typically low values are increased.

Because Alachua County is committed to innovative recycling, the County will continue processing food waste, yard trash, and pizza boxes for at least six months to determine its feasibility and will continue to compost food waste with possible other amendments and fund the project for a total of at least two years. After compost produced by the County is mature, the County will test the material according to procedures outlined in Florida Administrative Code Chapter 62-709, Criteria for the Production and Use of Compost Made from Solid Waste. Because food waste is a good source of nitrogen, yard trash provides good bulk and carbon, and the material is source separated to minimize contamination, the County anticipates the material will be classified as Type A compost, which is allowed unlimited distribution.

Because the County's compost is expected to be high quality, it will have high value. High value compost can be sold at about \$30 per ton. Using this estimate, the County will have succeeded in increasing the value of Tacachale's food waste by \$64 per ton because disposal costs of \$34 per ton were eliminated and the value was increased by \$30 per ton. The value

of pizza boxes from UF should increase by \$64 per ton, and yard trash and wood waste by \$30 per ton.

This project, along with other composting projects funded in Florida by the DEP, continue to help strengthen and mature Florida's composting infrastructure through pilot programs such as the one in Alachua County.