The Calm Before the Storm: End-Markets for Storm Debris
Innovative Grant #09-01

Final Report

September 2010

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Okaloosa County Innovative Grant
The Calm Before the Storm: End-Markets for Storm Debris

September 2010

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SECTION 1
INTRODUCTION

1.1 Background and Purpose

Over 500,000 cubic yards of storm debris were generated in Okaloosa County (County) from Hurricane Ivan in 2004. Unfortunately, due to the lack of processing equipment the County was unable to recycle this material. All of the storm debris from Hurricane Ivan went to the Telogia Plant and Dart Container for boiler fuel; however, this market will no longer take the County's vegetative debris due to plastic contamination. The potential exists in future hurricane seasons to generate massive amounts of storm debris, with the assistance of this project the County would be prepared in advance for this likely event.

Yard waste is the largest percentage of recyclables waste stream in Okaloosa County, with 37.4 percent. The County typically generates over 120,000 – 150,000 cubic yards of yard waste and storm debris on an annual basis. Currently 12,000 – 18,000 cubic yards per year of yard waste are used for landfill cover, while the remaining 108,000 – 132,000 cubic yards of yard waste are sent to the Wright Landfill for cover, erosion control, and contour development. Yard waste and storm debris are generated faster than the County is able to utilize on the landfill site. At the start of this project, the County had a stockpile of nearly 100,000 cubic yards of yard waste and storm debris. Processing this debris utilizing plastic separation equipment has the potential to create a clean marketable product that will allow the County to participate in organics recycling, therefore, recycling the largest percentage of the recyclables waste stream in the County.

Okaloosa County applied for and was awarded a fiscal year 2008-2009 Innovative Recycling and Waste Reduction Grant from the Florida Department of Environmental Protection (FDEP). The County enlisted SCS Engineers (SCS) and Kessler Consulting, Inc. (KCI) to assist with the planning and implementation of the project funded by the FDEP innovative grant.

1.2 Goals and Objectives

The objective of this project was to remove plastic bags from ground yard waste and typical storm debris to increase the beneficial use of organic material for better marketability. Additionally, the fundamental backbone of this project was evaluating and leasing processing equipment that effectively removes plastic bags from ground yard waste and storm debris. Once a quality product was created, a full market analysis was conducted to identify potential beneficial use markets. Having local markets and backup regional markets in place will expedite future storm debris collection and ensure that a majority of the material is recycled rather than

disposed of. Ultimately, the goal of this project was to collect and recycle yard waste and storm debris with the assistance of processing equipment to generate quality and marketable material.

1.3 Innovative Features

Processing equipment that effectively separates plastic bags from yard waste and storm debris is a new technology for the County. A majority of the County's yard waste is ground in tub grinders and utilized within the landfill for cover, erosion control, and contour development, rather than recycled due to the invariable cost of separation and contamination issues. The character of the material makes plastic film separation difficult in the initial screening process, however; innovative technologies such as plastic separation equipment have proven to be highly successful in removing plastic debris from ground material.

1.4 Information Dissemination

The results of this project are transferable to every city and county in Florida. While the project was specific to the County, the research conducted and equipment evaluation results are applicable to virtually any yard waste processing program.

Formal presentations detailing the project progress and results were conducted at the U.S. Composting Council (USCC) 2010 Annual Conference on January 25, 2010 and the Recycle Florida Today (RFT) 2010 Annual Conference on June 15, 2010. Both presentations were well attended and received by the audience. Additionally, an article was written and will be submitted to a national publication, Resource Recycling. The article is slated for release in the January 2011 issue, which is dedicated to organics recycling and is designed to be released in conjunction with the annual USCC conference. The project results will also be presented at the Southeast Recycling Conference in March 2011.

Articles detailing the equipment demonstration and evaluation event were featured in the August 2009 issue of the RFT Newsletter and December 2009 issue of the Florida Organics Recycling Center for Excellence (FORCE) E-Newsletter.

SECTION 2
IMPLEMENTATION

2.1 Initial Project Activities & Timeline

Project Schedule

The information listed below details the scope of services listed in the County's contract with the FDEP, including the project tasks, project schedule, a task description, and the deliverables for the project. The relative deliverables for each task have been previously submitted to the FDEP, or have been submitted at the conclusion of this project. Section 3 details the actual deliverables results prepared and produced.

Table 2-1: Project Schedule

Task	1Q	2Q	3Q	4Q	5Q	6Q	7Q	8Q
Task 1: Equipment Research, Evaluation, Comparison, and Demonstration	X	X	X	X				
Task 2: Lease Appropriate Equipment						X	X	
Task 3: Equipment Results Event					X	X	X	
Task 4: Beneficial Market Analysis					X	X	X	X
Task 5: Education and Outreach					X	X	X	X
Task 6: Quarterly and Final Reports	X	X	X	X	X	X	X	X
Task 7: Project Management	X	X	X	X	X	X	X	X

Table 2-2: Scope of Services

Task	Activities	Deliverables
Task 1: Equipment Research, Evaluation, Comparison, and Demonstration	Research innovative equipment that separates contaminants such as plastic bags from ground yard waste and storm debris. Based on overall research results, identify, evaluate, and compare innovative processing systems. Host a state-wide public demonstration event at a conference in 2009 to demonstrate, observe, and evaluate the equipment in action.	1) Equipment directory or list 2) Research results 3) Public equipment demonstration and evaluation event 4) Event marketing or promotional materials 5) Prepare Invitation to Bid 6) Prepare equipment comparison document
Task 2: Lease Appropriate Equipment	Once equipment is identified, work with manufacturers to lease appropriate processing system. Analyze and test equipment for a duration of time that allows for representative sampling and demonstration/usage of equipment to gather sufficient data.	7) Lease equipment 8) Utilize equipment 9) Equipment evaluation 10) Equipment evaluation report
Task 3: Equipment Results Event	Host a follow-up state-wide public event or presentation at a conference in 2010 to present equipment results to produce clean material used in GeoHay products. Conduct a local market tour or prepare video for presentation of the GeoHay end-market facility. Supply results information to all attendees.	11) Public tour event, PowerPoint, or video to present equipment results and attend conferences 12) Results material
Task 4: Beneficial Market Analysis	Conduct research to identify potential local and regional beneficial use markets, other than biomass or boiler fuel. Work with GeoHay to develop end-market for yard waste and storm debris.	13) Local and state market analysis report 14) Field monitoring trials of WoodWattle (WW) 15) Procure and deliver WW product for local market use 16) WW lab and field tests with reports
Task 5: Education and Outreach	Conduct a workshop or session in conjunction with SWANA or RFT to distribute project results. Develop two brochures that target residents and landscape companies focusing on the impacts of plastic bags on the mulch process. Develop model program/case study and submit to EPA, FDEP, and FEMA agencies.	17) Prepare and show PowerPoint presentation at conference(s) 18) Two brochures targeting residents and landscape companies 19) Case study
Task 6: Quarterly and Final Reports	Prepare and deliver quarterly and final reports specified in the terms of the contract.	20) Seven quarterly reports 21) One final report 22) Report interpretation based on FDEP contract
Task 7: Project Management	Coordinate and oversee all the project tasks and ensure compliance with FDEP agreement.	Meeting agenda, meeting notes, site visits, and travel expenses.

2.2 Equipment and Services Procured

Listed below are the technical and professional services that were procured for the overall project.

- SCS Engineers (SCS) provided the County with project oversight and financial management of Kessler Consulting, Inc. (KCI).
- KCI provided ongoing project management and technical assistance for all project tasks for the duration of the project.
- Thompson Tractor Company, Inc. provided the Doppstadt U.S. 720 Trommel and Wind Sifter for screening and removing plastic bags from ground yard waste.
- Hawker Corporation provided transportation of the Airlift Separator for the public processing equipment demonstration and evaluation event conducted on June 24, 2009.
- Solid Waste Equipment Solutions, LLC provided transportation of the Redox Mobile Separation Unit for the public processing equipment demonstration and evaluation event conducted on June 24, 2009.
- GeoHay provided WoodWattle erosion control socks for County use.
- Soil Control Lab provided laboratory testing and analysis of processed yard waste samples.
- Test America provided laboratory testing and analysis of processed yard waste samples.
- Additional supplies included printing of residential and landscaper's brochures, biodegradable paper yard waste bags for yard waste for promotional use, and travel to and from industry conference to formally present project results and findings.

2.3 Problems Encountered

Internal County department interpretations on how to document third party in-kind contributions based on the new guidelines provided by the FDEP resulted in a delay of the 2nd Quarterly Report submission. To avoid further delay in submission about $45,000 of legitimate in-kind contributions were removed from consideration. This also caused the project not to meet their expected in-kind contributions.

Additionally, there was initially a lack of responses to the County's Invitation to Bid (ITB) due to emails not being received by many vendors. This resulted in the demonstration and evaluation event to be postponed a month. Despite the rescheduling, the event was still a great success.

During the demonstration event one vendor, Doppstadt, was unable to provide their plastic separation equipment with the other vendors for the public demonstration and evaluation event in

June 2009. However, this was rectified by rescheduling and evaluation date for Doppstadt in July 2009. The Doppstadt demonstration and evaluation event that took place in July did not encounter any problems and technical data was collected and included in the equipment evaluation report.

There was an operational issue encountered with the Doppstadt 720 Trommel and attached Wind Sifter during the lease period, which created further delays in equipment processing. The operational and equipment malfunctions were resolved by replacing the flexible plastic separation hose with a rigid metal one, repairing the anti-freeze leak, and restarting the drum.

As a part of this grant project, the County worked extensively with GeoHay as a potential end-market for screened overs. Approximately 60 cubic yards of double screened overs were distributed to GeoHay for use in the WoodWattle (erosion control sock). This material was double screened using one-inch and two-inch drum screens (leased grant equipment) specifically for GeoHay to ensure the overs were the optimum size and free of plastic. The County material is a bit more sandy and gritty than the material GeoHay typically gets from tree trimmers, and the sand caused significant blockage of the WoodWattle processing equipment. The County offered to purchase equipment that would assist with reducing potential product quality issue such as an auger, however, GeoHay did not respond with equipment specifications in time to meet the grant deadline.

Due to the delays in the equipment ITB/lease process, demonstration event scheduling issues, and processing equipment malfunctions described above, the project management team requested a three month grant project extension. This extension, which was approved as of June 2, 2010 by the FDEP, allowed for finalizing reports after the equipment operational evaluation and WoodWattle monitoring were both completed.

All issues discussed in this section were provided solutions and brought to closure.

SECTION 3
PROJECT RESULTS

3.1 Achievement of Goals and Objectives

The following section describes the achievement of goals and objectives of this grant project by task, and details corresponding results and deliverables.

Task 1 – Equipment Research, Evaluation, Comparison, and Demonstration

An Invitation to Bid (ITB) titled Yard Waste Separation Equipment, Demonstration, Evaluation, and Lease document was prepared and sent to a list of over 64 equipment vendors that process, screen, or separate compost and yard waste. The list was compiled using a variety of resources, such as: Biocycle, Florida Recycling Center for Excellence (FORCE) equipment and technology database, Entec Report, U.S. Composting Council (USCC) Annual Conference equipment demonstration and trade show, and online searches. Also included in the bid document were the Equipment Evaluation Forms. The ITB also required bidders to attend a public demonstration open to all organics industry personnel, with an equipment evaluation to be performed the following day.

The bid results revealed one responder. Upon further investigation it was found that not all of the vendors received the ITB notice distributed by the County procurement department. Because the bid resulted in only one piece of equipment, and to be fair to other equipment vendors, the County decided to postpone the bid until after the demonstration event. County staff and KCI contacted vendors to invite them to participate in the public demonstration event. Both Redox and Airlift Separator were interested in participating. Komptech was not interested because they typically do not lease equipment. To secure participation and help offset transportation costs, each of the vendors were offered mobilization costs in the sum of $3,000 each from the County grant funds.

A flyer announcing the public equipment demonstration was developed and distributed to a wide range of public and private organics industry organizations and periodicals, their staff and membership including but not limited to: Recycle Florida Today (RFT), Southern Waste Information Exchange (SWIX), FORCE, Solid Waste Association of North America (SWANA) Florida Chapter, Florida Department of Transportation (FDOT), FDEP, Environmental Protection Agency (EPA) Region 4, Florida Solid Waste Directors and Recycling Coordinators, Biocycle Journal, Resource Recycling Journal, C&D Magazine, and registered yard waste and construction and demolition (C&D) processing facilities. A registration list was developed and used for the event to keep track of all interested attendees.

In preparation for the demonstration and evaluation event, the project team developed a detailed protocol and schedule for the County, KCI, and equipment vendor staff to follow. Pre-demonstration staging and stockpiling instructions were also developed to assist the County with preparing both the aged and fresh ground yard waste material for the demonstration and evaluation, along with a supply list to ensure the necessary equipment and supplies were onsite. Lastly, Evaluation Procedures were created as a guideline for the technical evaluation and testing portion of the event.

The public demonstration event on June 24, 2009 was a great success with over 40 attendees, despite the unusually hot temperature and excessive heat warning. The event began with registration and introducing the project and equipment vendors. Each piece of equipment was then operated for approximately twenty minutes processing both fresh and aged yard waste. Only one piece of equipment was run at a time to allow attendees to fully experience how each machine operated and to observe the results.

After the conclusion of the public event, KCI worked with County staff and equipment vendors to begin the technical evaluation. The evaluation continued the following day with throughput tests and sampling of sorted material. The equipment was evaluated using the following criteria: 1) plastic separation rates, 2) bulk density, 3) throughput, and 4) moisture content.

Doppstadt was unable to demonstrate the Wind Sifter during the public demonstration event held in June due to logistical reasons. However, they did operate their trommel screening capabilities for attendees. In order to demonstrate the equipment's true capacity for separating plastic utilizing the Wind Sifter, a separate demonstration was scheduled for July 28, 2009. This demonstration took place before County and KCI staff, as well as at least six additional observers from Escambia County. During the demonstration KCI staff conducted a full technical evaluation and data analysis, including throughput testing and sampling of sorted material.

The results from both demonstration and evaluation events were compiled and finalized in a comprehensive letter report. The report also detailed the methodology used to conduct the equipment evaluation and provided recommendations.

The following deliverables for Task 1 have already been transmitted to the FDEP in a previous quarter:

- Invitation to Bid and Equipment Vendor List
- Demonstration Event Flyer and Distribution Methodology
- Pre-Demonstration Staging and Stockpiling Instructions and Supply List

- Demonstration and Evaluation Event Protocol and Schedule
- Evaluation Procedures
- Attendee List
- Letter Report on Yard Waste Processing Equipment Demonstration and Evaluation

Task 2 – Lease Appropriate Equipment

The original ITB was revised and sent to the processing equipment vendors who participated in the equipment demonstration and evaluation events held in June and July of 2009. The ITB was also released on Demand Star. A total of three vendors submitted a bid including Doppstadt and Redox, which were accepted as competitive bids meeting ITB requirements. One bid from Erin did not meet the requirements due to the fact that they did not participate in the public demonstration event.

The project team prepared a bid information/comparison spreadsheet to evaluate the two qualifying bids from Doppstadt and Redox. After an extensive evaluation process, the project team chose the Doppstadt Trommel 720 as the processing equipment for this project. The equipment was delivered to the Wright Landfill site on February 2, 2010. During the first two weeks, the equipment was utilized by staff to learn how to operate the equipment and work out the kinks. The equipment did have some problems during this time and the vendor mechanics worked to fix the issues. The equipment was leased for a total of four months.

A detailed Processing Protocol was developed for use by the yard waste equipment operators at the Wright Landfill site. The protocol described how to process both fresh and aged ground yard waste. The protocol recommended that the fresh ground yard waste be double processed using two drum screen sizes (one-inch and two-inch) to ensure maximum plastic contamination removal, as well as produce an ideal sized material for use in the GeoHay WoodWattle erosion control sock. Double processing entailed running the fresh material through the two-inch drum screen first, followed by running the same material through the one-inch drum screen to separate the smaller undesirable particles from the end-product. The two-inch drum was leased for approximately one month.

Additionally, an Equipment Usage and Material Processing Tracking form was developed to monitor the effectiveness of the equipment processing and resulting end-product. The form was designed to track the following processing elements:

- Date of operation
- Total running time
- Amount of material fed into hopper

- Material processed (fresh or aged yard waste)
- Weather temperature and conditions
- Processed material product split (percentages of overs, fines, and separated plastics)
- Operator name
- Problems encountered

Tracking began on February 16, 2010 and continued through May 27, 2010. Photographs were also taken to document the process. In total, the equipment was operated for a total running time of 138.5 hours and processed a total of 2,800 cubic yards of both fresh and aged ground yard waste. The total processed material product split for both aged and fresh yard waste resulted in 14 percent overs, 70 percent fines, and 16 percent separated plastics. The equipment was utilized for a total of 35 days.

Aged Yard Waste

The equipment was operated for a total 52 hours and 15 days while processing aged material. Approximately 1,352 cubic yards of material was processed, and of that material the product split resulted in 12 percent overs, 73 percent fines, and 15 percent separated plastics. The aged fines were virtually contaminant free, while the aged overs did contain some remaining plastic, but less so than the fresh overs.

Fresh Yard Waste

The fresh ground yard waste was a little more troublesome as the fresh material is bulkier and more fibrous, causing plastic remnants to become entwined in the particles. As a result of double processing the fresh yard waste, the equipment was operated for a total of 87 hours and 20 days. Approximately 1,448 cubic yards of material was processed, and of that material the product split resulted in 17 percent overs, 67 percent fines, and 16 percent separated plastics. The equipment was able to process 16 cubic yards per hour of aged material, compared to 26 cubic yards per hour of fresh material. The Equipment Evaluation Report and completed Monitoring Form was submitted to the FDEP at the conclusion of this project.

The equipment had some additional problems throughout the duration of the lease and the vendor mechanics and County staff worked to fix the issues, such as an antifreeze leak, drum stoppage, and the flexible hose fell off multiple times (replaced with a metal rigid hose).

The following deliverables for Task 2 have already been transmitted to the FDEP in a previous quarter:

- Bid Comparison Spreadsheet

- Processing Protocol
- Equipment Usage and Material Processed Monitoring Form

Task 3 – Equipment Results Event

The project team developed a comprehensive presentation detailing the equipment demonstration and evaluation event results for the U.S. Composting Council (USCC) Annual Conference on January 25, 2010. The presentation was titled, "Using Innovative Equipment to Separate Plastic Bags From Yard Waste." The conference, held in Orlando, FL, was a great success with over 900 composting and organics recycling professionals and more than 100 exhibitors in attendance.

The USCC is a national, non-profit trade and professional organization promoting the recycling of organic materials through composting. The USCC is the only national organization committed to the advancement of the composting industry. The local organics industry, including Okaloosa County staff, was very fortunate at this time of reduced travel budget, to have a national conference held in Florida.

The following deliverables for Task 3 have already been transmitted to the FDEP in a previous quarter:

- USCC 2010 Annual Conference PowerPoint Presentation and Agenda

Task 4 – Beneficial Market Analysis

The project team went on a tour of the GeoHay facility and met with the owner/operator, Mike Mikell. Some major changes have taken place since the writing of this grant two years ago. The company considerably downsized their business by selling half of the operation (manufacturing erosion control products made of 100% recycled synthetic fibers) to a company in North Carolina. GeoHay still maintains the WoodWattle (WW) portion of this operation, which manufactures erosion control berms made of ground yard waste.

Research on biodegradable netting was also conducted for the GeoHay product. The WW previously utilized plastic tubular netting to encase the mulch material that did not break down in the environment. It is preferred that any end-market products are fully biodegradable and not leave plastic contaminants behind.

The project team conducted research on end-market testing and evaluation for the GeoHay WW and developed a Laboratory Testing and Field Monitoring Protocol. This protocol was designed

to analyze and test the end product resulting from processing fresh yard waste from the Doppstedt 720 Trommel and attached Wind Sifter.

The project team conducted a site visit to the processing site to gather samples of the end product. Samples of the aged fines and fresh overs (GeoHay material) were sent to Soil Control Lab in California for testing and analysis. The fines were tested to evaluate the quality of the product as a soil amendment for use in the agriculture or horticulture industry. The overs were evaluated to determine the chemical filtering ability and determine the rate at which water will permeate through the product.

Test results revealed that the aged fines are very high quality, stable, weed free, and nutrient rich. The overs (GeoHay material) also met all parameters for filtering and erosion control capability. In fact, 99 percent of motor oil was removed from water passing through the material.

During the site visit a total of five GeoHay WW containing the County's double processed fresh yard waste were gathered and brought to Reedy Creek for additional field testing and monitoring. WW monitoring was conducted from April 14, 2010 through July 14, 2010, for a total of three months worth of data. Field monitoring of the WW documented degradation, soil erosion process, and potential weed seed growth. Field data and photographs of the WW were taken on a weekly basis to monitor the process.

Results revealed that the WW utilizing the County's material proved to be an effective erosion control tool with significant filtering capacity. The product did not produce any weed seeds and withstood (did not degrade) extreme environmental conditions. Build up of sediment had reached a depth of 6.5 inches and was almost level with the top of the WWs, proving the WW provided a rigid and effective erosion/sediment control barrier. The WW Monitoring and Evaluation Results report was submitted to the FDEP at the conclusion of this project.

The project team prepared a Beneficial Market Analysis report, which detailed comprehensive research performed on local beneficial end-markets for clean ground yard waste and storm debris. Research includes, but is not limited to:

- Florida Nursery Growers & Landscape Association – Panhandle and Big Bend chapter members
- Local nurseries, landscapers, and land clearing businesses
- Okaloosa County IFAS Extension
- Florida Panhandle agriculture industry
- FDEP List of Registered Yard Waste Processing Facilities

- Okaloosa County Government – Parks, Road, and Facility Maintenance Departments
- Eglin Air Force Base
- Florida Department of Transportation (FDOT)
- Other potential applications and end-markets

Through this research, the FDOT District 3 / Ponce de Leon Operations Center took all available aged and fresh fines (972 cubic yards) for use in roadside maintenance projects. Another 60 cubic yards of fresh (double processed) overs were used in the GeoHay WW. And finally, Okaloosa County Resources (Parks, Solid Waste, and Recycling), Road, and Maintenance Departments will utilize 500 cubic yards of aged and fresh fines. Several yard waste processing facilities also expressed interest in Okaloosa County's processed material. It was recommended that should the County continue to process material to recycle, the County should host a brief Meet & Greet and invite interested parties to come see the material for themselves. Additionally, Filtrexx International contacted the County regarding purchasing unprocessed ground yard waste for use in a remediation product for the Gulf oil spill. The County is still corresponding with Filtrexx about this potential. A copy of the Beneficial Market Analysis Report has been submitted to the FDEP at the conclusion of the project.

The following deliverables for Task 4 have already been transmitted to the FDEP in a previous quarter:

- GeoHay Company Profile Summary
- Biodegradable Netting Research
- Laboratory Testing and Field Monitoring Protocol and WW Monitoring Form
- Laboratory Testing Results

Task 5 – Education and Outreach

Two brochures targeting residents and landscape companies were developed for this project. The residential brochure features an introduction to the County's yard waste recycling program, benefits of using compost and mulch, tips on what residents can do to eliminate contaminates from the County's yard waste, additional resources, and facts on the amount of organics disposed of in Florida's municipal solid waste stream. The landscapers brochure also features Greenscaping tips provided by the Environmental Protection Agency (EPA).

A case study featuring the overall project results was also developed and submitted to the FDEP, EPA, and the Federal Emergency Management Agency (FEMA) at the conclusion of this project. The Case Study was transmitted to the FDEP at the conclusion of the project.

The project team also developed a PowerPoint presentation describing the project results and video depicting the equipment demonstration event and material processed. This presentation was given in conjunction with the organics track at the RFT Annual Conference on June 15, 2010 in Orlando, Florida. Processed material samples were also provided for attendees to examine, as well as copies of both the residential and landscapers brochures and final lab results.

Articles detailing the equipment demonstration and evaluation event were featured in the August 2009 issue of the RFT Newsletter and December 2009 issue of the FORCE E-Newsletter. Additionally, an article highlighting the results of the project was written and submitted to a national publication, Resource Recycling. The article is slated for release in the January 2011 issue, which is dedicated to organics recycling and is designed to be released in conjunction with the annual USCC conference. A copy of the Resource Recycling Article Submission has been submitted to the FDEP at the conclusion of the project.

The following deliverables for Task 5 have already been transmitted to the FDEP in a previous quarter:

- Residential Yard Waste Recycling Program Brochure: Beneficial Use of Compost and Mulch
- Yard Waste Recycling Program for Landscapers Brochure: Beneficial Use of Compost and Mulch
- RFT 2010 Annual Conference PowerPoint Presentation and Agenda
- Summer 2009 RFT Newsletter: Renewable News
- Fall 2009 FORCE E-Newsletter: ForceMatters

Task 6 – Quarterly and Final Reports

As specified under the terms of the FDEP contract, the project team prepared and submitted seven quarterly progress reports and one final report to the FDEP. Progress reports were submitted in conjunction with reimbursement requests. Each report clearly described the activities undertaken during that reporting period, as well as activities anticipated for the next quarter, problems encountered, problem resolutions, financial summary of the project, and any schedule updates.

Task 7 – Project Management

The project was funded through an innovative grant that was awarded to Okaloosa County by the FDEP. Effectively managing the project, coordinating activities, and administering the grant was a joint effort between the County, SCS, and KCI.

KCI held regular project team meetings with the County as necessary. KCI prepared the meeting agendas based on the approach described herein. Regular updates were provided and open communication was maintained between KCI staff and the County regarding project activities, deliverables, and relevant updates. These regular meetings were crucial for the momentum and exchange of clear communication between the County and KCI regarding project work and activities to ensure the County's objectives and requirements were being met.

3.2 Advanced Technology or Process Demonstration

The County conducted a public demonstration event to test and evaluate innovative yard waste processing equipment that separates plastic bags from yard waste. Three different vendors and pieces of equipment were showcased at the event. Based on the results of the evaluation, the County leased the Doppstadt 720 Trommel and Wind Sifter for a duration of time that allowed for representative sampling and usage data. In total, the equipment was operated for a total running time of 138.5 hours and processed a total of 2,800 cubic yards of both fresh and aged ground yard waste. The total processed material product split for both aged and fresh yard waste resulted in 14 percent overs, 70 percent fines, and 16 percent separated plastics. The equipment was utilized for a total of 35 days during a four month period.

To the best of our knowledge, no other jurisdictions in Florida are currently using this type of technology that successfully removes contaminants, such as plastic film. Therefore, this technology was not only novel for the County, it was also novel for the state of Florida.

3.3 Material Recovery

This project specifically targeted the recycling of yard waste and storm debris. With the use of plastic separation and screening equipment, the County processed an estimated 2,800 cubic yards of incoming material (2,076 cubic yards after double processing fresh ground yard waste for GeoHay). As a result of the beneficial end-market research, the County successfully recycled 100 percent of the aged clean fines (1,472 cubic yards) and 37 percent of the fresh overs (60 cubic yards). In sum, the County recycled 74 percent (1,532 cubic yards) of the total processed yard waste using the Doppstadt 720 Trommel screen and attached Wind Sifter.

3.4 Transferability

The results, lessons learned, and all materials developed from this project are transferable by the County to all Florida jurisdictions. The following materials developed in this project that are

appropriate include:

- Invitation to Bid and Equipment Vendor List
- Demonstration Event Flyer and Distribution Methodology
- Demonstration and Evaluation Event Protocol and Schedule
- Evaluation and Sampling Procedures
- Letter Report on Yard Waste Processing Equipment Demonstration and Evaluation
- Bid Comparison Spreadsheet
- Yard Waste Processing Protocol
- Equipment Usage and Material Processed Monitoring Form
- Equipment Evaluation Report
- USCC 2010 Annual Conference PowerPoint Presentation
- GeoHay Company Profile Summary
- Biodegradable Netting Research
- Laboratory Testing and Field Monitoring Protocol and WW Monitoring Form
- WW Monitoring and Evaluation Results
- Beneficial Market Analysis Report
- Residential Yard Waste Recycling Program Brochure: Beneficial Use of Compost and Mulch
- Yard Waste Recycling Program for Landscapers Brochure: Beneficial Use of Compost and Mulch
- Case Study
- RFT 2010 Annual Conference PowerPoint Presentation and Agenda

Articles detailing the equipment demonstration and evaluation event were featured in the August 2009 issue of the RFT Newsletter and December 2009 issue of the FORCE E-Newsletter. Additionally, an article highlighting the results of the project was written and will be submitted to a national publication, Resource Recycling. The article is slated for release in the January 2011 issue, which is dedicated to organics recycling and is designed to be released in conjunction with the annual USCC conference. A copy of the Resource Recycling Article Submission has been submitted to the FDEP at the conclusion of the project.

Presentations featuring the equipment demonstration and evaluation event, as well as project results were conducted at the USCC Annual Conference in January 2010 and at the RFT Annual Conference in June 2010.

A case study featuring the overall project results was also developed and submitted to the FDEP, EPA, and FEMA at the conclusion of this project.

3.5 Cost Effectiveness and Efficiency

The following sections describe the total project expenditures, as well as potential avoided disposal fees and cost/benefit rationale for implementing a yard waste processing program.

3.5.1 Project Expenditures

The table below provides a breakdown of the total expenditures of this innovative grant project by category/expenditure type and vendor payments. The total grant funds expended equaled $243,771.07

Table 3-1: Innovative Grant Expenditures

Category / Expenditure Type	Vendor	Total Expenditures
Professional / Technical Services		
Consulting/Professional Services	SCS Engineers	$13,038.60
Consulting/Professional Services	Kessler Consulting, Inc.	$166,459.95
	Subtotal	**$179,498.55**
Equipment		
Mobilization of the Airlift Separator for equipment demonstration and evaluation event	Hawker Corporation	$3,000.00
Mobilization of the Redox machine for equipment demonstration and evaluation event	Solid Waste Equipment Solutions, LLC	$3,000.00
Lease of Doppstadt 720 Trommel and Wind Sifter	Thompson Tractor Co, Inc.	$52,400.00
WoodWattle (soil erosion control sock)	GeoHay	$2,000.00
	Subtotal	**$60,400.00**
Lab / Testing Costs		
Ship samples to Test America	FedEx/Kinko's	$9.64
Analytical testing of samples	Test America	$68.00
Ship samples to Soil Control Lab	FedEx/Kinko's	$19.63
Analytical testing of samples	Soil Control Lab	$615.00
	Subtotal	**$712.27**
Educational Materials / Supplies		
Supplies for Demonstration and Evaluation Events	Publix	$6.35
Supplies for Demonstration and Evaluation Events	Target	$47.05
Supplies for Demonstration and Evaluation Events	Lowes	$13.81
FEMA Course	SWANA Training	$125.00
Travel expenses for USCC Annual 2010 Conference	Okaloosa County	$958.99
Travel expenses for RFT Annual 2010 Conference	Okaloosa County	$529.85
Printing of residential and landscapers brochures	PrintPro	$840.00
Paper lawn and leaf bags - promotional	Ace Hardware	$639.20
	Subtotal	**$3,160.25**
	Total Costs	**$243,771.07**

In-Kind Contributions

The table below provides a breakdown of the total in-kind contributions provided by County staff and project partners not directly paid for their services or time on the project. The total in-kind contributions equaled $163,861.80 for the grant duration. The County did not meet their in-kind obligation by $29,138.20 for reasons detailed below.

The project achieved 85 percent of the $193,000 in-kind contribution specified in the grant. The $193,000 was based in part on anticipated contributions from private organizations and businesses; however, the County's grant office determined that no in-kind contributions from private organizations or businesses could be reported unless the organization or business verified its labor rates. The private sector generally prefers not to make labor rates publicly available, so nearly $45,000 of in-kind hours were lost and subsequently caused the project not to meet their expected in-kind contributions.

Additionally, the County anticipated utilizing the processing equipment for six months to a year, which would have yielded higher in-kind equipment and staff in-kind hours; however, due to the equipment ITB, demonstration, and processing delays this was not possible to do before the grant period ended.

Table 3-2: In-Kind Contributions

Quarter / Work Period	Contribution
Project Budget	**$193,000.00**
First Quarter - Period End 12/31/08	$15,001.27
Second Quarter - Period End 3/30/09	$780.80
Third Quarter - Period End 6/30/09	$19,443.96
Fourth Quarter - Period End 9/30/09	$1,995.91
Fifth Quarter - Period End 12/31/09	$8,083.17
Sixth Quarter - Period End 3/30/10	$38,015.21
Seventh Quarter - Period End 6/30/10	$76,156.68
Eighth Quarter - Period End 9/30/10	$4,384.80
Total	**$163,861.80**
Ending Balance	**$29,138.20**

3.5.2 Avoided Disposal Fees

This project successfully recycled 1,532 cubic yards (204 tons) of processed yard waste for beneficial use purposes during the four months of processing. Technically, this resulted in $7,995 of avoided disposal fees.[1] If the processing equipment was operated for a full year the County could actualize a $23,985 savings in disposal (tip) fees on an annual basis.

3.5.3 Cost/Benefit

It cost the County an estimated $112,206.14 in equipment usage and labor costs to grind, haul, and screen aged and fresh yard waste for a total of four months. This figure is based on labor costs for five employees working a total of 139 hours, operating auxiliary grinding equipment, and leasing the Doppstadt 720 Trommel and attached Wind Sifter. The labor and grinding equipment costs were in-kind contributions (County staff and County-owned equipment). Throughout the four month lease, the County processed a total of 2,800 cubic yards of fresh and aged yard waste. Approximately 1,532 cubic yards of this material was recycled for beneficial use. For the purposes of this grant, the County gave this material away for free; however, if the County were to sell it for $18 per cubic yard[2], potential revenues could equal $27,576. This revenue could potentially offset the operation cost and bring down the cost per cubic yard to $30.23.

Utilizing the same assumptions as above, the County could further reduce the total cost per cubic yard to $29.62 by leasing the Doppstadt 720 Trommel and attached Wind Sifter on an annual basis. Furthermore, if the County were to purchase the equipment rather than lease, the per cubic yard cost would go up to $48.42 per ton; however, it would only take 3.7 years to pay back the total purchase price of $310,000 based on the projected organics recycling revenue. After the payback period, the total operating cost would drastically drop down to $11.51 per cubic yard. These calculations are explained in further detail in the table below.

[1] Based on the current $39.19 yard waste tip fee for Okaloosa County.
[2] *Composting News* price for bulk retail yard waste compost in Florida, August 2010.

Table 3-3: Total Operation and Equipment Costs

Category	Description	Total Expenditures (4 Month Lease)	Total Expenditures (Annual Lease)	Total Annual Expenditures (Purchase Equip)	Total Annual Expenditures (Post Payback)*
Doppstadt 720 Trommel and Wind Sifter - 4 month lease - $13,100 per month for 4 month lease / $12,675 per month for 12 month lease	Screening and plastic separation equipment for processing	$52,400.00	$152,100.00	$310,000.00	$0.00
Auxilary equipment operation costs	Yard waste grinding and hauling equipment (grinder and loader)	$41,005.00	$123,015.00	$123,015.00	$123,015.00
Equipment operation labor costs	Grinding, hauling, and screening yard waste labor hours - 5 employees for a total of 139 hours	$18,801.14	$56,403.42	$56,403.42	$56,403.42
	Subtotal	**$112,206.14**	**$331,518.42**	**$489,418.42**	**$179,418.42**
Category	**Material Cubic Yard**	**Costs per CY (4 Month Lease)**	**Costs per CY (Annual Lease)**	**Costs per CY (Purchase Equip)**	**Costs per CY (Post Payback)***
Total material processed 4 mos	2,800	$40.07			
Estimated total material processed 12 mos	8,400		$39.47	$58.26	$21.36
Category	**Material Cubic Yard**	**Potential Revenue per CY (4 Month Lease)**	**Potential Revenue per CY (Annual Lease)**	**Potential Revenue per CY (Purchase Equip)**	**Potential Revenue per CY (Post Payback)***
Total recycled yard waste 4 mos	1,532	$27,576.00			
Estimated total recycled yard waste 12 mos	4,596		$82,728.00	$82,728.00	$82,728.00
Estimated compost revenue per ton**	$18.00				
Total Expenditures (equipment and labor costs)		$112,206.14	$331,518.42	$489,418.42	$179,418.42
Potential Recycling Organics Revenue		$27,576.00	$82,728.00	$82,728.00	$82,728.00
Total Costs After Recycling Revenue		$84,630.14	$248,790.42	$406,690.42	$96,690.42
Total Cost per Cubic Yard		**$30.23**	**$29.62**	**$48.42**	**$11.51**

*Estimated compost revenue per ton based on average price of yard waste compost for Florida from *Composting News*, August 2010.
*Post Payback Period does not include estimated equipment operating costs for the Doppstadt 720 Trommel and Wind Sifter.

This project reduced contaminants (plastic bags) in ground yard waste and storm debris and recycled it into beneficial use products such as clean compost and mulch. These products have physical (erosion and sediment control, reduces storm water run-off, improves water-holding capacity, reduces bulk-density, etc.), chemical (provides nutrients, stabilizes pH, etc.), and biological (provides soil biota, suppresses plant diseases, etc.) benefits.

This project recycled a total of 1,532 cubic yards (204 tons) of processed yard waste for beneficial use purposes, resulting in the following natural resource conservation and green house gas emissions reduction equivalent to:

- 7 passenger cars off the roadway each year[3]
- 4,588 gallons of gas saved
- 16,842 propane cylinders

[3] Environmental Protection Agency (EPA) Waste Reduction Model (WARM).

3.5.4 Nontraditional Materials

This project successfully demonstrated innovative processes to recycle yard waste generated both residentially and commercially, as well as storm debris. Yard waste is the largest percentage of the recyclable waste stream in Okaloosa County, with 37.4 percent. Until this project started none of this material was recycled for beneficial use. Processing this debris to create a cleaner and more marketable yard waste product allowed the County to participate in organics recycling. The County was able to successfully recycle 100 percent of the aged and fresh clean fines (1,472 cubic yards) to the Florida Department of Transportation and Okaloosa County Parks, Road, and Maintenance Departments for use in road side and local maintenance projects. Approximately 37 percent of the fresh overs (60 cubic yards) were recycled for beneficial use in the GeoHay WoodWattle (erosion control sock). In sum, the County recycled 74 percent of the total processed yard waste throughout the duration of this project. Results from this project have provided the County the information and tools it needs to move from a mulch operation to a potential future organics recycling operation where yard waste, food waste, and biosolids could be composted.