



FPPC

Farm Pilot Project Coordination, Inc.
"Technologies for Nutrient Management"

April 15th, 2008

To: Mr. William Boyd - Leader, Manure Management Team
East National Technical Support Center - NRCS

From: Bob Monley, General Manager, FPPC, Inc.
Lauren Seigel, FPPC Project Manager

Copy: Carolyn Adams, NRCS – Director ENTSC
Jeff Porter, NRCS – Manure Management Team, ENTSC
Bruce Newton, NRCS - Director WNTSC
Ron Williams, NRCS - Director CNTSC
Richard Salem, Executive Director & Board Chairman, FPPC Inc.
Dr. Robert Carnahan, FPPC Board Director
Robert Zaytoun, FPPC Board Director
Hilliard Eure, FPPC Board Director
Sara Royer, FPPC Treasurer
Frank Bordeaux, Executive Director – N.C. Agricultural Finance Authority
Peter Hubbell, Principal - Water Resource Associates
Frank Lancaster, N.C. Agricultural Finance Authority
Dudley Voorhees, FPPC Field Coordinator
Shetal Patel, CWI Business Development Manager

Re: Quarterly Report for period from January 1st through March 31st, 2008

This report is intended to update the NRCS and the FPPC Board of Directors on the status of the innovative technology pilot projects.

Executive Summary

During the first quarter of 2008, FPPC evaluated and funded five pilot projects for the Limited Resource Farmer application and funded three (3) renewable energy projects. Limited resource farmer projects were identified for sites in Texas, North Carolina, Virginia, Hawaii and in Puerto Rico. These technologies were approved in part because they required less than \$80,000 in investment and appeared to match the simplified nutrient management practices for the small farm scale. To advance the economic viability of nutrient management systems, the FPPC Board also approved funding of \$ 1,800,000 for three projects that will result in renewable energy benefits.

Final preparation is underway for the briefing to congressional staff members now scheduled for April 22nd in Washington DC.

OPERATIONS -----

A. New Project Initiatives: The FPPC Board met on two occasions during the first quarter to review the limited resource farmer proposals as well as FPPC's direction in renewable energy. A white paper describing the feasibility of various energy options was presented and adopted.

Accordingly, the FPPC Board of Directors approved funds of \$1.8 million to be allocated for three separate energy conversion projects. The development of fuel pellets, on-farm heating/cooling applications and liquid biofuel have been targeted. Specific application requirements and criteria have been posted on the website and also sent to potential providers interested in qualifying their capabilities. The intent is to formulate complete economically viable solution sets that will link the treatment of animal waste to revenue generating energy products, through *Clean Water International, Inc.*

In January, FPPC received proposals on the limited resource farm requirements and the issued RFP. The professional review panel recommended five (5) proposals to the Board. The Board took action and granted funding to the following based on the merit of the technical assessment and the potential outreach offered to the small and limited resource farmer.

- i. Cape Enterprises - This approved project will be conducted on a small dairy operation in Sulpher Springs, Texas and will be based on struvite formation to remove phosphorus from the effluent waste stream. The project will be phased with funding tied to a performance milestone in Phase I. Phase II funds will not be released without a successful demonstration during Phase I.
- ii. University of Hawaii – This project will support a small piggery operated by a private owner. The University will adapt technology currently used in Asia, based on the Janong Natural Farming methods. This will require, building a natural ventilation, solar lighting structure for housing the animals. Green waste material will be used as bedding which will compost. Composted material will be spread on to pasture for fertilizer.
- iii. Virginia Tech/VA Dairymen Association - This project will be located on a small dairy farm site in the Shenandoah Valley. Collaborative efforts on this farm have targeted struvite, but the FPPC project will assist by providing and testing a low cost solid separator for the farm.
- iv. North Carolina A&T - This project will utilize swine wastewater treatment technology that incorporates both a solid separation system and a biological system to treat the entire waste stream.
- v. University of Puerto Rico – The Board reserved \$10,000 for a pending proposal for advanced work on a simplified solid separation system appropriate for smaller scale applications. A forth coming proposal will be evaluated to determine the feasibility of a small testing and monitoring project.

B. Congressional Briefing: FPPC continues to prepare for a congressional briefing scheduled for April 22nd, 2008. A short video showcasing organic fertilizer and energy conversion at select CAFO locations has been prepared to augment the FPPC presentation.

- C. Testing/Monitoring:** A small testing project (#4.13) was awarded to Byogy and its partner MicrOganix to allow data collection and testing of two unit processes. The project was funded at \$20,000 and will use animal waste as a feedstock to characterize the drying characteristics of a micronizer and the separation potential of a vibrating membrane.
- D. Promoting nutrient reduction methods:** An interview, describing FPPC, was published in the March issue of “In the Field” magazine, a Florida publication serving farm community readers. A copy of the article can be accessed on the webpage at www.fppcinc.org . In another forum, FPPC lead the monthly discussion at the “Manure” luncheon on March 7th. This monthly gathering attracts local Gainesville participants including environmental engineers, dairy providers, University of Florida researchers and representatives from the Department of Agriculture and the Florida Department of Environmental Protection. FPPC has also been advised that its paper regarding lessons learned has been accepted for presentation at the 2008 Soil and Water Conservation Society’s Annual Conference this July in Tucson, AZ.
- E. Technology Summit:** FPPC has finalized the 2008 Technology Summit program to be held May 21st – 23rd in St. Petersburg, Florida. This year’s theme, entitled “Pathways to Energy” will focus on various technologies/methodologies that utilize the animal waste as a feedstock for energy conversion. This year virtual tours of five pilot projects will be presented in lieu of traveling to/from a nearby farm demonstration. This narrated video will allow participants to see technologies without committing travel time, and, be available for use thereafter.
- F. BGP Gasification & Five Rivers:** FPPC was advised that the BGP gasification project may be suspended or delayed after Smithfield’s recent announcement of the sale of their beef interest in Five Rivers.
- G. CWI Agreement:** FPPC has entered into an agreement with its for-profit subsidiary, Clean Water International, Inc.. The purpose of this effort is to provide assistance in evaluating economic viability, applicable technologies, process combinations as well as integrating various technologies of equipment suppliers to participate in one of three designated renewable energy projects. These three (3) selected pilot projects will extend the nutrient waste treatment process by converting waste into a valuable form of energy. Requirements for each pilot project and the evaluating criteria have been posted for on-line access on the Farm Pilot webpage. Notifications have been mass mailed to previous grant participants/applicants as well as other potential providers.

CWI has been provided a written work scope and will perform the work at cost. In the past, CWI has been utilized by FPPC as a third party to perform testing and monitoring at key pilot demonstration facilities.

A. Progress at active pilot demonstration sites is briefly summarized below:

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Swine and Dairy, Michigan (#6.06)-----
Phase 3 Developments & Investments, LLC
Geerlings Hillside Farm

Process Description:

- Treatment of mixed animal waste from both swine and dairy
- A series of waste treatment technologies (i.e. screw press and dissolved air flotation) have been integrated with an anaerobic digester to provide a complete system
- Ultimately producing electrical power may be incorporated at a later date
- Pelletization and transport of nutrients off site to organic fruit farms and other potential end users

Project Status:

Phase 3 continues to explore additional approaches for drying biofibers prior to pelletising. Due to the moisture content of the biofibers coming out of the screw press, the pellets fail to remain intact.

The challenge for the last three months has been in the use of the waste heat for biofiber drying. Multiple configurations were considered including, but not limited to: installation of a simple dynamic air flow through the auger, installation of a radiator at the end of the auger which would blast hot air on the fibers just as they entered the pellet mill feed hopper, and installation of a shroud underneath and all along the bottom half of the auger.

Biofibers are also being sent to an outside vendor for a unique friction drying approach. The trials were highly successful in drying the biofibers to <10% moisture, but the process also pulverized the fibers which would be problematic for pelleting.

Until a long term solution for drying biofibers can be found, the unpelleted biofibers will be used as animal bedding and compost base.

Swine, Illinois (#4.09)-----
Envirowaste Technology, Inc.
Rensing Family Farms, Inc.

Project Description:

- Low pressure and multiple filling of geo-textile bags to dewater solids from the first stage of a three-stage lagoon system. This farm houses a 2000-head finishing unit in Illinois.
- The effectiveness of this separation method will be compared and evaluated in light of waste stream differences (ie. – manure derived from the storage pit under the production house and manure pumped from a storage pond).

Project Status:

Envirowaste conducted its third loading event in January 2008. A total of 450,750 gallons of raw slurry were processed during this event. A total of 450 gallons of ferric sulfate (.001) and 189 gallons of polymer (.00042) were used over a total processing time of 32½ hours.

Slurry total solids continued to increase as the lagoon was processed, requiring close monitoring of chemistry to insure creation of the best floc for performance of the Geotube®. The Geotubes® consolidated satisfactorily upon refill with no blinding of the fabric. The filtrate samples were observed to have a dark tea clarity, and were indicative of good performance of chemistry and Geotube® filtration. Very little solids settling was observed in the filtrate samples.

A bench test of flocced lagoon slurry was conducted with a 1000 ml sample; dewatered through a Geotube® cone with 635 ml of free/bound water being released within 1 hour-to EPA 9095 paint filter standard test. This test indicated that the slurry contained nearly 36% hydrated flocced solids by volume.

Third Refill Event Summary:

| Total Sludge (gal) | Estimate Dry Tons | Polymer (gal) | Fe3 (gal) | Processing Time (hrs) | Samples |
|--------------------|-------------------|---------------|-----------|-----------------------|---------|
| 450,750 | 57 | 189 | 450 | 32.5 | 6 |

The fourth loading event is scheduled for May 2008.

Poultry, Virginia (#4.06)-----
Virginia Polytechnic Institute and State University
Heatwole Poultry Farm

Process Description:

- Fluidized bed – pyrolysis conversion of poultry litter to bio-fuel for on-site use

Project Status:

In March, representatives from Virginia Tech traveled to Hazen Research, Inc. in Colorado to perform control tests on the pyrolysis unit. The reactor was heated to operating temperature and pyrolyzed wood shavings were used to produce bio-oils. There were three minor problems with the unit which need to be corrected before Virginia Tech would accept delivery of the unit. The Hazen Research promised to make the corrections within two weeks and then the unit will be shipped at the end of April. Trailers and containers, housing the bio oil and bio char have been purchased and delivered to the cooperator's premises.

Virginia Tech has requested bids from EPA Certified companies to sample the pyrolysis gases and emissions from the flare.

Swine, Iowa (#4.03)-----
Puck Custom Enterprises (PCE)
Muhlbauer Farm
Greenflash II
Langle Farm

Project Description:

Further development and study of a dewatering method using high pressure and rapid filling of geo-textile bags and metal salt/polymer flocculation. Testing is now being planned for three (3) swine sites in Iowa.

Project Status:

Initial dewatering unit research and optimization has been started by PCE and Agri-Environmental Engineering (AEE). PCE anticipates its first loading event during May 2008.

Dairy, Utah (#4.04) -----
Utah State University, Center for Profitable Uses of Agricultural Byproducts
Blaine Wade Dairy near Ogden, Utah

Process description:

- This system utilizes an existing induced blanket reactor (IBR) type of anaerobic digester converting organic carbon in the manure to methane and carbon dioxide.
- The (IBR) effluent will be treated by a new electro-coagulation unit.
- Individual contributions of nutrient reduction of the screw press, settling basin and the electro-coagulator units will also be quantified.
- Testing of the Houle 2 stage separator

Project Status:

Utah State's project manager anticipates a final report by the end of May 2008.

Dairy, Pennsylvania (#5.07) -----
Nutrient Control Systems
Mercer Vu Farms in Mercersburg, Pennsylvania

Process description:

- Upgrading the existing nutrient management system, making waste treatment of manure more operationally friendly and cost effective.
- Fine sand removal, added solids separation capability and a conveyor, blower & controls, building expansion, windrow turner and curing pad to support a composting operation.

Project Status:

In January, Nutrient Control Systems installed a larger screw press into the system for testing. The separation building extension has also been completed for the installation of third rotary screen thickener. The site has been prepared and chemicals have been selected for the Kemira Band Press testing and operation. Testing of this unit is anticipated to begin in April 2008.

Dairy, Vermont (#5.02)-----
BioProcess Technologies
North Williston Cattle Co.

Process description:

- The existing system incorporates a solid separator, a digester, composting capability and effluent treatment.
- The proposed project will take the biological effluent treatment to a new level of effectiveness by upgrading pretreatment of fine suspended solids and optimizing organic treatment in the bio-filter towers
- Belt press will be installed as the primary solid separator

Project Status:

The AWS belt press system has been installed at the North Williston Cattle Co., however the anticipated BioProcess start up of the bio-filter towers is on hold until the targeted level of solids (<1%) can be achieved or the waste stream entry is conditioned acceptably for the bio-tower.

Dairy/Mixed Waste, California (#5.06) -----
Agricultural Waste Solutions, Inc.
Inland Empire Municipal Site, Chino

Process description:

This project utilizes a regional model and a centralized location at the Inland Empire Utilities Agency site in Chino, California. Key elements of the pilot demonstration include the AWS centrifuge and gasification unit. The one-year testing program will test dairy, swine, beef, poultry, horse, digested sludge, food waste and mixes of wastes for their produced energy value. The demonstrations and tests will simulate a large range of farm waste systems, from high-volume flushes to dry-lot manure systems, in order to evaluate energy production, efficiency, costs, automation and maintainability. The improved centrifuge will remove moisture and is designed to uniformly condition the feed stock entering the gasifier.

The system consists of a skid-mounted centrifuge, a skid-mounted gasifier, an intermediate solids hopper, augers from the centrifuge to the hopper and from the hopper to the gasifier. The unique centrifuge removes 98% of the suspended solids with 70% moisture and is designed to uniformly condition the feedstock entering the gasifier. All equipment sits on a 25 by 35 foot concrete pad, with a gas compressor, expansion tank and storage tank located nearby. Utilities are plumbed to the pad, and the gasifier can run on either natural gas or its produced gas from the storage tank.

Project Status:

During the first quarter, the system processed flushed dairy wastes, dry-corral dairy wastes, poultry wastes and mixed dairy/poultry wastes.

The centrifuge was shipped to Iowa to test feasibility of separation from a dairy farm and several swine farms for a potential centralized energy project. Good separation and dry solid results were obtained with fresh wastes from the dairy source; however the aged deep-pit swine wastes were more difficult to separate. With experimentation and different combinations of polymer, ferric and alum the optimum combination was achieved yielding good separation results.

A variable frequency drive was installed to control the speed of the gas compressor motor and to maintain a constant system vacuum throughout the gas production cycle.

Poultry, Wisconsin (#5.04) -----
R&J Partnership
Creekwood Farms, near Madison
Weiss Poultry Farm in Kewaskum, Wisconsin

Process description:

- Utilizes chicken manure and mortality carcasses, along with a carbon source for conversion into a stable, organic fertilizer derived from laying hen facility
- A bio-filter acts as a scrubbing mechanism to take out noxious odors associated with composting process.
- A key element in the process is the ammonia capture and the re-introduction of N into the final composting process.
- Leachate is collected in tanks and is re-used during the process. The net effect is that the process is optimized so that Nitrogen values remain elevated.

Project Status:

In October, the Board of Directors approved the additional funding to expand air emission testing and monitoring of the system. Additional sensors have been purchased for computer data logging. A new testing protocol was designed and the critical variables will be isolated and measured to determine the impact on the process.

FPPC attended a meeting with the technology provider and a potential commercial customer who was interested in replicating the system.

Swine, North Carolina (#4.05) -----
Super Soil Systems
Goshen Ridge Farms in North Carolina

Process description:

- This 2nd generation technology system deploys a “mobile” solid separation capability

- It can be deployed to serve multiple farm sites of different scales; however three 4360 hog production sites are being interconnected to replicate the waste output of one large swine facility and to test the scalability of this concept.
- The project goal is to demonstrate economic viability by lowering overall cost via shared capital investment across several sites

Project Status:

FPPC has completed the review of Super Soils revised plan of work and has decided not to pursue this project with solids destined for offsite fertilizer and compost processing.

**Dairy, New York (#5.05) -----
AWS, LLC (formerly Nutracycle LLC)
Noblehurst Dairy Farm**

Project description:

This dairy has approximately 1200 milking cows and is located in Linwood, New York. This farm owner has made a sizable investment in digester facilities and waste to energy capability. A belt press will be utilized to remove the bulk of the suspended solids coming from the digester.

Project Status:

During the first quarter, the farm personnel began operation of the equipment, weather permitting. The press cake has been tested to reveal approximately 60% moisture.

In March AWS visited the site for additional set-up and testing (see Figure 1). AWS is concerned that this site has been unable to replicate the results of initial pilot testing in Georgia.

However, after examining the Georgia data it was found that pre-conditioning of the influent manure resulted in more favorable dewatering conditions of the waste. Results obtained in treatment of raw waste at this farm and in Vermont were comparable. The data in Figure 1 clearly shows that the belt press was superior to the screw press in performance.

To date the belt press has 100+ running hours.

Figure 1 – Grab samples performed in March by AWS, LLC

| | % Solids | | Density - Range | |
|--|----------|------|-----------------|--------------------|
| | Low | High | g/l | lb/ft ³ |
| Belt Press Cake | 30% | 36% | 240-260 | 15.0-16.2 |
| Screw Press Cake | 20% | 24% | 276-420 | 17.2-26.2 |
| Belt Press Cake (air dried feedstock; rehydrated) | 34% | 42% | 260-266 | 16.2-16.6 |

Dairy, Vermont (#6.02) -----
AWS, LLC (formerly Nutracycle LLC)
Belt press application

Project status:

In January, AWS experienced several problems with the start up of the belt press due to frozen pipes and tears in the belt by rocks filtering through the system. The system also struggled with the adequate dosage of polymers to create the same results as previous pilot tests.

When repairing the primary press, AWS noticed that pressed sludge build up had plugged the perforated plate. After operating the press for 20 hours it was determined that the bolts on the scrapper and inlet box and sharp edges were the cause of the tears.

AWS also determined that small rocks were generating holes in the fabric belt, which is unaffected by a few tears but repairable with little down time of the system.

The test results at this farm are comparable to those at Noblehurst. The Georgia results were replicated at both Noblehurst and Vermont Dairy.

To date the belt press has 175+ running hours (of this 75 hours are automatic and unattended).

Dairy, Ohio (#4.07) -----
Crossroads RC&D / Wastewater Services, Inc.
Andreas Farm, Royer Farm

Process description:

- microbial enhancement
- flushed and dry scrape dairy sites
- dewatering and complete solid separation
- package plant to treat effluent
- able to achieve nutrient and water quality levels acceptable for discharge

Project Status:

During the first quarter Wastewater Services met with several solid separation vendors in Ohio to determine an application that would reduce solids to the needed level to feed into a package plant. Wastewater Services is looking at several options to fit between the brush screen and the proposed package plant, including a rotary press, a screw press and/or a dissolved air flotation system.

FPPC has been on numerous conference calls with the technology provider in order to help determine the best action forward. Testing of various solid separation systems will take place during the second quarter, and this project is on hold until the solids separation performance milestone can be met or the effluent system is determined capable of accepting increased solids.

Dairy, Florida (#5.09)-----
White Technologies Inc.
U.S. Environmental Products, Inc.
North Florida Holstein, Bell, Florida

Process description:

- development of solids removal via vacuum dewatering bed and polymer addition

Status:

Initial start up occurred in January and February. During startup, system vacuum testing indicated the presence of leaks somewhere in the system. . A systematic isolation has revealed some leaks in the concrete structure near expansion joints and water stops. This location was geometrically difficult to fill during the concrete pouring. Epoxy and special polymers are being used to fill void areas that are preventing adequate vacuum.

Attachment A

Final report status of sixteen completed pilot demonstration projects is listed below:

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- A. Swine, North Carolina -----**
Super Soil Systems, USA (#3.09)
Goshen Ridge Farms, LLC - in Clinton, NC
"Solids Removal System to Reduce Environmental Impact of Swine Production"
Report Status: The final report has been reviewed, issued and posted on the FPPC website.
- B. Swine, North Carolina -----**
Air Diffusion Systems (#3.02)
Cavanaugh Farm No. 1 - swine farm in Wallace, NC
"Advanced Microbial Treatment System (AMTS) at Cavanaugh Farm No. 1"
Report Status: The final report has been reviewed, issued and posted on the FPPC website
- C. Swine, Iowa -----**
Global Resource Recovery Organization (GRRO) (#3.05)
Burt Farm & Livestock Co. - swine farm in Marshalltown, IA
"Pork Nutrient Management Demonstration"
Report Status: The final report has been reviewed, issued and is posted on the FPPC website.
- D. Dairy, Florida -----**
Royal Consulting Services, Inc. (#3.08)
Posey Dairy in Lake Placid, FL
"Florida Dairy Nutrient Management Demonstration"
Report Status: The final report has been reviewed, issued and is posted on the FPPC website.
- E. Poultry, North Carolina -----**
McGill Environmental Systems (#3.06)
Farms in Sampson County, NC
"Nutrient Management Technology for Animal Feeding Operations"
Report Status: The final report has been reviewed, issued and is posted on the FPPC website.
- F. Poultry, North Carolina -----**
Cape Fear Resource Conservation (#3.03)
Central Processing Facility in Duplin County
"Demonstration Optimum Fertilizer of Ash from the BEST Solution for Swine and Poultry Manure Management"
Report Status: The final report has been reviewed, issued and posted on the FPPC website.
- G. Poultry, North Carolina -----**

Mountain Organic Materials (MOM) (#3.10)

Randy Johnson and David Parsons Farms, Wilkesboro, NC

"Demonstration of Poultry Manure and Mortality Forced Aeration Composting Bin Systems"

Report Status: The final report has been reviewed, issued and posted on the FPPC website.

H. Poultry, Alabama-----

Renewable Oil, Inc. (ROI) (#3.07)

Mills Poultry Farm in Russellville, AL

"Demonstrating BioOil Technology for Poultry Litter Nutrient Management"

Report Status: The final report has been reviewed, issued and posted on the FPPC website.

I. Poultry, Texas -----

RMG Strategies, Ltd and Microganics (#3.11)

Jacobs Ranch in Carmine, TX

Report Status: The final report has been reviewed, issued and posted on the FPPC website.

J. Dairy, Florida -----

AJT/Agrimond (#3.01)

Watson Dairy in Trenton, FL

Report Status: The final report has been reviewed, issued and posted on the FPPC website.

K. Dairy, Wisconsin -----

Skill Associates – Phase I & II(#5.08)

Weise Farms in Greenleaf, WI

Report Status: The final report has been reviewed, issued and posted on the FPPC website.

L. Dairy, Florida -----

Royal Consulting, Inc. (#4.01)

Butler Oaks in Lorida, Florida

Report Status: The final report has been reviewed, issued and posted on the FPPC website.

M. Dairy, Florida -----

QED Occtech (#4.02)

Branford–DPS Dairy in High Springs, Florida

Report Status: The final report has been reviewed, issued and posted on the FPPC website. Additional testing on current conditions at farm site has been completed. A final data report will be issued and posted.

N. Dairy, Florida -----

Chemical Lime Co. (#3.04)

Aprile Dairy in Riverview, Florida

Report Status: The final report has been reviewed, issued and posted.

O. Swine, Iowa -----
Global Resource Recovery Organization, Inc. (#3.13)
Mobile Deployment System, Eldora, Iowa
Report Status: The final report has been reviewed, issued and posted on the FPPC website.

P. Dairy, Colorado -----
Applied Chemical Magnesiums Corp. (ACM) (#3.12)
Bella Holsteins, Inc. in Platteville, Colorado
Report Status: A final report has been issued, reviewed, and posted on the FPPC website.