



FPPC

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

October 15th, 2007

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

From: Bob Monley, General Manager, FPPC, Inc.
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Re: Quarterly Report for period from July 1st through September 30th, 2007

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

Executive Summary

Since the last quarterly report, FPPC has completed its due diligence on five pending projects and completed negotiations on 4 out of 5 projects. The next RFP will be issued in October and will be focused on serving the needs of the "limited resource" farmer. Later in the year, another RFP will be issued to solicit complete system proposals which achieve quantifiable energy benefits.

Efforts to close all outstanding projects related to the first 02/03 FPPC grant are still on track for completion by October 30th, 2007. In the meantime, the term for the FPPC 04 grant has been revised and extended to September 30th, 2009.

OPERATIONS -----

- A. Staffing:** In September, Lauren Seigel was promoted to Project Manager. In her new responsibilities will encompass close monitoring of multiple projects, contract negotiation as well as the serving as the central administrative focus at FPPC. As workload develops additional administrative help will be provided.
- B. Pending Project Status:** Significant progress has been made in developing final project scope agreement at the Phase 3 Developments & Investment project in Michigan, at the Virginia Tech pyrolysis poultry project, at the Envirowaste swine project in Illinois, and with Puck Custom Enterprises proposed use of geotextile bags at three sites in Iowa. These projects have been advanced to active projects and beginning status is detailed later in this report.

For the Five Rivers Cattle Feeding gasification project, FPPC and NRCS conducted a site visit in July to see the feedlot operation and the steam flaking of corn referenced in the proposal at Grant County Feeders near Ulyses, Kansas. In September, FPPC invited management and technical representatives from Five Rivers, BGP, Inc and Smithfield to Tampa to discuss the potential of the proposed pilot gasification project and to better explain their implementation plan. A final recommendation for funding will be forwarded for action to the FPPC Board of Directors in October.

- C. Gasification:** In July, FPPC staff and the NRCS visited the California's Central Valley i) to meet with Steve McCorkle, principal investigator at FPPC's gasification project site at Inland Empire and ii) to explore Byogy's approach to gasification and technology integration. In a meeting with company principles, it was learned that Byogy employs a comprehensive approach using gasification and anaerobic digesters to extract value from manure in the form of energy and nutrients. Of special interest at Byogy was the \$650 K California Air Resources Board grant awarded for gasification of feedlot manure, and their demonstration of a vibrating membrane technology to clean effluent at a large dairy. It was noted that the tightening of air emission regulations was being planned for dairy farms with exposed animal manure and other facilities having composting operations.
- D. Sampling and monitoring:** Based on the need to overcome continued problems with perceived testing difficulty and still provide complete and accurate information, FPPC has made a decision to become more involved in subcontracting the data collection and analysis at active project demonstration sites. This will hopefully improve sample control at select sites, provide better coordination and more cognizant analysis of results. FPPC will assure reasonable costs and when prudent may purchase reusable or rent instrumentation (i.e. flow meters, weirs) for use at other test sites.
- E. Updating website:** FPPC is reworking its webpage to help identify and collect nutrient management related articles available across the available media.

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:

- Will treat mixed animal waste from both swine and dairy
- A series of waste treatment technologies (ie. 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:

All agreements have been executed. A site visit was conducted by FPPC and NRCS in August to monitor progress. The anaerobic digester is now in operation while the DAF and pelletizer are just coming on line prior to system start up.



Shown above is the DAF (left) being installed with anaerobic digester (right background) pictured behind building.

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:

Agreements are in now the final stages of negotiation. FPPC has already conducted a site visit to the farm and will finalize agreement during the October visit to Blacksburg. At that

time, FPPC will meet with the principal investigator and the contract administrators at Virginia Tech.

From a hardware standpoint, the pyrolysis unit is currently undergoing modification at a fabricator and is expected to be delivered to the poultry test site by November 2007. FPPC is primarily supporting the testing and monitoring efforts.

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:

All agreements have been signed and project is underway. FPPC will be on site in October for the first pumping cycle into the geo-textile bag. Envirowaste will fill the bag four times over a six month period. FPPC will install a weir prior to the first event in October in order to determine flow rates. At completion, the bag will be opened and samples will be pulled from the stored solids to determine the nutrient content and to characterize distribution.

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

Project Description:

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

Project Status:

Revised scope and budget was received by FPPC and agreements are in the final stage. Project start-up is anticipated in November 2007.

Swine and Poultry, Iowa (#3.13)-----
Global Resource Recovery Organization (GRRO)
Next generation system

Process description:

- System will incorporate dry manure transfer and/or bolt on technologies that help to offset the cost of the tempest dryer removing the greatest share of moisture
- Pre-Separation Cyclone (liquid removal)
- Modular designed cyclonic drying system (Tempest dryer) on modular mobile platform
- Development of value added/commercial grade product - slow release fertilizer.

Project Status:

During the month of September the Tempest Dryer was shipped back to Iowa for repairs. GRRO is now slated to conduct multiple tests at the GRRO headquarters in Eldora. This will allow the machine to operate under varying conditions and while testing different feedstocks.

Testing will include poultry, beef feedlot, dairy and scraped swine manures. Moisture and nutrient data will be collected and reported in the final report. Project closeout is anticipated to be completed during the month of October.

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:

More testing of the Houle 2 stage separator is planned. Initial observations indicate that it does not appear to require much maintenance or management attention. There is no change in status on the effluent treatment from the last report and a no cost extension request of the project has been agreed to. Development of a solid separator is key to further testing of any electro-coagulation unit and this is where the current project focus is.

During the past summer, Dr. Hansen hosted a site visit made to the Wade Dairy site by FPPC. Of special note, USU demonstrated a development vehicle powered by biogas produced at this dairy.

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:

This site was visited in September. All systems, in place during the January 2007 visit, are currently operating. The Vincent screw press however will be replaced in October to try a different separator manufactured by Integrity.

In the past, this compost has been sold to a local nursery company; however the farm owner is using most of it for his fertilizer on the cover crop of his corn stubble. He has found he can use 10-12 tons/acre of the compost to supply the same nutrients in commercial fertilizer.

Currently some of the “green solids” are used for bedding at his heifer and dry cow operations, and then he mixes with straw into the composting pad every 3-4 days. Compost has also been sold to neighboring farms for bedding.

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:

BioProcess has temporarily put the onsite testing on hold until the new belt separator is received and is operational. Electrical service at the farm has been reinspected for code compliance and to make sure the facility is equipment ready. The present system continues to run with small amounts of effluent to maintain the bacteria count.

The new belt press was shipped in September and a four week debug and start-up period is now anticipated. Waste treatment results using the connected system is expected by November. Tim Burns visited the FPPC office in the past month to discuss progress.

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. All equipment sits on a 25 by 35 foot concrete pad, with a gas compressor and storage tank. 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:

The AWS system processed flushed dairy wastes, dry-corral dairy wastes, poultry wastes and mixed dairy and poultry wastes during the third quarter of 2007. The highest energy gas values (~ 1000 btu/cu.ft.) were obtained from freshly flushed dairy waste separated through the centrifuge. A series of tests were run to optimize production for the combination of Carbon Monoxide, Hydrogen and BTU values. The goal was to maximize liquid fuel (bio-diesel) production. A "sweet spot" was found for dairy manure at close to 1000 degrees F, taking the temperature up to 1000 degrees as quickly as possible, allowing the material to become exothermic, and holding it there until the material is mostly gasified.

Samples of freshly-flushed dairy waste, separated through the centrifuge, were sent to Hazen Labs in Colorado. Analysis and output testing (Mineral and Ash Free 'MAF method') was 10,433 btu/lb., well over the 7500 btu/lb. average for raw dairy effluent. This supports the study of polymer usage and separation effectiveness by the American Society of Agricultural and Biological Engineers, which claims that up to 47% higher btu values can be obtained using polymer in devices with a very high degree of separation effectiveness.

A larger gas compressor was installed, capable of handling 120 cu. ft./minute with pressures to 150 psi, with an expansion tank and pressure transducer to handle the variations in gas production. The compressor, its cooling system and expansion tank was commissioned on July 1. A roof cover was installed over the entire system to protect it from the elements.

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.

This project scales up from last year's smaller prototypic demonstration effort to a farm scale - commercial size operation and will demonstrate stability, uniformity and consistency of higher grade compost for the fertilizer marketplace. It will also address the two common waste streams at layer facilities.

Project Status:

In September, R&J Partnership and FPPC met in Tampa to discuss the status of the technology project. Concrete work for the project has been completed and the in-vessel containers are in place and properly configured. FPPC was receptive to R&J's request to expand air emission testing and monitoring of the system.

Dairy, Colorado (#3.12)-----
Applied Chemical Magnesias Corp. (ACM)
Bella Holsteins, Inc. in Platteville, Colorado

Process description and objectives:

- Easily-assembled recovery system that utilizes the reaction capabilities of inexpensive, milled brucitic marble to extract between 75% - 90% of most nutrients
- Uses magnesium source to react with Nitrogen and Phosphorous to form a crystal precipitate.
- Uses a series of reaction tanks (sized for the anticipated flow) with simple mechanical (paddle) agitation, and a hydro-cyclone separator and drying screen for the recovery of the precipitate.
- Precipitated crystals and liquid are sent to the drying screen; crystals are separated from the liquid then stored for farmers to use as a slow release fertilizer. The remaining liquid flows to a lagoon for solids settling.
- Determine if there was something unique about the dairy and or waste stream that may contribute to the poor results
- Determine why brucitic marble may behave differently than its close treatment cousin – struvite which is successfully utilized in Idaho.

Project status:

This project is in final stages of close out and a final report is anticipated in October.

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 lower overall cost by spreading the capital investment across several sites and with operations significantly different in scale.

Project Status:

A letter was sent to SuperSoil requesting additional economic data and clarity on the project workscope. Further payment is pending receipt of this information.

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:

FPPC conducted a site visit in August for a final meeting prior to the belt shipment. The AWS belt press was installed in September. Full operation is anticipated in the beginning of October.



AWS, LLC belt press system installed at the Noblehurst Farm

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

Project status:

The belt press assembly system is complete and will be shipped the first week in October with installation and commissioning at Whitcomb Farm (associated with project 5.02) planned for November. This belt press was initially tested just after manufacture and prior to shipment using waste from a nearby swine farm.

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:

FPPC conducted a site visit to both Ohio farms in September. During the visit FPPC observed the test prototype model of Or Tec's drum-screen solid separator.

Currently the effluent being removed at the screen drain is measuring about 1% total suspended solids (TSS). The goal for the technology provider is to reduce the TSS to .25%, allowing the package plant to treat effluent at acceptable discharge levels.

The Royer Farm began utilizing an OrganiSol microbial addition during the month of September. This material is sprayed on the floors and poured into the pit reception pit area to help reduce odors and assist in the manure digestion.

FPPC observed the Andreas farm site and a complete “flush” of one free stall barn. The technology provider noted that the effluent coming from the double “Integrity” drum-screen separators was at a 1% TSS level.



At the Royer Farm: Or Tech brush screen



Andreas Farm: drum screen separator pictured above

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:

FPPC conducted a site visit in August to meet with the principals of the project regarding the proper construction of the vacuum bed. The site was visited again by FPPC in September.

During the meeting, it was determined that for efficiency, the vacuum bed will be cleaned with a “bobcat” type loader and will be able to turn on the surface of the bed, deposit the sludge over the side, onto a concrete slab. This will allow for significant reduction on wear and tear of the dewatering tiles.



Pictured above is the September construction of the vacuum dewatering bed in progress

Attachment A

Final report status of fourteen 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: Demonstration project completed – final report has been reviewed and written review comments have been submitted to the technology provider. An independent third party has been authorized to review the final report.
- 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 will be 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 initial engineering evaluation of the manure burner needed improvements has been completed. Modifications to the system are underway and a final report is in work for both phases of the project. Completion is expected in the next quarter.
- L. Dairy, Florida -----**
Royal Consulting, Inc. (#4.01)
Butler Oaks in Lorida, Florida
Report Status: A draft report has been review and comments have been submitted to the technology provider. A final report will be posted on the webpage.
- M. Dairy, Florida -----**
QED Occtech (#4.02)
Branford–DPS Dairy in High Springs, Florida
Report Status: A final report has been received and is under review. Continued testing at the site is being conducted by FPPC to determine effectiveness of entire waste management system.

N. Dairy, Florida -----

Chemical Lime Co. (#3.04)

Aprile Dairy in Riverview, Florida

Report Status: A final report has been submitted and is currently being reviewed.