



FPPC

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

April 15, 2010

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 January 1st through March 31st, 2010

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, efforts began to support close out for the 2005 FPPC/NRCS Cooperative Agreement. An amendment authorizing a no cost extension for the 2006 Cooperative Agreement was executed between FPPC and NRCS.

FPPC dedicated much effort during the first quarter for the planning of its first regional summit in Annapolis, Maryland. The conference was well attended and focused on nutrient issues emanating from poultry litter and dairy manure in the Chesapeake Bay watershed.

OPERATIONS -----

- 1. Board meeting:** A Board of Directors meeting was held during the first quarter. The purpose of this meeting was to review and approve three projects: 1) Gasification/thermal conversion of wet waste, 2) Nitrogen capture methods, and 3) Effluent treatment methods. The Board approved 25% of all project costs with an update required at the next Board meeting.
- 2. Professional Advisory Board:** An Advisory Board meeting was held in March. Project initiatives were reviewed and the potential role for FPPC and anaerobic digesters was discussed. Two guests, Mr. Bob Blythe, President of CH₄ Bio-Gas, and Mr. Dave Palmer, President of Cow Power made presentations and led the group discussion

The Board also been expanded by adding Mr. Don Bennink, owner of North Florida Holstein dairy. .

3. Outreach activities:

- In March, FPPC hosted its first regional summit in Annapolis, Maryland. With the conference focus on nutrient management in the Chesapeake Bay watershed, FPPC had participation from all areas including government representatives, researchers, not-for-profits, foundations, and private industry. With approximately 70 attendees the discussions were energetic and beneficial.

FPPC has begun work on the next regional summit in Des Moines, Iowa on June 14-16, 2010. Dates have also been secured for its annual conference in St. Petersburg, Florida on August 25-27, 2010.

- During the week of the symposium, Jeff Porter from NRCS and Bob Monley from FPPC met with the environmental committee of the Delmarva Poultry Inc. to discuss poultry litter options and available technology solutions in the Chesapeake Bay watershed.
 - During the same week as the regional conference, Bob Monley participated in a steering committee formed by Natural Resource Solutions, LLC to examine the current technology, programs and action plan for managing nutrients and manure in the Chesapeake Bay watershed. The steering committee effort is funded by the Keith Campbell Foundation.
 - During the first quarter, FPPC had the opportunity to brief USDA Deputy Under Secretary Ann Mills as well as available Congressman and staffers who wanted a progress update.
- 4. Database Development:** FPPC made significant progress in the past quarter and has purchased a "Google" server for storage and database search capabilities. Staff has completed review and posting to searchable file of all closed FPPC projects and is starting to review FPPC staff personal files of closed projects. FPPC submitted an unsolicited proposal to USDA to build a knowledge base for data sharing of related matter across agencies and sponsored projects.
 - 5. Personnel:** FPPC has hired Nidal Samad, a Senior Research Engineer with expertise in agricultural and industrial wastewater treatment. Nidal will be working closely with other staff to develop and manage effluent projects. Nidal has a M.S. in Environmental Science and Chemical Engineering.

Progress at active pilot demonstration sites is summarized below:

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

Process Description:

- Installation and development of solids removal capability via vacuum dewatering bed augmented by polymer additions

Project Status:

Performance of the vacuum dewatering bed has been unreliable and somewhat unpredictable. FPPC requested and conducted a meeting on site with the manufacturer of the bed filter media to review status and to discuss options.

Polymer Study (#5.09a) -----
North Florida Holstein Dairy

Project Description:

- To better understand the important variables and significant process controls required for cost effective application of select coagulants and flocculants during solid separation of manure waste.

Project Status:

Testing at the North Florida site continues. Statistically significant data is being captured using manure with varying solids concentrations with results to be available by the end of the second quarter.

Pretreatment Methods and Evaluation (#5.12) -----

Project Description:

- **Find the (best in class) pretreatments methods from off the shelf offering**
- **Visit farms and evaluate cost effectiveness**

Project Status:

A summary report has been generated and shared with the Board of Directors. It was determined that an adequate amount of commercially available equipment exists in the marketplace and has been successfully deployed on farms for proper pre-treatment. Final compilation of survey data is underway as the project is in close out mode.

Dairy, Florida (#4.12) -----
AWS, LLC and FPPC
Dual purpose pellets derived from dairy solids

Process description:

- FPPC will work with AWS, LLC to develop a mobile pellet plant leveraging the knowledge gained during the previous belt press demonstrations.
- Dual use pellet is for either fuel or fertilizer
- The system will consist of a belt press, pelletizer and fluidized bed dryer.

Project Status:

In January, FPPC met with AWS, LLC and inspected the finished belt press at the fabricator site. The next phase involved testing of individual equipment components. At the site, it was determined that a larger hydraulic power pack was needed to simultaneously provide enough energy for pretreatment stirring of manure solids and running the belt press machine. Currently, the project is in a testing phase of the belt press, polymer mixing and application and pelletizing.

Swine, Hawaii (#6.13) -----**University of Hawaii****Janong Natural Farms, Kurtistown, Hawaii****Process description:**

- Pigs will be housed on green litter for a limited resource farm demonstration
- Liquids will be absorbed by green waste and composted material
- Project will utilize and identify the primary indigenous microorganisms
- Economic analysis of construction/design of a solar & naturally ventilated facility

Project Status:

This project is now complete and a final report is in work. A video showing the open house events was transmitted.

Swine, North Carolina (#4.14) -----**North Carolina A&T****University Farm, Greensboro, North Carolina****Process description:**

- Incorporates solid separation, effluent treatment and wetland conservation.
- Process is designed for a limited resource farm application.

Project Status:

Swine manure has been processed from a collection pit of approximately 1000 gallons and treated at 24, 48, 72, 96 hour intervals to coincide with weekly flushing cycle. Solids content entering the geotube is ranging from 0.59 to 1.03% and is mixed with coagulant (Ferric Chloride) and a polymer (Hyperfloc CE854). Solid separation is measured in 30 minute intervals. Thus far, eight additional polymers have also been tested for flocculation.

After coagulation and flocculation the waste stream is pumped into a 50 ft X 30 ft geotube container. Discharge from the geotube was routed to a zeolite tank for additional ammonium removal or discharged to a surface flow constructed wetland. Thus far, data from the geotube indicates a reduction of suspended solids of 95% Nitrogen reduction of 50% and Phosphorus reduction of 86%. With the zeolite and constructed wetland, ammonium was reduced by 88% and 92% respectively.

Poultry, Virginia (#4.06) -----**Virginia Polytechnic Institute and State University****Heatwole Poultry Farm****Process Description:**

- Pyrolysis conversion of poultry litter to bio-fuel oil for on-site use
- Unit employs a fluidized bed and modern controls for managing the system operation

Project Status:

During the reporting period, analysis was conducted on the pyrolysis gases, biochar and bio-oils. The composition of the pyrolysis gases was analyzed by the Air Compliance Group, LLC and are tabulated below:

Table 1. Pyrolysis gas composition.

Component	Concentration	Mass rate (lbs/h)
CO	1414 ppm _{dv}	1.10
Filterable Particulates	0.0106 (g/dscf)	0.02
NO _x (as NO ₂)	19.2 ppm _{dv}	0.02
NH ₃	942.8 ppm _{dv}	1.86
VOC (as propane)	5300 ppm _{dv}	6.50
Phenol	8.73 ppm _{dv}	2.53E-02
Formaldehyde	0.05 ppm _{dv}	4.34E-05
HCl	3.65 ppm _{dv}	0.004
H ₂ S	0.00 ppm _{dv}	0.00
Naphthalene	1.29 ppm _{dv}	5.06E-03

Field trials, using biochar as organic fertilizer, were initiated with Appalachian Sustainable Development (ASD) on pepper farms during the last growing season. A second trial is being planned. Biochar was evaluated based on its ability to be granulated and initial results were positive because of the fine particle size.

Samples of bio-oil are also being evaluated for potential as heating fuel. They will be compared with wood pyrolysis oils.

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 Nitrogen 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:

A problem with the sensors has been reported and a meeting has been scheduled to review status and determine a path forward. FPPC is interested in utilizing the in vessel composting arrangement for capturing volatile emissions using absorption materials.

R&J Partnership also made a presentation regarding their composted products at the regional conference in Annapolis, Maryland.

Emissions and Nitrogen Capture (#6.08)-----

Project purpose:

Nutrients from manure can affect air quality by forming methane during the decomposition of organic matter. Ammonia and NO_x are also typical problems associated with Nitrogen. However, Nitrification/deNitrification can transform Nitrogen into an inert form (N₂) which is acceptable environmentally. However, converting to N₂ is viewed as a farm cost and is not generally valued as a by-product with market potential. The goal of this project is to capture Nitrogen in a form that would have value in the marketplace.

Project Status:

A completed literature review has revealed various methods for capturing Nitrogen and volatile emissions. For poultry houses, they include litter treatments applied between flocks and use of absorbing filter media to capture emissions escaping from air ventilation systems. Various land applications methods have been modified to promote slow release or minimum runoff of nitrogen fertilizers.

Thermal energy from dry waste (#6.12)-----

Project purpose:

To utilize nutrients in the manure and to utilize the poultry litter to offset on-farm energy needs (hot water for heating and electricity for ventilation and cooling of the barns).

Project status:

During the first quarter, a specification was generated and a gasifier was placed on order based on competitive bid. Delivery is expected in May. All agreements and contracts are in place and FPPC is on site to manage project start up. Preston Burnette presented the project at the Chesapeake Bay conference held in March.

Thermal energy from dairy or swine manure (#6.09)-----

Project purpose:

To convert wet manure into energy benefits needed by the farm.

Project status:

A meeting was conducted at a potential farm owner's site in Florida during the first quarter to discuss the project goals. FPPC is in the process of re-evaluating project requirements based on the owner's business objectives (ie. the farm owner expressed a strong desire to concentrate nutrients via gasification in the solids and was less interested in generating electricity derived from thermal energy of gasification. He was also interested in reducing nutrients in the liquid waste stream as his overall goal is to double his dairy size without additional land.

Effluent Treatment Methods (#6.07)-----

Project purpose:

Develop a graded approach to treat liquids using cost effective technologies after the solid separation step.

Project Status:

FPPC has evaluated various processes and candidate technologies for treating the liquid portion of the on-farm waste stream. A multi-stage, non-membrane supplier, FilterSure, has been selected to work with FPPC to build an effluent treatment system. In the last week of March, Filtersure hosted a site visit to the US Gypsum Plant, near Baltimore where an effluent system using a filtersure component was observed treating sewage and discharging clean effluent to the Chesapeake Bay.

Swine, Iowa (#6.4.03) -----

Puck Custom Enterprises (PCE)

**Muhlbauer Farm
Greenflash II Farm
Langle Farm**

Project Description:

This project will develop technology, methods and investigate geotextile container bags as a means of collecting solids.

- Dewatering with high pressure, rapid fill methods.
- Metal salt and polymer flocculation is utilized.
- Testing and evaluation is planned for three (3) separate swine sites in Iowa.

Project Status:

The remaining efforts on this project are being scheduled for spring 2010.

Attachment A

Final report status of twenty 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 is currently under review.
- 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 is currently under review to be re-posted on the FPPC website.
- N. Dairy, Florida-----
Chemical Lime Co. (#3.04)
Aprile Dairy in Riverview, Florida
Report Status: The final report has been reviewed, issued and posted on the FPPC website.
- 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 Magnesias Corp. (ACM) (#3.12)
Bella Holsteins, Inc. in Platteville, Colorado
Report Status: The final report has been issued, reviewed, and posted on the FPPC website.
- Q. Dairy, Utah-----
Utah State University (#5.4.04)
Blaine Wade Dairy near Ogden, Utah
Report Status: A final report has been issued, reviewed, and will be posted on the FPPC website.
- R. Dairy, Vermont-----
AWS, LLC (#6.02)
North Williston Cattle Company (Whitcomb Farm)
Report Status: A final report has been issued, reviewed, and posted on the FPPC website.
- S. Dairy, New York-----
AWS, LLC (#5.05)

Noblehurst Farms

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

T. Dairy, Vermont -----

BioProcess Technologies (#5.02)

North Williston Cattle Co.

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

U. Swine, Illinois-----

Envirowaste Technology, Inc. (#4.09)

Rensing Family Farms, Inc.

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

V. Swine and Dairy, Michigan-----

Phase 3 Developments & Investments, LLC (#6.06)

Geerlings Hillside Farm

Report Status: A final report has been issued and is under review to be posted on the website.

W. Dairy/Mixed Waste, California-----

Agricultural Waste Solutions, Inc. (#5.06)

Inland Empire Municipal Site, Chino

Report Status: The project is completed and the final report has been submitted for review.

X. Swine, North Carolina-----

Super Soil Systems USA (#4.05)

Goshen Ridge Farms in North Carolina

Report Status: Project closed, report under review.

Y. Dairy, Ohio-----

Crossroads RC&D / Wastewater Services, Inc. (#4.07)

Andreas Farm, Royer Farm

Report Status: A final report was drafted and is currently under revision.

Z. Dairy, Virginia-----

Virginia Dairymen's Association(#4.15)

D&D Dairy, Dayton, Virginia

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

AA. Dairy, Pennsylvania-----

Nutrient Control Systems, Integrity (#5.07)

Mercer Vu Farms in Mercersburg, Pennsylvania

Report Status: Project complete and final report is being drafted.

BB. Dairy, Texas -----

Reaction Energy Corp. (#4.16)

Fisher Dairy, Yantis, Texas

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