



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

July 15th, 2009

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

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Re: Quarterly Report for period from April 1st through June 30th, 2009

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 second quarter of 2009, two (2) project reports were finalized and one project was discontinued because it could not meet the original performance requirements in a cost effective way. Six (6) additional projects with final reports are projected for completion next quarter. Progress continues on the value add project proposals yielding energy benefits and the Board approved the initial due diligence phase for five (5) additional projects.

Efforts continue to identify funding opportunities for FPPC including follow-up trips to USDA and EPA and in regional hot spots like the Chesapeake Bay where nutrient reduction and runoff is a critical issue. In addition, FPPC continues to explore opportunities with technology providers and with others seeking collaboration, partnership and shared funding. Finally, a newly formed advisory Board has reviewed FPPC's current plans and offered recommendations to broaden FPPC approach.

OPERATIONS -----

1. **Energy conversion projects:** Progress continues on the Dual-use Pellet Project. The modified and reconditioned belt press, salvaged from the Vermont project, will be ready for use in August. A redesigned pretreatment system will be tested when the belt press is deployed. The rebuilt Jet Pro pelletizer is scheduled to begin testing next week. A rented generator will power the equipment at the farm site allowing process evaluation at multiple sites as needed. Alternative pelleting equipment is being evaluated in parallel.

Meanwhile, to assist in process evaluation and optimization of the unit processes, efforts are underway to establish moisture measurement capability on-site as well as calorimetry to characterize select samples. These measurements will allow us to determine the mass and energy balance.

2. **Trip to Washington, DC:** During the week of June 22nd FPPC visited USDA-HQ and briefed key staff from NRCS and Rural Development. Congressional staffers on the senate agricultural committee were also updated about technology deployed to date and the continued need for financial support. Introductory meetings were also conducted at National Fish and Wildlife Foundation. In Annapolis, Maryland, FPPC met with the Chesapeake Bay Foundation and later in the day with various collaborating members of the Chesapeake Bay Program. On Thursday a site visit was made to the Shenandoah Valley at Oren Heatwhole's facility. There FPPC met with Virginia Tech's grad student who was operating the pyrolysis unit with a poultry litter feedstock. A meeting was also held with Kristen Hughes from the Chesapeake Bay Foundation and multiple participants of the Waste Solution Forum and the Shenandoah Valley Stakeholders.
3. **Board meeting:** The first meeting of the newly formed Professional Advisory Board (PAB) has been held in conjunction with the FPPC Board of Directors meeting in May. The Board approved the due diligence phase of five (5) new projects areas focused on enhancing and optimizing pretreatment, effluent treatment, emissions, and two energy projects – one derived from wet and one derived from dry waste as a feedstock. The second phase for each of these projects will include specific farm sites and potential collaborators who may supplement funding requirements. A request for information (RFI) has been posted on the FPPC website at www.fppcinc.org
4. **Outreach and Technology Transfer:** FPPC has finalized its program for this year's Technology Summit event to be held on August 26th thru 28th at the Don CeSar Beach Resort in St. Petersburg, Florida. Summit information is posted on-line at the FPPC website www.fppcinc.org. Field visits are underway to prepare video documentation of project demonstrations which are nearly complete. Prior to the start of the Technology Summit and for those able to arrive early, a special hands-on polymer workshop is being planned at FPPC's northern Pinellas location.

In addition, FPPC has registered to exhibit at the Farm-to-Fuel Conference July 29-31st in Orlando. In an attempt to better understand the challenges facing small farms in Florida, FPPC will attend the first convention for Florida small farms in Kissimmee, Florida. More than 280 participants have registered for the initial event.

Preparation continues for FPPC's participation at the Livestock and Poultry Environmental Learning Center's next webcast event (<http://www.extension.org/animal+manure+management>) scheduled for Friday August 21st . The featured discussion will focus on considerations for applying innovative technology and lessons learned at Farm Pilot. In the 2:30 pm webcast, Dr. Clark, Bill Boyd and Bob Monley are scheduled to participate.

Progress at active pilot demonstration sites is summarized below:

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

Process description:

- Upgrading and enhancing the existing nutrient management system, making waste treatment of manure user friendly and cost effective.
- Capability for fine sand removal, additional solids separation capability, conveyor, blower & controls, building expansion, windrow turner and curing pad sufficient to support a viable composting operation.

Project Status:

During the first quarter the technology provider performed the primary testing of the decanter centrifuge, adjusting variables to acquire the best solids and nutrient capture rates.

This project demonstration continues to be on schedule with a final report by the end of September. A video has been made to document the project and will be available in the near term.

Dairy, Florida (#5.09 & #5.09a)-----
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 5.09a provides for on-site effort to optimize polymer addition and to debug current dewatering bed process

Project Status:

This project has been delayed because of debugging, needed repairs and operational problems experienced after restart. Picture 1a below shows the caulked seams between filter plates having been repaired. Without sealing between resin filter plates, the water under negative pressures, or under vacuum pressure, would not be directed or properly flow through the filter plate media. Picture 1b shows the dewatered solids when restarting the system after repairs and after caulking repairs are complete. Note the large crack indicating typical dewatering of manure solids. In this trial run polymer blending was properly predicted from lab jar testing.



Picture 1a



Picture 1b

In a subsequent run the dewatered manure solids behaved less predictably because of improper mixing of solids and polymer within the pipe – see non uniform waste entering the bed in Picture 2a below. In Picture 2b below, multiple valves are visible along the exterior run of the waste mixing manifold. For manure waste with high solids (i.e. sand laden manure) this long run of pipe creates a manifold with too much variability for proper mixing and the wet waste has tendency to pulse erratically through individual pipe sections. Since the original pipe section could only operate in a limited on/off mode, a decision was made to improve the flow control on each inlet by replacing the thirteen (13) original slide valves with adjustable flow ball valves.



Picture 2a



Picture 2b

In the next run, problems between the slurry pit and the dewatering bed location were detected. The two main lines from the slurry pits to the vacuum bed system were found to be plugged and one slurry pit pump revealed excessive belt wear and would not operate correctly.

A decision was made to isolate the dewatering bed with a new butterfly valve (picture 3a) and to subsequently backflush and clear the lines from the manure pit. Unfortunately the lines had become obstructed with sand and attempts to clear the lines resulting in a pipe burst – see picture 3b. Presently, we are waiting to replace pipe sections before resuming operations.



Picture 3a



Picture 3b

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

Project Description:

To better understand the important process variables, appropriate controls in the cost effective application of coagulants and flocculants as applied for optimum solids capture in solids.

Project Status:

Work has progressed with dairy waste and 12 different polymers. The polymers being evaluated differ by charge and molecular weight. Data has been collected on 16 runs and an analysis is underway to determine what is statistically significant. The downtime of the dewatering bed has hampered testing so far but the best dewatering test results have occurred with waste having solids below 10%. It should be noted that FPPC is planning to conduct a hands-on polymer workshop at the upcoming Summit in August.

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 of pretreatment methods

Project Status:

The first phase of this project is to find pretreatment methods and evaluate for economic and reliability perspective. The most defining pretreatment method for energy purposes is the removal of sand from manure. Sand laden manure has the highest rate of wear on any manure handling equipment. Most farms remove manure from their barns or freestall alleys by two methods: flushing or scraping of manure. From this point the farms need to use some type of gravity/ settling or mechanical separation method. FPPC is actively pursuing and observing commercial equipment at dairy operations and will collect performance data on efficiency and cost. A macerator has been placed on order to evaluate the impact on the pretreatment performance.

Dairy, Texas (#4.16)-----
Reaction Energy Corp.
Fisher Dairy, Yantis, Texas

Process description:

- Limited resource farm technology
- Development of struvite formation on a limited resource farm.
- Initial testing will provide the basis for continuing the project.

Project Status:

Final preparations are being made to gather all information for the final report expected in September

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.
- The system will consist of a belt press, pelletizer, and fluidized bed dryer.

Project Status:

FPPC continues to work with AWS to determine the best path forward for the dual use pellet project. Multiple methods for pelletization are being researched as well as the quickest solution to obtain dry solids for testing.

The AWS belt press has been salvaged from the Vermont farm and transported to Florida for repairs and modifications. It is expected that the belt press along with a new pre-treatment system feeding it will help get the belt press ready for commercialization. The belt press will be ready for testing by the middle of August and the Jet-Pro pelletizer will be ready for testing by the end of July. Both units will be tested and a recommendation will be made by September versus other available for pelleting and solid separators.

Swine, Hawaii (#6.13)-----
University of Hawaii
Janong Natural Farms, Kurtistown, Hawaii

Process description:

- Pigs will be housed on green litter for limited resource farm applications
- Liquids will be absorbed by green waste material
- Project will identify the primary indigenous microorganisms
- Economic analysis of construction and design of a solar and naturally ventilated facility in Hawaii.

Project Status:

The project has been delayed due to rainy weather and correct permits are still being acquired. The open house is now planned for the end of July. FPPC is still evaluating the best options to cover a site visit.

Swine, North Carolina (#4.14)-----
North Carolina A&T
University Farm, Greensboro, North Carolina

Process description:

- Process will incorporate solid separation, effluent treatment and wetland conservation.
- Designed for a limited resource farm.

Project Status:

During the first quarter of 2009, NC A&T has undertaken site preparation. Working closely with the local NRCS, the technology provider has laid the gravel and anticipates being in operation and debug mode. A video has been prepared to document efforts on site.

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:

FPPC conducted a site visit during the first quarter of 2009. The project was again observed during a site visit in the first week of June. FPPC is scheduling another trip in July to observe the project and to review testing procedures.

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

Process description:

- Microbial enhancement.
- Flushed and dry scrape dairy sites.
- Package plant to treat effluent.
- Able to achieve nutrient and water quality levels acceptable for discharge.

Project Status:

During the second quarter FPPC, conducted an interdisciplinary stakeholder status review meeting in Ohio with the farm owner, all technology participants and members of the NRCS were present. A decision was reached to discontinue the project based on the anticipated cost and the technical feasibility of treating 50,000 gallons of effluent at the BOD levels. The original project goal was to treat

the effluent to a sufficient level that the effluent could meet the requirements for discharge. This effort was undertaken as an alternative to additional investment of waste storage which has become more critical in regions banning winter spreading. FPPC will work with Technology Provider to close out the project and post the lessons learned in a final report.

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

Process Description:

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

Project Status:

The pilot demonstration project is continuing on schedule and will be completed by September this year. FPPC staff performed a site visit in June and witnessed the operation of the pyrolysis unit making oil on site. Another visit has been scheduled in July to capture a video account of the operation.

Dairy, Virginia (#4.15)-----
Virginia Dairymen's Association
D&D Dairy, Dayton, Virginia

Process description:

- Limited resource farm technology
- Demonstrate and evaluate a high-efficiency screw press to remove solids.
- In conjunction with a struvite precipitation system to remove Phosphorus from the liquid stream

Project Status:

The project is in its final phase, FPPC is scheduled to conduct a site visit during the second quarter.

The project is scheduled to end in September with and results documented in a final report. FPPC will visit the farm in late July to document the project in video form. A virtual tour will be available at the upcoming Summit and posted on the FPPC webpage.

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

Project Description:

This project will develop technology and investigate geotextile container bags as a means of collecting, dewatering with high pressure and rapid filling methods with metal salt/polymer flocculation. Comparative testing and evaluation is planned for three (3) separate swine sites in Iowa.

Project Status:

FPPC conducted a site visit during the second quarter. A video was made by FPPC staff to document and capture project activity. Some of the on-site and project activity is illustrated below.

Two (2) 50 ft. X 30 ft. geo-bags were observed being filled. The bags were a “300” mesh weave compared to the earlier bag material which was “500” mesh weave (weaves per square inch). The difference in bag material will be evaluated to determine if, a larger weave (300), the bag will dewater at a higher rate and still capture the nutrients. However, differences in tensile strength required the bags to be filled to a maximum of 4 ft. height; versus the 500 weave bags capable of being filled to 7-8 ft. height.



Preparation prior to filling of two bags



Kemira tote w/4512 Polymer & Ferric Sulfate

The control trailer was improved by redesign and rebuilt at Iowa State University. Lessons learned, from earlier farm experience, allowed the process equipment to be better controlled with more consistent ferric and polymer mixing at a lower fill rates (150 gpm). Iowa State representatives observed that the bags seem to dewater at a faster rate when not filled to extreme “stretched” heights but at about four (4) feet height. By balancing the input mixture with the draining rate, the fabric was not as stretched contributing possibly to better performance.

The trailer, used in the first trial fill of the Langel Farm, was modified to promote dewatering around all sides and to allow water flow on the trailer. A gutter was installed with a drain spout allowing accurate flow measurement.



15X22 bag in trailer at Langel Farm



Bag supported on trailer with pallets underneath and on side. Drainage “gutter” pipe on right side.

Puck Enterprises transported 3 partially filled bags (two 50ft and one 22ft), from the Green Flash II Farm site to their office location. The bags had approximately 6 inches of cake inside and were hoisted from the ground surface liner with chains and loaded on the truck. The liner was damaged, but the bags appeared visually to be in good condition. The bags are going to be returned to Green Flash site in the near future with attempted refilling. This demonstration tested the ability to handle partially filled bags.

Effluent Treatment Methods – Phase I (#6.07)-----

Project purpose:

Expand the list of candidate treatment methodologies following solid separation

Project Status:

Based on a literature search and engineering experience effluent treatment has been categorized into two subsets, Physical and Chemical, and Biological Treatment Processes.

The physical and chemical separation processes offer the best solution for final effluent treatment and final disposal of the waste. We will be evaluating a pilot plant size membrane separation system that would produce an effluent that should meet EPA's surface water discharge standard. Packed towers (or adsorption columns) offer opportunities to control the emissions of nitrogen and ammonia in waste water as well as hydrogen sulfide discharges.

The biological processes that show some promise include batch sequencing reactors, extended aeration, hybrid digesters, and attached growth reactors. The biological systems are more efficient in removal of organic material than the physical/ chemical processes. For complete treatment of the waste both systems will be needed but the key to selection is driven by the economics.

Emissions and Nitrogen Capture – Phase I (#6.08)-----

Project purpose:

Nutrients can typically contribute to air emissions through methane formation and the decomposition of organic matter and alternately with the fate of Nitrogen. Some waste treatment methods transform Nitrogen into an inert form (N_2) which is an acceptable environmentally but fails to realize the value of Nitrogen.

Project Status:

Efforts are underway to research methods and candidate processes for coping with ammonia and NO_x and capture the Nitrogen for use rather than experience the still Nitrogen losses to the atmosphere. A literature search has begun and the potent impact of NO_x compared to methane and CO_2 has been noted. This subject will be further showcased in a green house gas (GHG) discussion at the upcoming technology Summit.

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

Project purpose:

To utilize the poultry manure to offset energy needs on farm in the form of hot water for heating and for electricity for ventilation and cooling of the barns.

Project status:

A full project scope and proposal has been written but the start of the project is waiting review for funding approval and collaboration. Once approval has been granted, the project will begin by purchasing equipment which includes a gasifier, a hot water boiler, and organic rankine cycle genset. A sizing test of the gasified manure is tentatively scheduled for sometime in September. This test will result in proper design of the gasifier and hot water boiler.

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

Project purpose: To utilize the wet manure to offset energy needs on farm in the form of energy most needed by the farm.

Project status: This project is in the design stage. Energy audits are being conducted on two dairy farms to quantify how much energy is being used by the farm and in what form the energy is in electricity, propane, diesel. Once the results from the energy audit are in hand, an evaluation can be done as to how large the system needs to be and what components are needed. Other factors being considered for this project include the wet feedstock and the effect of sand laden manure. The high water content is being addressed with other projects being conducted by FPPC and the results of those projects will be applied to this project. Gasification companies are being currently being researched.

Swine, North Carolina (#4.05) -----

Super Soil Systems

Goshen Ridge Farms in North Carolina

Process description:

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

Project Status: A decision was reached not to proceed with this project. FPPC reviewed outstanding invoices and determined appropriate payment to close out the discontinued Super Soil Systems effort. A final report has been requested and will be a condition precedent to further remittance of funds.

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 is expected to be on the FPPC web site in July.