FPPC

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

TO: Mr. William Boyd - Leader, Manure Management Team**,** ENTSC - NRCS

FROM Bob Monley, General Manager, FPPC
Aimee Walker Thomas, FPPC Administrative Program Manager

DATE: April 3, 2012

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RE: 1st Quarter Report for January 1, 2012 to March 31, 2012

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

Farm Pilot has worked closely with the Fertilizer institute and other industry/nutrient experts to develop requirements for a new RFP. The RFP will solicit white papers addressing improved nutrient use efficiency incorporating best use of the 4 Rs for land application of nutrients. These white papers will be screened and evaluated on a competitive basis by a panel of experts, leading to three (3) sub grant awards averaging approximately $ 100K for the top tier proposals. Based on the proposed testing timetable, a request to extend and amend the 2010 cooperative agreement term may be required.

The BGP gasifier and the manure-to-energy system at the South Carolina site is currently being evaluated to determine where energy losses are occurring and why the system is failing to provide sufficient BTUs for generating electricity. The entry of rogue air into the gasifier and the associated turbulence are key performance variables being explored.

OPERATIONS ----------

1. **Method for Improved land application of nutrients**: Farm Pilot was asked by NRCS to implement an effective evaluation of potential methodologies and promising technologies that could improve the nutrient use efficiency in various hot spots. Farm Pilot collaborated with knowledgeable nutrient experts, like the Fertilizer Institute, to develop requirements including the objective and the scope of interest most meaningful for land application. A request for proposal (http://www.fppcinc.org/pdf/link-a-2012-rfi-nutrient-management-technologies-for-agriculture-use.pdf) was prepared, circulated with a call for white papers issued. Interest in this opportunity continues to increase but proposals are due by March 28, 2012.

2. **Startup at Marc Marsh Farm**: With the addition of many more hours and operating experience at the Marc Marsh Farm, more knowledge about system performance is becoming clear. Among the biggest concerns was the fouling of the heat exchanger with ash particles from the gasifier.

   In discussing this with BGP, their assessment indicated that the entry of rogue air at the auger interface area is believed to be creating turbulence and moving particulates into the flue gas stream. This micro-dust or ash particulate can become airborne and when it does can then be deposited downstream on the heat exchanger surfaces.

   In addition, some isolated insulating refractory tiles have begun to exhibit cracking. BGP designed an ash bridge similar to an air lock to reduce clearances at the auger interface. The refractory supplier was contacted and an inspection was performed on the refractory tiles. Subsequently the refractory supplier repaired cracked tiles and installed the ash bridge in the field. Currently FPPC is restarting the system and evaluate performance characteristics.

3. **Staffing changes**: After interviewing and screening a number of candidates over the past three months, a decision was made to hire Mr. Joe Petrucce for a senior engineering position. Joe joins the FPPC team with a wealth of multi-discipline engineering experience.

4. **Outreach**: Farm Pilot participated in the March 6, 2012 Lancaster Summit which focused on Nutrient Solutions and Opportunities for Farming Operations. The one day seminar was held in Lancaster County Farm and Home Center.

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Progress at active pilot demonstration sites is summarized below.

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Dairy, Florida (#4.12 and project 6.03)----------
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 while 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:

Final report is still in progress.

Poultry, Virginia (#6.4.06)----------
Virginia Polytechnic Institute and State University
Heatwole Poultry Farm

Process Description:

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

Project Status:

This project is ending without a commitment to commercialize. A final report is to be written.

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

Project purpose:
The objectives of this project include:

- Identify the benefits of land application of Bio-char and its effect on crops and soil health (carbon sequestration, water retention, etc.);
- The application of Nitrapyrin to help stabilize nitrogen when poultry litter is applied and its ability to slow migration; and
- The characterization of ammonia adsorption using Bio-char as an activated or non-activated sorption media and evaluation of its utility in swine and poultry house

Project Status:

Biochar testing has been completed by Dr. Reddy, North Carolina – A&T. Results reflect best method for activating biochar to increase N sorption rates. A final report has been received and is currently under review.

Thermal Energy from Poultry Litter (#6.12) ----------
Marc Marsh Farms, South Carolina

Project purpose:

To harness the electrical energy of poultry litter utilizing a continuous feed gasifier and poultry litter as a fuel. Electricity will be generated to offset ventilation/cooling costs for the farm.

Project status:

Picture above showing ash bridge or air lock installed with cast refractory

Augers are sleeved to reduce clearance and rogue air from entering gasifier

Problems with ash transfer are being addressed by reducing the dimensional clearance of the rotating augers. The picture on the right (above) shows the sleeve being installed to reduce clearance and the picture on the left (above) shows the refractory material being cast to hold sleeves in place.

Pictured below are two pictures of the heat exchanger. The picture on the left (below) show the heat exchanger surfaces free of dust particles and fouling. The picture at right (below) reflects an accumulation of dust particles collecting on the heat exchanger fins and results in the fouling of the heat transfer capability.

Clean heat exchanger

Heat exchanger surfaces fouling with particulate matter

The gasifier has also been plagued with deteriorating auger problems. After a period of time, the flights which have been attached via welding, begin to erode and degrade more severely at the ash end of the auger (see picture below). BGP is investigating improvements in auger materials and design for the service anticipated.

Auger flight damage evident on ash end

With problems surfacing in the continuous feed gasifier, FPPC has approached NC State to determine if there was interest and knowledge of modeling gasifier operations available. NC State has submitted a proposal for developing a model to help guide the design performance characteristics of these units.

Thermal Energy and Development of Ash Byproduct (#6.09) ---------- Old Mills Farm, Virginia

Project purpose: Phase I -To derive energy and nutrient benefits by gasifying poultry litter and converting the Phosphorous rich ash into a marketable by-product that can be utilized as a pathogen free fertilizer for the nearby vegetable crop. The intent is to reduce the typical poultry litter land application in Delmarva area by converting the gasified phosphorous rich ash to a viable pathogen free fertilizer for the nearby vegetable crop. Phase II – harness energy during the thermochemical reaction and convert to a useful and viable form of on-farm energy.

Project status:

Project has received partial funding but to continue the project will require revisiting the scope of work to assure complete funding. Due to documented experience at another project, the use of the second gasifier is now under review and will have to be evaluated potential for energy recovery.

Effluent Treatment Methods (#6.07A) ----------
Multiple dairy sites, Florida

Project purpose:

Develop a graded approach for treating liquid waste utilizing a cost effective system composed of incremental solid separation steps. Multiple pieces of equipment will be linked and connected into an optimum system and will rely primarily on low cost mechanical solid separation methods. The contribution from each piece of equipment will be determined based on the amount of solids and nutrients removed from the liquid waste stream.

Project Status:

FPPC has reconfigured a portable effluent system on trailers. It has been fresh water tested at the fabricator location. The unit has been pretested and is being operated to develop optimum performance parameters. Flow rates for the system will be calibrated and operationally tested with the manure.

The full system has been documented and a patent application describing the complete system and its function in removing 90% of the Phosphorous and 50% of the Nitrogen has been filed.

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Attachment A

Final report status of thirty-six (36) 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 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, reviewed and posted on the FPPC website.

W. Dairy/Mixed Waste, California----------
Agricultural Waste Solutions, Inc. (#5.06)
Inland Empire Municipal Site, Chino
Report Status: A final report has been issued, reviewed and posted on the FPPC website.

X. Swine, North Carolina----------
Super Soil Systems USA (#4.05)
Goshen Ridge Farms in North Carolina
Report Status: A final report has been issued and is currently under review.

Y. Dairy, Ohio----------
Crossroads RC&D / Wastewater Services, Inc. (#4.07)
Andreas Farm, Royer Farm
Report Status: A final report has been issued, reviewed, and posted on the FPPC website.

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

AB. 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.

AC. Dairy, Florida ----------
Pretreatment Methods and Evaluation (#5.12)
Report Status: A final report has been drafted and is being reviewed.

AD. Swine, Hawaii ----------
Limited Resource Farm – University of Hawaii (#6.13)
Janong Natural Farms, Kurtistown, Hawaii
Report Status: Final report is being reviewed for posting on FPPC website.

AE. Poultry, Wisconsin ----------
R&J Partnershi[(#5.04)
Creekwood Farms, Lake Mills, WI
Report Status: Project report is being drafted.

AF. Dairy, Florida ----------
White Technologies Inc – US Environmental Products Inc. (#5.09)

North Florida Holstein, Bell, FL
Report Status: Project report being drafted

AG. Dairy, Florida ----------
FPPC Polymer Study (#5.09a)
North Florida Holstein, Bell, FL
Project Status: Project report is being written.

AH. Swine, Iowa ----------
Puck Custom Enterprises (6.4.03)
Project Status: Awaiting report and review

AI. Swine, North Carolina (#6.4.14)
North Carolina A&T
University Farm, Greensboro, North Carolina
Report Status: A final report has been issued, reviewed, and to be posted on the FPPC website.

AJ. Dairy, Florida ----------
FPPC Effluent Treatment Methods (#6.07)
M&B Dairy, Lecanto, FL
Project Status: Final report is being written