

**Improving Water Quality by Developing, Implementing and  
Field Testing Innovative Methods  
FY 03 CWA 319(h)  
TSSWCB Agreement No. 03-10**

Quarter no. 10 From 1/01/06 Through 3/31/06

**I. Abstract**

Finalizing the evaluation of the year one technologies, initiation of Memorandums of Agreement with the year two technology providers, and assisting the year two technology providers with identifying cooperating dairies were the main focus of the tenth quarter. Reports summarizing the evaluation of the year one technologies are currently being finalized for submission to the TSSWCB during next quarter. Once these final reports are completed, fact sheets will then be developed. Other work planned for next quarter includes installing the year two technologies on cooperating dairies and releasing the year three request for proposals (RFP).

**II. Overall Progress and Results by Task**

**TASK 1: Demonstration and Evaluation of New Technologies**

*Subtask 1.1: Identification of potential technology providers. TCE, TWRI, TFB, dairy industry representatives, EPA Region 6, TSSWCB, TCEQ, BRA, NRCS, and TAES will identify and select promising technologies represented by willing technology providers. (month 1 thru 3)*

The following actions have been completed during this reporting period:

- a. Two technologies were evaluated for year one:
  - 1) "Electrocoagulation Technology" proposed by Ecoloclean Industries, Inc. (Huntsville, TX)
  - 2) "Phosphorus Removal by Chemical Precipitation and Geotube<sup>®</sup> Dewatering" proposed by Miratech Division (Commerce, GA)
- b. Two technologies were selected to be evaluated in year two:
  - 1) "A Demonstration by Envirotech, Inc. of Phosphorus Removal From Liquid Manure Effluent at a Texas Dairy Farm by the Use of Bauxsol<sup>™</sup>," proposed by Envirotech, Inc. (Atlanta, GA)
  - 2) "Demonstrate and Evaluate the Use of Technologies to Reduce Animal Waste Pollution" proposed by EnviroLink (Greeley, KS)
- c. Once both year two technologies are initiated, the RFP will be released for technology selection and implementation in year three.

**66% Complete**

*Subtask 1.2: Identification of dairy cooperators in the North Bosque watershed area that use a flush system and lagoons to remove, store, treat, and land-apply effluent (manure and process-generated wastewater). TCE, TSSWCB and TFB will identify dairy operations willing to participate in these demonstrations. (month 1 thru 3)*

The following actions have been completed during this reporting period:

- a. The year one technologies were implemented at the following dairies:
  - 1) “Ecoloclean” – OSVE Dairy (proprietor – Mr. Bert Velson), Bosque Watershed.
  - 2) “Geotube” – Triple X Dairy (proprietor – Mr. Wayne Moermen), Leon Watershed.
- b. The year two technology provider, EnviroLink, is proposing to demonstrate their technology on the Sherwyn Wood Dairy located in the Bosque watershed.
- c. The Comanche County Cooperative Extension Agent is assisting the year two technology provider, Envirotech, Inc., with identifying a cooperating dairy for demonstrating their technology in the Leon watershed.

**50% Complete**

*Subtask 1.3: On-site installation and start-up of the six pilot-scale technologies to be demonstrated. Technology providers will carry out the task of equipment transport, on-site installation, set-up, and start-up. With permission from the cooperating dairy owner/operator, the technology provider will prepare the site to install and operate the system for demonstration. (First installation by August 2003, last installation 6 months before the end of the 3-year project)*

The following actions have been completed during this reporting period:

- a. The Memorandum of Agreement (MOA) between Envirotech and TCE was initiated on January 13, 2006.
- b. The Memorandum of Agreement (MOA) between EnviroLink and TCE was initiated on January 18, 2006.
- c. A conference call was held on March 20, 2006 with TCE, TWRI, Envirotech, and Brazos River Authority to discuss the initiation and sampling of Envirotech’s technology. The meeting summary is attached (Appendix A). As a result of the conference call, Envirotech will submit a protocol to TCE by April 10, 2006.
- d. A conference call was held on March 27, 2006 with TCE, TWRI, EnviroLink, and Brazos River Authority to discuss the initiation and sampling of EnviroLink’s technology. The meeting summary is attached (Appendix B). As a result of the conference call, EnviroLink will submit a protocol to TCE by April 3, 2006.
- e. Once cooperating dairies are identified and the protocols are agreed upon, then on-site installation and start-up of these technologies can begin.

**40% Complete**

*Subtask 1.4: QAPP preparation and field data collection and analysis.*

*TCE will prepare the DQO and QAPP (August 2003 to August 2004)*

**100% Complete**

*TCE will collect samples from raw and treated effluent and resulting sludge. One of the evaluation tasks will be to analyze the sludge or by-product remaining after raw material treatment for P stability (August 2003 to May 2006)*

The following actions have been completed during this reporting period:

- a. Collection and analysis of all samples for the year one technologies has been completed.
- b. Sampling will resume upon initiation of the year two technologies.

**33% Complete**

*Subtask 1.5: Develop reports and outreach education materials. TCE in cooperation with TWRI will produce educational brochures and publications on effectiveness of this innovative technology. Quarterly and final reports will be prepared and submitted in a timely manner.*

The following actions have been completed during this reporting period:

- a. Reports summarizing both the Ecoloclean electrocoagulation technology and the Geotube technology are being finalized for submission to the TSSWCB next quarter.
- b. TWRI submitted the year 3, quarter 2 report to TSSWCB on April 12, 2006.

**62% Complete**

**III. Related Issues/Current Problems and Favorable or Unusual Developments**

- Despite several requests to Ecoloclean and Geotube, TCE has received only limited economic data, some of which appears suspect. This has limited the extent to which the economic analysis has progressed and allowed TCE to only make rudimentary estimates of the economy of these systems. TCE continues working to obtain the necessary information so that the analysis of the year one technologies can be completed.
- Initiation of the year two technologies has been delayed due to the additional time needed to negotiate the MOAs and the difficulty the technology providers have had in identifying cooperating dairies. The Brazos River Authority and County Extension Agents have been enlisted to assist the technology providers with finding cooperators. Now that the MOAs are signed and progress is being made on identifying cooperating dairies, we are hopeful that sampling can begin next quarter and be completed by the end of the fiscal year.
- Release of the year three RFP has been delayed as a result of the delay in initiating the year two technologies. Upon initiation of the year two technologies, the year three RFP will be released.

**IV. Projected Work for Next Quarter**

The following will be accomplished during the coming quarter:

- a. Finalize reports and draft fact sheets summarizing the results of the evaluation of the Geotube and Ecoloclean technologies.
- b. Finalize the identification of dairy cooperators, receive protocols, and begin installing Envirotech and EnviroLink on cooperating dairies.
- c. Develop RFP for year three technologies.
- d. Attend the Farm Pilot Project Coordination Second Annual Technology Summit to learn about innovative technologies and advertise the project to potential new participants.

**Appendix A**

**Envirotech Technology Coordination Meeting Summary**

**Envirotech Technology Coordination Meeting**  
March 20, 2006, 10:30 a.m. – 12:00 noon

Meeting Summary

**Participants:**

- |                                  |                                      |
|----------------------------------|--------------------------------------|
| -Charles Livingston – Envirotech | -Joe Robertson – Envirotech          |
| -Bob Whitney – TCE               | -John Ellis – Brazos River Authority |
| -Saqib Mukhtar – TCE             | -Lynn Lazenby – A&M                  |
| -Kevin Wagner – TWRI             |                                      |

**Overview of Meeting Agenda:**

- Status of identification of cooperator dairy
- Technology design and sampling protocol
- Timeline

**Status of identification of cooperator dairy:**

*Ellis:*

- No progress by BRA
- The fact that many dairies are going to honey-vac system poses a problem.

*Bob:*

- A meeting with several dairies is scheduled for Wednesday, March 22, 2006.
- Participating in this project will be a discussion item.
- More details needed before meeting.

**Technology design and sampling protocol**

*Livingston:*

- If lagoon on dairy is small, then Bauxsol will be applied topically.
- If lagoon on dairy is large, then Bauxsol will be applied to tanks filled with effluent.
- Instead of utilizing tanks, holes could be dug and lined with plastic, filled with lagoon effluent, and Bauxsol applied topically.

*Saqib:*

- A new protocol is needed since there is no “box” being used as originally proposed. Envirotech will provide this once a cooperating dairy is identified.
- The need for a Mass Balance was stressed.
- In addition, it was stressed that the focus of the project must be kept on addressing NPS pollution from lagoon effluent. The overarching goal of the project is to assist in meeting the TMDL goal of reducing soluble P 50% without increasing harmful constituents to significant levels

*Joe:*

- If there is less sediment, then Bauxsol is more efficient. Thus, the use of lagoon effluent supernate would be preferable. Following further discussion, it was concluded that the irrigation lagoon effluent (secondary lagoon) should be the one treated.

\* Testing of this could occur as follows:

1. Pump discharge from the primary treatment lagoon that flows into irrigation holding pond (secondary lagoon) into tank
2. Let settle for a period of time
3. Treat topically with Bauxsol

\* Sampling Procedure for this protocol could be as follows:

- 1) Sample effluent before it is discharged into tank
- 2) Following treatment with Bauxsol, supernatant samples as well as residuals at the bottom of the tank would be taken.

\* Steps needed prior to initiating project:

1. Identify a cooperating dairy with a minimum of 2 cells
2. Envirotech will visit dairy and evaluate its suitability
3. Envirotech will provide technology design and sampling protocol
4. Saqib will evaluate and approve technology design and protocol prior to project initiation

\* Sampling will occur weekly for 9 weeks. However, several questions remain:

- Will treatment be done more than once (in week 1)?
- Will effluent be added at rate similar to lagoon to better simulate a lagoon?

\* Discussion of this resulted in the group reevaluating using “box” treatment as originally proposed.

#### **Timeline:**

- March 22 and May 3 (meeting between Bob and dairymen)
  - When Bob meets with the dairies, he'll tell them that secondary lagoon will be targeted and Envirotech won't get in their way.
- April 10 (Joe Robertson will submit Protocol)
- April 18 (field day)
  - Saqib and Bob will discuss protocol provided by Joe with select dairymen
- July 1 – Aug 31 (Sampling period)

#### **Final Thoughts and Discussion:**

\* Saqib requested protocols from Envirotech for both scenarios:

- Bauxsol filter
- Topical application of Bauxsol to tank

\* Sampling focus will be on SRP (soluble reactive phosphorus)

\* Livingston will be notified once a cooperating dairy is identified

\* Bob emphasized that dairies want something simple and easy to use and care should be taken to make sure that the demonstration of the technology shows this.

**Appendix B**  
**EnviroLink Conference Call Summary**

**EnviroLink Conference Call**  
March 27, 2006, 10:00 – 11:00 a.m.

*Meeting Summary*

**Participants:**

- Patti McGhee – EnviroLink
- John Ellis – BRA
- Saqib Mukhtar – TCE
- Lynn Lazenby – A&M
- Kevin Wagner – TWRI

**John's Summary of Meetings with Potential Cooperating Dairies:**

- John and Patti visited 3 dairies on March 21, 2006 and were able to find a suitable dairy cooperator, the Sherwin Word Dairy.
- The only issue is the identified dairy flushes a few days a week and scrapes a few days a week and loads the scraped material with a front end loader for haul-off. The dairy does this because they don't have enough lagoon capacity to flush daily.
- The dairy has 200 acres for irrigation.
- The dairy is definitely interested in participating and is not adverse to us setting up tanks on site for the analysis.
- The dairy just has a primary treatment lagoon, but that's the one he pumps out of to irrigate.
- In summer, there's basically only parlor water going into the lagoon. During other times flush water and parlor water is going into the lagoon.
- Ellis's primary concern is there may not be enough samples collected.

**Patti's Summary of Meetings with Potential Cooperating Dairies:**

- The only negative point to using this dairy for the study is there's no daily flushing.
- The positives are:
  1. It has a nice average lagoon with some solids.
  2. It uses a reel gun to apply lagoon effluent to the application fields.
  3. The dairyman is a genuinely nice guy.
  4. There's easy access around the lagoon.
  5. The dairy is in the Bosque Watershed.
  6. The dairy milks around 400 head.
  7. He has some sand separation.

## Discussion

*John*

- We could add flush water and scraped material to the tanks, mix, and treat.

*Saqib*

- 2 tanks are needed to ensure 1 replication (at least).
- We need the project design to assess the sampling protocol and needs. Currently, we have money for 100 samples at \$100 each.

*John*

- A 12-14 month timeline is needed for evaluation of the technology.

*Saqib*

- Patti needs to send us a protocol including her recommendations on sampling design.

*Patti*

- Would it be possible to sample at the gun to assess the effectiveness of the bugs in the lagoon?

*Saqib*

- Placing coffee cans (lined with freezer bags) throughout the application field is recommended for sampling for the duration of the application in order to get a complete picture of the bugs impact on the lagoon effluent.

*Patti*

- We talked to the producer about keeping enough water in the lagoon to let the bugs work.

*Saqib*

- This is between Patti and the producer.

*Patti*

- We feel comfortable that he will do his best to keep water level stable.

*John*

- What methods must be used for collecting gun samples?

*Saqib*

- The samples must be iced down and delivered to the lab (TIAER) within 24 hours.
- The lab accepts samples Monday through Thursday.

*John*

- Effluent should be placed in the tanks and allowed to settle for several weeks before adding the bugs.

*John*

- Should we use old sludge or scrape/flush material in the tanks?

*Saqib*

- Old sludge is more representative of the lagoon.

*John*

- How many measurements of lagoon capacity are needed to assess effects of the bugs on sludge amounts?

*Saqib*

- 26-30 depth samples will be needed for the 1.5 acre lagoon. 50 foot by 50 foot depth samples will be taken to assess sludge depth.

*Patti*

- While taking measurements, can someone be on the bank writing down info?

*Saqib*

- How many times will depth measurements be taken? It's up to Patti.

*Patti*

- We're planning on doing depths every 60 days.

*John*

- Mass balance is done in tanks only.

*Patti*

- We're concerned with algae growing in the tanks.

*Saqib*

- That is a concern if the tanks are in direct sun.

*Patti*

- Could shade be placed over tanks?

*Saqib*

- Yes, if needed.

*Patti*

- Also, rains could also cause tanks to overrun if they're not covered.
- The tanks are 6.5 feet wide by 6 feet tall.

*Saqib*

- We need to keep 1 foot of free board to keep them from spilling.
- The tanks will also need maintenance.

*Patti*

- I'm in the area once a month.
- The dairyman could keep eye on them too.

*Saqib*

- Could algaecide be used without causing problems?

*Patti*

- We could do that, but then conditions would be different than the lagoon.
- We prefer to cover, but not seal the tanks, leaving the sides open.

*John*

- Saqib needs the protocol from Patti.

*Saqib*

- Samples must be taken by a 3<sup>rd</sup> party and sent to TIAER.

*Patti*

- Will E. Coli and Fecal Coliform be tested?

*Saqib*

- No, only solids, nutrients, Ca, Mn, Mg, Na, Cu, and pH will be tested.

*Patti*

- Can EnviroLink pay for E. Coli and Fecal Coliform?

*Saqib*

- She'll have to check with Mark Murphy at TIAER.

*Patti*

- We really want to have that done (E. Coli and Fecal Coliform testing).

*Saqib*

- This information could be included in final report though.

*John*

- There's some indirect evidence that the bugs reduce soil phosphorus. Can this be tested?

*Saqib*

- Currently, there is no money for this monitoring.

## **Timeline**

### *Patti*

- We'll develop a timeline and protocol by Friday.

### *Saqib*

- We need the Protocol to include:
  1. Start date
  2. Optimized date
  3. Sampling date to begin
  4. Sampling frequency

### *John*

- Supplemental information needed from cooperator includes:
  - Rainfall information (They do this for TCEQ already.)
  - Flushing records
  - Pumping Records
  - Lagoon levels (They may do this for TCEQ already as well.)
- BRA will give Patti additional guidance on protocol.

### *Saqib*

- Make sure to keep the focus on the development of a Mass Balance and trends and reducing solids and nutrients applied to lands.