



## **THINK TANK SESSION**

### **NEXT STEPS FOR DE-NITRIFICATION OF WATER: OUTLINING ACHIEVABLE ACTIONS AND PROJECTS WITH THE AGRICULTURAL INDUSTRY**

**OCTOBER 19, 2012**

## **SESSION NOTES**

On October 19, 2012, Project 17 International coordinated an invitation-only Think Tank Session following up on last year's session on de-nitrification of water. This session reviewed the issue and then asked the participants to outline a realistic next step to address the challenge of reducing and extracting nitrates from the water affected by the use of fertilizers in the growing process. Leaders in the agricultural industry; representatives of the commercial and research community; as well as representatives from farm organizations, federal institutions, and local water agency participated. This session was held in collaboration with Hartnell College and the Grower-Shipper Association.

Ms. Jocelyn Gretz of Rio Farms outlined key issues around nitrates in water, which launched the group into an examination of the obstacles to current solutions. Dr. Fatemah Shirazi, CEO of Microvi Biotechnologies Inc., presented a solution to extract nitrates from water that is fast, flexible and proven in other industry sectors. The group then outlined key components of a possible experiment focused on new technology solutions that could address -- in a timely and cost-effective manner -- the matter of extracting nitrates from water. The following notes document, primarily, the output of the group discussion. Discussion themes included:

- A review and further delineation of the issue of nitrates in water in and around agricultural areas and the factors to consider when designing a solution;
- Pros and cons of a bio-based de-nitrification solution offered by Microvi Biotechnologies Inc.;
- Characteristics of effective technology-based solutions; and
- Design components of a "Next Step" to solve the problem of nitrates in water in the agricultural sector, including possible key players, scope, sources of funding and timeline of an experiment.

**PARTICIPATING COMPANIES AND ORGANIZATIONS INCLUDED:**

- APTwater, Inc.
- California State University, Monterey Bay
- Comgro Soil Amendments, Inc.
- Driscoll Strawberry Associates
- Duda Farm Fresh Foods, Inc.
- GRUNDFOS Silicon Valley
- J L White International, Inc.
- J Lugg and Associates
- Lawrence Livermore Laboratory
- Microvi Biotechnologies, Inc.
- Mitsubishi International Corporation
- Monterey County Farm Bureau
- Monterey County Water Resources Agency
- Ocean Mist Farms
- Paraiso Vineyards
- Project 17 International
- Rio Farms
- Rose Royal Radicchio
- Royal Packing Company, a subsidiary of Dole Fresh Vegetables
- Smart World Center
- Steinbeck Country Produce
- Tanimura & Antle
- Taylor Farms California
- U.S. Department of Agriculture, Natural Resources Conservation Service
- Wilbur-Ellis Company

**GOALS OF THE SESSION**

- Review and further delineate the issue of nitrates in water;
- Learn about a new solution for de-nitrification;
- Outline the characteristics of effective technology-based solutions; and
- Design a Next Step to solve the problem of nitrates in water in the agricultural sector.

## WHAT IS THE PROBLEM WE ARE TRYING TO SOLVE? EXTRACTING NITRATES FROM THE WATER

### The Issue

- Legacy: nitrates existing for a long time (perhaps as long as 100+ years)
- Also natural pockets of nitrates per ground water usage, so the problem of nitrates in the soil might not always be coming from the use of fertilizers, but from the earth itself
- Lost crops are often disked in, turned under, and this plows back in nitrates into the soil.
- Surface water contamination is changing the biology of our water
  - We don't want algae in surface water
- Human health issue may not be the main issue (contamination)
  - There is a problems for young babies, but in reality this is a limited problem; just a seemingly larger one in the eyes of the public
- Growth of townships and the resulting growth of population using nitrates for their own gardening; and covering up whole watersheds
- Lack of scientific research on where the nitrates come from
- Future: what are we going to be faced with relative to this nitrate issue. It is not a big issue right now, but it could become one.

### What are obstacles to the current solutions?

- Dealing with heavy soils and varying soil structures makes it hard to measure and extract nitrates
- Economic factors are substantial. We need to weigh a risk to the crop versus a risk to society or to the environment (surface soil).
- Legacy issues – not understanding the amounts involved
- Can't even test to see if what we are doing is helping
- Regulatory environment: don't want to move forward on a solution if we don't even know if the regulatory agency will approve
- We don't have an institution that is tracking water quality "progress" in agriculture (There is a concern about the confidentiality regarding agricultural and water data and its use. It keeps us, sometimes, from moving forward.)
- District 3 Water Quality Control Board – doesn't understand agriculture's issues and perspectives.

## **CONSIDERATION OF DE-NITRIFICATION SOLUTIONS: PRESENTATION OF A SOLUTION BY MICROVI BIOTECHNOLOGIES INC.**

### **Pros of this Solution**

- It works: is proven to be successful in extracting nitrates from water.
- Can work in a “passing through” in-ground situation “Bio Barrier” that can handle varying flows (addressing watershed by watershed)
- It works fast.
- Small footprint - doesn't take up much space to deploy the solution
- Addresses pesticides as well as nitrates.
- Cost is similar to wood-chip bioreactor
- No sludge

### **Cons and Concerns of this Solution**

- Does it handle surges in water (e.g., storms)? -- Yes.
- Are we treating the issue of extracting nitrates from water or are we addressing the introduction of nitrates into the agricultural/growing system?
- Dealing with different qualities of soil and sediments. It can deal with this.
- East side of the valley (east of 101) has high runoff and lots of granite that can also produce nitrates. This solution might work well there.

## **DESIGNING A COLLABORATIVE SOLUTION TO EXTRACTING NITRATES IN WATER**

### **The Next Step: Concrete Ideas of Solutions to Test and Deploy**

- Prof. Marc Los Huertos' Research Projects
  - 5 or 6 treatments on the Blanco Drains (tile drains)
    - Test levels of nitrates and pesticides
    - Test practices
- East side (east of 101) has catch basins at the end of the field, also in south with test ponds. This could be a good place to test solutions.
  - One per farm and geology
  - Many per watershed, covering many acres
  - Test out some solutions, like Microvi

- Deploy the Microvi solution in San Jerrado
  - Get grant money to measure the results
- Focus on treating municipal drinking water system. Use as an example (e.g., San Ardo)
  - Do this at many municipalities in Monterey

### **Key Factors and Players in This Collaborative Solution**

- Leafy Green Research Board
- Growers and organizations themselves (e.g., Growers-Shipper Association)
- USDA "EQUIP" → Participants to enroll
- Resource Conservation District (Paul Robins, Monterey)
- Find Matching money – Strawberry Commission
- Dirk Giannini: If there were an East Side Project he would be a good contact
- "On-farm solution" – GSA
- Richard Smith and Michael Kahn, water experts at UC Davis
- Lawrence Livermore Labs
  - Has researchers but no focus on agriculture
  - Christine Hartmann, at the 10/19/12 offered to work with the ag group to see if there is willingness to collaborate on a project
  - Signing really tight non-disclosure agreements per Lawrence Livermore Lab's work on vulnerability studies
- Can the growers own this solution(s) that might be created after a collaborative experiment?
- We/ag should leverage research data to influence legislator and regulatory community
- Determine the age of the water in wells and see if this is a factor that affects the de-nitrification process
- Problem: We/ag are so protective of our agricultural industry that we don't invite researchers in due a lack of trust
- Challenge: We should have agricultural industry independence from the research, but we still need agricultural leadership and funding
- We should think about the watershed as a whole

- Do research that also has a component of multi-factor assessments
- 2013 – UC coop releasing hand-held app for measuring nitrates: we should look into this and coordinate around this advent
- Review the California nitrate assessment 2<sup>nd</sup> report

### **Incentives – Positive Factors**

- Getting an association to grant an incentive to those reducing nitrates
- FREP: Fertile Research & Education Program (CFA)

### **Timeline, Scope and Funding**

- Any project on de-nitrification should be completed by the next Ag waiver (i.e., 4 years)
- Start now and get results in 2 years to then get to Ag Waiver Board
  - Christine Hartmann, Lawrence Livermore Lab
  - Tamara Voss, Monterey Water Resource

### **Obstacles to This Next Step**

- Why solve a problem until the regulators stipulate the rules? Otherwise we are spending resources on a solution that we might not need.
- What if it does work, but costs \$500 per acre! And the regulators then require this expensive solution?
- Bureaucratic hurdles (re: USDA program)
  - Farms that are too large can't qualify for program funds
- Will this technology be approved by District 3?
- Translating research data from hydro-geologists over to the agricultural sector

### **SUMMARY AND SHAPING THE NEXT STEPS**

- No written discussion notes.