

Regional Results: Goal 2, Clean and Safe Water

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## Outreach and Enforcement Reduces Health Risk in American Samoa

Pigs are an important cultural resource in American Samoa. Approximately 2,700 pig farms house 35,000 pigs on the main island, Tutuila. Small-scale pig farms are commonly makeshift, with open-sided buildings on concrete slabs or packed earth floors. Wastes are typically flushed from the floor with pressurized water, which is then discharged as waste/water slurry into an unlined cesspool or directly into streams or wetlands. Historically, political will to support proper pig waste management has been

lacking. Pig urine and feces now contaminate drinking water, streams, and near-shore ocean water in 31 of the 41 watersheds in American Samoa, including Matu'u watershed, which was placed on the EPA's official list of impaired waters in 2004

An elevated risk of leptospirosis prompted American Samoa's Coastal Non-Point Source Pollution Control Program to implement water monitoring, outreach, inspections, and enforcement on Afuelo Stream. This project included moving 100 pigs away from the stream and installing waste treatment systems.



Matu'u watershed, American Samoa



Outreach meeting

**Results:** Implementing best-management practices reduced *E. coli* levels in Afuelo Stream by 90% and total nitrogen and total phosphorus by 58% and 43%, or 2649 and 2088 pounds annually, respectively. Outreach and education have increased public awareness of water quality problems and health risks, and created political will to require implementation of similar practices in 21 additional watersheds.

Regional Results: Goal 4, Healthy Communities and Ecosystems

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## Transition to Sustainable Agriculture: Winegrapes

Winegrapes are the third leading agricultural crop in California, grown in 47 of California's counties, covering 529,000 acres, and generating annual revenues of over \$2 billion.

From 2001 to 2004, the Agriculture Program invested \$234,000 in grant funding to support the transition to more sustainable practices in the winegrape industry.



### Results:

- **Central Valley:** From 2002 to 2005, the Lodi-Woodbridge Winegrape Commission growers reduced total acres treated with the high-risk pesticides propargite and simazine by 55% and 72% respectively through a new self-assessment workbook that promotes sustainable practices.
- **Central Coast:** From 2003 to 2005, the *Central Coast Vineyard Team* decreased use of contact and pre-emergent herbicides and nearly eliminated diazinon and chlorpyrophos use in their project vineyards. They did this through a new Positive Points System™ to encourage integrated pest management.
- **Sonoma County:** Data made available in 2005 showed that between 1999 and 2003, the *Sonoma County Grape Growers Association* cut use of nine high-risk pesticides by 32% and cut acres treated by 31% through a grower-to-grower integrated pest management (IPM) education program.

Regional Results: Goal 4, Healthy Communities and Ecosystems

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## Transition to Sustainable Agriculture: Almonds

California produces three-quarters of the world's almonds on 575,000 acres in the Central Valley from Chico to Bakersfield. In 2003, almonds were California's top agricultural export with a value of \$1.5 billion. The Agriculture Program has invested \$518,918 in grant funding to support the transition to sustainable practices in the almond industry.

The Agriculture Program works with the Almond Board of California (ABC) to develop integrated pest management techniques and to select environmental committee projects. The Agriculture Program has also supported the Community Alliance with Family Farmers to promote sustainable practices and California Almond Pest Management Alliance (PMA), which completed a resource guide for growers emphasizing environmentally sound pest management practices that PMA research has shown to be effective.



**Results:** Recently available data show that, California-wide from 1991 to 2000, the use of dormant-season organophosphate pesticides on almonds fell 77 percent, compared to a 35 percent reduction for all crops.



Regional Results: Cross-Goal Issues -- Agriculture

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# San Joaquin Valley Dairy Manure Collaborative

The Agriculture Program initiated the Dairy Manure Collaborative in fall 2003 to address the harmful environmental effects of dairy manure in the San Joaquin Valley through multi-party collaboration. The collaborative's goal is to fully utilize manure as a resource, improving the quality of soil, providing nutrients for crops, generating renewable energy, and creating jobs, and to manage manure to reduce contamination of air and water. Participating agencies and organizations include:

- Federal: Department of Energy, USDA Rural Development Agency, USDA Natural Resources Conservation Service, U.S. EPA Pacific Southwest Region
- State: California Energy Commission, California Department of Food and Agriculture, Cal/EPA, California Air Resources Control Board, California State Water Resources Control Board, California Integrated Waste Management Board
- Dairy Industry: Western United Dairymen, Milk Producers Council, California Dairy Campaign
- Public Interest: Sustainable Conservation, Great Valley Center

Regional administrators of the four federal agencies signed a Statement of Collaboration in April 2004. Participants are working to identify and evaluate technologies, project locations and participants, and funding.

The consensus of the group is that projects should meet these criteria:

- Environment: Reduce air emissions of VOCs, ammonia, and methane; manage nutrients (especially nitrogen) and salts to improve water and soil quality
- Energy: Create clean renewable energy sources
- Economics: Improve economic viability of dairies and create jobs

A subgroup, the Dairy Manure Technology Assessment Panel, is currently evaluating available off-the-shelf technologies.



Flush-dairy manure channel



Dry manure stockpile

## Dairy Manure Technology Feasibility Assessment

Some of the greatest agricultural problems in the San Joaquin Valley of California are the result of increasing amounts and concentrations of dairy manure. Nutrients, salts, bacteria, and organic matter in manure pollute surface and groundwater and decomposing manure emits air pollutants, including volatile organic compounds ammonia, methane, and unpleasant odors. The greatest obstacle to addressing this growing concern is the lack of information about viable technologies to treat the manure.

In FY2005, the Agriculture Program led a diverse group of stakeholders associated with dairy environmental issues to create a panel to review technologies for treating dairy manure. This group, the Dairy Manure Collaborative, issued a call for manure treatment technologies and a subcommittee, the Dairy Manure Technology Feasibility Assessment Panel, has reviewed more than 70 technologies to date. The Panel plans to issue a draft report that assesses the environmental and economic performance of first 44 technologies in fall/winter 2005.

Anaerobic digestion to produce methane for energy could be the base to which other treatment technologies would be added. Other treatment processes could include liquefying the methane for use in automobile engines, composting solids for use as animal bedding and soil amendments, concentrating nitrogen for fertilizer and salts for disposal, trapping mineral nitrogen in aquatic plants for animal feed or soil amendments, and treating dairy manure in combination with human sewage.

This effort is the first step towards implementing pilot projects in FY2006 that demonstrate comprehensive manure treatment technology with positive environmental effects in the San Joaquin Valley.



Spreading liquid manure on pasture



Methane digester

## Appendix A: Agriculture Grants Status

*Table 1. Completed FQPA Grants (cumulative; shaded rows completed in FY2005 and FY2006)*

<b>Grant Title</b>	<b>Recipient</b>	<b>Amount</b>	<b>Outcomes</b>
Putting the Farm Bill to Work: A Program to Increase the Ability of Northern California Specialty Crop Producers to Access EQIP	Center for Agricultural Partnerships	\$50,000 Leveraged \$21,600 (Pew Grant) FY04	Reduced the use of pesticides and increased desire for low risk pest management tools through helping growers successfully apply for EQIP.
Sustainable Winegrape Production	Lodi-Woodbridge Winegrape Commission	\$49,000 Leveraged \$239,474 (SWRCB, GVC, LWWC) FY03	Developed an in-field inspection program and chain-of-custody procedures for sustainable winegrape production. These components will be part of the third-party certification program for Lodi-Woodbridge. Also reduced total acres treated of propargite and simazine between 2002 and 2004 by 55% and 72% respectively.
Integrated Pest Management in Winegrape Production in Sonoma County	Sonoma County Winegrape Growers Association	\$25,000 Leveraged \$51,740 (SARE & in-kind) FY03	FQPA-targeted pesticides decreased by 35% in pounds used and 24% in acres treated from 1999 to 2002. Grape acres increased 16% over the same period.
Pest Management Alliance in Winegrapes	California Association of Winegrape Growers	\$30,000 Leveraged \$329,506 (CDPR, CAWG, in-kind) FY02	Decreased use of FQPA-targeted pesticides in pounds of active ingredients by 24% across all active ingredients, 23% for sulfur and 30% for the total of all nine PM higher-risk herbicides. Simazine was reduced by 18% and oxyfluorfen by 27%.
On Farm Innovation with Pesticide Use Reporting Data	University of California Davis, Dept of Land, Air, Water	\$30,000 Leveraged \$11,000 (in-kind) FY02	Reduced use of FQPA-targeted pesticides in Fresno County by 30%, Madera County by 29%, Napa County by 39%, and Sonoma County by 33% between 1993 and 2002. During this time period winegrape acreage increased from 255,803 to 481,286 statewide.
Understanding and Managing Lygus in Cotton	University of California, Statewide IPM Program	\$30,000 FY02	Increased IPM adoption in cotton. Reduced use of insecticides for Lygus resulting in less run-off and VOC emissions.

*Agriculture and Environmental Results in the Pacific Southwest Region*

<b>Grant Title</b>	<b>Recipient</b>	<b>Amount</b>	<b>Outcomes</b>
Integrated Strategies to Manage Resistant Weeds in Rice	U.C. Cooperative Extension, Sutter and Yuba counties	\$30,000, Leveraged \$3,000 (in-kind) FY02	Reduced herbicide loading into surface waters through the adoption of integrated weed strategies.
Biologically Integrated Orchard Systems (BIOS) in Walnuts	Community Alliance with Family Farmers	\$30,000 Leveraged \$2,067 (in-kind) FY02	Reduced pesticide impacts on air and water by adopting IPM practices.
Integrated Pest Management in Stone Fruit	California Tree Fruit Agreement	\$11,800 Leveraged \$222,301 (CDPR, CTFA) FY02	Identified barriers to adoption of integrated pest management in stone fruit – grower outreach.
Organic Pest and Weed Management	Organic Farming Research Foundation	\$ 10,430 FY02	Funded two projects in Region 9 researching organic and/or biological methods for pest management.
Implementing a Pest Management System in Walnuts	Center for Ag Partnerships	\$30,000 FY01	Conducted on-farm trials and outreach on pheromones & other integrated methods, to reduce pesticides. Identified barriers for IPM adoption.
Pest Management Strategic Plans for California Commodities	California Minor Crops Council	\$30,000 Leveraged \$54,890 (in-kind) FY01	Identified pest management priorities & strategies for FQPA transition in ten crops.
Pest Risk Reduction for California Prunes (Integrated Prune Farming Practices)	California Prune Board	\$22,000 Leveraged \$38,000 (CDPR, UC SAREP, NRCS, CPB) FY01	Developed pest management strategy and database system to track pest management methods.
Integrated Approach to Reduce Use of Pesticides in Sonoma Winegrapes.	Sonoma County Grape Growers Association	\$30,000 Leveraged \$84,200 (Sonoma Co. growers) FY01	Educated growers on pest management to reduce pesticide use and run-off into surface water.

Grant Title	Recipient	Amount	Outcomes
Integrated Approach to Reduce Pesticides in Table Grapes	University of California Riverside, Entomology Dept	\$30,000 Leveraged \$168,866 (CDPR, UC, WRIPMC, GDGAC) FY01	Conducted research and outreach on biocontrol methods in grapes to reduce pesticide use and protect water quality.
Weather Driven Disease Models for Strawberries	UC Sustainable Ag Research & Educ Program	\$50,000 Leveraged \$19,012 (UC SAREP) FY01	Growers used on-farm research and demonstration on weather models for disease management in strawberries. Participating growers reduced their fungicide applications by 3.5 in 2002 and achieved the same disease control.
Integrated Pest Management in Peaches, Plums and Nectarines	California Tree Fruit Agreement	\$8,200 Leveraged \$172,513 (CTFA, CCPGAB) FY01	Conducted demonstrations for farmers to show them how IPM in stone fruit is used to reduce pesticide use.
Biologically Integrated Farming	UC Sustainable Ag Research & Educ Program	\$400,000 \$24,600 (UC SAREP) FY01	Conducted research & application of integrated practices and pesticide reduction through partnerships, in prunes, almonds, apples, dairies, and strawberries. Reduced use of FQPA-targeted pesticides and increased adoption of IPM practices in all the commodities above.
Organic Farming Research for Pest/Weed Management (Projects in Region 8,9 and 10)	Organic Farming Research Foundation	\$84,000 FY01	Funded four projects each in Regions 8, 9 and 10. Supported R&D of organic farming methods for management of pests and diseases, and enabled farmers to reduce or avoid pesticide use.
Extending Biologically Integrated Farming Systems (BIFS)	University of California Regents, UC SAREP	\$40,000 Leveraged \$55,950 (in-kind) FY01	Additional funding for IPM and whole farming system methods to reduce pesticide use in prunes, walnuts, winegrapes, and rice.
Implementation and Evaluation for Reduced Risk Pest Management Programs with a Focus on Minority Small Farmers in Fresno County	University of California, UC Cooperative Extension	\$40,000 ends 9/30/05 FY03	Promote reduced-risk pest management strategies among immigrant farmers in Fresno County.



**Table 2. Active FQPA Grants in Fiscal Year 2005**

<b>Grant Title</b>	<b>Grant Recipient</b>	<b>Amount</b>	<b>Expected Outcomes</b>
Eco-Labeling as a Means for Pesticide Risk Reduction for California Strawberries	Protected Harvest	\$60,000 Leveraged \$100,000 (Resources Legacy Fund) Ends 12/31/06 FY05	Reduce pesticide use and increase grower standards through implementation of a certification program on 700 acres on California's Central Coast.
Biologically Integrated Farming Systems (BIFS) for Table Grapes in the Southern San Joaquin Valley	UC Sustainable Ag Research & Education Program	\$200,000 ends 9/30/07 FY05	30 percent reduction of high risk pesticides used on table grapes by first year following project completion.
Reducing use of FQPA pesticides in Stone Fruit Orchards in California's San Joaquin Valley	California Dept. of Pesticide Regulation	\$142,000 ends 6/30/08 FY04	Reduce use of organophosphate and carbamate pesticides in orchards near targeted waterbodies.
Implementation and Extension of Refined Management Strategies for Egyptian Alfalfa Weevil in California Alfalfa.	Univ. of California, UC Cooperative Extension	\$40,000 ends 12/1/05 FY04	Reduce use of organophosphate, carbamate and pyrethroid pesticides through understanding of Egyptian Alfalfa Weevil.
Enhancing Biologically Integrated Farming Systems for Lettuce on the Central Coast of California..	UC Sustainable Ag Research & Education Program	\$196,000 ends 12/31/06 FY04	Reduce use of organophosphate and carbamate pesticides through use of biological controls and other pest management tools.
Increasing Food Safety and Minimizing Risk for Hawaii's Small Scale Farming Communities	University of Hawaii	\$ 38,609 ends 3/31/06 FY04	Reduce use of FQPA pesticides to control the melon fly by increasing grower awareness about other pest management tools.
Pesticide Risk Reduction and Improved Environmental Performance for California's Fresh Stone Fruit Industry	Protected Harvest	\$70,000 Leveraged \$1,000,000 (USDA CIG) ends 12/31/05 FY04	Educate growers about proposed dormant spray regulations, identify areas of high pesticide use, and develop a grower resource guide emphasizing IPM.
Reduced Pesticide Use, High Yields, and Farm Profits: Are They Mutually Exclusive?	UC Davis, Dept of Land, Air, Water	\$36,000 Leveraged \$26,000 (in-kind) ends 9/30/05 FY03	Analyze crop yield and pest management data on walnuts to characterize economic impacts of reduced pesticide use.

<b>Grant Title</b>	<b>Grant Recipient</b>	<b>Amount</b>	<b>Expected Outcomes</b>
Walnut Pest Management Alliance	University of California, UC Cooperative Extension	\$50,000 ends 6/30/05 FY03	Develop and refine pheromone-mating disruption protocols for effectiveness and economic viability.
Biologically Integrated Farming Systems (BIFS)	UC Sustainable Ag Research & Education Program	\$ 200,000 Leveraged \$4,533 (in-kind) ends 6/30/06 FY03	Funds third year of prune and winegrape BIFS projects in order to accomplish BIFS adoption and reduced risk practices.
Almond Pest Management: Alternatives to Dormant Organophosphate and Pyrethroid Sprays	California Department of Pesticide Regulation	\$40,000 ends 10/31/05 FY03	Assist growers in understanding TMDLs & dormant spray regs. Use PUR data in 3 regions to identify at risk watersheds, and provide outreach.

*Table 3. Regional Geographic Initiative and Pesticide Environmental Stewardship Program Grants Completed in Fiscal Year 2005*

<b>Grant Title</b>	<b>Recipient</b>	<b>Amount</b>	<b>Outcomes</b>
Effects of Dairy Rations on VOC and TNMNEOC Emissions from Cows and their Waste under Controlled Conditions	The Regents of the University of California	\$75,000 Leverage \$665,000 (\$600,000 from Merced County bond money, plus \$65,000 from dairy industry) RGI FY 2003	Quantified emissions of VOCs from dairy cows and their manure. The California Air Resources Board is using the results to determine the impact of dairies on ozone formation and the reduction in emissions dairies may be responsible for under the State Implementation Plan.
Improved Management of Egyptian Alfalfa Weevil in California Alfalfa o Protect Environmental Quality	The Regents of the University of California	\$40,000 PESP award in 2003	Monitored Egyptian Alfalfa Weevil populations, reassessed treatment thresholds, and extended information to growers

*Table 4. Regional Geographic Initiative and Pesticide Environmental Stewardship Program Grants Active through*

***Fiscal Year 2005***

<b>Grant Title</b>	<b>Grant Recipient</b>	<b>Amount</b>	<b>Expected Outcomes</b>
Local and Regional Collaboration for treating dairy manure in the San Joaquin Valley	Local Government Commission	\$10,000 No leveraged funds RGI FY 2005	Engage local government organizations, technology experts, and the dairy industry in identifying technologies, sites, and financing for treating dairy manure in the San Joaquin Valley to reduce pollution and improve quality of air, water and soil.
Order for Supplies and Services (contract)	Tetra Tech EM, Inc.	\$15,000 No leveraged funds RGI FY 2005	The vendor is assisting with data collection, formatting, and report preparation in support of the San Joaquin Valley Dairy Manure Technology Feasibility Assessment Panel.
Pest Management Pesticide Training for At-risk Korean Farmers in Hawaii	Hawaii Deptment of Agriculture – Agriculture Development Corporation	\$38,969 ends 12/31/05	Provide technical assistance and safety training to underserved minority farming community.
Pesticides Environmental Stewardship Program - Lodi-Woodbridge Winegrape Commission	Lodi-Woodbridge Winegrape Commission	\$27,304 ends 12/31/06	Develop an In-field Inspection Program and Chain of Custody Procedures for Lodi-Woodbridge Winegrape Commission Sustainable Winegrape Productions Certification Program.

## Appendix B: Dairy Manure Collaborative Accomplishments, FY05

**Issue:** California is the nation's leading dairy state. Over the last 30 years, the industry has become significantly larger and more concentrated, leading to a corresponding increase in the amount and concentration of animal waste. The San Joaquin Valley, with three-quarters of California's dairy cows, has some of the most impaired air and water quality in the nation, and dairies contribute to that pollution.

**Background:** The Dairy Manure Collaborative was created in fall 2003 to comprehensively address dairy manure issues in the San Joaquin Valley. The approach is non-regulatory, and the goal is to fully utilize manure as a resource by managing it to address concerns in three areas:

- **Environment:** improve quality of soil, air and water. We are particularly interested in reducing or capturing nutrients, salts, pathogenic bacteria, volatile organic compounds (VOCs, which are precursors to the formation of both PM 2.5 and ozone), particulates, ammonia (a precursor to PM 2.5), methane (a global warming gas), and odors.
- **Energy:** create clean renewable energy sources
- **Economics:** improve economic viability of dairies, and create jobs

We spent most of FY 2004 creating the group, agreeing on goals, and generating interest and support from key organizations and stakeholders. Four federal agencies signed a "Statement of Collaboration" in April 2004. Since then we have opened the Collaborative to anyone who wishes to participate, and the group now functions as a loose affiliation of federal and state agencies, dairy industry organizations, University of California Cooperative Extension, public-interest non-profit organizations, and private and public technology providers. Participation is voluntary and free. Jamie Liebman of the US EPA Region 9 Agriculture Program leads the Collaborative.

### ***Activities and Accomplishments in FY 2005***

1. **Identifying Technologies to Treat Manure.** A diverse group of stakeholders associated with dairy issues in California met and recommended in October 2004 that a panel be created to review the economic and environmental performance myriad technologies for treating dairy manure. The California Air Resources Board is hosting the **Dairy Manure Technology Feasibility Assessment Panel**, which also includes representatives from USDA; EPA R9; the state Water Board, Waste Board, Energy Commission and Dept of Food & Agriculture; environmental groups (NRDC, Sustainable Conservation, CEERT); and the dairy industry. The first meeting was held February 1, 2005, after which a web site (<http://www.manureproducts.info>) was created, and a call for information about manure treatment technologies was widely distributed. To date, more than 70 technologies have been submitted. At year's end, the Panel was actively reviewing the technologies and drafting a draft report for distribution in late fall. Prospective findings include: (1) for most technologies, data is insufficient to assess environmental and economic performance, and (2) the need to combine various technologies into a comprehensive treatment system is acute.

Participating agencies and industries, state and federal legislators, and the California Pollution Control Financing Authority indicate strong interest in the report.

- 2. Identifying Sites for Regional Manure Treatment.** Working with the EPA Region9 GIS Center and the State Water Resources Control Board, we mapped the best potential sites for regional manure processing facilities. The maps indicate locations, herd size, and densities of dairies in the San Joaquin Valley, as well as the locations of existing composting, power generation, and wastewater treatment facilities that could potentially process manure. Finding this never-before-assembled data was a major hurdle. The Central Valley Regional Water Quality Control Board provided dairy data, which are still incomplete (e.g., herd size is available for only five of the eight counties of the SJV, and even then not all dairies are included). The state's water and air boards, USDA/NRCS, USDA Rural Development, DOE, and the dairy, compost, and energy industries reacted positively.
- 3. Communications and Outreach.** We distribute emails on funding opportunities and other news, and hold meetings with key stakeholders, grantees, and technology providers to identify technologies most suitable for treating dairy manure in the San Joaquin Valley. We presented material on the Collaborative's work in the following venues:

**A. Briefing Papers** for the Regional Administrator's office

- Preparation for RA Wayne Nastri to participate on a Dairy Tour, sponsored by Western United Dairymen, June 29, 2005.
- Appellate Court Ruling on CAFO Rule, March 2005
- Briefing on the Collaborative's plans for pilot projects to treat manure comprehensively, for RA Wayne Nastri, April 18, 2005 and July 20, 2005.
- Briefing to prepare RA Wayne Nastri for a meeting with Commissioner James Boyd of the California Energy Commission to discuss utilization of dairy manure as a source of clean, renewable fuel, August 22, 2005.

**B. Conferences**

- Local Government Commission/Great Valley Center "Waste to Watts, or What?" at the Modesto Agriculture Center, October 2004.
- Regional Science Workshop on Animal Feeding Operations: Science and Technical Support Needs (US EPA ORD/USDA/USGS), University of Maryland, December 6-9, 2004.
- BioCycle West, March 7, 2005. The annual meeting of BioCycle (an industry group representing the compost and recycling industry), included a panel presentation, organized by James Liebman, on improving management of dairy manure in California. Topics included the Dairy Manure Collaborative (James Liebman, EPA R9), co-composting dairy manure with urban green waste (Allen Dusault, Sustainable Conservation), and digestion of manure in combination with food processing waste and municipal sewage (Bob Feenstra, Milk Producers Council). Region 9's Waste Division co-sponsored the conference.

**C. Meetings**

We meet frequently with various stakeholders working on dairy issues. Our interest is to garner and focus support for a coordinated and comprehensive

approach to manure treatment. Highlights include:

- **State-Federal Coordination Meetings**
  - CalEPA-Federal Agency Ag Coordination Meeting, at USDA NRCS in Davis, CA, May 2005
  - CalEPA – US EPA R9 Summit, at US EPA R9, August 4, 2005.
- **Mosquito Control Districts.** Manure storage ponds and manure water applied as irrigation water to crop land are breeding habitat for mosquitoes. Concerns are especially acute this year because of the expected dramatic increase in cases of West Nile Virus, which is mosquito-borne and potentially deadly. The Sacramento-Yolo Mosquito & Vector Control District has agreed to help the Dairy Manure Collaborative assess the impact of dairy manure treatment technologies on mosquito populations, and to provide input on WNV to the State Water Resources Control Board for their \$5 million RfP to control water pollution from dairies.
- **Technology Vendors.** We have met (in-person and by conference call) with several dozen vendors that sell products for treating dairy manure. We help them identify critical environmental and economic data needed to establish the performance and suitability of the technology for the San Joaquin Valley, and we encourage all to submit their performance data to the Dairy Manure Technology Feasibility Assessment Panel. We also introduce companies to the appropriate dairy industry organizations and regulatory agencies.

**4. Leveraging Resources for Research, Policy and Implementation.** We provided input to state and federal programs to support research and implementation of new technologies to treat dairy manure.

**D. Grants Administration: VOC Emissions from dairies.** The San Joaquin Valley is in extreme non-attainment for ground-level ozone, and dairies are suspected of being major contributors to the problem through emissions of VOCs, which are ozone precursors. The Agriculture Program is managing a \$75,000 grant (matched with more than \$600,000 in funding from Merced County and \$75,000 from the dairy industry) to researchers at the University of California at Davis to quantify emissions of VOCs from dairy cows and their manure. The California Air Resources Board is using the results to determine the impact of dairies on ozone formation and the reduction in emissions dairies may be responsible for under the State Implementation Plan.

**E. Influencing Research Priorities**

- **EPA Office of Research and Development.** The Agriculture Program met extensively with ORD in spring and summer 2004, and presented Region 9 issues to the **EPA Science Advisory Board** (September 2004) and to a joint EPA/USDA conference (December 2004) to which we also brought two Dairy Specialists with the University of California Cooperative Extension, and Paul Martin of Western United Dairymen. AT both events we recommended that ORD support (1) a thorough characterization of the amount, species and reactivity of volatile organic compounds emitted from all portions of dairies, including application of manure to crop land; and (2) applied research and evaluation of the environmental and economic performance of technologies to treat dairy manure in the San Joaquin Valley. In response, EPA ORD was clear that (1) research

timelines are very long, on the order of 10 years from identification of the need to delivery of the research results, and (2) ORD is unlikely to fund research for animal feeding operations unless and until the AAs for the Air and Water Divisions list it as a priority. Despite this setback we continued to speak with ORD about research needs for AFOs, and in late August 2005 ORD announced the allocation of \$1M to the Environmental Technology Verification program to test the environmental and economic performance of three to five technologies for treating manure.

- **State of California Research on Dairy Emissions.** The Agriculture Program participates in monthly telephone conference calls and occasional in-person meetings with two groups that set research policy at the state level: (1) Ag Technical Committee and Dairy Sub-Committee of the San Joaquin Valley Air Pollution Control District, and (2) Ag Research Priorities Sub-Committee of the Central California Ozone Study's Policy Committee. As a result of these meetings, some half million dollars has been directed to study the emissions of VOCs from cows, their manure and feed, and from the various parts of a dairy. The research results are being used by the state Air Board to determine the best scientific estimate of VOC emissions from dairies and the most appropriate level and type of regulation and required technology to reduce emissions.
- **USDA Economic Research Service's Resource Economics Division.** The Resource Economics Division requested input from the EPA Regions "to identify important issues . . . and knowledge gaps [that] currently limit debate or policy formulation." We highlighted the need for economic analyses of technologies to treat dairy manure, including both reductions of pollutants (VOCs, ammonia, methane, NOx, hydrogen sulfide, odors, and excess nitrogen, phosphorous and salts) and economically valuable products (e.g. fertilizer, compost and other organic soil amendments, bedding, and renewable energy).
- **Grants Reviews for Dairy Waste Treatment Projects**
  - **EPA Small Business Innovation Research grant program.** Funding came from EPA HQ; R9 helped review two proposals that were funded at \$70k each: (1) process to capture animal nutrients in fast-growing algae for use as fish feed, and (2) technology to rapidly analyze nitrate and nitrite concentrations in wastewater.
  - **North American Development Bank.** We reviewed four projects seeding \$11.5M. We do not yet know if these projects will be funded.

## **F. Implementation Projects**

- **Anaerobic Digesters.** There are approximately 12 anaerobic digesters currently operating on California dairies. These projects were funded by \$10M from the California legislature (SB5x), and are managed by California Energy Commission and the dairy industry. EPA AgSTAR provides technical assistance, and R9 provided \$60k for one digester. Several (3 to 6) more digesters are being built near Elk Grove with financial support from DMC partners (USDA Rural Development, department of Energy, and Sacramento Municipal Utilities District), and technical assistance from AgSTAR.
- **Denitrification in Reciprocating Ponds.** In places where manure contains more nutrients than can be utilized at agronomic rates on surrounding crop land, the excess nitrogen can be converted to inert,

volatile N<sub>2</sub> gas. The R9 Water Division awarded a CWA 104(b)3 grant of \$124K to Sustainable Conservation in partnership with the Tennessee Valley Authority to set up a manure denitrification system at the dairy operated by the California State University at Fresno. The project will be built in summer 2005, and will include demonstration and evaluation components.

- **Manure Lagoon Management.** USDA NRCS awarded a \$1M Conservation Innovation Grant, matched with \$1M in-kind services from the dairy industry, to California Dairy Campaign, an industry group, in collaboration with the environmental group Sustainable Conservation. The projects is looking especially at the role of purple sulfur bacteria and lagoon mixers. A multi-stakeholder oversight committee includes EPA R9 staff as well as DMC partners from USDA NRCS.
- **Co-Composting Dairy Manure and Urban Green Waste.** With \$40k from EPA R9 OSWER Innovations Pilot Grant, the City of Merced and the environmental group Sustainable Conservation co-composted dairy manure with urban green waste. Addition of manure to green waste resulted in compost with higher concentrations of nutrients (N increased 13%; P, K and S by 100%; organic matter by 25%), and no pathogens were detectable in the final product. There wee no data on emissions of ammonia and volatile organic compounds, which are air pollution problems associated with both dairy manure and compost. Co-composting was cost-effective if sources of dairy manure and compost buyers were both within 15 miles of the composting site. There are currently 16 permitted composting facilities in the Central valley that meet these criteria. Details on the web at <http://www.ciwmb.ca.gov/Organics/Farming/AgDemos/Manure.htm>