



ITRC PROJECT PROPOSAL:

CONFINED ANIMAL FEEDING OPERATIONS

PROPOSAL DATE:

5pm Eastern time on Monday, March 9, 2009.

Please use brief statements or bullet items to input the requested information.

Proposal Contacts:

Bart Faris, Environmental Scientist
Remediation Oversight Section
Ground Water Quality Bureau
New Mexico Environment Department
5500 San Antonio NE
Albuquerque, NM 87109
Phone: (505) 222-9521
Fax: (505) 222-9510
Bart.faris@state.nm.us

Dr. Yucheng Feng, Associate Professor of Soil Microbiology
Department of Agronomy and Soils
Auburn University, AL 36849
Phone: 334-844-3967
Fax: 334-844-3945
yfeng@auburn.edu

Robert Libra, State Geologist
Iowa Dept. of Natural Resources
Wallace Building, 502 East 9th Street
Des Moines, IA 50310-0034
Phone: 515-242-6488
Fax: 515-281-8895
Robert.Libra@dnr.iowa.gov

Dr. Eric Nuttall, Professor Emeritus
Chemical Engineering Department
University of New Mexico/Kleinfelder
1445 Honneysuckle, NE
Albuquerque, NM 87122
Phone: (505) 269-7840
Fax: (505) 344-1711
nuttall@unm.edu

Call for Proposals Topical Area

- **Confined animal feeding operations (CAFO)**
Impacts of waste from livestock facilities on air quality, surface water, and ground water and remedial/pollution control technologies for such waste.

Problem Statement (why is this project necessary and relevant to ITRC's purpose & mission¹?)

The relationship of CAFOs to runoff into rivers and streams has been widely studied. However, the impact that CAFOs may have on the nation's groundwater and air resources is largely unknown at this time. While some work has been done, national coordination of those efforts is limited, and distribution of that information is lacking. More significantly, limited information is available that details the appropriate steps to take if contamination due to a CAFO is suspected.

The barriers to making progress in managing CAFO wastes are primarily economic, application of new technologies for waste re-use (i.e. methane generation), and cultural resistance to regulations from this industry. This project would have to work to reduce those barriers.

Nutrient (primarily nitrates, chloride, total dissolved solids, ammonia and phosphates) and bacterial contamination are common contaminants associated with CAFOs. Pharmaceuticals are widely used in

¹ **ITRC Purpose:** To advance innovative environmental decision making
ITRC Mission: Develop information resources and help break down barriers to the acceptance and use of technically sound innovative solutions to environmental challenges through an active network of diverse professionals.

CAFOs to enhance production and may be identified also as contaminants. CAFOs are becoming a significant consideration in state water programs implementing Federal Total Daily Maximum Load (TMDL) requirements and groundwater protection and clean up requirements. Complaints regarding odors, vectors (i.e. flies), and dust from these operations are frequent and providing alternate management practices can reduce significantly these issues.

New technologies must be found that not only remediate wastes but recycle and reuse wastes to the maximum extent possible, approaching a “zero discharge” process. This CAFO proposal intends to also emphasize Green Technology given the great potential for CAFOs to turn their waste into profit through reuse and the production of alternative fuels and bioproducts. Sustainability of this reuse can be viewed as a renewable resource that provides for minimal environmental impacts along with alternative benefits that can be an economic incentive that is sustainable.

Proposed Scope to Address Problem (what is the approach for this project?)

The approach of this project is to explore and describe the current status of CAFOs and their known impact to the environment. This would include: identifying current state and federal regulations that apply to CAFOs; clearly describing media impacted by CAFOs (soil, ground and surface water, air), showing past impacts to the humans, environment, property, and ecology; listing all contaminants of concern for all media related to CAFOs; identifying the impacts of CAFO contamination to water supplies; evaluating the carbon emissions; and impacts to surface waters and eutrophication.

The data needs for a CAFO team would include: identifying regulatory requirements (federal and state) and describing how each program functions (i.e. stormwater permits, state groundwater permits); evaluating current assessment and remediation technologies at CAFOs, describing current and innovative pollution prevention methodologies; identifying all reuse and sustainable technologies appropriate for CAFOs; and listing all contaminants of concern and their impacts seen throughout the nation (NO_3^- , PO_4^{3-} , CH_4 , TDS, Cl, SO_4^{2-} , NH_4^+). Characteristics of COCs – like ISB doc.

Understanding CAFOs operators perspectives on their scope of problems is critical in developing usable and appropriate technology/methodology overview and guidance products that become successful. This would include their involvement and perspective to reduce barriers in complying and abiding with regulatory requirements.

Targeted Users (who will use products generated by this project?)

The primary users include state regulators, CAFO owners, and contractors remediating CAFO sites. Secondary audiences include federal regulators, USDA staff, state agricultural department staff, CAFO cooperatives and associations, and community action groups.

CAFOs include virtually every aspect of animal agriculture. CAFOs occur in every state. These include dairy farms, feed lots, stockyards, hog farms, and chicken farms. The “end user” of CAFO technology is typically a large operation of over 1000 animal units. However, smaller operations may benefit from the technologies developed for larger operations. There is a potential for power production from generation of methane gas that might interest the DOE biofuels program. Technologies developed to address nitrate contamination produced by CAFOs may overlap DOD and DOE facilities with nitrate contamination derived from explosives (i.e. nitroaromatics).

In 2007, ITRC POCs identified CAFO as the 6th highest ranking topic with 10 states declaring CAFO as a priority and two states as an emerging issue. In 2008, ITRC POCs identified CAFO as the 10th highest ranking topic with 10 states declaring CAFO as a priority and one state as an emerging issue. In 2006, a group of state regulators meet in Kansas City at EPA Region VI to discuss CAFO issues. States represented included: Nebraska, New Mexico, Iowa, Kansas, and Oklahoma. Additional states that have a high number of CAFOs include, but not limited too, Arkansas, California, North Carolina, Texas, Alabama, Indiana, Michigan, Maryland, Utah, Minnesota, Nevada, and Oregon (<http://www.state-cafos.org/>) .

Summary of Deliverables (primary project product(s))

This would be a three-phase project to examine the potential impact of, and response to, groundwater and air contamination that may be caused by CAFO operations. The first phase is to provide a technology/methodology overview document describing their monitoring programs and any significant findings, as well as a description of any assessment approaches and remedial technologies for potential CAFOs contaminants. This would include identifying any biofuels development using wastes generated from CAFOs. An additional overview document outlining the current status of biofuel development from CAFOs wastes and air impacts may be prepared.

The second phase is the development of a technical and regulatory guidance document that would include the characteristics and parameters to consider in assessing and selecting options to address sites. The document would list criteria that should be evaluated in responding to the detection of potential CAFO-related compounds in groundwater and air. The document will provide an analytical approach that defines and shapes potential remedial responses, if needed. The overview and guidance documents will provide stakeholders, state regulators, and the community with key information needed to address contaminant issues related to CAFOs.

The final phase is to translate the overview and guidance documents into a curriculum for internet-based training (IBT). IBT courses are an effective way to reach a large number of people at low cost.

Impact (how will this project result in more effective environmental decision making?)

A major outcome of the first year's effort would be to get the various groups together to identify specific problems and document case studies or emerging technologies that address potential solutions. These solutions would document the operation, cost and performance of project(s) that deal with CAFO wastes which demonstrate different innovative management approaches. Beyond this first task, a logical follow-on activity would be the identification of the various regulatory approaches used by each state and the potential impact of public perception on the project and development of a regulatory barriers/solutions document. This could result in multiple technology overview documents – likely focusing on various problems and potential solutions or each document could focus on one type of CAFO (say a cattle feedlot, dairy, or hog farm). Final phase work would involve the development of training/information and technology transfer materials about the subject project.

Any of the technologies to deal with CAFO wastes would have an immediate applicability in most states. While differences may exist between various state programs, a zero-wastewater discharge system to manage CAFO wastes - the ideal solution to CAFO wastes - could result in these operations being either less regulated, or would result in a streamlined permitting process in which the states would be able to demonstrate that they have a functionally equivalent permitting program.

There are two major precedents that would be set with this project: (1) getting traditionally diverse groups (such as agribusiness and state environmental agencies) to work cooperatively on developing a solution to CAFO wastes and (2) helping to develop a technology to deal with a major source of pollution which has typically been outside the scope of traditional ITRC remediation-related efforts. This second precedent would allow ITRC to move into other areas beyond activities regulated under RCRA and CERCLA programs and into the Clean Water Act, Clean Air Act, and other environmental statutes.

Overview documents will be used by the primary and secondary users identified above for a greater awareness of CAFO issues and their expected future increased scrutiny. Regulatory guidance documents and IBT would enhance and focus best management practices and remediation techniques and alternatives for all primary and secondary users in addition to providing a benefit to ITRC by including Ag-business as a partner and client.

Project Schedule

Year 1 – Team Formation and Technology/Methodology Overview Document Development: The team leader(s) will form a CAFO team through ITRC membership, professional contacts from all ITRC interested parties, that will include state and federal regulators, academia, community stakeholders, Ag-

business, and CAFO cooperatives. The team will identify specific waste-management problems (regulatory and technology) and compile case studies that address potential solutions. The team will confirm and/or modify this proposal's direction and establish specific products for this project. Initial team work will focus on a potential regulatory barriers/solutions document and on identification of case studies and emerging technologies which address these issues. A case studies document could be completed within the first year during this phase. The case studies could document the operation, cost and performance of innovative management and remediation projects that deal with CAFO wastes. It is anticipated that the CAFO team will conduct 2 annual meetings in conjunction with ITRC meetings, and hold monthly conference calls.

Year 2 – Draft Regulatory Barriers/Solutions Document: Write regulatory barriers/solutions document. Members of team prepare regulatory discussions in agreed-upon outline and timeframe. It is possible that this team will develop two such documents: one addressing the soil and groundwater contaminant issues and another addressing the air issues with solutions that include biofuels development. It is anticipated that the CAFO team will conduct 2 annual meetings in conjunction with ITRC meetings, and hold monthly conference calls.

Phase 3 (Year 3) – Finalize Regulatory Barriers/Solutions Document and Training Materials: Draft document will be distributed for internal/external peer reviews, redrafted based on comment, reviewed by points of contact, and finalized. Develop training materials to facility technology transfer through a workshop session at ITRC Meeting, internet training, or other appropriate state/industry organization with distribution of case studies and regulatory barriers/solutions documents. It is anticipated that the CAFO team will conduct 2 annual meetings in conjunction with ITRC meetings, and hold monthly conference calls. It is also anticipated that identified team members will participate in at least 1 meeting at a national CAFO Conference or workshop to provide distribution of documents and training.

Given that the CAFO Team will be comprised of many persons and organizations new to the ITRC, a key element of the CAFO Team will be developing working relationships among diverse parties, so a significant effort will likely be conducting facilitated meetings.

Proposed Personnel

Potential Team Membership/Needs

Proposed Team Leaders are Bart Faris of New Mexico Environment Department (NMED) and Marty Link of Nebraska Department of Environmental Quality (NEDEQ).

- Bart Faris is an Environmental Scientist with NMED's Ground Water Quality Bureau. He is a team leader of the Remediation Oversight Section with responsibilities to provide regulatory oversight of soil and groundwater contaminated sites. Bart has spent the last 15 years with NMED primarily addressing multiple contaminated sites in NM either through direct project management or staff supervision. CAFO contaminated sites are prominent in NM and Bart's team has taken the leading role in requiring assessment and remediation at these sites. Bart had previously been involved with ITRC leading the Enhanced InSitu Bionitrification Team and the InSitu Bio team in addition to being the Team Leader Liaison and Board Member. Bart has also spent 8 years in Latin America working in water resources, small plot farmer assistance, and urban garden projects. He has a BS in Soil and Water Science from the University of Arizona (1983).
- States showing interest in being team members at this point include: Nebraska, New Mexico, Iowa, Kansas, Arkansas, and Oklahoma. Members from these states have shown an interest in an ITRC CAFO team primarily from their past discussions with Bart Faris during the 2006 CAFO meeting in Kansas City.
- Other potential team members that have shown interest in a CAFO team include: emeritus professor from the University of New Mexico, and a professor from Auburn University, EPA representatives from Regions 6, 7, and 9, state agriculture departments from NM and OK, and industry from ag-chemical companies. Academia representatives are interested to contribute and better understand the ongoing national research and identify areas of need for future research. EPA representatives are interested to contribute and better understand the impacts of federal

regulations (ie. NPDES permits) related to CAFOs. State agriculture departments are interested since some of these departments regulate CAFOs under state statute and others may be in the future. Ag-chemical companies have shown interest to join the team since many supply equipment and materials to CAFOs and may have contaminant issues with the same constituents associated with CAFOs.

- The CAFO team members should include hydrogeologist, engineers, soil scientist, CAFO operators, agronomists, veterinarians, and co-op members.
- The CAFO team members required should include EPA, state, community, regulated, regulator, academia, ag industry, CAFO cooperative leaders, USDA, and CAFO policy makers.

Proposed In-Kind/Direct Project Funding

If additional resources (financial or in-kind personnel support) have been committed or may be available from outside entities, please contact ITRC Director Anna Willett at awillett@sso.org and reference this proposal. Information is not being requested in proposals so that proposals may be evaluated on content vs. solely on funding commitments.

Related Work:

This project may build on the efforts of the former In Situ Bioremediation team whose work addressed nitrates in groundwater. For monitoring information, the project may be able to get information from the Diffusion Samplers team, the Sampling, Characterization, and Monitoring team, the Diffusion/Passive Samplers team, Remediation Process Optimization team, and the Sampling, Characterization, & Monitoring team. Past ITRC team documents would benefit the CAFO team in such areas as ISB, EISBD, Constructed Wetlands, Accelerated Site Characterization, Mitigation Wetlands, and Risk Assessment Resources.

The new ITRC Green and Sustainable Remediations team states in part: “In order to minimize any negative impacts of application of a remediation system, we need to consider the process from a holistic perspective and not protect one medium or one receptor at the expense of another medium or another receptor.” Given the potential sustainability and Green reuse issues that the CAFO team will evaluate, the opportunity for coordinated sub-teams from the Green and CAFO teams could provide a new synergistic relationship between ITRC teams as an innovative approach to address overlapping issues.