

Written Testimony In Support of Dr. Robert T. Burns Testimony to the House Committee on Agriculture; Subcommittee on Conservation, Credit, Energy, and Research, Hearing on *The Administration and Delivery of Conservation Programs*.

## **Comments on USDA-NRCS Technical Assistance Delivery to US Farmers**

Document prepared by

Dr. Robert T. Burns, P.E.

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## **Overview of NRCS Conservation Program Technical Assistance Delivery**

The conservation program technical assistance provided by USDA-NRCS to US farmers has been and continues to be of critical importance to protecting the United States' soil, water, air, plant and wildlife resources. In addition, the assistance provided by USDA-NRCS has played a critical role in helping US farming remain economically viable while increasing environmental sustainability. The Natural Resources Conservation Service (NRCS) should be commended for their excellent work in delivering conservation programming to US farmers both past and present.

For most of its history, the NRCS has primarily depended on NRCS employees (with some assistance from state and county Resource Conservation & Development organizations) to deliver conservation program delivery to farmers. Beginning around 2000, the NRCS implemented a new approach that began the use of third party technical service providers (TSPs) to also provide conservation program delivery to farmers. Under the current program structure, farmers can elect to receive conservation program technical assistance from either Conservation District (county level) NRCS employees or independent TSPs.

The third party TSP program has been operational for a decade now. In many ways it has been successful, but it has also faced many challenges, some of which continue to limit the effectiveness of the program. I have been involved in assisting NRCS with Conservation Program technical assistance delivery for the past decade. Specifically I have worked with NRCS on Comprehensive Nutrient Management Planning (CNMP) delivery. I have led state and national programs that certified third party TSPs for USDA in the CNMP area, as well as provided CNMP training to NRCS employees.

While I commend NRCS on their excellent work regarding CNMP implementation, and other conservation programs, I respectfully offer the following observations and suggestions that I believe could be of assistance in further improving the effectiveness of USDA-NRCS conservation program delivery.

## **Suggestions for Improved Delivery of Conservation Programming Technical Assistance**

### **Increased Consistency Needed Between NRCS Policy at the National, State and County Levels**

The current interpretation and implementation of NRCS conservation program delivery could be improved by reducing NRCS policy inconsistencies at the national, state and county levels. Because of these existing policy inconsistencies, third party TSPs encounter different certification and qualification requirements in different areas, the standards and format of conservation programming deliverables varies by location, and the type and quality of assistance that farmers receive is highly variable by location.

### ***NRCS Should Implement a National Certification Policy Review Committee That Reviews Deviations from the National Policy by State NRCS Offices***

The current Farm Bill indicates that NRCS should establish a national certification policy in regards to qualifying third party TSPs to be eligible to receive USDA funds for providing conservation practice technical assistance. While a national certification policy does exist, in reality it is not enforced at the state NRCS office level. Many state NRCS offices have established either different or additional certification criteria that do not follow the national policy. The result is that TSPs must follow the state NRCS policies if they wish to work in these states. The number of state NRCS office that have developed policies that do not comply with the national policy has increased over the past few years. From 2003 to 2010, I led a TSP CNMP Certification program that was recognized as meeting the national USDA CNMP

certification requirements under a Memorandum of Understanding (MOU) with NRCS. As a service to TSPs, my team tracked states where the state NRCS policy was in conflict with the national NRCS policy. Over the past few years, the number of states that do not follow the national NRCS policy has continued to increase. By 2009, a dozen states did not follow the national NRCS CNMP certification policy. Of a greater concern, is the fact that NRCS at the national level does not track or approve the deviations from national policy that are occurring at the state level. In October, 2009 the USDA-NRCS developed new TSP Certification requirements for the CNMP areas that are documented within NRCS's "General Manual Title 190 Part 405.11". These new requirements replaced the "General Manual Title 180 Part 490.10" requirements. The new NRCS Title 190 Part 405.11 policy states that "in addition to the general requirements, the State Conservationist will establish certification requirements specific to elements of a CNMP." I believe that the wording in the new Title 190 Part 405.11 policy could result in even more state NRCS offices developing policies in conflict with the national NRCS certification policy.

The lack of adherence to the national NRCS policy by at least a dozen state NRCS offices, coupled with a new policy that provide the state NRCS offices more latitude in deviating from the national NRCS CNMP certification policy (without any tracking or approval at the national level) makes it unrealistic for any third party group to offer a workable national TSP certification program for TSPs at this time.

**The NRCS should implement its current national TSP certification policy and effectively ensure that state NRCS offices comply. In addition, a national TSP Certification Policy Review Committee should be established that tracks state NRCS TSP policy, and in a timely manner reviews and either approves or disapproves any deviations from the national policy requested by state NRCS offices.**

### *TSP Qualification Requirements Should be Streamlined to Reduce the Time Burden Required of TSPs to Gain and Maintain Certification*

Due to the lack of uniformly implemented national TSP certification requirements, and a lack of oversight of state NRCS TSP certification and qualification requirements at the national NRCS level, TSPs currently face an ever changing set of certification requirements to remain qualified to receive USDA funds for their efforts. In many cases, TSPs are required to meet redundant qualification requirements and trainings in different states (many times states within the same region) to work in each state. The current lack of meaningful state NRCS policy oversight by NRCS at the national level in regards to TSP certification results in each state NRCS office developing independent (and many times duplicative) requirements. The current environment is one where state NRCS offices continue to add new requirements such that qualified and certified TSPs must continually spend unrealistic amounts of time and money to maintain the ability to serve as TSPs. This has resulted in many qualified third-party consultants electing to either not serve as a TSPs, or electing to stop maintenance of their TSP certification as the certification requirements become too burdensome.

In addition, the current NRCS certification policies assume that all TSPs have equal skill and experience and the current system requires that all TSPs complete all certification steps regardless of experience. A more flexible certification policy that allowed TSPs with higher experience levels decreased requirements would help streamline the TSP certification process without sacrificing the quality of deliverables.

**A national NRCS TSP Certification Policy Review Committee should be established that is charged with reviewing both national and state NRCS TSP certification policy, with the goal of reducing unnecessary or duplicative TSP certification requirements.**

### *Clear and Specific Standards for Conservation Programming Technical Assistance Should be Established to Ensure Similar Quality Deliverables are being Provided by NRCS Employees and TSPs*

In working with CNMP preparation across the United States, it has become very apparent to me that the quality of CNMPs being prepared by both NRCS employees and third party TSPs vary considerably. While there is a large variation in the quality of plans being prepared by different NRCS employees and different TSPs, it is my experience that generally the quality of CNMPs prepared by TSPs is higher than that of CNMPs being prepared by NRCS employees.

The current national NRCS CNMP guidance is essentially a listing of the components that should be included in a CNMP, with no specific guidance on how these components should be prepared. While it is true that every state is unique, the basic components that should be included in a CNMP are national in nature. All farmers, regardless of location, deserve to be provided the highest quality conservation program technical assistance that can be provided by USDA. This is true whether the assistance is provided by NRCS employees or third party TSPs.

**The national level NRCS should establish clear and specific conservation program assistance examples that meet the minimum quality requirements across the nation. Specifically, meaningful example CNMPs should be established for beef, dairy, swine, layer and broiler enterprises that establish minimum content and quality levels.**

### Improved Follow-up and Assistance with Conservation Planning Implementation

Technical assistance with conservation programs, whether provided by NRCS employees or third party TSPs, is planning assistance. Many times there is a disconnect between preparing the plan and implementing the plan at the farm level that is never bridged. In my opinion this is a larger issue for conservation planning assistance provided by TSPs for the simple reason that no funds are currently provided to TSPs for continued plan follow-up.

### *Funds Should be Made Available to Cover the Cost of Follow-up by TSPs to Assist Producers With Planned Conservation Programming Implementation*

Conservation planning assistance that is not implemented, or not implemented correctly fails to provide the planned conservation benefits. In many cases TSPs develop plans that are not implemented at all, or not implemented as planned on the farm. Continued interaction and follow-up by the plan provider and the farmer increases the probability that conservation planning assistance will be implemented in an effective and timely manner. Currently TSPs are not provided with funds to complete meaningful post planning follow-up regarding plan implementation.

**Funds should be made available to cover the cost of providing extended follow-up assistance with conservation planning implementation to farmers who have received conservation planning technical assistance.**

Committee on Agriculture  
U.S. House of Representatives  
Required Witness Disclosure Form

House Rules\* require nongovernmental witnesses to disclose the amount and source of Federal grants received since October 1, 2007.

Name: ROBERT BURNS  
Address: 120 MORGAN HALL, 2621 MORGAN CIRCLE KNOXVILLE, TN 37996  
Telephone: 865-974-7112  
Organization you represent (if any): \_\_\_\_\_

1. Please list any federal grants or contracts (including subgrants and subcontracts) you have received since October 1, 2007, as well as the source and the amount of each grant or contract. House Rules do **NOT** require disclosure of federal payments to individuals, such as Social Security or Medicare benefits, farm program payments, or assistance to agricultural producers:

Source: USDA-NRCS CIG Grant Amount: \$812,998 *BURNS WAS CO-PI*  
Source: \_\_\_\_\_ Amount: \_\_\_\_\_

2. If you are appearing on behalf of an organization, please list any federal grants or contracts (including subgrants and subcontracts) the organization has received since October 1, 2007, as well as the source and the amount of each grant or contract:

Source: \_\_\_\_\_ Amount: \_\_\_\_\_  
Source: \_\_\_\_\_ Amount: \_\_\_\_\_

Please check here if this form is NOT applicable to you: \_\_\_\_\_

Signature: *Robert Burns*

\* Rule XI, clause 2(g)(4) of the U.S. House of Representatives provides: *Each committee shall, to the greatest extent practicable, require witnesses who appear before it to submit in advance written statements of proposed testimony and to limit their initial presentations to the committee to brief summaries thereof. In the case of a witness appearing in a nongovernmental capacity, a written statement of proposed testimony shall include a curriculum vitae and a disclosure of the amount and source (by agency and program) of each Federal grant (or subgrant thereof) or contract (or subcontract thereof) received during the current fiscal year or either of the two previous fiscal years by the witness or by any entity represented by the witness.*

PLEASE ATTACH DISCLOSURE FORM TO EACH COPY OF TESTIMONY.

## Curriculum Vitae

**Robert Thomas Burns, Ph.D., P.E.**

120 Morgan Hall  
Knoxville, TN 37996  
Phone (865)-974-7112

fax: (865)-974-1068  
email: rburns@utk.edu  
Skype ID: rtburns

**Education**

**Ph.D. in Civil Engineering.** Environmental Engineering specialization. University of Tennessee, Knoxville. May 1995.

**M.S. in Environmental Engineering.** Air Quality Management/Pollution Control concentration with a minor in mixed waste management. University of Tennessee, Knoxville. May 1992.

**B.S. in Agricultural Engineering.** Soil and Water Conservation concentration. University of Tennessee, Knoxville. May 1990.

**Professional Experience:**

**Assistant Dean & Professor, University of Tennessee.** Assistant Dean in charge of Agriculture, Natural Resources and Resource Development faculty and programming within the University of Tennessee Extension Service. 100% administrative appointment July, 2010 - Present.

**Professor, Iowa State University.** Joint appointment between extension (55% appointment) and research (45% appointment). Manure management specialization with national and statewide extension responsibility. Associate Professor; August, 2004 – June 2009. Professor; July, 2010.

**National Conservation Engineer, USDA-NRCS.** Six month assignment as a National Conservation Engineer within the Conservation Engineering Division at the Washington, DC National Headquarters office of the United States Department of Agriculture Natural Resources Conservation Service. May 15 – November 15, 2006.

**Associate Professor, University of Tennessee, Knoxville.** Joint appointment between The Tennessee Agricultural Extension Service (70% appointment) and The Tennessee Agricultural Experiment Station (30% appointment). Environmental engineering specialization, including the design of animal waste management systems and nutrient management planning for livestock and poultry operations. July, 2000 – July, 2004.

**Assistant Professor, University of Tennessee, Knoxville.** Tennessee Agricultural Extension Service Water Quality Specialist, 100% Extension service appointment from June 1995 - 1998. Joint appointment (70% extension and 30% research) from 1998 - July, 2000.

**Research Associate, University of Tennessee, Knoxville.** Civil & Environmental Engineering Air Pollution Control Laboratory. Full-time staff position. Worked directly with EPA and TDEC with the preparation of air pollutant emission inventories and modeling of ozone formation. 1992 - 1995.

**Environmental Engineer, Sverdrup Technology Inc., Tullahoma, Tennessee.** Responsible for identifying and classifying waste streams, and monitoring RCRA 90 day hazardous waste storage facility. Maintained Sverdrup air permits at Arnold Engineering Development Center facility. 1992.

**Research Assistant, University of Tennessee, Knoxville.** Civil & Environmental Engineering Air Pollution Control Laboratory. Developed stationary and mobile source volatile organic compound (VOC) and nitrous oxide (NOx) air pollutant emissions inventories as part of the Tennessee State Implementation Plan for ozone non-attainment. 1990 - 1992.

**Farm Manager, Nora Davis Farm, Walland, Tennessee.** Responsible for the day to day management of a cow-calf operation in East Tennessee. Responsible for the wellbeing of 200 Black Angus brood cows and associated calves plus the production of all hay and forage required for the cattle as well as the production of burly tobacco and corn on the farm and maintenance of 10 horses. 1986 - 1990.

**Professional Registration:**

Registered Professional Engineer in Tennessee (P.E. # 102322)

USDA - NRCS Certified Technical Service Provider for CNMP Plan Development

**Publications:****Refereed Journal and Research Articles**

\* Graduate student under supervision of R.T. Burns as major professor

† Staff member employed by or under direct supervision of R.T. Burns

32. Spajić, R. \*, **R.T. Burns**, L.B. Moody, D. Kralik, V. Poznić, G. Bishop. 2010. Croatian food industry by-products: co-digestion with swine manure vs. use as liquid animal feed *Transactions of the ASABE*. (In Press). Burns is Major Professor of lead author.
31. Andersen, D.S. \*, **R.T. Burns**, L.B. Moody<sup>†</sup>, M. J. Helmers, R. Horton. 2010. Comparison of the Iowa State University-Effluent Limitation Guidelines Model with the Soil-Plant-Air-Water Model to describe Holding Basin Performance. *Transactions of the ASABE*. (In Press). Burns is Major Professor of lead author.
30. Wu-Haan W. \*, **R.T. Burns**, L.B. Moody<sup>†</sup>, D. Grewell and D.R. Raman. 2010. Evaluation of ultrasonic pretreatment on anaerobic digestion of different animal manures. *Transactions of the ASABE* (In Press). Burns is Major Professor of lead author.
29. Wu-Haan W. \*, **R.T. Burns**, L.B. Moody<sup>†</sup>, C.J. Hearn, D. Grewell. 2010. Characterization of ultrasonic pretreatment on biogas production potential from corn ethanol by-products. *Transactions of the ASABE* (In-Press). Burns is Major Professor of lead author.
28. Li, H., Xin, H., S. Li and **R.T. Burns**. 2009. Technical Note: Upstream vs. Downstream Placement of FANS Device to Determine Ventilation Fan Performance *In Situ*. *Transactions of the ASABE*. Vol. 52(6):2087-2090.
27. Gates, R.S., K.D. Casey, H. Xin and **R.T. Burns**. 2009. Building Emissions Uncertainty Estimates. *Transactions of the ASABE*. Vol. 52(4):1345-1351.
26. Xin, H., H. Li, **R. T. Burns**, R. S. Gates, D. G. Overhults, J. W. Earnest. 2009. Use Of CO<sub>2</sub> Concentration Difference Or CO<sub>2</sub> Balance To Assess Ventilation Rate Of Broiler Houses. *Transactions of the ASABE*. Vol. 52(4):1353-1361.
25. Shepherd, T.A., **R.T. Burns**, L.B. Moody<sup>†</sup>, D.R. Raman, K.J. Stalder. 2009. Development Of A Bench-Scale Air Sparged Continuous Flow Reactor For Struvite Precipitation From Two Different Liquid Swine Manure Storage Systems. *Applied Engineering in Agriculture*. 25(3):In-Press. Burns is Major Professor of lead author.
24. Shepherd, T.A. \*, **R.T. Burns**, D.R. Raman, L.B. Moody<sup>†</sup>, K.J. Stalder. 2009. Performance of a Pilot-Scale Air Sparged Continuous Flow Reactor and Hydrocyclone for Struvite Precipitation and Removal from Liquid Swine Manure. *Applied Engineering in Agriculture*. Vol. 25(2):257-267. Burns is Major Professor of lead author.
23. Shepherd, T.A. \*, **R.T. Burns**, L.B. Moody<sup>†</sup>, D.R. Raman, K.J. Stalder. 2009. Investigating Conductivity to Predict Magnesium Addition Requirements for Struvite Precipitation in Swine Manure Slurries. *Applied Engineering in Agriculture*. Vol. 25(1):103-108 Burns is Major Professor of lead author.
22. Moody, L.B.<sup>†</sup>, **R.T. Burns** and K.J. Stalder. 2009. Effect of Anaerobic Digestion on Manure Characteristics for Phosphorus Precipitation from Swine Waste. *Applied Engineering in Agriculture*. Vol. 25(1):97-102.
21. Li, H., Xin, H., Liang, Y and **R.T. Burns**. 2008. Effects of Topical Application of Zeolite, Al<sup>+</sup>Clear, Ferix-3 or PLT on Reduction of Ammonia Emissions from Stored Laying-Hen Manure. *Journal of Applied Poultry Research*. (In Press).
20. L.B. Moody<sup>†</sup>, H. Li<sup>†</sup>, **R.T. Burns**, H. Xin, R. Gates, S.J. Hoff, and D.G. Overhults. 2008. *Southeastern Broiler Gaseous and Particulate Matter Emissions Monitoring Quality Assurance Project Plan*. Published as Special ASABE peer reviewed publication. 289 pages. ASABE. St. Joseph, MI.
19. **Burns, R. T.**, and D. R. Raman. 2008. Animal Waste Management. In *Encyclopedia of Agricultural, Food, and Biological Engineering*, Heldman, D., Ed.; Taylor & Francis Group, LLC: Florida. 3 pages (In Press)
18. **Burns, R. T.**, and D. R. Raman. 2008. Animal Waste Treatment. In *Encyclopedia of Agricultural, Food, and Biological Engineering*, Heldman, D., Ed.; Taylor & Francis Group, LLC: Florida. 5 pages. (In Press)

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16. Trabue S., K. Scoggin, H. Li<sup>†</sup>, **R. Burns**, and H. Xin. 2008. Field Sampling Method for Quantifying Odorants in Humid Environments. *Environmental Science and Technology*. 42(10): 3745-3750.
15. Trabue S., K. Scoggin, F. Mitloehner, H. Li<sup>†</sup>, **R. Burns**, and H. Xin. 2007. Field Sampling Method for Quantifying Volatile Sulfur Compounds Emitted from Animal Feeding Operations. *Atmospheric Environment*. 42 (14): 3332-3341.
14. Zitomer, D.H., **R.T. Burns**, M. Duran and D.S. Vogel. 2007. Effect of Sanitizers, Rumensin, and Temperature on Anaerobic Digester Biomass. *Transactions of the ASABE*. 50 (5):1807-1813.
13. Zhu, Z., H. Xin, H. Li<sup>†</sup>, **R.T. Burns** and H. Dong. 2007. Assessment of in-line filter type and condition on ammonia adsorption, *Transactions of the ASABE*. 50 (5): 1823-1830.
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11. Oh, H.I., J.H. Lee, B.H. Choi, N.S. Myung, and **R.T. Burns**. 2006. Recovery of Phosphorous in Animal Wastewater by Struvite Forming. *The Korean Society for Agricultural Machinery*. 31(1) : 46-51.
10. Oh, I.H., **R. T. Burns** and J. Lee. 2005. Optimization Of Phosphorus Partitioning In Dairy Manure Using Chemical Additives with A Mechanical Solids Separator. *Transactions of the ASAE*. 48(8): 1235-1240.
9. Mayhew, C. R., D. R. Raman, R. R. Gerhardt, **R. T. Burns**, and M.S. Younger. 2004. Periodic Draining Reduces Mosquito Emergence from Free-water Surface Constructed Wetlands. *Transactions of the ASAE*. 47(2): 567-573.
8. Raman, D. R., E. L. Williams, A. C. Layton, **R. T. Burns**, J. P. Easter, A. S. Daugherty, G. S. Sayler, and M. D. Mullen. 2003. Estrogen content of dairy and swine wastes. *Environmental Science & Technology*. 38(13): 3567-3573.
7. Oh, I.H., J. Lee and **R. T. Burns**. 2003. Development and Evaluation of a Multi-Hose Slurry Applicator for Rice Paddy Fields. *Applied Engineering in Agriculture*. 20(1): 101-106.
6. Edens, W. C., L. O. Pordesimo, L. R. Wilhelm, and **R. T. Burns**. 2003. Energy use analysis of the major milking center components at a dairy experiment station. *Applied Engineering in Agriculture*. 19(6): 711-716.
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2. Hawkins, G. L., D. R. Raman, **R. T. Burns**, R. E. Yoder, and T. L. Cross. 2001. Enhancing Dairy Lagoon Performance with High-Rate Anaerobic Digesters. *Transactions of the ASAE* . 44(6):1825-1831.
1. Freeland, R.S., J.C. Regan, **R.T. Burns**, and J.T. Ammons. 1998. Sensing Perched Water using Ground-penetrating Radar - A Critical Methodology Examination. *Applied Engineering in Agriculture*. 14(6): 675-681.

**Conference Proceedings and Meeting Technical Papers**

\* Graduate student under supervision of R. T. Burns as major professor

<sup>†</sup> Staff member employed by or under direct supervision of R. T. Burns

91. Development of a Wireless Sensor Network to Quantify Hydrogen Sulfide Concentrations in Swine Housing. 2009. Swestka, R. \*, **R.T. Burns**, L. Tong, S. Hoff, H. Li, N. Keren, H. Xin, R. Spajic, R. Muhlbauer. *Proceedings of the 2009 ASABE International Meeting*. Paper number 096640, Reno, Nevada, June 21 - June 24, 2009.

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89. Spajic, R. \*, **R.T. Burns**, L.B. Moody, D. Kralik, V. Poznic, G. Bishop. 2009. Anaerobic Digestion of Swine Manures with Different Types of Food Industry Waste. *Proceedings of the 2009 ASABE International Meeting*. Paper number 097209, Reno, Nevada, June 21 - June 24, 2009.
88. Bishop, G. †, **R. T. Burns**, T. Shepherd, L. Moody, C. Gooch, R. Spajic. 2009. Evaluation of Laboratory Biochemical Methane Potentials as a Predictor of Anaerobic Dairy Manure Digester Biogas and Methane Production. *Proceedings of the 2009 ASABE International Meeting*. Reno, Nevada, June 21 - June 24, 2009.
87. Stinn, J. †, D. Andersen, **R.T. Burns**, L. Moody. 2009. Modification of the Iowa State University-Vegetative Treatment Area Model. *Proceedings of the 2009 ASABE International Meeting*. Reno, Nevada, June 21 - June 24, 2009.
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85. Muhlbauer, E. †, **R.T. Burns**, L. Moody, R. Spajic. 2009. A Review of Available Resources on Anaerobic Digestion Technologies. *Proceedings of the 44<sup>th</sup> Croatian & 4<sup>th</sup> International Symposium on Agriculture 2009*. February 15-19, 2009.
84. Moody, L. †, **R.T. Burns**, Wu-Haan, W. 2009. Use of Biochemical Methane Potential (BMP) Assays for Design and Enhancement of Anaerobic Digesters. *Proceedings of the 44<sup>th</sup> Croatian & 4<sup>th</sup> International Symposium on Agriculture 2009*. February 15-19, 2009.
83. Spajic, R. \*, **R.T. Burns**, L. Moody, D. Kralik. 2009. Anaerobic Digestion System Selection for Croatian Swine Manures. *Proceedings of the 44<sup>th</sup> Croatian & 4<sup>th</sup> International Symposium on Agriculture 2009*. February 15-19, 2009.
82. **Burns, R.T.** Air Emissions from Broiler Houses. 2008. *Proceedings of the 2008 National Poultry Waste Management Symposium*. October 21-23, 2008. Des Moines, IA. 7 pages.
81. Li, H., H. Xin, **R.T. Burns**. Air Emissions from Turkey Houses. 2008. *Proceedings of the 2008 National Poultry Waste Management Symposium*, October 21-23, 2008. Des Moines, IA. 6 pages.
80. **Burns, R.T.**, H. Li, L. Moody †, H. Xin, R. Gates, D. Overhults, and J. Earnest. 2008. Quantification of Particulate Emissions from Broiler Houses in the Southeastern United States. *Proceedings of the Eighth International Livestock Environment Symposium*. August 31-September 4, 2008. Iguassu Falls, Brazil. 9 pages.
79. Amaral, M.F.P., R.S. Gates, D.G. Overhults, I.F.F. Tinoco, H. Li, **R.T. Burns**, H. Xin, and J.W. Earnest. 2008. Analysis of Different Methods to Compute Ammonia Concentration and Emission Rate. *Proceedings of the Eighth International Livestock Environment Symposium*. August 31-September 4, 2008. Iguassu Falls, Brazil. 9 pages.
78. Li, H., H. Xin, **R.T. Burns**, S.J. Hoff, J.D. Harmon, L.D. Jacobson, and S.L. Noll. 2008. Effects of Bird Activity, Ventilation Rate and Humidity on PM<sub>10</sub> Concentration and Emission Rate of Turkey Barn. *Proceedings of the Eighth International Livestock Environment Symposium*. August 31-September 4, 2008. Iguassu Falls, Brazil. 6 pages.
77. Roberts, S. A., H. Li, **R.T. Burns**, and K. Bregendahl. 2008. Effects of Dietary Modification on Laying Hens in High Rise Houses: Part II- Hen Production Performance. *Proceedings of the Eighth International Livestock Environment Symposium*, August 31-September 4, 2008. Iguassu Falls, Brazil. 5 pages.
76. Li, H., H. Xin, **R. T. Burns**, S. A. Roberts, and K. Bregendahl. 2008. Effects of Dietary Modification on laying Hens in High-Rise House Emissions of Ammonia, Hydrogen Sulfide, and Carbon Dioxide. *Proceedings of the Eighth International Livestock Environment Symposium*, August 31-September 4, 2008. Iguassu Falls, Brazil. 8 pages.
75. Gates, R.S., K. D. Casey, H. Xin, **R. T. Burns**, H. Li. 2008. Uncertainty Analysis in Animal Building Aerial Emissions Measurements. *Proceedings of the Eighth International Livestock Environment Symposium*. August 31-September 4, 2008. Iguassu Falls, Brazil. 6 pages.

**Conference Proceedings and Meeting Technical Papers (Continued):**

74. Moore, P.A., Jr., D.M. Miles, **R.T. Burns**, D. H. Pote, and W. K. Berg. 2008. Evaluation of Ammonia Emissions from Broiler Litter. *Proceedings of the Eighth International Livestock Environment Symposium*. August 31-September 4, 2008. Iguassu Falls, Brazil. 8 pages.
73. Li, H., H. Xin, **R. Burns**, S. Hoff, J. Harmon, L. Jacobson, S. Noll, J. Koziel. 2008. Ammonia and PM Emissions from a Tom Turkey Grow-out Barn in Iowa. *Paper number 084425, 2008 ASABE International Meeting*. June 29-July 2, 2008. Providence, Rhode Island. 14 pages.
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\* Graduate student under supervision of R.T. Burns as major professor

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25. **Burns, R.T.** 2007. Swine Manure Storage and Handling Practices to Minimize Odors. National Pork Board Publication # 04803-03/07.
24. **Burns, R.T.** 2007. Swine Land Application Practices to Minimize Odors. National Pork Board Publication # 04805-05/07.
23. **Burns, R.T.**, L.B. Moody <sup>†</sup>. 2007. Comprehensive Nutrient Management Planning For Your Pork Production Operation. Pork Information Gateway. [Http://Pork.Porkgateway.Org/](http://Pork.Porkgateway.Org/)

**Extension Service Publications (Continued) :**

22. Anderson, R, **R.T. Burns**, L.B. Moody<sup>†</sup>, G. Brann, G. Grandle, F.R. Walker, G. Moore, And D. Tapp. 2002. Comprehensive Nutrient Management Plan for The Barr Dairy Farm; Example CNMP for the UT CNMP Certification Program. UT Agricultural Extension Service. 60 pages.
21. **Burns, R.T.** 2001 Alternative Livestock Watering Systems. Conservation Practices for the Farms and Forests of Tennessee. UT Agricultural Extension Service. Pages 45 - 46.
20. **Burns, R.T.** 2001. Liquid Manure Storage Structures. Conservation Practices for the Farms and Forests of Tennessee. The UT Agricultural Extension Service. Pages 49 - 50.
19. **Burns, R.T.** and C. Goan. 2001. Manure and Litter Land Application. Conservation Practices for the Farms and Forests of Tennessee. Knoxville, Tennessee. UT Agricultural Extension Service. Pages 45 – 46.
18. **Burns, R.T.** 2001. Protected Heavy-Use Areas. Conservation Practices for the Farms and Forests U of Tennessee. Knoxville, Tennessee. UT Agricultural Extension Service. Pages 63-64.
17. **Burns, R.T.** 2001. Stream Crossings. Conservation Practices for the Farms and Forests of U of Tennessee. Knoxville, Tennessee. UT Agricultural Extension Service. Pages 67 – 68.
16. **Burns, R.T.** 2001. Selection of Beef Watering Systems. University of Tennessee Agricultural and Biosystems Engineering Extension Publication. WQS–01-01.
15. **Burns, R.T.** and L.B. Moody<sup>†</sup>. 2001. Press Tech Agri-Press 600 solids separator performance test results using The University of Tennessee testing protocol. University of Tennessee Agricultural and Biosystems Engineering Extension Publication. AWM–01-01.
14. **Burns, R.T.** and L.B. Moody<sup>†</sup>. 2001. Vincent KP-6L solids separator performance test results using The University of Tennessee testing protocol. University of Tennessee Agricultural and Biosystems Engineering Extension Publication. AWM–01-02.
13. **Burns, R.T.** 2000. Using Incinerators for Poultry Mortality Management. University of Tennessee Agricultural and Biosystems Engineering Extension Publication AWM –01-00.
12. Walker, F.R. and **R.T. Burns**. 2000. Treating Broiler Litter with Alum. P&SS IS # 318.
11. **Burns, R.T.** and M.J. Buschermohle. 1999. Selection of Alternative Livestock Watering Systems. University of Tennessee Extension Publication PB1641.
10. Buschermohle, M.J. and **R.T. Burns**. 1999. Solar Livestock Watering Systems. University of Tennessee Extension Publication PB1640.
9. **Burns, R.T.**, F.R. Walker and H.J. Savoy. 1999. Nutrient Management Plan Assistance Guide for Tennessee Class II Concentrated Animal Feeding Operation Permit. University of Tennessee Agricultural Extension Service Publication PB 1635.
8. Eash, N.S., J. McClurken and **R.T. Burns**. 1998. Best Management Practices for Land Application of Biosolids. University of Tennessee Agricultural Extension Publication SP500.
7. **Burns, R.T.** 1998. Basic Filtration for Micro-Irrigation Systems. University of Tennessee Agricultural and Biosystems Engineering Extension Publication IR-01-98.
6. **Burns, R.T.** 1998. Basic Fertigation for Micro-Irrigation Systems. University of Tennessee Agricultural and Biosystems Engineering Extension Publication IR-02-98.
5. Eash, N.S. and **R.T. Burns**. Cryptosporidium Contamination of Water. 1996. University of Tennessee Agricultural Extension Publication SP465-A.
4. Turner, L., R. Bowling, **R.T. Burns**, M. Buschermohle, W. Crist, G. Grandle, S. Isaacs, P. Scharko, and J. Taraba. 1996. Farmstead Planning. *Chapter 3 - Sustainable Dairy Systems Manual*. SARA / ACE Project. The University of Tennessee Agricultural Extension Service.
3. Taraba, J., R. Bowling, **R.T. Burns**, T. Cross, S. Isaacs and M. Williams. 1996. Manure Management. *Chapter 10 - Sustainable Dairy Systems Manual*. Southern Region SARA / ACE project. The University of Tennessee Agricultural Extension Service.
2. **Burns, R.T.** and J.B. Wills. 1996. Assessing your Petroleum Product Storage. Tennessee Farm-A-Syst Factsheet. University of Tennessee Agricultural Extension Publication SP484G.
1. **Burns, R.T.** and J.B. Wills. 1996. Assessing your Hazardous Waste Management. Tennessee Farm-A-Syst Factsheet. University of Tennessee Agricultural Extension Publication SP484H.

**Extension Training Manuals**

\* Graduate student under supervision of R.T. Burns as major professor

† Staff member employed by or under direct supervision of R.T. Burns

27. **Burns, R.T.**, L.B. Moody<sup>†</sup>, B. Kintzer, A. Mills, M. Kingland, L. Krom, W. Lazarus, N. McDonald, B. Moffatt, D. Nemke, J. Pankonie, S. Subler, C. Voell, J. Van Voorhis, A. Wedel. 2009. Energy Production from Anaerobic Digestion of Dairy Manure. Manual for use with the September 28-29, 2009 Short-course held in Madison Wisconsin.
26. **Burns, R.T.**, L.B. Moody<sup>†</sup>, B. Kintzer, M. Sexton, J. Ferrando. 2009. *Understanding and Working with Nutrient Management Plans Under the CAFO Final Rule*. Manual for use with April 9, 2009 Short-course held in Des Moines, IA.
25. **Burns, R.T.**, L.B. Moody<sup>†</sup>, B. Kintzer, S. Mukhtar, M. Sexton, J. Ferrando, R. Rouse. 2009. *Writing NPDES Permits that Include Nutrient Management Plan Terms – Special Training for the US EPA*. February 2 – 4, 2009. Kansas City, Kansas
24. **Burns, R.T.**, L.B. Moody<sup>†</sup>, B. Kintzer, S. Mukhtar, N. Rector, A. Sutton, , M. Sexton, 2009. *Comprehensive Nutrient Management Plan Development Manual* for use with April 6-8, 2009 CNMP Short-course held in Des Moines, IA.
23. **Burns, R.T.**, L.B. Moody<sup>†</sup>, B. Kintzer, S. Mukhtar, G. Grandle, R. Gates, N. Rector, G. Erickson, D. Hickman, R. Hodupp, B. Moffatt, M. Sexton, 2008. *Comprehensive Nutrient Management Plan Development Manual* for use with Feb. 25-27, 2008 CNMP Short-course held in Louisville, KY.
22. **Burns, R.T.**, B. Kintzer, D.A. Hartman, D.W. Anderson, A. Mills, D. Berger, V Dobbs, J. Haelzle, L. Hice, J. Pankonie, C.L. Rodgers, S. Gill, T. Gidda. 2008. *Liners and Covers for Agricultural Waste Storage Manual* for use with March 25-27, 2008 Short-course held in Fresno, CA.
21. **Burns, R.T.**, R. Kanwar, L. B. Moody<sup>†</sup>, B. Kintzer, J. Beddoes, E. Becerra. 2007. *Manure Management for Water Quality Protection: Training Workshop for Romania Farmers and Farm Advisors Manual* used for May 11, 2007 Short-course in Timisoara, Romania
20. **Burns, R.T.**, T. Mitev, L.B. Moody<sup>†</sup>, R. Kanwar, B. Kintzer, J. Beddoes, E. Becerra. 2007. *Developing Environmentally Sustainable Animal Production Systems: Training Workshop for Bulgarian Farm Advisors Manual* used for May 8, 2007 Short-course at Trakia University in Bulgaria
19. **Burns, R.T.**, B. Kintzer, A. Mills, R.P. Anex, M.J. Casper, P.C. Flynn, J. Going, T. Matthews, D. Miller, M. O'Neil, J.M. Scott, S. Sung, D.E. Totzke, P. Wright. 2007. *Anaerobic Treatment of Agricultural Wastes Manual* for use with May 21-22, 2007 Short-course held in Des Moines, IA.
18. **Burns, R.T.**, L.B. Moody<sup>†</sup>, Barry Kintzer, S. Mukhtar, Sam Feagley, L. Ziehr, G. Moore, A. Sutton, D. Hickman, P. McCloud, W. Kuenstler, S. Baggett, C. Nash, T. Nennich, B. Pursley, G. Sokora. 2007. *Comprehensive Nutrient Management Plan Development Manual* for use with Feb. 26-28, 2007 CNMP Short-course held in Arlington, TX.
17. **Burns, R.T.**, Moody, L.B.<sup>†</sup>, R. Koelsch, A. Sutton, R. White, G. Erickson, J. Harrson, R. Massey. 2006. *Feed Management for CNMP Development Manual* for use with Dec. 13, 2006 Short-course held in Ames, IA.
16. **Burns, R.T.**, D.W. Anderson, B.A. Hartman, A. Mills, T. Arthurs, V. Dobbs, L. Hice, J.F. Kouba, D. K. McCook, G. Matheny, J.T. Olsa, J. Pankonie, D.S. Rohe, L. M. Sael, D.E. Totzke, D.M. Watkins. 2006. *Liners and Covers for Agricultural and Industrial Waste Storage Systems Manual* for use with Dec. 4-6, 2006 Short-course held in Indianapolis, IN.
15. **Burns, R.T.**, L.B. Moody<sup>†</sup>, J. Buchanan, W. Boyd, A. Wedel, D. Watkins, B. Kintzer, S. McCloud, G. Zwicke, D. Johnson, J. Porter, D. Hickman, W. Reck, C. Zuller, L. Edmonds. 2006. *Evaluation of Alternative Manure Treatment Systems Manual* for use with Nov. 6 -9, 2006 Short-course held in Nebraska City, NE.
14. **Burns, R.T.**, L.B. Moody<sup>†</sup>, S. Brinkman, J.G. Davis, G. Erickson, J. Harner, J. Lally, B. Pursley, R. Stowell, K. Arora, J.E. Ayen, J. DeRouchey, L. Frees, C. Fulhage, K. Gustafson, R. Koelsch, J. Martinson, D.H. Rogers, C. Wortmann. 2006. *Comprehensive Nutrient Management Plan Development Manual* for use with Feb. 13-15, 2006 Short-course held in Kansas City, MO.
13. **Burns, R.T.**, L.B. Moody<sup>†</sup>, B. Kintzer, G. Grandle, G. Moore, A. Sutton, N. Rector, D. Hickman, J. Lally, P. McCloud, J. Cracraft Beddoes, J. Benning, J. Harrison, J. Martinson, R. Sheffield, B. Wilson. 2005. *Comprehensive Nutrient Management Plan Development Manual* for use with Nov. 15-17, 2005 Short-course held in Portland, OR.
12. Zitomer, D.H, **R.T. Burns**, D. Totzke, R. Speece, M.S. Switzenbaum, J. Van Voorhis. 2005. *Anaerobic Treatment of High-Strength Industrial and Agricultural Wastes Manual* for Use with Sept. 22-23, 2005 Short-course held in Milwaukee, WI.

**Extension Training Manuals (Continued):**

11. **Burns, R.T.**, L. Wulf, D. Frundle. 2005. *Alternative Technology and ELG Models for Open Cattle Feedlot Runoff Control* Manual for use with March 21, 2005 Short-course held in Ames, IA.
10. **Burns, R.T.**, L.B. Moody<sup>†</sup>, B. Kintzer, G. Moore, G. Grandle, N. Rector, A. Sutton, P. McCloud, R. Anderson, J. Cracraft Beddoes, A. Daugherty, M. Gangwer, K. Hill, W. Oaks, R. Sheffield, V. Simpson, B. Wilson. 2004. *Comprehensive Nutrient Management Plan Development* Manual for use with Nov. 16-18, 2004 Short-course held in Indianapolis, IN.
9. **Burns, R.T.**, D.H. Zitomer, D. Totzke, R.E. Speece, P. Wright, J. Van Voorhis, D. Lawrence, R. Kucinski, F. Porter, R. Rosdil, P. Wright, J. Lorimar. 2004. *Anaerobic Treatment of High-Strength Industrial and Agricultural Wastes* Manual for use with Feb. 19-20, 2004 Short-course held in Nashville, TN.
8. **Burns, R.T.**, D. Zitomer, R. Speece, D. Totzke, J. Van Voorhis, R. Anderson, M. Eeckhaut, R. Rosdil. 2003. *Anaerobic Treatment of High-Strength Industrial and Agricultural Wastes* for use with April 7-8, 2003 Short-course held in Knoxville, TN.
7. **Burns, R.T.**, L.B. Moody<sup>†</sup>, R. Anderson, D. Bolinger, G. Brann, J. Buchanan, G. Grandle, B.A. Hartman, P.J. Hess, B.C. Joern, B. Kintzer, R. Kloot, J. Lape, S. Marshall, G. Moore, N. Rector, V. Simpson, D. Tapp, R. Von Bernuth, F.R. Walker, D.M. Watkins. 2003. *Comprehensive Nutrient Management Plan Development* Manual for use with Feb. 12-14, 2003 Short-course held in Nashville, TN.
6. **Burns, R.T.**, L.B. Moody<sup>†</sup>, R. Anderson, G. Brann, G. Conatser, P. Fulks, C. Goan, G. Grandle, B.A. Hartman, G. Jordan, C. Lane, P. McCloud, G. Moore, N. Rector, G. Rogers, R. Sheffield, V. Simpson, A. Sutton, F.R. Walker, D.M. Watkins. 2003. *Comprehensive Nutrient Management Plan Development* Manual for use with Nov. 17-19, 2003 Short-course held in Knoxville, TN.
5. Zitomer, D.H., **R.T. Burns**, D. Totzke, R. Speece. 2003. *Anaerobic Treatment of High-Strength Industrial and Agricultural Wastes* Manual for Use with Sept. 22-23, 2003 Short-course held in Milwaukee, WI.
4. **Burns, R.T.**, J. Lorimar, B. Kintzer, P. Wright, L. Saele, D.R. Raman, K. Ross, D. Hanusa, P. Lusk, A. Wilkie, S. Dvorak, W. Foster, C. Hansen, M. Erwin. 2003. *Anaerobic Treatment for Agricultural Wastes* Manual for use with Nov. 3-5, 2003 Short-course held in Nashville, TN. (Course commissioned by NRCS for their engineers)
3. **Burns, R.T.**, L.B. Moody<sup>†</sup>, R.W. Anderson, G. Brann, J.R. Buchanan, B.A. Hartman, G. Grandle, J.F. Kouba, G. Moore, N. Rector, D. Tapp, T.W. Tyson, R. Von Bernuth, F.R. Walker, D.M. Watkins, A.W. Wedel. 2002. *Animal Waste Management Systems: Comprehensive Nutrient Management Plan Development* Manual for use with Feb. 20-22, 2002 Short-course held in Nashville, TN.
2. **Burns, R.T.**, R.W. Anderson, J. Buchanan, B.A. Hartman, D.M. Horton, J.F. Kouba, D.K. McCook, D.R. Raman, D. Shanklin, R.E. Sheffield, F.R. Walker, A.W. Wedel. 2001. *Animal Waste Management System Design* Manual for use with Feb. 19-21, 2001 Short-course held in Nashville, TN.
1. **Burns, R.T.** *Animal Waste Management Training: Level II Agent In-Service*. 1997. University of Tennessee Short Course taught over five weeks in Nashville, TN.

**National Extension Short-Courses Developed by R.T. Burns**  
**(Fee based courses that have generated over \$750,000 in extension programming support)**

**Comprehensive Nutrient Management Plan Development Course – R.T. Burns Course Coordinator**

Apr. 6-8, 2009. Des Moines, IA.  
 Feb. 25-27, 2008. Louisville, KY.  
 Feb. 26-28, 2007. Arlington, TX  
 Feb. 13-15, 2005. Kansas City, MO.  
 Nov. 15-17, 2005. Portland, OR.  
 Nov. 16-18, 2004. Indianapolis, IN.  
 Feb. 12-14, 2003. Nashville, TN.  
 Nov. 17-19, 2003. Knoxville, TN.  
 Feb. 20-22, 2002. Nashville, TN.  
 Feb. 19-21, 2001. Nashville, TN.

**Liners and Covers for Agricultural Waste Storage Systems – R.T. Burns Course Coordinator**

March 25-27, 2008. Fresno, CA.  
 December 4-6, 2006. Indianapolis, IN.

**National Extension Short-Courses Developed by R.T. Burns (Continued)**

Anaerobic Treatment of Agricultural Wastes -**R.T. Burns Course Coordinator.**

Sep. 28-29, 2009. Madison, WI.

May 21-22, 2007. Des Moines, IA.

Nov. 3-5, 2003. Nashville, TN. (Course commissioned by NRCS for their engineers)

Anaerobic Treatment of High-Strength Industrial and Agricultural Wastes - **R.T. Burns and D. Zitomer (Marquette University) course Co-Coordiators.**

Sept. 22-23, 2005. Milwaukee, WI.

Feb. 19-20, 2004. Nashville, TN.

Sept. 22-23, 2003. Milwaukee, WI.

April 7-8, 2003. Knoxville, TN

Understanding and Working with Nutrient Management Plans Under the CAFO Final Rule. April 9, 2009. Des Moines, Iowa. **R.T. Burns Course Coordinator.**

Writing NPDES Permits that Include Nutrient Management Plan Terms – Special Training for the US EPA. February 2 – 4, 2009. Kansas City, Kansas. **R.T. Burns Course Coordinator.**

Feed Management for CNMP Development. Dec. 13, 2006. Ames, Iowa. **R.T. Burns Course Coordinator.**

Alternative Manure Treatment System Evaluation Workshop (Training for 80 USDA-NRCS Engineers). November 6 -9, 2006. Nebraska City, Nebraska. **R.T. Burns Course Coordinator.**

Technical Service Provider Education and Certification Program Workshop. Oct. 12, 2006. Nashville, TN. **R. T. Burns Course Coordinator.**

Manure Utilization Planning for CAFOs. July 28, 2001 Sacramento, CA. Continuing Professional Development Course (CPD) taught at 2001 ASAE meeting. R.T. Burns Course Coordinator.

Animal Waste Management Training: Level II Agent In-Service. March (Taught over a five week period), 1997 Nashville. **R.T. Burns Course Coordinator.**

Emission Inventory Preparation: APTI Course 519, U.S. EPA Air Pollution Training Institute. 1993. RTP, North Carolina. **Course co-developed by W.T. Davis, T.L. Miller and R.T. Burns.**

**International Extension Short-Courses Developed by R.T. Burns**

Wastewater Management and Water Conservation for Dairy and Cheese Processing Facilities. July, 19, 2007. Yerevan, Armenia. - **R.T. Burns Course Coordinator**

Developing Environmentally Sustainable Animal Production Systems: Training Workshop for Bulgarian Farm Advisors. May, 2007. Stara Zagora, Bulgaria - **R.T. Burns Course Coordinator**

Manure Management for Water Quality Protection: Training Workshop for Romanian Farmers and Farm Advisors. May, 2007. Timisoara, Romania - **R.T. Burns Course Coordinator**

Manure Management Options for Croat Farmers - **R.T. Burns Course Coordinator**

Feb. 5, 2007. Zagreb, Croatia.

Feb. 7, 2007. Vrbovec, Croatia.

Feb. 12, 2007. Osijek, Croatia.

Feb. 14, 2007. Dubrava, Croatia.

Feb. 16, 2007. Zadar, Croatia.

Training Workshop on Good Farming Practices to Reduce Environmental Pollution in Bulgaria. May 27-30, 2006. Stara Zagora, Bulgaria. **R.T. Burns Course Coordinator.**

## Web Sites

\* Graduate student under supervision of R.T. Burns as major professor

† Staff member employed by or under direct supervision of R.T. Burns

Iowa State University Agricultural Waste Management Website co-developed by L.B. Moody<sup>†</sup>, E. Muhlbauer<sup>†</sup>, **R.T. Burns**, 2004 - Present. Web address: [www.abe.iastate.edu/wastemgmt/](http://www.abe.iastate.edu/wastemgmt/). Sub-sites included: Beef Vegetative Treatment Systems, Hydrogen Sulfide Detection Systems, Anaerobic Digestion, Concentration and Extraction of Phosphorus from Swine Manure, Quantification of Emissions from Mechanically Ventilated Poultry Houses. Average hits per month since January 2008: 2,144 (6<sup>th</sup> within ISU ABE)

Comprehensive Nutrient Management Plan Core Curriculum Website co-developed by L.B. Moody<sup>†</sup>, L. Meyer<sup>†</sup>, **R.T. Burns**, 2004 - Present. Web address: <http://www.abe.iastate.edu/wastemgmt/cnmp-curriculum.html>. Average hits per month since January 2008: 180.

CNMP Technical Service Provider Certification Website co-developed by L.B. Moody<sup>†</sup>, L. Meyer<sup>†</sup>, **R.T. Burns**, 2004 - Present. Web address: <http://www.abe.iastate.edu/wastemgmt/tsp-certification.html>. Average hits per month since January 2008: 183.

USDA AHAT Animal Housing Energy Estimator webpage development assistance by **R.T. Burns** Specifically, R.T. Burns developed the Dairy section of the web-based tool. 2006. Web address: <http://ahat.sc.egov.usda.gov/>. This web site averages 20 visits per day, 38 page views per day and 289 hits per day. The total usage of this page since it was launched on November 15, 2006 are 17,304 visits, 44,424 page views and 372,170 hits.

University of Tennessee Animal Waste Management Website co-developed by L.B. Moody<sup>†</sup> and **R.T. Burns**. 2001 - 2004. Web address: <http://wastemgmt.ag.utk.edu>.

## Software

\* Graduate student under supervision of R.T. Burns as major professor

† Staff member employed by or under direct supervision of R.T. Burns

Iowa State University-Effluent Limitation Guidelines Model Version 1.005. Modified by D.S. Andersen\*, **R.T. Burns**, J. Lester<sup>†</sup>. 2008. <http://www.abe.iastate.edu/wastemgmt/beef-at-systems.html>

Low-Cost Monitoring System Flow Calculator Version 1.0 Program co-developed by R. Muhlbauer<sup>†</sup>, I. Khanijo\* and **R.T. Burns**, 2007. <http://www.abe.iastate.edu/wastemgmt/beef-at-systems.html>

Iowa State University-Effluent Limitation Guidelines Model Version 1.004. Developed by L. Wulf and J. Lorimor. 2005. Peer Review led by **R.T. Burns**. <http://www.abe.iastate.edu/wastemgmt/beef-at-systems.html>

Iowa State University Vegetative Treatment Area Model Version 1.004. Developed by L. Wulf and J. Lorimor. 2005. Peer Review led by **R.T. Burns**. <http://www.abe.iastate.edu/wastemgmt/beef-at-systems.html>

Iowa State University- Vegetative Infiltration Basin/Vegetative Treatment Area Model Version 1.004. Developed by L. Wulf and J. Lorimor. 2005. Peer Review led by **R.T. Burns**. <http://www.abe.iastate.edu/wastemgmt/beef-at-systems.html>

**Grantsmanship:**

\* Graduate student under supervision of R.T. Burns as major professor

† Staff member employed by or under direct supervision of R.T. Burns

**56 Funded Grants totaling \$6.9 million;****R.T. Burns Principal Investigator (PI) on 41 Grants totaling \$4.8 million****Funded Proposals**

56. 3/10-12/10 *Nutrient transport and fate in vegetative treatment systems*. D. Andersen, M. Castellano, R. Burns, L.B. Moody. \$16,454 awarded by Iowa Water Center.
55. 6/09 – 9/09 *Evaluation of a swine feed additive on manure via biochemical Methane Potentials*. R. Burns and L.B. Moody. \$6,998 awarded by DSM Nutrition.
54. 10/09 – 12/09. *Literature Review on Deep Pit Swine Facility Flash Fires and Explosions: Sources, Occurrences, Factors, and Management*. **R.T. Burns**, Lara Moody and Ross Muhlbauer. **\$10,203** awarded by the National Pork Board. **R.T. Burns Role – PI**
53. 06/09 – 12/10. *Impacts of Feeding DDGS to Swine: Aerial Emissions and Potential Management Strategies*. **R.T. Burns**, Xin, H. and R. Swestka. **\$117,819** awarded by the Iowa Pork Producers Association. **R.T. Burns Role – PI**
52. 8/09 – 8/10 *Optimization of the Amana Farm Digester and Development of Educational Programming*. **R.T. Burns** and L.B. Moody. **\$73,153** awarded by Amana Farms. **R.T. Burns Role – PI**
51. 6/09 – 6/10. *Water Consumption and Conservation Techniques Currently Available for Swine Production*. **R.T. Burns**, L.B. Moody, J. Harmon, K. Stalder. **\$19,199** awarded by the National Pork Board. **R.T. Burns Role – P.I.**
50. 7/08-6/09. *Monitoring of Vegetated Treatment Systems for Beef Feedlot Run-off Control*. **R.T. Burns**, L.B. Moody<sup>†</sup>, J.D. Lawrence, **\$50,000** awarded by the Iowa Department of Agriculture and Land Stewardship. **R.T. Burns Role – PI**
49. 8/08-11/08. *Performance Testing of a Yeast/Enzyme product to Enhance Septic System Performance*. **R.T. Burns** and L.B. Moody<sup>†</sup>. **\$38,475** awarded by LeSaffre Yeast Co. **R.T. Burns Role – PI**
48. 8/08-12/08. *Update to the National Pork Board Database for Environmental Management Practices Employed at Pork Production Facilities*. **R.T. Burns**, L. Moody<sup>†</sup> and E. Muhlbauer<sup>†</sup>. **\$10,939** awarded by the National Pork Board. **R.T. Burns Role – PI**
47. 6/08 – 06/09. *Hydrogen Sulfide Spatial Distribution and Worker Exposure in Swine Houses*. **R. T. Burns**, N. Keren, R. Muhlbauer<sup>†</sup>, H. Xin and S. Hoff. **\$49,715** awarded by the National Pork Board. **R.T. Burns Role – PI**
46. 2/08 – 10/09. *Multi-state Vegetative Treatment System Technology Implementation*. **R.T. Burns**, L. Moody<sup>†</sup>, J. Lawrence, M. Helmers. **\$900,000**. Awarded by the National USDA-NRCS Conservation Innovation Grant Program in conjunction with the Iowa Cattleman's Association. **R.T. Burns Role – PI**
45. 1/08 – 12/09. *Feeding DDGS and other altered diets to egg laying hens to demonstrate economically viable reductions in ammonia emissions-a United Egg Producers endeavor with university collaborators*. H. Xin, **R.T. Burns**, K. Bregendahl, Kliebenstein, R.S. Gates, E. Wheeler, P. Patterson. **\$812,998** awarded by USDA-NRCS-CIG. **R.T. Burns Role – air emissions monitoring**.
44. 11/07 – 12/07. *White Paper: Anaerobic Digestion of Animal Manure: Manure Digesters 101*. **R.T. Burns** and L. Moody<sup>†</sup>. **\$3,650**. awarded by Dairy Farmers of America. **R.T. Burns Role – PI**

**Funded Proposals (Continued):**

43. 7/07– 6/08 *Monitoring of Vegetated Treatment Systems for Beef Feedlot Run-off Control*. **R.T. Burns**, J.D. Lawrence, L.B. Moody<sup>†</sup>. **\$50,000** awarded by the Iowa Department of Agriculture and Land Stewardship. **R.T. Burns Role – PI**
42. 5/07 – 04/08. *Development and Testing of a Hydrogen Sulfide Detection System for use in Swine Housing*. **R. Burns**, H. Xin, S. Hoff, L. Moody<sup>†</sup>. **\$48,389** awarded by the National Pork Board. **R.T. Burns Role – PI**
41. 5/07 – 7/07. *White Paper: Utilization of Manure Nutrients for Soybean Crop Production*. **R. T. Burns**, M. Helmers, L. Moody<sup>†</sup>, and L. Meyer<sup>†</sup>. **\$8,060** awarded by the National Pork Board. **R.T. Burns Role – PI**
40. 1/07 – 6/07. *Developing Environmentally Sustainable Animal Production Systems: Training Workshop for Bulgarian Farm Advisors*. **R.T. Burns**, L.B. Moody<sup>†</sup>, R.S. Kanwar and E. Becerra. **\$25,574** awarded by the USDA-FAS. **R.T. Burns Role – PI**
39. 1/07 – 6/07. *Manure Management for Water Quality Protection: Training Workshop for Romanian Farmers and Farm Advisors*. **R.T. Burns**, L.B. Moody<sup>†</sup>, R.S. Kanwar and E. Becerra. **\$18,695** awarded by the USDA- FAS. **R.T. Burns Role – PI**
38. 3/07 – 2/08. *Field Verification of Ammonia Emission Mitigation Strategies from Layer Houses*. H. Xin, **R.T. Burns**, E. Wheeler, Patterson, R. Gates. **\$70,436** awarded by USEPA. **R.T. Burns Role – air emissions monitoring.**
37. 3/07 – 3/09 *Determining Ammonia and Particulate Matter Emissions from Midwest Turkey Growout Buildings*. H. Xin, L.D. Jacobson, **R.T. Burns**, J.D. Harmon, S. Noll and J.A. Koziel. **\$499,933**. Awarded by USDA/NRI. **R.T. Burns Role – air emissions monitoring.**
36. 7/06 – 6/07. *Monitoring of Vegetated Treatment Systems For Beef Feedlot Run-off Control*. **R.T. Burns**, J.D. Lawrence, L.B. Moody<sup>†</sup>. **\$50,000** awarded by the Iowa Department of Agriculture and Land Stewardship. **R.T. Burns Role – PI.**
35. 4/06 – 6/06. *Training Workshop on Good Farming Practices to Reduce Environmental Pollution in Bulgaria*. **R.T. Burns**, R.S. Kanwar and E. Becerra. **\$35,000** awarded by the USDA-FAS. **R.T. Burns Role – PI.**
34. 5/06 – 5/09. *Phosphorous Contributions from Crop Residues*. R. S. Kanwar, **R.T. Burns**, A. Mallarino. **\$90,000** funded by the Iowa Egg Council. **R.T. Burns Role – phosphorus analysis.**
33. 4/06 – 12/06. *Development of a Database for Environmental Management Practices Employed at Pork Production Facilities*. **R.T. Burns**, L. Moody<sup>†</sup>, D. Raman, L. Meyer<sup>†</sup>. **\$103,002** awarded by the National Pork Board. **R.T. Burns Role – PI.**
32. 03/06 – 02/07. *Laying Hen Manure Characteristics and Air Emissions as Affected by Genetic Strains*. H. Xin, **R.T. Burns** and Arthur. **\$27,160** awarded by MPRP and Hy-Line. **R.T. Burns Role – manure nutrient analysis.**
31. 01/06 – 06/07. *Field Verification of Dietary Manipulation on Ammonia Emission and Hen Performance in High-rise Layer Houses*. H. Xin, **R.T. Burns** & K. Bregendahl. **\$150,000** awarded by Eco-Cal Products and Iowa Egg Council. **R.T. Burns Role – air emissions monitoring and manure nutrient analysis.**
30. 2/06 – 12/06. *Bio-fuel Production from Bio-Dried Animal Manure to Improve Iowa Livestock Production Economy, Part 2 Farm scale biodrying of bedded back swine manure..* S. Sadaka, **R.T. Burns** and M. Hanna. **\$110,000** awarded by the Iowa State University Biotechnology Bioproducts Consortium. **R.T. Burns Role – guidance on experimental design.**
29. 10/05 – 10/07. *Total Suspended Particulate, PM<sub>10</sub>, PM<sub>2.5</sub>, Hydrogen Sulfide and Hydrocarbon National Consent Agreement Emissions Determination from Broiler Production Systems*. **R.T. Burns**, H. Xin, R. Gates and S. Hoff. **\$648,231** awarded by Tyson Foods. **R.T. Burns Role – PI.**

**Funded Proposals (Continued):**

28. 10/05 – 9/07. *Development and Integration of A National Feed Management Education Program and Assessment Tools into a Comprehensive Nutrient Management Plan (CNMP)*. J. Harrison, A. Sutton, G. Erickson, **R. Burns**. **\$425,000** awarded by the USDA-NRCS Conservation Initiative Grant program. **R.T. Burns Role – Intergration of materials into national CNMP course.**
27. 9/05 – 9/06. *Bio-fuel Production from Bio-Dried Animal Manure to Improve Iowa Livestock Production Economy*. S. Sadaka, **R.T. Burns** and M. Hanna. **\$80,000** awarded by the Iowa State University Biotechnology Bioproducts Consortium. **R.T. Burns Role – guidance on experimental design.**
26. 7/05 – 6/06. *Monitoring of Alternative Technolgy Systems Using Settling Benches For Beef Feedlot Run-off Control*. **R.T. Burns**, J.D. Lawrence, and L.B. Moody<sup>†</sup>. **\$100,000** awarded by the Iowa Department of Agriculture and Land Stewardship. **R.T. Burns Role – PI.**
25. 6/05 – 6/06. *Pathogen Monitoring from Alternative Beef Feedlot Run-Off Control Systems*. **R.T. Burns**, L.B. Moody<sup>†</sup> and J.D. Lawrence. **\$30,000** awarded by the U.S. EPA. **R.T. Burns Role – PI.**
24. 5/05 – 11/08. *Non-basin Technologies for Open Feedlot Runoff: Demonstration, Implementation, and Modeling*. **R.T. Burns**, J.D. Lawrence, L.B. Moody<sup>†</sup> and M.J. Helmers. **\$632,367** awarded by the USEPA in conjunction with the Iowa Cattlemen's Association. **R.T. Burns Role – PI.**
23. 3/05 – 9/06. *Ammonia Emissions Determination from Broiler Production Systems*. **R.T. Burns**, H. Xin and R. Gates. **\$399,525** awarded by Tyson Foods. **R.T. Burns Role – PI.**
22. 9/03 - 9/06. *Development of A CNMP Core Training Curriculum*. R.T. Burns, L. B. Moody, N. Rector, A. Sutton and R. Sheffield. **\$290,000** awarded by the USDA CSREES 406 Extension Education Program. **R.T. Burns Role – PI. (Project and funding transferred to ISU with R.T. Burns)**
21. 12/03 – 12/06. *Concentration and Extraction of Phosphorus from Swine Manure Slurries*. **R.T. Burns**, L. B. Moody<sup>†</sup>, F. R. Walker, W. M. Park, and J. R. Buchanan. **\$168,000** awarded by USDA/NRI. **R.T. Burns Role – PI. (Project and funding transferred to ISU with R.T. Burns)**
20. 05/02 – 12/03. *Control of Ammonia and Litter Pathogen Levels in Broiler Production Facilities Treated with Alum as a Litter Amendment*. **R.T. Burns**, F.A. Draughon, L.R. Wilhelm and F.R. Walker. **\$27,914** awarded by the General Chemical Corporation. **R.T. Burns Role – PI.**
19. 07/01 – 06/02. *Animal Waste System Design Workshop*. **R.T. Burns**. **\$26,850** awarded by the Tennessee Department of Agriculture. **R.T. Burns Role – PI.**
18. 07/01 – 06/02. *Dairy Waste Management Field Day*. **R.T. Burns**., F.R. Walker, T. Woods, and J. Goddard. **\$12,540** awarded by the Tennessee Department of Agriculture. **R.T. Burns Role – PI.**
17. 7/01 – 7/03. *On-farm Demonstration of the Use of Aluminum Sulfate as an in-house amendment for Poultry Litter*. Walker, F.R., and **R.T. Burns**. **\$45,030** awarded by the TN 319 Pollution Control Program. **R.T. Burns Role – assist with demonstration plan and field-day.**
16. 7/01 – 7/03. *Control of Ammonia and Litter Pathogen Levels in Broiler Production Facilities Treated with Alum as a Litter Amendment*. **R.T. Burns**, A. Draughon, F.R. Walker, L. Wilhelm. **\$25,625** awarded by the Food Safety Center of Excellence. **R.T. Burns Role – PI.**
15. 11/00 – 01/04. *Agricultural Engineering Water Quality Technical Support*. **R.T. Burns**. **\$225,000** awarded by the Tennessee Department of Agriculture. **R.T. Burns Role – PI.**
14. 07/00 – 06/01. *Animal Waste System Design Workshop*. **R.T. Burns**. **\$50,608** awarded by the Tennessee Department of Agriculture. **R.T. Burns Role – PI.**
13. 01/00 – 12/00. *Demonstration of Phosphorus Binding in Swine Waste using Alum*. Walker, F.R. and **R.T. Burns**. **\$10,000** awarded by the Tennessee Department of Agriculture. **R.T. Burns Role – Experimental design and data collection.**

**Funded Proposals (Continued):**

12. 11/99-11/01. *Quantifying and minimizing 17 Beta-estradiol emissions from dairy and swine*. Raman, D.R., A.C. Layton, M.D. Mullen, **R.T. Burns** and G.S. Saylor. **\$215,500** awarded by the USDA / NRI. **R.T. Burns Role – manure collection assistance.**
11. 3/99 – 8/00. *High-Rate Anaerobic Pretreatment of Animal Wastewater: Impact on Traditional Anaerobic Animal Waste Treatment System Performance and Economics*. Raman, D.R. and **R.T. Burns**. **\$38,680** awarded by The United States Geological Service Water Resources Research Program. **R.T. Burns Role – assist with project design and data analysis.**
10. 07/99 – 06/00. *Dairy Manure Solids Separation project: Animal Waste Management Information & Education Project*. **R.T. Burns** and H.H. Dowlen. **\$7,000** awarded by The Tennessee Department of Agriculture. **R.T. Burns Role – PI.**
9. 07/98 – 06/99. *Soil Moisture Measurement of Plasticulture on Tomatoes and Cantaloupes*. UT Vegetable Initiative grant request. **R.T. Burns**, R.E. Yoder, M.J. Buschermohle and G.S. Honea. **\$1,800** awarded by the Knox Experiment Station. Work Plan Number TN-050-KES-02. **R.T. Burns Role – PI.**
8. 07/97 – 06/98. *Alternative Livestock Watering Systems for Limited Access Situations*. **R.T. Burns** and M.J. Buschermohle. **\$5,000** awarded by The Tennessee Department of Agriculture. **R.T. Burns Role – PI.**
7. 07/97 – 06/98. *Soil Moisture Measurement Equipment for Irrigation Scheduling at Knoxville, Crossville, Greenville*. **R.T. Burns** and R.E. Yoder. UT Vegetable Initiative grant request. **\$2,500** awarded by the Knox Experiment Station. Work Plan Number TN-050-KES-01. **R.T. Burns Role – PI.**
6. 07/97 – 06/98. *Soil Moisture Data Monitoring in Support of TN-058-KES-01-1 and TN-058-KES-24-1*. UT Vegetable Initiative grant request. **R.T. Burns**, R.E. Yoder, and M.J. Buschermohle. **\$5,400** awarded by the Knox Experiment Station. Work Plan Number TN-050-KES-02. **R.T. Burns Role – PI.**
5. 07/97 – 06/98. *Drip Irrigation Filter Demonstration System Plant Sciences Unit - Knoxville*. UT Vegetable Initiative grant request. **R.T. Burns** and R.E. Yoder. **\$5,500** awarded by the Knox Experiment Station. Work Plan Number TN-050-KES-03. **R.T. Burns Role – PI.**
4. 07/97 – 06/98. *Drip Irrigation Fertigation Demonstration System Plant Sciences Unit – Knoxville*. UT Vegetable Initiative grant request. **R.T. Burns** and R.E. Yoder. **\$2,400** awarded by the Knox Experiment Station. Work Plan Number TN-050-KES-04. **R.T. Burns Role – PI.**
3. 10/96 – 09/97. Funding to support the Level II Agent In-Service *Animal Waste Management Training, Environmental Education Project*. **R.T. Burns**. Course taught in Spring 1997. **\$5,000** awarded by the U.S. Environmental Protection Agency. **R.T. Burns Role – PI.**
2. 07/96 – 06/97. Applied research work in swine waste manure application: *Application of Swine Waste*. **R.T. Burns**. **\$4,000** awarded by the Tennessee Department of Agriculture. **R.T. Burns Role – PI.**
1. 07/95 – 06/97. *Cattle Access to Streams: Research and Demonstration*. Yoder, R.E., D.C. Yoder, C.R. Mote, M.J. Buschermohle, **R.T. Burns** and N.S. Eash. **\$22,400** awarded by The Tennessee Department of Agriculture. **R.T. Burns Role – Design and install alternative cattle watering systems.**

**Graduate Candidate Committees:****As Major Professor at Iowa State University**

Daniel Anderson      PhD, Agricultural Engineering      In-Progress  
 Thesis Title: *Fate and Transport of Nitrogen and Phosphorus in Vegetated Treatment Areas*

Steven Sell      M.S., Agricultural Engineering      In-Progress  
 Thesis Title: *Optimization of a Full-Scale Beef Manure Anaerobic Digester*

Laura Pepple      M.S., Agricultural Engineering      In-Progress  
 Thesis Title: *Impacts of Feeding DDGS to Swine: Aerial Emissions and Potential Management Strategies*

Robert Spajic'      Ph.D., Agricultural Engineering      In-Progress  
 Dissertation Title: *Anaerobic Digestion of Manures for Energy Production*  
 Mr. Spajic' is completing his degree at the Agricultural University in Osijek Croatia and will be working in the ISU Agricultural Waste Management Lab as a pre-doctoral Fulbright Scholar for two semesters. Dr. Burns is Mr. Spajic' co-Major professor (with Dr. Dravor Kralik) for his Ph.D.

Randy Swestka      M.S., Agricultural Engineering      In-Progress  
 Thesis Title: *Hydrogen Sulfide Spatial Distribution and Worker Exposure in Swine Houses*

Bradley Bond      M.S., Agricultural Engineering      In-Progress  
 Thesis Title: *Vegetated Treatment System Performance: A Multi-State Study*

Daniel Anderson      M.S., Agricultural Engineering      Completed 2009.  
 Thesis Title: *Modeling of Alternative Technology Beef Feedlot Run-Off Control Systems*

Wei Wu-Haan      M.S., Environmental Science      Completed 2008  
 Dissertation Title: *Enhanced Manure Anaerobic Digestion*

Ishadeep Khanijo      M.S., Agricultural Engineering      Completed 2008.  
 Thesis Title: *Monitoring of Alternative Technology Beef Feedlot Run-Off Control Systems*

Timothy Shepherd      M.S., Agricultural Engineering      Completed 2007.  
 Thesis Title: *Development of a Pilot-Scale Struvite Recovery System for Phosphorus Recovery from Swine Manure Slurries*

**As Major Professor at the University of Tennessee**

Ipek Celen      Ph.D., Biosystems Engineering      Completed 2007.  
 Dissertation Title: *Optimization of Phosphorus Precipitation from Swine Manure Slurries to Enhance Recovery*

Ken Armstrong      M.S., Biosystems Engineering Technology      Completed 2003.  
 Thesis Title: *Effect of Alum addition to Broiler Litter on Pathogen levels, Soluble Phosphorus and In-house Ammonia Levels on Broiler Production Systems*

Adam Daughtery      M.S., Biosystems Engineering Technology      Completed 2001  
 Thesis Title: *Economic Comparison of Animal Waste Transport and Application Methods*

**As Committee Member at Iowa State University**

Cody John Hearn      M.S. Industrial & Agricultural Technology      In-Progress  
 Thesis Title: *Ultrasonification to Enhance Ethanol By-product from Anaerobic Digestion*

Stacy Roberts      Ph.D. Animal Science      In-Progress  
 Dissertation Title: *Mechanisms and Efficacy of DDGS Diet for Laying Hens on Ammonia Emissions and Production Performance*

**As Committee Member at Iowa State University (Continued:)**

Xiaopeng Ning M.S., Agricultural Engineering Completed 2008.  
Thesis Title: *Feeding, Defecation and Gaseous Emission Dynamics of Hy-Line W-36 Laying Hens*

Hong Li Ph.D. Agricultural Engineering Completed 2006  
*Dissertation Title: Gaseous Emissions from Stored Poultry Manure*

Wei Wu M.S., Animal Science Completed 2006  
Thesis Title: *Influence of Diet on Ammonia and Hydrogen Sulfide Emissions from Laying Hens*

**As Committee Member at the University of Tennessee:**

Elizabeth Williams M.S., Biosystems Engineering Technology Completed 2003.  
Thesis Title: *Presence of 17-Beta Estradiol and Estrone in Dairy and Swine Manures*

Alexandra Maria Pinto Ph.D. Biosystems Engineering Completed 2001  
Dissertation Title: *Fuzzy Logic Based Toxicity Detector for Upflow Anaerobic Sludge Bed Reactors*

A. Renea Peters M.S., Biosystems Engineering Technology Completed 2001  
Thesis Title: *Runoff Masses of 17-Beta Estradiol from Plots Amended with Dairy Manure*

Theresa Louise Ervin M.S., Biosystems Engineering Completed 2001  
Thesis Title: *Reservoirs of Escherichia coli O157:H7, Listeria monocytogenes, and Salmonella species on a Tennessee dairy farm*

Gary Hawkins Ph.D. Biosystems Engineering Completed 2000.  
Dissertation Title: *Kinetics of High-Rate Anaerobic Digestion of Dairy Waste*

Catherine R. Mayhew M.S., Biosystems Engineering Technology Completed 1999.  
Thesis Title: *Mosquito Control and Pollutant removal in Constructed Wetlands: A Mesocosm Study Using Dairy-Wastewater*

Jeffery Russell Powell M.S., Biosystems Engineering Technology Completed 1998.  
Thesis Title: *Water Quality and Ecological Impacts of Watering Cattle Adjacent to a Small Middle Tennessee Stream*

Joseph Cole Reagan M.S. Biosystems Engineering Technology Completed 1997.  
Thesis Title: *An Examination of Methodologies to Assess High-Resolution Noninvasive Sensing of Near-Surface Perched Water.*

**Personnel Supervised by Dr. R.T. Burns at Iowa State University**

<b>Professional and Scientific Staff</b>				
<b>Name</b>	<b>Dates</b>	<b>Position</b>	<b>Project</b>	<b>% of Time</b>
Lara Moody	Fall 04-present	Extension Specialist	Project Coordination	100%
Carl Pedersen	Fall 05-present	Research Associate	Vegetative Treatment Systems	10-75%
Hong Li, Ph.D.	Spring 05-Spring 07	Research Associate	Gaseous Emissions from Poultry Houses	25-100%
Lana Meyer	Fall 05-Fall 07	Program Assistant	Communications	100%
Nurun Nahar	Summer 06-Fall 07	Lab Manager	Laboratory analyses	100%
Ember Muhlbauer	Fall 07-present	Program Assistant	Communications	100%
Ross Muhlbauer	Spring 08-present	Research Associate	Project and Field Work Coordination	100%

**Personnel Supervised by Dr. R.T. Burns at Iowa State University (Continued)**

<b>Graduate Research Assistants</b>				
<b>Name</b>	<b>Dates</b>	<b>Position</b>	<b>Project</b>	<b>% of Time</b>
Tim Shepherd	Spring 05- Fall 07	Graduate Student	Phosphorus Precipitation	100%
Ishadeep Khanijo	Fall.05- Spring 08	Graduate Student	Vegetative Treatment Systems	100%
Daniel Andersen	Fall 07- Present	Graduate Student	Vegetative Treatment Systems	100%
Brad Bond	Spring 08- Present	Graduate Student	Vegetative Treatment Systems	100%
Wei Wu-Haan	Spring 07- Present	Graduate Student & Lab Manager	Biochemical Methane Potential	100%
Randy Swestka	Summer 08- Present	Graduate Student	Hydrogen Sulfide Detection System	100%
Robert Spajic	Fall. 08- Present	Graduate Student	Anaerobic Digestion	100%
<b>Undergraduate Research Assistants</b>				
<b>Name</b>	<b>Dates</b>	<b>Position</b>	<b>Project</b>	<b>% of Time</b>
Ross Muhlbauer	Spring 05- Spring 08	Undergraduate Research Assistant	Vegetated Treatment Systems & H <sub>2</sub> S Detection	100%
Cyrus Anderson	Summer 05	Undergraduate Research Assistant	Gaseous Emissions from Poultry Houses	100%
Adam Cook	Fall 05-Fall 06	Undergraduate Research Assistant	Water Quality	100%
Neil Heithoff	Fall 05- Present	Undergraduate Research Assistant	TEOM Boxes- Gaseous Emissions from Poultry Houses	100%
Jay Duncan	Fall 05- Spring 08	Undergraduate Research Assistant	General Lab Work	100%
Sarah Asberry	Spring 06	Undergraduate Honors Student	Phosphorus Recovery and GC work	100%
Laura Pepple	Spring 06- Present	Undergraduate Research Assistant	Vegetated Treatment Systems & Feedlot Run-Off Monitoring	100%
Kinit Patel	Spring 06- Summer 07	Undergraduate Research Assistant	Modeling and NPB Database	100%
Jude Sellner	Summer 06	Undergraduate Research Assistant	Gaseous Emissions from Poultry Houses- Rose Acres	100%
Brent Applegate	Summer 06	Undergraduate Research Assistant	Poultry-Layer Air Emissions	100%

**Personnel Supervised by Dr. R.T. Burns at Iowa State University (Continued)**

<b>Undergraduate Research Assistants</b>				
Jana Kamerman	Summer 06	Undergraduate Research Assistant	Various Lab Assignments	100%
Lynnea Harty	Spring07	Undergraduate Honors Student	Biochemical Methane Potential	100%
Alicia Rasmussen	Spring 07	Undergraduate Honors Student	Biochemical Methane Potential	100%
Gayle Bishop	Spring 07- Present	Undergraduate Research Assistant	Analytical Lab Work	100%
Randy Swestka	Spring 07- Spring 08	Undergraduate Research Assistant	Gaseous Emissions from Poultry House-Rose Acre	100%
John Lester	Fall 07- Spring 08	Undergraduate Research Assistant	Modeling and NPB Database	100%
Jenae Baumert	Spring 08 - present	Undergraduate Honors Student	Biochemical Methane Potential	100%
Jenny English	Spring 08	Undergraduate Honors Student	Biochemical Methane Potential	100%
John Stinn	Spring 08- present	Undergraduate Research Assistant	Vegetated Treatment Systems Modeling	100%
Joe Freund	Spring 08- Present	Undergraduate Research Assistant	Vegetated Treatment Systems	100%
Jacob Baker	Spring 08- Present	Undergraduate Research Assistant	Vegetated Treatment Systems	100%
Todor Mitev	Summer 07& Summer 08	Research Associate	General Lab Work	100%
Emil Mitev	Summer 08	Research Associate	General Lab Work	100%
Chantal Roberts	Spring 09- Present	Undergraduate Research Assistant	Analytical Lab Work	100%
Lauren Engfer	Spring 09- Present	Undergraduate Honors Student	General Lab Work	100%
Wyatt Hall	Spring 09- Present	Undergraduate Research Assistant	Swine Manure Solids Separation	100%
Dan Puck	Spring 09- Present	Undergraduate Research Assistant	Swine Manure Solids Separation	100%

**Service (ISU Record: 2004 – 2008):****Agricultural and Biosystems Engineering Department - Iowa State University.**

Chair of the International Programs Committee – 2009 - Present  
Professor in Charge of Livestock Environmental Building Research Complex – 2005 - Present  
Member Website and Marketing Committee – 2008 - Present  
Vice-Chair Social Committee – 2008 – Present  
Member Social Committee – 2005 - 2007  
Member Agronomy / Agricultural Engineering Research Center – 2006 - Present  
Chair Awards Committee – 2006  
Member Awards Committee – 2005, 2007, 2009/  
Member Biological Engineering Curriculum Committee – 2005, 2006.  
Member Graduate Programs Committee – 2004 - 2006  
Vice-Chair Graduate Programs Committee – 2008 - Present

**Iowa State University and College of Agriculture and Life Sciences**

Member – College of Agriculture Promotion and Tenure Committee – 2009 – 2011.  
Professor-in-Charge: Agricultural Waste Management Laboratory – 2004 - Present  
Member - Air Quality Task Force – 2005 - Present  
Member - Livestock in the Bioeconomy – 2007 - Present  
Member - ISU Dairy Farm Construction Committee – 2004- Present  
Assist ISU Beef Center as requested – 2004 – Present  
Assist ISU Swine Center as requested – 2005 – Present  
Assist ISU Dairy Extension Team as requested – 2005 – Present  
Science with Practice Faculty Mentor – 2005 – Present  
Freshman Honors Student Faculty Mentor – 2006 – Present  
Airy Beef Conference – 2005-06 – Member of Conference Planning Committee.  
Iowa State University designated Member of the S-1032 Improving the Sustainability of Livestock and Poultry Production in the United States Animal Manure & Waste committee (formerly S-1000).  
2007 - Present.

**State Service - Iowa**

Member - Iowa Renewable Natural Gas Working Group - 2007 – Present  
Member – Iowa Small Beef Feedlot Working Group; Engineering Committee - 2006 – Present  
Member - Interagency Livestock Working Group - 2005 – Present  
Advisor – Iowa Commercial Nutrient Applicators Association - 2007 – Present

**National Service**

Member- United States Department of Agriculture – Agricultural Air Quality Task Force (AAQTF)  
Selected to serve as a member of the National USDA Agricultural Air Quality Task Force for a two year term. The AAQTF is charged with advising the U.S. Secretary of Agriculture with respect to the role of USDA to provide oversight and coordination related to agricultural air quality. (2008 – 2010).  
Chair- Pork Air Science Policy Advisory Committee:  
Serve as the Chair of the National Pork Producers Council committee charged with assisting NPPC review and best utilize current scientific information in regards to air emissions from pork production systems. (2007 – Present).  
Member- National Pork Board Environmental Research Advisory Committee:  
Serve as a member of the National Pork Board committee charged with assisting the National Pork Board plan future research expenditures on environmental issues. (2006 – Present)  
Iowa State University CNMP TSP, USDA Certification Program:  
Serve as the Designated Technical Leader for the ISU Comprehensive Nutrient Management Plan Technical Service Provider certification program. Iowa State University serves as a national certification program for the United States Department of Agriculture. (2004 - Present).  
University of Tennessee CNMP TSP, USDA Certification Program:  
Serve as the Designated Technical Leader for the Tennessee Comprehensive Nutrient Management Plan Technical Service Provider certification program. Program was selected as the national USDA TSP certification program in 2003. (2001 – 2004)

**Professional Service****Conference Chair- Mitigating Air Emissions from Animal Feeding Operations:**

Served as the Conference Chair of a national conference focused on exploring the advantages, limitations and economics of emissions mitigation methods currently available for use on animal feeding operations held on May 19-21, 2008 in Des Moines, Iowa with 250 participants.

**Session Moderator – International Conference on Ammonia in Agriculture:**

Served as an invited Moderator for two technical sessions for International Conference on Ammonia in Agriculture in Ede, The Netherlands on March 19-21, 2007.

**Proceedings Chair - ISAAFPW 2003**

Served as proceedings chair for The Ninth International Symposium on Animal, Agricultural and Food Processing Wastes held in Raleigh, NC on October 11-14, 2003.

**ASABE National Committee Service:**

Professional Engineering Institute (PEI), Chair 2008 - 2010

Professional Engineering Institute (PEI), Vice Chair 2006 – 2008

Meetings Development Council, Member 2006-2008

P - 414 *Professional Engineering Licensure* member, Chair for 2003 - 2005 (two -year term)

P - 414 Vice-Chair 2001 – 2003

T-09 *Environmental Quality Group* member.

SE - 412 *Structures & Environment* committee member, Chair 2004 - 2005 Vice Chair 2003-2004,

Secretary 2003 / 04, Session Chair - 2001 ASAE International Meeting

**Iowa Section of the ASABE Service:**

Chair of the Iowa Section of ASAE. 2006-07

Vice-Chair for Programs of the Iowa Section of ASAE. 2005-2006

**Tennessee Section of the ASAE Service:**

Chair of the Tennessee Section of ASAE. 2002-03

**National Council of Examiners for Engineering and Surveying:**

Assist with preparation of the national professional engineers exam in the Agricultural Engineering area. 1998 – Present.

NCEES Examinations for Professional Engineers (EPE) Committee Member, 2005 – 2007

**Southern Region Chair - National Animal Waste Initiative**

Served as the 2001-2002 Southern Region Chair of the National Animal Waste Initiative.

**USDA Grant Reviews:**

Member of 2008 USDA NRI Air Quality review panel.

Member of 2008 USDA CSREES Regional Water Quality review panel.

Member of 2004 USDA-CSREES Conservation Effects Assessment Program grant review panel.

Panel Manager for 2002 USDA-CSREES Water Quality competitive grant review panel.

Served as a member of 2000 and 2001 USDA-CSREES 406 Water Quality review panels.

Ad Hoc Reviewer for USDA FAS, NRI and SBIR grants as requested. 1999 – present.

**Natural Resources Conservation Service (NRCS) Committee Service:**

Member of the Tennessee NRCS Conservation Planning Certification Policy Advisory Board. 2003

Member of the Tennessee NRCS CNMP Review Committee. 2003

Member of the Tennessee NRCS Conservation State Technical Committee. 2003

**I-FARM *Integrated Crop and Livestock Production and Biomass Planning Tool***

Member of the Advisory Committee. 2006 – Present.

**Manuscript Review as Requested:**

*Transactions of the ASABE*

*Applied Engineering in Agriculture*

*Journal of Environmental Quality*

*Environmental Science and Technology*

*Journal of Environmental Engineering*

*Journal of Environmental Engineering and Science*

*Environmental Technology*

**International Experience:****Armenia**

Developed wastewater management and water conservation plans for five Armenian dairy and cheese processing facilities. Developed and taught a workshop on wastewater management and water conservation for USAID, through Development Alternatives International (DAI). July 7-23, 2007.

**Bulgaria**

Developed and offered a Training Workshop on Good Farming Practices to Reduce Environmental Pollution for Bulgarian farm advisors, producers, university personnel and local government officials. The three-day training course was held on May 27-30, 2006 in Sofia, Bulgaria and attended by 68 people. I also led the development and offering of an environmental sustainability workshop for animal production systems held on May 8-9, 2007 in Stara Zagora, Bulgaria. There were 46 participants at the workshop including county adviser officers of agriculture, advisors from the National Adviser Service, farmers, university students and faculty from Trakia University, and managers of agriculture cooperative farms. Also, I was named an Honorary Professor with the College of Agriculture, Trakia National Agrarian University, Stara Zagora, Bulgaria in August, 2007.

**Croatia**

Developed and implemented an MOU between ISU and J.J. Strossmayer University, Osijek, Croatia. The MOU outlines cooperation on animal waste management projects and encourages student exchange between the universities. Consulted with Belje (largest swine producer in Croatia, finishing 300,000 pigs per year) on swine manure treatment and anaerobic digestion systems. February 10 – 27, 2009.

Assisted Development Alternatives International (DAI) develop and offer five training workshops on manure management for Croatian dairy and swine producers. Worked one-on-one with Croatian dairy producers in evaluating current manure management systems. February 5 – 20, 2007.

**Denmark**

Provided environmental engineering consultation to Kemira Water on enhancing nutrient removal performance of their swine manure solids separation unit. August 4 – 10, 2007

**Romania**

Worked with Borlaug Scholars interested in animal manure management in both Bucharest and the US. Led the development and offering of an environmental sustainability workshop for animal production systems in Timisoara Romania for Timis County swine producers on May 11, 2007. There were 97 total participants: 45 farmers, 21 Banat's University professors, 17 government officials, 8 students, 4 specialists involved in consulting or extension, 1 Deputy Chamber member and 1 rural community leader.

**Republic of Korea**

Named a Senior Scientist in the Livestock Waste area for a three year term by The National Livestock Research Institute, RDA, South Korea, beginning in 2005. Provide consultation to the Animal Science Research Institute in the Republic of Korea on the development of a 100,000 head swine finish facility. 2004. Seoul National University - Invited Speaker. Presented lectures on Developing Sustainable Animal Production Systems. 2004 and 2005. Konkuk University - Invited Speaker. Presented lectures on Environmental Engineering Aspects of Animal Production Systems. 2005. Chungju, South Korea.

**Zambia**

Mpongwe Development Company - Agricultural engineering support of post-harvest grain drying / storage and irrigation expansion planning for Mpongwe Development Company (MDC). The MDC operates the largest arable farm (60,000 ha) in Africa. The farm is in north central Zambia under a partnership between the Commonwealth Development Corporation and the Government of Zambia. 2003.

**Consulting:**

Dr. Burns has provided agricultural and environmental engineering consulting services to various groups including the USEPA, USDA-NRCS, USDA-FAS, USAID, DAI, Conestoga Rovers and Associates, The Commonwealth Development Corporation of Great Britain, America's Clean Water Foundation, Thoreau Environmental Capital and numerous state departments of agriculture and environmental protection as well as over 350 individual farming operations.

**International Visiting Scholars, Students and others Hosted or Mentored by Dr. R.T. Burns:**

<b>Name</b>	<b>Organization</b>	<b>Country</b>	<b>Year</b>	<b>Role</b>
Dr. In-Hwan Oh	Konkuk University	South Korea	2003	Scholar
Mr. I. Park	National Livestock Research Institute	South Korea	2004 / 2005	Scholar
Dr. Leonard Ilie	University of Agronomic Sciences and Veterinary Medicine - Bucharest	Romania	2004	Borlaug Scholar
Dr. Hong Choi	Seoul National University	South Korea	2004	Scholar
Mrs. Elena Radoutchava	Megatron	Sofia, Bulgaria	2005	Agri-Business
Mr. Gabriel Nicolau	Private Consultant	Iasi, Romania	2005	Consultant
Mr. Nikolay Mikolov	Bulargo	Dobrich, Bulgaria	2005	Agri-Business
Mrs. Dimana Valkanova	Rimex Engineering	Sofia, Bulgaria	2005	Consultant
Mr. Ovidiu Onisor	Dairy Farm Business	Cluj, Romania	2005	Producer
Mr. Horia Hemes	Dairy Farm Business	Sibiu, Romania	2005	Producer
Mrs. Marius Macinca	Citibank	Iasi, Romania	2005	Banker
Mrs. Mihaela Constanescu	RFLD	Craiova, Romania	2005	Government
Mrs. Kristina Dobay	FRLD	Iasi, Romania	2005	Government
Dr. Felix Arion	University of Agronomic Sciences and Veterinary Medicine - Bucharest	Romania	2005	Borlaug Scholar
Mirjana Zdravkovic	Institute of Soil Science	Belgrade, Serbia	2006	Scholar
Zoran Stojanovic	Institute of Soil Science	Belgrade, Serbia	2006	Scholar
Ivica Nikolic	Republic of Serbia	Belgrade, Serbia	2006	Scholar
Tatjana Glisie	Republic of Serbia	Belgrade, Serbia	2006	Scholar
Dejan Cosic	Republic of Serbia	Belgrade, Serbia	2006	Scholar
Dr. Tchanka Mitev	Trakia University	Stara Zagora, Bulgaria	2006&2007	Scholar
Dr. Yuri Mitev	Trakia University	Stara Zagora, Bulgaria	2006	Scholar
Mr. Mladen Viktorov Mladenov	NAAS	Bulgaria	2007	Government
Mrs. Vasilka Ilieva Stoyanova	NAAS	Bulgaria	2007	Government
Mr. Mladen Slavov	County Extension Agent	Bourgas, Bulgaria	2007	Extension
Mrs. Vanushka Yordanova Petkova	County Extension Agent	Silistra, Bulgaria	2007	Extension
Mrs. Marinela Ivanova Georgieva	County Extension Agent	Bourgas, Bulgaria	2007	Extension
Mr. Valentin Petkov Byalkov	County Extension Agent	Bourgas, Bulgaria	2007	Extension
Mrs. Zoya Georgieva Todorova	County Extension Agent	Yambol, Bulgaria	2007	Extension
Mr. Deyan Ivanov Dontchev	County Extension Agent	Veliko Tarnova, Bulgaria	2007	Extension

**International Visiting Scholars, Students and others Hosted or Mentored by Dr. R.T. Burns  
(Continued):**

Name	Organization	Country	Year	Role
Mr. Methody Georgiev Methodieff,	FOR A	Bulgaria	2007	Unknown
Mrs. Radostina Vladimirova Piralkova	Bulgarian Agriculture Ministry	Bulgaria	2007	Government
Mr. Ventsi Marinov	U.S. Dept. of Agriculture-Foreign Ag. Service	Bulgaria	2007	USDA Liason
Dr. Claudio Alberto Soto Carriez	University of Concepcion	Chile	2007	Scholar
Jose Cadillo	National Agrarian University	Peru	2007	Scholar
Ms. Simone Kraatz	Leibniz-Institut für Agrartechnik Potsdam	Germany	2007	Student
Dr. Eberhard Hartung	University of Kiel	Germany	2007	Scholar
Dr. Angelika Häußermann	University of Kiel	Germany	2007	Scholar
Mr. Todor Mitev	Trakia University	Stara Zagora, Bulgaria	2007 & 2008	Student
Mr. Emil Mitev	Trakia University	Stara Zagora, Bulgaria	2008	Student
Mr. Jan Hansen	AL2 - Teknik	Denmark	2008	Visiting Researcher
Mr. Preben Nissen	Kemira Agro Solutions	Denmark	2008	Visiting Researcher
Mr. Robert Spajic	Osijek Agricultural University	Croatia	2008	Fulbright Scholar

**Recent Invited Lectures and Presentations (2005-2009)**

47. *Phosphorus Recovery from Animal Manures*. Invited Presentation. Manitoba Manure Phosphorus Management Meeting. Winnipeg, Manitoba, Canada. November 30, 2009.
46. *Using Digested Dairy Manure as a Crop Nutrient Source*. Invited Presentation. 2009 Green Dairy Conference, Torreon, Mexico. November 18, 2009.
45. *Anaerobic Digestion of Animal Manures for Biogas Production*. Invited testimony to the United States of House of Representatives Committee on Science and Technology, Sub-Committee on Energy and Environment, Hearing on *Biomass for Thermal Energy and Electricity; A Research and Development Portfolio for the Future*. Washington DC, October 21, 2009.
- 44.. *Overview of Animal Feeding Operation Ammonia Mitigation Methods*. Co-presented with Dr. Hongwei Xin. Invited presentation at the Agricultural Air Quality Task Force Meeting, Des Moines, Iowa. September, 15, 2009
- 43 *Current Status of Manure Anaerobic Digestion in the US and Beyond*. Invited presentation. Kansas Environmental Conference. Wichita, Kansas. August 19, 2009.
42. *Understanding Manure Anaerobic Digestion Systems*. Invited presentation to the 2009 Grinnell Mutual Insurance Annual Loss Prevention Conference. Newton, Iowa. August 18, 2009.
41. *Manure Anaerobic Digestion Opportunities and Challenges*. EPA Region 7, Kansas City, Kansas. July 9, 2009.
40. *Overview Of Nutrient Management Planning with Anaerobic Digestion Effluent*. Invited presentation to the Tianjin China Environmental Protection Division. Tianjin, China, July 28, 2009.
39. *Overview of US Animal Production Systems and Manure Management Options*. Invited presentation to the Chinese Academy of Agricultural Sciences. Beijing China. July, 27, 2009.

**Recent Invited Lectures and Presentations (2005-2009) – (Continued):**

38. *Introduction to Intermediate Level Understanding of Anaerobic Digestion Training*. Three (3) Invited presentations at the 2009 Hi-Tech Conference, Scottsdale, Arizona. July, 20 2009.
37. *Review of Manure Cover Options for Manure Storage and Biogas Collection*. Invited presentation, broadcast nationally as an NRCS. NetMeeting. November 20, 2008.
36. *Southeastern Broiler Gaseous and Particulate Matter Emissions Monitoring*. Invited presentation to the United States Environmental Protection Agency. Research Triangle Park, NC. October 27, 2008. Co-presented with Drs. H. Xin and R.S. Gates.
35. *Vegetated Treatment Systems; Current System Performance and Design Options*. Invited presentation at the Heartland Fall TSP Training. Saint Joseph, MO. October 1-2, 2008.
34. *Compacted Clay Liner Installation and Quality Assurance to Minimize Seepage*. Invited presentation at the Heartland Fall TSP Training. Saint Joseph, MO. October 1-2, 2008.
33. *The Rules of the Game: Using the First Three Laws of Thermodynamics to Asses Advanced Manure Treatment Systems*. Invited presentation at the Heartland TSP College. Omaha, Nebraska. March 11-23, 2008.
32. *Nitrogen Fate and Forms in Advanced Manure Treatment*. Invited presentation at the Heartland TSP College. Omaha, Nebraska. March 11-23, 2008.
31. *Unit Operations and Processes in Advanced Manure Treatment*. Invited presentation at the Heartland TSP College. Omaha, Nebraska. March 11-23, 2008.
30. *Use of Solids Separation in Advanced Manure Treatment*. Invited presentation at the Heartland TSP College. Omaha, Nebraska. March 11-23, 2008.
29. *Use of Flocculation / Coagulation in Advanced Manure Treatment*. Invited presentation at the Heartland TSP College. Omaha, Nebraska. March 11-23, 2008.
28. *Use of Aerobic Treatment in Advanced Manure Treatment*. Invited presentation at the Heartland TSP College. Omaha, Nebraska. March 11-23, 2008.
27. *Current Status of Beef Manure Anaerobic Digestion in the United States*. Invited presentation to the Iowa Beef Center team members. Ames, Iowa. October, 2007.
26. *Overview of Advanced Manure Treatment Technologies*. Invited national webcast presentation for the Livestock Poultry Environmental Learning Center. October, 2007.
25. *Agricultural Waste Management Education: How will we respond in the next 100 years?* One of four invited presentations at a special session on "Agricultural and Biosystems Engineering: The Next 100 Years" that was held on the 100<sup>th</sup> anniversary of ASABE at the 2007 Annual International meeting in Minneapolis, Minnesota.
24. *Ammonia Emissions from Representative Tyson Broiler Houses*. Invited presentation made to the Sierra Club leadership. Springdale, Arkansas. May 30, 2007.
23. *Current Status of Dairy Manure Anaerobic Digestion in the United States*. Invited presentation to the Dairymen in northeastern Iowa. Orange City, Iowa. May 24, 2007.
22. *Current Status of ISU Vegetated Treatment Beef Run-Off Control System Research*. Invited presentation to Heartland Water Quality Workshop. April, 2007.
21. *Measurement and Mitigation of Air Emissions from Poultry Systems*. Invited presentation to Iowa USDA-NRCS Personnel. March, 2007.
20. *Introduction to Unit Operations and Processes for Advanced Manure Treatment*. Invited presentation to the Farm Pilot Progress Corporation Leadership Board. Greenville, North Carolina. February 22, 2007.
19. *Update on U.S. Poultry Air Emissions Studies*. Invited presentation to the USDA - Agricultural Air Quality Task Force. Harrisburg, Pennsylvania. August 2006.
18. *Use of the National Comprehensive Management Plan Core Training Curriculum*. Invited national webcast presentation for the Livestock Poultry Environmental Learning Center. September 15, 2006.
17. *Air Emissions from Poultry Production Systems – a National View*. Invited speaker at the 2006 National Poultry Waste Management Symposium. Springdale, Arkansas, October 23-25, 2006.
16. *Using CNMPs to meet NPDES Permit Nutrient Management Plan Requirements*. Invited speaker at the 39<sup>th</sup> Meeting Midwestern Sectional Scientific Sessions and Business Meeting, American Society of Animal Science and the American Dairy Science Association. Des Moines, Iowa, March 20-22, 2006.
15. *What are the Choices to Mitigate Air Quality Problems? An Overview of Possible Approaches*. Invited presentation given in as part of the Air Quality Solutions for Swine Producers: Examining the Options" program held in Lewis, IA on March 7, 2006 and in Webster City, Iowa on March 8, 2006.

**Recent Invited Lectures and Presentations (2005-2009) – (Continued):**

14. *Agricultural Production in Zambia's Mpongwe Region*. Invited presentation to the Iowa State University Agronomy Club. Ames, Iowa. March 2, 2006.
13. *Vegetated Treatment Systems Update and Developing a Better NMP/CNMP* and on "Field Experience with Vegetated Treatment Systems" Heartland Animal Manure Management Workshop; Nebraska City, Nebraska April 4-5, 2006.
12. *Iowa Swine Confinement Regulation Update*. Presented at the 2006 Northeast Iowa Swine Conference in Oelwein, Iowa. January 17, 2006.
11. *Agricultural Production in Zambia's Mpongwe Region*. Invited presentation to Engineers for a Sustainable World - Iowa State University Chapter. Ames, Iowa. November, 2005.
10. *Chemical Amendment Applications for Phosphorus Reduction from Animal Wastes*. Invited presentation at the INTERTECH Coagulants and Flocculants 2005 Conference. Chicago, Illinois. September 19-21, 2005.
9. *Selection and Performance of Mechanical Solids-Liquid Manure Separators*. Invited speaker at the NRAES Dairy Waste Management conference in Syracuse, New York. March 14, 2005.
8. *Comprehensive Nutrient Management Planning to Swine Farms*. Invited speaker at an Iowa Pork Producers Association producer meeting in Des Moines, Iowa on May 18, 2005.
7. *Selection and Use of Manure Solids Separators*. Invited speaker at the Heartland Water Quality meeting in St. Joseph, Missouri. June 1, 2005.
6. *Swine Manure Management – National Issues and Answers*. Invited to serve as one of three recognized experts on manure management at the National Pork Board panel discussion at the World Pork Expo on June 9, 2005. Discussion was aired on national radio (Brownfield Network).
5. *Manure Management Planning to Iowa Swine Producers*. Invited speaker by the Iowa Pork Producers Association. Presented manure management planning seminars at six locations in Iowa to 300 producers during the week of August 22, 2005.
4. *Development of Environmentally Sustainable Animal Production Systems*. Invited presentation to the faculty of the Animal Science Department at Seoul National University. Seoul, South Korea. February, 2005
3. *An Overview of Agricultural Production in the Mid-Western United States*. Invited presentation to the faculty of the Biosystems Engineering Department antiknock University. Chungbuk, South Korea. February, 2005
2. *Animal Production Systems in the United States*. Invited presentation to the Republic of Korea National Livestock Research Institute, RDA, Suwon, South Korea. February, 2005
1. *Using CNMPs for Manure Management Planning*. Invited speaker at a seminar on Manure Management Planning for pork producers at the Iowa Pork Congress held in Des Moines, Iowa on January 26 & 27, 2005.

## Honors & Awards:

- **US EPA Farm, Ranch, and Rural Communities Committee Member (FRRCC).** Selected as a member of the 2010 – 2012 US EPA FRRCC. The FRRCC is tasked with providing independent policy advice, information, and recommendations to the US EPA Administrator on environmental issues and policies of importance to agriculture and rural communities. (2010- 2012).
- **2009 G.B. Gunlogson Countryside Engineering Award.** Awarded by the American Society of Agricultural and Biological Engineers for engineering practices resulting in enhancement of techniques or technology for countryside development or other leadership activities which promoted development of the countryside.
- **United States Department of Agriculture – Agricultural Air Quality Task Force Member.** Selected by the Chief of the USDA Natural Resources Conservation Service to serve as a member of the National USDA Agricultural Air Quality Task Force (AAQTF). The AAQTF advises the U.S. Secretary of Agriculture regarding the role of USDA in providing oversight and coordination related to agricultural air quality. (2008 – 2010).
- **Iowa Section of the ASABE Young Engineer of the Year.** Presented by the Iowa Section of the American Society of Agricultural and Biological Engineers to recognize an outstanding engineer 40 years of age or less in the Iowa Section. (*Award was received twice, first in 2006 and again in 2008*).
- **2007 Iowa State University College of Engineering Superior Engineering Extension Award.** Presented by the Iowa State University College of Engineering to recognize superior programming in extension engineering at Iowa State University.
- **Honorary Professor with the College of Agriculture, Trakia National Agrarian University, Stara Zagora, Bulgaria.** Named August, 2007.
- **2007 Mid-Central Section of the ASABE Young Engineer of the Year.** Presented by the Mid-Central (Iowa, Nebraska, Kansas & Missouri) Section of the American Society of Agricultural and Biological Engineers to recognize an outstanding young engineer in the Mid-Central section.
- **2005 Honorary Senior Scientist.** Named a Senior Scientist in the Livestock Waste area for a three year term by The National Livestock Research Institute, RDA, South Korea.
- **2003 Nolan Mitchell Young Extension Worker Award.** Awarded by the American Society of Agricultural Engineers for distinguished educational programming in the areas of water quality and animal waste management.
- **2003 NACAA “Learning Module” National Winner Award.** Presented by the National Association of County Agricultural Agents, R. T. Burns, L. Moody and G. Grandle for the Comprehensive Nutrient Management Plan (CNMP) Certification Program Notebook.
- **2002 ASAE Blue Ribbon Award.** Awarded by the American Society of Agricultural Engineers in the Extension Methods Category for the TN CNMP Certification Program for TSPs. 2002.
- **2001 Outstanding Young Agent.** Awarded by the Tennessee Association of Agricultural Agents and Specialists. 2001.
- **Best Publication.** 1st Place statewide winner for best extension publication recognized by the Tennessee Association of Agricultural Agents and Specialist for *Solar Livestock Watering Systems*. (PB 1640 Co-authored with M.J. Buschermohle). April, 2000.
- **Outstanding Speaker** award given by USDA-NRCS for paper *Mass Balance Approach to Long Term Nutrient Management Planning* at the Southeast Animal By-Product Utilization Workshop. September 3, 1999.
- **Epsilon Sigma Phi State Team Award** - Member of the Sustainable Dairy Systems Team that received the 1998 Epsilon Sigma Phi State Team Award. 1998.
- **Tennessee Higher Education Environmental Stewardship Award.** Member of the Extension Environmental Stewardship Priority Team that received the 1998 award.
- **Friend To CFW** - Award given by the Coffee-Franklin-Warren Animal Waste Utilization Association for Continued Support and Interest to the Association’s Dairy and Swine Producers. 1998.
- **Exceptional Service Award.** Presented by The University of Tennessee Department of Civil and Environmental Engineering. 1995.
- **Undergraduate Student with Professional Promise** - Recognition awarded by the faculty of the University of Tennessee Agricultural Engineering Department. 1990
- **ASAE Student Honor Award** - Tennessee Student Engineering Branch. Given in Recognition of Conspicuous Student Activity. 1990.
- **Farm Shop Workhorse Award.** Given for Outstanding Achievement in Agricultural Mechanics by the Future Farmers of America (Owasso, Oklahoma Chapter). 1985.

**Membership in Professional and Honorary Societies:**

- Air and Waste Management Association
- American Society of Agricultural and Biological Engineers
- American Society of Engineering Educators
- Chi Epsilon (National Civil Engineering Honor Society)
- Tau Beta Pi Engineering Honor Society (National member and Alpha Chapter member)
- Phi Kappa Phi Honor Society (National Member and UTK Chapter member)
- Gamma Sigma Delta (Honor Society of Agriculture)