



**Position:**  
Odor Investigation

**Parent Firm:**  
Material Matters, Inc.

**Years of Experience:**  
With Firm: 12  
Total: 36

**Education:**  
2003 Ph.D., Agricultural & Biological Engineering, The Pennsylvania State University.  
1989 M.S. Agricultural Engineering, The Pennsylvania State University.  
1989 B.S. Agricultural Engineering, The Pennsylvania State University.  
194 B.S. Forest Science, The Pennsylvania State University.

**ROBIN C. BRANDT, PH.D., P.E.**  
Vice President – Research & Development, Material Matters, Inc.

## OVERVIEW

Responsible for development of new initiatives and peer review of technical project elements/procedures related to processing/management of residuals. Projects include: sensory evaluation of organic residuals odors (biosolids, WWTP emissions, Ag wastes, etc.); P (phosphorus) index nutrient management projects involving municipal wastewater biosolids and food processing residuals (FPRs). Serves as coordinator/ liaison for selected projects involving consultation with Pennsylvania State University faculty and/or service providers. As Director of the Penn State Odor Assessment Laboratory, responsible for oversight/ supervision of PSU Odor Assessment Laboratory projects/ personnel and participation in environmental odor studies (WWTP biosolids & Ag odors).

- P.E.: Pennsylvania – No PE-037888-E (1988)

## PROJECT EXPERIENCE

### **Wastewater Treatment Facility Odor Survey and Renovation of Failing Compost facility Biofilter, State College, Pa.**

**Owner:** University Area Joint Authority – David Allison or Steven Welch/814.238.5361

**Description:** Project manager for investigation of principal malodor sources/emission rates from selected facility processes and diagnosis of underperforming compost facility biofilter. Biofilter failure was determined to be directly related to filter media decomposition and filter fabric blinding. Air flow short circuiting allowed untreated air to be exhausted. Remediation involved bench-top experiments on candidate replacement media and isolation layer materials, removal of all existing media and fabric, and replacement with a coarse plastic mesh and mixture of softwood chips. The renovated biofilter resulted in an immediate reduction in nuisance odor complaints and continued to perform well until it was decommissioned (5+ years), when facilities were expanded.

### **Use of Steady-State Flux Chamber Technology for Collection/ Analysis of Biosolids Gas Emissions, for Philadelphia Biosolids Recycling Center.**

**Owner:** Philadelphia Water Department - William Toffey/215.407.1998

**Description:** Technical project manager for collaborative study with the *Penn State University Odor Assessment Laboratory* (PSOAL) to employ the PSU steady-state flux chamber (SSFC) system for collection of biosolids off-gas emissions. For this project, Philadelphia biosolids were placed in the SSFC at agronomic rates to simulate emissions expected from surface-applied material in the field. In one trial, ammonia & green house gas emissions (CH<sub>3</sub>, N<sub>2</sub>O, CO<sub>2</sub>) were continuously recorded on ~20-minute intervals for 90 hrs, using a photoacoustic gas analyzer. The system was also used to collect Teldar™ bag air samples, which were then evaluated using sensory evaluation techniques, including: dynamic olfactometry (triangular forced-choice), and odor quality (character, hedonic tone, and intensity). Tedlar™ bag air samples from the SSFC were also evaluated for specific odorants via GC-MS and GC-FID methods. A number of important findings were revealed through this project, including GHG emission levels from Philadelphia biosolids when surface-applied.

### **Sensory Evaluation of Nuisance Odors Originating From the Philadelphia Biosolids Recycling Center.**

**Owner:** Philadelphia Water Department - Jim Golembeski/215.685.4073

**Description:** Technical project manager for application of improved methodology for quantifying odor *dilution-to-threshold* (D/T) levels using multi-assessor field Olfactometry, pioneered at the PSOAL. The technique was used to perform an *odor survey* at the Philadelphia Biosolids Recycling Center (BRC): to benchmark odor emissions originating from the BRC site under current operating conditions, & identify vulnerable perimeter locations for off-site odor complaints. Odor survey stations were selected to encircle portions of the BRC site, including both upwind and downwind positions *inside-the-fence*. Field olfactometer instruments were used to collect multiple D/T observations at each location, and the *10-minute Best Estimate Odor Threshold* (BET<sub>10</sub>) was determined. Objective odor concentration and subjective odor quality observations

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were remarkably (statistically) consistent. The study concluded that current operations/ practices produce a low probability for off-site nuisance odor complaints.

## **PUBLICATIONS & PRESENTATIONS (PARTIAL LIST)**

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- Brandt, R.C. (presenter), T.E. Johnston, W. Toffey, and J. Golembeski. 2009. Use of field olfactometry for quantification of WWTP dewatering facility odor emissions. *In proceedings (to be available 10/10/09):* WEFTEC-2009 – 82<sup>nd</sup> annual Water Environment Federation Technical Exhibition and Conference. October 10-14, 2009. Orlando, FL.
- Brandt, R.C. (presenter), M.A.A. Adviento-Borbe, M.A. Higgins, T.E. Johnston, W.E. Toffey, and J. Golembeski. 2009. *Use of inventory management to mitigate odor emissions from land applied biosolids.* *In Proceedings:* Water Environment Federation Residuals and Biosolids Conference, 2009. May 3-6, 2009. Portland, OR.
- Brandt, R.C. (presenter), H.A. Elliott, M.A.A. Adviento-Borbe, and E.F. Wheeler. 2009. *Field olfactometry for odor related decision-making.* *Presented at:* ASABE Annual International Conference, June 21-24, 2009. Poster No. 096134. Reno, NV.
- Brandt, R.C. (presenter). 2008. *Sensory quantification of odors in the field.* *Presented at:* Pennsylvania Water Environment Association – PennTec 2008. June 1-4, 2008. State College, PA.
- Brandt, R.C. (presenter), H.A. Elliott, M.A.A. Adviento-Borbe, E.F. Wheeler, P.J.A. Kleinman, D.B. Beegle. 2008. *Field olfactometry assessment of dairy manure application methods.* *Presented at:* ASABE Annual International Conference, June 29-July 2, 2008. Providence, RI. Poster and ASABE Pub. No.084939. St. Joseph, MI.
- Lascano, G.J., Topper, P.A., R.C. Brandt, M.A.A. Adviento-Borbe, E.F. Wheeler, and A.J. Heinrichs. 2008. *Ammonia emissions and olfactometry analysis of limited fed high and low concentrate diets with different forage quality in dairy heifers.* *J. Dairy Sci.* 91: E-Suppl. 1: 488.
- Brandt, R.C. (presenter). 2007. *Odor evaluation methods.* *Presented at:* Dairy Practices Council Annual meeting. Dairy practices through education and cooperation. November 7, 2007. Four Points Sheraton, Harrisburg, PA.
- Brandt, R.C. (presenter). 2007. *Odor paneling protocols.* *Presented at:* Mid-Atlantic Biosolids Association. MABA Annual Biosolids Symposium – Hot topics / hot-tools for effective biosolids management. November 7, 2007. University of MD, Baltimore County campus, MD.
- Brandt, R.C. (presenter). 2007. *Nuisance odors and sensory evaluation using the Nasal Ranger Field Olfactometer.* *Presented at:* Effective and Efficient effects of minimum disturbance injection equipment – Field staff training session. Maryland Department of Agriculture. September 27, 2007. Paul Coblentz Farm, Middleton, MD.
- Brandt, R.C. (presenter). 2007. *Understanding nuisance odors. AND. Sensory evaluation of agricultural odors using the Nasal Ranger Field Olfactometer.* *Presented at:* Agricultural Odor Management Training for NRCS, Conservation Districts, Planners, and Extension. May 16, 2007. Livestock Evaluation Center, Pennsylvania Furnace, PA.
- Wagner, D.J., H.A. Elliott, R.C. Brandt, and D. Jaiswal. 2008. Managing biosolids runoff phosphorus using buffer strips enhances with water treatment residuals. *J. Environ. Qual.* 37:1567-1574.
- Elliott, H.A., R.C. Brandt, and J.S. Shortle. 2007. Biosolids disposal in Pennsylvania. Final Report prepared for the Center for Rural Pennsylvania. Released November 2007. Harrisburg, PA. Available on-line at (confirmed 11/12/08): <http://www.ruralpa.org/biosolids07.pdf>
- Brandt, R.C. (presenter). 2007. Sustaining biosolids recycling under phosphorus-based nutrient management. *Presented at:* Pennsylvania Water Environment Association – PennTec 2007. June 3-6, 2007. State College, PA.
- Brandt, R.C. (presenter). 2007. Selection of a universal WEP test for manures and biosolids as an indicator of runoff loss potential. *Presented at:* Mule Barn Group and the Mid-Atlantic Regional Water Program - A Day with Phosphorus Source Coefficients. May 22, 2007. Fredericksburg, MD.
- Kleinman P.J.A., D. Sullivan, A. Wolf, R.C. Brandt, Z. Dou, H.A. Elliott, J. Kovar, A. Leytem, R. Maguire, P. Moore, L. Saporito, A. Sharpley, A. Shober, T. Sims, J. Toth, G. Toor, H. Zhang, T. Zhang. 2007. Selection of a water extractable phosphorus test for manures and biosolids as an indicator of runoff loss potential. *J. Envir. Qual.* 36:1357-1367.

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- Kleinman, P.J.A., A.N. Sharpley, A.M. Wolf, D.B. Beegle, H.A. Elliott, J.L. Weld, and R.C. Brandt. 2006. Developing an environmental manure test for the phosphorus index. *Comm. Soil Sci. Plant Anal.* 37: 2137-2155.
- Elliott, H.A., R.C. Brandt, P.J.A. Kleinman, A.N. Sharpley, and D.B. Beegle. 2006. Estimating source coefficients for phosphorus site indices. *J. Environ. Qual.* 35(6): 2195-2201.
- Brandt, R.C. and H.A. Elliott. 2005. Sensitivity analysis of the Pennsylvania phosphorus index for agricultural recycling of municipal biosolids. *J. Soil Water Cons.* 60:209-219.
- Elliott, H.A., R.C. Brandt, and G.A. O'Connor. 2005. Runoff phosphorus losses from surface-applied biosolids. *J. Environ. Qual.* 34:1632-1639.
- Elliott, H.A. J. Womer, J.H. Kang, R.C. Brandt, and G.A. O'Connor. 2005. Neutral ammonium citrate extraction of biosolids phosphorus. *Comm. Soil Sci. Plant Anal.* 36: 2447-2459.
- Brandt, R.C., H.A. Elliott, G.A. O'Connor. 2004. Water-extractable phosphorus in biosolids: Implications for land-based recycling. *Water Environ. Research.* 67: 121-129.