Dr. Brandt is an officer and partner with Material Matters, Inc., where he is responsible for technical aspects of odor-related projects and development/review of project elements/procedures for new initiatives involving land-based recycling. Dr. Brandt is a faculty member with the Department of Agricultural and Biological Engineering at the Pennsylvania State University, University Park campus. He is a founding collaborator (2007) and Director of the Penn State Odor Assessment Laboratory (PS-OAL). As a Senior Lecturer, he teaches several undergraduate courses related to Natural Resource Engineering during the academic year. Areas of interest include: environmental odor studies; measurement of ammonia, hydrogen sulfide and greenhouse gas emissions from organic residuals; human sensory quantification of environmental odors via field and laboratory-based olfactometry techniques; quantification of odor quality characteristics; development of improved and/or simplified odor assessment techniques for inexpensive odor qualification, and; remediation strategies to manage/reduce odors from animal agriculture operations. He has also investigated phosphorus (P)-based land application of municipal wastewater biosolids and participated in projects involving characterization and sprinkler-application of food processing residuals (FFPRs). Dr. Brandt is a Co-author of the Pennsylvania Department of Agriculture document entitled, Odor management in agriculture and food processing - A manual of practice for Pennsylvania (2002), and; the Pennsylvania Department of Environmental Protection, FPR Management Manual (1994). He also authored selected portions of the PA Biosolids Recycling Manual and National Manual of Good Practice for Biosolids (2003).

Selected Relevant Experience

University Area Joint Authority (UAJA), State College, PA – Spring Creek Pollution Control Facility (SCPCF) – Odor Control Study. Teamed with HRG.....

This assignment was a team project with Herbert, Rowland and Grubic, Inc. (HRG) engineers, who served as project lead. Material Matters recruited the PS-OAL and collaborated to secure field and laboratory odor characterization information, and selected odorant concentration measurements using specialized equipment. Data was analyzed to produce air dispersion model (AERMOD) mapping and derive critical information prioritizing odor sources for targeted evaluation of appropriate odor control equipment. Pertinent findings follow:

Emission sources contributing the greatest odor emissions at the SCPCF (Odor Emission Rates, OER expressed as OU/sec) included: the composting building exhaust directed through the biofilter, dewatering building stack, headworks building, and primary clarifiers. Field olfactometry surveys confirmed the presence of malodors off-site from the SCPCF, which logically originated from the plant. Odor emissions were dominated by sulfur-based compounds including: methyl mercaptan, hydrogen sulfide, dimethyl sulfide, and dimethyl disulfide. Trimethylamine and butanoic acid concentrations were also detected above recognized human Low Odor Threshold levels. Air dispersion modeling, together with observations documented during the study by odor panels, generally confirmed anecdotal reports of occasional off-site nuisance odor episodes (field olfactometry observations ≥7 D/T are commonly recognized as a reasonable odor nuisance threshold). Considerable variation in OERs from the various odor sources were documented across the three seasonal data collection Events in this study. The most notable variations were found for the compost building/biofilter facility, which showed steady improvement with each sampling Event. This OER reduction was believed largely due to maintenance and operational changes initiated by UAJA personnel since the beginning of the odor study. Air dispersion modeling results from trial runs assuming a 95% reduction in maximum OERs from the biofilter and dewatering building stack facilities (the two greatest OER sources at the SCPCF) suggested that off-site odor nuisance episodes could be substantially eliminated by focusing on these two sources.
Lancaster Area Sewer Authority (LASA), Lancaster, PA. - On-Site Odor Detection and Measurement Training.

Developed a simple bench-top method for in-house assessment of biosolids odors and conducted an Odor Detection and Measurement Workshop for administrative and operations staff. LASA personnel were trained to evaluate odor intensity, character, and hedonic tone (pleasantness) of lime-stabilized biosolids using the syringe method (ASTM D1391). Odor samples were collected from the headspace of one-gallon static chambers constructed by Material Matters. Conducted a trial odor panel with plant personnel serving as assessors, using LASA biosolids secured from storage piles representing different aged material, and several biosolids from other local facilities. Trial results were summarized and reported back to LASA. The simplified odor assessment method/equipment and training provided LASA with a practical in-house method to assess the odor potential of biosolids from material stored for varying lengths of time. The trial assessment confirmed that lengthy storage time results in higher odor emissions from lime-stabilized biosolids. The procedure is currently being used by in-house staff to investigate acceptable storage duration for biosolids produced at the LASA facility.

District of Columbia Water and Sewer Authority, Washington, D.C. - Olfactometry Survey of the Blue Plains Advanced Wastewater Treatment Facility (BPAW). Teamed with AECOM.....

Served as project manager for an assignment involving the transport and set-up of dynamic olfactometry equipment from the Penn State Odor Assessment Laboratory to a hotel in the Washington, D.C area to facilitate quick turn-around (same day) odor panel evaluations of whole-air samples secured at the BPAW. Over the course of two five-day on-site testing cycles, over 115 individual air samples were evaluated for characteristics including: detection threshold via Dynamic Triangular Forced-Choice Olfactometry (EN13725-2003); persistency; intensity; character and hedonic tone. Same-day assessment was performed to minimize sample deterioration resulting from extended Tedlar™ bag sample holding times. As a result a majority of samples were assessed within four-hours of collection in the field. Information is being used by BPAW upgrade design engineers to model odor emissions, to insure proposed facility improvements include appropriate odor control measures.


Developed an improved methodology for quantifying odor dilution-to-threshold (D/T) levels using field olfactometry, pioneered at the Penn State Odor Assessment Laboratory, was used to perform an odor survey at the Philadelphia Biosolids Recycling Center (BRC). The objectives of this study were: to benchmark odor emissions originating from the BRC site under current operating conditions, and; identify vulnerable perimeter locations for off-site odor complaints. Four odor survey events were performed at the BRC in late July 2008. Thirteen odor survey locations (stations) were selected to encircle active portions of the BRC site, including both upwind and downwind positions inside-the-fence. Field olfactometer instruments were used to collect multiple dilution-to-threshold (D/T) observations at each location, and the 10-minute Best Estimate Odor Threshold (BET10) was determined. Field olfactometer measurements were complimented with subjective odor quality observations. Temperatures up to 100°F and wind speeds rarely exceeding 5 mph were recorded during survey events, insuring conditions favoring release of nuisance odors. Objective odor concentration and subjective odor quality observations were remarkably consistent. The study offered several recommendations to reduce odor emissions and concluded that current operations/practices produce a low probability for off-site nuisance odor complaints.


Served as technical project manager for collaborative study with the Penn State University Odor Assessment Laboratory (PS-OAL) to employ the PSU steady-state flux chamber (SSFC) system technology for collection of biosolids off-gas emissions. For this project, Philadelphia biosolids were placed in the SSFC at equivalent agronomic rates to simulate emissions expected from surface-applied material in the field. In one trial, ammonia & greenhouse gas emissions (CH₄, N₂O, CO₂) were continuously recorded on ~20-minute intervals for 90 hrs using a photoacoustic gas analyzer. The system was also used to collect Tedlar™ 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.
Selected Relevant Publications and Presentations


