

*CE SCHMIDT, Ph.D.*  
Environmental Consultant

**CHARLES E. SCHMIDT**  
**19200 LIVE OAK ROAD**  
**RED BLUFF, CALIFORNIA 96080**  
**(530) 529-4256**  
**FAX (530) 529-4878**  
*ceschmidt.com; schmidtce@aol.com*

EDUCATION:

Ph.D., Analytical Chemistry, University of Michigan, Ann Arbor, MI, 1980.  
B.A., Chemistry, Oberlin College, Oberlin, OH, 1975.

EXPERIENCE:

Independent Environmental Consultant, Red Bluff, CA, 1989 - Present.  
Senior Staff Scientist, Radian Corporation, Sacramento, CA, 1980-1989.  
Graduate Teaching Assistant, University of Michigan, Ann Arbor, MI, 1975-1980.  
Chemical Consulting Service Coordinator, Ann Arbor, MI, 1976-1980.  
Teaching Assistant, Oberlin College, Oberlin, OH, 1974-1975.

FIELDS OF EXPERIENCE:

Dr. Schmidt has served as Senior Staff Scientist/Project Director, Consultant, and/or major Task Leader on a number of projects associated with the management of hazardous waste and assessment of air emissions from area sources. Technical involvements have focused primarily on the assessment and evaluation of atmospheric contaminant emissions from hazardous waste facilities and area sources, including: the design, fabrication, and testing of direct emissions sampling devices; gaseous emission control technology design and testing; continuous real-time gas contaminant monitoring and integrated gas sampling; atmospheric emissions modeling; and data reduction, interpretation, and reporting. Responsibilities for these projects include: development of technical approach; test plan/quality assurance project plan design; project health and safety; schedule and budget management; field and laboratory supervision; and project reporting.

Significant and recent project experience includes:

- o Developed technical approaches, wrote quality assurance project plans, and used direct emission measurement technologies to estimate air toxic emissions from a variety of area sources and facilities satisfying state and federal regulations.
- o Performed a variety of projects assessing air emissions from subsurface area sources, mainly in industrial/residential settings, providing source-term data for health risk assessment studies.

## **Charles E. Schmidt**

- o Coordinating consulting organizations and developing project teams in response to client request for services for air toxics compliance testing.
- o Expert witness providing testimony on the design and effectiveness of air monitoring and air emission (source) control associated with a Superfund hazardous waste site and permitted treatment facility.
- o Development of a technical approach to assess potential health effects from the volatilization of organic compounds from contaminated ground water. The approach included survey work in subsurface utilities, soil gas testing, and indoor and outdoor air toxic measurement and monitoring.
- o Development of the technical approach and implementation of the approach used to assess the air quality degradation of air emissions from a biomedical research facility (University of California, San Francisco). The approach included source testing for volatile organic compounds and radionuclides, ambient sampling and analysis, air quality modeling, and risk assessment.
- o Design and implementation of a field testing program to evaluate the application of the isolation emission flux chamber for exposure assessment. The program included selecting a test site suitable for comparing the direct chamber technique to the best available indirect atmospheric measurement and modeling technique (transect sampling/dispersion modeling); and designing a technical approach for conducting the field test.
- o Design and direction of a large west coast investigation to study off-site impacts to areas surrounding the refinery. Large area liquid hydrocarbon plumes on ground water were creating hydrocarbon vapor impacts in structures. The investigation included indoor air structure surveys, soil sampling and analysis, subsurface emission measurements using the downhole isolation emission flux chamber, contour plotting, and involvement in testing a vapor collection system for the mitigation of the impacts to the communities and environment.
- o Technical involvement for developing field investigations to address state air quality regulations and compliance to the Toxics Pit Cleanup Act (surface impoundments) at a large west coast refinery.
- o Development of test protocols and implementation of testing activities in compliance to the Calderon landfill testing requirements at private and government landfills.

## Charles E. Schmidt

- o Lead technical role in remedial investigations at three major hazardous waste sites involving significant potential for air emissions of potentially toxic gas and particulate matter species. Two sites included the design of air monitoring during remediation, and one site included air monitoring and the design and mitigation of air emissions during remediation.
- o Development of testing protocols using the isolation emissions flux chamber to aid in the development and marketing of vapor suppression foam products for a private client. These foams are used for vapor emissions control at hazardous waste sites.
- o Volatile emissions surveys at five sites for EPA-Environmental Monitoring Systems Laboratory, Las Vegas, Nevada, using direct and indirect source testing technologies. These data were used to assess the utility of various techniques as well as collect volatile emissions rate data on air emissions from various treatment, storage, and disposal facilities for hazardous waste.
- o Production of air monitoring and air quality assessment manuals for hazardous site remediation for the Department of Environmental Quality, New Jersey.
- o Lead role in the development of surface isolation emission flux chamber technology for EPA-EMSL Las Vegas and additional subsurface (downhole and ground probe) technologies.
- o Technical involvement in remedial investigation/feasibility studies at a total of 19 hazardous waste sites, most involving the study of the air contaminant pathway.

### HONORARY/PROFESSIONAL SOCIETIES:

Phi Lambda Upsilon, Delta Chapter, 1977

American Chemical Society, 1980

Air Pollution Control Association/Air and Waste Management, 1985-to-Present

### SIGNIFICANT PUBLICATIONS/PRESENTATIONS

Kiefer, Ken, CE Schmidt, et. al. "Assessing Vapour Intrusion- How Do Assessment Technologies Compare?", *Remediation Australia*, Issue 12, pp. 16-19, 2014.

Schmidt, CE, et. al. "California Composting Trial in Impacted Air Shed", *Bio Cycle*, October 2013, pp. 33-36.

## **Charles E. Schmidt**

Schmidt, CE and Tom Card, "Air Emissions Control for Composting Operations", *Bio Cycle*, March 2012, pp. 27-32.

Schmidt, CE, et. al., "Comparison of Technologies for Assessing Vapor Intrusion In Future Structures from Subsurface Source- Case Study with Side-by-Side Measured Flux and J&E Modeling", Paper No. 2011-A-944-AWMA, Proceedings of the 104<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Orlando, Florida, June, 2011.

Schmidt, CE, et. al., "Assessing VOC Emissions and Ozone Reactivity from a Compost Site Biofilter Using Conventional and Innovative Technologies", Paper No. 2011-A-946-AWMA, Proceedings of the 104<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Orlando, Florida, June, 2011.

Schmidt, CE, et. al., "Assessing Air Emissions of VOCs, Ammonia, Fixed Gases, and Siloxanes from Biofilters at Compost Facilities Using the SCAQMD Modified USEP Surface Flux Chamber Technology", Paper No. 2011-A-945-AWMA, Proceedings of the 104<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Orlando, Florida, June, 2011.

Schmidt, CE and Tom Card, "Air Emissions Assessment Technologies", *Bio Cycle*, March 2011, pp. 54-57.

Schmidt, CE, Ron Sahu, Mark Jones, Kevin Kiefer, "Comparison of Measured Flux Versus Modeled Flux of VOCs from a Groundwater Source- Case Study with Side-by-Side Flux and Soil Gas Measurements," AWMA Symposium on Air Quality Measurement Methods and Technology, Los Angeles, CA, November 2010.

Schmidt, CE, Peter Green, et. al., "Assessing Ozone Reactivity Emissions from a Biofilter at a Compost Facility Using the SCAQMD Modified USEPA Surface Flux Chamber Technology and the UC Davis Mobile Ozone Chamber," AWMA Symposium on Air Quality Measurement Methods and Technology, Los Angeles, CA, November 2010.

Schmidt, CE, Tom Card, Steve Hoyt, Lorrie Loder, "Assessing Air Emissions of VOCs, Ammonia, Fixed Gases, and Siloxanes from Biofilters at Compost Facilities Using the SCAQMD Modified USEPA Surface Flux Chamber Technology," AWMA Symposium on Air Quality Measurement Methods and Technology, Los Angeles, CA, November 2010.

Schmidt, CE, Teri Copeland, Mark Jones, " Land Redevelopment Case Study: Assessing Potential Health Risks Related To Vapor Intrusion of VOCs and Radon Using Static and Dynamic Flux Chambers," AWMA Specialty Conference on Vapor Intrusion, San Diego, CA, January 2009.

## **Charles E. Schmidt**

Schmidt, CE, TR Card, “Validation of the Modified USEPA Flux Chamber Technology for Assessing High Advective Flow Sources such as Biofilters at Compost Sites,” Paper # A446.2, Proceedings of the 101<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Portland, Oregon, June, 2008.

Schmidt, CE, TR Card, J Goodwin, “Validation of the Modified USEPA Flux Chamber Technology for Assessing High Advective Flow Sources such as Biofilters at Compost Sites,” 16<sup>th</sup> Annual Composting Council Conference, Oakland, California, February 2008.

Schmidt, CE, Steve Hoyt, “Validation of Volatile Fatty Acid Recovery from the USEPA Surface Emission Isolation Flux Chamber Technology and USEPA Method TO-17”, AWMA Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, May, 2007.

Schmidt, CE, Steve Hoyt, “Validation of Volatile Fatty Acid Recovery from the USEPA Surface Emission Isolation Flux Chamber Technology and USEPA Method TO-17”, AWMA Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, May, 2007.

Schmidt, CE., Robert Kick., “Use of Flux Chambers and Indoor Air Measurements to Evaluate Vapor Intrusion”, AWMA Specialty Conference on Vapor Intrusion, Los Angeles, CA, September 2006.

Schmidt, CE, et. al., “Reactive Organic Gases and Amine Emission Estimates from Northern California Dairies: Direct Measurement Using the USEPA Surface Emission Isolation Flux Chamber”, 2006 International Conference on ‘The Future of Agriculture: Science, Stewardship, and Sustainability’, Sacramento, CA, August 2006.

Schmidt, CE, et. al., “Evaluating Direct Measurement Approaches Used for Assessing Potential Air Pathway Impacts to Occupants in Structures Over Subsurface Sources”, AWMA Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, April, 2005.

Stelljes, Mark, CE Schmidt, “Assessing Potential Air Pathway Impacts to Occupants of Future Structures in Cold Climates Using Predictive Modeling and Surface Flux Measurements on Undeveloped Sites”, AWMA Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, April, 2005.

Schmidt, CE, Tom R. Card, Patrick Gaffney, Steve Hoyt, ”Assessment of Reactive Organic Gases and Amines from a Northern California Dairy Using the USEPA Surface Emissions Isolation Flux Chamber”, 14<sup>th</sup> USEPA Annual Emissions Inventory Conference Las Vegas, Nevada, April, 2005.

## **Charles E. Schmidt**

Kerger, Brent D., David R. Suder, CE Schmidt, DJ Paustenbach, “Airborne Exposures to Trihalomethanes from Tap Water in Homes With Refrigeration-Type and Evaporative Cooling Systems”, *Journal of Toxicology and Environmental Health*, Part A, 68:401-429, 2005.

Mills, William, Erin Bennett, CE Schmidt, Louis Thibodeaux, “Obtaining Quantitative Vapor Emissions Estimates of Polychlorinated Biphenyls and Other Semivolatile Organic Compounds from Contaminated Sites”, *Environmental Toxicology and Chemistry*, Vol. 23, No. 10, pp.2457-2464, 2004.

Leet, R. CE Schmidt, “Case Study- Tier 3 Assessments of Potential Risks to Occupants of an Office Building Over a Groundwater Contaminated Plume Via the Indoor Air Pathway,” Paper No. 455, Proceedings of the 97<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Indianapolis, Indiana, June, 2004.

Copeland, T., J. Van de Water, CE Schmidt, “Reducing Uncertainties in Health Risk Characterization, Part II: Methodologies for Assessing Indoor Air Exposures to Carcinogens,” Paper No. 361, Proceedings of the 97<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Indianapolis, Indiana, June, 2004.

Babyak, A., CE Schmidt, “Using EPA’s Dynamic Flux Chamber to Measure Vapor Flux from Subsurface Sources, Dealing with Regulatory Buy-In: Two Case Examples in California,” Paper No. 219, Proceedings of the 97<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Indianapolis, Indiana, June, 2004.

Schmidt, CE. A. Babyak, “Comparison of Static Chamber and Dynamic Chamber Technology for Assessing Infiltration of Soil Gas into Structures,” Paper No. 277, Proceedings of the 97<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Indianapolis, Indiana, June, 2004.

Schmidt, CE. E. Winegar, S. Hoyt, “A Practical Guide for the Measurement of Indoor Air Impacts from Subsurface Contamination,” Paper No. 278, Proceedings of the 97<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Indianapolis, Indiana, June, 2004.

Kick, R., CE Schmidt, JD McDermott , “Case Study- Assessing Potential Air Pathway Exposure to Occupants in Structures Over Groundwater Impacted by Volatile Organic Compounds Using Environmental Data Collected on Public and Private Property,” Paper No. 279, Proceedings of the 97<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Indianapolis, Indiana, June, 2004.

Schmidt, CE, Andrew Sheldon, Bruce Lewis, “USEPA Flux Chamber Technology and the Negative Pressure Enclosure for Assessing Potential Impacts to Occupants in Future Structures

**Charles E. Schmidt**

Over Contaminated Soil and Groundwater,” Paper No. 311, Proceedings of the 97<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Indianapolis, Indiana, June, 2004.

Greenberg, Alvin, CE Schmidt, “Direct Measured Data as Input to HRA for the Indoor Infiltration Scenario in Addition to Predictive Input,” Paper No. 352, Proceedings of the 97<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Indianapolis, Indiana, June, 2004.

Smyth, Brenda, C.E. Schmidt, “Air Quality Issues on Composting Horizon”, Biocycle, October 2002, PP. 42-51.

Schmidt, C.E., Heriberto Robles, Teri Copeland, Jim Van de Water, Michael Manning, “Measured Infiltration Flux as the Preferred Input to Indoor Exposure Assessment,” Paper No. 70, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Schmidt, C.E., Andrew Sheldon, “Measuring Indoor Infiltration Flux at -4Pa Underpressurization,” Paper No. 72, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Richter, Rich, Schmidt, C.E., “Assessing Realistic Risk to Indoor Occupants from Subsurface VOC Contamination,” Paper No. 69, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Greenberg, Alvin, Schmidt, C.E., “Assessing Fugitive Air Emissions and Health Risk to Landfill Neighbors Using Direct Flux Measurement and Indoor Air Monitoring,” Paper No. 71, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Boehnker, David, John Tiffany, Schmidt, C.E., “Estimating Exposure to Residents With Basements Using Measured Surface and Subsurface Flux Data,” Paper No. 67, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Bejorklund, Brian, Schmidt, C.E., Robin Streeter, “Air Pathway Analysis Characterizing Potential Exposure from a Dissolved-Phase Groundwater Plume using Direct Flux Measurement,” Paper No. 64, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

## **Charles E. Schmidt**

Schmidt, C.E., Nancy Beresky, Steve Hoyt, "Subsurface Flux Technology Used for Site Assessment," Paper No. 68, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Card, Tom, Schmidt, C.E., "Measuring Fugitive Emissions from WWT Processes with Weirs," Paper No. 78, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Card, Tom, Schmidt, C.E., "Advantages and Disadvantages of Measuring Flux on Liquid Surfaces Using Flux Chambers and Wind Tunnels," Paper No. 79, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Smyth, Brenda, Schmidt, C.E., "Estimating Fugitive Emissions from Greenwaste Compost Operations Using the USEPA Flux Chamber," Paper No. 14, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Thalheimer, Andrew, Mark Jones, Schmidt, C.E., "Measured Flux in an Air Pathway Analysis as a Necessary Step in Site Remediation," Paper No. 76, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Wojnowski, Gary, Schmidt, C.E., "Calibrating Water 9 Predictive Model Using Measured Fugitive Emissions Data," Paper No. 77, Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology, San Francisco, California, November 13-15, 2002.

Schmidt, C.E., Teri Copeland, Jim Van de Water, Michael Manning, "Predicting Potential Exposure from the Occupants in Future Buildings Using Direct Measurement and Predictive Modeling Techniques," Paper No. 43141, 95<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Baltimore, MD, June, 2002.

Schmidt, C.E., Nancy Beresky, Steve Hoyt, and Jeff Dagdigian, "Differentiating Multiple Sources of Subsurface Contamination by Similar Petroleum Products- Air Pathway Analysis Used in Conjunction with Routine Multimedia Site Assessment Technologies," Paper No. 42785, 95<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Baltimore, MD, June, 2002.

Sheldon, Andrew, and C.E. Schmidt, "Evaluation of an Underpressurized Emission Flux Chamber for Measuring Potential Subsurface Vapor Intrusion Into Buildings," Paper No. 42690, 95<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Baltimore, MD, June, 2002.



## **Charles E. Schmidt**

Card, Tom, C.E. Schmidt, Jay Witherspoon, Larry Koe, "Theoretical and Practical Considerations in the Use of Wind Tunnel for Odor Emission Measurement," Paper No. 42654, 95<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Baltimore, MD, June, 2002.

Card, Tom, and C.E. Schmidt, "Estimating Air Emissions from Unit Treatment Processes with Weirs," Paper No. 43373, 95<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Baltimore, MD, June, 2002.

Wojnowski, Gary, and C.E. Schmidt, "Calibration of Emission Model by Flux Chamber Measurements for Emissions from Industrial Facultative Ponds," Paper No. 43423, 95<sup>th</sup> Annual Meeting of the Air and Waste Management Association, Baltimore, MD, June, 2002.

Schmidt, C.E., Jared Rubin, "Indoor Infiltration Assessments of VOCs from Contaminated Groundwater Using the US EPA Flux Chamber," Paper No. 446, 93<sup>rd</sup> Annual Meeting of the Air and Waste Management Association, Salt Lake City, Utah, June, 2000.

Schmidt, C.E., et. al., "Comparison of Measured Versus Modeled Surface Flux of VOCs from Contaminated Groundwater", Paper No. 447, 93<sup>rd</sup> Annual Meeting of the Air and Waste Management Association, Salt Lake City, Utah, June, 2000.

Kerger, B.D., C.E. Schmidt, and D.J. Paustenbach, "Assessment of Airborne Exposure to Trihalomethanes from Tap Water in Residential Showers and Baths", Risk Analysis, Volume 20, No. 5, 2000.

Ostojic, Ned, Martha O'Brien, C.E. Schmidt, and John Chack, "Relationship Between Odor and Hydrogen Sulfide Emissions at a Water Pollution Control Plant in New York City", 2000 WEF Specialty Conference, Cincinnati, Ohio.

Greenberg, Alvin, Scott Santala, C.E. Schmidt, "The Utility of the Air Pathway Analysis for Landfills", 99-728, 92<sup>th</sup> Annual Meeting of the Air and Waste Management Association, St. Louis, Missouri, June, 1999.

Winegar, Eric, and C.E. Schmidt, "Analysis Using a Jerome 631-X Portable Hydrogen Sulfide Sensor : Laboratory and Field Evaluation", Report submitted to Arizona Instruments, Inc., December 30, 1998.

Schmidt, C.E., Steve Wilsey, Tom Hasek Jr., "Technical Approach for the Assessment of Air Emissions from Municipal Landfills Using the US EPA Flux Chamber and Dispersion Modeling to

## **Charles E. Schmidt**

Predict Off-site Impact Potential", 98-TA40.04, 91th Annual Meeting of the Air and Waste Management Association, San Diego, California, June, 1998.

Schmidt, C.E., Teri Copeland, Rich Pesin, "Comparison of Measured and Modeled Emissions from Subsurface Contamination at an Industrial Site in a Residential Neighborhood", 98-WPC.01, 91th Annual Meeting of the Air and Waste Management Association, San Diego, California, June, 1998.

Schmidt, C.E., T.F. Zdeb, "Direct Measurement of Indoor Infiltration Using the US EPA Flux Chamber and Dispersion Modeling", 98-TA9C.01, 91th Annual Meeting of the Air and Waste Management Association, San Diego, California, June, 1998.

Schmidt, C.E., John Ungvarsky, Eric Winegar, "Assessment of Ozone Precursor Emissions from the Dairy Industry", 97-MP74.01, 90th Annual Meeting of the Air and Waste Management Association, Toronto, Canada, June, 1997.

Schmidt, C.E., Lawrence Hentz, Eric Winegar, "Assessment of Odorous Emissions from Composting Facilities", 97-TP56.02, 90th Annual Meeting of the Air and Waste Management Association, Toronto, Canada, June, 1997.

Hentz, Lawrence, W.E. Toffey, C.E. Schmidt, "Understanding the Synergy Between Composting and Air Emissions", Biocycle, March, 1996, pp.67-75.

Schmidt, C.E., et.al., "Assessment of Odor Emissions Using the US EPA Flux Chamber and Olfactory Odor Measurement," 96-FA147.04, 89th Annual Meeting of the Air and Waste Management Association, Nashville, TN, June, 1996.

Schmidt, C.E., et.al., "Air Pathway Analysis in Support of Remediation of the Rocky Mountain Arsenal," 96-TP40.05, 89th Annual Meeting of the Air and Waste Management Association, Nashville, TN, June, 1996.

Hentz, Lawrence, W.E. Toffey, C.E. Schmidt, "Air Emissions from Philadelphia's Biosolids Composting Facilities," A468, 89th Annual Meeting of the Air and Waste Management Association, Nashville, TN, June, 1996.

Schmidt, C.E., Lawrence Hentz, E.D. Winegar, "Innovative Assessment and Engineering Evaluation of a Municipal Wastewater Treatment Facility," 96-TA29A.06, 89th Annual Meeting of the Air and Waste Management Association, Nashville, TN, June, 1996.

## **Charles E. Schmidt**

Hentz, Lawrence H., C.E. Schmidt, E.D. Winegar, "VOC and HAP Sampling and Analytical Procedures for Wastewater Treatment Facilities," Presented at the WEFTEC '95, National Water Environment Federation, Miami, Florida, October 21, 1995.

Schmidt, C.E., et. al., "Evaluation of Open Path Air Monitoring (FTIR/UV) for First Alert Monitoring, Fenceline Monitoring, and Estimating Emission Rates," 95-TP55.05, 88th Annual Meeting of the Air and Waste Management Association, San Antonio, Texas, June 1995.

DeVaull, G.E., J.B. Gustafson, C.E. Schmidt, "Surface Emission Flux Measurements: Background Levels," Proceedings of the Fourth Annual West Coast Regional Specialty Conference on Current Air Toxic Issues, AWMA, November, 1994.

Cohen, Y., G.E. Anderson, L.R. Chinkin, G. Pascoe, C.E. Schmidt, A. Winer, "The Valdez Air Health Study," Risk Analysis, Volume 14, No. 6, 1994.

Schmidt, C.E., Michelle Simon, "How To Measure Fugitive Emissions," Environmental Protection, April 1994, PP. 47-52.

Schmidt, C.E., D.A. Barton, M. Hasegawa, and T.R. Munnich, "Use of Optical Remote Sensing and Flux Chamber Technologies for Determining Emission Rates from a Pulp Mill Wastewater Treatment Facility", 94-A1044, 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 1994.

Downs, Wayne C., C.E. Schmidt, J.C. Walton, "Comparison of Measured and Modeled Emission Rates from a Buried Waste Site", 94-A1017, 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 1994.

Schmidt, C.E., et al, "Assessment of Municipal Solid Waste Landfill Emissions Using Optical Remote Sensing and Flux Chamber Technologies", 93-A1053, 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 1994.

Downs, Wayne C., C.E. Schmidt, J.C. Walton, "Comparison of Measured Versus Modeled Emission Rates from Covered Landfills," Proceedings of the Fourth Annual West Coast Regional Specialty Conference on Current Air Toxic Issues, AWMA, November, 1993.

Edwards. L.O., C.E. Schmidt, D. Suder, "Insight: Strategy for Developing an Emission Inventory to Determining If You Need a Title V Operating Permit:," Clean Air Permits, Tab 100, Thompson Publishing Group, July 1993, pages 319-331.

## **Charles E. Schmidt**

Schmidt, C.E., M., Simon, "Application of a Direct Emission Assessment Technology for Conducting Site Investigations for Subsurface Contamination", 93-MP-22.04, 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado June 1993.

Schmidt, C.E., D. Suder, W. Knuth, "Assessing Air Toxic Emissions from the Primary and Secondary Treatment of Liquid Waste from a Paper and Pulp Mill", 93-TA-30A.05, 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado June 1993.

Pleus, R.C., C.E. Schmidt, D. Suder, "Methodology for Assessing the Health Impacts of Gaseous Emissions from a Pulp Mill", 93-TA-36A.05, 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado June 1993.

Deeney, L.R., C.E. Schmidt, "Cost-Effective Monitoring of Hazardous Air Pollutants for Superfund Cleanup Activities: A Case Study", 93-TA-39A.02, 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado June 1993.

Shen, T., C.E. Schmidt, T. Card, Assessment and Control of VOC Emissions From Waste Treatment and Disposal Facilities, Van Nostrand Reinhold Publishing, New York, New York, 1993.

Schmidt, C.E., "Theory and Application of the EPA Recommended Surface Emission Isolation Flux Chamber- Assessment of Volatile and Semi-Volatile Species Emission Rates," Chapter 3, Sampling and Analysis of Airborne Pollutants, Eric Winegar and Larry Keith editors, Lewis Publishers, Ann Arbor, Michigan, 1993.

Schmidt, C.E., "Minimizing and Controlling Air Toxic Emissions from Hazardous Waste Sites", Environmental Protection, January 1993.

Kittle, P., C.E. Schmidt, "Comparison of Long Duration Foam, Synthetic Tarpaulins, Geotextiles, and Soil as Subtitle D Compliant Daily Cover Materials for Sanitary Landfills", presented at the Annual National Solid Wastes Management Association, Marina Del Rey, CA, January 1993.

Kittle, P., C.E. Schmidt, "Sanitary Landfill Cover Material Compared", Public Works, May 1993, PP. 51-52.

Schmidt, C.E., "Area Source Emission Assessment Technologies", Environmental Protection, October 1992.

Nottoli, J., C.E. Schmidt, R. Boyd, "Measurement of Toxic Air Contaminants From an Industrial Wastewater Treatment Plant", 92-99.08, 85th Annual Meeting of the Air and Waste Management Association, Kansas City, Kansas, June 1992.

## **Charles E. Schmidt**

Suder, D., C.E. Schmidt, "Comparison of Effectiveness and Costs of Various Technologies for the Reduction of VOC Technologies From Exposed Hazardous and Non-Hazardous Waste," 92-11.15, 85th Annual Meeting of The Air and Waste Management Association, Kansas City, Kansas, June 1992.

Butler, W.A., C.E. Schmidt, "Air Emissions Rate Measurements of VOCs and Semi-VOCs Emitted From an In-Situ Bioremediation Pilot-Scale Test on Surface Impoundment Sludge," 1992 EPA/AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Raleigh, North Carolina, May 1992.

Schmidt, C.E., EPA Engineering Bulletin - Design Considerations for Ambient Air Monitoring at Superfund Sites, Draft, March 1992.

Schmidt, C.E., EPA Engineering Bulletin - Air Pathway Analysis, Draft, February 1992.

Koster, Robert, C.E. Schmidt, et al, "Comparative Testing of Tedlar Bag, Solid Sorbent, and Canister Gas-Sample Collection Techniques," Proceedings of the Second Annual West Coast Regional Specialty Conference on Current Air Toxic Issues, AWMA, November, 1991.

Schmidt, C.E., Editor, EPA Engineering Bulletin - Control of Air Emissions From Materials Handling During Remediation, EPA/540/2-91/023, October 1991.

Schmidt, C.E., Nancy Stein, Raj Rangaraj, "Development of an Engineering Approach for the Remediation of a Petroleum Sump and the Measurement and Modeling of Air Emissions from the Remedial Approach," 91-91.6, 84th Annual Meeting of the Air and Waste Management Association, Vancouver, B.C., June 1991.

Berry, R.S., C.E. Schmidt, R.C. Wells, "An Evaluation of Sampling Strategies for Determining Soil Filter Control Efficiencies," 91-17.4, 84th Annual Meeting of the Air and Waste Management Association, Vancouver, B.C., June 1991.

Schmidt, C.E., Nancy Stein, Raj Rangaraj, "Estimating Air Emissions From the Remediation of a Petroleum Sump Using Direct Measurement and Modeling," Proceedings of the 1991 EPA/AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Raleigh, North Carolina, May 1991.

Schmidt, C.E., William Faught, Judy Nottoli, "Using the EPA Recommended Surface Emission Isolation Flux Chamber to Assess Emissions from Aerated and Non-Aerated Liquid Surfaces,"

## **Charles E. Schmidt**

Proceedings of the 1991 EPA/AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Raleigh, North Carolina, May 1991.

Suder, David, Anne Wooster, C.E. Schmidt, "Comparison of Measured To Modeled Emission Rates at an Active Hazardous Waste Landfill", 90-82.6, 83rd Annual Meeting of the Air and Waste Management Association, Pittsburgh, Pennsylvania, June, 1990.

Schmidt, C.E., W. Faught, "Review of Direct and Indirect Emission Measurement Technologies for Measuring Fugitive Emissions From Wastewater Treatment Facilities." 1990 Summer National American Institute of Chemical Engineers, San Diego, California, August, 1990.

Boyd, R.R., J.L. Balzer, C.E. Schmidt, L.O. Edwards, "A Multi-Media Environmental Assessment of Emissions From a Large, Biomedical Research Facility." 90-131, 83rd Annual Meeting of the Air and Waste Management Association, Pittsburgh, Pennsylvania, June, 1990.

Shen, T., C.E. Schmidt, T. Nelson, "Chapter 20, Land Disposal," AP-40, EPA Publication, Date Not Determined, Submitted June, 1990.

Schmidt, C.E., D. Suder, "Development of a Technical Approach for Determining the Volatilization Rate of Hydrocarbons From a Landfill Using Both Modeling and Direct Emission Measurement Techniques." Proceedings of the 1990 EPA/AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Raleigh, North Carolina, May, 1990.

Schmidt, C.E., J.A. Clark, "Use of the Surface Isolation Flux Chamber to Assess Fugitive Emissions From a Fixed-Roof on an Oil-Water Separator Facility." Proceedings of the 1990 EPA/AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Raleigh, North Carolina, May, 1990.

Shen, T., C.E. Schmidt, T. Nelson, "Assessment and Control of VOC Emissions From Waste Disposal Facilities," Volume 20, Issue 1, CRC Press, Inc., January, 1990.

McDonough, M., C.E. Schmidt. "Procedures for Conducting Air Pathway Analyses at Superfund Sites - Baseline Emission Estimates," 82nd Annual Meeting of the Air and Waste Management Association, Anaheim, California, June 1989.

Schmidt, C.E., L.O. Edwards, J.L. Balzer. "Technical Approach for Conducting an Air Emissions Assessment at a Large Facility With Multiple Point Sources." Proceedings of the 1989 EPA/AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Raleigh, North Carolina, May 1989.

## **Charles E. Schmidt**

Schmidt, C.E., and M. McDonough, "Guidance Document on Air Pathway Analysis and Estimating Emission Rates for Air Contaminants From Hazardous Waste Sites." Proceedings of the 1989 EPA/AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Raleigh, North Carolina, May 1989.

Schmidt, C.E., A.S. Johnson, "Technical Approach Developed to Assess the Volatilization and Migration of Volatile Organic Compounds From Contaminated Ground Water." Proceedings of the 1989 EPA/AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Raleigh, North Carolina, May 1989.

Schmidt, C.E., and R. Vandervort. "Gas-Phase Sampling Techniques and Procedures Used to Assess an Underground Liquid Hydrocarbon Plume on Groundwater. Technical Paper and Presentation." 81st Annual Meeting of the Air Pollution Control Association, Dallas, TX, June 1988.

Schmidt, C.E., R. Larsen, S. Quan. "A Technical Approach for Designing Air Monitoring Programs for Site Mitigation." 81st Annual Meeting of the Air Pollution Control Association, Dallas, TX, June 1988.

Schmidt, C.E., C.C. Mecham, M.T. Galloway, "The Importance of Proper Site Characterization Work Supporting Hazardous Waste Management Activities", Proceedings of the 1988 Hazmacon Conference, Anaheim, California, April 1988.

Clark, J.A., C.E. Schmidt, T.D'Auanzo, "Area Source Emission Assessment for Air Toxics," Proceedings of the 1988 Hazmacon Conference, Anaheim, California, April 1988.

Schmidt, C.E., C.C. Mecham, M.T. Galloway, "The Importance of Proper Site Characterization of the Air Contaminant Pathway," Proceedings of the 1988 EPA/APCA Symposium on Measurement of Toxic and Related Air Pollutants, Raleigh, North Carolina, May 1988.

Clark, J.A., C.E. Schmidt, T. D'Auanzo, "Overview of Applicable Emission Measurement Technologies for the Measurement of Volatile Hazardous Waste Emissions," Proceedings of the 1988 EPA/APCA Symposium on Measurement of Toxic and Related Air Pollutants, Raleigh, North Carolina, May 1988.

Schmidt, C.E., G. Turl, R. Stephens, "Control and Monitoring of Air Contaminants During Site Mitigation." Proceedings of the 80th Annual Meeting of the Air Pollution Control Association, New York, New York, June 1987.

## **Charles E. Schmidt**

Rouge, J.D., C.E. Schmidt, J. Hicks, "Hazardous Materials and Waste Tracking System," Proceedings of the 80th Annual Meeting of the Air Pollution Control Association, New York, New York, June 1987.

Schmidt, C.E., R. Vandervort, W.D. Balfour, "Technical Approach and Sampling Techniques Used to Detect and Map Subsurface Hydrocarbon Contamination," 86-75.4, 79th Annual Meeting of The Air Pollution Control Association, San Francisco, California, June 1986.

Balfour, W.D., C.E. Schmidt, B.M. Eklund. "Sampling Approaches for the Measurement of Volatile Compounds at Hazardous Waste Sites," Journal of Hazardous Materials, 14 (1987), PP. 135-148.

Johnson, A.S., C.E. Schmidt, R. Vandervort. "Indoor Air Sampling for Volatile Organic Compounds Associated with Environmental Contamination," Proceedings of the Third Annual Hazardous Materials Management Conference and Exposition, Anaheim, California, April 1986.

Eklund, B.M., W.D. Balfour, C.E. Schmidt. "Measurement of Fugitive Volatile Organic Emission Rates," Environmental Progress, August 1985, pp 199-202.

Schmidt, C.E. "Developing Site-Specific Ambient Monitoring Programs for Hazardous Waste Sites," Instructor for the University of California, Davis, Extension Program, Air Pollution and Toxic Chemicals, Davis, CA, July 1985.

Schmidt, C.E. and J.K. Meyer-Schmidt. "Assessment, Monitoring, and Modeling from a Superfund Site Remedial Action," Proceedings of the 78th Annual Meeting of the Air Pollution Control Association, Detroit, MI, June 1985.

Schmidt, C.E. and D.L. Gordy. "Designing Air Monitoring Programs for Remediation at Hazardous Waste Sites," Proceedings of the 78th Annual Meeting of the Air Pollution Control Association, Detroit, MI, June 1985.

Schmidt, C.E. "Measurement of Organic Fugitive Emissions from Area Sources," Presented at the Annual Engineering Foundation Conference, Santa Barbara, CA, March 1985.

Vandervort, R., C.E. Schmidt, W.D. Balfour. "Surface and Subsurface Gas/Vapor Monitoring Techniques Applied to Environmental Contamination Caused by Petroleum Products and Processing Waste," Proceedings of American Petroleum Institute Committee Meeting on Safety and Fire Protection, San Antonio, TX, September 1984.



## **Charles E. Schmidt**

Eklund, B.M., W.D. Balfour, C.E. Schmidt. "Measurement of Fugitive Volatile Organic Compound Emission Rates with an Emission Isolation Flux Chamber," Proceedings of the AIChE 1984 Summer National Meeting, Philadelphia, PA, August 1984.

Balfour, W.D. and C.E. Schmidt. "Sampling Approaches for Measuring Emission Rates from Hazardous Waste Disposal Facilities," Proceedings of the 77th Annual Meeting of the Air Pollution Control Association, San Francisco, CA, June 1984.

Schmidt, C.E. and M.W. Eltgroth. "Off-Site Assessment of Air Emissions from Hazardous Waste Disposal Facilities," Proceedings of the 4th National Conference and Exhibition on Management of Uncontrolled Waste Sites, Washington D.C., November 1983.

Schmidt, C.E. and W.D. Balfour. "Direct Gas Emission Measurement Techniques and the Utilization of Emissions Data from Hazardous Waste Sites," Presented at the 12th Annual Conference on Waste Technology, Memphis, TN, October 1983.

Schmidt, C.E., W.D. Balfour, and R.D. Cox. "A Direct Emission Sampling Technique for Measurement of Toxic Gaseous Contaminants," Presented at the National Conference on Environmental Engineer, Boulder, CO, July 1983.

Schmidt, C.E. and R.D. Sacks. "Characterization of a Hybrid Flame/Arc Excitation Source Using Monodisperse Aerosol Introduction," *Spectrochimica Acta*, Vol. 38B, No. 4, pp. 557-571, 1983.

Schmidt, C.E., W.D. Balfour, and R.D. Cox. "Sampling Techniques for Emission Measurements at Hazardous Waste Sites," Proceedings of the 3rd National Conference and Exhibition on Management of Uncontrolled Hazardous Waste Sites, Washington, D.C., November 1982.

Schmidt, C.E. "Operation of a Mobile Aerosol Reaction Chamber," Presented at the American Association for Aerosol Research (AAAR), Santa Monica, CA, 17-19 February 1982.

Schmidt, C.E., "Optical Emission Spectroscopy of Uniform Aerosol Droplets in a Hybrid Flame/Arc Excitation Source," Ph.D. Dissertation, University of Michigan, Ann Arbor, Michigan, 1980.

Schmidt, C.E. and R.D. Sacks, "Comparative Study of Plasma Generators for DC Arc Emission Spectroscopy," 1978 FACSS Convention, Boston, MA, 1978.