
• Applied Measurement Science •

Sampling and Analysis of Airborne Pollutants

Principal: Eric D. Winegar, Ph.D., QEP

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Background and Experience

Education	Ph.D., Physical and Environmental Chemistry, UC Davis
Experience	Radian Corporation (5 years) Air Toxics Limited (5 years) Applied Measurement Science (13+ yrs)
Publications	One book, one chapter, >60 papers and conference presentations.
Teaching	UC Berkeley and UC Davis Extensions.
Professional	AWMA MLC Board of Directors, AWMA Technical Council, Specialty Conference Chair/Vice-chair, session chair, membership professional technical societies and organizations. EPA Science Advisory Panel. Qualified Environmental Professional (QEP).

Areas of Specialization

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|----------------------------|-------------------------------------|
| • Ambient Air Monitoring | • Measurement Technology Evaluation |
| • Source/Process Emissions | • On-site analysis |
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Representative Clients

Chevron (Molycorp, Inc.)	City of Berkeley, CA
NOVA Chemical, Inc.	Methyl Bromide Industry Panel
American Petroleum Institute	Advanced Micro Devices, Inc.
Environ Corporation	McDaniel-Lambert, Inc.

Representative Projects

Ambient Air

Measurement Technology/On-site Analysis

Assessment of impact from open incineration to residents at site in French West Indies.

Review of methods for chemical agent detection and analysis during remediation activities.

Solar-power operated network (6 instruments) of continuous PM10 monitors at mine tailing operation.

Evaluation of portable instrument functionality and operation, including field and lab comparisons.

Detection and quantitation of subsurface contaminant infiltration into residences.

Development and fabrication of on-line emissions measurement system for semiconductor fab facility.

Source/Process Emissions

Odor Assessment

Semiconductor emission control evaluation of Multiple emission points.

Area source odor emissions assessment at former chemical warfare agent manufacturing site.

Automated measurement of emissions from 12 points for process optimization.

Odor emissions from pulp mill wastewater treatment plant using real-time and standard lab methods.

Measurement Science: The science of quantitative measurements.

Concepts without percepts are empty, whereas percepts without concepts are blind!--Immanuel Kant

Count what is countable, measure what is measurable and what is not measurable, make measurable.--Galileo Galilei

Eric Winegar, PhD, QEP.

PRIMARY CAPABILITY: Monitoring and Measurement of Airborne Pollutants

AREAS OF TECHNICAL PROFICIENCY

- Problem-solving oriented sampling and analysis of airborne pollutants.
- Source and ambient air sampling and analysis.
- On-site analysis.
- Analytical method development.
- Quality assurance program development.
- Data Review and Interpretation.

EDUCATION

Ph.D., Physical and Environmental Chemistry, University of California, Davis

M.S., Physical Chemistry, Brigham Young University, Provo, Utah

B.A., Chemistry, Brigham Young University, Provo, Utah

EXPERIENCE

Principal, Applied Measurement Science, 1997-present.

Technical Director, Field Analytical Services and Training, Air Toxics Limited, 1996-1997.

Director of Research and Technical Services, Air Toxics Limited, Folsom, CA. 1992-1997.

Senior Chemist, Radian Corporation, Sacramento, CA, 1992.

Group Leader, Environmental Chemistry Group, Radian Corporation, 1989-1992.

Staff Chemist, Radian Corporation, Sacramento, CA, 1988-1991.

PUBLICATIONS/PRESENTATIONS

Books/Chapters

Winegar, Eric D., Larry O. Edwards, "Current Sampling and Analytical Methods for Point and Area Source Emission Measurements," Chapter 24 in Principles of Environmental Analysis, second edition, Lawrence H. Keith, ed., American Chemical Society Press, 1996.

Winegar, Eric D., and Lawrence H. Keith, eds. Sampling and Analysis of Airborne Pollutants, Lewis Publishers, 1993.

Presentations/Publications

Over 60 professional presentations and publications. See attached list.

PROFESSIONAL ACTIVITIES

EPA Science Advisory Panels

August 24 - 25, 2004 - Fumigant Bystander Exposure Model Review: Probabilistic Exposure and Risk model for FUMigants (PERFUM) Using Iodomethane as a Case Study

August 26-27, 2004 - Fumigant Bystander Exposure Model Review: The Fumigant Exposure Modeling System (FEMS) Using Metam Sodium as a Case Study

September 9-10, 2004 - Fumigant Bystander Exposure Model Review: SOil Fumigant Exposure Assessment System (SOFEA) Using Telone as a Case Study

September, 2010: Continuing membership on SAP.

EPA Special Studies

May, 2005. Environmental Technology Verification Program—Measurement Systems for Hydrogen Sulfide. Provided in-situ verification analysis for continuous H₂S monitors.

Professional Societies

Vice-Chair, Secretary, AWMA Technical Council Committee, AM-3 Ambient Monitoring, 2003-2004.

Chair, Mother Lode Chapter of the Air and Waste Management Association, 2001-2002.

Director, Mother Lode Chapter of the Air and Waste Management Association, 1994-2003.

Conferences

Organizer, Co-Chairman, Executive Committee, Air and Waste Management Association Air Quality Measurement Methods and Technology Symposium, San Francisco, CA and RTP, NC, 2002 to present.

Co-Chairman of Air and Waste Management Association Conference on “Current Issues in Air Toxics,” Sacramento, CA, November, 1992, 1993, 1994.

Vice-Chairman of Air and Waste Management Association Conference on “Current Issues in Air Toxics,” Sacramento, CA, November, 1991.

Chairman and Organizer, American Chemical Society Symposium on “Measurement of Airborne Compounds: Sampling, Analysis, and Data Interpretation,” Washington, DC, 1990. Session chairman at several conferences.

Teaching

Restek Corporation, “Air Monitoring Workshop,” October, 1996.

Instructor: University of California, Davis Extension Courses “Introduction to Air Sampling and Analysis,” 1991-1996.

Instructor: University of California, Davis Extension Courses “Air Pollution Aspects of Site Remediation,” 1993-1995.

Instructor: University of California, Berkeley Extension Courses “Air Pollution Aspects of Site Remediation,” 1993, 1994.

Instructor: University of California, Berkeley Extension Courses “Introduction to Air Quality,” 1994-1996.

Professional Courses

Good Laboratory Practice (GLP) Essentials for Technical Staff: SOPs, 2003.

Good Laboratory Practices (GLPs) for Study Directors and Monitors, 2003.

Air Modeling Using ISC and AERMOD, Lakes Environmental, 2001.

Deposition Preparation/*Daubert* Standard Evaluation: American Academy of Forensic

Sciences, 2000.

Air and Waste Management Association. Advanced Air Sampling and Analysis Course, 1992.

Air and Waste Management Association Remote Sensing Course, 1991.

Radiation Safety, University of California, Davis, 1990.

American Chemical Society Air Sampling and Analysis Course, 1989.

40-hour Safety Training, OSHA 29 CFR, 1988, and continuing.

MEMBERSHIPS

Air and Waste Management Association

American Chemical Society

CERTIFICATIONS

Qualified Environmental Professional, Institute of Professional Environmental Practice,
Number 05960099

Publications/Presentations

Winegar, Eric D., Scott Fruin, Jay Turner, Arthur Winer, "Approaches and Methodologies for Measurement of Diesel Exhaust Self-Pollution in School Buses," Proceedings of the AWMA Air Quality Measurements Methods and Technology Symposium—2010, November, 2011.

Winegar, Eric D., "Practical and Theoretical Aspects of Flow Controllers in Canister Sampling," Proceedings of the AWMA Air Quality Measurements Methods and Technology Symposium—2007, May, 2007.

Winegar, Eric D., "Ambient and Endogenous Hydrogen Sulfide," Proceedings of the AWMA Air Quality Measurements Methods and Technology Symposium—2006, April, 2006.

Winegar, Eric D., Ernesto Sandoval, Diane Benton, "Characterization of Emissions From a Flowering of the Titan Arum *Amorphophallus titanum* Using GC/MS—Time of Flight, GC/MS-Quadrupole, GC/SCD, and GC/PFPD. Paper #84, Proceedings of the AWMA Air Quality Measurements Methods and Technology Symposium—2005, April, 2005.

Schmidt, CE, Eric Winegar, Steven Hoyt, "A Practical Guide for the Measurement of Indoor Air Impacts from Subsurface Contamination," Paper #278, Proceedings of the Air and Waste Management Association, June 24, 2004.

Winegar, Eric D.; Scott Honan, "Field Evaluation of EBAM PM10 Particulate Sensor," AWMA Air Quality Measurements Methods and Technology Symposium—2004, April 19, 2004.

Winegar, Eric D. "An Integrated Analytical System for the Low-level Determination of Hydrogen Sulfide in the Field," AWMA Air Quality Measurements Methods and Technology Symposium--2002, Nov. 13-15, 2002.

Freeman, RR, Eric D Winegar, "Sampling and Analytical Protocols for the Determination of Volatile, Reactive Compounds at Ambient Levels," AWMA Air Quality Measurements Methods and Technology Symposium--2002, Nov. 13-15, 2002.

Winegar, Eric D. "Methodology and New Measurement Techniques for Hydrogen Sulfide," American Petroleum Institute, Hydrogen Sulfide Health Research and Risk Assessment Symposium, Chapel Hill, NC, October 31-Nov. 1, 2000.

Lambert, CE, Phyllis Fox, Eric Winegar, "Ambient and Human Sources of Hydrogen Sulfide: An Explosive Topic," Air and Waste Management Association, Salt Lake City, June, 2000.

Winegar, Eric D., Schmidt, C.E., "Analysis Using a Jerome 631-X Portable Hydrogen Sulfide Sensor: Laboratory and Field Evaluation," Proceedings of the 1998 Symposium on the Measurement of Toxic and Related Air Pollutants, Air and Waste Management Association, 1998.

Winegar, Eric D., Timothy A. Spaeder, "Cost-Effective, Rapid and Legally Defensible Analytical Measurement Solutions for Operating Permits and Site Remediation Activities," Pittsburgh Conference, New Orleans, March 4, 1998.

Winegar, Eric D., Timothy A. Spaeder, "Utilization of Fast GC Analysis to Increase Sample Throughput at a Commercial Analytical Laboratory," Pittsburgh Conference, New Orleans, March 5, 1998.

Schmidt, C.E., Larry Hentz, Eric D. Winegar, "Assessment of Odorous Air Emissions from Compost Facilities," Proceedings of the Air and Waste Management Association National Meeting, Paper 97-TP56.02, June 8-13, 1997

Schmidt, C.E., John Ungvarsky, Eric D. Winegar, "Assessment of Ozone Precursor Emissions from the Dairy Industry," Proceedings of the Air and Waste Management Association National Meeting, Paper 97-MP74.01, June 8-13, 1997.

Winegar, Eric D. C. C. Crume, D.B. Curtis, M.J. Yates, "Quantification of the Technical and Financial Benefits from Using Instrumentation Designed for Field Measurements," IFPAC '97, Fifth International Conference On-Site Analysis, Seattle, WA, February 5, 1997.

Winegar, Eric D. C. C. Crume, D.B. Curtis, M.J. Yates, "Practice vs. Promise: Applications of Portable High Speed Microchip Gas Chromatographs to Process and Environmental Monitoring," Field Analytical Methods for Hazardous Wastes and Toxic Chemicals, Las Vegas, January 30, 1997.

Winegar, Eric D. "Practice vs. Promise: Applications of Portable High Speed Microchip Gas Chromatographs to Process and Environmental Monitoring," American Chemical Society Western Regional Meeting/Pacific Conference, San Francisco, CA, October 31, 1996.

Freeman, R.R., Eric D. Winegar, D.S. Panda, C.C. Crume, "PPBV Determination of Reduced Sulfur Compounds Using Glass Lined Canisters, Deactivated Tedlar Bags and Sorbent Tubes: A Study of the Critical Parameters," Measurement of Toxic and Related Air Pollutants, Air and Waste Management Association Specialty Conference, Research Triangle Park, NC, May 7, 1996.

Winegar, Eric D., Glenn C. England, Thomas P. McGrath, "Validation of EPA Method 0040 GC Analysis Using Cryogenic Concentration," Stationary Source Sampling and Analysis for Air Pollutants XX, Palm Coast, FL, March 24, 1996.

Schmidt, C.E., Larry Hentz, Eric D. Winegar, "Innovative Assessment and Engineering Evaluation of A Municipal Wastewater Treatment Facility," Proceedings of Air and Waste Management Association, Paper 96-TA29A.06, June, 1996.

Winegar, Eric D., Marie J. Yates, David B. Curtis, "Comparative Data Quality: Portable GC vs. Laboratory GC/MS," AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Durham, NC, May 17, 1995.

Winegar, Eric D. "Air Measurement: The Forces Behind the Technology," Environmental Lab, March/April, 1995, pg. 15.

Winegar, Eric D. , David B. Curtis, "Water Management in Sampling and Analysis: Problems and Progress," Source Evaluation Society, San Diego, CA, March 29, 1995

Winegar, Eric D. "Current Approaches to Point and Area Source Emission Measurements: Sampling and Analysis," Invited Speaker, Pittsburgh Conference on Analytical Chemistry and Spectroscopy, New Orleans, March 6, 1995.

Winegar, Eric D., Marie J. Yates, David B. Curtis, "Field Screening Vs. Field Analysis: Data Quality Objectives In The Age Of Advanced On-Site Instrumentation," Proceedings of EPA/AWMA Field Screening Conference, February, 1995.

Winegar, Eric D. "Methyl Bromide Users Search for Science," Environmental Protection, Jan, 1995.

Winegar, Eric D. , Freeman, R.R., Craig C. Crume, "An Integrated Approach to Parts-Per-Trillion Measurements of Volatile Organic Compounds in Air," AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Durham, NC, May 5, 1994.

Freeman, R.R., Eric D. Winegar, Craig C. Crume, "Beyond Canister Cleaning...What About the Surface Chemistry?" AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Durham, NC, May 5, 1994.

Winegar, Eric D. "Area and Point Source Sampling Approaches for the 1990's," American Chemical Society, San Diego, California, March 15, 1994.

Winegar, Eric D., "Field Instruments for Air Sampling," Environmental Protection, July 1993, pg. 17.

Freeman, Robert R., Eric D. Winegar, Craig C. Crume, "Practical Aspects of Using Summa Canisters for Ambient Air Sampling," AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Durham, NC, May 5, 1993.

Winegar, Eric D. and Robert R. Freeman, "The Use of Perdeuterated Sampling Surrogates (d₆-butadiene and d₆-benzene) in Comparing Tedlar Bags and Canisters for Source Samples", Source Evaluation Society Meeting, San Diego, March 23, 1993.

Winegar, Eric D., and Lawrence H. Keith, eds. Sampling and Analysis of Airborne Pollutants, Lewis Publishers, 1993.

Jeffrey B. Hicks, Eric D. Winegar, "Assessment of Indoor Air Exposure to Medical Waste Incineration Emissions by Extractive Fourier Transform Infrared Spectroscopy and Conventional Sampling," IAQ '92, San Francisco, California, October 18-21, 1992.

Winegar, Eric D, "Air Toxics Sampling and Analysis: A User's Perspective," ASTM E-6 Meeting (Committee on Chromatography), San Diego, California, October 7, 1992.

Winegar, Eric D, Jeff B. Hicks, William B Herget, "Assessment of Indoor Air Exposure to Medical Waste Incineration Emissions by Extractive Fourier Transform Infrared Spectroscopy and Conventional Sampling," AWMA/EPA International Symposium on the Measurement of Toxic and Related Air Pollutants, Raleigh, NC, May, 1992.

Winegar, Eric D and R. A. Rasmussen, "What is a Good "Hold Time" for Canisters?" Stability Studies and Degradation/Formation Questions, "AWMA/EPA International Symposium on the Measurement of Toxic and Related Air Pollutants, Raleigh, NC, May, 1992.

Edwards, Larry O., Eric D. Winegar, Lee Cover, Simultaneous In-Plume and Stack Sampling for Detached Plume Formation Analysis at a Cement Plant," AWMA/EPA International Symposium on the Measurement of Toxic and Related Air Pollutants, Raleigh, NC, May, 1992.

Winegar, Eric D, Lesley Matsumoto, Dave-Paul Dayton, "Data Analysis and Interpretation for Source Apportionment in Integrated and Directional Ambient Air Sampling," AWMA/EPA International Symposium on the Measurement of Toxic and Related Air Pollutants, Raleigh, NC, May, 1992.

Winegar, Eric D., and Judy A. Nottoli, "Approaches to the Measurement and Modeling of Volatile Organic Compound Emissions from Industrial Wastewater Treatment Plants," California Water Pollution Control Association Annual Conference, April, 1992.

Winegar, Eric D., Jeff B. Hicks, and Carol S. Sim, "Extractive and Open-Path Fourier Transform Infrared Spectroscopy with Conventional Sampling: Uses for Assessment of Exposure to Air Toxics," in Proceedings of Hazmacon 1992 , pg. 597, April, 1992.

Winegar, Eric D., and Judy A. Nottoli, "Approaches to the Measurement and Modeling of Volatile Organic Compound Emissions from Industrial Wastewater Treatment Plants," in Proceedings of Hazmacon 1992 , pg. 608, April, 1992.

Winegar, Eric D., Editor, Proceedings of the "Current Issues in Air Toxics," AWMA Mother Lode Section Conference, November 1991.

Winegar, Eric D., Thomas A. Cahill, and R.A. Rasmussen, "Development of a Comprehensive Methodology for the Determination of Visibility-Reducing Carbonaceous Aerosols," Current Issues in Air Toxics Conference, AWMA Symposium, Sacramento, November, 1991.

Winegar, Eric D., Thomas A. Cahill, R.A. Rasmussen, "Development and Application of a Comprehensive Methodology for the Determination of Visibility-Reducing Carbonaceous Aerosols in the Mt. Rainier Area," AWMA/EPA International Symposium on the Measurement of Toxic and Related Air Pollutants, Raleigh, NC, 1991.

Winegar, Eric D., Joan T. Bursey, "Analytical Laboratory Challenges from the Clean Air Act Amendments," Environmental Lab, June/July, 1991, pp 56-60.

Cahill, T.A., R.A. Eldred, P.J. Feeney, Brian Perley, and Eric D. Winegar, "Comparison of Direct and Indirect Methods for the Analysis of Carbonaceous Aerosols," Symposium on Measurement of Air Toxics: Sampling, Analysis, and Data Interpretation, ACS, Washington, DC, August, 1990.

Winegar, Eric D., and Amy S. Johnson, "Limits on the Usefulness and Information Content of Low Level Analytical Data," AWMA/EPA International Symposium on the Measurement of Toxic and Related Air Pollutants, Raleigh, NC, 1990.

Johnson, Amy S., Jeffrey B. Hicks, and Eric D. Winegar, "Indoor Air Testing for Low-Level Volatile Organics: A Site-Specific Technical Approach," Proceedings of the 1990 EPA/A&WMA International Symposium on Measurement of Toxics and Related Air Pollutants, A&WMA, Raleigh, NC, 1990, pg 974.

Winegar, Eric D., "Approaches to Air Toxics Sampling and Analysis for Regulatory Compliance," Proceedings of HAZMACON 1990, ABAG, 1990, Vol. II, pg 45.

Hobbs, Amy D., and Eric D. Winegar, "The Application of Statistical Techniques to Assess the Quality of Analytical Data," Approaches to Air Toxics Sampling and Analysis for Regulatory Compliance," Proceedings of HAZMACON 1990, ABAG, 1990, Vol. I, pg 9.

Clark, John A., Amy S. Johnson, and Eric D. Winegar, "The Use of Soil Gas Screening for Low-Level Volatile Organic Compounds in Evaluating Potential Indoor Air Contamination," Proceedings of HAZMACON 1990, ABAG, 1990, Vol. I, pg 20.

Winegar, Eric D., and David L. Lewis, "The Determination of Gas Phase Total (Sampling and Analytical) Detection Limits for Stainless Steel Canisters, Charcoal Sorbents, and Soil Gas Probe Techniques," Proceedings of HAZMACON 1989, ABAG, 1989, Vol. II, pg 3.

Winegar, Eric D., David L. Lewis, Joseph E. Winter, and E. Scott Harter, "The Determination of Gas Phase Total (Sampling and Analytical) Detection Limits for Stainless Steel Canisters," Proceedings of the 1989 EPA/A&WMA International Symposium on Measurement of Toxics and Related Air Pollutants, A&WMA, Raleigh, NC, 1989, pg 134.

Weiss-Lopez, Boris, Eric D. Winegar, and Nancy S. True, "Proton Spin-Lattice Relaxation in Gaseous Furan," *Journal of Physical Chemistry* **1988**, 92, 4052-4056.

Chauvel, J. Paul, B. Ri. Friedman, Nancy S. True, and Eric D. Winegar, "Conformational Kinetics of Methyl Nitrite, Temperature Dependence of Helium Collision Efficiency," *Chem. Phys. Lett.* **1985**, 122, 175.

Chauvel, J. Paul, Eric D. Winegar, and Pak Sin Chu, "Nitrogen Inversion in Aziridine. Pressure dependence of pseudorotation in Tetrahydrofuran," Experimental NMR Conference, Asilomar, CA. April 1985.

Chauvel, J. Paul and Eric D. Winegar, "T₂ Effects in Methyl Nitrite," Pacific Conference/ACS Regional Meeting, Sacramento, CA, October, 1984.

Chauvel, J. Paul, B. Ri. Friedman, Hoa Van, Eric D. Winegar, and Nancy S. True, "Conformational Kinetics of Methyl Nitrite. III. Collisional Energy Transfer in the Bimolecular Region," *J. Chem. Phys.* **1984**, 82, 3996.

Winegar, Eric D. and S. Scott Zimmerman, "Ada Benchmarks on an Apple II Computer," *J. of Pascal and Ada* **1983**, 2, 39.

Winegar, Eric D., "Management Science for Managing Science," "Computers in Chemistry," Utah Academy of Arts, Letters, and Sciences, Logan, Utah. April 1983.

Winegar, Eric D. and S. Scott Zimmerman, "Ada in Chemistry," ACS National Meeting, Seattle, Washington. March 1983.

Thorne, James M., and Eric D. Winegar, "Problem Solving Models for Chemical Research", Utah Academy of Arts, Letters, and Sciences, St. George, Utah. November, 1981.