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## THOMAS J. RAPPOLT, QEP

### Education

MS – Meteorology, Pennsylvania State University, 1984  
BS – Physics, Moravian College, 1974

### Professional Licenses

Qualified Environmental Professional (No. 04960066): San Diego Regional Coordinator for IPEP

### Professional Affiliations

Air and Waste Management Association  
American Meteorological Society  
Hazardous Waste Association of California  
American Society of Mechanical Engineers  
National Defense Industrial Associations  
Industrial Environmental Associations of San Diego

### Security Clearance

Active – Secret DoD

### Professional Experience

Mr. Rappolt is an Office Director and Vice President of SCS Tracer Environmental and SCS Engineers, and a Senior Air Quality Meteorologist and Project Director. He has over 34 years of program management and technical experience in air quality compliance and pollutant dispersion and air measurement programs. He is considered an expert in atmospheric dispersion and transport of airborne pollutants, particularly in the area of complex terrain, including overwater/coastal meteorological regimes, as well as inter and intra building processes. During Mr. Rappolt's career, he has designed and implemented over 40 atmospheric monitoring networks and comprehensive field measurement programs involving toxic chemicals and molds, volatile and semi-volatile organic compounds, metals, odorous compounds, criteria pollutants, and other targeted compounds of interest including chemical and biological warfare agents. Many of these measurement studies required support monitoring of local meteorological parameters, including upper atmospheric data using an array of direct probe and remote sensing devices. Mr. Rappolt has served as an expert witness in the area of meteorology, atmospheric dispersion, and odor impacts on numerous legal cases, hearing boards, and programs which have regulatory significance.

Due to the ongoing threat of terrorism with the possible use of biological, chemical, and nuclear agents, Mr. Rappolt has led the effort within SCS to apply his monitoring and dispersion expertise toward conducting programs related to homeland defense. These programs have included infiltrations studies on selected buildings using tracer science as well as studying dispersion in extreme urban environments to validate crisis management models.

Mr. Rappolt has applied his technical knowledge of pollutant movement and formation in the atmosphere to help assess and mitigate industrial odor issues. He has developed a method to assess a specific facility's odor footprint and how that footprint affects compliance to nuisance regulations. This method, which incorporates onsite monitoring, modeling and surveys, has been very effective in isolating cost effective mitigations to resolve odor issues. This approach has been successfully utilized at manufacturing facilities, wastewater treatment plants, landfills and composting operations.

Most recently, Mr. Rappolt has been active in participating with state and local regulators regarding the formulation of greenhouse gas (GHG) regulations. As a stakeholder representative for industry, Mr. Rappolt is a member of several early action committees for the California Air Resources Board (CARB) regarding the implementation of AB32. In this capacity, Mr. Rappolt has provided testimony before the Air Resources Board regarding the severity of impacts these regulations could have on California businesses. Mr. Rappolt also serves on the Industrial Environmental Association's Air Quality Committee which is active in assessing compliance strategies for industries subject to AB32 based regulations.

In addition to his technical contribution to numerous programs and projects, Mr. Rappolt is a proven manager of major air quality and environmental compliance groups. He has assumed this responsibility throughout his working career as an officer for four separate nationally recognized environmental consulting firms in addition to his founding of Tracer ES&T, Inc. Mr. Rappolt has organized and directed cumulative groups numbering more than 50 technical personnel responsible for millions of dollars of air quality, risk management and safety compliance, and research programs. He has served as an industry representative on the Board of the Bi-National Air Quality Alliance. Mr. Rappolt is an appointed member and Chair of the San Diego County Air Pollution Control District Hearing Board and an active member of the California Air Resources Board's Community Health Modeling Working Group—a committee which is assisting the ARB develop models and protocols to assess urban cumulative impacts. Mr. Rappolt has also served on rule making committees as an industry stakeholder relative to AB32 initiatives.

Highlighted below is a sampling of the technical programs in which Mr. Rappolt participated.

**Instrumentation Development (Government Client).** Led the design team and fabrication effort of the latest automated and continuously sampling tracer gas analyzer (TGA) offered by Tracer ES&T, Inc. The TGA 2600 is a standalone analyzer built for client specifications. The TGA 2600 provides continuous concentration readings of SF<sub>6</sub> tracer gases in air over a dynamic detection range of 50,000 pptv to 1 pptv. The units are contained in weather proof portable boxes and have optional remote telemetry link into a central base station display and recording system. The wireless telemetry capability extends 40 km line-of-site distances and this distance can be exceeded through the use of repeater stations. A network of 36 such analyzers were built for a US Government client.

**US Department of Energy, Dispersion of Gases in Fog.** Program Manager of a study that investigated the dispersion of gases and particulates during zero visibility conditions. Under this program, the project team developed a remotely piloted mini-blimp with a GPS guidance system. The blimp was instrumented with a continuous realtime SF<sub>6</sub> analyzer used to measure specific tracer plumes in the Central Valley region of California during low wind Tule fog conditions.

**US Marine Corps, Vapor Dispersion Study in Urban Los Angeles.** Program Director of a study that conducted a series of 12 ambient atmospheric dispersion tests in the extreme urban setting of downtown Los Angeles. A vapor simulant based upon SF6 tracer gases was used to simulate vapor threat releases. More than 50 downwind receptors were deployed in a dense receptor grid. Operated an array of support meteorological sensors to record winds, stability, and turbulence during test conditions.

**California Air Resources Board, Baseline Monitoring Along the California/Mexico Border.** Strategized and designed the implementation team to conduct a multi-year comprehensive ambient monitoring effort along the Mexico/California border. A total of 12 monitoring sites collect a range of criteria pollutants together with air toxics, metals, VOC's and meteorological parameters. Designed and implemented a radio-modem DAS to support the data processing of the program.

**South Coast Air Quality Management District/EPA/US Navy/Port District of LA and Long Beach, Overwater and Coastal Transport and Dispersion Measurement Program for SCOS97.** Program Manager for a multi-tracer dispersion study to measure the impact change to the air quality of the Los Angeles Air Basin if the offshore shipping lanes are moved further west and out of the Santa Barbara Channel. The program was conducted in conjunction with SCOS97/NARSTO. Over 51 monitoring and QA/QC sites were operated during intensive testing episodes during August to October 1997.

**UNOCAL, PSD Monitoring Related to Production Development in the Santa Barbara Channel.** Designed, implemented, and operated several monitoring networks in Santa Barbara County for compliance programs related to the construction and operation of Platform Irene and related expansions to various gas processing plants and pipeline corridors. A network of 13 stations were operational at the peak of monitoring activities which included criteria pollutants, ROC's, particulates, and meteorological parameters. Complied with rigorous data processing, capture, and QA/QC guidelines enforced by the local APCD.

**Department of Health Services/California Air Resources Board, Dispersion Studies at Class I Waste Sites in Support of Model Validation.** Designed and conducted a series of dispersion monitoring studies using multiple tracers at Kettleman Hills and Casmalia Class I waste site. The collected data was used to validate EPA dispersion codes for applicability at hazardous/toxic materials class I waste sites.

**Idaho National Engineering Laboratories/US Department of Energy/EG&G, Inc., Monitoring of Particulate Impacts from a Low-Level Radiological Waste Storage Site.** Designed a detailed monitoring plan to measure non-radiological and radiological impacts associated with the operation of a low level radiological waste facility in the Idaho National Engineering Laboratories. A network of over 30 fence line monitoring sites were designed to collect particulate, alpha, beta, and gamma emitters and determine exposure/concentration impacts.

**California Air Resources Board/Joint Powers Agency, SJVAQS/AUSPEX Perfluorocarbon Tracer Studies.** Designed and managed a multi-tracer dispersion and transport monitoring program in the Central Valley and High Sierra's of California. Over 90 monitoring sites were implemented during four separate intensive air quality episodes. A complement of at least 30

meteorological monitoring station were used to support the monitoring. A full QA/QC program was conducted in conjunction with the study which was regulatory approved.

**Environmental Research Foundation, SO<sub>2</sub>/SO<sub>x</sub> Monitoring Network.** During the mid to late 1970s monitoring was conducted in the San Luis Obispo and Santa Barbara County regions by public agencies and industry groups to define air quality attainment with the Clean Air Act Standards. A comprehensive, network was implemented using used equipment to measure SO<sub>2</sub>/SO<sub>x</sub> levels. Mr. Rappolt was the initial program manager for this monitoring program.

**UNOCAL, Odor Monitoring and Sulfur Compound Monitoring.** During the mid-1980s, Tracer ES&T designed and implemented a series of odor monitoring stations near the Lompoc HS&P. Parameters included real-time H<sub>2</sub>S and Total Reduced Sulfur (TRS) compounds with coincident meteorological data. The stringent Santa Barbara QA/QC guidelines were achieved along with rigorous data logging and reporting requirements.

**Offshore Operators Committee (OOC)/Walk Haydel, Inc., Breton Aerometric Monitoring Program (BAMP).** Key member of project team to conduct a comprehensive monitoring effort to develop a regional model for the oil industry to enable permitting of OCS operations in the Gulf of Mexico. Tracer ES&T would support monitoring efforts in addition to taking a lead role in planned dispersion studies. A tracer effort is in the planning stages with US government agency (DOE and MMS) support.

**South East Regional Reclamation Authority (SERRA)/Aliso Water Management Agency (AWMA), Odor Impact Studies and Monitoring Program.** Technical lead and expert witness regarding odor impact assessment to neighborhoods near waste water treatment plants in Orange County, CA. Designed and implemented a program to quantify and profile odor emissions from several plants and utilize this data to support modeling efforts. Defense oriented expert witness testimony provided in a class action law suit.

**County Sanitation Districts of Los Angeles County, Odor Impact and Dispersion Study.** Investigated odor events from a major landfill operation in the LA Basin. Various mitigative measures were investigated. Tracer sciences were applied to study transport corridors in and out of the landfill and the effect of mitigation strategies.

**US Department of Navy, Overwater Dispersion Studies.** Real-time measurement of plume dispersion and transport in the overwater regime was conducted off Pismo Beach, CA. Tracer gases were released from a US Navy research vessel and low flying aircraft equipped with air quality monitors and precise navigational instruments/recorders were used to document plume movement. The data was used to parameterize dispersion models.

**West Associates (Utility Industry Association), Particulate Tagging and Tracer Studies.** A research program designed to develop a method to tag utility particulate and fly-ash. Various perfluorocarbon chemical tracers were utilized as taggants to various particulates. Field studies were conducted to determine the effectiveness of the tracer technique.

**Brookhaven National Laboratories/DOE, Design of Regional Transport and Dispersion Measurement Programs.** A joint effort with BNL to design monitoring programs associated with the BAMP and the California Central Valley PM<sub>2.5</sub> Study. Proposed field studies will be

implemented using developed plans and unique tracer science applications. The purpose of the program is to assist in model development and validation for environmental permitting.

**Southern California Edison, SCAQS Program.** Over 70 air quality sampling sites were operated to collect samples for tracer analysis. Multiple perfluorocarbon tracers were released from coastal mobile sources and power plants. Plumes were tracked and monitored over a two day period encompassing a grid that extended 100s of kilometers across the SoCAB. The data was successfully used to validate photochemical models used by SCAQMD.

**Bureau of Land Management/MMS, Climatological Studies of California, Nevada, and New Mexico.** Detailed climatological studies were conducted to update government records for BLM lands in three southwestern states. Current monitoring data were incorporated into existing databases to establish new baselines. These climatological updates were used to support EIS's in the various regions.

**Texaco, Inc., Central Valley Criteria Pollutant Monitoring Network.** A total of nine monitoring sites were operated in the San Joaquin Valley in the vicinity of Bakersfield, CA. Monitoring stations were audited and maintained. A data management system was installed to enhance data capture and ease reporting tasks.

### **Publications and Presentations**

Mr. Rappolt has authored hundreds of technical reports and dozens of papers in environmental journals and publications. In addition, he typically presents papers at technical conferences. Highlighted below is a sampling of such papers and publications:

Rappolt, T. J., Kerrin, S. L., Hochheiser, W, Ziman, S., Reheis, C., "Mapping Air Quality Plumes from Fossil Energy Sources to Assess the Impacts of Secondary Aerosol Development," Society of Petroleum Engineers (SPE), Paper No.: 66502, February 2001.

Rappolt, T. J., "Utilizing Chemical/Biological Agent Simulants for Assessing Facility Vulnerability to CB Terrorism Threats," White Paper for Tracer Environmental Sciences & Technologies, Inc., May 1999.

Rappolt, T. J., "A Risk Management Approach to Prepare Against Chemical and Biological Terrorism," Tracer Environmental Sciences & Technologies concept prepared for The U.S. State Department and other agencies, February 1999.

Dietz, R. N., Senum, Gunnar I., Fajer, R. W., Wieser, R. F. (Brookhaven National Laboratory) and Rappolt, Thomas J. (Tracer ES&T), BNL-65897-AB, "New Detectability in Atmospheric Perfluorocarbon Tracing," Presented at the American Chemical Society Meeting, Boston, MA, August 23, 1998.

Rappolt, T. J., and Teuscher, L. H., "Identification of Regional Air Mass Transport Using Tracer Studies," Air and Waste Management Association, Regional Photochemical Measurement and Modeling Studies, November 1993.

- Rappolt, T. J., Friesen, D., Crow, D., "A Comparison of Data Sampling Frequencies for Determination of Atmospheric Stability for PSD Monitoring Programs," Air Pollution Control Association, 87-74.8, June 1987.
- Rappolt, T. J., Quon, S. L., "Perfluorocarbon Tracer Experiments Performed in the San Joaquin Valley of California during the SJVAQS/AUSPEX Program - Summer of 1990," Air and Waste Management Association, 92-102.02, June 1992.
- Rappolt, T. J., England, T., Kerrin, M., "Measurement of Hazardous Waste Incineration Destruction and Removal Efficiencies Using Sulfur Hexafluoride as a Chemical Surrogate," Air Pollution Control Association, 86-61.1, June 1986.
- Rappolt, T. J., "The Effect of Los Angeles on Your Air Emissions Strategy," Industrial Environmental Association of San Diego, August 1991.
- Rappolt, T. J., "Environmental Permitting Considerations for Enhanced Oil Recovery Operations," Enhanced Recovery Week, June 1982.
- Rappolt, T. J., Berglund, R. L., "Quality Improvement Programs (QIP's) - An Uncharted Field in Environmental Permitting," Air & Waste Management Association, 96-RP133.03, June, 1996.
- Rappolt, T. J., Deuble, J. L. Jr., Teuscher, L. H., "Review of Atmospheric Tracer Studies Using Manmade Gaseous Chemical Compounds in the Overwater-Coastal Regime," American Chemical Society, 216th National Meeting, Boston, Mass., August 23, 1998.
- Rappolt, T. J., Dietz, R. N., et al., "New Detectability in Atmospheric Perfluorocarbon Tracing," American Chemical Society, 216th National Meeting, Boston, Mass., August 23, 1998.
- Rappolt, T. J. (1982), "Synopsis and Critique of SF6 Tracer Gas Experiments Conducted by MMS and ARB Offshore Central California," R-82-9089, Energy Resources Co., La Jolla, CA.
- Rappolt, T. J. (1977), "Critique and Synopsis of the ARB-NPS R/V Acania Cruise #77-55," Science Applications, Inc., La Jolla, CA.
- NUS Corporation (1977), "Interim Report of the Onshore Tracer Tests Conducted December 1976 through February 1977 at the San Onofre Nuclear Generating Station - Main Volume," Rockville, MD.
- Rappolt, T. J. and L. H. Teuscher (1978), "Southern California Offshore Tracer Study," Science Applications, Inc., La Jolla, CA.
- Teuscher, L. H., W. G. England, and T.J. Rappolt (1979), "Beaver Combined Cycle Facility Study," Energy Resources Co., La Jolla, CA.
- Crow, D., and T. J. Rappolt (1981), "Melbourne Airshed Tracer Study," Energy Resources Co., La Jolla, CA.

- Rappolt, T. J., et al. (1980), "Synopsis and Critique of SF6 Tracer Gas Experiments Conducted by CARB and BLM in the Santa Barbara Channel Sep/Oct 1980," Energy Resources Co., La Jolla, CA.
- Schacher, G., et al. (1981), "Offshore Transport and Diffusion in the Los Angeles Bight II - NPS Data Summary," Report AD-AO98-341/1, Naval Post Graduate School, Monterey, CA.
- Rappolt, T. J., et al. (1982), "Atmospheric Tracer Experiments Along OCS Sale No. 53," Energy Resources Co., La Jolla, CA.
- Crow, D., T. J. Rappolt, et al. (1982), "Overwater Atmospheric Tracer Data for the Parameterization of a Gaussian Transport and Dispersion Model for Overwater Use," Vol. 1 and 2, Energy Resources Co., La Jolla, CA.
- Rappolt, T. J., and D. Crow (1982), "Summary Analysis Report NPS June 1982 Offshore Tracer Experiments Data Base," Tracer Technologies, Escondido, CA.
- Skupniewicz, C. E., and G. E. Schacher (1984), "Measured Plume Dispersion Parameter Over Water," NPS-61-84-012, Naval Post Graduate School, Monterey, CA.
- Skupniewicz, C.E., et al. (1986), "Parameterization of Overwater Diffusion: Separation of Relative Diffusion and Meander," CR 86-02, Naval Post Graduate School, Monterey, CA.
- England, W. G., L. H. Teuscher, S. L. Kerrin, J. L. Deuble, and T. J. Rappolt (1989), "Southern California Edison SCAQS Tracer Study," Tracer Technologies, San Marcos, CA.
- Rappolt, T. J., et al. (1997), "Tracer Dispersion Study of Shipping Emissions During the 1997 Southern California Ozone Study," SCAQMD Contract No. 97148, Tracer ES&T, San Marcos, CA.
- Rappolt, T. J., et al. (1991), "Transport of Acidic Air Pollutants to Forests and Alpine Regions of the Sierra Nevada," Tracer Technologies, Inc., ARB Contract No. A932-141, January & May 1992, San Marcos, CA.
- Rappolt, T. J., and S. L. Quon (1992), "Perfluorocarbon Tracer Experiments Performed in the San Joaquin Valley of California during the SJVAQS/AUSPEX Program - Summer of 1990," Air and Waste Management Association, Paper 92-102.02, Pittsburgh, PA.