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EDUCATION

University of Southern California

Ph.D., Chemical Physics (1980)

San Diego State University

M.S., Physical Chemistry (1972)

University of Washington

B.S., Chemistry (1968)

PROFESSIONAL EXPERIENCE

Executive Director, Institute for Research and Technical Assistance (IRTA), Los Angeles, California, April 1990 – Present

- Responsible for establishing and managing a nonprofit organization. Aim of IRTA is to identify, develop, test and demonstrate safer alternatives.
- Established and operated Pollution Prevention Center
- Conducts technical pollution prevention and green chemistry projects sponsored by local, state and federal government agencies.
- Focuses on projects that involve finding safer alternatives and demonstrating new and emerging technologies.
 - concentration on ozone depleting, global warming, chlorinated, toxic and VOC solvent industrial and consumer product applications
 - examples of alternatives projects include alternative floor wax strippers, alternative nail polish removers, release agents for industrial molds, concrete stamping and asphalt manufacture and application, graffiti management alternatives, alternative pharmaceutical company cleaning options, non biocide boat hull paints, repair and maintenance cleaning, brake cleaning, batch loaded cold cleaning, vapor degreasing, handwipe cleaning, electronics cleaning, aerospace cleaning, automotive aerosol cleaning, aircraft and ground vehicle stripping, furniture stripping, consumer product paint stripping, dry cleaning, garment cleaning spotting chemicals, foam fabrication adhesives, contact adhesives, autobody coatings, wood furniture coatings, autobody coatings, marine antifouling coatings, lubricants, rust inhibitors, vanishing oils, coating and adhesive application equipment cleaning, lithographic printing cleanup, screen printing cleanup, UV curable ink cleanup, energized electrical equipment cleaning, chemical reactor tank cleaning, paint and lacquer thinner, marine coatings and lubricants.
 - examples of technology demonstration projects include alternative boat hull paints, alternative drying methods for traditional textile wet cleaning, use of laser for paint stripping and use of dry ice blasting for paint stripping and cleaning.
- Writes and distributes quarterly newsletter.
- Arranges and Co-sponsors conferences and workshops on topical issues.

- Prepares reports and outreach materials.
- Develops and gives presentations.

Director, Pollution Prevention Center, Glendale, California, 1994 – 2007

- Managed and provided oversight of loose affiliation of several government agencies including Cal/EPA's Department of Toxic Substances Control, the Santa Barbara County Air Pollution Control District, the South Coast Air Quality Management District, three southern California sanitation districts, the Hazard Evaluation System & Information Service, the U.S. Environmental Protection Agency Region IX and Southern California Edison. Aim of group was to conduct technical alternatives projects of mutual interest taking into account air, hazardous waste, wastewater implications and worker exposure.

Project Manager, Source Reduction Research Partnership (SRRP), Los Angeles, California, February 1987 – April 1990

- Responsible for managing and conducting unique nonprofit study on source reduction of chlorinated solvents jointly sponsored by the Metropolitan Water District of Southern California and the Environmental Defense Fund. Effort involved field visits to 76 plants. Aim of study was to estimate the potential for source reduction in firms for chlorinated solvents used in electronics, metal cleaning, dry cleaning, paint stripping, aerosol, adhesive, coatings, flexible foam, textile processing, food processing, pharmaceuticals and chemical intermediates.
- Responsible for technical feasibility and cost analysis of more than 200 source reduction options in 13 industries. Included evaluation of chemical substitutes, process modification, product substitutes and control technologies.
- Responsible for coordinating members of SRRP advisory committee which included 54 members from interested sectors.
- Responsible for interacting with outside groups on project direction which included extensive public speaking.

Consultant, The RAND Corporation, Santa Monica, California, February 1987 – 1989

- Responsible for research projects conducted by RAND under the University of California at Los Angeles NSF Engineering Research Center on Hazardous Materials Control. Studies included a technology assessment of cleanup methods for contaminated sites, an evaluation of the impacts of the land disposal ban on industries using chlorinated solvents and an analysis of the influence of waste minimization on future incineration capacity requirements.

Consultant, The UCLA Engineering Research Center, Los Angeles, California, 1988 – 1989

- Responsible for arranging, participating in and conducting innovative workshops on hazardous substances control issues.

- Responsible for managing and conducting a waste minimization project on Small Quantity Generators at Los Angeles International Airport which involved four UCLA students.

UCLA Extension, Los Angeles, California, December 1987 – 1995

- Member of Advisory Committee responsible for setting up and conducting the UCLA Hazardous Materials Management program.
- Member of Advisory Committee responsible for setting up and advising the Air program.
- Responsible for teaching classes on Technologies for Managing Hazardous Substances, Case Studies of Superfund Cleanups, Special Topics in Hazardous Substances Management, Industrial Processes and Waste Minimization and Advanced Technologies.

Member of National Research Council Committee, March 1987 – 1990

- Responsible for evaluating the utility of mass balance in tracking releases from industrial plants and measuring progress in waste reduction.

Staff Member, Engineering and Applied Sciences Department, The RAND Corporation, Santa Monica, California, 1973 February 1987

- Responsible for conducting a study on alternatives to land disposal of chlorinated solvents.
- Responsible for an assessment of solvent use, emissions and waste generation in the dry cleaning industry.
- Responsible for developing a historical data base on chlorinated solvents, including the life cycle effects on the industries in response to regulation.
- Responsible for technical assessment of the chlorofluorocarbon (CFC) manufacturing industry.
- Conducted interdisciplinary studies of the economic impacts of regulation on industries where CFCs and other ozone depleting substances were used and produced over a nine year period. Industries of focus included refrigeration and air conditioning, fire extinguishing, solvents, foam manufacturing and miscellaneous applications.
- Responsible for conducting an assessment of worldwide biotechnology research.
- Responsible for analyzing atmospheric and surface water transport for releases from coal fired power plants and coal tar sites.
- Responsible for conducting a study on the comparative effects of high and low pressure sodium lighting on astronomy.
- Responsible for determining the feasibility of using a carbon dioxide laser to decompose hazardous chlorinated ethanes and ethylenes emitted from industrial plants.
- Responsible for conducting studies on materials technology, remote chemical atmospheric sensing and energy conservation.

Consultant, Litton Industries, Beverly Hills, California, 1982

- Responsible for analysis of an emission control system for an incinerator.

- Responsible for examining technologies for destruction of chemical warfare gases.
- Responsible for identifying future applications of laser chemistry.

Research Associate, Chemistry Department, University of Southern California, Los Angeles, California, 1982 – 1983

- Responsible for theoretical calculations on the circular dichroism spectrum of (+) 2-butanol.

Research Assistant, Chemistry Department, University of Southern California, Los Angeles, California, 1977 – 1980

- Responsible for research in Quantum Mechanics, Spectroscopy and Electron Scattering.

PROFESSIONAL ORGANIZATIONS AND HONORS

Past Member of Advisory Board, Environmental Quality Management

Past Member of South Coast Air Quality Management District Best Available Control Technology Scientific Review Committee

Member of Cal/EPA's Department of Toxic Substances Control Green Chemistry Initiative Science Advisory Panel

Member of National Academy of Sciences Committee to Evaluate Mass Balance Information for Facilities Handling Toxic Substances

Member of Cal/EPA's Department of Toxic Substances Control External Advisory Committee

Recipient of Western Regional Pollution Prevention Network 2005 Pollution Prevention

Advocate of the Year

Recipient of 2002 U.S. Environmental Protection Agency, Region 9 Environmental Achievement Award

Recipient of 1999 Governor's Environmental and Economic Leadership Award

Recipient of South Coast Air Quality Management District 1997 Clean Air Award

Past Member of Environmental Protection Agency Reactivity Implementation Working Group

Past Member of the Association of Woodworking & Furnishings Suppliers

Member of Numerous California Air Resources Board Consumer Product and South Coast Air Quality Management District Regulatory Working Groups

PUBLICATIONS

“Safer Alternative Nail Polish Removers for Salons and Consumers,” Institute for Research and Technical Assistance, prepared for the Paul H. Johanson Fund and the Bay Area Air Quality Management District, February 2016.

“Safer Alternatives to Current Floor Wax Strippers for Schools and Public Buildings,” Institute for Research and Technical Assistance, prepared for the University of Nevada, Reno (Western Sustainability and Pollution Prevention Network), the Bay Area Air Quality Management District and EPA Region IX, October 2015.

“Graffiti Removal: Alternative Blasting Systems, Fact Sheet,” Institute for Research and Technical Assistance, prepared for EPA Region IX, the Bay Area Air Quality Management District and the San Francisco Department of the Environment, August 2014.

“Graffiti Removal: Safer Alternative Graffiti Removers, Fact Sheet,” Institute for Research and Technical Assistance, prepared for EPA Region IX, the Bay Area Air Quality Management District and the San Francisco Department of the Environment, August 2014.

“Graffiti Removal: Safer Films and Graffiti Resistant Coatings for Protecting Surfaces, Fact Sheet,” Institute for Research and Technical Assistance, prepared for EPA Region IX, the Bay Area Air Quality Management District and the San Francisco Department of the Environment, August 2014.

“Safer Alternative Graffiti Management Methods for California,” Institute for Research and Technical Assistance, prepared for EPA Region IX, the Bay Area Air Quality Management District and the San Francisco Department of the Environment, June 2014.

“High-Global Warming Potential F-Gas Emissions in California: Comparison of Ambient-Based Versus Inventory-Based Emission Estimates and Implications of Refined Estimates,” *Environmental Science & Technology*, 48(2), p 1084, 2014.

“Alternative Low-VOC Release Agents and Mold Cleaners for Industrial Molding, Concrete Stamping and Asphalt Applications,” Institute for Research and Technical Assistance, Prepared for the South Coast Air Quality Management District and EPA Region IX, October 2013.

“Alternatives to Isopropyl Alcohol for Biocide Control in Healthcare and Industrial Applications, Phase I Report,” prepared for the Bay Area Air Quality Management District, June 2013.

“Safer Alternatives for the Chemical, Pharmaceutical and Biotechnology Industries: Paint Manufacturing Tank Cleaning,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, March 2012.

“Alternatives to Copper Antifouling Paints for Pleasure Craft,” Fact Sheet, Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, February 2012.

“Diver Maintenance Practices for Nonbiocide Alternative Boat Hull Paints,” Fact Sheet, Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, February 2012.

“Alternative Boat Hull Paint Stripping Methods,” Fact Sheet, Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, February, 2012.

“Alternative Application Methods for Nonbiocide Boat Hull Paints,” Fact Sheet, Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, February 2012.

“Boatyard Copper Recycling Opportunities,” Fact Sheet, Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, February 2012.

“Safer Alternatives to Copper Antifouling Paints: Nonbiocide Paint Options,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, February 2012.

“Safer Alternatives for the Chemical, Pharmaceutical and Biotechnology Industries: Screening Tests of Alternatives,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, September 2011

“Safer Alternatives for the Chemical, Pharmaceutical and Biotechnology Industries: Process Hose Cleaning,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, September 2011.

“Developing a California Inventory for Industrial Applications of Perfluorocarbons, Sulfur Hexafluoride, Hydrofluorocarbons, Nitrogen Trifluoride, Hydrofluoroethers and Ozone Depleting Substances,” Institute for Research and Technical Assistance, prepared for the California Air Resources Board, March 2011.

“Safer Alternatives to Copper Antifouling Paints for Marine Vessels,” the Port of San Diego and the Institute for Research and Technical Assistance, prepared for U.S. EPA, January 2011.

“Laser Strip: A Portable Hand-Held Laser Stripping Device for Reducing VOC, Toxic and Particulate Emissions,” Institute for Research and Technical Assistance, prepared for the California Air Resources Board, December 2009.

“Safer Alternatives for the Textile Cleaning Industry: Alternative Spotting Agents and Evaluation of Improvements in Carbon Dioxide and Wet Cleaning Technologies,” Institute for Research and Technical Assistance, prepared for the Bay Area Air Quality Management District, November 2009.

“Alternatives to Toxic, VOC, Ozone Depleting and Global Warming Energized Electrical Equipment Cleaners,” Institute for Research and Technical Assistance, prepared for U.S. EPA, August 2009.

“Implementing Safer Alternatives to Lithographic Cleanup Solvents to Protect the Health of Workers and the Environment,” Sutton, Wolf and Quint, *Journal of Occupational and Environmental Hygiene*, Volume 6, March 2009, p 174.

“Safer Alternative Thinners, Cleanup Materials, Coatings and Sanding Methods in the Autobody Industry,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control, May 2008.

“AB998 Non-Toxic Dry Cleaning Incentive Program: Demonstration of Safer Technologies for the Textile Cleaning Industry,” Institute for Research and Technical Assistance, prepared for the California Air Resources Board, May 2008.

“Tert-Butyl Acetate: Safer Alternatives in Cleaning and Thinning Applications,” Institute for Research and Technical Assistance, prepared for U.S. EPA, March 2007.

“Low-VOC, Low Toxicity Alternatives for Consumer Product Cleanup and Thinning Solvents,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control, March 2007.

“Spotting Chemicals: Alternatives to Perchloroethylene and Trichloroethylene in the Textile Cleaning Industry,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control, January 2007.

“Automotive Aerosol Cleaning Products: Low-VOC, Low Toxicity Alternatives,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and City of Santa Monica, November 2006.

“Assessment, Development and Demonstration of Alternatives for Five Emerging Solvents,” Institute for Research and Technical Assistance, prepared for Hazard Evaluation System & Information Service and U.S. EPA, October 2006.

“Assessment, Development and Demonstration of Alternatives to VOC-Emitting Lubricants, Vanishing Oils and Rust Inhibitors,” Institute for Research and Technical Assistance, prepared for South Coast Air Quality Management District, August 2006.

“Methylene Chloride Consumer Product Paint Strippers: Low-VOC, Low Toxicity Alternatives,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control, May 2006.

“Assessment, Development and Demonstration of Low-VOC Materials for Cleaning Ultraviolet and Electron Beam Curable Coatings and Adhesives.” Institute for Research and Technical Assistance, prepared for South Coast Air Quality Management District, May 2006.

“Hydrocarbon Technology Alternatives to Perchloroethylene for Dry Cleaning,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control, December 2005.

“Evaluation of New and Emerging Technologies for Textile Cleaning,” Institute for Research and Technical Assistance, prepared for the California Air Resources Board and U.S. EPA, August 2005.

“Alternative Low-VOC, Low Toxicity Cleanup Solvents for the Screen Printing Industry,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, April 2005.

“Alternatives to Automotive Consumer Products that use Volatile Organic Compounds (VOC) and/or Chlorinated Organic Compound Solvents,” Institute for Research and Technical Assistance, prepared for the California Air Resources Board, December 2004.

“Safer Alternatives to Solvent Aerosol Automotive Cleaning Products,” Institute for Research and Technical Assistance, prepared for the Department of Health Services Hazard Evaluation System & Information Service, December 2004.

“Alternative Low-VOC, Low Toxicity Cleanup Solvents for the Lithographic Printing Industry,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control, South Coast Air Quality Management District and U.S. EPA, November 2004.

“Alternatives to VOC Emitting Petroleum Based Lubricants and Chlorinated Paraffin Lubricants: Minimizing the Health and Environmental Consequences,” Institute for Research and Technical Assistance, prepared for U.S. EPA, November 2004.

“Safer Adhesive and Cleanup Alternatives for Countertop Manufacturing,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and U.S. EPA, August 2004.

“Development of Safer Cleaning Alternatives in the Aerospace, Printing and Coating Industries,” Institute for Research and Technical Assistance, prepared for U.S. EPA, June 2004.

“Assessment, Development, and Demonstration of Low-VOC cleaning systems for South Coast Air Quality Management District Rule 1171,” Institute for Research and Technical Assistance, prepared for South Coast Air Quality Management District, August 2003.

“Assessment, Development, and Demonstration of Low-VOC cleaning systems for South Coast Air Quality Management District Rule 1171, Executive Summary,” Institute for Research and Technical Assistance, prepared for South Coast Air Quality Management District, August 2003.

“Furniture Stripping: Tests of Alternative Non-Methylene Chloride Stripping Formulations,” Institute for Research and Technical Assistance, prepared for South Coast Air Quality Management District, March 31, 2003.

“Alternative Adhesive Technologies in the Foam Furniture and Bedding Industries,” prepared for U.S. EPA, March 2003.

“Alternatives to Perchloroethylene Vapor Degreasing For Plating Operations: Case Study Conversions,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s

Department of Toxic Substances Control, Los Angeles County Sanitation Districts and the City of Los Angeles Bureau of Sanitation, February 2003.

“Furniture Stripping Alternatives Project Testing Protocol,” Institute for Research and Technical Assistance, prepared for South Coast Air Quality Management District, November 27, 2002.

“Alternatives to VOC and Toxic Solvents in Batch Loaded Cold Cleaning,” Environmental Quality Management, Autumn 2002, p 19.

“Alternatives to Automotive Consumer Products that use Volatile Organic Compounds (VOC) and/or Chlorinated Organic Compound Solvents, Task 1 Plan,” Institute for Research and Technical Assistance, prepared for the California Air Resources Board, September 30, 2002.

“Alternatives to Automotive Consumer Products that use Volatile Organic Compounds (VOC) and/or Chlorinated Organic Compound Solvents, Task 3 Interim Report,” Institute for Research and Technical Assistance, prepared for the California Air Resources Board, September 15, 2003.

“Alternative Adhesives Technologies: Foam Furniture and Bedding Industries, Volume 1: Cost and Performance Evaluation,” prepared for U.S. EPA, June 2002.

“Alternative Adhesives Technologies: Foam Furniture and Bedding Industries, Volume 3: Executive Summary,” prepared for U.S. EPA, June 2002.

“Alternatives in Batch Loaded Cold Cleaning: Case Study Conversions,” Institute for Research and Technical Assistance, prepared for U.S. EPA, Cal/EPA’s Department of Toxic Substances Control, Los Angeles County Sanitation Districts, City of Los Angeles Bureau of Sanitation, Southern California Edison, May 2001.

“Investigation of Technologies to Reduce Emissions of Methylene Chloride From Furniture Stripping Operations, Final Report,” Institute for Research and Technical Assistance, prepared for the California Air Resources Board, March 2001.

“Pollution Prevention at a Maquiladora Facility: Tecate Furniture,” Institute for Research and Technical Assistance, prepared for the Environmental Health Coalition, February 2001.

“Development of Improved Emission Inventory for Furniture Stripping and Other Uses of Methylene Chloride,” Institute for Research and Technical Assistance, prepared for the South Coast Air Quality Management District, June 2000.

“Analysis and Testing of Methods for Reducing the Emissions and Risk from Furniture Stripping Facilities,” Institute for Research and Technical Assistance, prepared for the National Institute for Occupational Safety and Health, March 2000.

“Alternative Cleaning in the Twenty-First Century,” Pollution Prevention Review, Winter 2000, p 77.

“Development of Improved Emission Inventory for Furniture Stripping and Other Uses of Methylene Chloride, Project Work Plan,” Institute for Research and Technical Assistance, prepared for the South Coast Air Quality Management District, November 5, 1999.

“Evaluation of Low- and Non-VOC Technologies: Application to South Coast Air Quality Management District Cleaning Rules,” Institute for Research and Technical Assistance, prepared for South Coast Air Quality Management District, September 1999.

“Evaluation of Low- and Non-VOC Technologies: Application to South Coast Air Quality Management District Cleaning Rules, Executive Summary,” Institute for Research and Technical Assistance, prepared for South Coast Air Quality Management District, September 1999.

“Brake Cleaning in Auto Repair Facilities: The Conversion to Water,” Institute for Research and Technical Assistance, prepared for U.S. EPA, September 1999.

“Case Studies: Repair and Maintenance Operations Convert to Water-Based Cleaning,” Institute for Research and Technical Assistance, published in Pollution Prevention Review, Autumn 1999, p 27.

“Alternatives to Solvents in Cleaning Applications: Case Studies of Small Business Conversions to Water-Based Cleaners,” Institute for Research and Technical Assistance, prepared for U.S. EPA, June 1999.

“Water-Based Repair and Maintenance Cleaning: Case Study Conversions,” Institute for Research and Technical Assistance, prepared for Southern California Edison, December 18, 1998.

“Water-Based Parts Washer Systems: Case Study Conversions,” Institute for Research and Technical Assistance, prepared for U.S. EPA and Santa Barbara County APCD, published by Cal/EPA’s Department of Toxic Substances Control, December 11, 1998.

“Switching to Water-Based Cleaners in Repair and Maintenance Parts Cleaning,” booklet prepared by the Institute for Research and Technical Assistance in conjunction with Cal/EPA’s Department of Toxic Substances Control, City of Los Angeles Bureau of Sanitation, Eastern Municipal Water District, Los Angeles County Sanitation Districts, County Sanitation Districts of Orange County, Santa Barbara County APCD, South Coast AQMD and Southern California Edison, October, 1998.

“Water-Based Parts Washer Systems: A Guidance Program for Users,” Institute for Research and Technical Assistance, prepared for Cal/EPA’s Department of Toxic Substances Control and the Santa Barbara County APCD, October 22, 1998.

“Aqueous Parts Cleaning for Auto Repair Shops,” Institute for Research and Technical Assistance, Pollution Prevention Review, Autumn 1997.

“Methods for Reducing the Emissions and Risk From Furniture Stripping Facilities,” Institute for Research and Technical Assistance, prepared for the South Coast Air Quality Management District, April 30, 1998.

“Repair and Maintenance Cleaning: A Major Industry Change,” Parts Cleaning Magazine, Jan/Feb 1998.

“Analysis of Ventilation Systems Used in Furniture Stripping Facilities,” Institute for Research and Technical Assistance, prepared for the South Coast Air Quality Management District, September 30, 1997.

“Plan for Testing Reformulated Strippers in Furniture Stripping Facilities,” Institute for Research and Technical Assistance, prepared for the South Coast Air Quality Management District, September 30, 1997.

“Aqueous Parts Cleaning for Auto Repair Shops,” Pollution Prevention Review, Autumn 1997.

Appendices to Parts Cleaning in Auto Repair Facilities: The Conversion to Water,” prepared under U.S. EPA’s Environmental Justice Pollution Prevention Program, published by Cal/EPA’s Department of Toxic Substances Control, Doc. No. 615, June 1997.

“Parts Cleaning in Auto Repair Facilities: The Conversion to Water,” prepared under U.S. EPA’s Environmental Justice Pollution Prevention Program, published by Cal/EPA’s Department of Toxic Substances Control, Doc. No. 614, April, 1997.

Parts Cleaning in Auto Repair Facilities: The Conversion to Water, Executive Summary,” prepared under U.S. EPA’s Environmental Justice Pollution Prevention Program, published by Cal/EPA’s Department of Toxic Substances Control, Doc. No. 613, April, 1997.

“Existing and New Regulations: How Do They Affect Cleaning Alternatives?” Parts Cleaning Magazine, Apr/May 1997.

“Alternative Cleanroom Solvents,” Pollution Prevention Review, Spring, 1997.

“Alternatives to Perchloroethylene for Degreasing in Plating Operations Pollution Prevention Project,” prepared for the California Manufacturing Technology Center, January 28, 1997

“P2 and the Clean Air Act Amendments of 1990,” Pollution Prevention Review, Summer, 1996.

“Controlling Dry Cleaner Discharges in Wastewater,” Water Environment Federation Monograph, Alexandria, VA, 1995.

“Handwipe Cleaning: Are the Alternatives Safer? Do They Reduce Emissions?,” Pollution Prevention Review, Spring 1995.

"A Simplified Guide for Evaluating Alternatives to Chlorinated Solvents in Cleaning Applications," prepared for U.C. Riverside, California Department of Toxic Substances Control and U.S. EPA, April 1995.

"Alternatives to Chlorinated Solvents in Cleaning Applications," prepared for U.C. Riverside, California Department of Toxic Substance Control and U.S. EPA, IRTA, December 1994.

"Insulation Foam CFC Recovery Project," prepared for Southern California Edison, IRTA, December 1994.

"Water-Based Cleaning: An Alternative to Chlorinated Solvents," prepared for Southern California Edison, IRTA, December 1994.

"The Aerospace Industry: An Assessment of the Effects of Emerging Regulations on Waste Management," prepared for Southern California Edison, IRTA, December 1994.

"The Truths and Myths about Water-Based Cleaning -- A Systems Approach to Choosing the Best Alternatives," Pollution Prevention Review, Spring 1994.

"Methyl Bromide Control in Commodity Fumigation Operations," January 1994.

"The Generic Classification System: A Simplified Approach to Selecting Alternatives," Pollution Prevention Review, Winter 1993-1994.

"Reduction of Polluting and Ozone Depleting Substances, Executive Summary," prepared for California Department of Commerce's Competitive Technology Program, IRTA, November, 1993.

"Chemical Substitution in Cleaning Applications, Vol. I," prepared for California Department of Commerce's Competitive Technology Program, IRTA, November 1993.

"The Film Cleaning Industry: A Case Study of Solvent Substitution, Vol. II," prepared for California Department of Commerce's Competitive Technology Program, IRTA, November 1993.

"Analysis of the Furniture Refinishing Industry in California: Methods of Reducing Emissions and Risk, Vol. III," prepared for California Department of Commerce's Competitive Technology Program, IRTA, November 1993.

"Dry Cleaning: The Challenge of the 1990's, Vol. IV," prepared for California Department of Commerce's Competitive Technology Program, IRTA, January 1993.

"The Dry Cleaning Industry: Challenges of the 1990s," prepared for the South Coast Air Quality Management District, IRTA, December 1992.

"The Flexible Foam Industry: Options and Tradeoffs in Pollution Prevention," Pollution Prevention Review, Winter 1992.

"Pollution Prevention in the Dry Cleaning Industry: The Challenge of the 1990s," Pollution Prevention Review, Summer 1992.

"An Analysis of Alternatives to Ozone Depleting Solvents in Cleaning Applications," Pollution Prevention Review, Spring 1992.

"Identification of Alternatives for Small Businesses: Paint Stripping," prepared for the South Coast Air Quality Management District, IRTA, September 1992.

"Identification of Alternatives for Small Businesses: Maskants," prepared for the South Coast Air Quality Management District, IRTA, September 1992.

"Identification of Alternatives for Small Businesses: Coatings," prepared for the South Coast Air Quality Management District, IRTA, August 1992.

"Identification of Alternatives for Small Businesses: Aerosol Coatings," prepared for the South Coast Air Quality Management District, IRTA, July 1992.

"Identification of Alternatives for Small Businesses: Adhesives," prepared for the South Coast Air Quality Management District, IRTA, July 1992.

"Identification of Alternatives for Small Businesses: Cold Cleaning and Vapor Degreasing," prepared for the South Coast Air Quality Management District, IRTA, July 1992.

"Identification of Alternatives for Small Businesses: Wipe Cleaning," prepared for the South Coast Air Quality Management District, IRTA, June 1992.

"Identification of Alternatives for Small Businesses: Equipment Cleaning," prepared for the South Coast Air Quality Management District, IRTA, June 1992.

"SCAQMD Regulation XIII: Compliance Strategies for Small Businesses," prepared for the South Coast Air Quality Management District, IRTA, June 1992.

"SCAQMD Rule 1401: Compliance Strategies for Small Businesses," prepared for the South Coast Air Quality Management District, IRTA, June 1992.

"SCAQMD Rule 1411: Compliance Strategies for Small Businesses," prepared for the South Coast Air Quality Management District, IRTA, May 1992.

"SCAQMD Rule 1415: Compliance Strategies for Small Businesses," prepared for the South Coast Air Quality Management District, IRTA, May 1992.

"HCFCs: Are They Still Viable in Solvent Applications?," in Second Annual International Workshop on Solvent Substitution, Phoenix, Arizona, December 1991.

"An Assessment of New Generation Refrigerant Systems," in Second Annual International Workshop on Solvent Substitution, Phoenix, Arizona, December 1991.

"Alternatives to Ozone Depleting Substances in Cleaning: Case Studies," in Second Annual International Workshop on Solvent Substitution, Phoenix, Arizona, December 1991.

"Chlorinated Solvents: Will the Alternatives Be Safer?," Journal of the Air and Waste Management Association, August 1991.

"Alternatives to Perchloroethylene in Dry Cleaning," August 1991.

"Printed Circuit Board Defluxing Without Chlorinated Solvents," SAMPE, June 1991.

"Alternatives in Printed Circuit Board Defluxing: Will they be Safer?," SAMPE, June 1991.

"Solvent Recycling in the Aerospace Industry," in Industrial Solvent Recycling Conference, May 23 - 24, 1991, San Diego, California.

"Metal and Precision Cleaning: Alternatives to Ozone Depleting Substances," SAMPE, March 1991.

"The Next Steps: Planning for the Future," in Reducing Risk in Paint Stripping, Proceedings of an International Conference, February 12 - 13, 1991.

"Tracking Toxic Substances at Industrial Facilities: Engineering Mass Balance Versus Materials Accounting," prepared for the National Academy of Sciences National Research Council, 1990.

"Printed Circuit Board Defluxing: Alternatives to Ozone Depleting Substances," in Solvent Substitution, First Annual International Workshop on Solvent Substitution, December 4 - 7, 1990, Phoenix, Arizona.

"Alternatives to Chlorinated Solvents: Health and Environmental Tradeoffs," First Annual International Workshop on Solvent Substitution, December 4 - 7, 1990, Phoenix, Arizona.

"Chlorinated Solvents: Source Reduction in Chemical Intermediate Applications," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Dry Cleaning Industry," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Solvent Cleaning Industry", Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Electronics Industry," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Paint Stripping Industry," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Flexible Foam Industry," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Aerosol Industry," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Adhesives Industry," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Coatings Industry," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Pesticide Industry," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Food Processing Industry," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Pharmaceutical Industry," Source Reduction Research Partnership, Draft 1990.

"Chlorinated Solvents: Source Reduction in the Textile Processing Industry," Source Reduction Research Partnership, Draft 1990.

"Source Reduction of Chlorinated Solvents in Paint Stripping," Fifth Annual Aerospace Waste Minimization Conference, June 1990.

"Ozone Depletion and Chlorinated Solvents," Institute of Environmental Sciences, November/December 1989.

"Ozone Depletion and the Electronics Industry," Proceedings of the AIChE meeting in San Francisco, Ca, November 1989.

"Source Reduction in the Electronics Industry: A Future Challenge," Proceedings of the Air and Waste Management Meeting, Long Beach, Ca, June 1989.

"Ozone Depletion and Waste Minimization," in Hazardous Waste Minimization, Industrial Overviews, H. Freeman, Ed., Air and Waste Management Association, 1989.

"Source Reduction of Chlorinated Solvents," paper presented at Hazardous Waste Conference, Madrid, Spain, May 1989.

"Source Reduction: What Is It and How Can We Accomplish It?" in National Academy of Sciences Proceedings, May 8, 1989.

"Source Reduction in the Electronics Industry," SAMPE, September 27 -28, 1988.

"Health Risk From a Coal Tar Disposal Site," The RAND Corporation, R-3595-EPRI, May 1988.

"Reducing Toxic Substances at the Source: An Unusual Partnership," in Proceedings of the Third Annual Hazardous Materials Management Conference/West, 1987.

"The Future of CFCs and Source Reduction of Chlorinated Solvents," Waste Minimization Symposium Abstracts, Boeing, Seattle, Washington, September 15 - 17, 1987.

"Health Risks of Toxic Emissions From a Coal-Fired Power Plant," The RAND Corporation, R-3507-EPRI, July 1987.

"Source Reduction Research Partnership," Draft Work Plan, April 1987.

"Initial Meeting of Advisory Committee," Source Reduction Research Partnership, April 16, 1987.

"Important Hard Problems in Public Policy Analysis," The RAND Corporation, P-7282, January 1987.

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