

CAROL E. LYONS

Publications and Presentations

Publications

“PHOTOCHEMISTRY RESEARCH AT NREL,” Research Opportunities in Photochemical Sciences, Workshop Proceedings, U.S. Department of Energy and National Renewable Energy Laboratory, NREL/CP-450-21097, February 1997, with L. Carlson.

Abstract: The photochemistry research team at NREL conducts research and development work in all R&D areas, basic, applied, demonstration and transfer to commercialization. Basic research includes core PCO R&D and catalysts work as well as conducting research into new photochemistry areas such as photoinduced adsorption and high temperature solar PCO. Applied research work consists of remediation of chloroethylenes in gas phase, gas phase solar photoreactor development, and application research including indoor air quality, hybrid biological /PCO processes and more. We are demonstrating the PCO treatment technology in the gas phase with SEMATECH through CRADA work and remediation of organics in aqueous phase through the Solarchem Environmental Systems. We are working with IT through a CRADA to transfer the PCO gas phase remediation technology to IT to commercialize this promising technology. Photochemistry research conducted at NREL spans the R&D spectrum from basic research through technology demonstration with the goal of technology commercialization.

“SOLAR PHOTOCATALYTIC PROCESSES FOR THE PURIFICATION OF WATER: STATE OF DEVELOPMENT AND BARRIERS TO COMMERCIALIZATION,” Solar Energy (Journal of the International Solar Energy Society), Vol. 56, No. 5, 1996, with Y. O. Parent, D. Blake, K. Magrini-Bair, C. Turchi, A. Watt, E. Wolfrum, and M. Prairie.

Abstract: Semiconductor-based photocatalytic processes for removing hazardous chemicals from contaminated water have been studied for nearly 20 years. One goal of this research is to use the sun as the light source. This article assesses the state of development of solar heterogeneous photocatalytic processes for treating contaminated water and identifies key barriers that must be overcome for the technology to achieve commercial success. Some industry members estimate that the cost of using solar technology for waste treatment will need to be less than half the cost of a “conventional” technology in order to gain market acceptance. The number of applications that are near commercial viability could be expanded with significant progress in the improvement of the photo-efficiency of the photocatalytic process.

“AIR POLLUTION AND OXYGENATED GASOLINE,” paper no. 930374, New Developments in Alternative Fuels and Gasoline for SI and CI Engines. SAE Technical Paper Series, February 1993. Also presented at SAE International Congress and Exposition, Detroit, MI, March 1993. Abstract: During the fall, winter, and spring of 1991-1992, a measurement program was conducted in Denver, Colorado to quantify the technical and economic effectiveness of oxygenated gasoline in reducing automobile CO emissions. This paper describes the measurement program and its results. The measurement program demonstrated that most of the reduction is concentrated in a small percentage of the vehicles that use oxygenated gasoline. The remainder experience little or no reduction in emissions. This paper describes the ability of the oxygenated gasoline program to reduce pollution; the overall cost of the program to government, industry, and consumers; and the effectiveness of the program in reducing pollution compared to its cost.

“PERFORMANCE AUDIT OF THE COLORADO OXYGENATED FUELS PROGRAM,” State of Colorado, Office of State Auditor, Denver, December 1992.

Abstract: The Colorado State Legislature in Senate Bill 89-77 required a performance audit of the state oxygenated fuels program. To fulfill the mandate of this legislation, the State Auditor’s Office requested PRC Environmental Management, Inc. undertake the performance audit. PRC in cooperation with SAO staff conducted the audit according to generally accepted auditing standards. As required by SB89-77, the audit relied on original, independently derived data. The results are not estimated, modeled, or projected. Instead, they are based on real-world measurements obtained using an innovative remote-sensing technique. PRC also relied on interviews, surveys, and laboratory analysis in completing the audit.

“REMOTE SENSING ENHANCED MOTOR VEHICLE EMISSIONS CONTROL FOR POLLUTION REDUCTION IN THE CHICAGO METROPOLITAN AREA: SITING AND ISSUE ANALYSIS,” Illinois Department of Energy and Natural Resources, ILENR/RE-AQ-91/15, October 1991, with D. H. Stedman.

Abstract: This report describes three specific scenarios for implementation of remote sensing to enhance inspection and maintenance (I/M) programs for controlling motor vehicle emissions. Three scenarios are presented which describe the range of potential applications of a Fuel Efficiency Automobile Test (FEAT) remote sensor to motor vehicle emissions control. A combination of two or three scenarios would be most effective in identifying high mileage gross polluting vehicles. The preliminary implementation framework of each scenario is described for the purpose of discussion to develop future pilot studies and implementation plans. The ultimate purpose of this work is to contribute to the development of acceptable plans for the further reduction of emissions from automobiles in the Chicago metropolitan area.

“ENVIRONMENTAL PROBLEM SOLVING: THE 1987-88 METRO DENVER BROWN CLOUD STUDY,” Chemical Engineering Progress, May 1990.

Abstract: The Denver metropolitan area was a giant laboratory during the winter of 1987-88. Unknown to most residents, a proposed air pollution control strategy was being tested as part of the century-old effort to combat Denver’s brown cloud. Electricity in the Denver area, including the cities of Boulder and Golden, is supplied by four generating stations owned and operated by Public Service Co. of Colorado. The smallest plant uses natural gas. The three largest, which generate up to 1,100 MW, burn coal. Local air quality advocates had recommended that Public Service Co. switch the coal-fired plants to natural gas to reduce Denver’s visible air pollution problem. During three periods of about two weeks each during the winter of 1987-88, PSC converted all of its coal-fired units to natural gas, which reduced total sulfur emissions in Denver by over 50% and permitted a full-scale analysis of the effectiveness of this control strategy.

1987-88 METRO DENVER BROWN CLOUD STUDY - PROJECT SUMMARY, Report to the Policy Committee, 1987-88 Metro Denver Brown Cloud Study, Inc., October 1988, with B. F. Bryan, E. F. Harvey, J. G. Watson.

Abstract: Urban visible air pollution such as metropolitan Denver’s wintertime brown cloud is not the direct subject of any existing federal or state regulation. It is however the most noticeable form of air pollution and is widely perceived as a detriment to the region’s quality of life. The 1987-88 Metro Denver Brown Cloud Study was organized in the spring of 1987 to determine the relative contributions of the sources of the winter brown cloud, providing fair and objective data for developing control strategies. In addition, the Study was designed to take advantage of Public Service Company’s voluntary switch from coal burning to natural gas burning for forty-five days during the winter to test the brown cloud impact of the change in fuel.

Presentations

“Ethics Workshop: Priorities and Values,” session chair, A&WMA 94th Annual Meeting, EP-9b, San Diego, CO, June 2003.

“Science and Technology Ethics,” book review, Chemical Engineering Progress, March 2003.

“Doing the Right Thing – Ethics for Environmental Professionals,” East and West Michigan Chapters’ A&WMA annual conference, East Lansing, MI, December 2002.

“The Rocky Flats Cold War Museum,” Rocky Flats Citizens Advisory Board annual meeting, Denver, CO, December 2001.

“Long-term Stewardship and Remedy Decision-making,” Energy Communities Alliance Peer Exchange Meeting, Grand Junction, CO, July 2001.

“Professional Ethics Laboratory, An Introduction to ‘Doing the Right Thing,’” session co-chair, A&WMA 94th Annual Meeting, EP-9a, Orlando, FL, June 2001.

“Current Issues in Radioactive Waste and Nuclear Contamination,” session co-chair, A&WMA 94th Annual Meeting, WR-3d, Orlando, FL, June 2001.

“Environmental Consulting in the New Millennium,” Annual A&WMA Rocky Mountain States Section and University of Colorado at Denver Student Chapter meeting, March 2001.

“The Role of Local Governments in Long-Term Stewardship at DOE Facilities,” Environmental Law Institute Research Report, February 2001, contributor.

“Long-Term Stewardship of Contaminated Sites,” Resources for the Future, Discussion Paper 00-54, December 2000, contributor.

“Protecting Ourselves from our Nuclear Mess: Can the Backyard Neighbors Agree with DOE on Long-Term Stewardship?” U.S. DOE Long-Term Stewardship Workshop, August 2000, Denver, CO.

“Protecting Ourselves from our Nuclear Mess: Can the Backyard Neighbors Agree with DOE on Long-Term Stewardship?” A&WMA 93rd Annual Meeting, paper #796, Salt Lake City, UT, June 2000, with R. Edge, S. Tarlton, and J. Werner.

“A View from the Backyard: Stakeholders and Asset-holders,” Long-Term Stewardship Workshop, Waste Management 2000 Symposium, February 2000, Tucson, AZ.

“Denver Comprehensive Plan 2000: A Vision for Denver and its People,” published January 2000, Environmental Sustainability Community Task Force Volunteer, 1997-1999.

“Nuclear Weapons and Waste Cleanup: Why You Should Still Care,” session chair, Pacific Northwest International Section A&WMA Annual Conference, Pasco, WA, November 1999.

“The Integration of Science and Politics to Clean up 50 Years in the Nuclear Sandbox,” A&WMA 92nd Annual Meeting, paper #99-22, St. Louis, MO, June 1999, with T. Holeman.

“Site Characterization, Clean-up, and Closure and Associated Multi-Media Issues,” session chair, A&WMA 92nd Annual Meeting, T1, St. Louis, MO, June 1999.

“Rocky Flats,” Leadership Roundtable, Arvada Community News, May 1999.

“Look What’s in our Backyard: Local Government’s Contending With Cleanup,” ECA annual meeting, March 1999, Washington, DC, with T. Holeman.

“Inventing the Science and Politics of Local Government Involvement in Nuclear Waste Cleanup,” Pacific Northwest International Section (PNWIS), Air & Waste Management Association (A&WMA), Annual Conference, Portland, OR, November 1998.

“Engineering and Environmental Ethics,” book review, EM, October 1998.

“Impress Your Regulators and Your Shareholders -- Improved Regulatory Compliance Through EMSs and ISO 14000,” A&WMA 91st Annual Meeting, paper #98-TP53.06, San Diego, CA, June 1998, with J. Grosskopf and C. Kuiper.

“Air Quality,” session chair, Northwest Colorado Coal Conference, May 1998, Meeker, CO.

“Professional Ethics,” panel moderator, Colorado Hazardous Waste Management Society workshop, March 1998.

“Ethics of an Environmental Professional,” A&WMA Rocky Mountain States Section, monthly meeting, Denver, August 1997.

“Ethics of an Environmental Professional: Integrating Earth Day Consciousness of the 70s in the Budget Cutting Consciousness of the 90s,” A&WMA 90th Annual Meeting, paper #97-MP171.02, Toronto, ON, Canada, June 1997.

“Environmental Ethics,” PNWIS A&WMA Annual Conference, Seattle, WA, December 1996.

“Solving Low Concentration Toxic VOC Air Emission Problems,” PNWIS A&WMA Annual Conference, paper #3D-2, Spokane, WA, November 1995

“Solving Widespread Low Concentration VOC Air Pollution Problems: Gas-Phase Photocatalytic Oxidation Answers the Needs of Many Small Businesses,” A&WMA, 88th Annual Meeting, San Antonio, TX, June 1995, with C. Turchi and D. Gratson. NREL publication #TP-473-7569.

“The Next Generation of Automobile Emissions Reduction: Innovative Control of Off-Cycle Emissions,” A&WMA 88th Annual Meeting, paper #95-WP97A.04, San Antonio, TX, June 1995, with T. F. Potter. NREL publication #TP-473-7570.

“Breakthroughs in Automotive Emission Control Technology,” Innovative Multimedia Strategies for the 21st Century, PNWIS A&WMA Annual Conference, paper #2B-2, Eugene, OR, November 1994, with T. F. Potter.

“The Air is Cleaner in Libby, Montana — Grassroots Residential Wood Smoke Pollution Reduction,” A&WMA, Rocky Mountain States Section monthly meeting, Denver, November 1993.

“Performance Audits to Evaluate Cost Effectiveness of Air Pollution Control Strategies,” Transboundary/International Issues, PNWIS A&WMA Annual Conference, Victoria, BC, Canada, November 1993.

“Quantifying the Emissions Reduction Effectiveness and Costs of Oxygenated Gasoline,” paper no. 93-TP-41B.01, A&WMA 86th Annual Meeting, Denver, June 1993.

“Visibility Source Apportionment: Another Order of Complexity Magnitude,” paper no 18.4, PNWIS A&WMA Annual Conference, Bellevue, WA, November 1992.

“Designing a Study to Quantify Emissions Reductions,” paper no. 30.1, PNWIS A&WMA Annual Conference, Bellevue, WA, November 1992.

“Quantifying the Emissions Reduction and Costs of Oxygenated Fuels,” Emissions Inventory Issues and Progress International Symposium, A&WMA and U.S. Environmental Protection Agency, Research Triangle Park, NC, October 1992, with R. J. Fox.

“Quantifying the Benefits of Mobile Source Emission Control Programs Using Remote Sensing,” International Specialty Conference on Optical Remote Sensing, A&WMA, Houston, TX, April 1992, with J. A. Grinspoon.

“Development of a Residential Wood Smoke Reduction Plan in a Wood Burning Community,” PNWIS A&WMA Conference, Kalispell, MT, Dec. 1991, with L. A. Manderino and R. L. Anderson.

“The 1987-88 Metro Denver Brown Cloud Study,” International Workshop Series on Ozone, Air Pollution Control Association (APCA), Denver, November 1987.

“Measuring Fugitive Toxic Air Emissions from Process Plans and Refineries,” International Workshop on Air Toxics, APCA, Denver, April 1987, with H. J. Taback.

“Experimental Field Design for Source/Receptor Apportionment,” paper no. 81-64.6, 74th Annual Meeting, APCA, Philadelphia, PA, June 1981, with K. Bumiller and I. H. Tombach.

“A New Concept for the Control of Urban Inhalable Particulates by the Use of Electrostatically Charged Fog,” paper no. 80-68.5, 73rd Annual Meeting, APCA, Montreal, QC, Canada, June 1980, with J. S. Kinsey, S. A. Hoenig and D. Drehmel.

“Relating Particulate Matter Sources and Impacts in the Willamette Valley During Field and Slash Burning,” paper no. 79-46.3, 72nd Annual Meeting, APCA, Cincinnati, OH, June 1979, with I. H. Tombach, R. A. Eldred, F. . Terraglio, and J. E. Core.