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General Biographical Information

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Academic background

Ph.D.	University of Washington	1967
M.S.Ch.E.	University of Washington	1963
B.S.Ch.E.	University of Washington	1960

Professional history

Professor of Civil Engineering, Department of Civil & Environmental Engineering, University of Washington, Seattle, WA, 1978-present.

Adjunct Professor of Chemical Engineering, Department of Chemical Engineering, University of Washington, Seattle, WA, 1984-present

Director, Air Pollution Training Center, 1983-present

Associate Professor, Department of Civil Engineering, University of Washington, Seattle, WA, 1971-1978.

Assistant Professor, Department of Civil Engineering, University of Washington, Seattle, WA, 1967-1971.

US Public Health Service Fellowship, University of Washington, Seattle, WA, 1964-1967.

Engineer, The Boeing Company, Seattle, 1961-1964.

Refereed Journal Publications

Pilat, M.J. and R.J. Charlson (1966) "Theoretical and optical studies of humidity effects on the size distribution of a hygroscopic aerosol," *Journal de Recherches Atmospheriques* **2** 165-170 (April-September 1966).

Pilat, M.J. (1967) "Optical efficiency factors for concentric spheres," *Applied Optics* **6** 1555-1558 (September 1967).

Pilat, M.J. (1968) "Application of gas-aerosol adsorption data to the selection of air quality standards," *J. Air Pollution Control Association* **18** 751-753 (November 1968).

Charlson, R.J. and M. J. Pilat (1969) "Climate: The influence of aerosols," *J. Applied Meteorology* **8** 1001-1002 (December 1969).

Pilat, M.J. and D.S. Ensor (1970) "Plume opacity and particulate mass concentration," *Atmospheric Environment* **4** 163-173 (March 1970).

Noll, K.E. and M.J. Pilat (1970) "Inertial impaction of particles upon rectangular bodies," *J. Colloid & Interface Science* **33** 197-207 (June 1970).

Pilat, M.J. and D.S. Ensor (1970) "Authors' reply to discussion by Jarman and deTurville on Plume opacity and particulate mass concentration" *Atmospheric Environment* **4** 589-590 (September 1970).

Sparks, L.E. and M.J. Pilat (1970) "Effects of diffusiophoresis on particle collection by wet scrubbers," *Atmospheric Environment* **4** 651-660 (November 1970).

Pilat, M.J., D.S. Ensor, and J.C. Bosch (1970) "Source test cascade impactor," *Atmospheric Environment* **4** 671-679 (November 1970).

Pilat, M.J. and D.S. Ensor (1971) "Comparison between the light extinction-aerosol mass concentration relationship of atmospheric and air pollutant emission aerosol," *Atmospheric Environment* **5** 209-215 (May 1971).

Ensor, D.S. and M.J. Pilat (1971) "The effect of particle size distribution on light scattering measurement," *American Industrial Hygiene Association J.* **32** 287-292 (May 1971).

Noll, K.E. and M.J. Pilat (1971) "Size distribution of atmospheric giant particles," *Atmospheric Environment* **5** 527-540 (July 1971).

Pilat, M.J., D.S. Ensor, and J.C. Bosch (1971) "Cascade impactor for sizing particulates in emission sources," *American Industrial Hygiene Association J.* **32** 508-511 (August 1971).

Charlson, R.J. and M.J. Pilat (1971) "Reply to discussion by Schneider on Climate: The influence of aerosols," *Journal of Applied Meteorology* **10** 841-842 (August 1971).

Ensor, D.S. and M.J. Pilat (1971) "Calculation of smoke plume opacity from particulate air pollutant properties," *J. of Air Pollution Control Association* **21** 496-501 (August 1971).

Sparks, L.E. and M.J. Pilat (1971) "Authors reply to discussion by Alt on Effect of diffusiophoresis on particle collection by wet scrubber," *Atmospheric Environment* **5** 667 (August 1971).

Bosch, J.C., M.J. Pilat, and B.F. Hrutfiord (1971) "Size distribution of aerosols from a kraft mill recovery furnace," *Technical Association Pulp & Paper Industry Journal* **54** 1871-1876 (November 1971).

Ensor, D., W. Porch, M. Pilat, and R. Charlson (1971) "Influence of the atmospheric aerosol on albedo," *Journal of Applied Meteorology* **10** 1303-1306 (December 1971).

- Larssen, S., D. Ensor, and M. Pilat (1972) "Relationship of plume opacity to the properties of particulates emitted from kraft recovery furnaces," *Technical Association of Pulp & Paper J.* **44** 88-92 (January 1972).
- Liao, P.B. and M.J. Pilat (1972) "Air pollutant emissions from fluidized bed sewage sludge incinerators," *Water and Sewage Works* **24** 68-74 (February 1972).
- Hanna, T.R. and M.J. Pilat, (1972) "Size distribution of particulates emitted from Soderberg aluminum reduction cells," *J. of Air Pollution Control Association* **22** 533-536 (July 1972).
- Ensor, D., L. Sparks, and M.J. Pilat (1973) "Light transmittance across plumes downwind from point sources of aerosol emissions," *Atmospheric Environment* **7** 1267-1277 (December 1973).
- Larson, T.V. and M.J. Pilat (1974) "Letter to Editor on 'A linear model for predicting the washout of pollutant gases from industrial plumes' by J. Hales, M. Wolf, and M. Dana; *AIChE J* 19 292 (1973), *American Institute of Chemical Engineers J.* **20** 207 (January 1974).
- Pilat, M., S. Jaasund, and L. Sparks (1974) "Collection of aerosol particles by electrostatic droplet spray scrubber," *Environmental Science & Technology* **8** 340-348 (April 1974).
- Ensor, D., L. Sparks, and M. Pilat (1974) "Reply to discussion by Jarman and deTurville on 'Light transmittance across smoke plumes downwind from point sources of aerosol emissions,'" *Atmospheric Environment* **7** 871-872 (August 1974).
- Pilat, M. (1974) "Future needs for fine particle scrubber capabilities," *J. Air Pollution Control Association* **24** 975 (October 1974).
- Pilat, M. (1975) "Collection of aerosol particles by electrostatic droplet spray scrubbers," *J. Air Pollution Control Association* **25** 176-178 (February 1975).
- Pilat, M. and A. Prem (1976) "Calculated particle collection efficiencies of single droplets including inertial impaction, brownian diffusion, diffusiophoresis, and thermophoresis," *Atmospheric Environment* **10** 13-19 (January 1976).
- Pilat, M. and A. Prem (1977) "Effect of diffusiophoresis and thermophoresis on the overall particle collection efficiency of spray droplet scrubbers," *J. Air Pollution Control Association* **27** 982-988 (October 1977).
- Prem, A. and M. Pilat (1978) "Calculated particle collection efficiencies by single droplets considering inertial impaction, brownian diffusion, and electrostatics," *Atmospheric Environment* **12** 1981-1991 (October 1978).
- Thielke, J. and M. Pilat (1978) "Plume opacity related to aerosol properties," *Atmospheric Environment* **12** 2489-2448 (December 1978).

- Kester, R. and M. Pilat (1980) "Nitrogen oxide emissions from pilot plant spreader-stoker bark-fired boiler," *Technical Association of Pulp & Paper Industry Journal* **63** 159-161 (February 1980).
- Steig, T. and M. Pilat (1983) "Comparison of opacities measured by portable and cross-stack transmissometers at a coal-fired power plant," *Atmospheric Environment* **17** 1-9 (January 1983).
- Pilat, M. and J. Wider (1983) "Opacity of monodisperse sulfuric acid aerosols," *Atmospheric Environment* **17** 1825-1835 (September 1983).
- Wilder, J. and M. Pilat (1983) "Calculated droplet size distribution and opacities of condensed sulfuric acid aerosols," *J. Air Pollution Control Association* **33** 858-863 (September 1983).
- Pilat, J. and T. Steig (1983) "Size distribution of particulate emissions from a pressurized fluidized bed coal combustion facility," *Atmospheric Environment* **17** 2429-2433 (December 1983).
- Novick, V. J. and M.J. Pilat (1990) "Gas and aerosol sampling from high temperature transient pressure environments," *Nuclear Engineering and Design* **118** 219-226
- Fellows, K. and M. Pilat (1990) "HCl sorption by dry NaHCO₃ for incinerator emissions control," *Journal Air & Waste Management Association* **40** 887-893 (June 1990).
- Larsen, E. and M. Pilat (1991) "Design and testing of a moving-bed VOC adsorption system," *Environmental Progress Journal* **10** 75-82 (February 1991).
- Larsen, E. and M. Pilat (1991) "Moving bed adsorption system for control of VOC's from an facility," *Journal Air & Waste Management Association* **41** 1199-1206 (September 1991).
- Pegnam, R. C. and M. J. Pilat (1992) "Airborne particulate emissions from a chromic acid anodizing process tank," *Journal of the Air & Waste Management Association* **42** 303-308 (March 1992).
- Klobucar, J. and M. Pilat (1992) "Continuous flow thermal desorption of VOC's from activated carbon," *Environmental Progress Journal* **11** 11-17 (February 1992).
- Williamson, J. and M. Pilat, "Effects of water vapor interference on a pulsed fluorescence SO₂ instrument," Accepted for publication in *Atmospheric Environment* pending revisions (March 1, 1991).
- J. M. Klobucar & M. J. Pilat, "Characterization of Hydrophobic Adsorbents for VOC Emission Control", Accepted for publication in *Environmental Progress Journal* pending revisions (Sept. 1992).
- M. Pilat and R. Pegnam, "Aerosol Particle Emissions from Chrome Plating", Submitted for publication in *Aerosol Science and Technology* (April 14, 1998). Accepted for Publication pending revisions, June 17, 1998, revisions made, in press.

Fully-Refereed Conference Proceedings

Pilat, M.J. and R.J. Charlson (1966) "Theoretical and Optical Studies of Humidity Effects on the Size Distribution of a Hygroscopic Aerosol," Presented at 6th International Conference on Condensation Nuclei, Albany, NY (May 9-13, 1966).

Rossano, A.T., Jr. and M.J. Pilat (1970) "Recent Developments in the Control of Air Pollution from Primary Aluminum Smelters in the United States," Presented at the 2nd International Clean Air Congress, Washington, D.C. (December 6-11, 1970).

Ensor, D.S. and M.J. Pilat (1970) "The Relationship Between the Visibility and Aerosol Properties of Smoke-Stack Plumes," Presented at the 2nd International Clean Air Congress, Washington, D.C. (December 6-11, 1970).

Abstract and Non-Refereed Conference Proceedings and Other Non-Journal Articles

Pilat, M.J. (1966) "Effects of Sorption on the Size Distribution and Optical Properties of an Aerosol," Presented at PNWIS-APCA Annual Meeting, Seattle (November 3-4, 1966).

Pilat, M.J. (1968) "Application of Gas-Aerosol Adsorption Data to the Selection of Air Quality Standards," Presented at Annual APCA Meeting, St. Paul, Minn. (June 23-27, 1968).

Poll, H. and M.J. Pilat (1968) "The Public and Air Pollution Control Agencies," Presented at PNWIS-APCA Annual Meeting, Vancouver, B.C. (November 21-22, 1968).

Sparks, L.E. and M.J. Pilat (1969) "Diffusion Forces and Particulate Scrubber Efficiencies," Presented at APCA Annual Meeting, New York (June 22-26, 1969).

Sparks, L.E., D.S. Ensor, and M.J. Pilat (1969) "Light Extinction by Cooling Tower Plumes," Presented at PNWIS-APCA Annual Meeting, Portland, Oregon (November 24-25, 1969).

M.J. Pilat (1970) "Control Technology for Small Particles," Presented at 11th Conference on Methods in Air Pollution at Industrial Hygiene Studies, University of California, Berkeley, California (March 20-April 1, 1970).

Sparks, L.E. and M.J. Pilat (1970) "Influence of Droplet Size on Wet Scrubber Particulate Removal," Presented at American Industrial Hygiene Conference, Detroit, Michigan (May 11-15, 1970).

Pilat, M.J., D.S. Ensor, and J.C. Bosch (1970) "Cascade Impactor for Sizing Particulates in Emission Sources," Presented at AIHA Conference, Detroit, Michigan (May 11-15, 1970).

Ensor, D.S. and M.J. Pilat (1970) "The Effects of Particle Size Distribution on Light Transmittance Measurements," Presented at AIHA Conference, Detroit, Michigan (May 11-15, 1970).

Ensor, D.S. and M.J. Pilat (1970) "Calculations of Smoke Plume Opacity from Particulate Air Pollutant Properties," Presented at APCA Annual Meeting, St. Louis, Missouri, (June 16, 1970).

Hrutfjord, B.F., J.C. Bosch, and M.J. Pilat (1970) "Size Distribution of Aerosols from a Kraft Recovery Furnace," Presented at 3rd Canadian Wood Chemical Symposium, Vancouver, B.C. (June 26, 1970).

Hanna, T.R. and M.J. Pilat (1970) "Size Distribution of Particulates Emitted from a Horizontal Space Soderberg Aluminum Reduction Cell," Presented at PNWIS-APCA Annual Meeting, Spokane, Washington (November 16-18, 1970).

Larssen, S., D.S. Ensor, L.E. Sparks, and M.J. Pilat (1970) "Size Distribution of Particulate Emissions from a Veneer Drier," Presented at PNWIS-APCA Annual Meeting, Spokane, Washington (November 16-18, 1970).

Larssen, S., D.S. Ensor, and M.J. Pilat (1971) "Relationship of Plume Opacity to the Properties of Particulates Emitted from Kraft Recovery Furnaces," Presented at TAPPI Water and Air Conference, Boston, Mass. (April 4-7, 1971).

Pilat, M.J., D.S. Ensor, and K.E. Noll (1971) "Atmospheric Aerosol Size Distribution," Presented at ACS 45th National Colloid Symposium, Georgia Institute of Technology, Atlanta, Georgia (June 21-23, 1971).

Ensor, D.S., A.P. Waggoner, and M.J. Pilat (1971) "Effects of Angular Light Loss in the Integrating Nephelometer," Presented at AIHA Conference, Toronto (May 24-28, 1971).

Sparks, L.E. and M.J. Pilat (1971) "Influence of Wet Scrubber Operating and Design Parameters on Particulate Removal," Presented at AIHA Conference, Toronto (May 24-28, 1971).

Pilat, M.J. (1971) "Measurement of Plume Opacity as Related to Mass Concentration, Size Distribution, Refractive Index, and Specific Gravity," Presented at 13th Conference in Methods of Air Pollution and Industrial Hygiene, University of California, Berkeley, California (October 30-31, 1972).

Pilat, M.J. (1973) "Isokinetic Sampling with a Stack Cascade Impactor," Presented at 3rd Annual Air Pollution Control Conference, University of Tennessee, Knoxville, Tennessee (March 29-30, 1973).

Pilat, M.J. (1973) "Submicron Particle Sampling with Cascade Impactors," Presented at APCA Annual Meeting, Chicago (June 24-28, 1973).

Pilat, M.J. (1973) "Wet Electrostatic Collection of Fine Particles," Presented at EPA Seminar on Electrostatics and Fine Particles, EPA-NERC, Research Triangle Park, N.C. (September 6, 1973).

Pilat, M.J. and D.J. Lutrick (1973) "U.W. Cascade Impactor for Sizing Particles in Emission Sources" Presented at PNWIS-APCA Annual Meeting, Seattle, Washington (November 28-30, 1973).

Pilat, M.J., G.W. Smith, and C.T. VanDeCar (1973) "Condenser Control for Vapor Phase Air Pollutant Emissions," Presented at PNWIS-APCA Annual Meeting, Seattle, Washington (November 28-30, 1973).

Pilat, M.J. (1974) "Measurement of Particle Size Distributions at Emission Sources with Cascade Impactors," Presented at US-USSR Symposium on Fine Particle Particulate Emissions from Stationary Sources, San Francisco (January 15-18, 1974).

Pilat, M.J. (1974) "Future Needs for Fine Particle Scrubber Capabilities," Presented at EPA Fine Particle Scrubber Symposium, San Diego (May 30, 1974).

Ensor, D.S. and M.J. Pilat (1974) "The Correlation of Plume Opacity to Particulate Mass Concentration," Presented at AIChE 78th National Meeting, Salt Lake City, Utah (August 18-21, 1974).

Pilat, M.J. (1974) "Plume Opacity Related to Particle Properties," Presented at U. of Col. - U. of W. Conference on Hot Gas Precipitation for Use with Low Sulfur Coal-fired Boilers, Denver, Colorado (September 24, 1974).

Pilat, M.J. (1974) "Collection of Aerosol Particles by Electrostatic Droplet Spray Scrubbers," Presented at EPA Symposium on Electrostatic Precipitation for the Control of Fine Particles, Pensacola Beach, (October 2, 1974).

Pilat, M.J. (1974) "Plume Opacity Related to Particle Properties," Presented at PNWIS-APCA Annual Meeting, Boise, Idaho (November 18-19, 1974).

Pilat, M.J. (1975) "Source Test Particle Sizing in the 0.02 to 0.2 Micron Diameter Range with a Cascade Impactor," Presented at 1975 Engineering Foundation Conference on Evaluation of Air Pollution Emissions of Stationary Sources, AsiloMar Conference Grounds, Pacific Grove, California (March 31-April 4, 1975).

Pilat, M.J. (1975) "Development of an Instrument for Measuring Size Distribution of Particles Emitted from Coal-fired Utility Boilers with a Low Pressure Cascade Impactor," Presented at University Contractors Conference, ERDA, NSF/RANN, EPRI, Park City, Utah (October 22-23, 1975).

Pilat, M.J., G.M. Fioretti, and E.B. Powel (1975) "Sizing of 0.02 to 20 Micron Diameter Particles Emitted from Coal-fired Power Boilers with Cascade Impactors," Presented at PNWIS-APCA Annual Meeting, Vancouver, B.C. (November 20, 1975).

Pilat, M.J. (1975) "Low Pressure Impactors for In-stack Particle Sizing," Presented at EPA Seminar on In-stack Particle Sizing for Particulate Control Device Evaluations, NERL, Research Triangle Park, N.C. (December 4-5, 1975).

Pilat, M.J. (1976) "Plume Opacity and Scrubbers," Presented at U. of Col. - U. of W. Conference on Disposal of Scrubber Effluents and Sludges on Low Sulfur Coal-fired Boilers, Denver, Colorado (April 21, 1976).

Pilat, M.J. (1976) "Fine Particulate Measurements in Emission Stacks," Presented at NCASI West Coast Regional Meeting, Portland, Oregon (December 8-9, 1976).

Pilat, M.J. (1977) "Discussion of Fine Particulate and Gaseous Emissions Control Experience with TRW Charged Droplet Scrubber," Presented at Workshop on Novel Concepts, Methods, and Advanced Technology in Particle-Gas Separation," U. of Notre Dame, Notre Dame, Indiana (April 20-22, 1977).

Pilat, M.J., G.A. Raemhild, and D.L. Harmon (1977) "Fine Particle Control with U.W. Electrostatic Scrubber," Presented at EPA Second Fine Particle Symposium, New Orleans (May 2-3, 1977).

Pilat, M.J., G.A. Raemhild, and D.L. Harmon (1977) "Tests of U.W. Electrostatic Scrubber at an Electric Arc Steel Furnace," Presented at EPA Conference on Particulate Collection Problems in the Use of Electrostatic Precipitators in the Metallurgical Industry, Denver, Colorado (June 1-3, 1977).

Pilat, M.J., E.B. Powell, and R.C. Carr (1977) "Submicron Particle Sizing with U.W. Mark 4 Cascade Impactor," Presented at APCA Annual Meeting, Toronto, Ontario (June 20-24, 1977).

Pilat, M.J. and G.A. Raemhild (1977) "Control of Emissions from Coal-Fired Power Boiler with U.W. Electrostatic Scrubber," Presented at ERDA/NSF/EPRI University Conference on Coal Research, Pittsburgh (August 24-26, 1977).

Pilat, M.J., and G.S. Raemhild (1977) "Cascade Impactor Measurements of Particles Emitted from Electric Utility Generating Stations," Presented ERDA/NSF/EPRI University Conference on Coal Research, Pittsburgh (August 24-26, 1977).

Thielke, J.F., and M.J. Pilat (1977) "Computer Program (RASS) for Processing Cascade Impactor Data into Particle Size Distributions," Presented at PNWIS/APCA Annual Meeting, Spokane (November 14-16, 1977).

Mummey, D.S., J.F. Thielke, and M.J. Pilat (1977) "In-stack Plume Opacity Measurements Related to Aerosol Properties for Coal-Fired and Oil-Fired Boilers," Presented at PNWIS/APCA Annual Meeting, Spokane (November 14-16, 1977).

Raemhild, M.J., and M.J. Pilat (1977) "Control of Particulate Emissions with U.W. Electrostatic Spray Scrubber," Presented at PNWIS/APCA Annual Meeting Spokane, (November 14-16, 1977).

Pilat, M.J., E.B. Powell, and R.C. Carr (1977) "Particle Sizing and the U.W. Mark 3-4 Source Test Cascade Impactors," Presented at PNWIS/APCA Annual Meeting, Spokane (November 14-16, 1977).

Pilat, M.J.(1978) "Sizing Submicron Particles with a Cascade Impactor," Presented at EPA International Symposium on Advances in Particle Sampling and Measurement, Ashville, North Carolina (May 14-17, 1978).

Pilat, M.J. and G.A. Raemhild (1978) "Control of Particulate Emissions with U.W. Electrostatic Spray Scrubber," Presented at EPA International Symposium on Transfer and Utilization of Particulate Control Technology, Denver, Colorado (July 24-28, 1978).

Pilat, M.J., G.A. Raemhild, and T.W. Gault (1978) "Tests on U.W. Electrostatic Scrubber for Particulate and Sulfur Dioxide Collection," Presented at PNWIS/APCA Annual Meeting, Portland (November 8-10, 1978).

Pilat, M.J. (1978) "Relationship of Plume Opacity and Properties of Particulates," Presented at EPA Visible Emissions Training and Field Evaluation Techniques Workshop, Seattle (October 11-13, 1978).

Pilat, M.J. (1979) "Field Operation of In-Stack Cascade Impactors," Presented at Workshop on In-stack Cascade Impactors, University of Florida (March 15-16, 1979).

Pilat, M.J. (1979) "Particulate Sampling for Mass Concentration and Size Distribution," Presented at Meeting of the Engineering Institute of Canada, Trail, B.C. (May 30-June 1, 1979).

Pilat, M.J. (1979) "Particulate Sampling for Mass Concentration and Size Distribution," Presented at Meeting of The Engineering Institute of Canada, Trail, B.C. (May 30-June 1, 1979).

Pilat, M.J. (1979) "Tests on UW Electrostatic Scrubber for Particulate and Sulfur Dioxide Collection," Presented at EPA 2nd International Symposium on Transfer and Utilization of Particulate Control Technology, Denver, Colorado (July 23-27, 1979).

Pilat, M.J. and T.W. Steig (1980) "Particle Size Measurements on Emissions from Pressurized Fluidized Bed Coal Combustion Facility at CURL, Leatherhead, England," Presented at 89th Nat. Meeting of American Institute of Chemical Engineers, Portland, Oregon (August 17-20, 1980).

Wilder, J.M. and M.J. Pilat (1980) "Effect of Condensed Sulfuric Acid on Aerosol Size Distributions and Plume Opacity," Presented at Pacific Northwest International Section of APCA Annual Meeting, Yakima, WA (November 1980).

Steig, T.W. and M.J. Pilat (1980) "Opacity Stratification at a Coal Fired Boiler Using Cross-stack and Portable Instruments," Presented at PNWIS-APCA Annual Meeting, Yakima, WA (November 19-21, 1980).

Raemhild, G.A. and M.J. Pilat (1981) "Particle Collection Efficiency of a Wet Scrubber on Emissions from a Horizontal Spike Soderberg Aluminum Reduction Process," Presented at PNWIS-APCA Annual Meeting, Spokane, WA (November 2-4, 1981).

Nothstein, G.L. and M.J. Pilat (1981) "Source Testing for H₂SO₄ Using the IPA-Thorin Method (EPA Method 8)," Presented at PNWIS-APCA Annual Meeting, Spokane, WA (November 2-4, 1981).

Steig, T.W. and M.J. Pilat (1981) "High Temperature Particle Sizing with Cascade Impactors," Presented at PNWIS-APCA Annual Meeting, Spokane (November 1981).

Carleson, T., M. Pilat, and J. Berg (1982) "Sulfur Dioxide Absorption by Charged Water Droplets - Laboratory and Pilot Scale Results," Presented at PNWIS-APCA Annual Meeting, Vancouver, B.C. (November 15-17, 1982).

Pilat, M. (1983) "Low Pressure Cascade Impactors," Presented at Annual Meeting of Fine Particle Society, Honolulu, Hawaii (August 1-5, 1983).

Pilat, M. and J. Wilder (1983) "Opacity of H₂SO₄ Aerosols," Presented at Annual Meeting of Fine Particle Society, Honolulu, Hawaii (August 1-5, 1983).

Burnet, P. and M. Pilat (1983) "Dust Piling on Pulse-Cleaned Fabric Filters," Presented at Pacific NW Int. Section of Air Poll. Control Association, Seattle (November 16-18, 1983).

Pilat, M.J. (1984) "Field Test Procedures for In-Stack Impactors," Presented at 6th Annual In-stack Impactor Workshop, U. of W., Seattle (August 7-9, 1984).

Pilat, M. and P. Burnet (1984) "Dust Piling on Pulse-Cleaned Fabric Filters," Presented at 1st International Aerosol Conference, Minneapolis (September 17-21, 1984).

Pilat, M. (1985) "Woodstove Emissions: Particulate and Gaseous," presented at Woodstove Emissions Workshop, Portland (February 5-7, 1985).

Pilat, M. and A. Waggoner (1985) "Characterization of Atmospheric Aerosols Near Olympia, Washington," Presented at 16th Annual Meeting of Fine Particle Society, Miami Beach, Florida (April 22-26, 1985).

Novick, V., J. Alvarez, and M. Pilat (1985) "Aerosol Sampling from High Temperature Transient Pressure Environments," Presented at 16th Annual Meeting of Fine Particle Society, Miami Beach, FL (April 22-26, 1985).

Pilat, M. "Air Pollutant Emissions From Woodstoves," Presented at Woodstove Emissions Workshop, Portland, (May 20-22, 1986).

Sonnichsen, T., M. Pilat, and J. Wilder (1986) "Flue Gas Desulfurization by Dry Alkaline Sodium Sorbent Injection using an Electrostatic Precipitator," Presented at EPA/EPRI 1986 Symposium on Dry SO₂/NO_x Control Technology, Raleigh, North Carolina (June 2-6, 1986).

Pilat, M., J. Guenthoer, and K. Hansen (1986) "Measurement of Particle Collection Efficiency as a Function of Particle Size with Cascade Impactors," Presented at 2nd Int. Aerosol Conference, West Berlin (September 22-26, 1986).

Pilat, M., J. Wilder, and T. Sonnichsen (1986) "Flue Gas Desulfurization with Dry Aerosols of Sodium Sorbents," Presented at 2nd Int. Aerosol Conference, West Berlin (September 22-26, 1986).

Wilder, J. and M. Pilat (1986) "Pilot Scale Flue Gas Desulfurization by Dry Sodium Sorbent Injection," Presented at PNWIS-APCA Annual Meeting, Eugene, Oregon (November 19-21, 1986).

Wilder, J.M. and M.J. Pilat (1987) "Suspended phase flue gas desulfurization reactions between sodium bicarbonate particles and sulfur dioxide," Presented at 1987 Annual Meeting of American Association for Aerosol Research, Seattle (September 14-17, 1987).

Moore, D. and M. Pilat (1988) "Pilot scale HCl control by dry alkaline injection for emissions from refuse incinerators," presented at PNWIS-APCA Annual Meeting, Whistler, B.C., November 9-11, 1988.

Dugan, S. and M. Pilat (1988) "Comparison of calculated and measured gas absorption efficiencies of sampling impingers," presented at PNWIS-APCA Annual Meeting, Whistler, B.C., November 9-11, 1988.

Fellows, K. and M. Pilat (1988) "HCl sorption with dry NaHCO_3 for control of emissions from refuse incineration," presented at PNWIS-APCA Annual Meeting, Whistler, B.C., November 9-11, 1988. Received prize 1st prize in graduate student paper competition.

Anuszewski, J. and M. Pilat (1989) "Chemistry of hexavalent chromium control," presented at PNWIS-AWMA Annual Meeting, Spokane, November 8-10, 1989.

Dorf, G., and M. Pilat (1989) "Emission testing for VOC's," presented at PNWIS-AWMA Annual Meeting, Spokane, November 8-10, 1989.

Dugan, S., and M. Pilat (1989) "Source sampling for styrene," presented at PNWIS-AWMA Annual Meeting, Spokane, November 8-10, 1989. Received 2nd prize in graduate student paper competition.

Hall, J., and M. Pilat (1989) "VOC control with porous polymer resins" presented at PNWIS-AWMA Annual Meeting, Spokane, November 8-10, 1989.

Larsen, E. and M. Pilat (1989) "Design and testing of a moving bed VOC adsorption system," presented at PNWIS-AWMA Annual Meeting, Spokane, November 8-10, 1989.

Pegnam, R. and M. Pilat (1989) "Ambient sampling for VOC's in Western Washington," presented at PNWIS-AWMA Annual Meeting, Spokane, November 8-10, 1989.

Larsen, E. and M. Pilat, "Design and Testing of a Moving Bed VOC Adsorption System", Presented at the 1990 Summer National Meeting of American Institute of Chemical Engineers, San Diego, California, August 18-22, 1990.

Larsen, E. and M. Pilat (1990) "Real-time measurements of VOC concentrations using automated cryogenic sample trapping and gas chromatography," presented at PNWIS-AWMA Annual Meeting Portland, Oregon, November 14-16, 1990,.

Pegnam, R. and M. Pilat (1990) "Characterization of Particulate emissions from chromic acid anodizing process and from chrome plating process sources," Presented at PNWIS-AWMA Annual Meeting Portland, Oregon, November 14-16, 1990.

Dorf, G. and M. Pilat (1990) "VOC emissions from an aircraft painting facility," Presented at PNWIS-AWMA Annual Meeting Portland, Oregon, November 14-16, 1990, Received 1st prize for best graduate student paper.

Pilat, M. and E. Larsen (1991) "VOC emission control with cross-flow moving adsorbent bed," Presented at International Meeting of Society for Advancement of Material and Process Engineering, San Diego, Calif., May 21-23, 1991.

Larsen, E. and M. Pilat, "Comparison of observed and predicted VOC collection efficiencies in a thin cross-flow adsorption bed," Presented at Air & Waste Management Association Annual Meeting, Vancouver, BC, June 17-21, 1991.

Larsen, E. and M. Pilat, "Real Time Measurements of VOC Concentrations Using Automated Cryogenic Sample Trapping and Gas Chromatography", presented at the PNWIS-AWMA annual meeting, Portland, Oregon, November 14-16, 1991.

Pegnam, R. and M. Pilat, "Characterization of Particulate Emissions from Chromic Acid Anodizing Process and Chrome Plating Process Sources", presented at the PNWIS-AWMA annual meeting, Portland, Oregon, November 14-16, 1991.

Morante, G. and M. Pilat (1992) "Calculation of NO_x emission reductions using thermal DeNO_x Process," Presented at PNWIS Air & Waste Management Association Annual Meeting, Bellevue, WA, November 11-13, 1992.

Pegnam, R. and M. Pilat (1992) "Control of aerosol emissions from chromic acid anodizing process," Presented at PNWIS-Air & Waste Management Association Annual Meeting, Bellevue, WA., November 11-13, 1992.

Klobucar, J. and M. Pilat (1992) "Hydrophobic adsorbents for VOC emission control," Presented at PNWIS-Air & Waste Management Annual Meeting, Bellevue, WA, November 11-13, 1992.

Pilat, M. (1995) "Deposition of atmospheric particles on aircraft experimental surfaces," November 1995, Presented at PNWIS Air & Waste Management Annual Meeting, Spokane, WA. November 1995.

Pilat, M. and R. Pegnam, (1995) "Formation of air pollutant particles during chrome plating," November 1995, Presented at PNWIS Air & Waste Management Annual Meeting, Spokane, WA November 1995.

Pilat, M. and R. Pegnam (1995) "Particle emissions from chrome plating," Presented at Annual Meeting of American Association for Aerosol Research, Philadelphia, PA., November 1995.

Pilat, M. and K. Noll (1996) "Comparison of size distribution of atmospheric and source emission aerosols," Presented at 5th International Conference on Atm. Science Applications to Air Quality, Seattle, June 18-21, 1996.

Parts of Books (chapters in edited books)

Pilat, M. J., "Engineering Control of Air Pollution," Chapter 9, pp. 128-150, *Air Pollution Control - Guidebook for Management*, Edited by A. T. Rossano, publication by McGraw-Hill (1969).

Pilat, M. J., "Plume Opacity," Chapter 32, pp. 833-845, *Handbook of Air Pollution Technology*, Edited by S. Calvert and H. Englund, publication by Wiley-Interscience (1984).

Pilat, M. J. "Combustion Evaluation in Air Pollution Control", book for EPA 427 short course, March 1995, 309 pages.

Pilat, M. J. and K. E. Noll "Wet Scrubbers" *Air Pollution Engineering Manual*, 2nd Edition, Edited by W. T. Davis, John Wiley & Sons, Published 2000.

Patents

#3,693,457 (9/26/72) "Source Test Cascade Impactor" by M. J. Pilat.

#4,193,774 (3/18/80) "Electrostatic Aerosol Scrubber and Method of Operation," by M. J. Pilat.

#4,204,844 (5/27/80) "Liquid Transfer Systems for Conductive Liquids," by M. J. Pilat.

#4,211,116 (7/8/80) "Assembly for and Method of Sampling Particulate-Laden Fluids and a Cascade Impactor Used Therewith," by M. J. Pilat, E. B. Powell, and J. F. Thielke.

Editing and Other Scholarly Papers

None Listed

Sponsored Research

01/70-06/72 Continuous Monitoring of Aerosol Emission from Kraft Recovery Furnaces,
Northwest Pulp & Paper Assoc., \$18,894.

09/70-06/77 Relationship at Plume Opacity to the Characteristics of Particulates Emitted from
01/70-06/74 a Soderberg Aluminum Plant, Reynolds Metals, Longview, \$25,000.

03/71-06/72	Size Distribution of Particles Emitted from Anode Baking Plant, ALCOA, Wenatchee,	\$1,300
02/71-01/72	Particle Size Measurements with U of W. Cascade Impactor, Georgia Corp.,	\$1,770
07/71-07/72	Measurement of Particle Size Distribution at Kaiser, Tacoma, Kaiser Aluminum and Chemical Corp.,	\$2,349
05/72-04/73	Plume Opacity and Air Pollutant Particle Properties, EPA,	\$28,198
08/72-12/78	Source Test Cascade Impactor, Pollution Control Systems Corp., Renton,	\$23,789
08/72-06/74	Air Pollutant Testing, Ketchikan Pulp, Co.,	\$27,017
05/73-04/74	Plume Opacity, EPA,	\$25,000
08/73-12/75	Control of Particle Emissions with Electrostatic Wet Scrubber, Northwest Pulp and Paper Assoc.,	\$45,204
02/73-12/75	Particle Sizing at Emission Sources, Glen Odell Consulting Engineers, Portland, Oregon,	\$3,000
01/74-12/74	Evaluation of UW Electrostatic Wet Scrubber, Ketchikan, Alaska, Ketchikan Pulp Co,	\$ 17,000
12/74-12/75	Fine Particle Collection with UW Electrostatic Scrubber, EPA,	\$ 71,799
02/75-12/77	Sizing and Particles Emitted from Coal-Fired Power Boilers, EPRI,	\$166,461
07/75-09/76	Plume Opacity Related to Particle Size and Chemical Composition, EPA,	\$27,000
03/76-03/77	Fine Particle Control with UW Electrostatic Scrubber, EPA,	\$74,485
09/76-09/77	Plume Opacity, EPA,	\$33,000
11/77-11/78	Plume Opacity Related to Particle Characteristics, EPA,	\$40,000
07/78-06/80	Particulate and SO ₂ Control, EPA,	\$204,745
06/78-09/79	Plume Opacity of Oil-Fired Power Boiler, Pacific Gas & Electric Co.,	\$57,275
06/78-09/79	Air Pollution Training Program (Co-principal investigator with A.T. Rossano), EPA,	\$52,655
03/79-04/80	Mass Transfer of SO ₂ to Charged Droplets in Electric Fields, UW GSRF,	\$4,188

09/79-09/80	Air Pollution Training Program (Co-PI with A. T. Rossano), EPA,	\$57,500
11/79-12/81	Plume Opacity at ASARCO Smelter, ASARCO, Tacoma,	\$22,355
12/79-06/88	Source Test Cascade Impactor, Pollution Control Systems Corp.,	\$17,855
09/80-10/	Air Pollution Training Program , EPA,	\$46,400
09/81-12/84	Air Pollution Training Program, EPA,	\$137,798
03/83-06/84	Filtration at Intalco Aluminum Co., Intalco Aluminum Co., Ferndale, WA,	\$11,850
06/83-12/83	Opacity of Pulp Mill Emissions, Northwest Pulp & Paper Assoc., Bellevue,	\$3,750
10/84-09/86	Air Pollution Training Program, EPA,	\$54,163
06/85-03/86	SO ₂ Control Pilot on UW Boiler, Wood/Harbinger, Inc., Kirkland, WA,	\$8,500
02/86-06/87	SO ₂ Collection with Dry Sodium Based Reagents, Church & Dwight Co., Princeton, New Jersey,	\$ 10,000
10/86-09/87	Air Pollution Training Program, EPA,	\$12,269
09/87-08/90	Air Pollution Training Program, EPA,	\$59,569
08/88-12/92	Boeing Hazardous Waste Research Program,	\$450,000
04/89-12/89	Styrene Emissions, Washington Dept. of Ecology (EPA),	\$15,000
09/89-09/94	Air Pollution Training Program, EPA,	\$194,420
10/91-10/98	Air Pollution Training Program,EPA,	\$150,400
09/94-09/01	Air Pollution Training Program, EPA,	\$43,500
07/94-12/00	Effect of Atm. Contamination on Hybrid Laminar Flow Control, Boeing,	\$75,000

Civil Engineering Industrial Affiliates Program (M.J. Pilat, Principal Investigator)

8/87	Sorption by Dry Alkaline Material, Church & Dwight Co., Princeton, New Jersey,	\$6,000
12/87	Air pollution control plume opacity, Unocal Chemicals Division, Unocal Corp., Kenai,	Alaska, \$5,000
8/88	VOC Emission, ARCO Petroleum Products Co., Cherry Point Refinery, Ferndale, Washington,	\$5,000
1/89	VOC Emission, ARCO Petroleum Products Co., Cherry Point Refinery, Ferndale, Washington,	\$5,000

8/88 Air Toxics, Hazardous Wastes, The Boeing Company, Seattle, Washington, \$100,000

1/90 Air Toxics, The Boeing Company, Seattle, Washington, \$150,000

8/90 Air Pollutant Control, Hexavalent Chromium, ASKO Processing Inc., Seattle, Washington, \$4,000

1/91 Odor Control Fishmeal Plant, EWOS Canada, Ltd., Surrey, British Columbia, \$8,500

2/91 Control of Particulates Colored Glass Furnaces, Spectrum Glass Co., Woodinville, Wash., \$9,000

6/92 Present Air Toxics, The Boeing Company, \$200,000

Project reports (reports to sponsors)

"Instruction Manual for UW Mark 10 and Mark 20 Cascade Impactor Sampling System" by M. Pilat, J. Thielke, E. Powell, and J. Thoreen, Report to EPRI, Dec. 1977, 95 pages.

"Development of a Cascade Impactor System for Sampling 0.02 to 20 Micron Diameter Particles", by M. Pilat, G. Raemhild, E. Powell, G. Fioretti, and D. Meyer., EPRI Report No. FP-844, Aug. 1978, 91 pages.

"Plume Opacity Study at Pittsburg No. 7 Oil-Fired Boiler" by M. Pilat and D. Mummey, Report to Pacific Gas & Electric Co., San Francisco, CA, May 1979, 149 pages.

"Air Pollutant Source Tests at Ketchikan Pulp Mill" by M. Pilat, B. Sorenson, and S. Jaasund, Report to Ketchikan Pulp Company, March 1973, 394 pages.

"Air Flow and Pressure Drop of Perforated Plates Contaminated with Atmospheric Aerosol" by M. Pilat and R. Pegnam, Report to Boeing Co., Sept. 1995, 244 pages.

"Manual for Smokemeter Monitoring of Particulate Emissions from Kraft Recovery Furnaces" by M. Pilat and S. Larssen, Report to Northwest Pulp & Paper Assoc., Jan. 1972, 46 pages.

"Opacity of Aerosol Emissions from a Horizontal Spike Soderberg Aluminum Reduction Plant" by M. Pilat, and D. Ensor, Report to Reynolds Metals Co., Longview, Dec. 1971, 51 pages.

"Continuous Monitoring of Aerosol Emissions from Kraft Recovery Furnaces" by M. Pilat and S. Larssen, Report to Northwest Pulp & Paper Assoc., Feb. 1972.

"University of Washington Electrostatic Scrubber Tests at a Steel Plant" by M. Pilat, G. Raemhild, and A. Prem; EPA Report No. EPA-600/7-78-177a, Sept. 1978, 51 pages.

"University of Washington Electrostatic Scrubber Tests at a Coal-Fired Power Plant" by M. Pilat and G. Raemhild, EPA Report No. EPA-600/7-78-177b, Dec. 1978, 48 pages.

University of Washington Electrostatic Scrubber Tests: Combined Particulate and SO₂ Control" by M. Pilat, EPA Report No. 600/7-79-245, Nov. 1979, 51 pages.

"Particle Collection Efficiency of a Cyclonic Spray Scrubber at a Soderberg Aluminum Reduction Plant" by M. Pilat, L. Sparks, and G. Hofer; Report to Reynolds Metals Co., Longview, Dec. 1971, 83 pages.

"Size Distribution of Particles Emitted from a Carbon Anode Baking Plant" by K. MacKenzie and M. Pilat, MSE Thesis and Report to Alcoa Aluminum Co., Wenatchee, June 1972, 79 pages.

"Characteristics of the Airborne Aerosol Emissions from a Horizontal Spike Aluminum Reduction Cell" by T. Hanna and M. Pilat, MSE Thesis and Report to Kaiser Aluminum and Chemical Corp., Tacoma; March 1971, 134 pages.

"Dust Pilling on Fabric Filters at Intalco" by P. Burnet and M. Pilat, MS Thesis and Report to Intalco Aluminum Co., Ferndale, May 1983, 61 pages.

"Fluoride Source Sampling of Aluminum Reduction Cells" by J. Guenthoer and M. Pilat, MSE Thesis and Report to Intalco Aluminum Co., Ferndale, Dec. 1985.

Research-Related Activities

None Listed

Invited Lectures and Seminars

Partial Listing: Invited Paper: Larsen, E. and M. Pilat (1990) "Design and testing of a moving bed VOC adsorption system," presented at 1990 Summer National Meeting of American Institute of Chemical Engineers, San Diego, August 18-22, 1990.

Presentations Given at Conferences

Professional licenses

Professional Engineer, State of Washington, PE No. 15815

Professional Society Membership

Air and Waste Management Association (member since 1967)

Pacific NW International Section of Air & Waste Management Association

American Association for Aerosol Research (member since 1982)

American Chemical Society (member since 1968)

Gesellschaft Fur Aerosolforschung, (European Aerosol Society) (since 1970).

Professional Society and Other Service

Air & Waste Management Association

Technical Program Co-Chair, 1991 Annual Meeting, Vancouver, B.C.
 Chair of Particulate Committee (1977-1979)
 Higher Education Committee, 1992-1997
 Particulate Control Technology Committee, 1992-1997
 Pacific NW International Section of Air & Waste Management Association
 Chair of Technical Committee (1988-1996)
 Member of Board of Directors (1988-1990)
 American Association for Aerosol Research
 Annual Meeting Program Chair, 1987, Seattle

Reviews Made

Reviewed manuscripts for Atmospheric Environment, J of Aerosol Science, Aerosol Science & Technology, Air & Waste Management Journal, Environmental Science & Technology, and Environmental Progress.

Awards and Honors

Sigma Xi, Who's Who in American Law (5th Ed.)
 Tau Beta Pi, Who's Who in Technology Today (4th Ed.)
 American Men and Women in Science (14th Ed.), Who's Who in the West (17th-21st Ed.)
 International Who's Who in Education (2nd Ed.), Who's Who in America (44th Ed.)

Teaching (courses taught at the University of Washington)

Course	Quarter	No Students	Course Title	Avg of Items 1-4
CE 599	Spr. 1968		Gas Cleaning Design I	
CE 599	Aut. 1968		Gas Cleaning Design II	
CE 566	Wtr. 1969		Gas Cleaning Design I	
CE 350	Wtr. 1969		Sanitary Engineering I (air lectures)	
CE 567	Spr. 1969		Gas Cleaning Design II	
CE 350	Spr. 1969		Sanitary Engineering I (air lectures)	
CEWA 458	Aut 1969		Chemistry of Air Pollution	
CEWA 566	Wtr 1970		Gas Cleaning Design I	
CEWA 567	Spr 1970		Gas Cleaning Design II	
CEWA 599	Spr 1970		Incinerator Design	
CEWA 466	Aut 1970		Air Pollution Control	
CEWA 566	Wtr 1971		Gas Cleaning Design I	
CEWA 567	Spr 1971		Gas Cleaning Design II	
CEWA 466	Spr 1971		Air Pollution Control	
CEWA 466	Aut 1970		Air Pollution Control	
CEWA 566	Wtr 1971		Gas Cleaning Design I	
CEWA 567	Spr 1971		Gas Cleaning Design II	
CEWA 467	Spr 1971		Air Pollutant Source Testing and Equipment Evaluation	

CEWA 466 Aut. 1971		Air Pollution Control
CEWA 566 Wtr. 1972		Design of Gaseous Pollutant Control Equipment
CEWA 567 Spr 1972		Design of Particulate Air Pollutant Control Equipment
CEWA 467 Spr 1972		Air Pollutant Source Testing and Equipment Evaluation
CEWA 566 Aut. 1972		Design of Gaseous Pollutant Control Equipment
CEWA 450 Aut. 1972	177	Man and the Pollution of His Environment (air lectures)
CEWA 450 Spr 1973	374	Man and the Pollution of His Environment (air lectures)
CEWA 467 Spr 1973	11	Air Pollutant Source Testing and Equipment Evaluation
CEWA 566 Aut 1973		Design of Gaseous Pollutant Control Equipment
CEWA 450 Aut 1973	379	Man and the Pollution of His Environment (air lectures)
CEWA 466 Wtr 1974	48	Air Pollution Control
CEWA 450 Spr 1974	353	Man and the Pollution of His Environment (air lectures)
CEWA 467 Spr 1974	15	Air Pollutant Source Testing and Equipment Evaluation
CEWA 450 Aut. 1974	280	Man and the Pollution of His Environment (air lectures)
CEWA 566 Aut. 1974		Design of Gaseous Pollutant Control Equipment
CEWA 466 Wtr 1975	38	Air Pollution Control
CEWA 450 Spr 1975	296	Man and the Pollution of His Environment (air lectures)
CEWA 467 Spr 1975	10	Air Pollutant Source Testing and Equipment Evaluation
CEWA 450 Aut 1975	236	Man and the Pollution of His Environment (air lectures)
CEWA 566 Aut 1975		Design of Gaseous Pollutant Control Equipment
CEWA 466 Wtr 1976	35	Air Pollution Control
CEWA 567 Wtr 1976		Design of Particulate Air Pollutant Control Equipment
CEWA 450 Spr 1976	137	Man and the Pollution of His Environment (air lectures)
CEWA 467 Spr 1976	12	Air Pollutant Source Testing and Equipment Evaluation
CEWA 566 Aut 1976	9	Design of Gaseous Pollutant Control Equipment
CEWA 450 Aut 1976	107	Man and the Pollution of His Environment (air lectures)
CEWA 466 Wtr 1977	39	Air Pollution Control
CEWA 567 Wtr 1977	11	Design of Particulate Air Pollutant Control Equipment
CEWA 467 Spr 1977	16	Air Pollutant Source Testing and Equipment Evaluation
CEWA 450 Spr 1977		Man and the Pollution of His Environment (air lectures)
CEWA 450 Aut 1977	103	Man and the Pollution of His Environment (air lectures)
CEWA 566 Aut 1977	8	Design of Gaseous Pollutant Control Equipment
CEWA 466 Wtr 1978	51	Air Pollution Control
CEWA 567 Wtr 1978	7	Control of Particulate Air Pollutants
CEWA 450 Spr 1978	107	Man and the Pollution of His Environment (air lectures)
CEWA 566 Aut 1978		Control of Gaseous Air Pollutants
CEWA 466 Wtr 1979	31	Air Pollution Control
CEWA 468 Wtr 1979	12	Air Pollution Control Equipment Design
CEWA 467 Spr 1979	13	Air Pollutant Source Testing and Equipment Evaluation
CEWA 450 Spr 1979	66	Man and the Pollution of His Environment (air lectures)
CEWA 566 Aut 1979		Control of Gaseous Air Pollutants
Wtr 1980		<i>Sabbatical Leave</i>
CEWA 467 Spr 1980	11	Air Pollutant Source Testing and Equipment Evaluation
CEWA 567 Spr 1980	10	Control of Particulate Air Pollutants

CEWA 566 Aut 1980		Control of Gaseous Air Pollutants
CEWA 466 Wtr 1981	12	Air Pollution Control
CEWA 468 Wtr 1981	8	Air Pollution Control Equipment Design
CEWA 467 Spr 1981	15	Air Pollutant Source Testing and Equipment Evaluation
CIVE 350 Spr 1981	26	Environmental Engr: Water & Air Quality (air lectures)
CEWA 461 Aut. 1981	9	Air Pollution Dynamics and Control
CEWA 562 Aut 1981		Industrial Sources of Air Pollution
Wtr 1982		<i>Sabbatical Leave</i>
CEWA 467 Spr 1982		Air Pollutant Source Testing and Equipment Evaluation
CEWA 567 Spr 1982		Control of Particulate Air Pollutants
CEWA 461 Aut 1982	10	Air Pollution Dynamics and Control
CEWA 468 Wtr 1983	19	Air Pollution Control Equipment Design
CIVE 350 Wtr 1983	80	Environmental Engr: Water & Air Quality (air lectures)
CEWA 567 Spr 1983	6	Control of Particulate Air Pollutants
CEWA 461 Aut 1983		Air Pollution Dynamics and Control
CIVE 350 Aut 1983		Environmental Engr: Water & Air Quality (air lectures)
CIVE 468 Wtr 1984	10	Air Pollution Control Equipment Design
Spr 1984		<i>Sabbatical Leave</i>
CEWA 461 Aut 1984	17	Air Pollution Dynamics and Control
CEWA 562 Aut 1984		Industrial Sources of Air Pollution
CEWA 468 Wtr 1985		Air Pollution Control Equipment Design
CEWA 467 Spr 1985	12	Air Pollution Source Testing & Equipment Evaluation
CEWA 567 Spr 1985		Control of Particulate Air Pollutants
CIVE 350 Aut 1985	52	Environmental Engr: Water & Air Quality (air lectures)
CEWA 461 Aut 1985	9	Air Pollution Dynamics and Control
CEWA 468 Wtr 1986	18	Air Pollution Control Equipment Design
CEWA 467 Spr 1986	8	Air Pollutant Source Testing and Equipment Evaluation
CEWA 566 Spr 1986	7	Control of Gaseous Air Pollutants
CEWA 461 Aut 1986	12	Air Pollution Control
CIVE 350 Aut 1986	50	Environmental Engr: Water & Air Quality (air lectures)
CEWA 468 Wtr 1987	11	Air Pollution Control Equipment Design
CEWA 520 Wtr 1987	37	Environmental Engineering Seminar
CEWA 467 Spr 1987	18	Air Pollution Source Testing & Equipment Evaluation
Spr 1987		CEWA 567 Control of Particulate Air Pollutants
CEWA 461 Aut 1988		Air Pollution Control
CIVE 342 Aut 1988		Fluid Mechanics
CEWA 468 Wtr 1989		Air Pollution Control Equipment Design
CEWA 562 Wtr 1989		Hazardous Air Pollution
CEWA 467 Spr 1989		Air Pollution Source Testing & Equipment Evaluation
CEWA 567 Spr 1989		Control of Particulate Air Pollutants
CEWA 461 Aut 1989		Air Pollution Control
CEWA 468 Wtr 1990		Air Pollution Control Equipment Design
CEWA 562 Wtr 1990		Hazardous Air Pollution
CEWA 467 Spr 1990		Air Pollution Source Testing & Equipment Evaluation

CEWA 566 Spr 1990-		Control of Gaseous Air Pollutants	
CEWA 461 Aut 1990		Air Pollution Control	
CEWA 468 Wtr 1991		Air Pollution Control Equipment Design	
CEWA 562 Wtr 1991		Hazardous Air Pollution	
CEWA 461 Spr 1991		Air Pollution Control	
CEWA 461 Aut 1991	42	Air Pollution Control	
CEWA 468 Wtr 1992	23	Air Pollution Control Equipment Design	
CEWA 461 Spr 1992	19	Air Pollution Control	
CEWA 566 Spr 1992	8	Control of Gaseous Air Pollutants	
CEWA 461 Aut 1992		Air Pollution Control	
CEWA 468 Wtr 1993		Air Pollution Control Equipment Design	
CEWA 562 Wtr 1993		Hazardous Air Pollution	
CEWA 461 Spr 1993		Air Pollution Control	
CIVE 490 Aut 1993		Air Pollution Control	
CEWA 567 Aut 1993		Control of Particulate Air Pollutants	
CIVE 494 Wtr 1994		Air Pollution Control Equipment Design	
CEWA 562 Wtr 1994		Hazardous Air Pollution	
CIVE 490 Aut 1994		Air Pollution Control	3.21
CIVE 350 Aut 1994		Environmental Engr: Water & Air Quality (air lectures)	
CIVE 494 Wtr 1995		Air Pollution Control Equipment Design	
CEWA 562 Wtr 1995		Hazardous Air Pollution	
CIVE 350 Wtr 1995		Environmental Engr: Water & Air Quality (air lectures)	
CIVE 480 Spr 1995		Air Quality Modeling	
CIVE 490 Aut 1995		Air Pollution Control	3.50
CIVE 494 Wtr 1996		Air Pollution Control Equipment Design	
Spring 1996		<i>Sabbatical Leave</i>	
CIVE 490 Aut 1996		Air Pollution Control	
CIVE 350 Aut 1996		Environmental Engr: Water & Air Quality (air lectures)	
CIVE 494 Wtr 1997		Air Pollution Control Equipment Design	
CEWA 562 Wtr 1997		Hazardous Air Pollution	
Spring 1997		<i>Sabbatical Leave</i>	
CIVE 490 Aut 1997		Air Pollution Control	3.20
CIVE 350 Aut 1997		Environmental Engr: Water & Air Quality (air lectures)	
CIVE 494 Wtr 1998		Air Pollution Control Equipment Design	
CIVE 562 Wtr 1998		Hazardous Air Pollution	
CEWA 520 Wtr 1998		Environmental Engineering Seminar	
Spring 1998		<i>Sabbatical Leave</i>	
CIVE 490 Aut. 1998		Air Pollution Control	
CEWA 566 Aut. 1998		Control of Gaseous Air Pollutants	
CIVE 494 Wtr. 1999		Air Pollution Control Equipment Design	3.26
CEWA 562 Wtr. 1999		Hazardous Air Pollution	
CEWA 567 Spr. 1999		Control of Particulate Air Pollutants	
CIVE 490 Aut 1999		Air Pollution Control	
CEWA 566 Aut 1999		Control of Gaseous Air Pollutants	

CIVE 494	Wtr 2000	Air Pollution Control Equipment Design
CEWA 520	Spr 2000	Seminar in Environmental Engineering
CEWA 562	Spr 2000	Hazardous Air Pollution
CEE 490/ENVH461	Aut 2000	Air Pollution Control
CEE 559/ChE 567	Wtr 2001	Control of Particulate Air Pollutants
CEE 494/ChE 468	Spr 2001	Air Pollution Control Equipment Design
CEE 556/ChE 562	Spr 2001	Hazardous Air Pollution
CEE490/ENVH461	Aut 2001	Air Pollution Control
CEE559/ChE567	Wtr 2002	Control of Particulate Air Pollutants
CEE494/ChE567	Spr 2002	Air Pollution Control Equipment Design

Short Courses, Workshops, and Other Educational Programs

	Titles of 4 Day EPA Short Courses		Course Location
Oct. 80	EPA 413	Control of Particulate Emission	Denver
May 81	EPA 427	Combustion Evaluation	Helena
July 81	EPA 435	Atmospheric Sampling	Seattle
Sept 81	EPA 450	Source Sampling for Particulates	Seattle
Dec 81	EPA 411	Air Pollution Meteorology	Seattle
Mar 82	EPA 415	Control of Gaseous Emissions	Seattle
May 82	EPA 423	Air Pollution Dispersion Models	Seattle
Sept 82	EPA 450	Source Sampling for Particulates	Seattle
Dec. 82	EPA 482	Control of Volatile Organics	Portland
Mar 83	EPA 415	Control of Gaseous Emissions	Seattle
Apr 83	EPA 468	Sampling for Gaseous Pollutants	Seattle
Sept 83	EPA 450	Source Sampling for Particulates	Seattle
Oct. 83	EPA 413	Control of Particulate Emissions	Seattle
Mar 84	EPA 470	Quality Assurance for Air Pollution Measurements	Seattle
Apr 84	EPA 468	Source Sampling for Gaseous Pollutants	Seattle
Sept 84	EPA 464	Analytical Methods for Air Quality Standards	Seattle
Oct. 84	EPA 427	Combustion Evaluation	Seattle
Apr 85	EPA 450	Source Sampling for Particulates	Seattle
May 85	EPA 468	Source Sampling for Gaseous Pollutants	Seattle
June 85	EPA 427	Combustion Evaluation	Seattle
Dec. 86	EPA 400	Air Toxics	Seattle
June 87	EPA 450	Source Sampling for Particulates	Seattle
Mar 88	EPA 427	Combustion Evaluation	Seattle
Feb. 89	EPA 502	Hazardous Waste Incineration	Seattle
Mar. 89	EPA 413	Control of Particulate Emissions	Seattle
May 89	EPA 427	Combustion Evaluation	Raleigh, NC
Sept 89	EPA 435	Atmospheric Sampling	Redmond, WA
Mar 90	EPA 445	Baseline Source Inspection Techniques	Seattle
Mar 90	EPA 446	Inspection Procedures and Safety	Seattle
June 90	EPA 450	Source Sampling for Particulate Pollutants	Seattle

Mar 91	EPA 413 Control Particle Emissions	Seattle
June 91	EPA 415 Control of Gaseous Emissions	Seattle
Sept 91	EPA 502 Hazardous Waste Incineration	Seattle
Mar, 92	EPA 415 Control of Gaseous Pollutants	Tempe, AZ
Mar. 92	EPA 427 Combustion Evaluation	Kansas City, Missouri
Aug. 92	EPA 450 Source Sampling for Air Pollutants	Seattle
Oct. 92	EPA 400 Introduction. to Air Toxics	Seattle
Feb. 93	EPA 444 Air Pollution Field Enforcement	Seattle
Mar 93	EPA 427 Combustion Evaluation	Seattle
Apr 93	EPA 413 Control of Particulate Emissions	Seattle
May 93	EPA 435 Monitoring or Ambient Air Pollutants	Bellevue, WA
Sept 93	EPA 474 Continuous Emission Monitoring	Bellevue, WA
Apr 94	EPA 413 Combustion Evaluation in Air Pollution Control	Seattle
May 94	EPA 470 Quality Assurance for Air Pollutant Monitoring	Bellevue, WA
Sept 94	EPA 474 Continuous Emission Monitoring	Bellevue, WA
Mar 95	EPA 427 Combustion Evaluation in Air Pollution Control	Seattle
Jun. 95	EPA 423 Air Pollution Dispersion Models	Seattle
Oct. 95	EPA 380 VOC Fugitive Emission Source Inspection	Seattle

May 1993-Present We downlink and present EPA Televised Workshops and Short Courses at the rate of about 5 days of programs per month. The EPA funded installation of a satellite dish (installed on the roof of Wilcox Hall) with the associated electronics and television displays so that we can downlink EPA televised short courses and workshops broadcast primarily from North Carolina State University, Raleigh, North Carolina. About one-half of these EPA workshops and short courses are on the topic of air pollution. This is part of our Air Pollution Training Center activities (see Web site at: <http://depts.washington.edu/aptc>)

Chaired Doctoral Degrees

Kenneth E. Noll, July 1969	Professor of Environmental Engr., Illinois Institute of Technology
Leslie E. Sparks, Dec. 1971	Engineer with EPA, Research Triangle Park, North Carolina
David S. Ensor, June 1972	Engineer with Research Triangle Institute, North Carolina
Bao-Ho Liao, March 1972	Engineer and Vice President at KCM Engineering, Inc., Seattle
William G. Tucker, Dec. 1974	Engineer with EPA, Raleigh, North Carolina
Richard A. Kester, Dec. 1979	Vice President at CH2M-Hill, Bellevue, Washington
Vincent J. Novick, Dec. 1988	Scientist with Argonne National Lab, Argonne, Illinois

Chaired Master Degrees

Gene Smith	Aug. 1970
Thomas R Hanna	Mar. 1971
Jon L., Peacy	Mar. 1971
Steinar Larssen	Aug. 1971
George C Hofer	Dec. 1971
Kenneth MacKenzie	June 1972

Gary A Raemhild	Aug. 1972	
Steven A. Jaasund	Mar. 1973	
Philip A. Nelson	Apr. 1973	
George S. Beckwith	Feb. 1974	
Anil Prem	Dec. 1974	
Gene M. Fioretti	May 1977	
Terrell W. Gault	May 1978	
John C. Lukas	June 1978	
Brian D. Wright	May 1980	
Tracey W. Steig	Dec. 1980	
James M. Wilder	Feb. 1981	
James S. Geier	Aug. 1981	
Paul G. Burnet	May 1983	
Valadimir V. Oliveira	Aug. 1983	
Michael R. Hoyles	June 1985	
Gregory L. Nothstein	Aug. 1985	
James A. Guenthoer	Dec. 1985	
Thomas A. Bachman	Aug. 1986	
Kenneth T. Fellows	May 1989	
John L. Williamson	June 1989	
Eric. S. Larsen	Nov. 1990	
Milton N. Sogabe	July 1991	
Joseph M. Klobucar	Aug. 1992	
David W. Moore	Nov. 1992	
Gail Dorf	Nov. 1992	
Robert C. Pegnam	Mar. 1994	
Fred L. Austin	Nov. 1994	
Greg Hanby	Aug. 1995	
E. Ann Williamson	June 1999	
Stephanie Box	June 2001	MS Chemical Engineering
Geoffrey Glass	Aug 2001	MS Chemical Engineering

Other Student Supervision (service on graduate degree committees)

Ph.D. Committees

Partial Listing: Timothy V. Larson (Civil Engineering, 1976), Mary Ann Einarson (Chem Engr. 1993), James A. Ferrara (Chem. Engr., 1994, Grad School Rep.), William P. Paplham (Chem. Engr., 1994), Allen S. Bellas (Economics, 1995, Grad School Rep.), Wanguang Li (Chem. Engr., 1995, Grad School Rep.), Bret A. Snyder (Chem. Engr., 1996, Grad School Rep.), Jeffrey A. Morrow (Industrial Engineering 1998, Grad School Rep.), Ron Bardell (Mech. Engr., Grad School Rep, graduated Dec. 2000), Chaw-Wu Tseng (Mech Engr), Carrie Monohan (Forest Resources)

Departmental Service

1968-1969 CE Undergraduate Policy Committee; CE Environmental Engr. Committee

1969-1970 CE Student Affairs Committee;
CE Committee for Teaching Evaluation & Improvement
1978-1979 CE Rep. to College of Engr. Research Policy Committee;
CE Research Policy Committee
1981-1982 Member of CE Exec Committee (Rep. from EE&S Program)
1983-1984 CE Rep. to College of Engr. Research Policy Committee;
CE Rep. to College of Engr. ENGR Course Review Committee
1984-1986 CE Undergraduate Education Committee
1990-1998 CE Committee for Safety, Management, and Organization of CE Labs
1999-1999 CE Rep. to College of Engr. Research Policy Committee
2002- Committee on BS Environmental Engr Degree

College Service

College of Engineering, Engineering Council (76-78, 79-80, 82-83, 84-85)
College of Engineering Research Policy Committee (1973-1985)
Chair, 76-78, 79-80, 82-83, 84-85.
College of Engineering, Search Committee for Dean of Engineering, April - Dec. 1980
College of Engineering, ENGR Course Review, 1983-1985
College Council March 2002-

University Service

1975-1977, 1997-1999 Faculty Senate,
Sept. 1985-Dec. 1986, Faculty Senate Executive Committee
Dec. 1988-Sept. 1992 Faculty Senate Executive Committee
Dec. 1981-Sept. 1994 Faculty Senate Council on Grant & Contract Research
Vice Chair 1984-1985
Chair 1985-1986, 1988-1989
1983-1984 Faculty Senate Subcommittee on Personal Computers for Faculty
Use, Co-Chair
Jan. 1985-1988 Faculty Senate Subcommittee on Washington Technology Center
Jan. 1988-Sept. 1992 Faculty Senate Subcommittee on Indirect Costs
Sept. 1989-Sept. 1991 Faculty Senate Deputy Legislative Representative
Sept. 1991-Sept. 1992 Faculty Senate Legislative Representative
Sept. 89 - Sept. 92 Faculty Senate Budget Committee
Nov. 1988 - 1990 UW Board of Environmental Health and Safety
April 1985-Present UW Chemical Hazards Advisory Committee, (Chair 1985 - 1990)
1986-1989 UW Committee for Review of Program 02 Funded Research Centers
Sept. 1988 - 1992 Classified and Proprietary Research Review Com.
Jan.-June 87 Search Committee, UW Vice President for Business & Services
Sept. 1992-Sept. 1995 Tacoma Branch Campus Facilities Planning Committee
1989-Present Graduate School Committee, Advanced Materials and
Manufacturing Processing
Sept. 1986-Present Faculty Senate Council on Research, Subcommittee on Purchasing

Student Service**Community Service**

None listed yet

State Service

None listed yet

National Service

None listed yet

All Other Service

None listed yet

Consulting Experience

Air-Qual Co. Seattle, Measurement of particulate mass concentration at inlet and outlet of control equipment at asphalt batch plant (5/68-8/68).

Resources Engineering Associates, New Jersey, Prepare report on use of scrubbers to reduce emissions of odors for PHS Nat. Air Pollution Control Admin. contract (1/70-12/70).

Manufacturing Chemists Association New York, Presentation of lectures concerning engineering control of air pollutant emissions at week-long technical seminars held at various cities in US and Canada (6/78-12/70).

Harvey Aluminum Co., The Dalles, Oregon, Review of design of air pollution control equipment for the new vertical spike Soderberg aluminum reduction plant to be constructed near Klickitat, Wash. (near John Day) (1/70-12/70).

ITT-Rainier, Grays Harbor Division, Hoquiam, Wash., Evaluate performance of wet scrubber for control of particulate emissions from sulfite Recovery boiler at Hoquiam pulp mill. Impactor particle size measurements (8/70-5/71).

Mathematical Sciences Northwest, Inc., Assist in preparation of research contract proposal to PHS-NAPCA concerning instrumentation to monitor the emissions of particulate air pollutants (1/70-/70).

Nevada Power Co. Las Vegas, Nevada, Provide information concerning the minimum particulate mass concentration necessary to meet the Nevada plume opacity regulations for a coal-fired power plant (10/70-6/71).

Midwest Research Institute, Kansas City, Missouri, Assist MRI prepare a research contract proposal to the EPA concerning particulate air pollution research (4/71-3/72).

Reynolds Metals Co., Longview, Wash., Review plume opacity calculations for silicon plant emissions at Listerhill, Alabama (4/71-12/71).

Washington Machinery, Corp., Seattle, Washington, Measure size distribution and mass concentration of particles emitting from a hot-mix asphalt plant in order to evaluate performance of new air pollution control equipment (2/72-6/72).

Puget Sound Power & Light Co., Bellevue, Washington, Measure in-stack plume opacity and air pollutant concentrations in emissions from Puget Power Co. Shuffleton Power Plant (during cold weather) (1/72-3/72).

Alaska Lumber & Pulp, Co., Sitka and Ketchikan, Alaska, Teach engineers at the pulp mills how to and measure SO₂ and particulate matter concentrations in stack gases. Also supervise field measurements at these mills (8/72-8/73).

Bouillon, Christofferson, & Schairer, Seattle, Washington, Assist with design, constructions, and evaluation of air-cooled condenser used to control the hydrocarbon air pollutant emissions from the plywood veneer dryers at the Weyerhaeuser mill at Snoqualmie, Washington (4/73-8/73).

Ketchikan Pulp Co., Ketchikan, Alaska, Analyze test data from UW Electrostatic Scrubber pilot plant. Assist with scale-up designs and cost estimates for full-scale unit (4/74-9/75).

Acurex Corp., Mountain View, Calif., Assist with research proposal to EPA on particle sizing (5/75-8/75).

Union Carbide Corp., South Charleston, South Carolina, West Review of Union Carbide's air pollution control research program and the provision of recommendations for improvements (?/75-9/75).

Pollution Control Systems Corp., Seattle, Washington, Provide technical assistance regarding UW Source Test Cascade Impactor and UW Electrostatic Scrubber (10/75 to present).

National Council for Assist Air & Stream Improvement, Corvallis, Oregon, Improve with the measurement of the particle size distribution at the inlet and outlet of the Combustion Power Co. gravel bed filter on the exhaust gases from the hog fuel at the Weyerhaeuser Snoqualmie Falls mill (3/76-5/76).

Electric Power Research Institute, Palo Alto, California, Assist with the writing of a book on the measurement of particle size distributions of emissions from coal-fired power plants (3/76-6/77).

Union Camp Corp., Montgomery, Alabama, Perform calculations of plume opacity for emissions from kraft recovery boiler and bark fired hog-fuel boiler prior to construction to see if the opacity will meet standards (11/77-3/78).

Southern Research Inst., Birmingham, Alabama, Participate in workshop on particle sampling, assist with identification of needed particle measurement methods and needed research on measurement techniques (11/70-12/79).

Meteorology Research, Inc., Altadena, California, Measurement of particle size distributions emitted from a coal-fired Omaha, Nebraska (filter baghouse) using Mark 10 Test Cascade Impactor (8/78-11/78).

Pacific Gas & Electric Co., San Francisco, California, Prepare a research proposal concerning a study for the cause of the excessive plume opacities of the gases exhausting from oil-fired power boilers (3/78-09/78).

Black & Veatch Consulting Engineers, Kansas City, MO, Assist with preparation of research proposal to EPRI concerning study of particle collection efficiency of wet scrubbers on emissions from coal-fired power plants (4/78-3/79).

Southern Research Inst., Birmingham, Alabama, Perform engineering calculations and designs of scrubbers to control particulate emissions from diesel engines on motor vehicles as part of a EPA project (5/79-8/79)

Pacific Power & Light, Co., Portland, OR, Assist with calculations and evaluation of opacity of plume emitting from coal-fired power plants at the Jim Bridger plant near Rock Springs, Wyoming (1/78-12/79).

British Coal Labs, National Coal Board, Leatherhead, England, Measurement of particle size distribution of emissions from the high pressure, high temperature fluidized bed coal combustion test facility using the Mark 5 Pilat Cascade Impactors (6-11/79).

Salt River Project, Phoenix, Arizona, Measure the particle size distribution of the particles emitted from the hot-side electrostatic precipitator at the Navajo coal-fired power plant near Page, Arizona (9/79-9/80).

EXXON USA, Benicia, California, Study of the cause for the excessive plume opacities of the emissions from an oil finery operation under certain weather conditions (2/79-9/80).

Pacific Gas & Electric Co., San Francisco, California, Evaluation of field measurement data and mathematical modeling concerning the explanation for the excessive plume opacity of emissions from oil fired boilers (6/79-12/80).

State of Minnesota, Development of graphs and equations to relate opacity to stack diameter for the purpose of possibly having opacity regulations related to stack diameter and power plant size (9/79-4/80).

URS, Inc., Seattle, Washington, Evaluate engineering plans for air pollution control equipment proposed for the planned 500 megawatt coal-power plant, by Washington Water Power (Spokane) at Creston, Wash. Work done by URS for the Washington State Facility Site Evaluation Council (1/81-6/81).

Law Offices of Paul, Hastings, Janofsky, & Walker, Los Angeles, California, Provide technical advice concerning plume opacity and particulate emissions from the Kaiser Steel Plant, Fontana, California. Case in U.S. District Court brought by U.S. Dept. of Justice for repeated violations of EPA Mth. 9 in an area which is not in attainment for suspended particulate matter (8/83-3/84).

Babcock & Wilcox, Barberton, Ohio, Prepare a report on the problems of excess sulfate causing high readings of $\text{SO}_3/\text{H}_2\text{SO}_4$ when using EPA Mth. 8 to source test stack gases emitted from power plants (11/83-8/84).

EG&G Idaho, Inc., Boise, Idaho, Provide technical advice concerning the sampling and size distribution measurement of aerosols emitted from the meltdown of a nuclear reactor (4/84-6/86).

ASARCO, Inc., Tacoma, Washington, Provide technical advice on opacity of emissions from copper smelter in Tacoma. Presented testimony to Board of Directors at Puget Sound Air Pollution Control Authority concerning opacity and particulate mass concentrations (1979-1982).

City of Fairbanks, Fairbanks, Alaska, Provide advice regarding particulate air pollutant source tests on emissions from utility coal-fired boilers (9/85-8/86).

Coffman Engineers, Seattle, Washington, Advise on design of particulate air pollution control equipment for existing refuse incinerator at North Slope Borough, Alaska (10/85-3/86).

Kaiser Cement Corp., Oakland, California, Explain calculations of cement dust emissions from ship unloading facilities. Particulate mass concentrations were obtained from opacity readings using the Pilat-Ensor equation (9/85-12/85).

Law Offices of McCutchen, Doyle, Brown, and Enersen, San Francisco, California, Provide assistance regarding relationship of opacity to particle concentration, particle size, and plume dimensions for estimating cement dust emissions from ship unloading. Participate in hearings before San Francisco Bay Area Air Poll. Control Agency Technical Advisory Board (11/85-7/86).

US Army Chemical R&D Center, the U.S. Army Aberdeen Proving Ground, Maryland, Serve on panel to review and evaluate aerosol particle sampling systems under development for the U.S. Army Aberdeen Proving Ground, Maryland (12/86-4/87).

US Dept. of Energy, Serve on panel to review on-going research projects regarding control of particulate air pollutant emissions from fossil fuel fired power plants(7/88-10/88).

Magnesium Corp. of America, Salt Lake City, Utah, Review information on air pollutant source test data and plume opacity and advise regarding emission reduction (12/90-3/91).

Swedish Hospital, Seattle, Washington, Provide advice regarding control of acid gases emitted from a medical waste incinerator (6/91-9/91).

ITT Rayonier Inc., Port Angeles, Washington, Explain relationship between plume opacity and properties of air pollutant particles emitted from wood-waste boiler (3/92-5/92).

Unocal, Kenai, Alaska, Review of particulate air pollutant source test data on emissions from urea prilling tower (9/94-12/95).

Yampa Utilities Project, State of Colorado, Provide assistance with particulate air pollutant emissions and plume opacity of coal-fired power plants in State of Colorado (6/97 - 8/97).

Phillips Petroleum, Anchorage, Alaska. Provide assistance relating the opacity and particulate mass concentration of airborne emissions from stationary diesel engines used for electric power generation. (10/2000 - 6/2001).

Rocky Mountain Steel, Pueblo, Colorado. Provided assistance with particulate air pollutant emissions, opacity of smoke plumes, and EPA Reference Method 9 measurement of plume opacity (10/2000 - 2/2001).