GREGORY E. OGDEN, Ph.D., P.E.

Department of Chemical & Environmental Engineering
520-621-4422
gogden@email.arizona.edu

EDUCATION

University of Arizona, Doctor of Philosophy in Chemical Engineering, August 2002. Environmental Engineering Minor. Dissertation Title: Pulverized Coal Combustion: Flame Attachment and NO_x Emissions. Advisor - Jost O.L. Wendt.

University of Colorado, Master of Science in Chemical Engineering, August 1988. Thesis Title: Methodology of Crossflow Microfiltration of Microbial Suspensions. Advisor - Robert H. Davis.

University of Washington, Bachelor of Science in Chemical Engineering, June 1986.

PROFESSIONAL REGISTRATION/CERTIFICATION

Professional Engineer-Chemical

Arizona Registration No. 27287. Expires 9/30/14
Washington Registration No. 0032032. Expires 7/11/14

PROFESSIONAL EXPERIENCE:

Process Control/Process Design Engineer, ARID Raceway. Responsible for upgrading data acquisition and control system for operating ARID raceways at the University of Arizona. Activities include design, construct and install relay control and communication system, revamp DAQ program and integrate additional sensor input and control output features into system to allow for more routine operations and direct user input. 12/12-present

Research Associate Professor, University of Arizona, Tucson, Arizona. Primary responsibilities include serving as **Experimental Lab Director** responsible for upgrading and maintaining unit operations laboratory equipment for department of chemical engineering.

Manager, Ogden Engineering & Associates, LLC. Tucson Arizona.
Founded and manage all facets of company dedicated to providing chemical & environmental engineering services to our clients in a timely and cost effective manner. The company was founded on the premise that success is not worth the expense of compromising ethical behavior with respect to our Employees, Clients or the Environment. This, in addition to a commitment to Excellence forms the core values of Ogden Engineering & Associates and pervades all aspects of the firm. Ogden Engineering is a small business organized to develop and maintain close personal ties with our clients to meet their needs and maximize their potential for success. The company utilizes its network of scientists, engineers and environmental professionals to provide specialized services through the formation of multidisciplinary teams. This teamed approach ensures rapid response and cost effective service. 1999 to present

Engineering 102 Coordinator, University of Arizona, Tucson, Arizona. Provided oversight and coordination of ENGR102 for the college engineering. Involved with all aspects of teaching 102 –prepare materials for co-lecture faculty, provide course schedule

and project oversight. Held weekly faculty meetings for all co-lecture section faculty and developed workshops to disseminate materials to faculty. 2006-2009.

Department Chair, Pima Community College - East Campus, Tucson, Arizona. Department Chair for Environmental Sciences and Pharmacy Technology Programs. Provides leadership in curriculum and program development, teaching, advising, class scheduling and enrollment management, instructional delivery, technology support systems and professional development. Established Associate of Arts Degree for Transfer to the University of Arizona for Environmental Science Occupational students desiring a Bachelor's of Science degree. 9/98 - 6/00

ATE Project Director, Pima Community College, Tucson, Arizona.
Principle Investigator for National Science Foundation Advanced Technology Education Grants. Responsible for all aspects of project management including budgeting, project definition and development, assessment, student recruitment and oversight of summer high school teacher workshops. Activities including interfacing with local industry and national engineering laboratory personnel to create challenging internships for student teams and making formal presentations at local and national conferences. Total project funding from National science foundation, Pima Community College and Industrial Hosts exceeds $750,000. Initial Project duration 10/97 – 9/00. Selected by NSF and AACC as an Exemplary Project highlighted in The Learning Edge, Mahoney, J.R., and Barnet, L, Community College Press, 2001. Awarded a second ATE Grant-Project Duration: 10/00 – 3/04

Faculty, Pima Community College - East Campus, Tucson, Arizona.
Department of Environmental Sciences. Teach Environmental Science, Engineering, Chemistry and related courses for students pursing Associate of Science and Associate of Applied Science degrees and Advanced Certificates for Direct Employment. Includes lecture, demonstration and exam preparation, laboratory management, development of curricula and experiments, program recruitment, student advising and supervision. 1/95 – 6/05

Graduate Research Assistant, University of Arizona, Tucson, Arizona.
Designed and conducted experiments to study near-flame combustion phenomena with an emphasis n flame attachment and its effect on pollutant formation. Included design and fabrication of novel 2M electrically heated 17kW combustor and axial flow burner. Conducted experimental program to evaluate impacts transport stream oxygen partial pressure and coal fines content on flame attachment and NO_x emissions. Analytical experience includes fabrication of flame safety, continuous emissions monitoring train with infrared, chemiluminescent and paramagnetic analyzers and data acquisition and control systems. 8/97 - 8/02

Consulting Engineer, RPM/Midwest Soil Remediation, Inc., Tucson, Arizona.
Project evaluation and analysis, new process assessment, equipment specification review, sample testing, and preparation and procurement of operating permits for on-site treatment of contaminated soils using low temperature thermal desorption technologies. 6/98 - 4/99

Southwest Regional Manager, Eco Compliance Corporation, Tucson, Arizona.
Regional Manager responsible for marketing, technical lead and technical support. Activities included proposal preparation, marketing, technical review and engineering approval of facility plans, equipment specification, process design, testing and installation, permitting and project management for various clients. 3/94 - 7/99

Consulting Engineer, Los Alamos National Laboratory, Los Alamos, New Mexico. Collaborator responsible for developing budgetary cost estimate for biological reactor to degrade organic materials contaminated with radioactive isotopes. Tasks included: reactor sizing and design, equipment and operating cost estimation, performing sensitivity analysis and final report preparation. 10/93 - 8/96

Chemical Engineer, Southwest Soil Remediation, Inc., Tucson Arizona.
Process development for low temperature thermal desorption systems for remediating chlorinated and petroleum hydrocarbon contaminated soils. Other responsibilities included preparation of operating permits and technical sales. 1/92 - 12/94

Process Engineer, Merrick & Company, Los Alamos, New Mexico.
Developed Conceptual and Title I Design Packages for National Engineering Laboratories. Tasks included designing uranium processing and tritium recovery systems for the Los Alamos National Laboratory and facility support systems for the Idaho National Engineering Laboratory. 7/91 - 3/93

Process Engineer, United Engineers & Constructors, Denver, Colorado.
Evaluated technical feasibility of flue gas desulfurization processes including wet, dry and sorbent injection technologies. Responsibilities included performing mass and energy balances, equipment sizing and specification, the development of capital and levelized cost estimates and technical report preparation. 9/88 - 6/91

RESEARCH SUPPORT

Chilled Water Recirculation. UA Green Fund, 2012-2013.

PureWaterLab: Conservation Education and Research Through Interactive Simulations. National Science Foundation Course Curriculum and Laboratory Improvement Program. Pending release of Funds. 3/05-4/10

SBIR Phase II Project. Missile Defense Agency. Contract # W9113M-06-C-0179. 6/06-11/10

SBIR Phase I Project. Missile Defense Agency. Contract # HQ0006-05-C-7120. 2/05-8/05

STTR Phase I Project. Space and Missile Defense Command, Missile Defense Agency. Contract # DASG60-03-P-0327. 9/03 – 7/04

Environmental Science Curriculum Enrichment Project. National Science Foundation, Advanced Technology Education Program. DUE grant # 0053288. 10/00 – 3/04

Teamed Internships: Innovative Education for Environmental Technicians and Engineers. National Science Foundation, Advanced Technology Education Program. DUE grant # 9602368. 10/96 – 9/00

Associated Western University Faculty Fellowship at Los Alamos National Laboratory, Los Alamos, New Mexico. 6/96 - 8/96

Dean's Minority Education Initiatives Grant Program, Pima Community College. 9/95 - 6/96

HONORS

1994 Marx Isaacs Award for Outstanding Newsletter-Rocky Mountain Section AIChE.

Thomas G. Chapman Fellowship, 2000-2001. The graduate fellowship honors Dean Chapman, first Dean of the College of Mines, University of Arizona.

PROFESSIONAL AND SERVICE ACTIVITIES

Pima County Community College Assessment Committee, August 1995 to June 1997

Executive Secretary, Partnership for Environmental Technology Education (PETE) Western Region, 1996 to 2002. Board Member 1995-2002

American Institute of Chemical Engineers; Member 1984- present
Newsletter Editor, 1993-1995, 1989-1991
Chairman, New Mexico Subsection Steering Committee, 1991-1992

American Society of Engineering Education - 2007 – present.
2012 ASEE-AIChE Summer School Organizing Committee and LabView Programming Workshop Presenter.

University of Arizona Outreach High School Gifted Program Instructor, 1995

Process Hazard Analysis Leader Training, Course 110. ABS Consulting, New Orleans, LA, February 2010

COURSES DEVELOPED/TAUGHT

University of Arizona Courses

ENGR498A Cross-Disciplinary Design I (Mentor)
ENGR102 Intro to Engineering
CHEE303 Chemical Engineering Mass Transfer
CHEE304 Chemical Engineering Unit Operations
CHEE301A/B Chemical Engineering Unit Operations-Junior Level
CHEE401A Chemical Engineering Unit Operations-Senior Level

Pima Community College Courses

CHM130 Fundamental Chemistry. Lecture and Laboratory
CHM140 Fundamental Organic and Biochemistry. Lecture and Laboratory
CHM151 General Chemistry Laboratory
ENG102 Problem-Solving and Engineering Design
ENG 110 Chemistry of Materials
ENV100 Introduction to Environmental Technology
ENV102 Hydraulics
ENV104/ANT104 Humanity and the Environment Discovery Laboratory
ENV105/ANT105 Humanity and the Environment
ENV106 Chemistry of Water/Wastewater Treatment
ENV120/ENV140/ENV130 Introduction to Water and Wastewater Treatment
ENV122/ENV142/ENV132 Water and Wastewater Conveyance Systems
ENV208 Environmental Laboratory Analysis
ENV258 Advanced Laboratory Analysis
ENV298 Advanced Topics
ENV299 Co-op Work in ENV

SELECT PROJECT EXPERIENCE

Space and Missile Defense Command Phase I and II SBIR Principal Investigator, FY06 Contract W9113M-06-C-0179. 6/06-8/10, FY05 contract No. HQ0006-05-C-7120. Project titled: Hypergolic Green Fuel Formulation**,** Technical objectives include conducting micro-combustion experiments; obtaining rheological property data and material compatibility for hypergolic green fuels (HGF), develop fuel production process, model and design thruster injectors for HGF use. 2/05-8/10.

Phase I STTR Principal Investigator, FY09 STTR Project: *Jojoba-Based Naval Fuels***,** contract No N0001409M0272. Technical objectives: Produce F75 and JP5 from jojoba feedstock, conduct agrarian study, identify COCT process design parameters. 7/09-1/10.

Phase I STTR Principal Investigator, FY09 STTR Project "*Enhancing Monopropellant Combustion Efficiency (EMCE)*", contract No. HQ0147-09-C7061. Technical objectives: improve performance on HAN based monopropellants and obtain rheological properties for reformulated monopropellants. 2/09-9/09.

Space and Missile Defense Command, Phase I STTR Project. "*Fundamental Modeling and Analysis for Thermal Decomposition of Hydrogen Peroxide"*. Technical objectives include developing a fundamental model of hydrogen peroxide decomposition and identification of device design strategies that provide for sustained thermal decomposition under variable flow rate conditions. Responsible for overall project management and development of high pressure (3000 psig), high temperature (1000°F) sample cell for

conducting HTP thermal decomposition tests to obtain kinetic data for CFD model verification. Designed novel optical sampling system for in situ HTP concentration measurements. University of California San Diego participated as the Research Institution Subcontractor.

Controlled Environment Agriculture Greenhouse Water and Nutrient Recycle Project Mentor Mentored multidisciplinary senior design student team from CHEE and ABE to develop agricultural wastewater recycle system. Oversaw installation of recycle and treatment system in the UA 1/8-acre hydroponic greenhouse by team of middle school teachers during the Math & Science Institute hosted by the ERC Center for Environmentally Benign Semiconductor Manufacturing.

U.S. Army Corps of Engineers, Fort Lewis SRCPP Remediation Project. Responsible for permitting, compliance and emissions stack testing oversight for on-site remediation of carcinogenic polyaromatic hydrocarbons (cPAH's) at former Solvent Refined Coal Pilot Plant (SRCPP) located at Fort Lewis, Washington. Interfaced with Army personnel, state and federal regulators, and consultants to secure all necessary permits for the low temperature thermal desorption of 105,000 tons of cPAH contaminated soil. Coordinated emissions stack test with Puget Sound Air Pollution Control Authority, emissions testing firm and the Army Corps of Engineers.

Environmental Chemical Corporation, IAAP Soil Treatability Test. Consulting Engineer responsible for conducting a bench-scale treatability test to confirm that Client's low temperature thermal desorption process could effectively remediate nitroaromatic-hydrocarbon impacted soils at the Iowa Army Ammunition Plant. The test was also designed to determine the operating temperatures required to satisfy land disposal restrictions or risk-based treatment criteria.

Soil Treatability Testing. Conducted full- and bench-scale treatability tests to determine site-specific plant operating parameters for treating chlorinated and petroleum hydrocarbon-contaminated soils using low temperature thermal desorption (LTTD). Activities included evaluating LTTD's ability to remediate chlorobenzene-contaminated soil in a 10-ton full-scale test. Bench scale analyses included static tray tests to determine soil treatment temperatures for remediating creosote, PAH and chlordane contaminated soils for various Clients. Designed and constructed a novel rotary batch reactor capable of attaining bed temperatures up to 1000°F. The bench-scale reactor will be used to determine soil treatment more accurately than is currently possible using conventional static tray test methods.

Hauser & Associates, Prototype Design and Development. Designed novel prototype locking mechanism. Developed component specifications and 3-dimensional renderings of device. Formulated and presented conceptual design to Fortune 500 Manufacturer as part of on-going development efforts.

Southwest Soil Remediation, Low Temperature Thermal Desorption of Contaminated Soils. Chemical Engineer responsible for process development of low temperature thermal desorption units to treat soils contaminated with chlorinated hydrocarbons (PCBs, pesticides,

and solvents) and petroleum products including gasoline, diesel and jet fuel. Responsible for obtaining air emissions, operating and fixed-facility permits for the onsite treatment of contaminated soils at industrial, RCRA and Superfund sites.

Unocal, Brawley Pesticide Treatment. Process Engineer responsible for air emissions permitting, development of site health and safety plan, air emissions sampling protocol and testing schedule for the onsite treatment of DDT, toxaphene and ammonium nitrate-contaminated soils classified as a California hazardous waste.

RPM/Midwest Soil Remediation, Inc. Consulting Engineer responsible for project evaluation and analysis, new process assessment, equipment specification review, sample testing, and preparation and procurement of operating permits for on-site treatment of contaminated soils using low temperature thermal desorption technologies.

Los Alamos National Laboratory, Plutonium and Uranium-Contaminated Materials Biodegradation Reactor Design. Chemical Engineers responsible for developing budgetary cost estimates for a biological reactor to degrade organic materials and waste lubricating oils contaminated with plutonium and uranium. Tasks included reactor design and sizing, estimation of equipment and operating costs, data and theoretical analyses, final report preparation and publication of results. The cost estimates evaluated three processing scenarios and included cost sensitivity analyses.

Los Alamos National Laboratory, ULISSES Line Design. Process Engineer responsible for developing block and process flow diagrams and material balances for processing enriched and depleted uranium. Tasks included the evaluation of current processing technologies, equipment design, laboratory layout and determination of service requirements.

Los Alamos National Laboratory, Weapons Subsystem Laboratory Conceptual Design. Process Engineer responsible for designing tritium waste treatment systems for both nitrogen- and helium-purged glovebox trains and for the emergency tritium cleanup system. Developed mass balances, equipment design and layout, cost estimates and detailed process descriptions for the conceptual design report for a new tritium processing facility.

Idaho National Engineering Laboratory, Waste Characterization Facility Title 1 Design. Process Engineer responsible for support systems design including breathing air, compressed air, radioactive liquid waste, potable water, sanitary sewer, fuel gas and specialty gas systems. Tasks included developing site- and process-specific mass and energy balances, process and instrumentation diagrams, arrangement drawings and system specifications. Determined usage rates, optimized equipment design, and prepared Title 1 Design Record Baseline and Design Record documents.

PATENTS, PUBLICATIONS AND PRESENTATIONS:

Kozliak,E., Mota,R., Rodriguez, D., Overby, P., Kubátová, A., Stahl, D., Niri, V., Ogden, G., and Seames, W., (2013). “Non-catalytic cracking of jojoba oil to produce fuel and chemical by-products”, Industrial Crops and Products, 43: 386– 392.

James E. Smith, Gregory E. Ogden, Clinton J. Brown, Paul M. Frisby, and Sahar A. Torabzadeh, Hydroxyethylhydrazinium Nitrate-Acetone Formulations and Methods of Making Hydroxyethylhydrazinium Nitrate-Acetone Formulations, U.S. Utility Patent Application, Serial No. 12/798,787. Filed April 9, 2010.

Ogden G.E. (Compiled by) Engineering 102: The Freshman Design Experience, Pearson Custom Publishing (2009).

Zankich, V., Murfee, H., Ogden, G., "Hypergolic Green Fuel Development and Testing", presented at the 57th JANNAF Meeting, Colorado Spring, CO, May 3-7, 2010.

Zinsli, P., Seames W., Ogden, G.E., "Jojoba Oil-Based Naval Fuels", Presented at the Advanced Propulsion Mid-Year Review Meeting, Office if Naval Research, Washington DC, Dec. 14-16, 2009.

Ogden, G.E., Frisby, M., Brown,C., Smith, J.E. Jr, "The Path Towards a Green Hypergol", presented at the 56th JANNAF Meeting, Las Vegas, NV, April 14-17, 2009.

Ogden, G.E., "Hypergolic Green Fuel Formulation", presented at the AIAA/MDA 5th Annual U.S. Missile Defense Conference, Washington, DC, March 19-22, 2007.

Ogden, G.E., Herz, R., "Purewaterlab: an interactive Simulator for Promoting Water Conservation and Sustainability in Engineering Education", 2006 AIChE Annual Meeting, San Francisco, CA, November 12-17, 2006.

Herz, R., Ogden, G., "Distributed Dynamic Simulation of Water Process Plants for Collaborative Learning", Educational Software Demonstration, 2006 AIChE Annual Meeting, San Francisco, CA, November 12-17, 2006.

Ogden, G.E., Wong, E, DeDea, S., Smith, S., Herz, R., "Predictive Modeling of Hydrogen Peroxide Decomposition", Presented at the 53rd JANNAF Meeting, Monterey CA, Dec 5-9, 2005.

Ogden, G.E., Wendt, J.O.L., "Using Oxygen Enrichment and Coal Fines to Diminish NOx Emissions from Pulverized Coal Axial Diffusion Flames", Abstract 73, Session 19-1, 2005 Pittsburgh Coal Conference.

Ogden, G.E., "Successful Pima Community College and University of Arizona Partnerships". Invited Presenter/Participant, National Academy of Engineering Articulation Workshop, Washington D.C., July 7-8, 2004.

Ogden, G.E., Wendt, J.O.L., "Using Oxygen Enrichment and Coal Fines to Diminish NO_X Emissions from Pulverized Coal Axial Diffusion Flames", 2003 AFRC Fall Meeting, Livermore, California, Oct 15-17, 2003.

Hazleton, A., Hernandez, K., Ogden, K.L., Ogden, G.E., "Our Internship at Raytheon under the CEP Project", Student Intern Presentation, National ATE Principal Investigators Conference, Washington, DC., October 22-24, 2003.

Feldman, J., Ogden, G.E., Single-Piece Nipple to Fit Various Beverage Containers, United States Patent Application, Pub. No. US 2002/0104816 A1, August 8, 2002.

Ogden, G.E., Wendt, J.O.L, “Effect of Coal Fines and Oxygen Enrichment on Flame Attachment and NO_x”, Presented as the Combustion Technology University Alliance Workshop, Cincinnati, OH, September 12-13, 2002.

Ogden, G.E., Wendt, J.O.L., “The Role of Fines in Flame Stabilization and NO_x Emissions Reduction in Axial Coal Jet Flames”, 2002 AIChE Annual National Meeting, Indianapolis, Indiana, November 5-8, 2002

Ogden, G.E., Wendt, J.O.L., “Flame Stabilization and NO_x Emissions Reduction in Axial Coal Jet Burners”, 2002 AIChE Annual National Meeting, Indianapolis, Indiana, November 5-8, 2002.

Ogden, G.E., Pulverized Coal Combustion: Flame Attachment and NOx Emissions, Ph.D. Dissertation, University of Arizona, 2002.

Ogden, G.E., Wendt, J.O.L., “Systematic Evaluation of Burner Aerodynamics and Impact on NO_x Emissions from Axial Coal Burners”. Presented at the Western States Section of the Combustion Institute 2002 Spring Meeting, La Jolla, CA, March 25-26, 2002.

Ogden, G.E., Wendt, J.O.L., “The Effect of Primary Jet Oxygen Partial Pressure on Flame Stability and NO_x emissions”, Poster Presentation, 2001 AIChE Annual Meeting, Reno Nevada, November 7, 2001.

Croissant, J., Ogden, G. E., and Ogden K. L. “Teamed Internships: Innovative Education Program for Environmental Technicians and Engineers”. J. Eng. Educ. April 2000, 111-114.

Ogden, G.E., Ogden K.L., "Curriculum Enrichment Project (CEP)". Eighth National ATE Principal Investigators Conference, Washington, D.C., October, 2001.

Kinn, L., Bramhall, D., Ogden, G.E., Student Intern Presentation, Eighth National ATE Principal Investigators Conference, Washington, D.C., October, 2001.

Ogden, G.E., Budilarto, S.G., Sinclair, J.L., Wendt, J.O.L., “Comparison of Velocity vs. Momentum for Stabilizing Turbulent Natural Gas Flames”. Presented at the 2000 Spring Meeting, AFRC, Newport Beach, CA, June 1-5, 2000.

Ogden, K. L., Ogden, G. E. and Croissant, J. “Teamed Internships: Innovative Education Program for Environmental Technicians and Engineers” AIChE Annual Meeting, Miami Beach, FLA, November, 1999.

Ogden, G.E., Ogden, K.L., Croissant, J.L., "Teamed Internships: Innovative Education Program for Environmental Technicians and Engineers". Poster Presentation, Western PETE Annual Instructor Conference, Lake Tahoe, California, August, 1999.

Ogden, G.E., Ogden, K.L., Croissant, J.L., "Teamed Internships: Innovative Education Program for Environmental Technicians and Engineers-An Update". AACC ATE Conference, Washington, D.C., November, 1998.

Ogden, G.E., Ogden, K.L., "Teamed Internships: Innovative Education Program for Environmental Technicians and Engineers-Year 1". AACC ATE Conference, Washington, D.C., November, 1997.

Ogden, G.E., Sinclair, J.L., Wendt, OL., ”Optimization of Coal Particle Flow Patterns in Low NO_x Burners”, Presented at the 1999 FETC University Coal Research Contractors Review Conference, Pittsburgh, PA, June 1-2, 1999.

Ogden, K.L., Ogden, G.E., Sauer, N.N., and Unkefer, P.J., "Treatment of Mixtures of Hazardous Organics and Toxic Metals". Invited Chapter in S. Sidkar, editor Bioremediation: Principles and Practice-Fundamentals & Applications. Volume 2, 1998.

Ogden, K.L., Ogden, G.E., Hanners, J.L. and Unkefer, P.J., "Remediation of Mixed Waste: Cellulose and Plutonium." *J. Haz. Mat.*, **51**, 115-130. 1996.

Ogden, G.E. and Davis, R. H., "Experimental Determination of the Permeability and Relative Viscosity for Fine Latexes and Yeast Suspensions". Chem. Eng. Comm., **91**, 11-28. 1990.

Keeth, R. J., Baker, D. L., Tracy, P. E., Ogden, G. E., Ireland, P. A., "Economic Evaluation of FGD Systems-1990 Final Report". Electric Power Research Institute, RP1610-6, December 1990.

Treatability Test for Remediating Nitroaromatic Hydrocarbon Impacted Soils-Report for Environmental Chemical Corporation, June, 1998.

Treatability Test for Remediating Creosote Contaminated Soils-Report for Southwest Soil Remediation, Inc., November, 1994.

Cellulose Degradation Reactor Cost Estimate-Final Report for Los Alamos National Laboratory, May, 1994.

Waste Oil Degradation Reactor Cost Estimate-Final Report for Los Alamos National Laboratory, July, 1994.

Waste Characterization Facility-Title I Design Package prepared for EG&G Idaho, Inc., Merrick Project No. 360-9905, March 1992.

Weapons Subsystem laboratory-Conceptual Design Report prepared for the Los Alamos National Laboratory, Merrick Project No. 360-9908, February 1992.