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EDUCATION

- Ph.D.** *Civil Engineering*, University of California, Davis, 1982 (Environmental Engineering)
MS *Civil Engineering*, University of California, Davis, 1980 (Environmental Engineering)
BS *Civil Engineering*, University of California, Davis, 1977, (Summa Cum Laude)
BA *Psychology*, Stanford University, 1967 (Honors)

EXPERIENCE

- **1999 - present: Professor**, research and primary teaching undergraduate and graduate courses in Environmental Engineering, *Department of Civil, Environmental & Architectural Engineering, University of Colorado, Boulder, CO.*
- **1989 - 1999: Associate Professor**, research and primary teaching undergraduate and graduate courses in Environmental Engineering, *Department of Civil, Environmental & Architectural Engineering, University of Colorado, Boulder, CO.*
- **1982 - 1989: Assistant Professor**, research and primary teaching undergraduate and graduate courses in Environmental Engineering, *Department of Civil, Environmental & Architectural Engineering, University of Colorado, Boulder, CO*
- **1979 - 1982: Graduate Student Research Assistant**, Ph.D. dissertation project: control of activated sludge flocculation in Sequencing Batch Reactors. Environmental Engineering, *Department of Civil Engineering, University of California, Davis, CA.*
- **1978 - 1979: Graduate Teaching Assistant** in environmental engineering courses: solid waste management, water quality, wastewater design, and pilot plant laboratory. *Department of Civil Engineering, University of California, Davis, CA.*
- **1976 - 1978: Engineering Assistant**, Water Quality Section, Division of Operations & Maintenance, State Water Project, *State of California Department of Water Resources, Sacramento, CA.* Projects on aquatic weed and algae control in reservoirs and canals, modeling of thermocline-induced oxygen depletion in reservoirs, and design of wind generator for automated water quality data monitoring in remote field sites.

AWARDS & PROFESSIONAL REGISTRATION

- Eminence Member, American Academy of Environmental Engineers, 2006
- CU-Lead Alliance, Faculty Appreciation Award, 2006
- Distinguished Achievement Award, CEAE Department, 2006
- Clarence Eckel Faculty Achievement Award, CU, Dept. CEAE, 2001
- Faculty Appreciation Award, CU Multicultural Engineering Program, 2000-2001

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- Distinguished Engineering Educator, (national) Society of Women Engineers, 2000
- Faculty Award for Women Scientists and Engineers, National Science Foundation, 1992-1997
- National Water Research Institute, Service Award, 1996
- Association of Environmental Engineering Professors, Service Award, 1997
- Water Environment Federation, 1st Prize for Ph.D. Dissertation to my student, Rita Klees, 1990
- Dept. Civil, Env., & Arch. Eng. Awards: Research, 1985, 1992; Service, 1998
- Dept. Civil & Arch. Engineering Student-Selected Teaching Awards: 1986, 1998
- **Registered Professional Engineer, Colorado #26151**

RESEARCH INTERESTS

- Water/wastewater treatment processes based on anaerobic respiration by bacteria, including: denitrification, perchlorate and iron (Fe(III)) respiration by suspended microorganisms and in biofilm.
- Processes for biodegradation of toxic organic compounds using mixed populations of bacteria.
- Application of bacterial population dynamics to in-situ remediation of acid mine drainage and other biological treatment processes using mixed microorganism communities.
- Water recycling and wastewater treatment in extreme environments.
- Activity of autotrophic bacteria in biofilm: nitrification, manganese oxidation and iron oxidation.
- Spatial scale effects on behavior of biological processes for treatment of water and wastes.

REFEREED JOURNAL PUBLICATIONS

- Gutierrez-Padilla, G.D., A. Bielefeldt, S. Ovtchinnikov, J. Pellegrino, and J. Silverstein. "Simple scanner-based image analysis for corrosion testing: Concrete application. *J. Mat. Proc. Technol.* 209:51-57, 2009.
- Choi, H. and JoAnn Silverstein. "Inhibition of perchlorate reduction by nitrate in a fixed biofilm reactor, *J. Hazardous Mat.*, 159:440-445, 2008.
- Choi, H. and JoAnn Silverstein, "Effluent Recirculation to Improve Perchlorate Reduction in a Fixed Biofilm Reactor," *Biotech. Bioeng.*, 98:132-140, 2007.
- Bilgin A.A., Harrington J.M. and Silverstein J "Enhancement of bacterial iron and sulfate respiration for in situ bioremediation of acid mine drainage sites: a case study. *Minerals and Metallurgical Processing (SME)*, 24 (3): 139-144 2007.
- Baeseman, J.L., R.L. Smith, and J. Silverstein, "Denitrification Potential in Stream Sediments Impacted by Acid Mine Drainage: Effects of pH, Various Electron Donors, and Iron, *Microbial Ecol.*, 51(2):232-241, 2006.
- Bilgin, A., J. Silverstein, and M. Hernandez. "Microbial neutralization of acid mine drainage in the presence of soluble ferri-Hydroxide complexes," *Environ. Sci. Technol.*, 39:7826-7832, 2005.
- Bilgin, A., J. Silverstein, and J.D. Jenkins, "Iron Respiration by *Acidiphilium cryptum* at pH 5." *FEMS Microbiology*, 49:137-143, 2004.
- Jo, K-H. and J. Silverstein, "Acclimation of activated sludge to degrade toxic levels of 2,4-dinitrophenol, *Wat. Sci. Technol.*, 50(6):45-50, 2004.
- E.A. Marchand and J. Silverstein, "The Role of Enhanced Heterotrophic Bacteria Growth on Iron Oxidation by *A. ferrooxidans*," *Geomicrobiol. J.*, 20(3):231-244, 2003
- E.A. Marchand and J. Silverstein, "The Influence of Heterotrophic Microbial Growth on Biological Oxidation of Pyrite," *Environ. Sci. Technol.*, 36:5483-5490, 2002.
- Kuchenrither, R.D., S. Sharvelle, and J. Silverstein, "Risk Exposure. Are treated wastewater and biosolids hazardous to your health?" *Wat. Environ. Tech.*, 38-40, May 2002.

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- Pasmore, M., P. Todd, S. Smith, D. Baker, J. Silverstein, D. Coons, and C.N. Bowman, "Effects of ultrafiltration membrane surface properties on *Pseudomonas aeruginosa* biofilm initiation for the purpose of reducing fouling," *J. Membrane Sci.*, 194:15-32, 2001.
- Pasmore, M., P. Todd, S. Smith, D. Baker, J. Silverstein, D. Coons, and C.N. Bowman, "Effects of ultrafiltration membrane surface properties on *Pseudomonas aeruginosa* biofilm initiation for the purpose of reducing fouling," *J. Membrane Sci.*, 194:15-32, 2001.
- Brion, G. and Silverstein, J., "Selection a Sensitive Bacteriophage Assay for Evaluation of a Prototype Water Recycling system," *J. Life Support and Biosphere Sci.*, 8:9-14, 2001.
- Peccia, J., E.A. Marchand, J. Silverstein, and M. Hernandez, "Development and Application of Small-Subunit rRNA Probes for Assessment of Selected Thiobacillus Species and Members of the Genus Acidophilium," *Appl. Environ. Microbiol.*, 66(7):3065-3072, 2000.
- Oh, J. and J. Silverstein, "Oxygen inhibition of activated sludge denitrification," *Wat. Res.* 33(8):1925-1937, 1999.
- Glass, C. and J. Silverstein, "Denitrification of High-Nitrate, High-Salinity Wastewater," *Wat. Res.*, 33(1):223-229, 1999.
- Brion, G. and J. Silverstein, "Iodine Disinfection of a Model Bacteriophage, MS2, Demonstrating Apparent Rebound," *Wat. Res.*, 33(1):169-179, 1999.
- Jo, K-H. and J. Silverstein, "Substrate inhibition of degradation of 2,4-dinitrophenol in activated sludge," *Wat. Environ. Res.*, 70:94-100, 1998.
- Glass, C. and J. Silverstein, "Denitrification Kinetics of High Nitrate Concentration Water: pH Effect on Inhibition and Nitrite Accumulation," *Wat. Res.*, 32:831-839, 1998.
- Glass, C., J. Silverstein, and J. Oh, "Inhibition of denitrification by activated sludge by nitrite," *Wat. Environ. Res.*, 69:1086-1093, 1997.
- Silverstein, J. and C. Glass, "Equal Opportunity and Equality in Environmental Engineering," Forum, *J. Environ. Eng. (ASCE)*, 124(7):581-583, 1998.
- Carlson, G. and J. Silverstein, "Effect of Molecular Size and Charge on Biofilm Sorption of Organic Matter," *Wat. Res.*, 32:1580-1592, 1998.
- Carlson, G. and J. Silverstein, "Effect of Ozonation on Sorption of Natural Organic Matter by Biofilm," *Wat. Res.*, 31:2467-2478, 1997.
- Marchin, G.L., J. Silverstein and G.M. Brion, "Effect of Microgravity on *Escherichia coli* and MS-2 Bacteriophage Disinfection by Iodinated Resins," *Acta Astronautica*, 40(1):65-68, 1997.
- Silverstein, J., T.F. Hess, N. Al Mutaari, and R. Brown, "Enumeration of a Species of Toxic Compound Degrading Bacteria in a Multi-Species Activated Sludge Biomass," *Wat. Sci. Tech.*, 29:309-316, 1994.
- Silverstein, J., G. Brion, R. Barkley, A. Dunham, C. Hurst, P. Todd, J. Shulz, "Contaminant Accumulation in Space Recycle Systems." *Acta Astronautica*, 33:317-338, 1994.
- Hess, T.F., J. Silverstein, and S.K. Schmidt, "Effect of glucose on 2,4-dinitrophenol degradation kinetics in sequencing batch reactors," *Wat. Environ. Res.*, 65(1):73-81, 1993.
- S.K. Schmidt, R. Smith, D. Sheker, T.F. Hess, J. Silverstein and P.M. Radehaus, "Interactions of Bacteria and Microflagellates in Sequencing Batch Reactors Exhibiting Enhanced Mineralization of Toxic Organic Chemicals," *Microbial Ecol.*, 23:127-142, 1992.
- Klees, R. and J. Silverstein, "Improved Biological Nitrification Using Recirculation in Rotating Biological Contactors," *Wat. Sci. Tech.*, 26:545-553, 1992.
- Figuerola, L.A. and J. Silverstein, "The effect of particulate organic matter on biofilm nitrification," *Wat. Environ. Res.*, 64:728-733, 1992.
- deMendonça, M., J. Silverstein, and N. Cook, "Short and Long-Term Responses to Changes in Hydraulic Loading in a Fixed Denitrifying Biofilm," *Wat. Sci. Tech.*, 26:535-544, 1992.
- Brion, G.M. and J. Silverstein. "Inactivation of a Model Coliphage Virus in Water by Iodine." *Trans. Soc. Auto. Engineers*, 101:1310-1316, 1992.

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- Barkley, R. Hurst, C., Dunham, A., Silverstein, J. and Brion, G. "Generation of Iodine disinfection By-Products in a Water Recycle System." *Trans. Soc. Auto. Engineers*, 101:1317-1321, 1992.
- Hess, T.F., Schmidt, S.K., Silverstein, J., and Howe, B., "Supplemental Substrate Enhancement of 2,4-Dinitrophenol Mineralization by a Bacterial Consortium," *Appl. Environ. Microbiol.*, 56:1551-1558, 1990.
- Figuroa, L.A. and J. Silverstein, "Measurement of Extracellular Polysaccharides in Activated Sludge by Dye Absorption," *Biotech. Bioeng.*, 33:941-947, 1989.
- Silverstein, J. and E.D. Schroeder, "Performance of SBR Activated Sludge Processes with Nitrification/Denitrification," *J. Wat. Pollut. Control Fed.*, 55(4):377-384, 1983.

BOOK CHAPTERS

- Page, A. *et al.*, (including J. Silverstein), *Use of Reclaimed Water and Sludge in Food Crop Production*, National Research Council, National Academy Press, Washington, DC, 1996.
- Barrett, J.M. and J. Silverstein, "The Effects of High-Carbon and High-Coliform Feed Waters on the Performance of Slow Sand Filters under Tropical Conditions," in *Slow Sand Filtration*, ed. N. Graham, Wiley & Sons, New York, NY, 1988.
- Harris, J., J. Silverstein and D. Andrews, "Educating Women in Science," in *Educating the Majority*, Macmillan Co., New York, NY, 1989.

REVIEWED ABSTRACTS

- Silverstein, J. and E.D. Schroeder, "SBR Processes with Nitrification and Denitrification," *Wat. Use & Wastewater*, 25:72-74, 1983. (Japan)
- Silverstein, J. and E.D. Schroeder, "Nitrification and Denitrification in SBR's," *Wat. Treatment Tech.*, 24:64-66, 1983. (Japan)

PUBLISHED CONFERENCE PROCEEDINGS

- Silverstein, J., H. Rajaram, and J. Jenkins, "Preventing Pyrite Oxidation: A Geomicrobial Strategy for Source Control of Acid Mine Drainage. SME Annual Meeting and Exhibit, Denver, 2009.
- Andre, B., H. Rajaram, J. Silverstein, and T. Yacob. "Pore-scale Rate Model of Acid Rock Drainage Geochemistry and Geomicrobiology." SME Annual Meeting and Exhibit, Denver, 2009.
- Gutierrez-Padilla, Ma-G., A. Bielefeldt, M. Hernandez, J. Silverstein. Biokinetics of Sulfur Oxidizing Microorganisms and Monitoring of Microbially Induced Concrete Corrosion in Pipelines, Corrosion NACEexpo/2006 61st Annual Conference and Exposition, San Diego, 2006.
- Choi, H. and J. Silverstein, "Use of Internal Recirculation to Improve Perchlorate Reduction in a Fixed Biofilm Process, 2006 AWWA Annual Conference, San Antonio, TX, 2006
- A. Azra Bilgin, James M. Harrington, and JoAnn Silverstein, "Enhancement of Bacterial Iron and Sulfate Respiration for in-situ Bioremediation of Acid Mine Drainage Sites: A Case Study," 2005 Soc. Mining, Metallurgy and Exploration (SME) Annual Meeting, Salt Lake City, Feb. 2005.
- Nam, S-N., S. Kim, H. Choi, J. Yoon, J. Silverstein, and G. Amy, "Perchlorate Rejection by High-Pressure Membranes and Brine Stream Treatment by Chemical and Biological Processes," Membrane Tech. Conf., AWWA, 2005.

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- Bilgin, A. and J. Silverstein, "Role of Bacterial Iron in In-Situ Restoration of Acid Mine Drainage," *Proc. 7th Int'l. Symposium on Environ. Issues and Waste Management in Energy and Mineral Production*, Cagliari, Sardinia, Italy, 2002.
- Sharvelle, S., J. Silverstein, D. Klaus, L. Supra, "Nitrogen Removal from a Urine-Soap Wastewater Using a Bioprocessor System: Process Monitoring and Control," 32nd ICES, *SAE paper # 2002-01-2353*, 2002.
- Silverstein, J., G. Carlson, and J. Copeland, "Biological Denitrification of Groundwater: Demonstrations of a new Process for Cost-Effective Treatment of Rural Drinking Water," *Proc. Conf. on Applications of Waste Remediation Technologies to Agricultural Contamination of Water Resources*, Manhattan, Kansas, 2002.
- Silverstein, J., A. Keith, L.N. Supra, and B.W. Finger, "Substrate-limited denitrification of urine-soap wastewater." *Proc. Conference on Wastewater and EU-Nutrient Guidelines*, IWA, Amsterdam, 149-156, 2001.
- E.A. Marchand and J. Silverstein, "Remediation of Acid Rock Drainage by Inducing Biological Iron Reduction," *Proc. Fifth International Conference on Acid Rock Drainage (ICARD)*, SME, Vol II:1201-1207, 2000
- Silverstein, J. and J. Oh, Nitrite Accumulation in Denitrification Systems: Effects of Dissolved Oxygen, Substrate Limitation and pH, *Proc. Intl. Recirc. Aquaculture Conf.*, Roanoke, VA, 1-8, 1998.
- Silverstein, J. "Navigating Career and Family Paths," *Proc. Women in Engineering Conference*, WEPAN, Denver, CO, 111-116, 1996.
- Veydovec, B., J. Silverstein, N.E. Cook, Jr., L.A. Figueroa, R. Hund, and G.D. Lehmkuhl, Denitrification Inhibition by High Nitrate Wastes, in Critical Issues in Water and Wastewater Treatment, eds. Joseph N. Ryan and Marc Edwards, *Proc. ASCE Nat. EE Conf.*, ASCE, New York, NY, 415-422, 1994.
- Carlson, G. and J. Silverstein, "Biofilm Adsorption of Natural Organic Matter from Drinking Water," in Critical Issues in Water and Wastewater Treatment, eds. Joseph N. Ryan and Marc Edwards, *Proc. ASCE Nat. EE Conf.*, ASCE, New York, NY, 460-466, 1994.
- Cook, N.E., Jr., J. Silverstein, W. Hogrewe and K. Hammad, "Denitrification of Potable Water in a Packed Tower Biofilm," in *Env. Eng., Proc. ASCE Nat'l. EE Conf.*, 175-183, 1990.
- Cook, N.E., Jr., J. Silverstein, L.A. Figueroa, K. Cutter, R. Hund, and B. Veydovec, "pH Control of Denitrification of a High Nitrate Strength Industrial Wastewater," #AC93-039-001, 66th *Ann. Water Environ. Fed. Conf. (WEFTEC)*, WEF, Alexandria, VA, 205-216, 1993.
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- Figueroa, L.A. and J. Silverstein, "Pilot-Scale Trickling Filter Nitrification at the Longmont, [Colorado] Wastewater Treatment Plant," *Proc. ASCE Nat. EE Conf.*, ASCE, New York, NY, 302-309, 1991.
- Silverstein, J., M. Bowman, T. Hess, S.K. Schmidt, and B. Howe, "2,4-dinitrophenol degradation and sludge floc size," *Proc. ASCE Nat. EE Conf.*, ASCE, New York, NY, 205-212, 1990.
- Klees, R. and J. Silverstein, "Aerated Static Pile Composting of Municipal Sludge," *Proc. ASCE Nat. EE Conf.*, ASCE, New York, NY, 23-29, 1986.
- Silverstein, J. and E.D. Schroeder, "Control of Activated Sludge Settling in an SBR," *Proc. ASCE Nat. EE Conf.*, ASCE, New York, NY, 238-246, 1983.

PRESENTATIONS

Silverstein, C.V.

- A. Azra Bilgin and JoAnn Silverstein, "Determination of Community Composition and Physiological Structure in AMD Environments by PLFA Analysis," ISSM-ISEB Joint International Symposium, Jackson Hole, 2005
- J. Baeseman, R.L. Smith, J. Silverstein, "Seasonal Variability of Denitrification in Heavy Metal-Stressed Mountain Streams," ISSM-ISEB Joint International Symposium, poster, Jackson Hole, August 2005
- J. Jenkins, J. Silverstein, "Bacterial Population Changes Resulting from Drainage through Mine Waste Rock," poster, ISSM-ISEB Joint International Symposium, Jackson Hole, August 2005.
- Joy Jenkins and JoAnn Silverstein, "The Effect of Drainage Flow and Saturation Conditions on Microbial Pyrite Oxidation in Mine Waste Rock," Invited presentation, Society of Environmental Toxicology and Chemistry (SETAC) North America, 26th Annual Meeting, Baltimore, Nov. 2005.
- April Tumey, JoAnn Silverstein, Harihar Rajaram, "Geomicrobial model of acid mine drainage production at the rock surface scale," poster, ISSM-ISEB Joint International Symposium, Jackson Hole, August 2005.
- Hyeoksun Choi and JoAnn Silverstein, "Biological Reduction of Perchlorate in a Fixed Biofilm Process: Effects of ClO₄- Concentration, Flow Recirculation, and Nitrate." poster, Strategic Environ. Research & Devel. Program (SERDP), 2005 Symposium, Washington, DC, Nov. 2005.
- Baeseman, J.L., R.L. Smith, and J. Silverstein, "Denitrification in Acid Impacted Streams," American Soc. Microbiol. Annual Conf., Salt Lake City, Utah, 2002.
- Silverstein, J. "Activated Sludge Denitrification in Sub-optimal Conditions: Effects of Oxygen, Substrate Availability and pH." (invited paper) Symposium: Fundamentals, Modeling and Applications of Nitrification and Denitrification, VPI & SU, Roanoke, VA, 1999.
- Silverstein, J. and J. Oh, "Nitrite Accumulation in Denitrification Systems: Effects of Dissolved Oxygen, Substrate Limitation and pH," (invited paper), *Intl. Recirc. Aquaculture Conf.*, Roanoke, VA, 1998.
- Pasmore, M., E. Bjercknes, J. Bonomo, P. Todd, J. Silverstein and C.N. Bowman, "Biofilm Fouling of Water Processing Membranes: The Role of Surface Properties," *11th Ann. Colorado Biotech. Symposium, Fort Collins, CO*, 1998.
- Silverstein, J. "Putting the Bugs to Work: Using Microorganisms to Improve Water Quality on Boulder Creek," *Boulder Creek Watershed Forum*, 1998.
- Silverstein, J. and G. Carlson, "Demonstration of a Novel Process for Biological Denitrification of Ground Water for Drinking Water Treatment in a Rural Community," (invited paper), *49th Ann. Nat. Ground Wat. Assoc. Conf.*, Las Vegas, NV, 1997.
- Silverstein, J. "Demonstration of Drinking Water Denitrification in a Rural Colorado Community," (invited presentation), Annual conference, Assoc. State Drinking Water Agencies, Los Angeles, CA, 1996.
- Silverstein, J. "Teaching a Capstone Design Course in Environmental Engineering," (invited presentation), National Conference on Educational Needs in Environmental Engineering, Assoc. of Environ. Eng. Professors and American Academy of Environmental Engineering, Orono, ME, 1996.
- Panel: "Career and Family Paths for Women Engineering Professors," (invited presentation) *Annual Conference, Women in Engineering Programs Advocates Network*, Denver, CO, 1996.
- *Silverstein, J., "Demonstration of Drinking Water Denitrification at Wiggins, Colorado," *Annual Conference of Electric Power Research Institute*, Community Environmental Center, San Diego, CA, 1996
- Silverstein, J., "Environmental Engineering Ethics," (invited presentation), *GTE Seminar Series on Professional Ethics*, Purdue Univ., Calumet, Indiana, Sept. 1994.

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- *Veydovec, W., Silverstein, J., Cook, N.E., Jr., Figueroa, L.A., Hund, R., Lehmkuhl, G., "Inhibition of SBR Denitrification by High Nitrate Wastewater," *ASCE Nat. EE Conf.*, Boulder, CO, July 1994.
- *Carlson, G. and Silverstein, J., "Biofilm Adsorption of Natural Organic Material from Drinking Water," *ASCE Nat. EE Conf.*, Boulder, CO, July 1994.
- *Brion, G.M., Gerba, C.P. and Silverstein, J., "Selection of a Model Indicator Virus for Space Water Recycle," 24th International Conf. Environ. Systems (ICES), Germany, July 1994
- Silverstein, J., et al., "Health Risks of Recycled Water Systems," *Ann. Conf. Soc. Aerospace Medicine*, San Antonio, TX, May 1994.
- Silverstein, J., "Denitrification by Mixed Microbial Consortia in Activated Sludge and Biofilm Reactors," (invited paper), *Florida Environmental Chemistry Conference*, Palm Coast, FL, 1993.
- *Cook, N.E., Jr., Silverstein, J., Figueroa, L.A., Cutter, K., Hund, R., Veydovec, B., "Denitrification of a High Nitrate Strength Industrial Wastewater," *66th Ann. Water Environment Federation Conf.*, Anaheim, CA, 1993.
- *Silverstein, J., Hurst, C., Barkley, R., Dunham, A., "Effect of Iodine Disinfectant Source and Water Quality Parameters on Soluble Iodine Speciation," *Proc. 23rd Intl. Conf. Environ. Systems (ICES)*, Soc. Automotive Engineers (SAE), Warrendale, PA, 1993.
- *Barkley, R., Dunham, A., Hurst, C., Silverstein, J., "Iodine Disinfection By-Products Generated in Water from Selected Precursor Compounds," *Proc. 23rd Intl. Conf. Environ. Systems (ICES)*, Soc. Automotive Engineers (SAE), Warrendale, PA, 1993.
- *Silverstein, J., Schulz, J., Barkley, R., Brion, G.M., and Hurst, C., "Contaminant Distribution and Accumulation in Water Recycle Systems," *Proc. 22nd Intl. Conf. Environ. Systems (ICES)*, # 921360, Soc. Automotive Engineers (SAE), Warrendale, PA, 1992.
- *Brion, G.M. and Silverstein, J., "Inactivation of a Model Coliphage Virus in Water by Iodine," *Proc. 22nd Intl. Conf. Environ. Systems (ICES)*, # 921361, Soc. Automotive Engineers (SAE), Warrendale, PA, 1992.
- *Barkley, R., Hurst, C., Dunham, A., Silverstein, J., and Brion, G.M., "Generation of Iodine Disinfection By-Products (IDP's) in a Water Recycle System," *Proc. 22nd Intl. Conf. Environ. Systems (ICES)*, # 921362, Soc. Automotive Engineers (SAE), Warrendale, PA, 1992.
- *Schulz, J. and J. Silverstein, "A Systems Approach to Water Recycling Research, Third Int'l Conf. Eng. Const. in Space, Am. Soc. Civil Eng., Denver, CO, May 1992.
- *Silverstein, J., Mendonça, M.M., Cook, N.E., Jr., and Veydovec, B., "Effect of Flow Variation on Biological Denitrification of Groundwater," *Colo. Water Eng. & Mgmt. Conf.*, Denver, CO., 129-136, 1992.
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- *Klees, R. and Silverstein, J.; "The Use of Recirculation to Improve Nitrification in Rotating Biological Contactors," *Water Pollution Control Fed. National Conf.*, Washington, D.C., 1990.
- *Cook, N.E., Jr. and Silverstein, J.; "Biological Denitrification of a Potable Water Supply," *NATO Intl. Conf. Nitrate Pollution*, Lincoln, NE, 1990.
- *Silverstein, J. and Cook, N., "Nitrate Pollution of Shallow Groundwaters in the West," *Groundwater Eng. Mgmt. Conf.*, Denver, CO, 1990.
- *Silverstein, J. and Klees, R., "Cold Weather Operation of Sludge Compost Piles," *Water Pollution Control Fed. National Conf.*, San Francisco, CA; 1989.

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 - Hammad, K.A., Cook, N.E., Peters, D., and Silverstein, J., "Chlorine Demand and Trihalomethane Formation from a Biological Denitrification Treatment Process for Potable Water," *Rocky Mountain Am. Water Works Assoc. Conf.*, Santa Fe, NM; 1989.
 - *Barrett, J. and Silverstein, J., "Optimization of a Low-Technology Potable Water Treatment Method for Use in Tropical Climates," *Am. Public Health Assoc. National Conf.*, Chicago, IL, 1989.
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 - Cook, N.E.; Silverstein, J. and Hogrewe, W. "Denitrification of Potable Water - Effect of the Biofilm Process on Disinfection," *Am. Water Works Assoc. National Conf.*, Los Angeles, CA; 1989.
 - Hess, T., Silverstein, J. and Schmidt, S., "Biodegradation of DNP in Axenic Cultures and Activated Sludge," *Hazardous Waste Research Conf.*, Kansas State Univ., Manhattan, KA, 1989.
 - Figueroa, L. and Silverstein, J. "Inhibition of Nitrification in Rotating Biological Contactors," *Rocky Mountain Water Pollution Control Fed. Annual Conf.*, Snowmass, CO, 1988.
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 - Figueroa, L. and Silverstein, J. "Inhibition of Nitrification by Particulate BOD," (invited paper) *Rocky Mountain Pollution Control Fed. Mid-Year Conf.*, Denver, CO, 1988.
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- Silverstein, J. and E. Wheeler, "Biological Oxidation of Ammonia and Manganese in a Nitrifying Trickling Filter at the Boulder Wastewater Treatment Plant," *Final Report to City of Boulder, CO*, 1998.
- Silverstein, J. and G. Carlson, "Development of Safe and Rapid Biofilm Inoculation Protocol to Enhance Commercialization of Biological Processes for Drinking Water Treatment," *Final Report, Colorado Advanced Materials Institute for Entrepreneurs' Technical Assistance Program (CAMI/ETAP)*, ETAP98.3.6, 1998.
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- Silverstein, J., N.E. Cook, and L.A. Figueroa, "Denitrification of Saltcrete Brine at Rocky Flats," (three volumes) *Final Report to EG&G/Rocky Flats, Inc.*, 1993.
- Center for Space Environmental Health, NASA Center for Research and Training: "Recycled Water Quality," (chapters in five annual reports), *NASA-NSCORT Program*, 1992-1996.
- Cook, N.E., J. Silverstein, B. Veydovec, M. deMendonça, and R. Sydney, "Field Demonstration of Biological Denitrification of Polluted Groundwater and Pilot Scale Field Testing of Biological

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Denitrification with Widely Varied Hydraulic Loading Rates," *Completion Report No. 162, Colorado Water Resources Research Institute, Fort Collins, CO*, 1991.

Silverstein, J., "Nitrification in Trickling Filter and a Rotating Biological Contactor at the Longmont [Colorado] Wastewater Treatment Plant," *Final Report to City of Longmont, CO*, 1990.

Cook, N.E. and J. Silverstein, "Biological Denitrification of Polluted Groundwater," *Completion Report No. 153, Colorado Water Resources Research Institute, Fort Collins, CO*, 1989.

Silverstein, J., "Aerated Static Pile Composting of Wastewater Sludge at the Longmont [Colorado] Wastewater Treatment Plant," *Final Report to City of Longmont, CO*, 1987.

Silverstein, J., "Addition of Waste Rice Hulls to Bricks," *Final Report to Adolph Coors Brewing Company*, 1987.

PATENT

Silverstein, J. (inventor), Univ. Colorado (owner), "Biological Denitrification of Water," U.S. (#5,681,471, Oct. 28, 1997) and international (European Patent Office, no. 97903788.4-2104, 10/8/98), currently licensed by Univ. Colorado to Meridian Water Corporation.

FIELD PILOT PLANT AND DEMONSTRATION STUDIES

Biofilm Denitrification Pilot Study, included slow sand filter post-treatment. Location: City of Brighton, Colorado, 1992-1994, Sponsor: Colorado Water Resources Research Institute. Capacity, 0.2 – 1 gpm.

Biofilm Denitrification Demonstration, included slow-sand filter post-treatment. Location: Wiggins, Colorado, 1996-1998, Sponsors: Electric Power Research Institute, National Rural Electric Coop Association, Colorado Department of Local Affairs, Nitrate Removal Technologies, LLC. Capacity: 10 – 20 gpm.

Assisted Nitrate Removal Technologies, LLC with subsequent pilot study by in Suffolk County, NY, including microfiltration post-treatment, and development of full-scale operating denitrification plant for drinking water treatment in Coyle, OK. Capacity: 27.5 gpm treated (55 gpm blended), including slow sand filter post-treatment. Developed pathogen-free inoculation method and evaluated the effect of carbon sources (1998-1999).

Biofilm Nitrification in Trickling Filters and Rotating Biological Contactors, Longmont Wastewater Treatment Plant, Sponsors: City of Longmont, Colorado Utilities Department. Capacity: 0.3 – 1 gpm. (1988-1990)

Wastewater Biosolids Aerated Static Pile Composting, Location: Longmont Wastewater Treatment Plant, Sponsor: City of Longmont, Colorado Utilities Department. Capacity: 50 DT/month. (1985-1987)

RESEARCH GRANTS

"Geomicrobial Strategy for Prevention of Acid Mine Drainage," PI (co-PI Hari Rajaram), NSF, \$196,000, 2005-2008.

"Perchlorate reduction in sewer conditions," PI, Geomatrix Engineering, \$30,800. 2005.

"Perchlorate Removal from Contaminated Groundwater." Co-PI with Gary Amy, Castaic Lake Water Agency, \$47,000, 2003-2004.

"Interactions between Microbial Nitrogen Cycling and Acid Mine Drainage Contaminants in Impacted Streams," PI. \$77,600, NSF, 2002-2004. (100%)

"Research Experience for Undergraduates in Environmental Engineering," PI. \$300,000. NSF. 2000-2004. (100%)

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- "Wastewater Bioprocessor Experiment Definition," \$275,000. NASA - Johnson Space Center NRA grant (1998-2000), co-PI.
- "Development of Safe and Rapid Biofilm Inoculation Protocol to Enhance Commercialization of Biological Processes for Drinking Water Treatment," PI, Colorado Advanced Materials Inst., Entrepreneurs' Tech. Assistance Program (CAMI/ETAP), \$74,000, 1997-98. (100%)
- "Bioremediation of Acid Mine Drainage," PI, Kennecott Copper, \$10,500, 1997-98. (100%)
- "Ammonia and Manganese Removal from Wastewater in a Nitrifying Trickling Filter," co-PI, City of Boulder, CO, \$25,000, (1997-98). (80%)
- "Fiberoptic Oxygen Sensor for Mixed Waste Biological Treatment Oxygen Control," PI, Colorado Advanced Materials Institute, Entrepreneurs' Technical Assistance Program (CAMI/ETAP), \$93,500, (1996-97). (100%)
- "Water Contaminant Distribution in Space Recycle Systems," co-PI, NASA Center of Research and Training (NSCORT) Center for Space Environmental Health, with CU Boulder, CU Health Sciences Center, Univ. Rochester Dept. Environmental Medicine, Martin-Marietta Aerospace Corp., \$5,500,000. (1991-96). (10%)
- "Biodegradation of Xenobiotic Organic Contaminants," PI, Faculty Award for Women Scientists and Engineers, NSF, \$250,000. (1992-97). (100%)
- "Denitrification of High Nitrate Strength Saltcrete Brine," Department of Energy, Los Alamos National Lab, PI, \$90,000 (5/94-10/95). (100%)
- "Drinking Water Denitrification Demonstration in a Rural Community," PI, Electric Power Research Institute (\$100,000), National Water Research Institute, \$51,000, Global Environmental Technologies, Inc. (\$22,500), State of Colorado Department of Local Affairs (\$35,000), Town of Wiggins, Colorado (\$2,500), Nitrate Removal Technologies, LLC (\$54,000) Morgan County Rural Electric Assoc. (in-kind, \$30,000), Tri-State Generating and Transmission Assoc., Inc. (in-kind, \$20,000) awarded May 1995, cash total: \$265,000, in-kind total: \$50,000 (5/94 - 10/97) (100%)
- "Biofouling of Membranes Used in Drinking Water Treatment," co-PI, Center for Separations Using Thin Films, (Univ. Colorado), \$105,000 (6/94 -6/97). (100%)
- "Denitrification of Solar Pond Water," PI, EG&G/Rocky Flats, \$175,000 (1992-93). (60%)
- "An Integrated Ozone Bioreactor System Versus Membrane Separation of DBP Precursors," PI, EPA Cooperative Research Agreement, \$536,000. (10/91-4/94). (33%)
- "Biodegradation of Organic Compounds in Water," PI, NSF, \$130,155 (1988-91). (60%)
- "Nitrification of Wastewater in Trickling Filter and Rotating Biological Contactor Processes," PI, City of Longmont, CO, \$225,000, (1988-90). (100%)
- "Denitrification of Contaminated Groundwater: Laboratory and Field Pilot Plant Studies," co-PI, Colorado Water Resources Research Institute, \$54,000, (1988-90). (100%)
- "Study of Sequencing Batch Reactor Wastewater Treatment Process in Bailey, CO," PI, KKBNA Engineering Consultants, \$5,000, (1987). (100%)
- "Aerated Static Pile Composting of Wastewater Sludge," PI, City of Longmont, CO, \$100,000, (1984-86). (75%)
- "Use of Waste Rice Hulls in Bricks," PI, Adolph Coors Brewing Co., \$25,000, (1985). (100%)
- "Measurement of Extracellular Polysaccharides in Activated Sludge Flocs," PI, Research Initiation Grant, NSF, \$54,000 (1983-85). (100%)

UNIVERSITY SERVICE

CEAE Department

- Chair, 2002 – 2010 (two terms)
- Executive Committee: 1998-2000 (representative from Environmental Engineering group), 1985-87.
- Personnel Committee, 1998-present

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- ABET 1999-2000 Directed Accreditation General Review Preparation Committee, 1998-99. Wrote Self-Study Report, Directed Outcomes Assessment for Environmental and Water Resources Engineering Track Curriculum, and coordinated Fall 1999 ABET visit under EC 2000 Rules.
- ABET: Wrote Interim Review Self-Study Report (summer 2001) and was liaison to ABET re-visit, fall 2001.
- Operations Committee, 1992-1998
- Curriculum Committee, 1987-91
- Graduate Committee, 1982-87.
- PRP Self-Study Committee, 1988-89.
- GAANN (Ph.D. Fellowship) Executive Committee, Chair, 1995-97.
- Search Committees: Environmental Engineering, chair, (1997, 1988, 1987); member, (1995, 1993, 1985). Member: Illumination Engineering (1998), Water Resources Engineering (1985, 1993), Geotechnical Engineering (1985), Structural Engineering (1984), Architectural Engineering/Building Systems (1986), Construction Engineering (1985)

College of Engineering

- Administrative Council (Dept. Chairs), 2002-present
- Faculty Advisory Board, Women in Engineering Program, 1993 - 1998
- Faculty Liaison, BioEngineering Program, 2001-2003
- Member, Vice Chancellor's Ad Hoc Committee for Dean Corotis' Performance Review, 1999.
- Search Committee for Dean of College of Engineering, 1995.
- Search Committee for Director, Women in Engineering Program, 1997.
- Search Committee for Assistant Director for Student Affairs, SEED (Minority Engineering), 1998 and 1999.
- Ad-hoc Committee on Women in Engineering Program, 1994.
- Faculty Advisory Board, Minority Engineering Program, 1990-92.
- Dean's Ad-hoc Committee on Minorities and Women in Engineering, 1986.
- Proposal Review, Joint Program for Biomedical Engineering, College of Engineering and Health Sciences Center, 1997.
- Assist on Proposal for Environmental Engineering BS Degree Program, 1996.
- High School Honors Institute, environmental engineering activity, Engineering Open House

Boulder Campus

- Boulder Campus Salary Equity Committee, 2007-present
- Vice Chancellor's Advisory Committee, 2004 - 2006
- Search Committee for Vice Chancellor for Research and Dean of the Graduate School 2006-2007
- Faculty Advisory Council, Center of the American West, 2001-present
- PRP-Internal Review Committee, Environmental Studies Program, 2001
- Vice-Chancellor's Program Review Panel, (Liaison and PRP Report preparation for Electrical and Computer Engineering, Chemical Engineering and Computer Science Departments) 1995-98.
- Committee on Graduate Research and Creative Work Awards, 1990-2001
- Hazardous Material Advisory Board, 1994-96, Chair, 1995-96.
- Vice-Chancellor's Salary Equity Committee, 1990-91.
- Boulder Faculty Assembly Comm. on Faculty Women, Chair, (member BFA Exec. Comm.) 1989-93.
- Search Committee for Director, Office of Intellectual Property Technology Transfer, 1995.
- Search Committee for Director, Residence Hall Academic Program in Environmental Science, 1997.

CU System

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- Emerging Leaders Program, 2005
- President's Council on Global Change and Environmental Sciences, 1993-95.
- System-wide Graduate School Committee, 1996-98

DIVERSITY

- Author of one book chapter and several papers on women and minorities in engineering
- Advisor/mentor to nine women doctorates in Civil Engineering from CU Boulder (two are Hispanic-American women) and one African-American man. Of these ten, five have gone on to teaching/research careers in universities where they in turn are mentoring women and minority students.
- Member of the first Faculty Advisory Board of Women in Engineering Program in the College of Engineering at the University of Colorado
- Faculty Advisory Board, Minority Engineering Program.
- Co-PI and Chair of Awards Committee, Graduate Assistantships in Areas of National Need (GAANN) grant from US Dept. Education, with focus to award fellowships to outstanding scholars in Civil Engineering who are also women and/or minority students. 9/18 GAANN Scholars were women; 1/18 was a minority (Hispanic-American) student.
- Member and Chair for six years, Boulder Faculty Assembly Committee on Faculty Women. Major activities: salary equity survey resulting in >\$100,000 in annual salary increases for women and minority faculty; report on women non-regular faculty at CU; parental leave policy for faculty.
- Vice Chancellor's Salary Equity Committee: evaluation of over 200 minority and women faculty vitae using method of comparison with 600 white male counterparts as well as statistical analysis to determine past discrimination and to recommend salary adjustments to alleviate.
- Member of Committee to prepare "Minority Graduate Education" program proposal to the National Science Foundation for CU Boulder.

PROFESSIONAL SERVICE

- Project Advisory Committee, Water Research Foundation (formerly AwwaRF) "Biological Denitrification Demonstration," Thornton, CO, 2008-2009.
- Project Advisory Committee, Water Research Foundation (formerly AwwaRF) "Biological Denitrification Demonstration," Glendale, AZ, 2008-2009.
- Member, Ad hoc Panel to review amicus brief on land application of biosolids in San Bernadino County, CA, Water Environment Federation, 2008.
- Member, standing Committee on Biological Treatment of Drinking Water, American Water Works Association, 2008-present.
- Liaison, Rocky Mountain Water and Wastewater Operators Short School.
- Chair, External Review Committee, Dept. Civil Engineering, Univ. Arizona, 2007.
- Membership Nominating Committee, American Academy of Environmental Engineers, 2006 – present.
- Research Advisory Board, *National Water Research Institute*, 1995 - present
- Board of Directors, *Assoc. Environ. Engineering Professors*, 1994-1997 (Secretary, 1994-1996)
- *National Research Council*, Committee to Evaluate the Use of Treated Municipal Wastewater Effluents and Sludge in the Production of Crops for Human Consumption, 1994-1996
- Technical Advisory Board, *Teledyne Water Pik Company*, Fort Collins, CO, 1994-1996
- External Peer Review Committee, *Rockwell Corp. and EG&G/Rocky Flats*, reports on feasibility of methods for mixed waste disposal for Federal Facilities Compliance Agreement, 1988-89.
- Technical Advisor, *City of Boulder, Colorado Biosolids Study Review Group*, 1996-1997

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- Technical Advisor, *City of Broomfield, Colorado*, Wastewater Facilities Plan, 1998.
- Expert testimony, Land Application of Biosolids, *Colo. Water Quality Control Commission*, 1997.
- Expert testimony, Land Application of Biosolids, *Joint Legislative Committee on Agriculture, Natural Resources and Energy, Colorado General Assembly*, 1998.
- Chair, *Current Research* session, WEF Biosolids Management Conf., Denver, CO, 1995.
- Organizing Committee, ASCE Environ. Eng. Div. National Conf., Boulder, CO, 1994.
- Peer Review (1983-present).
PROPOSALS: National Science Foundation (mail and panels: CAREER, IGERT, PIRE, SBIR, GRFP, CBET, S&T Center), USAID, Colorado, Wyoming and National Water Research Centers (USGS and Dept. Interior), National Water Research Institute, Water Environment Research Foundation, NY Solid Waste and Combustion Research Center
JOURNALS: *J. Environ. Eng. (ASCE)*, *Wat. Res.*, *Wat. Environ. Res.*, *Environ. Sci. Tech.*, *Wat. Sci. Tech.*, *J. Separ. Sci.*, *Environ. Prog.*, *Aquaculture Eng.*, *Biotechnology & Bioengineering*.

PROFESSIONAL SOCIETIES

- American Academy of Environmental Engineers
- Tau Beta Pi
- Chi Epsilon
- Phi Kappa Phi
- Sigma Xi
- Society of Women Engineers
- Association of Environmental Engineering and Science Professors
- American Society of Civil Engineers
- Water Environment Federation
- International Water Association
- American Society for Microbiology
- American Water Works Association

ENGINEERING CONSULTING

- National Water Research Institute* Blue Ribbon Panel to Review Nitrogen and Selenium Management Program, Count of Orange, California, 2006.
- National Water Researach Institute* Panel to Review Santa Clarita Valley Joint Sewerage System Chloride Source Report, Sanitation Districts of Los Angeles County, October 2002.
- Aquatic Environmental Services*. Evaluation of Pinery Wastewater Treatment Plant, Douglas County, CO.
- Eldorado Springs Water Initiative*. Evaluation of Wastewater Collections and Treatment Alternatives for the Eldorado Springs community.
- US Air Force*. Develop Operations to Improve Nitrification and Denitrification at USAF Academy Wastewater Treatment Plant.
- Cornish Consultants*. Evaluation of Temperature Phased Anaerobic Digestion for a 100-MGD Treatment Plant.
- David Evans & Assoc.* Evaluation of US Air Force Academy wastewater treatment process performance and recommendations for improvements.*
- NSF, International (Washington, DC)*, development of test protocol for package biological processes for drinking water treatment to remove nitrate.*
- Nitrate Removal Technologies, LLC (Golden, Colorado)* Commercialization of patented drinking water denitrification process.*

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San Gabriel Basin Water Quality Authority (West Covina, California), Feasibility of biofilm denitrification process for destruction of perchlorate contaminant in drinking water wells.
Aquatic Environmental Services, (Boulder, Colorado), wastewater treatment facility audit of Bardenpho-type activated sludge system at the Pinery, Colorado.*

GRADUATE STUDENT RESEARCHER SUPERVISION

Principal Advisor or co-advisor to 22 Ph.D. students and 50 MS thesis students who completed degrees (1989-2007), Currently advising 3 Ph.D. students. Director and PI, NSF-sponsored Research Experience for Undergraduates Program (1999-2004), sponsored 40 undergraduate summer research interns.

COURSES TAUGHT

Undergraduate: Introduction to Environmental Engineering, Water and Wastewater Treatment, Thermodynamics, Environmental Engineering Design Capstone Course, Introduction to Civil Engineering, Water Quality Lab.

Graduate: Biological Wastewater Treatment, Pilot Plant Laboratory, Aquatic Chemistry, Hazardous/Industrial Waste Management, Drinking Water Treatment.