

QILIN LI

Environmental Engineering Program
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Education

Ph.D. in Environmental Engineering October, 2002

University of Illinois at Urbana-Champaign, Urbana, Illinois
Dissertation: Competitive Adsorption of Trace Organic Compounds by PAC in Membrane Filtration Systems

MS in Environmental Engineering August, 1999

University of Illinois at Urbana-Champaign, Urbana, Illinois
Thesis: Displacement Effect of the Strongly Competing Fraction of NOM on Atrazine Adsorption by Activated Carbon

BE in Environmental Engineering July, 1995

Tsinghua University, Beijing, P. R. China
Thesis: Modeling Long-distance Transport of Gaseous Acidic Pollutants (a sub-project of China's National Eighth Five-year Plan)

Professional Experience

Jan. 06 - present Assistant Professor, Rice University
Apr. 09 – Jul. 09 NRC Summer Faculty Fellow, USEPA National Exposure Research Laboratory
Jan. 04 – Dec. 05 Assistant Professor, Oregon State University
Sept. 02 – Dec. 03 Post-doctoral Research Associate, Yale University
Aug. 97 – Aug. 02 Graduate research assistant, University of Illinois at Urbana-Champaign
Sept. 95 – Feb. 97 Graduate research assistant, Tsinghua University

Research Interests

Physical chemical processes in natural and engineered aqueous systems

- *Water Quality Control*: Development and application of advanced technologies (adsorption, membrane filtration, advanced oxidation) for drinking water purification and wastewater reuse.
- *Fate and Transport of Environmental Colloids and Macromolecules*: Understanding the interactions between environmental macromolecules and natural and manufactured colloidal materials in the aqueous environment; Modeling the transport of colloidal materials in natural and engineered aqueous systems.
- *Environmental Application and Implication of Nanomaterials*: Development and application of nanotechnology enabled water treatment processes; Understanding the fate, transport and ecotoxicity of engineered nanomaterials.

Honors and Awards

Roy E. Campbell Faculty Development Award, Excellence in Review Award (Environmental Science and Technology), Water Quality and Technology Conference Best Student Paper Award (with graduate student Alison Harris), Association of Environmental Engineering and Science Professors/Parsons Engineering Science Best Doctoral Thesis Award.

Professional Membership

June 07 – present Association of Chinese American Professors in Environmental Engineering and Science
June 06 – present Chinese Association of Professionals in Science and Technology
Feb. 05 – present American Society of Civil Engineers
Jan. 05 – present American Chemical Society
Jan. 04 – present Association of Environmental Engineering and Science Professors
Apr. 02 – present North American Membrane Society
Dec. 98 – present American Water Works Association

Peer Reviewed Journal Publications

1. Hwang, Y.S. and Li, Q. **Characterizing Photochemical Transformation of Aqueous nC₆₀ under Environmentally Relevant Conditions.** *Environmental Science and Technology*, 2010 (available online. DOI: 10.1021/es903713j)
2. Law, C.M.C., Li, X.Y. and Li, Q. **The Combined Colloid-Organic Fouling on Nanofiltration Membranes for Wastewater Treatment and Reuse.** *Separation Science and Technology* (in press)
3. Kim, A., Harris, A., Li, Q. and Rong, Y. **Fundamental Mechanisms of Three-Component Combined Fouling with Experimental Verification.** *Langmuir*, 2009, 25(14): 7815-7827.
4. Li, Q., Xie, B., Hwang, Y.S. and Xu, Y. **Kinetics of C₆₀ Fullerene Dispersion in Water Enhanced by Natural Organic Matter and Sunlight.** *Environmental Science and Technology*, 2009, 43(10): 3574-3579.
5. Zodrow, K., Brunet, L., Mahendra, S., Li, D., Zhang, A., Li, Q. and Alvarez, P.J.J. **Polysulfone Ultrafiltration Membrane Impregnated with Silver Nanoparticles Show Improved Biofouling Resistance and Virus Removal.** *Water Research*, 2009, 43(3): 715-723.
6. Harris, A., Kim, A. and Li, Q. **Effect of Water and Wastewater Organic Matter on the Combined Fouling Behavior of Nanofiltration Membranes.** *Journal of Membrane Science*, 2009, 327(1-2): 87-95.
7. Guo, X., Li, Q., Hu, W., and Liu, D. **Ultrafiltration of Dissolved Organic Matter in Natural Water.** *Journal of Membrane Science*, 2009, 327(1-2): 254-263.
8. Li, Q., Mahendra, S., Lyon, D. Y., Brunet, L., Liga, M. L., Li, D. and Alvarez, P. J. J. **Antimicrobial Nanomaterials for Water Disinfection and Microbial Control: Potential Applications and Implications.** *Water Research*, 2008, 42(18): 4591-4602.

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9. Li, D., Lyon, D., Li, Q. and Alvarez, P. **Effect of Natural Organic Matter on Antibacterial Activity of Fullerene Water Suspension.** *Environmental Toxicology and Chemistry*, 2008, 27(9): 1888-1894.
 10. Xie, B., Xu, Z., Guo, W. and Li, Q. **Impact of Natural Organic Matter on the Physicochemical Properties of Aqueous C₆₀ Nanoparticles.** *Environmental Science and Technology*, 2008, 42(8): 2853-2859.
 11. Huang, X., Leal, M., and Li, Q. **Degradation of natural organic matter by TiO₂ photocatalytic oxidation and its effect on fouling of low pressure membranes.** *Water Research*, 2008, 42: 1142-1150.
 12. Li, Q., Xu, Z. and Pinnau, I. **Fouling of Reverse Osmosis Membranes by Biopolymers in Wastewater Secondary Effluent: Role of Membrane Surface Properties and Initial Permeate Flux.** *Journal of Membrane Science*, 2007, 290 (1-2): 173-181.
 13. Li, Q. and Elimelech, M. **Synergistic effects in Combined Fouling of a Loose Nanofiltration Membrane by Colloidal Material and Natural Organic Matter.** *Journal of Membrane Science*, 2006, 278: 72-82.
 14. Ding, L., Mariñas, B.J., Schideman, L., Snoeyink, V.L. and Li, Q. **Competitive effects of natural organic matter: Parameterization and verification of the three-component adsorption model COMPSORB.** *Environmental Science and Technology*, 2006, 40(1): 350-356.
 15. Escobar, I. C. et al. **Committee Report: Recent Advances and Research Needs in Membrane Fouling.** *J. AWWA*, 2005, Vol. 97(8): 79-89.
 16. Li, Q. and Elimelech, M. **Natural Organic Matter Fouling and Chemical Cleaning of Nanofiltration Membranes.** *Water Science and Technology: Water Supply*, 2004, Vol. 4(5-6): 245-251.
 17. Li, Q., Mariñas, B. J., Snoeyink, V. L. and Campos, C. **Pore Blockage Effects on Atrazine Adsorption in a PAC/Membrane System. I: Model Development.** *Journal of Environmental Engineering, ASCE*, 2004, Vol. 130(11): 1242-1252.
 18. Li, Q., Mariñas, B. J., Snoeyink, V. L. and Campos, C. **Pore Blockage Effects on Atrazine Adsorption in a PAC/Membrane System. II: Model Verification and Application.** *Journal of Environmental Engineering, ASCE*, 2004, Vol. 130(11): 1253-1262.
 19. Li, Q. and Elimelech, M. **Organic Fouling and Chemical Cleaning of NOM-Fouled Nanofiltration Membranes: Measurements and Mechanisms.** *Environmental Science and Technology*, 2004, Vol. 38(17): 4683-4693.
 20. Chen, J. C., Li, Q. and Elimelech, M. **In-situ Monitoring Techniques for Concentration Polarization and Fouling Phenomena in Membrane Filtration.** *Advances in Colloid and Interface Science*, 2004, Vol. 107(2-3): 83-108.
 21. Li, Q., Snoeyink, V. L., Mariñas, B. J., and Campos, C. **Pore Blockage Effect of NOM on Atrazine Adsorption Kinetics of PAC: the Roles of NOM Molecular Weight and PAC Pore Size Distribution.** *Water Research*, 2003, Vol. 37(20): 4863-4872.
 22. Li, Q., Mariñas, B. J., Snoeyink, V. L. and Campos, C. **Three-Component Competitive Adsorption Model for Flow-Through PAC Systems. Part I: Model Development and**

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- Verification with a PAC/Membrane System.** *Environmental Science and Technology*, 2003, Vol. 37(13): 2997-3004.
23. Li, Q., Mariñas, B. J., Snoeyink, V. L. and Campos, C. **Three-Component Competitive Adsorption Model for Flow-Through PAC Systems. Part II: Model Application to a PAC/Membrane System.** *Environmental Science and Technology*, 2003, Vol. 37(13): 3005-3011.
24. Li, Q., Snoeyink, V. L., Mariñas, B. J. and Campos, C. **Elucidating Competitive Adsorption Mechanisms of Atrazine and NOM Using Model Compounds.** *Water Research*. 2003, Vol. 37(4): 773-784.
25. Li, Q., Snoeyink, V. L. Campos, C. and Mariñas, B. J. **Displacement Effect of NOM on Atrazine Adsorption by PACs with Different Pore Size Distributions.** *Environmental Science and Technology*. 2002, Vol. 36 (8): 1510-1515.
26. Hao, J., Zhou, X., Fu, L., and Li, Q. **Sulfuric Deposition Modeling Research in the East Part of China: Model Application,** *China Environmental Science*ⁱ, 1996, Vol. 16 (5): 345-349.
27. Zhou, X., Hao, J. Fu, L., and Li, Q. **Sulfuric Deposition Modeling Research in the East Part of China: Model Development and Performance Analysis.** *China Environmental Science*ⁱ, 1996, Vol. 16 (4): 241-245.

Book Chapter

1. Mahendra, S., Li, Q., Lyon, D. Y., Brunet, L. and Alvarez, P. J. J. **Nanotechnology Enabled Water Disinfection and Microbial Control: Merits and Limitations.** In *Nanotechnology Applications for Clean Water*, Diallo et al., Ed., William Andrew Publishing: 2008.
2. Snoeyink, V. L., Campos, C., Li, Q., Schideman, L. and Marinãs, B. J. **Application of Powdered Activated Carbon in the Flocc Blanket Reactor/Ultrafiltration Process.** In *Water Research and Water Supply in the 21st Century*, Watanabe, Y. and Funamizu, N., Ed., Hokkaido University Press, Sapporo, Japan, 2003: 157-165.

Other Publications

1. Li, Q., Tomson, M., Wong, M. and Alvarez, P.J.J. Nanotechnology: A Source of Answers to Global Clean Water Challenge. *Water* 21, August 2008.
2. Huang, X. and Li, Q. Leaching of Metals from Aquifer Soils during Infiltration of Low Ionic Strength Reclaimed Water: Determination of Kinetics and Potential Mitigation Strategies. WRF 06-005, WateReuse Foundation. ISBN: 978-1-934183-25-0

Technical Reports

1. Li, Q. and Kegley, L. Assessing the Effectiveness and Environmental Impacts of Using Natural Flocculants to Manage Turbidity. State Planning and Research Project Number 615, Oregon Department of Transportation Research Group.

ⁱ Top environmental journal in China; Included in more than 10 international journal database including EI, CA, and ASFA.

Conference Presentations

1. Contreras, A.E., Kim, A. and Li, Q. Investigating Combined Fouling of Colloid and Organic Macromolecules on Nanofiltration and Reverse Osmosis Membranes. IWA Membrane Technology Conference. Beijing, China, September 1-4, 2009.
2. Wang, S., Liu, X. and Li, Q. Effect of Polymer Flocculants on Microfiltration Membrane Flux. IWA Membrane Technology Conference. Beijing, China, September 1-4, 2009.
3. Ma, J., Lu, H., Lou, J. and Li, Q. Effect of Surface Topography on Colloidal and Bacterial Adhesion. The 13th International Conference on Surface and Colloid Science [ICSCS] and the 83rd ACS Colloid and Surface Science Symposium. New York City, New York, June 15-19, 2009.
4. Wang, S., Liu, X. and Li, Q. Effect of Polymer Flocculants on Microfiltration Performance. The 13th International Conference on Surface and Colloid Science [ICSCS] and the 83rd ACS Colloid and Surface Science Symposium. New York City, New York, June 15-19, 2009.
5. Liga, M.V., Bryant, E., Colvin, V., and Li, Q. Virus Inactivation in Drinking Water by TiO₂ Based Nanocomposite Photocatalysts. The 13th International Conference on Surface and Colloid Science [ICSCS] and the 83rd ACS Colloid and Surface Science Symposium. New York City, New York, June 15-19, 2009.
6. Contreras, A.E., Steiner, Z., Miao, J., Kasher, R. and Li, Q. Probing the Effect of Surface Chemistry on Adsorption and Cleaning of Organic Foulants Using SAM Coating and QCMD. The 13th International Conference on Surface and Colloid Science [ICSCS] and the 83rd ACS Colloid and Surface Science Symposium. New York City, New York, June 15-19, 2009.
7. Contreras, A.E. and Li, Q. Combined Fouling Layers Formed during Nanofiltration and Reverse Osmosis of Colloidal and Organic Solutions. The 13th International Conference on Surface and Colloid Science [ICSCS] and the 83rd ACS Colloid and Surface Science Symposium. New York City, New York, June 15-19, 2009.
8. Hwang, Y.S., Hockaday, W.C., Masiello, C.A., Li, Q. Photochemical Transformation of nC₆₀ Clusters in the Environment. The 13th International Conference on Surface and Colloid Science [ICSCS] and the 83rd ACS Colloid and Surface Science Symposium. New York City, New York, June 15-19, 2009.
9. Contreras, A., Kim, A. and Li, Q. Mechanisms of Coupled Organic and Colloidal Fouling of a Low-salt Rejecting Nanofiltration Membrane. AWWA Membrane Technology Conference. Memphis, Tennessee, March 15-18, 2009.
10. Kim, A., Contreras, A., Li, Q. and Yuan, R. Modeling of Three-Component Combined Fouling of Nanofiltration Membranes. AWWA Membrane Technology Conference. Memphis, Tennessee, March 15-18, 2009.
11. Wang, S., Liu, X. and Li, Q. The Role of Polymer Coagulants/Flocculants in Microfiltration of Surface Water. AWWA Membrane Technology Conference. Memphis, Tennessee, March 15-18, 2009.

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12. Wang, S., Liu, X. and Li, Q. Effect of Polymer Flocculants on Microfiltration Membrane Flux Performance. The 2008 AWWA Water Quality and Technology Conference. Cincinnati, Ohio, November 16-20, 2008.
 13. Liga, M., Bryant, E., Li, D., Colvin, V., Alvarez, P.J.J. and Li, Q. Virus Inactivation by Silver Doped Titanium Dioxide. *The 2008 AWWA Water Quality and Technology Conference*. Cincinnati, Ohio, November 16-20, 2008.
 14. Li, Q., Xie, B. and Xu, Y. Natural Organic Matter Enhanced C₆₀ Fullerene Dispersion in the Aqueous Phase. *The 2008 International Environmental Nanotechnology Conference*. Chicago, Illinois, October 7-9, 2008.
 15. Harris, A.E., Kim, A. and Li, Q. A Mechanistic Study on the Coupled Organic and Colloidal Fouling of Nanofiltration Membranes. *The 2008 International Congress on Membranes and Membrane Processes*. Honolulu, Hawaii, July 12-18, 2008.
 16. Harris, A.E., Li, Q. and Kim, A. Statistical Modeling of Combined Fouling of Nanofiltration Membranes by a Binary Mixture of BSA Macromolecules and Silica Particles. *The 2008 International Congress on Membranes and Membrane Processes*. Honolulu, Hawaii, July 12-18, 2008.
 17. Xie, B. and Li, Q. Natural Organic Matter Enhanced Dispersion of C₆₀ in the Aqueous Phase. *The 235th ACS National Meeting and Exposition*. New Orleans, Louisiana, April 6-10, 2008.
 18. Xie, B., Xu, Z., Guo, W. and Li, Q. Effect of Natural Organic Matter (NOM) on Properties and Mobility of Aqueous Fullerene Nanoparticles (nC₆₀). *2007 AGU Fall Meeting*. San Francisco, California, December 10-14, 2007.
 19. Fang, Y.L, Heck, K.N., Huang, X., Li, Q., Alvarez, P.J.J. and Wong, M.S. Immobilization And Testing Of Pd-On-Au Nanoparticles For Catalyzed Trichloroethene Hydrodechlorination In Water. *AICHE 2007 Annual Meeting*. Salt Lake City, Utah, November, 4-9, 2007.
 20. Harris, A.E., Hale, J. S., Houchens, B. C. and Li, Q. The Fouling Mechanisms of Complex Fluid Filtration: Modeling the Combined Fouling Effect of Colloidal Materials and Dissolved Macromolecules. *AICHE 2007 Annual Meeting*. Salt Lake City, Utah, November, 4-9, 2007.
 21. Harris, A.E., Marbury, C. and Li, Q. Aggravated Fouling of NF and RO Membranes in the Presence of Dissolved Organic Matter and Inorganic Colloids. *AWWA Water Quality and Technology Conference*. Charlotte, North Carolina, November 4-8, 2007.
 22. Harris, A.E., Hale, J. S., Houchens, B. C. and Li, Q. Nanofiltration of complex fluids containing colloid materials and dissolved macromolecules: the combined fouling effect. *The 81st ACS Colloid and Surface Science Symposium*. Newark, Delaware, June 24-27, 2007.
 23. Xie, B., Xu, Z., Guo, W. and Li, Q. NOM Induced Dispersion and Disaggregation of n-C60 Aggregates in Water. *The 81st ACS Colloid and Surface Science Symposium*. Newark, Delaware, June 24-27, 2007.
 24. Hale, J., Harris, A., Li, Q. and Houchens, B. Mathematical Modeling Techniques for Concentration Polarization and Cake Layer Formation in NF and RO Systems. 2007 North American Membrane Society Annual Meeting, Orlando, Florida, May 12-16, 2007.

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25. Li, Q., Xie, B. and Xu, Z. Dispersion and Disaggregation of Fullerene Aggregates in Aqueous Phase Induced by Natural Organic Matter. *The 233rd ACS National Meeting and Exposition*. Chicago, Illinois, March 25-29, 2007.
 26. Li, Q. and Huang, X. A Hybrid Photocatalysis-Membrane Filtration Process for NOM Removal and Membrane Fouling Control. *2007 AWWA Membrane Technology Conference*. Tampa, Florida, March 18-21, 2007.
 27. Li, Q. and Xu, Z. Impact of Environmental Macromolecules and Contaminants on Physical Chemical Properties of Engineered Nanomaterials. (poster) *The 232nd ACS National Meeting and Exposition*. San Francisco, California. September 10-14, 2006.
 28. Li, Q., and Huang, X. Effect of TiO₂ Photocatalytic Oxidation on NOM Fouling of MF and UF Membranes. *The 232nd ACS National Meeting and Exposition*. San Francisco, California. September 10-14, 2006.
 29. Huang, X., Li, Q. and Tang, Y. Preparation and Characterization of TiO₂ Photocatalysts with Visible Light Activity for Water and Wastewater Contaminant Removal. *The 2nd International Conference of Environmental Science and Technology*. Houston, TX, August 19-22, 2006.
 30. Li, Q. and Xu, Z. Role of Environmental Macromolecules and Contaminants on Physical Chemical Properties of Engineered Nanomaterials. *The 80th ACS Colloid and Surface Science Symposium*. Denver, Colorado, June 18-22, 2006.
 31. Li, Q. and Xu, Z. RO Membrane Fouling by Biopolymers in Wastewater. *Pacificchem Congress*. Honolulu, HA, December 14-20, 2005.
 32. Li, Q. Chemical Cleaning of NF Membranes Fouled by Natural Organic Matter, Effect of Solution Chemistry. *AWWA Water Quality Technology Conference*. Québec City, Québec, Canada, November 6-10, 2005.
 33. Li, Q. and Xu, Z. Effect of Membrane Properties on Fouling of RO Membranes by Biopolymers. *AWWA Water Quality Technology Conference*. Québec City, Québec, Canada, November 6-10, 2005.
 34. Xu, Z., Irvine, C. and Li, Q. Combined Fouling and Chemical Cleaning of Nanofiltration Membranes. *The PNW Section AWWA Annual Conference*. Portland, Oregon, May 4-6, 2005.
 35. Kegley, L., Irvine, C. and Li, Q. Assessing the Effectiveness and Environmental Impacts of Using Natural Flocculants to Manage Turbidity. *The PNW Section AWWA Annual Conference*. Portland, Oregon, May 4-6, 2005.
 36. Elimelech, M., and Li, Q. Natural Organic Matter (NOM) Fouling and Chemical Cleaning of Nanofiltration Membranes. *The International Water Association 4th World Water Congress*. Marrakech, Morocco, September 19-24.
 37. Li, Q. and Elimelech, M. Combined Colloidal and Organic Fouling and Chemical Cleaning of Nanofiltration Membranes. *The 15th North America Membrane Society Annual Meeting*. Honolulu, Hawaii, June 26-30, 2004.
 38. Li, Q. and Elimelech, M. Combined Fouling of Nanofiltration Membranes by Colloidal Material and Natural Organic Matter and Chemical Cleaning of the Fouled Membranes. *The 78th ACS Colloid and Surface Science Symposium*. New Haven, Connecticut, June 20-23, 2004.

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39. Li, Q. and Elimelech, M. Revealing the Mechanisms of Organic Fouling and Chemical Cleaning of Nanofiltration Membranes. *The 226th ACS National Meeting*. New York City, New York, September 7-11, 2003.
 40. Li, Q., and Elimelech, M. Chemical Cleaning of Fouled Nanofiltration and Reverse Osmosis Membranes: Measurements and Mechanisms. *The 77th ACS Colloid and Surface Science Symposium*. Atlanta, Georgia, June 15-18, 2003.
 41. Ding, L., Snoeyink, V. L. Marinās, B. J., and Li, Q. The Competitive Effect of NOM: Application of a Three-Component Model to Atrazine Adsorption in PAC-Membrane Processes. *AWWA Annual Conference*. Anaheim, California, June 15-19, 2003.
 42. Li, Q., and Elimelech, M. Chemical Cleaning of Organic-fouled Nanofiltration Membranes: Measurements and Mechanisms. *The 14th North America Membrane Society Annual Meeting*. Jackson Hole, Wyoming, May 17-21, 2003.
 43. Li, Q., Marinās, B. J., Snoeyink, V. L., and Campos, C. Modeling Trace Organic Compound Removal in Hybrid PAC/Membrane Systems. *AWWA Membrane Technology Conference*. Atlanta, Georgia, March 2-5, 2003.
 44. Li, Q., Snoeyink, V. L., Marinās, B. J. and Campos, C. Prediction of Trace Organic Compound Removal by PAC in Floc Blanket Reactors. *AWWA Water Quality Technology Conference*. Seattle, Washington, November 10-14, 2002.
 45. Li, Q., Snoeyink, V. L., Marinās, B. J. and Campos, C. Role of NOM Molecular Weight in PAC Adsorption Equilibrium and Kinetics of Atrazine: A Simulation Study Using Model Compounds. *AWWA Water Quality Technology Conference*. Nashville, Tennessee, November 11-15, 2001.
 46. Snoeyink, V. L., Campos, C., Li, Q., Schideman, L. and Mariñas, B. J. Application of Powdered Activated Carbon in the Floc Blanket Reactor/Ultrafiltration Process. *Tambo Memorial Symposium*. Sapporo, Japan, October 4-5, 2001.
 47. Schideman, L., Snoeyink, V. L, Mariñas, B. J. and Li, Q. Modeling and Verification of Hybrid Membrane-Adsorption Processes for Taste and Odor Control in Drinking Water. *AWWA Annual Conference*. Washington, D.C., June 17-21, 2001.
 48. Snoeyink, V. L., Li, Q. Schideman, L. and Mariñas, B. J. Using GAC to Remove SOCs. Workshop of Innovation, Practice, and Trends in the Use of Granular Activated Carbon (GAC) for Drinking Water Application. *AWWA Water Quality Technology Conference*. Salt Lake City, Utah. November 5-9, 2000.
 49. Li, Q., Snoeyink, V. L. and Campos, C. The Effect of Strongly Adsorbing NOM on PAC Adsorption Capacity for Atrazine in a Continuous Flow System. *AWWA Annual Conference*. Chicago, Illinois. June 20-24, 1999.