



Water Quality & Treatment Solutions, Inc.
An Environmental Engineering & Science Consulting Company

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EDUCATION:

Ph.D., Environmental Engineering, Univ. of Illinois at Urbana-Champaign 1990
M.S., Environmental Engineering, Univ. of Illinois at Urbana-Champaign 1987
B.S., Civil Engineering, American Univ. of Beirut, Lebanon 1985

REGISTRATION:

Professional Civil Engineer, California (1997). Registration Number C 57496



TEACHING EXPERIENCE:

2007 – Present Adjunct Associate Professor
Civil & Environmental Engineering Department
University of California at Los Angeles
Physical & Chemical Processes in Water Treatment

1998 – 2005 Instructor
Civil & Environmental Engineering Department
University of California at Los Angeles
Physical & Chemical Processes in Water Treatment
Design of Water Treatment Plants

PROFESSIONAL EXPERIENCE:

Water Quality & Treatment Solutions, Inc.

Los Angeles, California

2000 – present: Founder and President

Montgomery Watson

Pasadena, California

1997 – 2000: Vice President and Manager, Applied Research Department

1994 – 1997: Principal Engineer; Applied Research Department

1992 – 1994: Supervising Engineer; Applied Research Department

1990 – 1992: Senior Engineer, Applied Research Department

SUMMARY:

Issam Najm is the founder and president of Water Quality & Treatment Solutions, Inc. (WQTS), a specialty environmental engineering and science consulting company whose mission is to provide water utilities with innovative and cost-effective solutions to water quality and water treatment challenges. Dr. Najm is intimately involved in a number of WQTS projects including the evaluation of water treatment plant performance, pilot-scale and bench-scale testing of water treatment technologies, regulatory and permitting

support for existing and new treatment plants, development of water quality monitoring plans, and providing training classes to treatment plant operations staff.

Dr. Najm is a registered Professional Civil Engineer in the State of California and is a Board-Certified Environmental Engineer with the American Academy of Environmental Engineers and Scientists. Dr. Najm is an adjunct Associate Professor of environmental engineering at the University of California Los Angeles (UCLA). His primary teaching focus is on the principles and application of water treatment technologies with emphasis on physical and chemical processes.

RECOGNITIONS & AWARDS:

- ❑ A.P. Black Research Award – American Water Works Association – 2021
- ❑ George Warren Fuller Award – American Water Works Association – 2017
- ❑ Best Paper Award – AWWA Water Quality Division – 2014
- ❑ Dr. Pankaj Parekh Research Innovation Award – Water Research Foundation – 2014
- ❑ Best Research Paper Award – AWWA Water Science & Research Division – 2007
- ❑ Best Publication Award – AWWA – 2007
- ❑ Board-Certified Environmental Engineer, American Academy of Environmental Engineers
- ❑ Young Civil Engineer Achievement Award, University of Illinois at Urbana-Champaign, Civil & Environmental Engineering Alumni Association, 1999
- ❑ Academic Achievement Award for best doctoral dissertation, American Water Works Association, 1990

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS:

- ❑ American Water Works Association (AWWA)
- ❑ American Academy of Environmental Engineers & Scientists (AAEES)

COMMITTEE MEMBERSHIP:

- ❑ Associate Editor, AWWA Water Science, AWS, American Water Works Association, 2018 – Present
- ❑ American Academy of Environmental Engineers & Scientists, AAEES; Member of the Board of Trustees; 2015 – 2017
- ❑ AWWA CA-NV Section; SOURCE Editorial Advisory Committee, Chair; 2014 – 2017
- ❑ Disinfection By-Products Technical Action Workgroup, AWWA: 2012 – Present
- ❑ AWWA; Water Research & Science Division Trustee, 2007 – 2013
- ❑ Journal AWWA Editorial Advisory Board, Chair; 2009 – 2013
- ❑ Journal AWWA Editorial Advisory Board, Member – 2001 to 2009
- ❑ Peer Review Editorial Board, Journal AWWA, Chair; 2006 to 2009
- ❑ AWWA; Inorganic Contaminants Committee: Chair; 2002 – 2006
- ❑ AWWA; Organic Contaminants Research Committee, Chair; 1998 – 2001

EXAMPLE PROJECTS:

Dr. Najm has been involved in dozens of water quality and treatment projects across the United States. A short list of representative projects he led at WQTS is included below. References for these projects are available upon request.

Tracking the Fate of Manganese through a Water Treatment Plant Helix Water District, California

The Helix Water District treats water from multiple sources at surface water treatment plant, which includes intermediate ozonation and biological filtration. One of the sources can be occasionally high in manganese levels. However, some manganese spikes result in residual manganese in the filtered water, while other spikes are completely removed through the plant. Working with District staff, WQTS developed and implemented a manganese monitoring program that utilized size fractionation to understand the fate of

manganese through the treatment plant. The results showed that the size of the manganese particles is a key determinant of whether manganese will pass through into the treated water.

Emergency Response to a Discolored Water Challenge City of South Pasadena, California

The City of South Pasadena uses chlorinated groundwater as its drinking water source. After the enactment of a new California MCL for 1,2,3-TCP which was present in the City's wells, the City had to shut down all its groundwater supply and rely on chloraminated imported surface water while it constructed a GAC system to remove 1,2,3-TCP from its groundwater. Shortly after, the City began to receive reports from customers about discolored water from galvanized plumbing. Because there was no time to investigate the cause of the challenge, since the primary change in the chemistry of the water that could be impacted was the change from free chlorine to chloramine, WQTS worked with the City to quickly design and construct a breakpoint chlorination system at the imported water connection, and made changes in the water transmission system to provide sufficient contact time for the breakpoint reaction to reach completion before the water enters the distribution system. This system, which resolved the discolored water challenge, remained in place until the City returned to its chlorinated groundwater.

RSSCT Testing of GAC for PFAS Removal Eastern Municipal Water District

After detecting PFAS in one of its well, Eastern Municipal Water District retained the service of WQTS, under a contract with Kennedy Jenks Consultants, to evaluate the applicability of GAC for PFAS removal. WQTS conducted Rapid Small-Scale Column Tests (RSSCT) using two GAC products and two scaling approaches, and the results were reported to the District for full-scale implementation.

Rapid Testing of PFAS Treatment Technologies Santa Clarita Valley Water Agency, California

Santa Clarita Valley Water Agency has a number of groundwater wells that contain PFAS chemicals. Specifically, the wells contain PFOA and PFOS at levels higher than their California Response Levels (RL). The Agency retained the services of WQTS to design and conduct bench-scale testing experiments to decide whether Granular Activated Carbon (GAC) or ion-exchange (IX) resins are more suited for PFAS removal from the Agency's water. WQTS conducted combinations of Rapid Small-Scale Column Tests (RSSCT) and batch isotherm tests to quantify the capacities of different GAC products and IX resins for each PFAS present in the water. The Agency is currently designing IX treatment systems for PFAS removal at two of its wells.

Distribution System Conversion from Free Chlorine to Chloramine Crescenta Valley Water District, La Crescenta, California

The Crescenta Valley Water District blended chlorinated local groundwater with imported treated water containing chloramine from the Metropolitan Water District of Southern California. To avoid blending chlorine and chloramine, the District practiced breakpoint chlorination to convert the imported water to chlorine before it enters the system. With declining groundwater supplies, the higher THM levels in the surface water have raised the concern that the THM MCL may be exceeded. In response, WQTS worked with the District to prepare and implement conversion of the system from free chlorine to chloramine, and worked with the District and the design firm to properly design and operate the chlorine and ammonia feed systems at the various groundwater entry points into the system.

Evaluation of Cyanotoxins Treatment Potential at the District's Surface Water Treatment Plant Goleta Water District & City of Santa Barbara

After detecting cyanotoxins in Lake Cachuma, which serves as the drinking water supply to the Goleta Water District and the City of Santa Barbara, the two agencies retained the services of WQTS to conduct bench-scale testing of the treatment technologies at each agency's plant and determine their ability to remove cyanotoxins. Testing evaluated the removal of microcystins -LR, -LA, and -RR, as well as anatoxin-a with ozone, chlorine, and powdered activated carbon.

***Evaluation of DBP Control Alternatives post Watershed Wildfire
Montecito Water District, California***

The Thomas fire of 2017 caused a dramatic rise in the organic content of Jameson Lake, which serves as the drinking water supply to the Montecito Water District's WTP. The plant utilizes a direct filtration process with minimal organic removal capability and achieves primary and secondary disinfection with free chlorine. The District retained the services of WQTS to help identify and implement measures that can reduce the formation of DBPs and maintain compliance with the drinking water standards for them. WQTS worked with the District to design and install a spray aeration system to help remove THMs from the plant's large clearwell which serves as the main storage tank in the system.

***Pilot-Scale Evaluation of Chlorite Addition for Nitrification Control
Los Angeles Department of Water & Power, Los Angeles, California***

The Los Angeles Department of Water & Power (LADWP) retained the services of WQTS to conduct a pilot-scale study aimed at evaluating the feasibility of adding a low dose of chlorite, either continuously or intermittently, to treated water from its surface water treatment plant in order to minimize the occurrence of nitrification in the distribution system. The study was conducted at the WQTS facility in Los Angeles and determined that chlorite addition can significantly delay the onset of nitrification, thus giving the system operators longer time to respond and implement mitigation measures.

***Discolored Water Mitigation Study
City of Fresno, California***

The City of Fresno retained the services of WQTS to conduct a desktop study and a 9-month pilot study to select a recommended chemical treatment approach for a new surface water treatment plant to blend a new surface water with the existing groundwater in the City's distribution system. The pilot plant utilized galvanized iron pipes removed from existing homes and quantified the extent of iron release from them when served to groundwater alone, surface water alone, or alternating surface water and groundwater, each treated under different conditions.

***Surface Water Integration Study
City of Ceres, California***

The City Ceres has always used groundwater as its only drinking water source. The City is embarking on a project to treat Tuolumne River water and use it to supplement the groundwater supply. The City retained the services of WQTS to help address the City's concern over the potential impact of blending this new water source into the distribution system on metals release from the system piping and home plumbing. WQTS evaluated historical data and conducted chemical modeling. The study report recommended that the City maintain a specific target chemical quality in the treated water from the plant and implement specific measures in the system to prepare it for the new water source.

***Treatment Alternatives for the Control of Disinfection By-Product Formation
El Dorado Irrigation District, Placerville, California***

WQTS was retained by the El Dorado Irrigation District to conduct an evaluation of the factors leading to the formation of elevated levels of Disinfection By-Products (DBP)s in its distribution system and identify approaches to reduce the DBP levels.

***Technical and Permitting Support for the City of Santa Barbara's Seawater Desalination Plant
IDE Americas, Inc., Carlsbad, California***

IDE Americas, Inc. retained the services of WQTS to provide technical and permitting support under its contract with the City of Santa Barbara to rehabilitate and operate the City's seawater desalination plant. Dr. Najm has prepared technical memoranda on various technical aspects of the project, participated in meetings with the State Water Resources Control Board's Division of Drinking Water (DDW) staff, and provided general technical support for the plant's startup effort.

***Design Review for the Patterson Pass WTP and Del Valley WTP Modifications
Zone 7 Water Agency, Livermore, California***

The Zone 7 Water Agency owns and operates two water treatment plants: the 24-MGD Patterson Pass WTP and the 40-MGD Del Valle WTP. The Agency embarked on two capital improvements project to install

new media filters and a 5-MG clearwell at the Patterson Pass WTP and add ozonation at the Del Valle WTP. Zone 7 retained the services of WQTS as a technical resource to help in the preparation of the design RFP documents, review of design proposals, and review of the design submittals through the issuance of construction bid documents.

***Evaluation and Implementation of Treatment Technologies for Mining-Influenced Water
Park City Municipal Corporation, Park City, Utah***

Park City draws its drinking water from water flows out of the portals for two closed mines in the local mountains. While the City utilizes only a portion of the water, it is responsible for the entire water flow. Due to elevated levels of various metals in the water and the tightening of discharge limits into the local creeks, the City is required to lower the metals from all the water flow to the new discharge limits. As the City embarked on a long-range program to identify, design, build, and operate treatment facilities for this mining-influenced water, the City retained the services of WQTS to provide technical support in the evaluation of treatment alternatives, and the bench-scale and pilot-scale testing of treatment technologies.

***Evaluation of Cyanotoxins Removal/Destruction with Water Treatment Technologies
Zone 7 Water Agency, Livermore, California
Alameda County Water District, Fremont, California
Santa Clara Valley Water District, Santa Clara, California***

The Zone 7 Water Agency, Alameda County Water District, and the Santa Clara Valley Water District treat water drawn from the Sacramento-San Joaquin Delta via the South Bay Aqueduct (SBA). The three agencies pooled resources and retained the services of WQTS to conduct bench-scale testing to evaluate the ability of each agency's treatment plant to remove and/or destroy cyanotoxins that could be generated by a future cyano-bacterial bloom in the Delta or the SBA. WQTS received raw SBA water, spiked it with four cyanotoxins, and evaluated their potential destruction with ozone and chlorine, as well as their removal with the addition of Powdered Activated Carbon (PAC).

***Evaluation of T&O Removal at the City's Water Treatment Plant
City of Yuba City, California***

The City of Yuba City operates a 36 MGD surface water treatment plant that treats water from the Feather River. During recent years, seasonal algal activity in the water supply resulted in the presence of low levels of 2-methylisoborneol, MIB, which imparts objectionable taste-and-odor (T&O) into the City's drinking water. The City retained the services of WQTS to conduct a desktop study to identify and evaluate viable options for MIB removal from the City's water. After the completion of the study, WQTS conducted bench-scale testing to evaluate the potential removal of MIB from the City's water supply using Powdered Activated Carbon, PAC.

***Evaluation of Waste Minimization Alternatives for Cr(VI) Treatment Systems
Water Research Foundation, Denver, Colorado***

WQTS completed a research project jointly funded by the Water Research Foundation (WRF) and the California Water Service Company (CalWater) aimed at evaluating alternatives to reduce the waste production from three treatment technologies used for the removal of hexavalent chromium, Cr(VI), from water. Extensive bench-scale testing was conducted to evaluate the recovery and reuse of the brine solution from ion-exchange processes used for Cr(VI) removal that would otherwise have to be hauled off site for disposal.

***Evaluation of the Impact of Water Quality on the Technical Feasibility and Cost of Cr(VI) Treatment
Water Research Foundation, Denver, Colorado***

WQTS completed a research project jointly funded by the Water Research Foundation (WRF) and 11 water agencies from California, Nevada, and Oklahoma. The project focused on evaluating the impact of different groundwater qualities on the removal of hexavalent chromium, Cr(VI), from water using three treatment technologies: 1). regenerable strong-base anion-exchange, 2). disposable weak-base anion-exchange, and 3). reduction, coagulation, and filtration.

Development of an Online EXCEL-Based Cost Model for Cr(VI) Removal from Groundwater **Water Research Foundation, Denver, Colorado**

WQTS developed an EXCEL-based model that estimates the capital and annual O&M costs of three different technologies for the removal of Cr(VI) from groundwater. The model, which can be found at www.CrVITreatmentCosts.com, allows the user to enter specific water quality data, and then uses them to develop capital and annual O&M costs for Cr(VI) removal with coagulation-filtration, strong-base ion-exchange, or weak-base ion exchange processes.

Evaluation of Alternative Strontium Treatment Technologies **Water Research Foundation, Denver, Colorado**

The Water Research Foundation (WRF) selected WQTS to conduct a desktop evaluation of alternative treatment technologies for the removal of Strontium from groundwater. WQTS conducted a thorough literature review of available technical information on strontium chemistry and removal mechanisms, which were then presented and analyzed in a technical report. The report also included a list of research needs for consideration by the Foundation.

Development and Implementation of a Sulfide & Manganese Groundwater Treatment Strategy **City of Santa Barbara, California**

The City of Santa Barbara, California, has a number of groundwater wells that produce water with elevated levels of manganese and sulfide. The City had a greensand filtration system that it built to treat this groundwater, but it was not capable of removing sulfide, and the City took it off-line for more than 20 years. While conventional sulfide removal technologies can treat the water, the location of the site in the middle of downtown Santa Barbara and its very limited footprint, made it impossible to implement these technologies. WQTS identified and pilot-tested a new and novel approach to removing sulfide from water using granular iron-oxide media that can be implemented at the same site. Since then, the City modified the plant and used the existing vessels to implement the new treatment technology, which began operation in 2013. The plant is successfully removing sulfide and manganese from the groundwater.

Pilot-Scale Testing of Biological Treatment for Nitrate Removal from Groundwater **City of Glendale, California**

Part of the City of Glendale's groundwater contains elevated nitrate levels due to past agricultural activities. The City retained the services of WQTS to conduct pilot-scale testing of biological treatment for the removal of nitrate from the groundwater without the generation of an objectionable waste stream as that generated by ion-exchange systems. Biological nitrate removal utilizes the natural bacteria present in the groundwater in an engineered system to degrade nitrate. WQTS successfully completed the pilot testing effort and demonstrated its suitability for drinking water treatment to the State's Division of Drinking Water. After the completion of the study, the City and WQTS received conditional approval of the treatment system from DDW.

PEER REVIEWED JOURNAL ARTICLES:

1. Najm, I.N.; B.T. Gallagher; N. Vishwanath; N.K. Blute; A. Gorzalski; A. Feffer; & S. Richardson. "PFAS Removal with GAC and a Specialty Adsorbent – A Case Study". Accepted for Publication in *Journal AWWA Water Science* (2021).
2. Seidel, C.J.; I.N. Najm; N.K. Blute; C.J. Corwin; & X. Wu. "National and California Treatment Costs to Comply with Potential Hexavalent Chromium MCLs", *Journal AWWA*, **105**:6 (2013).
3. Najm, I.N. "An Alternative Interpretation of Disinfection Kinetics". *Journal AWWA*, **98**:11 (2006).
4. Najm, I.N.; M. Kennedy; & W. Naylor. "Lignite vs Bituminous GAC for Biofiltration – A Case Study". *Journal AWWA*, **97**:1 (2005).
5. Rosen, J.S.; I. Najm; J. Sobrinho; & S. Via. "Role of Variability in Design, Implementation, and Interpretation of Microbial Inactivation Studies," *Water Science & Technology: Water Supply*, **4**(2):93-101 (2004).
6. Najm, I.N.; K. Rakness; M. Hotaling; S. Via; & D. Rexing. "A Proposed C×T Table for the Synergistic Inactivation of *Cryptosporidium* with Ozone and Chloramine," *Journal AWWA* **96**(6) 105-113 (2004).

7. Nerenberg, R., B.E. Rittmann, and I.N. Najm. "Perchlorate Reduction in a Hydrogen-Based Membrane Biofilm Reactor". *Journal AWWA*, **94**(11):103-114 (2002).
8. Najm, I.N. "User-Friendly Carbonate Chemistry Charts". *Journal AWWA*, **93**(11):86-93 (2001).
9. Najm, I.N.; R.R. Trussell. "NDMA Formation in Water & Wastewater". *Journal AWWA*, **93**:2 (2001)
10. Najm, I.N.; J.P. Marcinko; & J.A. Oppenheimer. "Impact of Water Quality and Analytical Methodology on TOC Analytical Results." *Journal AWWA*, **92**(8) (2000).
11. Trussell, R.R.; & I.N. Najm. Application of Advanced Oxidation Processes for the Destruction of Disinfection By-Product Precursors. In *Formation and Control of Disinfection By-Products in Drinking Water*. Philip Singer, Editor. American Water Works Association. Denver, CO (1999).
12. Najm, I.N.; C.H. Tate; and D. Selby. "Optimizing Enhanced Coagulation With PAC Addition: Case Study". *Journal AWWA*, **90**:10 (1998).
13. Najm, I.N.; E.M. Aieta; J.A. Oppenheimer; and B.T. Gallagher. "Impact of Turbidity on the Inactivation of *Giardia* cysts With Ozone". *Water Supply*, Vol. 16; Nos 1/2, pp. 419-442 (1998).
14. Kawamura, S., I.N. Najm, K.M. Gramith, "Filter Trough Modifications to Minimize Media Loss During Filter Washing," *Journal AWWA*, **89**:12 (1997).
15. Najm, I.N., "Advances in the Mathematical Modeling of Powdered Activated Carbon Processes," *Journal AWWA* **88**:10 (1996).
16. Najm, I.N., and S.W. Krasner, "Effects of Bromide and Natural Organic Matter on the Formation of Ozonation By-Products," *Journal AWWA*, **87**:1 (1995).
17. Najm, I.N., N.L. Patania, J.G. Jacangelo, S.W. Krasner, "Evaluating Surrogates for Disinfection By-Products," *Journal AWWA*, **86**:6 (1994).
18. Najm, I.N., V.L. Snoeyink, Y. Richard, "Removal of 2,4,6-Trichlorophenol and Natural Organic Matter From Water Supplies Using PAC in Floc-Blanket Reactors," *Water Research*, **27**:4 (1992).
19. Najm, I.N., V.L. Snoeyink, and Y. Richard, "Effect of Initial SOC Concentration on its Activated Carbon Adsorption Capacity in Natural Water," *Journal AWWA*, **83**:8 (1991).
20. Najm, I.N., V.L. Snoeyink, B.W. Lykins, and J.Q. Adams, "Powdered Activated Carbon for Drinking Water Treatment: A Critical Review," *Journal AWWA*, **83**:1 (1991).
21. Najm, I.N., V.L. Snoeyink, M.T. Suidan, C.H. Lee, and Y. Richard, "Effect of Particle Size and Background Organics on the Adsorption Efficiency of PAC," *Journal AWWA* **82**:1:65-72 (1990).
22. Wang, Y.T., M.T Suidan , J.T. Pfeffer, and I.N. Najm, "The Effect of Concentration of Phenols on Their Batch Methanogenesis," *Biotechnology and Bioengineering* **33**:1353-1357 (1989).
23. Suidan, M.T., I.N. Najm, Y.T. Wang, and J.T. Pfeffer, "Anaerobic Biodegradation of Phenol: Inhibition Kinetics and System Stability," *Journal of Environmental Engineering, ASCE* **114**:6 (1988).

PEER REVIEWED RESEARCH REPORTS:

1. Najm, I.N., Romer-Maraccini, O., Maraccini, P.A. *Verification of the Effect of pH on the Microbial Inactivation Efficiency of Free Chlorine*. In Press. Water Research Foundation, Denver, CO (2019)
2. Najm, I.N. *Strontium in Water: Critical Review of its Treatment Options and Considerations for its Removal*. Final Report, Water Research Foundation, Denver, CO (2016)
3. Najm, I.N.; N.L. Patania-Brown; E.Y. Seo; B.T. Gallagher; K.M. Gramith; N. Blute; X. Wu; M. Yoo; S. Liang; S. Maceiko; S. Kader; & J. Lowry. *Impact of Water Quality on Hexavalent Chromium Removal Efficiency and Cost*. Final Report, Water Research Foundation, Denver, CO (2014).
4. Najm, I.N.; N.L. Patania-Brown; B.T. Gallagher; E.Y. Seo; & K.M. Gramith. *Minimizing Waste Backwash Water from a Biological Denitrification Treatment System*. Final Report, Water Research Foundation, Denver, CO (2014).

5. Najm, I.N.; N.L. Patania Brown; & K. Gramith. *Quantifying Hydrazine in Chloraminated Water*. Final Report, Water Research Foundation, Denver, CO (2011).
6. Najm, I.N.; N.L. Patania Brown; & K. Gramith. *Minimizing Backwash Volume from Coagulation/Filtration for Arsenic Removal*. Final Report, Water Research Foundation, Denver, CO (2010).
7. Najm, I.N.; N.L. Patania Brown; K. Gramith; & T. Hargy. *Validating Disinfection in Ozone Contactors*. Final Report, Water Research Foundation, Denver, CO (2008).
8. Najm, I.N.; N.L. Patania Brown; & K. Gramith. *Minimizing Backwash Water Volume Generated from the Coagulation/Filtration Process used for Arsenic Removal*. Final Report, Water Research Foundation, Denver, CO (2007).
9. Najm, I.N.; & N.L. Patania Brown. *Formation of Hydrazine as a Chloramine By-Product*. Final Report, Water Research Foundation, Denver, CO (2006).
10. Singer, Philip C.; H.S. Weinberg; K. Brophy; L. Liang; M. Roberts; I. Grisstede; S. Krasner; H. Baribeau; H. Arora; & I. Najm. *Relative Dominance of Haloacetic Acids and Trihalomethanes in Treated Drinking Water*. Final Report. Awwa Research Foundation, Denver, CO (2002).
11. Najm, I.N., & R.R. Trussell. "Emerging Water Treatment Technologies." In *Emerging Water Contaminants*. Report by the National Research Council (1999).
12. Najm, I.N., V.L. Snoeyink, T.L. Galvin, and Y. Richard, "Evaluation of Powdered Activated Carbon Use for the Control of Organic Compounds During Drinking Water Treatment," Final Report, AWWARF, (January 1991).
13. Najm, I.N. "Evaluation of the Use of Powdered Activated Carbon for the Control of Organic Compounds During Drinking Water Treatment," Ph.D. Dissertation, University of Illinois at Urbana-Champaign, Urbana, Illinois (1990).
14. Najm, I.N., "Kinetics of Anaerobic Biodegradation of Phenolic Compounds," M.S. Thesis, University of Illinois at Urbana-Champaign, Urbana, Illinois (1987).

CONFERENCE PRESENTATIONS:

1. Najm, I.N., "Particulate Matter Removal in Water Treatment – Historical Perspective and Current State of the Science," Presentation at the California-Nevada AWWA Section Virtual Fall Conference (2020)
2. Najm, I.N., & L. Lyford, "Managing Manganese Challenges in an Ozone Water Treatment Plant," Presentation at the California-Nevada AWWA Section Virtual Fall Conference (2020)
3. Najm, I.N. "Bench-Scale Testing Methodology for Evaluating PFAS Removal with IX Resin," Presentation at the California-Nevada AWWA Section Virtual Fall Conference, (2020).
4. Najm, I.N. "PFAS Removal from Drinking Water – Technical Requirements & Anticipated Costs," Association of California Water Agencies Regulatory Summit, Sacramento, CA (2019).
5. Najm, I.N., P. Maraccini, D. Ferguson, G. Rajagopalan, M. Rivera, G. Kowalski, A. Javier, & D. Christensen, "PFAS Removal with GAC using the Rapid Small-Scale Column Test Procedure," In Proceedings of the AWWA Annual Conference & Exposition, Denver, CO (2019).
6. Najm, I.N., O. Romero-Maraccini, V. Dabbaghian, & P. Liu, "Pilot-Scale Evaluation of Chlorite Addition for Nitrification Control and Prevention," In Proceedings of the AWWA Annual Conference & Exposition, Denver, CO (2019).
7. Najm, I.N. "Navigating the Chemistry of Manganese and its Removal through a Water Treatment Plant," In Proceedings of the AWWA California-Nevada Section Fall Conference, San Diego, CA (2019).
8. Najm, I.N., N. Turner, A. Kanold, & C. Hurshman. "Design, Cost, and Performance of a Spray Aeration System for THM Removal from a Treated Water Reservoir," In Proceedings of the AWWA Water Quality Technology Conference, Dallas, TX (2019).

9. Najm, I.N. "Back to the Basics: Challenges and Solutions for Small Systems/Groundwater Treatment – Hexavalent Chromium (Cr6)," In Proceedings of the AWWA California-Nevada Section Spring Conference, Sacramento, CA (2019).
10. Najm, I.N., O. Romero-Maraccini, P. Maraccini. "Examining the Effect of Water pH on Microbial Inactivation with Free Chlorine.," In Proceedings of the AWWA Annual Conference & Exposition, Las Vegas, NV (2018).
11. Najm, I.N.; M. DeHaan; C. Busch; P. Swaim; & B. Emerson, "Heavy Metals Removal to Ultra-Low Levels – A Bench-Scale Study", In Proceedings of the AWWA Annual Conference & Exposition, Philadelphia, PA (2017).
12. Najm, I.N.; Romero-Maraccini, O.; Gallagher, B. & M. Paulucci, "Cyanotoxins & MIB Removal with Powdered Activated Carbon", In Proceedings of the AWWA California-Nevada Section Spring Conference, Sacramento, CA (2016).
13. Najm, I.N. "Minimizing Waste Brine Production from Ion-Exchange Plants Operated for Cr(VI) Removal from Groundwater", In Proceedings of the AWWA California-Nevada Section Spring Conference, Sacramento, CA (2016).
14. Najm, I.N. "Cyanotoxins Removal with Drinking Water Treatment Technologies", In Proceedings of the AWWA Annual Conference & Exposition, Chicago, IL (2016).
15. Najm, I.N. & S. Teefy, "Proposed Chlorine CT Values for Giardia Inactivation at pH Greater than 9.0." In Proceedings of the AWWA Water Quality Technology Conference, Salt Lake City, UT (2015).
16. Najm, I.N. "Application of the Segregated Flow Analysis (SFA) Method for Calculating Disinfection Across a Contactor." In Proceedings of the AWWA Water Quality Technology Conference, Salt Lake City, UT (2015).
17. Najm, I.N. & G. Deol; L. Hakes; & P. Zhou. "Cyanotoxins Removal with Water Treatment Technologies Applied to South Bay Aqueduct Water." In Proceedings of the AWWA California-Nevada Section Conference, Anaheim, CA (2015).
18. Najm, I.N. & M. Rho. "Biological Removal of VOCs from Groundwater – Results of a Bench-Scale Study." In Proceedings of the AWWA CA-NV Section Fall Conference, Anaheim, CA (2014).
19. Najm, I.N. "Critical Review of California DPH's Cost of Compliance with Cr(VI) MCL." In Proceedings of the AWWA CA-NV Section Fall Conference, Anaheim, CA (2014).
20. Najm, I.N., "Feasibility and Cost of Hexavalent Chromium Removal from Groundwater," Paper presented at the Association of California Water Agency's Regulatory Summit, Oxnard, California (2013).
21. Najm, I.N. "National, California, and Community Cost of Implementing a Cr(VI) MCL." Paper presented at the Water Research Foundation Hexavalent Chromium Workshop, Sacramento, CA (2013).
22. Najm, I.N.; T.J. Kim; & C. Ajwani. "Optimizing Biological Denitrification of Groundwater – Recovering Waste Backwash Water & Co-Removal of Hexavalent Chromium." In Proceedings of the AWWA Water Quality Technology Conference, Long Beach, CA (2013).
23. Najm, I.N.; N.L. Patania-Brown; N. Blute; X. Wu; S. Kader. "Feasibility and Cost of Hexavalent Chromium Removal from Groundwater." In Proceedings of the AWWA Water Quality Technology Conference, Long Beach, CA (2013).
24. Najm, I.N., N.L. Patania Brown, N. Blute, & S. Kader, "Impact of Water Quality on Cr(VI) Treatment Efficiency and Cost," In Proceedings of the AWWA Annual Conference & Exposition, Denver, Colorado (2013).
25. Najm, I.N., D.J. Askenaizer, & R. Takidin, "Performance & Cost of Biological Denitrification of Groundwater," In Proceedings of the AWWA Annual Conference & Exposition, Denver, Colorado (2013).
26. Najm, I.N., & D.J. Askenaizer, "Pilot-Scale Evaluation of Biological Denitrification of Groundwater." Paper presented at the AWWA Inorganic Contaminants Workshop, Sacramento, California (2013).

27. Najm, I.N., C. Seidel, N. Blute, C. Corwin, X. Wu, "Hexavalent Chromium Treatment Goals – Community and National Cost Implications." In Proceedings of the AWWA Water Quality Technology Conference, Toronto, California (2012).
28. Najm, I.N., & G. Lynch, "Fitting an Arsenic & Manganese Treatment Plant on a 'Postage Stamp'", In Proceedings of the AWWA CA-NV Section Fall Conference, San Diego, California (2012).
29. Najm, I.N., & D.J. Askenaizer, "Pilot-Scale Evaluation of Biological Denitrification of Groundwater." In Proceedings of the AWWA CA-NV Section Fall Conference, San Diego, California (2012).
30. Najm, I.N., S. Thomson; & L. Chiourn, "Impact of Watershed Fire on a Water Treatment Plant – The Santa Barbara Experience," In Proceedings of the AWWA CA-NV Section FALL Conference, Sacramento, California (2010)
31. Teefy, S., I.N. Najm, L. Sangines, B. Gentry, & C. Pena, "Full-Scale Demonstration of Bromate Control with Pre-Chloramination." In Proceedings of the AWWA Annual Conference & Exposition, Chicago, Illinois (2010).
32. Najm, I.N., N.L. Patania Brown, K. Gramith, J. Ma, "A Novel Use of Ultra-Light Media in a Coagulation-Filtration Process for Arsenic Removal from Groundwater". In Proceedings of the AWWA Annual Conference & Exposition, Chicago, Illinois (2010).
33. Najm, I.N., S. Thomson; & L. Chiourn, "Impact of Watershed Fire on DBP Formation & Control – The Santa Barbara Experience," In Proceedings of the AWWA Annual Conference & Exposition, Chicago, Illinois (2010).
34. Najm, I.N., N.L. Patania Brown, K.M. Gramith, "Hydrazine Formation as a By-Product of Chloramine Addition to Natural Waters," In Proceedings of the AWWA Annual Conference & Exposition, Chicago, Illinois (2010).
35. Najm, I.N., B.T. Gallagher, M. Phillibert, J. Meyerhofer, R. Anderson, & S. Thomson. "A Novel Approach to Sulfide Removal from Groundwater", In Proceedings of the AWWA Annual Conference & Exposition, San Diego, California (2009).
36. Teefy, S.M., A. O'Brien, J. Fong, & I. Najm. "When T&O Destruction is the Primary Goal, what is the Optimum Ozone-Peroxide Process Configuration?". In Proceedings of the AWWA Annual Conference & Exposition, San Diego, California (2009).
37. Patania Brown, N., I. Najm, K. Gramith, S. Liang, B. Boman, & I. Babbitt. "Hydrogen-Based Autotrophic Biodegradation of Nitrate & Perchlorate in Groundwater," In Proceedings of the AWWA Annual Conference, San Diego, California (2009).
38. Teefy, S.M., C. Pena, B. Gentry, I. Najm, A. Mofidi. "Comparison of Bromate Control Strategies – pH Suppression vs. Chloramine Addition." In Proceedings of the AWWA Water Quality Technology Conference, Cincinnati, Ohio (2008).
39. Najm, I.N., D. Dempsey, Y. C. Guo. "Hydrazine as a Chloramine By-Product", In Proceedings of the AWWA Annual Conference, San Francisco, California (2005).
40. Najm, I.N., S.M. Teefy, S.E. Barrett. "NDMA Formation from Water Treatment Polymers". In Proceedings of the AWWA Annual Conference, Orlando, Florida (2004).
41. Najm, I.N. "Control of Nitrosamine Formation in Water Treatment". In Proceedings AWWA Annual Conference, Anaheim, California (2003).
42. Najm, I.N., S. Teefy, & L. Hidas. "Optimizing the Use of Carbon Dioxide for Bromate Control." In Proceedings of the AWWA Annual Conference, Anaheim, California (2003).
43. Rosen, J.S.; I.N. Najm; S.H. Via; J.A.H. Sobrinho; & M.M. Marshall. "Effects of Variability on the Developing Regulations for Ozone Inactivation of *Cryptosporidium parvum*." In Proceedings of the AWWA Water Quality Technology Conference, Seattle, WA (November 2002).
44. Najm, I.N., M. Kennedy, and Bill Naylor. "Full-Scale Comparison Between Lignite GAC and Bituminous GAC for Biofiltration". In Proceedings of the AWWA Water Quality & Technology Conference, Seattle, WA (November, 2002).

45. Najm, I.N., and J. Ma. "Formation of Nitrosamines as By-Products of Chloramination". Paper presented at the AWWA Annual Conference in New Orleans, Louisiana (June, 2002)
46. Najm, I.N., and S. Teefy. "Reducing Bromate Formation with Carbon Dioxide Addition". Paper presented at the AWWA Annual Conference in New Orleans, Louisiana (June, 2002)
47. Najm, I.N.; and R.R. Trussell. "NDMA Formation in Water & Wastewater". Paper presented at the AWWA Water Quality Technology Conference in Salt Lake City (November, 2000)
48. Rittmann, B.E.; R. Nerenberg; & I.N. Najm. "Autohydrogenotrophic Perchlorate Reduction," Paper Presented at the AWWA Inorganic Contaminants Workshop, Albuquerque, NM (February 28 & 29, 2000)
49. Najm, I.N.; R.R. Trussell; L. Boulos; B. Gallagher; R. Bowcock; C. Williams; and D. Clifford. "Application of Ion-Exchange Technology for Perchlorate Removal from Drinking Water," Paper presented at the AWWA Annual Conference, Chicago, IL (June, 1999)
50. Teefy, S.; & I.N. Najm. "Evaluating Performance of Backwash Water Treatment Processes Using Indigenous Aerobic Bacterial Spores," Paper presented at the AWWA Annual Conference, Chicago, IL (June, 1999)
51. Najm, I.N., R.R. Trussell, D.E. Clifford, and R. Bowcock. "Evaluating Ion-Exchange Technology for Perchlorate Treatment," Paper presented at the National Groundwater Association's Specialty Conference on Perchlorate and MTBE, Anaheim, California (June, 1998).
52. Najm, I.N., R.R. Trussell, E.M. Aieta. "Comparing Kinetic Models for *Giardia* and *Cryptosporidium* Inactivation with Ozone". Paper presented at the AWWA Water Quality Technology Conference, Denver, CO (November, 1997).
53. Najm, I.N., E.M. Aieta, J.A. Oppenheimer, B.T. Gallagher. "Impact of Natural Water Quality on the Inactivation of *Giardia* With Ozone," Paper presented at IWSA Conference, Madrid, Spain (September, 1997).
54. Trussell, R.R., I.N. Najm, "Feasibility of DBP Destruction With Advanced Oxidation Processes," Paper presented at the Disinfection By-Products Symposium, University of Houston, Houston, TX, March 20-21 (1997).
55. Najm, I.N., S. Liang, M. Davis, and E.M. Aieta, "Comparison Between RSSCT and Pilot-Scale GAC Performance for TOC Removal," Paper presented at the AWWA specialty workshop on "GAC and Membranes: Bench- and Pilot-Scale Evaluations" in Cincinnati, OH (March 1996).
56. Najm, I.N., and J.P. Marcinko, "Impact of Analytical Methodology and Water Quality on TOC Analytical Results," In Proc. of the American Water Works Association Water Quality Technology Conference in New Orleans, LA (Nov. 1995).
57. Reich, K., I.N. Najm, K. Helm, and E.M. Aieta, "Industrial Use of Reclaimed Water: Implications of Water Quality", In Proc. of the Water Environment Federation Annual Conference in Miami Beach, FL (Oct. 1995).
58. Najm, I.N., S. Espinoza, J. P. Marcinko, C. H. Tate, and D. Selby, "Improving Enhanced Coagulation Performance With PAC Addition," In Proc. of the 1995 American Water Works Association Annual Conference, Anaheim, California (June, 1995).
59. Najm, I.N., "Advances in Mathematical Modeling of Powdered Activated Carbon Processes," Paper presented at the IWSA specialized conference on Activated Carbon in Drinking Water Treatment in Amsterdam, The Netherlands (September 1994).
60. Najm, I.N., and S.W. Krasner, "Effects of Bromide and Natural Organic Matter on the Formation of Ozonation By-Products," Paper presented at the 1994 American Water Works Association Annual Conference, New York City, New York (June 1994).
61. Najm, I.N. "Powdered Activated Carbon in Drinking Water Treatment," Paper presented at the 1994 American Water Works Association Annual Conference, New York City, New York (June 1994).

62. Najm, I.N., N.L. Patania, J.G. Jacangelo, and S.W. Krasner, "Effect of Coagulation on the Removal of DBP Precursors," Paper presented at the 1991 American Water Works Association Water Quality Technology Conference, Orlando, FL (November 1991).
63. Najm, I.N., and J.G. Jacangelo, "Formation and Control of Disinfection By-products," Paper presented at the 1991 annual conference of the California/Nevada section of the American Water Works Association, Anaheim, CA (October 1991).
64. Najm, I.N., V.L. Snoeyink, and Y. Richard, "Prediction Activated Carbon Capacities for Synthetic Organic Chemicals Present in Natural Waters," Paper presented at the 1991 American Water Works Association Annual Conference, Philadelphia, PA (June 1991).
65. Najm, I.N., V.L. Snoeyink, M.T. Suidan, and Y. Richard, "Powdered Activated Carbon in Floc-Blanket Reactors," presented at the 1989 American Water Works Association Annual Conference, Los Angeles, CA (June 1989).