Peter A. Maraccini, Ph.D., P.E.

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

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EDUCATION:

Ph.D., Environmental Science and Eng., Stanford University	2016
M.S., Environmental Science and Eng., Stanford University	2011
B.S., Civil & Environmental Eng., Univ. of Illinois at Urbana-Champaign	2010
B.A., Spanish Language & Culture, Univ. of Illinois at Urbana-Champaign	2010

REGISTRATION:

Professional Civil Engineer, California (2018). Registration Number C 89341

PROFESSIONAL EXPERIENCE:

Water Quality & Treatment Solutions, Inc.
Jan. 2016 – present: Engineer

Stanford University
Sept. 2010 – Dec. 2015: Graduate Researcher and Teaching Assistant

SUMMARY:

Dr. Peter Maraccini is an Engineer with WQTS. He is a graduate of Stanford University with Masters and Ph.D. degrees in Environmental Science and Engineering. His Ph.D. dissertation research focused on the disinfection kinetics and mechanisms of bacteria in water irradiated with sunlight, with emphasis on how the water properties and cellular characteristics would influence the disinfection rates. Dr. Maraccini provides WQTS his expertise in laboratory experimental work, strong technical knowledge in microbiology and water chemistry, and advanced organizational and data processing skills.

EXAMPLE PROJECTS:

Dr. Maraccini has been involved in a wide array of water quality, water treatment, and regulatory projects, a short list of which is presented below. References for these projects are available upon request.

Pilot Testing of Groundwater Treatment Alternatives **2018 – present**
Suburban Water Systems

WQTS is conducting pilot testing at three Suburban Water System groundwater wells to evaluate possible treatment alternatives to remove iron and manganese and reduce disinfection byproduct formation in the distribution system. Dr. Maraccini has operated the pilot units for several months, gathered and analyzed operational and performance data, written progress updates discussing the data gathered, and overall managed the testing and reporting efforts.

Pilot Testing of Iron Oxide Media for Arsenic Removal **2018**
City of Victorville, CA

Following a successful demonstration at the bench-scale, WQTS conducted pilot testing of granular ferric oxide media for the removal of arsenic from the groundwater at three City of Victorville wells. Testing took place over four months, during which two different granular ferric oxide media were tested at two suppressed pH levels. Dr. Maraccini aided in the installation of the pilot unit, helped troubleshoot

any issues, managed the testing oversight effort, coordinated the data collection and analysis, and wrote the final report.

Pilot Testing of Treatment Alternatives for Corrosion Control **2016 – 2017**
City of Fresno, CA

WQTS conducted pilot-scale testing to evaluate the potential occurrence and mitigation of iron corrosion in the City's distribution system after the startup of a newly constructed water treatment plant. WQTS has been involved in the desktop study, pilot design and fabrication, and the current testing oversight. Dr. Maraccini managed the testing oversight effort, coordinated the data collection and analysis, and wrote the final report.

Rapid Small-Scale Column Testing **2016 – 2018**
City of Victorville, CA
Hazen & Sawyer
Kennedy/Jenks Consultants

Rapid Small-Scale Column Testing (RSSCT) is a bench-scale testing procedure used to predict the replacement frequency of an adsorbent at a full-scale treatment plant. Dr. Maraccini has performed RSSCT for predicting the replacement frequency of GAC for removal of volatile organics (Hazen & Sawyer) and perfluorochemicals (Kennedy/Jenks Consultants) and the replacement frequency of granular ferric oxide media for the removal of hexavalent chromium (City of Victorville).

Tracer Testing **2017-2018**
Carollo Engineers
Kern County Water Authority

WQTS regularly plans and performs tracer testing plan on chlorine contact basins, having done so at the Irvine Ranch Water District facility (Carollo Engineers) and Henry C. Garnett Water Purification Plant in Bakersfield (Kern County Water Authority). Tracer testing identifies the appropriate hydraulic efficiency factor to be used in calculating the disinfection credits achieved. Dr. Maraccini assisted in performing the tracer testing, conducting the data analysis, and writing the final report submitted to the Division of Drinking Water.

Modeling the Effect of pH on the Microbial Inactivation Efficiency of Free Chlorine **2017 – 2019**
Water Research Foundation

WQTS conducted bench-scale inactivation tests with *Bacillus subtilis* spores and free chlorine from pH 5 to 12 and modeled the inactivation data using a chemical speciation model that treated the two species of free chlorine, HOCl and OCl-, as two separate disinfectants. Dr. Maraccini helped plan and conduct the bench-scale tests, analyze the data, write progress reports, and assemble the final report delivered to the Water Research Foundation.

Evaluation of Chlorite Addition for Nitrification Prevention & Control **2016 – 2017**
Los Angeles Department of Water and Power

WQTS carried out a study investigating the applicability and efficiency of chlorite addition as a supplemental tool for nitrification control and prevention in the Los Angeles Department of Water & Power distribution system. Dr. Maraccini assisted with the experiment design and laboratory work, and was one of lead writers for the final report.

Cost-Effective Hexavalent Chromium Residual Management Strategies **2016 – 2017**
Water Research Foundation

WQTS researched alternative waste minimization techniques that could be implemented at drinking water treatment facilities employing hexavalent chromium removal techniques, including brine reuse for strong base anion resin treatment, beneficial uses for spent weak base anion resin, and backwash treatment and disposal alternatives for reduction, coagulation, and filtration treatment. Dr. Maraccini provided a quality assurance review on all the analysis performed and assembled the final report.

Watershed Sanitary Surveys **2016 – 2017**

Stockton East Water District
Calaveras County Water District
Santa Clara Valley Water District
Irvine Ranch Water District

Dr. Maraccini has been part of WQTS teams preparing five-year watershed sanitary survey updates for large and small water systems, including those for the Irvine Ranch Water District, Calaveras County Water District, Stockton East Water District, and the Santa Clara Valley Water District. Updates to watershed sanitary surveys include site visits to sources and treatment plants, review of water quality data, identification of potential sources of contamination, and submittals of a Final Report with recommendations for improving water quality over the next five-year period. Dr. Maraccini has been primarily responsible for the water quality data analysis and compiling and reviewing the Final Report.

Technical and Regulatory Support Services **2016 – Present**

Tahoe Water Suppliers Association

WQTS is providing on-call technical and regulatory support services regarding the application of aquatic herbicides in Lake Tahoe. Dr. Maraccini has researched and responded to the Tahoe Water Suppliers Association (TWSA) questions regarding the step-by-step process for acquiring an exemption to the current basin plan prohibiting the use of aquatic herbicides, including formal documents on behalf of TWSA submitted to the Lahontan Regional Water Quality Control Board.

RECOGNITIONS & AWARDS:

Secretary on Student Leadership Committee, ReNUWIt, a NSF Engineering Research Center at Stanford University, 2014-2015
Chair, Environmental Science and Engineering Seminar Series, Stanford University, 2011-2015
Co-Chair and Conference Organizer, Gordon Research Seminar on Environmental Sciences: Water, 2012-2014
Recipient, National Science Foundation Graduate Research Fellowship, 2010
Ira O Baker Prize – First Prize, Civil and Environmental Engineering, University of Illinois, 2010
- Given to the top graduating senior in the Department of Civil and Environmental Engineering.

Knight of St. Patrick, College of Engineering, University of Illinois, 2010
- Given to ~10 students each year who represent leadership, excellence in character, and exceptional contributions to the College of Engineering and its students. The award is considered one of the highest honors bestowed by the College of Engineering.

Inscription on the Bronze Tablet, University of Illinois, 2010
- Given to students ranking in the top 3% of the students in their graduating class.

JOURNAL ARTICLES:

1. Liu, C.; Kong, D.; Hsu, P.; Yuan, H.; Lee, H.; Liu, Y.; Wang, H.; Wang, S.; Yan, K.; Lin, D.; **Maraccini, P.A.**; Parker, K.M.; Boehm, A.B.; Cui, Y. Rapid water disinfection using vertically aligned MoS2 nanofilms and visible light. *Nature Nanotechnology*. 2016, 11 (12), 1098-1104.
2. **Maraccini, P.A.**; Wenk, J.; Boehm, A.B. Exogenous indirect photoinactivation of bacterial pathogens and indicators in water with natural and synthetic photosensitizers in simulated sunlight with reduced UVB. *Journal of Applied Microbiology.* 2016, 121 (2), 587-597.
3. **Maraccini, P.A.**; Mattioli, M.C.; Sassoubre, L.M.; Cao, Y.; Griffith, J.F.; Ervin, J.S.; Van De Werfhorst, L.C.; Holden, P.A.; Boehm, A.B. Solar Inactivation of Enterococci and *Escherichia coli* in Natural Waters: Effects of Water Absorbance and Depth. *Environmental Science & Technology.* 2016, 50 (10), 5068-5076.
4. **Maraccini, P.A.**; Wenk, J.; Boehm, A.B. Photoinactivation of Eight Health-Relevant Bacterial Species: Determining the Importance of the Exogenous Indirect Mechanism. *Environmental Science & Technology*. 2016, 50 (10), 5050-5059.
5. **Maraccini, P.A.**; Wang, D.; McClary, J.; Boehm, A.B. Growth-dependent Photoinactivation Kinetics of *Enterococcus faecalis*. *Journal of Applied Microbiology*. 2015, 118 (5), 1226-1237.

6. Liu, C.; Xie, X.; Zhao, W.; Liu, N.; **Maraccini, P.A.**; Sassoubre, L.; Boehm, A.B.; Cui, Y. Conducting Nanosponge Electroporation for Affordable and High-Efficiency Disinfection of Bacteria and Viruses in Water. *Nano Letters*. 2013, 13 (9), 4288-4298.
7. **Maraccini, P.A.**; Ferguson, D.; Boehm, A.B. Diurnal Variation in Enterococcus Species Composition in Polluted Ocean Water and a Potential Role for the Enterococcal Carotenoid in Protection against Photoinactivation. *Applied and Environmental Microbiology*. 2012, 78 (2), 305-310.
8. Bradely, I.; Straub, A.; **Maraccini, P.A.**; Markazi, S.; and Nguyen, T.H. Iron oxide amended biosand filters for virus removal. *Water Research*. 2011, 45 (15), 4501-4510.

PEER REVIEWED RESEARCH REPORTS:

1. Najm, I.; Romero-Maraccini, O.; **Maraccini, P.A.**; Askenaizer, D.; Gallagher, B. *Cost-Effective Cr(VI) Residuals Management Strategies.* Water Research Foundation, Denver, CO. 2017.
2. **Maraccini, P.A.** *Photoinactivation of Bacteria: Effects of Physiology, Water Conditions, and Sunlight Intensity.* Ph.D. Dissertation, Stanford University. 2016.

CONFERENCE PRESENTATIONS:

1. **Maraccini, P.A.**; McClary, J.; Boehm, A.B. (Poster) The Role of Exogenous Sensitizers in the Photoinactivation of Fecal Indicator and Pathogenic Bacteria. Gordon Research Conference: Environmental Sciences: Water, Holderness, NH, June 22-27, 2014.
2. **Maraccini, P.A.**; Boehm, A.B. (Presentation) Photoinactivation kinetics of Enterococcus faecalis in simulated seawater depends on culture age and specific growth rate. ReNUWIt Sunlight Symposium, Stanford University, Stanford, CA, April 2, 2013.
3. **Maraccini, P.A.**; Boehm, A.B. (Poster) Revisiting carotenoid interactions with sensitizers and reactive oxygen species: Implications for photoinactivation kinetics. Gordon Research Conference: Environmental Sciences: Water, Holderness, NH, June 24-29, 2012.