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| AGREEMENT NUMBER 15-C0087 |
| REGISTRATION NUMBER |

1. This Agreement is entered into between the State Agency and the Contractor named below:

STATE AGENCY'S NAME

Department of Pesticide Regulation

CONTRACTOR'S NAME

The Board of Trustees of the Leland Stanford Junior University

2. The term of this Agreement is: **April 1, 2016** or upon final approval, whichever occurs later, through September 30, 2018

3. The maximum amount of this Agreement is: **\$ 135,000.00**
One hundred thirty-five thousand dollars and no cents

4. The parties agree to comply with the terms and conditions of the following exhibits which are by this reference made a part of the Agreement.

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| Exhibit A – Scope of Work | 4 Pages |
| Exhibit B – Budget Detail and Payment Provisions | 3 Pages |
| Exhibit C* – General Terms and Conditions (GTC 610) | |
| Exhibit D - Special Terms and Conditions | 2 Pages |
| Exhibit E – Additional Provisions | 2 Pages |
| Exhibit F – Curriculum Vitae | 16 Pages |

Items shown with an Asterisk (*), are hereby incorporated by reference and made part of this agreement as if attached hereto. *These documents can be viewed at <http://www.dqs.ca.gov/ols/Resources/StandardContractLanguage.aspx>*

IN WITNESS WHEREOF, this Agreement has been executed by the parties hereto.

| | | |
|--|---|---|
| CONTRACTOR | | <i>California Department of General Services Use Only</i> |
| CONTRACTOR'S NAME (if other than an individual, state whether a corporation, partnership, etc.) The Board of Trustees of the Leland Stanford Junior University | | |
| BY (Authorized Signature)  | DATE SIGNED (Do not type) 6/20/16 | |
| PRINTED NAME AND TITLE OF PERSON SIGNING Theresa Tom, JD Assistant Director, Pre-Award Office of Sponsored Research Stanford University | | |
| ADDRESS 3160 Porter Drive, Suite 100, Palo Alto, CA 94304 | | |
| STATE OF CALIFORNIA | | |
| AGENCY NAME Department of Pesticide Regulation | | |
| BY (Authorized Signature)  | DATE SIGNED (Do not type) 6/30/16 | |
| PRINTED NAME AND TITLE OF PERSON SIGNING Lu Saephanh, Fiscal Services and Business Operations Branch Chief | | |
| ADDRESS 1001 I Street Sacramento, CA 95814 | | |
| | | <input checked="" type="checkbox"/> Exempt per: Delegation Letter 74.5 |

SP0 122682

EXHIBIT A
STANDARD AGREEMENT

SCOPE OF WORK

1. This Agreement is between Stanford University, hereinafter referred to as Stanford or Contractor, and the Department of Pesticide Regulation, hereinafter referred to as DPR.
2. This Agreement will commence on the start date April 1, 2016 as presented herein or upon final approval by the State, whichever is later and no work shall begin before that time. This Agreement is of no effect unless approved by the State. Contractor shall not receive payment for work performed prior to the approval of the Agreement and before receipt of the notice to proceed by the Contract Manager. This Agreement shall expire on September 30, 2018. The services shall be provided during normal working hours.
3. The Project Representatives during the term of this Agreement will be:
 - A. All official communications, except invoices, from the Contractor to DPR, shall be directed to the attention of the DPR Contract Manager, **Dan Wang**, or designee, at:

Department of Pesticide Regulation
Environmental Monitoring Branch, MS 3B
1001 I Street
P.O. Box 4015
Sacramento, CA 95812-4015

Phone: (916) 324-4201 Fax: (916) 324-4088
E-mail: Dan.Wang@cdpr.ca.gov

- B. All invoices from the Contractor to DPR shall be directed to:

Department of Pesticide Regulation
Attn: Accounts Payable
P.O. Box 4015, MS 4A
Sacramento, CA 95812-4015

- C. All programmatic communications from DPR to the Contractor shall be directed to the attention of **Prof. William Mitch**, or designee at:

Prof. William Mitch
Department of Civil and Environmental Engineering
Stanford University
Y2E2 Room 145

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473 Via Ortega
Stanford, CA 94305

E-Mail: wamitch@stanford.edu

D. All administrative communications, except payments, from DPR to Contractor shall be directed to:

Tiffany Hayes
Contract & Grant Officer, OSR
Stanford University
3160 Porter Drive, Suite 100
Palo Alto, CA 94304
Phone: (650) 724-9857

Email: tifhayes@stanford.edu

E. All payments from DPR to the Contractor shall be directed to:

First Class Mail
Stanford University Lockbox
P.O. Box 44253
San Francisco, CA 94144-4253

Certified or Overnight Mail
Wells Fargo Lockbox
Stanford University Lockbox 44253
3440 Walnut Ave, Bldg A, 2nd Floor
Fremont, CA 94538

F. The Project Representatives during the term of this Agreement may be changed by mutual written agreement without the necessity of formal amendment to this Agreement.

4. Background and Goals

As non-point source surface water contaminants, pesticides are notoriously difficult to remediate. Several California water bodies exhibit elevated toxicity associated with pesticides, such as fipronil. Such pesticides may reach surface waters after discharge from the stormwater retention wetlands now required for some new housing developments in California. The development of treatment systems to deactivate pesticides within the discharge channels before they reach surface waters would enable efficient treatment because of the high concentrations of pesticides in these

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channels. However, due to the difficulty associated with maintaining treatment systems for this type of non-point source contamination, the treatment system should be cheap, and passive. The goal of the research is to develop a sunlight-driven, activated carbon-based electrolysis system for the passive remediation of pesticide-impacted drainage channels.

Objectives

A. The objectives are to:

- 1) The first objective is to evaluate the effect of direct current electrolysis conditions (e.g., electrolysis voltage, pH) on the degradation of a selection of priority pesticides (fipronil, bifenthrin, and permethrin), and characterize end-products within buffered deionized water systems.
- 2) The second objective is to evaluate the effect of alternating current electrolysis conditions (e.g., electrolysis voltage, pH) on the degradation of a selection of priority pesticides (fipronil, bifenthrin, and permethrin), and characterize end-products within buffered deionized water systems.
- 3) The third objective is to develop and test a pilot-scale unit to treat an authentic, pesticide-impacted stormwater.

5. Work to Be Performed

A. Task 1:

Conduct laboratory studies with direct current electrolysis. In the first phase of the project, laboratory batch reactor studies will be conducted to evaluate the reductive electrolysis of fipronil, bifenthrin, and permethrin. The research would evaluate reaction conditions needed to achieve removal of these compounds (e.g., voltage, pH) and characterize reaction products. Of particular interest would be the potential for reductive dehalogenation products (i.e., removal of halogens).

B. Task 2:

Conduct laboratory studies with alternating current electrolysis. The second phase will conduct similar laboratory batch reactor studies with alternating current electrolysis. Alternating current electrolysis exposes the target pesticides to both oxidative and reducing conditions, and thereby may enhance degradation efficiencies. Furthermore, it vastly simplifies the reactor by eliminating the need for a separate anode and the ion exchange membrane between the electrodes. The research would characterize necessary reactions conditions (as in Task 1) and evaluate the potential for the oxidation of halides (e.g., chloride) in source waters to hypochlorous acid (which might generate unwanted byproducts).

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C; Task 3:

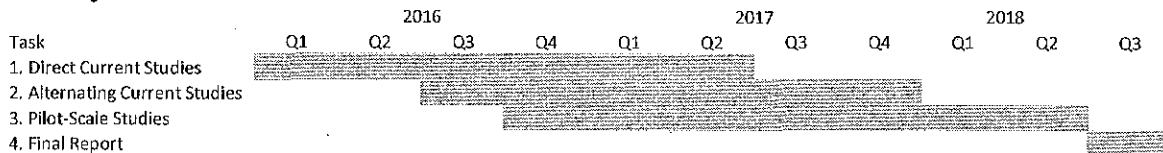
Develop a small, pilot-scale system to test at a housing development retention pond. The third phase of the project would develop a pilot-scale system using the most promising configuration (e.g., direct or alternating current) from the first two tasks. The pilot-scale system would be tested using an authentic stormwater retention pond, selected in conjunction with DPR. The pilot-scale system would be flow-through, and the task would evaluate the potential to retain and degrade the pesticides, and the effect of background organic matter and particulates on the process.

6. Deliverables

The contractor will:

- A. Provide quarterly updates by email to DPR's Contract Manager.
- B. Task 1: A technical memorandum will be prepared summarizing the results of the direct current electrolysis studies. The memorandum will be submitted to DPR's Contract Manager via email on or before July 1, 2017.
- C. Task 2: A technical memorandum summarizing the results of the alternating current electrolysis studies. The memorandum will be submitted to DPR's Contract Manager via email on or before January 1, 2018.
- D. Task 3: A technical memorandum summarizing the results of the pilot-scale study outlining will be submitted to DPR's Contract Manager via email on or before July 1, 2018.
- E. A manuscript will be prepared for submission to a leading peer-reviewed technical journal. The manuscript will summarize the findings of Tasks 1 to 3 (Deliverables B. to D.). The manuscript will be emailed to DPR's Contract Manager no less than 30 days prior to submission and not later than August 1, 2018.
- F. Present one seminar to DPR, toward the end of the project, on the findings of the conducted research.
- G. Based on the manuscript in E., prepare a final technical report of the study to DPR 21 days before completion of the contract.

7. Project Timeline



8. DPR's Responsibilities

- A. DPR will participate, as needed, in Tasks 1 to 3 of the project.
- B. DPR will review the final technical report prepared under Task 4 and will provide comments within 21 days of submission.

EXHIBIT B
STANDARD AGREEMENT

1. Invoicing

- A. In no event shall the Contractor request reimbursement from the State for obligations entered into or for costs incurred prior to the commencement date or after the expiration of this Agreement.
- B. For services satisfactorily rendered and approved by the Contract Manager and upon receipt and approval of the invoices, DPR agrees to compensate Contractor for actual allowable costs incurred as specified herein and in accordance with the rates specified herein or attached hereto. Incomplete or disputed invoices shall be returned to Contractor, unpaid, for correction.
- C. The Contractor shall submit 2 copies of each invoice and all supporting documentation, not more frequently than monthly or less frequently than quarterly in arrears, to:

Department of Pesticide Regulation
Attn: Accounts Payable
P.O. Box 4015
Sacramento, CA 95812-4015

- D. All invoices shall contain the name of the Contractor, the Contractor's address as specified on the first page of this Agreement (Std 213), the Agreement number 15-C0087, the date of the invoice, the Contractor's invoice number, the invoice period, and a description of the services provided.

2. Budget Contingency Clause

- A. It is mutually understood between the parties that this Agreement may have been written before ascertaining the availability of congressional or legislative appropriation of funds, for the mutual benefit of both parties, in order to avoid program and fiscal delays that would occur if the Agreement were executed after that determination was made.
- B. This Agreement is valid and enforceable only if sufficient funds are made available to the State by the United States Government or the California State Legislature for the current year and/or any subsequent years covered under this Agreement. In addition, this Agreement is subject to any additional restrictions, limitations, or conditions enacted by the Congress or any statute enacted by the Congress or the California State Legislature which may affect the provisions, terms or funding of this Agreement in any manner.
- C. If funding for any fiscal year is not appropriated, reduced or deleted by the United States Government or the California State Legislature for purposes of this program,

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DPR shall have the option to either cancel this Agreement with no liability occurring to DPR, or offer an Agreement Amendment to Contractor to reflect the reduced amount.

3. Payment

- A. Payment will be made in accordance with, and within the time specified in, Government Code Chapter 4.5, commencing with Section 927.
- B. Contractor will be reimbursed for direct costs, other than salary costs, that are identified in the Contractor's rates.
- C. Contractor will bill in arrears for costs incurred during the billing period. If applicable, salary costs will be itemized and billed by position classification. Documentation supporting specific salary costs will be presented if requested by DPR. Non-wage costs will be billed, in summary, according to general expense categories. A detailed report of transactions will support the billing. Individual expenditures exceeding \$500.00 will be supported by a photocopy of the original documentation. Documentation in support of expenditures less than \$500.00 will be presented if requested by DPR.
- D. The final ten percent (10%) of the Agreement total shall be withheld by DPR until the satisfactory completion of this Agreement.

4. Rates

Table I. Expenditures by Budget Line Item

| <u>Budget Line Item</u> | FY 15-16 | FY 16-17 | FY 17-18 | TOTAL |
|-------------------------|----------|----------|----------|-----------|
| 1. Salaries & Wages | \$7,478 | \$18,512 | \$18,433 | \$44,423 |
| 2. Direct Benefits ① | \$389 | \$1,262 | \$1,106 | \$2,757 |
| 3. Travel | \$0 | \$0 | \$0 | \$0 |
| 4. Supplies ② | \$9,275 | \$6,000 | \$6,000 | \$21,275 |
| 5. Tuition/Fees | \$7,916 | \$9,277 | \$9,648 | \$26,841 |
| 6. Overhead Cost@58% ③ | \$9,942 | \$14,949 | \$14,813 | \$39,704 |
| Total | \$35,000 | \$50,000 | \$50,000 | \$135,000 |

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Table II. Detail of Salaries and Wages

| Classification | Annual Salary | Percentage of Time | Total |
|---|----------------------|---------------------------|-----------------|
| William Mitch, Principle Investigator @ 0.6% (FY 16-17), | \$195,600 | 0.6% | \$1,181 |
| William Mitch, Principle Investigator @ 0.3% (FY 17-18), | \$195,600 | 0.3% | \$582 |
| Graduate student researcher @ 15% (FY 15-16) | \$49,856 | 15% | \$7,478 |
| Graduate student researcher @ 30% represents a 3% pay increase (FY 16-17) | \$51,351 | 34% | \$17,331 |
| Graduate student researcher @ 30% represents a 3% pay increase (FY 17-18) | \$52,892 | 34% | \$17,851 |
| Total Personnel | | | \$44,423 |
| Direct Benefits ①: | | | |
| Principle Investigator @ 30.6% for years 1-3 | | | \$539 |
| Graduate Student Researcher @5.2% for one student for years 1-3 | | | \$2,218 |

①Benefits include: Worker's Compensation to cover student and other benefits appropriate for title (NOTE: Student Interns are non-personnel employees with no benefits and shall be excluded from the percentage calculation of this line item.)

②Supplies include: materials required to perform service, this line item does not include any unit acquisition of \$5,000 or more.

③Overhead Cost: 58%of Modified Total Direct Cost (MTDC), which is Total Direct Cost less Tuition/Fees, includes: depreciation of buildings and equipment, utility consumption, operations and maintenance costs, administrative services provided at the departmental and central level, and library costs.

5. Cost Limitation

- A. The total amount of this Agreement shall not exceed \$135,000.00.
- B. It is understood and agreed that this total is an estimate and that DPR will pay for only those services actually rendered as authorized by the DPR Contract Manager or their designee.

EXHIBIT D
STANDARD AGREEMENT

SPECIAL TERMS AND CONDITIONS

1. Termination

- A. Either Party reserves the right to terminate this agreement without cause upon 30 days written notice to the other Party, or immediately in the event of a material breach. In the event of termination, Contractor shall be paid for all allowable costs incurred up to the date of termination and upon receipt of the final invoice.
- B. In the event that the total Agreement amount is expended prior to the expiration date, DPR may, at its sole discretion, terminate this Agreement with 30 days notice to contractor.

2. Subcontracting

Contractor shall perform the work contemplated with resources available within its own organization and no portion of the work shall be subcontracted.

3. Harassment Free Workplace

The Department of Pesticide Regulation (DPR) is committed to providing a safe, secure environment, free from sexual misconduct. It is policy of the Department that employees have the right to work in an environment that is free from all forms of discrimination, including sexual harassment. This policy specifically speaks to freedom from a sexually harassing act that results in the creation of an intimidating, hostile or offensive work environment or that otherwise interferes with an individual's employment or work performance. As a Contractor with DPR, you and your staff are expected to comply with a standard of conduct that is respectful and courteous to DPR employees and all other persons contacted during the performance of this Agreement. Sexual harassment is unacceptable, will not be tolerated; and may be cause for prohibiting some or all of the Contractor's staff from performing work under this Agreement.

4. Retention of Records/Audits

For the purpose of determining compliance with Public Contract Code Section 10115, *et seq.* and Title 21, California Code of Regulations, Chapter 21, Section 2500 *et seq.*, when applicable, and other matters connected with the performance of the Agreement pursuant to Government Code Section 8546.7, the Contractor, subcontractors and the State shall maintain all books, documents, papers, accounting records, and other evidence pertaining to the performance of the Agreement, including but not limited to, the costs of administering the Agreement. All parties shall make such materials available at their respective offices at all reasonable times during the Agreement period and for three years from the date of final payment under the Agreement. The State, the State Auditor, FHWA, or any duly authorized representative of the Federal government having jurisdiction under Federal laws or regulations (including the basis of Federal funding in whole or in part) shall have access to any books, records, and documents of the

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Contractor that are pertinent to the Agreement for audits, examinations, excerpts, and transactions, and copies thereof shall be furnished if requested.

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ADDITIONAL PROVISIONS

1. Disposition of Work Product

DPR retains non-commercial governmental use and distribution rights to all deliverables identified in Exhibit A of this Agreement.

2. Contractor Evaluation

The Contractor is hereby notified that its performance under this Agreement will be evaluated within 30 calendar days following the Expiration of this Agreement. The evaluation may include statements on the adequacy of the service or the product, whether the service was satisfactory, whether the service or the product was provided or completed within the time limitations, reasons for time or cost overruns, whether the product is operational or being utilized by the State, and/or the State plans for implementation, and the State's general impression as to the competency of the Contractor and its staff. The evaluation shall be filed in the State's official Contractor Evaluation File.

3. Consulting Services

- A. The Contractor is hereby advised of its duties, obligations and rights under Public Contract Code § 10335.5.
- B. The Contractor's key personnel assigned to perform work under this Agreement and their level of responsibility shall be mutually acceptable to the State and the Contractor.

4. Insurance Requirements

- A. Coverage needs to be in force for complete term of contract. If insurance expires during the term of the contract, a new certificate must be received by the State at least 10 days prior to the expiration of this insurance. This new insurance must still meet the terms of the original contract.
- B. Insurance policies shall contain a provision that states that coverage will not be cancelled without 30 days prior written notice to the State.
- C. Any insurance required to be carried shall be primary, and not excess, to any other insurance carried by the State.
- D. Contractor shall maintain general liability with limits of not less than \$1,000,000 per occurrence for bodily injury and property damage liability combined. The policy shall include coverage for liabilities arising out of premises, operations, independent

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contractors, products, completed operations, personal & advertising injury, and liability assumed under an insured contract. This insurance shall apply separately to each insured against whom claim is made or suit is brought subject to the contractor's limit of liability.

- E. Contractor shall maintain motor vehicle liability with limits of not less than \$1,000,000 per accident. Such insurance shall cover liability arising out of a motor vehicle including owned, hired, and non-owned motor vehicles.
- F. Contractor shall maintain statutory workers' compensation and employer's liability coverage for all its employees who will be engaged in the performance of the contract, including special coverage extensions where applicable. Employer's liability limits of \$1,000,000 shall be required.
- G. The policy must include the State of California, its officers, agents, employees and servants as additional insured's, but only insofar as the operations under the contract are concerned.

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WILLIAM A. MITCH

Department of Civil and Environmental Engineering
Stanford University
Y2E2 Room 145
473 Via Ortega
Stanford, CA 94305
Tel: 650-725-9298 Fax: 650-723-7058
Website: https://sites.stanford.edu/mitch_lab/
e-mail: wamitch@stanford.edu

EDUCATION

- 2003 Ph.D. Civil and Environmental Engineering, University of California, Berkeley
Dissertation: "Prevention of the Formation of N-nitrosodimethylamine (NDMA) During Wastewater Chlorination"; Advisor: Professor David L. Sedlak
1996 M.S. Civil and Environmental Engineering, University of California, Berkeley
1993 B.A. Anthropology (Archaeology), Harvard University (Summa Cum Laude)

AWARDS

- 2017 Elected Chair 2017 Disinfection Byproducts Gordon Conference, Mt. Holyoke College
2015 Elected Vice-Chair 2015 Disinfection Byproducts Gordon Conference, Mt. Holyoke College
2013 Excellence in Review Award *Environmental Science and Technology*
2012 Elected Vice-Chair of the 4th Disinfection Byproducts Gordon Conference in 2015.
2012 Invited speaker for the 3rd Disinfection Byproducts Gordon Conference, Mt. Holyoke College.
2010 *Environmental Science and Technology* Editors' Choice Award Best Paper 3rd runner up
2010 Top 10 most-accessed articles, 2nd Quarter, *Environmental Science and Technology*
2010 Invited speaker for the Environmental Sciences – Water Gordon Conference
2010 Appointed to the US EPA Scientific Advisory Board Drinking Water Committee
2009 Invited speaker for the 2nd Disinfection Byproducts Gordon Conference, Mt. Holyoke College.
2007 NSF CAREER Award
2007 Advisor for recipient of the ACS Environmental Chemistry Graduate Student Award
2006 Invited speaker for the first Disinfection Byproducts Gordon Conference, Mt. Holyoke College.
2005 Certificate of Merit for co-authorship of the paper "Nitrile and nitroalkane formation from chlorination of amines" at the 230th ACS National Meeting
2005 Arthur Greer Memorial Prize for teaching and research excellence by a junior faculty member at Yale University
2004 Outstanding Doctoral Dissertation Award from the Association of Environmental Engineering and Science Professors and Parsons Engineering.
1993 Graduated Summa Cum Laude and elected into the Phi Beta Kappa Academic Honor Society

PROFESSIONAL EXPERIENCE

- 7/1/2013-present Associate Professor, Department of Civil and Environmental Engineering,
Stanford University

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| | |
|---------------------|--|
| 7/1/2010-6/30/2013 | Associate Professor with tenure, Department of Chemical Engineering, Yale University |
| 7/1/2008-7/1/2010 | Associate Professor, Department of Chemical Engineering, Yale University |
| 7/1/2003-7/1/2007 | Assistant Professor, Department of Chemical Engineering, Yale University |
| 7/1/1998-2/1/2000 | Senior Staff Engineer, Kennedy/Jenks Consultants, San Francisco, CA. |
| 1/1/1997-7/1/1998 | Assistant Engineer, Montgomery Watson, Walnut Creek, CA. |
| 1/1/1995-12/31/1996 | Graduate Student Research Assistant, Department of Civil and Environmental Engineering, University of California, Berkeley |
| 9/1/1994-6/1/1995 | Research Assistant, Department of Earth and Atmospheric Sciences, Georgia Institute of Technology |
| 9/1/1993-6/1/1994 | Staff Analyst, Environmental Solutions for Business, Billerica, MA. |

PROFESSIONAL SOCIETY MEMBERSHIPS

- Professional Engineer License #61429 in California (2002)
- American Chemical Society (2003)
- American Association of Environmental Engineering Professors (2003)

RESEARCH INTERESTS AND ACTIVITIES

- Chemicals of concern associated with wastewater recycling
- Prevention of the formation of nitrogen-based disinfection byproducts (N-DBPs)
- Participation of halides in photochemical processes
- Byproducts of carbon sequestration
- Destruction of organic pollutants by black carbon in the presence of hydrogen sulfides

PEER-REVIEWED PUBLICATIONS (SUBMITTED)

1. Parker, K.M.; Mitch, W.A. Halogens radicals as an unrecognized source of marine photo-oxidants. *Science*.
2. Chuang, Y.-H.; McCurry, D.L.; Tung, H.-H.; Mitch, W.A. Formation Pathways and Tradeoffs Between Haloacetamides and Haloacetaldehydes During Combined Chlorination and Chloramination of Lignin Phenols and Natural Waters. *Environ. Sci. Technol.*
3. McCurry, D.L.; Quay, A.N.; Mitch, W.A. Ozone Promotion of Chloropicrin Formation by Amine Oxidation to Nitro Compounds. *Environ. Sci. Technol.*

PEER-REVIEWED PUBLICATIONS

1. Zeng, T.; Mitch, W.A. Contribution of N-Nitrosamines and Their Precursors to Domestic Sewage by Greywaters and Blackwaters. *Environ. Sci. Technol.* **2015**, DOI: 10.1021/acs.est.5b04254
2. Choe, J.K.; Richards, D.H.; Wilson, C.J.; Mitch, W.A. Degradation of Amino Acids and Structure in Model Proteins and Bacteriophage MS2 by Chlorine, Bromine and Ozone. *Environ. Sci. Technol.*, **2015**, DOI: 10.1021/acs.est.5b03813.
3. Wang, Z.; Mitch, W.A. Influence of Dissolved Metals on N-nitrosamine Formation Under Amine-Based CO₂ Capture Conditions. *Environ. Sci. Technol.* **2015**, DOI: 10.1021/acs.est.5b03085.
4. Ren, Y.; Chen, Y.; Zeng, T.; Feng, J.; Ma, J.; Mitch, W.A. Influence of Bi-doping on Mn_{1-x}Bi_xFe₂O₄ catalytic ozonation of di-n-butyl phthalate. *Chem. Eng. Journal* **2016**, 283, 622-630.

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5. Howell, S.C.; Richards, D.H.; Mitch, W.A.; Wilson, C.J. Leveraging the Mechanism of Oxidative Decay for Adenylate Kinase to Design Structural and Functional Resistances. *ACS Chemical Biology* **2015**, *10*, 2393-2404.
6. McCurry, D.L.; Krasner, S.W.; von Gunten, U.; Mitch, W.A. Determinants of Disinfectant Pretreatment Efficacy for Nitrosamine Control in Chloraminated Drinking Water. *Water Res.* **2015**, *84*, 161-170.
7. Dai, N.; Mitch, W.A. Controlling Nitrosamines, Nitramines, and Amines in Amine-Based CO₂ Capture Systems with Continuous Ultraviolet and Ozone Treatment of Washwater. *Environ. Sci. Technol.* **2015**, *49* (7), 8878-8886.
8. Yang, Y.; Li, Y.; Walse, S.S.; Mitch, W.A. Destruction of methyl bromide sorbed to activated carbon by thiosulfate or electrolysis. *Environ. Sci. Technol.* **2015**, *49* (7), 4515-4521.
9. Xu, W.; Pignatello, J.J.; Mitch, W.A. Reduction of Nitroaromatics Sorbed to Black Carbon by Direct Reaction with Sorbed Sulfides. *Environ. Sci. Technol.* **2015**, *49* (6), 3419-3426.
10. Dai, N.; Zeng, T.; Mitch, W. A. Predicting N-Nitrosamines: N-Nitrosodiethanolamine as a Significant Component of Total N-Nitrosamines in Recycled Wastewater. *Environ Sci Technol. Let* **2015**, *2* (3), 54-58.
11. Harkness, J.S.; Dwyer, G.S.; Warner, N.R.; Parker, K.M.; Mitch, W.A.; Vengosh, A. Iodide, bromide, and ammonium in hydraulic fracturing and oil and gas wastewaters: environmental implications. *Environ. Sci. Technol.* **2015**, *49*, 1955-1963.
12. Zeng, T.; Pignatello, J.J.; Li, R.J.; Mitch, W.A. Synthesis and Application of a Quaternary Phosphonium Polymer Coagulant to Avoid N-Nitrosamine Formation. *Environ. Sci. Technol.* **2014**, *48*, 13392-13401.
13. McCurry, D.L.; Bear, S.E.; Bae, J.; Sedlak, D.L.; McCarty, P.L.; Mitch, W.A. Superior Removal of Disinfection Byproduct Precursors and Pharmaceuticals from Wastewater in a Staged Anaerobic Fluidized Membrane Bioreactor Compared to Activated Sludge. *Environ Sci Technol. Let* **2014**, *1*, 459-464.
14. Chu, W.; Gao, N.; Yin, D.; Krasner, S.W.; Mitch, W.A.; Impact of UV/H₂O₂ pre-oxidation on the formation of haloacetamides and other nitrogenous disinfection byproducts during chlorination. *Environ. Sci. Technol.* **2014**, *48* (20), 12190-12198.
15. Parker, K.M.; Zeng, T.; Harkness, J.; Vengosh, A.; Mitch, W.A.; Enhanced formation of disinfection by-products in shale gas wastewater-impacted drinking water supplies. *Environ. Sci. Technol.* **2014**, *48*, 11161-11169.
16. Wagner, E.D.; Osiol, J.; Mitch, W.A.; Plewa, M.J. Comparative in vitro toxicity of nitrosamines and nitramines associated with amine-based carbon capture and storage. *Environ. Sci. Technol.* **2014**, *48*, 8203-8211.
17. Dai, N.; Mitch, W. A., Effects of flue gas compositions on nitrosamine and nitramine formation in post-combustion CO₂ capture systems. *Environ. Sci. Technol.* **2014**, *48*, 7519-7526.
18. Mendez-Diaz, J.; Shimabuku, K.K.; Ma, J.; Enumah, Z.O.; Pignatello, J.J.; Mitch, W.A.; Dodd, M.C. Sunlight-driven photochemical bromination and iodination of dissolved organic matter in seawater. *Environ. Sci. Technol.* **2014**, *48*, 7418-7427.
19. Zeng, T.; Wilson, C.J.; Mitch, W.A. Effect of chemical oxidation on the sorption tendency of dissolved organic matter to a model hydrophobic surface. *Environ. Sci. Technol.* **2014**, *48*, 5118-5126.
20. Yang, Y.; Pignatello, J.J.; Ma, J.; Mitch, W.A. Comparison of Halide Impacts on the Efficiency of Contaminant Degradation by Sulfate and Hydroxyl Radical-Based Advanced Oxidation Processes (AOPs). *Environ. Sci. Technol.* **2014**, *48*, 2344-2352.

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21. Dai, N.; Mitch, W.A. Influence of amine structural characteristics of N-nitrosamine formation potential relevant to postcombustion CO₂ capture systems. *Environ. Sci. Technol.*, **2013**, *47*, 13175-13183.
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23. Xu, W.; Pignatello, J.J.; Mitch, W.A. The role of black carbon electrical conductivity in mediating hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) transformation on carbon surfaces by sulfides. *Environ. Sci. Technol.* **2013**, *47*, 7129-7136.
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30. **Dai, N.**; Shah, A.D.; Hu, L.; Plewa, M.J.; McKague, B.; Mitch, W.A. Measurement of nitrosamine and nitramine formation from NO_x reactions with amines during amine-based carbon dioxide capture for post-combustion carbon sequestration. *Environ. Sci. Technol.* **2012**, *46*, 9793-9801.
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33. Shah, A.D.; Mitch, W.A. Halonitroalkanes, halonitriles, haloamides and N-nitrosamines: A critical review of nitrogenous disinfection byproduct (N-DBP) formation pathways. *Environ. Sci. Technol.*, **2012**, *46*, 119-131.
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38. Schafer, A.I.; Mitch, W.A.; Walewijk, S.; Munoz, A.; Teuten, E.; Reinhard, M. Chapter 7 Micropollutants in water recycling: A case study of N-nitrosodimethylamine (NDMA) exposure from water versus food. *Sustainability Science and Engineering* **2010**, *2*, 203-228.
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53. Walse, S.S.; Mitch, W.A. Nitrosamine carcinogens also swim in pools. *Environ. Sci. Technol.*, **2008**, *42* (4), 1032-1037.
54. Schreiber, I.M.; Mitch, W.A. Enhanced nitrogenous disinfection byproduct formation near the breakpoint: implications for nitrification control. *Environ. Sci. Technol.*, **2007**, *41* (20), 7039-7046.
55. Joo, S.-H.; Mitch, W.A. Nitrile, aldehyde and halonitroalkane formation during chlorination/chloramination of primary amines. *Environ. Sci. Technol.*, **2007**, *41* (4), 1288-1296.
56. Schreiber, I.M.; Mitch, W.A. Nitrosamine formation pathway revisited: the importance of

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57. **Schreiber, I.M.**; Mitch, W.A. Occurrence and fate of nitrosamines and nitrosamine precursors in wastewater-impacted surface waters using boron as a conservative tracer. *Environ. Sci. Technol.*, **2006**, *40* (10): 3203-3210.
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 64. Mitch, W. A.; Sedlak, D. L. Formation of N-nitrosodimethylamine (NDMA) from dimethylamine during chlorination. *Environ. Sci. Technol.* **2002**, *36*, 588-595.
 65. Mitch, W. A.; Sedlak, D. L. Factors controlling nitrosamine formation during wastewater chlorination. *Water Sci Technol.: Water Supply* **2002**, *2*(3), 191-198.

BOOK CHAPTERS/REPORTS

1. Mitch, W.A.; Krasner, S.W.; Westerhoff, P.; Dotson, A. "Occurrence and Formation of Nitrogenous Disinfection By-Products". Final report for AwwaRF Project #3014, 2009.
2. Mitch, W.A.; Schmidt, C.K.; Krasner, S.W. "N-DBP Formation during Chlorination, Chloramination or Chlorine Dioxide Treatment of Drinking Water." Chapter in Organic Byproducts of Potential Health Concern in Drinking Water Treatment. Invited lecture: AWWARF- Suez-Environnement Workshop in Paris, France - March 5-9, 2007.
3. Schäfer, A.I.; Mitch, W.A.; Walewijk, S.; Munoz, A.; Teuten, E.; Reinhard, M. (2009) "Micropollutants in Water Recycling: A case study of N-nitrosodimethylamine (NDMA) exposure from water versus food." Chapter in Sustainable Water for the Future – Water Recycling versus Desalination. Escobar, I.C.; Schäfer, A.I. (Eds.); Sustainability Science and Engineering: Defining Principles, Series Editor Abraham M.A., Elsevier, Volume 2, pp. 201-28, 2009.

PAPERS IN CONFERENCE PROCEEDINGS

1. Mitch, W.A. "NDMA and Dimethylnitramine Formation in Drinking and Recreational Waters". American Water Works Association Water Quality Technology Conference, Charlotte, NC – November 7, 2007.
2. Wilczak, A.; Lai, H.H.; Mitch, W.A. "NDMA Formation in Chloraminated Distribution System. Is There an Effect of Nitrification? – EBMUD Experience". Proceedings of the Annual American Water Works Association Conference, June 2004, Orlando, FL.

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3. Mitch, W.A. "Fate of NDMA Precursors During Municipal Wastewater Treatment". Proceedings of the Annual American Water Works Association Conference, June 15-19, 2003, Anaheim, CA.
4. Schreiber, I.M.; Mitch, W.A. "Chloramination Techniques to Reduce NDMA Formation during Disinfection". Proceedings of the 2005 EEH Conference, October 5-7, 2005, Atlanta, GA.

PATENTS

Mitch, W.A. Phosphonium-based polyDADMAC for drinking water coagulation. 7/20/11.

Mitch, W.A. Ultraviolet-hydrogen peroxide advanced oxidation treatment to simultaneously control nitrosamine/nitramine and amine emissions from amine-based carbon capture. 11/5/11. Publication WO2012116171 A3 and Application number PCT/US2012/026309

Mitch, W.A. Method for reducing toxic byproducts of drinking water and wastewater disinfection. 8/10/09.

DOCTORAL STUDENT SUPERVISION

Current

Aleksandra Szczuka

Research Area: Linking energy-positive anaerobic wastewater treatment to direct potable reuse systems

Daniel McCurry

Research Area: Byproduct formation associated with wastewater recycling

Kimberly Parker

Research Area: Impact of halides on the indirect photolysis of contaminants in estuaries

Yuanqing Li

Research Area: Electrolytic destruction of methyl bromide

Previous

Wenqing Xu

Dissertation topic: Black carbon-catalyzed destruction of contaminants by sulfides in sediments

Affiliation: Assistant Professor, Villanova University

Ning Dai

Dissertation topic: Nitrosamine formation during carbon capture

Affiliation: Assistant Professor, State University of New York at Buffalo

Jerome M. Kemper

Dissertation topic: Abiotic destruction of RDX in marine sediments and nitrosamine formation from quaternary amines.

Affiliation: US EPA

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Janel E. Grebel

Dissertation topic: Impact of halides on engineered and natural photochemical processes

Affiliation: Kennedy/Jenks Consultants

I. Marie Schreiber

Dissertation topic: Formation of nitrosamines during chloramination: importance of chloramines speciation.

Affiliation: University of Barcelona

POST-DOCTORAL FELLOWS

Current

Brad Chuang: 2014-present

Research Area: DBP removal in advanced treatment trains for potable reuse

Zimeng Wang: 2014-present

Research Area: Nitrosamine formation during carbon capture

Jong Choe: 2013-present

Research Area: Byproducts of combined amino acids in blood

Teng Zeng: 2012-present

Research Area: Phosphorus based polyDADMAC for drinking water coagulation

Previous

Yu Yang: 2012-2013

Research Area: Electrolytic destruction of methyl bromide on activated carbon

Affiliation: Assistant Professor, University of Nevada at Reno

John Sivey: 2011-2012

Research Area: Byproducts of combined amino acids in blood

Affiliation: Assistant Professor, Towson University

Amisha Shah: 2008-2012

Research Area: N-DBP formation during UV disinfection and carbon sequestration byproducts

Affiliation: Assistant Professor, Purdue University

Lanhua Hu: 2011-2012

Research Area: Nitrosamine and nitramine formation during carbon capture

Affiliation: Nalco, Inc.

Pankaj Kulshrestha: 2009-2010

Research Area: Development of a total nitrosamine (TONO) assay

Affiliation: US EPA

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Michael Dodd: 2008-2009

Research Area: Abiotic halogenation reactions by reactive halogen species in seawater
Affiliation: Assistant Professor, University of Washington at Seattle

Spencer Walse: 2007-2008

Research Area: Transformation of combined amino acid residues during disinfection
Affiliation: USDA-ARS, Parlier, CA

Monica Lam: 2006-2007

Research Area: Abiotic halogenation reactions by reactive halogen species in seawater
Affiliation: Avon, Inc.

Sung Hee Joo: 2005-2006

Research Area: Nitrile formation mechanisms during wastewater recycling
Affiliation: Assistant Professor, University of Miami

CURRENT AND PAST FUNDING (Total \$3.7 million)

WaterReuse Research Foundation. "NDMA Precursor Control Strategies for Direct Potable Reuse". Co-P.I. \$50,000. 2015-2016. This research has been supported by the WaterReuse Research Foundation.

Water Research Foundation. "Major sources of nitrosamine precursors from raw waters and distribution systems." Co-P.I. \$62,500. 2015-2016. This research has been supported by the Water Research Foundation.

National Science Foundation. Elucidating a novel photodegradation pathway: impact of halides on the photodestruction of organic contaminants in estuarine and marine systems. \$336,000. 2011-2016. This research has been supported by the National Science Foundation.

USDA. "Retaining export and food security of U.S. specialty crops: low-emission methyl bromide fumigations for quarantine and pre-shipment uses". Foreign Agricultural Service Technical Assistance for Specialty Crops Cooperative Agreement. 2011-2016. \$500,000. This research has been supported by the US Department of Agriculture.

Woods Institute. "Simultaneous Reduction of Energy Consumption and Water Contamination from CO₂ Capture." Co-PI with Dr. Adam Brandt, Stanford University. \$100,000. 2015-2016.

Pre-Court Energy Institute. "From "Waste" Water to Fresh Water: Anaerobic Treatment for Energy-Neutral Potable Water." PI with Dr. Craig Criddle, Stanford University. \$200,000. 2015-2016.

Water Research Foundation #4452. "Investigating Coagulant Aid Alternatives to polyDADMAC Polymers." Co-P.I. \$100,000. 2011-2015. This research has been supported by the Water Research Foundation.

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Norwegian Government/Gassnova. Nitramine Analysis Procedures Development and Screening Toxicity Study for Carbon Sequestration. \$112,000. 2013-2014. This research has been supported by the Norwegian government (CCM).

Water Research Foundation #4370. "Controlling the formation of nitrosamines during water treatment." Co-P.I. \$110,000. 2011-2012. This research has been supported by the Water Research Foundation.

Water Research Foundation #4242. "Fate of non-regulated DBPs in distribution systems." Co-P.I. \$95,000. 2011-2012. This research has been supported by the Water Research Foundation.

Norwegian Government/Gassnova. Nitramine Analysis Procedures Development and Screening Toxicity Study for Carbon Sequestration. \$120,000. 2011-2012. This research has been supported by the Norwegian government (CCM).

Norwegian Government/Gassnova. "Atmospheric Chemistry - Aqueous Phase Chemistry". Subcontract to Sintef, Norway. \$99,000. 2011-2012. This research has been supported by the Norwegian government (CCM).

Norwegian Government/Gassnova. Nitramine Analysis Procedures Development and Screening Toxicity Study for Carbon Sequestration. \$146,000. 2010-2011. This research has been supported by the Norwegian government (CCM).

Yale Climate and Energy Institute interdisciplinary Research Grant. "Protecting Water Supplies from Nitrosamine and Nitramine Carcinogen Contamination by Carbon Sequestration Operations. 2011-2012. \$100,000. This research has been supported by Yale University.

Statoil Hydro, ASA. "Nitrosamine and nitramine formation relevant to carbon sequestration". \$90,000. 2010. This research has been supported by Statoil Hydro, ASA.

American Water Works Research Association Foundation #4180. "Development of a Protocol to Predict the Formation of Nitrosamine While Minimizing the Formation of Regulated DBPs." Co-P.I. \$160,000. 2009-2011. This research has been supported by the American Water Works Research Association Foundation.

American Water Works Association Research Foundation #4209. "Development and application of a total nitrosamine assay for disinfected waters." P.I. \$150,000. 2008-2011. This research has been supported by the American Water Works Research Association Foundation.

National Science Foundation – CBET. "CAREER: Use of Black Carbon for the In-Situ, Abiotic Destruction of Sediment-Associated Persistent Organic Pollutants with Sulfides: A Combined Research and Educational Plan." P.I. \$400,000. 2008-2012. This research has been supported by the National Science Foundation.

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American Water Works Association Research Foundation #3014 Project Continuation Grant. "Occurrence and formation of nitrogenous disinfection by-products". PI. \$25,000. 2007-2008. This research has been supported by the American Water Works Research Association Foundation.

National Science Foundation – CBET. "Collaborative Research: Predicting and tackling the emerging public health threat of nitrogenous disinfection byproducts." PI. \$200,000. 2007-2009. This research has been supported by the National Science Foundation.

American Water Works Association Research Foundation #3014. "Occurrence and formation of nitrogenous disinfection by-products". PI. \$350,000. 2005-2009. This research has been supported by the American Water Works Research Association Foundation.

American Water Works Association Research Foundation #4019. "Disinfection byproduct formation from UV treatment of drinking water". Co-PI with Dr. Karl Linden of Duke University and Dr. Howard Weinberg of University of North Carolina at Chapel Hill. Yale share: \$80,000. 2008-2010. This research has been supported by the American Water Works Research Association Foundation.

American Chemical Society Petroleum Research Fund G Grant #41207-G4. "N-nitrosamine, nitrile and halonitroalkane formation from chlorination and chloramination of alkylated amines." PI. \$35,000. 2004-2006. This research has been supported by the American Petroleum Research Fund.

INVITED LECTURES

1. Mitch, W.A. Reclamation of impaired waters to address water scarcity. Santa Clara University, October 23, 2015.
2. Mitch, W.A. Series of 5 lectures on current research topics. Peking University, Beijing, China, September 14-19, 2015.
3. Mitch, W.A. DBPs at the Water-Energy Nexus. Tsinghua University, Beijing, China. September 15, 2015.
4. Mitch, W.A. DBPs at the Water-Energy Nexus. 2015 Gordon Disinfection Byproducts Conference, Mt. Holyoke, MA. August 12, 2015.
5. Mitch, W.A. Wastewater as a California water supply. University of California at Davis. Civil and Environmental Engineering Department. May 12, 2015.
6. Mitch, W.A. Wastewater as a California water supply. RO Concentrate Workshop. Santa Clara Valley Water District, March 9, 2015.
7. Mitch, W.A. Nitrosamines in wastewater recycling: Predicting precursors and solutions. DBPs 2014, Mulheim, Germany, October 28, 2014.
8. Mitch, W.A. N-DBPs in swimming pools. World Aquatic Health Conference, Portland, OR, October 9, 2014.
9. Mitch, W.A. Effect of halides on UV/hydrogen peroxide and UV/persulfate AOPs in saline waters. EUCEM, Istanbul, September 3, 2014.
10. Mitch, W.A. Nitrosamines in Wastewater Reuse Predicting Byproducts and Solutions. American Chemical Society Meeting, San Francisco, August 4, 2014.
11. Mitch, W.A. Nitrogenous Disinfection Byproducts. University of California at Riverside, February 12, 2014.

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12. Mitch, W.A. Influence of Halides on Natural and Engineered Photolytic Processes. Duke University, November 4, 2013.
13. Mitch, W.A. Protein-Based Disinfection Byproducts. American Society of Mass Spectrometry. Asilomar, CA. October 21, 2013.
14. Mitch, W.A. Nitrogenous Disinfection Byproducts. Harbin Institute of Technology, China, September 10, 2013.
15. Mitch, W.A. Black Carbon-Mediated Destruction of Hydrophobic Contaminants By Sulfides Relevance to Marine Sediments. Harbin Institute of Technology, China, September 10, 2013.
16. Mitch, W.A. Frontiers in Disinfection Byproduct Research. Harbin Institute of Technology, China, September 11, 2013.
17. Mitch, W.A. Influence of halogen radicals on engineered and natural processes. Harbin Institute of Technology, China, September 12, 2013.
18. Mitch, W.A. Black Carbon-Mediated Destruction of Hydrophobic Contaminants By Sulfides Relevance to Marine Sediments. Keynote address at the 10th International Symposium on Persistent Toxic Substances at the University of Alberta at Edmonton, August 15, 2013.
19. Mitch, W.A. Predicting Drinking Water DBPs and Applications to Other Fields. University of Connecticut, November 2, 2012.
20. Mitch, W.A. Predicting Drinking Water DBPs and Applications to Other Fields. Harvard University, October 22, 2012.
21. Mitch, W.A. Predicting Drinking Water DBPs and Applications to Other Fields. Disinfection Byproducts Gordon Conference, Mt. Holyoke College, MA, August 6, 2012.
22. Mitch, W.A. Impact of halides on contaminant degradation in estuaries. Arizona State University, February 17, 2012.
23. Mitch, W.A. N-DBPs: Formation, Control, Precursors and New Frontiers. Cornell University, November 16, 2011.
24. Mitch, W.A. N-DBPs: Formation, Control, Precursors and New Frontiers. International Conference on Drinking Water Safety, Security and Sustainability. Hangzhou, China. October 9-12, 2011.
25. Mitch, W.A. N-DBPs: Formation, Control, Precursors and New Frontiers. OzWater 2011. Adelaide, Australia. May 9-11, 2011.
26. Mitch, W.A. N-DBPs: Formation, Control, Precursors and New Frontiers. University of Minnesota, Department of Civil and Environmental Engineering. December 9, 2010.
27. Mitch, W.A. N-DBPs: Formation, Control, Precursors and New Frontiers. University of Illinois at Urbana-Champaign, Water for Life/ WaterCAMPWS. November 11, 2010.
28. Mitch, W.A. N-DBPs: Formation, Control, Precursors and New Frontiers. University of Illinois at Urbana-Champaign, Department of Civil and Environmental Engineering. November 11, 2010.
29. Mitch, W.A. N-DBPs: Formation, Control, Precursors and New Frontiers. University of Nevada at Reno, Department of Civil and Environmental Engineering. November 4, 2010.
30. Mitch, W.A. N-DBPs: Formation, Control, Precursors and New Frontiers. Stanford University, Department of Civil and Environmental Engineering. October 22, 2010.
31. Mitch, W.A. Impact of Halides on Engineered and Natural Photo-Initiated Destruction of Organics: From EDCs to Global Warming. Environmental Sciences – Water Gordon Conference, June, 2010.
32. Mitch, W.A. Understanding organic nitrogen contributions from municipal wastewater and agricultural inputs on downstream drinking water utilities and ecosystems. French American Water, Agriculture and Climate Change Symposium. May 12, 2010 at Purdue University, Lafayette, IN.

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33. Mitch, W.A. N-DBPs: Formation, Control, Precursors and New Frontiers. University of Alberta at Edmonton, November 13, 2009.
34. Mitch, W.A. N-DBPs: What's in your water? University of New Haven, November 14, 2009.
35. Mitch, W.A. Nitrosamine and nitramine formation relevant to amine-based carbon sequestration. Amines for CO2 management – New Challenges for “Old Technology”. StatoilHydro Research Summit 2009. Trondheim, Norway, September 21-22, 2009.
36. Mitch, W.A. N-DBP Update: Formation, Control, Precursors and New Frontiers. Disinfection Byproducts Gordon Conference, Mt. Holyoke College, MA, August 10, 2009.
37. Mitch, W.A. Macro vs. micropollutants: what really matters? Humic Substances and Technology Conference, Boston, March 19, 2009.
38. Mitch, W.A. “Halide Oxidant Modifications to Amino Acid Side-Chains Implications for Drinking/Recreational Waters, Inflammation-Induced Carcinogenesis, and Chemical Oceanography”. University of Rhode Island Graduate School of Oceanography, April 25, 2008.
39. Mitch, W.A. “Combining Engineering and Chemistry to Handle the Emerging Public Health Threat of Nitrogenous Disinfection Byproducts” Amherst College, February 1, 2008.
41. Mitch, W.A. “N-DBP Formation during Chlorination Chloramination or Chlorine Dioxide Treatment of Drinking Water.” American Water Works Association Water Quality Technology Conference, Charlotte, NC – November 4, 2007.
42. Mitch, W.A. “N-DBP Formation during Chlorination, Chloramination or Chlorine Dioxide Treatment of Drinking Water.” Chapter in Organic Byproducts of Potential Health Concern in Drinking Water Treatment. AWWARF- Suez-Environnement Workshop in Paris, France - March 5-9, 2007.
43. Mitch, W.A. “Transformation of Amine-Containing Organic Matter into Toxic By-Products during Chlorination/Chloramination.” Humic Substance Society, Boston, March, 2007.
44. Mitch, W.A. “Converting Organic Nitrogen into Toxic Nitrogenous Disinfection By-Products during Chlorination/Chloramination.” *Gordon Research Conference* on Disinfection ByProducts at Mt. Holyoke College, August, 2006.
45. Mitch, W.A. “New Approaches to an Emerging Public Health Threat: Nitrogenous Disinfection By-Products”. WaterCAMPWS at the University of Illinois in Urbana-Champaign, February, 2006.
46. Mitch, W.A. “Towards a Rational Approach to Handle an Emerging Public Health Threat: Nitrogenous Disinfection By-Products”. Johns Hopkins University, November, 2005.
47. Mitch, W.A. “Converting organic nitrogen into toxic nitrogen-based disinfection by-products”. Georgia Institute of Technology, October, 2005.
48. Mitch, W.A.; Schreiber, I.M. “Chloramination Techniques to Reduce NDMA Formation during Disinfection”. 2005 EEH Conference, October 5-7, 2005, Atlanta, GA.
49. Mitch, W.A. “Preventing NDMA formation during chlorination”. University of Massachusetts at Amherst, February, 2004.
50. Mitch, W.A. “Minimization of N-nitrosodimethylamine formation during chlorination”. Massachusetts Institute of Technology, September, 2003.

LECTURES

1. Xu, W.; Mitch, W.A. “Black carbon properties that promote degradation of sorbed contaminants by sulfides” Presented at: American Chemical Society Meeting, Denver, August, 2011.

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2. Mitch, W.A. A Total Nitrosamine (TONO) Assay for Disinfected Waters. Presented at: American Water Works Association Water Quality Technology Conference, Savannah, GA, November 16, 2010.
3. Mitch, W.A. Tradeoffs in DBP Formation During Chloramination Following Pre-Oxidation for Nitrosamine Control. Presented at: American Water Works Association Water Quality Technology Conference, Savannah, GA, November 16, 2010.
4. Xu, W.; Mitch, W.A. "Black-carbon mediated in-situ remediation of nitroglycerin and RDX by hydrogen sulfide: Relevance to In-Situ Remediation" SETAC North Atlantic Chapter 2010 Annual Meeting, Narragansett, RI. June 2010.
5. Xu, W.; Dana, K.E.; Mitch, W.A. "Black-carbon mediated in-situ remediation of nitroglycerin and RDX by hydrogen sulfide" ACS National Meeting 2010, Boston, MA. August, 2010.
6. Kemper, J.M.; Mitch, W.A. Nitrosamine and dimethylnitramine formation during strong base anion exchange treatment. Presented at: American Chemical Society Meeting, Washington, D.C. August 19, 2009.
7. Mitch, W.A. Macro vs. Micropollutants: What Really Matters? Exploring Modifications to Combined Amino Acid Side Chains within the Matrix. Micropol Conference, San Francisco, CA, June 9, 2009.
8. Shah, A.D.; Dotson, A.D.; Weinberg, H.S.; Linden, K.G.; Mitch, W.A. Impact of UV Disinfection Combined with Chlorination/Chloramination on the Formation of Nitrogenous Disinfection Byproducts in Drinking Water. International UV Association and International Ozone Association Conference, Boston, MA. May 7, 2009.
9. Mitch, W.A. Dealing with wastewater-impaired waters. Presented at: Yale-New Haven Teachers' Institute, April 14, 2009.
10. Dana, K.; Mitch, W.A. Breakdown of RDX and HMX in the presence of sulfides and black carbon. Presented at: American Chemical Society Meeting, Salt Lake City, March 22, 2009.
11. Walse, S.S.; Mitch, W.A. Macro vs. micropollutants: what really matters? Presented at: American Chemical Society Meeting, Salt Lake City, March 22, 2009.
12. Grebel, J.E.; Pignatello, J.J.; Song, W.; Cooper, W.J.; Mitch, W.A. Impact of halides on the photobleaching of dissolved organic matter. Presented at: Humic Substances and Technology Conference, Boston, March 19, 2009.
13. Mitch, W.A. "What's in your water?" Yale Science Saturdays, October 11, 2008.
14. Walse, S.S.; Plewa, M.J.; Mitch, W.A. "Amino acid disinfection byproducts: Insights into formation, isolation, and toxicity". Presented at: 235th American Chemical Society National Meeting, New Orleans, April 7-8, 2008.
15. Walse, S.S.; Kemper, J.M.; Mitch, W.A. "Quaternary amines as nitrosamine precursors". Presented at: 235th American Chemical Society National Meeting, New Orleans, April 7-8, 2008.
16. Grebel, J.E.; Pignatello, J.J.; Mitch, W.A. "Advanced oxidative treatment of saline-impacted waters." Presented at: 235th American Chemical Society National Meeting, New Orleans, April 7-8, 2008.
17. Kemper, J.M.; Mitch, W.A. "Abiotic degradation of RDX in the presence of hydrogen sulfide and black carbon." Presented at: 233rd American Chemical Society National Meeting, Chicago, March 25-29, 2007.
18. Schreiber, I.M.; Mitch, W.A. "Enhanced nitrogenous disinfection byproduct formation near the breakpoint: implications for nitrification control." Presented at: 233rd American Chemical Society National Meeting, Chicago, March 25-29, 2007.

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19. Mitch, W.A. "NDMA and Dimethylnitramine Formation in Drinking and Recreational Waters". American Water Works Association Water Quality Technology Conference, Charlotte, NC – November 7, 2007.
20. Mitch, W.A. "Converting Organic Nitrogen into Toxic Nitrogenous Disinfection By-Products during Chlorination/Chloramination." Presented at: EAWAG, Zurich, Switzerland, October, 2006.
21. Mitch, W.A. "Update on Nitrosamine Research in the United States". Presented at: Global Water Research Coalition research advisory committee meeting in Karlsruhe, Germany, October, 2006.
22. Mitch, W.A. "The Influence of the order of reagent addition on NDMA formation during chloramination". Presented at: WateReuse Research Conference. Orlando, FL, June 23-24, 2005.
23. Mitch, W.A.; Sedlak, D.L. "Characterization and Fate of N-nitrosodimethylamine (NDMA) Precursors during Municipal Wastewater Treatment". Presented at: 226th American Chemical Society National Meeting, New York, September 7-11, 2003.
24. Mitch, W.A. "NDMA formation during wastewater chlorination". Presented at: 2003 WateReuse Foundation Annual Meeting in San Francisco, CA.
25. Mitch, W.A. "Factors controlling nitrosamine formation during wastewater chlorination". Presented at: International Water Association 2nd World Water Congress. October 15-19, 2001, Berlin, Germany.

ADVISORY COMMITTEES AND SERVICE

Outside the University

- US EPA Scientific Advisory Board, Drinking Water Committee, 2010-present.
- Guest Editor, Journal of Environmental Engineering, Special Issue, 2012.
- Project Advisory Committee for Water Research Foundation project 4343, "Transformation of Amines to Nitrosamines on Activated Carbons: Implications for Nitrosamine Analysis and Water Purification". 2010-2013.
- Project Advisory Committee for Water Research Foundation project 4295, "Anion Exchange Resins as a Source of Nitrosamines and Nitrosamine Precursors". 2009-2012.
- Project Advisory Committee for AWWARF project 4132, "Human Toxicogenomic Analysis of the Monohaloacetic Acids". 2010-2012.
- Project Advisory Committee for AWWARF project 4065, "Organic Chloramine Decay". 2008-2010.
- External expert to the Global Water Research Coalition meeting on future nitrosamine research, Karlsruhe, Germany, October, 2006.
- Project Advisory Committee for AWWARF project 2979, "Strategies for Minimizing Nitrosamine Formation during Disinfection of Drinking Water" 2005-2007
- Project Advisory Committee for WateReuse project 03-014, "Development of indicators and surrogates for chemical contaminant removal during wastewater treatment and reclamation" 2006-2008.
- Advisory Committee to assess future research needs for the WateReuse Foundation. February, 2004.

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- Project Advisory Committee for WaterReuse project 02-009, “Study of Innovative Treatments for Reclaimed Water” 2005-2007
- Technical Review Panel for Water Environment Research Foundation Project 04-HHE-4, “Disinfection of Wastewater Effluent – Comparison of Alternative Technologies”. 2007-2008.

Within the University

- 2004-2013: Founder and faculty advisor for the Yale chapter of Engineers without Borders
 1. Two trips to Honduras and 2 to Cameroon
- 2004-2009: Director of Undergraduate Studies for the Yale Environmental Engineering Program.
- 2005: Mentored minority high school students on research projects in my laboratory during the summer through the Connecticut Pre-Engineering Program (CPEP).
- 2011-2013: Director of Graduate Studies for the Yale Chemical and Environmental Engineering.
- 2013-2015: Environmental Engineering Systems graduate admissions committee.

CLASSES TAUGHT

Yale University

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| ENVE 120a | Introduction to Environmental Engineering |
| ENVE 377b | Water Quality Control |
| ENVE 448 | Environmental Transport Processes |
| ENVE 630 | Environmental Organic Chemistry |

Stanford University

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| CEE 174A | Providing Safe Water for the Developing and Developed World |
| CEE 174B | Wastewater Treatment: From Disposal to Resource Recovery |
| CEE 270B | Environmental Organic Chemistry |