DELAWARE RIVERKEEPER NETWORK

May 6, 2015

watersupply@dep.nj.gov
New Jersey Department of Environmental Protection
Trenton, New Jersey

Re: Development of a Practical Quantitation Level for Perfluorononanoic Acid (PFNA)

Please find enclosed a technical analysis prepared by Fardin Oliaei, MPA, PhD, and Don Kriens, Sc.D., P.E. of Cambridge Environmental Consulting commissioned by Delaware Riverkeeper Network and submitted on behalf of the organization and its membership on the Drinking Water Quality Institute's document **Development of a Practical Quantitation Level for Perfluorononanoic Acid (PFNA)**. Also attached is a PDF containing the Curriculum Vitae for Dr. Oliaei and for Don Kriens, Sc.D., P.E.

Delaware Riverkeeper Network submits these comments advocating that the public be protected from PFNA contamination and that New Jersey's drinking water be required to be treated to a safe level based on the best available scientific evidence.

We support the recommendations and findings made by Dr. Oliaei and Cambridge Environmental Consulting in this technical analysis regarding a Practical Quantitation Level (PQL) for PFNA. We support Dr. Oliaei's concurrence with the 5 ng/L PQL value for PFNA developed by the Drinking Water Quality Institute and with the methodologies used by the Drinking Water Quality Institute's Testing Subcommittee.

Thank you for developing an accurate PQL for PFNA, an action that is critically needed to carry out the effective measurement and removal of this toxic compound from New Jersey's drinking water supplies.

Sincerely,

Maya van Rossum
the Delaware Riverkeeper

Tracy Carluccio
Deputy Director

Attachments:

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Technical Analysis of NJ Drinking Water Quality Institute Proposed Health-Based Maximum Contaminant Level (MCL) for PFNA in Drinking Water

Curriculum Vitae - Fardin Oliaei, MPA, PhD. and Don Kriens, Sc.D., P.E.

Technical Analysis of New Jersey Drinking Water Quality Institute

Development of a Practical Quantitation Level for Perfluorononanoic Acid

prepared by

Fardin Oliaei MPA, Ph.D.

Don Kriens Sc.D., P.E.

Cambridge Environmental Consulting

May 5, 2015

Technical Analysis of Proposed NJDWQI Development of a Practical Quantitation Level for Perfluorononanoic Acid

prepared by

Cambridge Environmental Consulting

The Method Detection Limit (MDL) and derivative Practical Quantitative Level (PQL) are used to estimate the limits of performance of analytical methods for measuring contaminants. The MDL is the minimum detection capability of particular method reported by each laboratory and defined as the concentration of a contaminant (with true value greater than zero) that can be measured and reported with 99% confidence. The PQL is the minimum concentration for which the contaminant can be reliably quantitated within acceptable limits of uncertainty.

To develop an appropriate PQL requires a thorough evaluation of analytical methods with adequate sensitivity to detect PFNA at or below a proposed health based Maximum Contaminant Level (MCL). To develop the PQL for PFNA, the NJDWQI Testing Subcommittee considered accredited laboratories based on the National Environmental Laboratory Accreditation Program (NELAP), and those that are participating in the EPA Unregulated Contaminant Monitoring Rule 3 (UCMR3), and certified by NJDEP OQA for PFNA Analysis with Reporting Limit under 20ng/L. The Minimum Reporting Level (MRL) is defined as the minimum concentration by which PFNA is reliably quantitated by the individual laboratory.

The Testing Subcommittee evaluated the following three methods for deriving the PQL for PFNA:

1. **Developing PQL using MDLs** - The individual MDL value from nine laboratories was used to determine median MDL value of 0.4 ng/L as a representative inter-laboratory MDL. The PQL could be calculated by multiplying the median MDL by a factor of 4, 5, or 6 (Eaton, et. al., 1993). The Testing Subcommittee chose to use convention of multiplying the median MDL value by a factor of 5 to derive the **PQL of 2 ng/L** for PFNA based on the inter-laboratory MDL.

2. **Bootstrap Estimate of a Confidence Interval of a Mean –** Is an approach recently used by EPA that generates distribution and associated 95% upper and lower confidence intervals from the skewed values for inter-laboratory MDLs. The upper confidence limit from the Bootstrap method was multiplied by 5 to determine a PQL of 4.6 ng/L for PFNA. Bootstrap technique was also used for the reporting limit (RL) data, generating an upper confidence limit of 3.42 ng/L.

3. **Developing PQL using MRLs** –The Testing Subcommittee also assessed PQL value using the MRLs that account for both accuracy and precision as opposed to MDLs that are mainly measure of precision. The average of the reporting limits was calculated to be 4.9 ng/L. Since 4.9 ng/L is based on actual reporting limits obtained from laboratories, the Testing Subcommittee thus recommends **the PQL of 5 ng/L for PFNA.**

We concur with the methodologies used by the NJDWQI in evaluation of a PQL for PFNA, and concur with the 5 ng/l PQL value developed by the NJDWQI Testing Subcommittee.

References:

Eaton, Andrew, Principal Investigator, Evaluation of PQL Determination Methodologies, Division of Science and Research Final Report Contract P33501, 1993.

Curriculum Vitae **Fardin Zoe Oliaei**
fardin_oliaei@hks09.harvard.edu
Phone: 617-775-5797

PROFILE

- Accomplished scientist with years of experience in creating innovative solutions to challenging environmental problems related to public health, policy development and environmental sustainability.
- Experienced project manager with skills in the application of analytical methods and techniques necessary for working within the framework of state/federal environmental and public health organizations.
- Registered independent consultant in the UNEP and UNIDO experts' roster for U-POPs and New-POPs and implementation of the Stockholm Convention on Persistent Organic Pollutants.
- Rigorous researcher and team leader experienced in spearheading all phases of (planning, budgeting, developing, conducting, and directing) of environmental project management.
- Effective communicator with ability to translate complex scientific data into coherent material in order to inform audiences with varying degrees of knowledge about environmental issues.
- Conscientious professional with experience presenting expert witness testimony in litigation cases involving a wide range of environmental problems and related public health issues.
- Experienced college instructor developing and teaching natural sciences and environmental science and public health policy courses.

EDUCATION

Harvard University School of Public Health, Boston, MA
Audited several courses: Air Pollution; Water Pollution; and Risk Assessment

Harvard University John F. Kennedy School of Government, Cambridge, MA
Master in Public Administration
Concentration*:* Leadership and International Env. Health Policy and Management

Western Michigan University, Kalamazoo, MI
PhD in Environmental Sciences
- Dissertation title: Acid Rain and Lake Acidification Impacts on Aquatic Life

MS in Biology
- Thesis title: Drinking Water Quality and Waterborne Diseases in Rural Iran

National University of Iran, Tehran, Iran
BS Chemistry, Minor Biology

PROFESSIONAL EXPERIENCE

Cambridge Environmental Consulting, LLC., Boston, MA 2006 - Present
Senior Scientist and President

- "Visiting Professor" at the Iranian National Institute of Oceanography (INIO) - conducted training workshops for INIO staff/scientist and coastal management professionals on the policy aspects of coastal zone management and its implications. The training was tailored to the local cultural characteristics, government structure, resource integrity, and management needs of the country (2012).
- Invited by the Iranian Governor's Officials to visit and evaluate the environmental impacts of a historically contaminated site caused by the largest landfill located near the Caspian Sea. Developed an integrated solid waste management plan for implementation, including an assessment of all environmental risks, and the development of mitigation efforts required to minimize the adverse impacts on Public health and the environment (2012).
- Participated and presented two papers at Dioxin 2010 - 30th International Symposium on Halogenated Persistent Organic Pollutants (POPs) on 1) Presence of PBDEs in Minnesota Landfills – Environmental Releases and Exposure Potential, and 2) Investigation of PFOS/PFCs Contamination from a PFC Manufacturing Facility in Minnesota – Environmental Releases and Exposure Risks (2010).
- Chaired the "New POPs" Section (Implication of Stockholm Convention of New POPs) of the11th International HCH and Pesticide Forum, Cabala, Azerbaijan (2012).
- Serve as expert witness in environmental litigation pertaining to release of industrial toxic contaminants.
- Conduct evaluations of toxic contaminants (including New POPs) and use dispersion modeling (groundwater, surface water, soils and air) to evaluate contaminants' environmental impacts and public health risks.
- Review and evaluate EPA documents related to the issuance of new source National Pollutant Discharge Elimination System (NPDES) permits to industrial activities.

Women's Environmental Institute (WEI), St. Paul, MN 2006 - 2012
Principal Scientific Consultant

- Served as a WEI Board Member and later, as the principal scientific consultant, developed environmental justice education program to promote environmental awareness, sustainability, and health disparity.
- Directed and managed projects on environmental issues related to public health and environmental quality.
- Analyzed the effectiveness and efficiency of existing environmental and public health programs for the implementation and administration of programs best fit the affected communities. Identified and presented to public policy makers the problems affecting concerned communities.
- Evaluated the impact of toxic pollutants on the growth and development of exposed children. Developed multimedia outreach programs to inform families about toxic exposure and consequences.
- Developed culturally specific environmental training and educational seminars for exposed communities through different radio stations and newspapers.

Mote Marine Laboratory, Sarasota, FL 2007- 2008
Associate Scientist

- Designed health risk assessment framework to evaluate potential exposure pathways and toxicity effects of contaminants in Florida manatees. Contributed to development of research proposals.
- Evaluated public and environmental regulatory policies and proposed effective mitigation tools

Minnesota Pollution Control Agency (MPCA), St. Paul, MN 1989 - 2006
Senior Scientist, Project Manager, and Emerging Contaminants Program Coordinator

- Developed policy, program analysis methods, and multimedia strategy to assess health impact of toxic chemicals.
- Initiated and led the Emerging Contaminants Program for the competent authority (MPCA).
- Prepared Environmental Impact Assessments (EIS) for major projects in MN and communicated the results, including the potential social, and economic impacts of these projects with authorities and public.
- Represented the MPCA as a scientific expert, liaison, and critical state contact in the PCBs, Dioxin, and emerging contaminants activities of the US EPA, Great Lakes Binational Strategy (GLBNS) and in other related national and international programs.
- Worked closely with diverse array of clientele and stakeholders (federal and state governments, industry, grass root organizations, affected communities, and the state legislators) to develop progressive environmental policies and educational materials.
- Presented at international conferences and gave presentations regarding environmental issues in public meetings, legislative hearings and governmental agencies.
- Managed contracts and secured federal/state grants and awards for health impacts of contaminant in Minnesota.
- Developed statewide air toxics monitoring/bio-monitoring network using mass balance and integrated air exposure-effect models.
- As the technical coordinator and MPCA liaison, built partnership between PCA and other sister agencies (MN Department of Health, MN Department of Natural Resources, and MN Department of Agriculture), USA EPA, and MN university researchers for ongoing efforts to identify, evaluate, control, regulate, and reduce the emerging pollutants with endocrine disruptive characteristics (PFOS and PFOA, PBDEs, and pharmaceuticals).
- Assessed the current regulations and programs already in place that may be addressing reduction of toxic contaminants of concern, identified unregulated emerging contaminants of greatest potential risk to human health and the MN environment, rationale of why these contaminants need to be regulated.

TEACHING EXPERIENCE

Teach biology, chemistry, environmental science, health and policy-related courses (Elements of Health and Wellness, Foundations of Research, Public Policy Planning and Implementation), part-time at:

• **University of Phoenix** – Adjunct Faculty	Boston, MA	2010 - Present
• **Regis College** – Adjunct Professor	Weston, MA	2012 - 2013
• **Hamline University –** Adjunct Assistant Professor	St. Paul, MN	2002 - 2003
• **St. Paul College –** Adjunct Assistant Professor	St. Paul, MN	1998 - 2002
• **Inver Hills Community College** – Adjunct Faculty	St. Paul, MN	1996 - 2002
• **Minnesota Department of Corrections**	Various locations	1998 - 2000
• **Normandale Community College** – Adjunct Faculty	Bloomington, MN	1990 - 1998
• **Northland College** – Assistant Professor	Ashland, WI	1986 - 1989
• **Western Michigan University** – Teaching Assistant	Kalamazoo, MI	1980 - 1985

PROFESSIONAL AFFILIATIONS

- Member, **PCB Elimination Network (PEN)** of the Stockholm Convention 2011 - Present
- Member, **Society of Environmental Toxicology and Chemistry** 1990 - Present
- Member, Board of Directors, **Women's Environmental Institute** 2003 - Present
- Member, **Aquatic Biogeochemistry Research Group,** Harvard University, Harvard School of Public Health (HSPH) 2010 - 2012
- Member, **American Chemical Society** 1992 - 2010
- Member, **Air and Waste Management Association** 1998 - 2010

LANGUAGE SKILLS

- Fluent in English and Farsi (Persian)

PUBLICATIONS

- Brambilla, G., d'Hollander, W. Oliaei, F., Stahl, T., and Weber, R. Pathways and factors for food safety and food security at PFOS contaminated sites within a problem based learning approach, Accepted for publication at Chemosphere, 2014.
- Oliaei, F., Weber, R., Watson, A., and Kriens, D. Review of Environmental Releases and Exposure Risk of PFOS/PFAS Contamination from a PFOS Production Plant in Minnesota. Environmental Science and Pollution Research, 2013.
- Oliaei, F., Weber, R., and Watson, A. Landfills and Wastewater Treatment Plants as Sources and Reservoir of Polybrominated Diphenyl Ether (PBDE) Contamination. Environmental Science and Pollution Research, 2012.
- Weber, R., Watson, A., and Oliaei, F. *The Stockholm Convention Listing of New POPs – Implications and Follow Up Activities.* 11th International HCH and Pesticide Forum, Cabala, Azerbaijan, 2011.
- Oliaei, F., Weber, R., and Watson, A. *Landfills and Wastewater Treatment Plants as Sources of Polybrominated Diphenyl Either (PBDE) Contamination.* 11th International HCH and Pesticide Forum, Cabala, Azerbaijan, 2011.
- Oliaei, F., Weber, R., and Watson, A. Contamination of Drinking Water and the Environment by Production and Industrial Use of Perfluoroalkyl Compounds (PFCs). 11th International HCH and Pesticide Forum, Cabala, Azerbaijan, 2011.
- Weber, R., Watson, A., Forter, M., and Oliaei, F. *Persistent Organic Pollutants and Landfills – A Review of Past Experiences and Future Challenges.* Journal of Waste Management & Research, 29(1), 107-121, 2011.
- Oliaei, F., Weber, R., and Watson, A. *Presence of PBDEs in Minnesota Landfills – Environmental Releases and Exposure Potential.* Organohalogen Comp. 72, 1346-1349, 2010. http://www.dioxin20xx.org/pdfs/2010/10-1509.pdf
- Oliaei, F, Kriens, D, and Weber, R. *Investigation of PFOS/PFCs Contamination from a PFC Manufacturing Facility in Minnesota – Environmental Releases and Exposure Risks.* Organohalogen Comp. 72, 1338-1341, 2010. http://www.dioxin20xx.org/pdfs/2010/10-1507.pdf.
- Oliaei (2010), *Update on PFC Investigation and Health Risks*, http://www.w-e-i.org/update-pfc-investigation-and-health-risks-fardin-oliaei-2010
- Oliaei, F., and Kriens, D. *Environmental Releases of Perfluoroalkyl compounds from Two Landfills at the PFOS/PFC Production Site in Minnesota.* EPA – PFAA Day III, 2010.

- Oliaei, F., and Kriens, D. *Discovery of PFOS/PFC Contamination in Fish Near a PFOS/PFC Manufacturing Plant in Minnesota.* EPA – PFAA Day III, 2010.
- Oliaei, F., Kriens, D., and Kessler, K. *Perfluorochemical (PFC) Investigation in Minnesota: Phase One.* Minnesota Pollution Control Agency (MPCA). Legislative Report 2006. (79 pages).
- Oliaei, Fardin. *The presence and Distribution of Perfluorochemicals (PFCs) in Minnesota.* The EPA, Federal-State Toxicology and Risk Analysis Committee Meeting (FSTRAC), 2005.
- Oliaei, Fardin. *Flame Retardant: Polybrominated Diphenyl Ethers (PBDEs) in Minnesota.* Minnesota Pollution Control Agency (MPCA). Legislative Report 2005. (34 pages).
- Oliaei, Fardin. *The Presence and Distribution of PBDEs in MN's Landfills, Wastewaters and the Environment.* Minnesota Pollution Control Agency (MPCA). Annual Report of the Closed Landfill Program (CLP). 2004
- Oliaei, F., and Hamilton, C. *PBDE congener profiles in fish with different feeding behaviors from major rivers in Minnesota.* Organohalogen Comp. 64, 356-359, 2003.
- Oliaei, F., King, P., and Phillips, L. *Occurrence and Concentrations of Polybrominated Diphenyl Ethers (PBDEs) in Minnesota Environment.* Organohalogen Comp. 58, 185-188, 2002.
- Pratt, G., Oliaei, F., Wu, C., Palmer, K., and Fenske, M. *An Assessment of Air Toxics in Minnesota.* Environmental Health Perspective. 108(9), 815-825, 2002.
- Oliaei, Fardin. *Flame Retardants: Persistent, Bioaccumulative and Toxic Chemicals.* The EPA, Federal-State Toxicology and Risk Analysis Committee Meeting (FSTRAC). 2000.
- Oliaei, Fardin. *Toxic Air Pollutant Update.* Minnesota Pollution Control Agency (MPCA). 1999.
- Oliaei, Fardin. *Minnesota Air: Air Quality and Emissions Trends.* Minnesota Pollution Control Agency (MPCA). 1997, (215 pages).
- Pratt G., Gerbec, P., Livingston S., Oliaei F., Bollweg G., Paterson S., and Mackay D. *An indexing system for comparing toxic air pollutants based upon their potential environmental impacts.* Chemosphere 27(8), 1359-1379, 1993.

Don Kriens **Curriculum Vitae**

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Oakdale, MN 55128 dlk810@mail.harvard.edu

AREAS OF EXPERTISE

- Professional engineer - range of civil and environmental engineering projects, and design.
- Exposure and risk assessments for human health.
- Project manager - toxic contaminant cleanup projects.
- Design of water/wastewater treatment systems, hydro-geologic studies, remediation projects, stormwater control, and hazardous waste cleanups (Superfund).
- Industrial technologies and processes, pollution prevention, industrial process chemistry, and application of emerging treatment technologies to industries.
- HAZMAT trained.
- Regulatory enforcement, civil and criminal. Skilled in technical writing and presentation, and negotiation. Knowledge of federal and state environmental regulatory programs.
- Global water scarcity problems, environmental policy and justice, climate change impacts, energy, and engineering economic analysis.
- Modeling exposure and risk of chemicals, including disinfection byproducts and contaminants in drinking water supplies.

EDUCATION

HARVARD UNIVERSITY, Cambridge, MA
Sc.D. Environmental Health
Concentration - Exposure Sciences

HARVARD UNIVERSITY, Cambridge, MA
M.S. Environmental Health

UNIVERSITY OF IOWA, Iowa City, Iowa.
M.S. Environmental Engineering

UNIVERSITY OF IOWA, Iowa City, Iowa.
B.S. Sciences

AWARDS
Bush Foundation Leadership Fellow 2008
U.S. EPA Civil and Criminal Investigation Award
Harvard University Andelot Scholarship
Harvard University Water Initiative Fellow

PROFESSIONAL EXPERIENCE

1978-2008 MINNESOTA POLLUTION CONTROL AGENCY, St. Paul, MN

Principal Engineer
- Lead agency technical expert for water projects. Mentor to engineers, hydro-geologists, and other technical staff.

- Research projects to assess ecological and health impacts of contaminants. Evaluated emerging technologies to resolve pollution problems.
- Conducted major civil and criminal environmental investigations with MN Attorney General staff, U.S. Attorney's Office, USEPA Region V. Expert witness.
- Developed major industrial environmental permits, determined technologies required to comply. Assessed economic impact of regulations.
- Technical expert for water/wastewater treatment, remediation and hazardous waste, water supplies.
- Technical expert for emergency response regarding toxics and resolution. Project manager and/or engineer for remediation of various toxic waste sites.

1996-2008 Kriens Engineering, Oakdale, MN
Consulting Engineer and Owner
- Design of Individual Sewage Treatment Systems. Groundwater (well) analysis and water consulting.

Castek Consulting Engineering Services
Engineer
- Operation, design, and process chemistry evaluations of wastewater treatment plants; air pollution studies; indoor air quality assessments.

TEACHING EXPERIENCE

Harvard University
- Teaching Assistant in water pollution and risk assessment. Lecturer in water scarcity at Harvard Extension School.

Kirkwood Community College, Cedar Rapids, Iowa
- Instructor; wrote courses in chemistry/advanced chemistry of wastewater treatment.

University of Iowa Department of Civil and Environmental Engineering, Iowa City, Iowa
Research Scientist and Environmental Engineering Laboratory Supervisor
- Supervised laboratory conducting biological and chemical analyses, including GC and GC/MS. Conducted field studies. Occasional teaching assistant.

LICENSES AND PROFESSIONAL AFFLILIATIONS

- Registered Professional Engineer
- Individual Sewage Treatment System Designer (Minnesota)
- Certification in air quality inspections (California Air Resources Board)
- Certification in Stormwater Treatment and Erosion Design
- Member, Minnesota Government Engineers Council
- Member, Society of Professional Engineers

PAPERS AND PUBLICATIONS

Listing available on request