OMB No. 0925-0001 and 0925-0002 (Rev. 03/2020 Approved Through 02/28/2023)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Patrick T. O’Shaughnessy

eRA COMMONS USER NAME (credential, e.g., agency login): OSHAUGHNESSY

POSITION TITLE: Professor

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

| INSTITUTION AND LOCATION | DEGREE  (if applicable) | Completion Date  MM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| University of Vermont, Burlington, VT | B.S. | 1980 | Wildlife Biology |
| University of Vermont, Burlington, VT | M.S | 1993 | Civil Engineering |
| University of Vermont, Burlington, VT | Ph.D | 1996 | Environmental Engineering |

A. Personal Statement

Dr. O’Shaughnessy has been a member of the department of Occupational and Environmental Health since 1997. He is the Associate Head for Student Affairs and Curriculum and the Director of the NIOSH-funded Heartland Center for Occupational Health and Safety, a training grant that helps provide stipend and tuition support to over 40 graduate students each year. He has developed expertise in the general area of aerosol physics, specializing in the assessment of aerosol sampling devices, the hazards associated with nanoparticles, the properties of respirators worn in agricultural environments, and the dispersion of dusts and gases spatially from air pollution sources.

B. ****Positions, Scientific Appointments, and Honors****

**Positions and Scientific Appointments**

2018–present Professor, Department of Occupational and Environmental Health, The University of Iowa, Iowa City, IA

2018-present Member, ISO TC 146 – Workplace Atmospheres

2010-present Director, Heartland Center for Occupational Health and Safety Education and Research Center

2004-present Member, Editorial Board of the Journal of Occupational and Environmental Hygiene

1998–present Member, American Industrial Hygiene Association

1993–present Member, American Association for Aerosol Research

2003–2010 Associate Professor, Department of Occupational and Environmental Health (75%) and Department of Civil and Environmental Engineering (25%), The University of Iowa, Iowa City, IA

2002–present Associate Head for Student Affairs and Curriculum, Department of Occupational and Environmental Health, College of Public Health, The University of Iowa, Iowa City, IA

1997-2003 Assistant Professor, Department of Occupational and Environmental Health (75%) and Department of Civil and Environmental Engineering (25%), The University of Iowa, Iowa City, IA

**Honors**

1994, 2004, 2022 Outstanding Aerosol Paper Award, American Industrial Hygiene Association Journal

2020 John M. White Best Paper Award, AIHA Respiratory Protection Committee

2002 Collegiate Teaching Award, University of Iowa

2008 Outstanding Individual Contributor Award, American Industrial Hygiene Association

2008 Certified Industrial Hygienist, American Board of Industrial Hygiene

2008 Member, Delta Omega Honorary Public Health Society

2014 Fellow, American Industrial Hygiene Association

**C. Contributions to Science**

1. Environmental Exposure Assessment and Modeling: The primary aspect of my research related to this competitive renewal is my research related to both the assessment of exposures to ambient pollutants and the use of dispersion models to simulate pollutant migration from a source. My research with regards to pollutants in the ambient environment has been associated with those emanating from agricultural facilities and their effect on local rural populations. My research has also investigated exposures of toxic compounds to workers. Modelling efforts have also included those in collaboration with EHSRC member Dr. Ching-Long Lin who is renowned for his sophisticated computational fluid dynamic models of the human lung and the use of it to determine the deposition of particles in the lung. Examples of publications in this area include:
   1. O'Shaughnessy PT, Altmaier R. (2011) Use of AERMOD to determine a hydrogen sulfide emission factor for swine operations by inverse modeling. *Atmospheric Environment, 45*, 4617-4625. PMC: PMC3144569, PMID: DOI:10.1016/j.atmosenv.2011.05.061
   2. Peters T, O'Shaughnessy P, Grant R, Altmaier R, Swanton E, Falk J, Osterberg D, EP, Wyland N, Sousan S, Stark A, Thorne P (2017). Community Airborne Particulate Matter from Mining for Sand used as Hydraulic Fracturing Proppant. *Science of the Total Environment*, 609:1475-1482.
   3. Stapleton EM, O'Shaughnessy PT, Locke SJ, Altmaier RW, Hofmann JN, Beane Freeman LE, Thorne PS, Jones RR, Friesen MC (2018). A Task-based Analysis of Black Carbon Exposure in Iowa Farmers During Harvest. Journal of Occupational and Environmental Hygiene, 15(4):293-304.
   4. O'Shaughnessy P, LeBlanc L, Pratt A, Altmaier R, Rajaraman P, Walenga R, Lin C (2020). Assessment and Validation of a Hygroscopic Growth Model with Different Water Activity Estimation Methods. Aerosol Science and Technology, 54(10):1169-1182.
2. Inhalation Toxicology Support: **My early research career was associated with an inhalation toxicology facility at the University of Vermont where the emphasis of the studies conducted was related to crystalline silica and asbestos aerosol exposures. That experience provided me with the expertise needed to support the inhalation toxicology research conducted at the University of Iowa which has emphasized the toxicology of organic aerosols and nanoparticles. My contributions to those studies were primarily associated with aerosol delivery and measurement. For example, inhalation systems were developed and well characterized prior to actual animal exposures using both whole-body and nose-only systems. Sophisticated instruments were used to continually monitor aerosol concentrations as well as to characterize their mass concentration and size distribution. The studies related to nanoparticle exposures were performed as a member of a large team that also included physical chemists and toxicologists. Our results were some of the first to demonstrate toxicological differences resulting from exposure to nanoparticles of varying sizes. We have added extensively to the literature with regards to the pulmonary toxicity of a number of metal and metal-oxide nanoparticles. Examples of publications in this area including the following:**
   1. Adamcakova-Dodd A, Stebounova LV, Kim JA, Vorrink SU, Ault AP, O'Shaughnessy PT, Grassian VH, Thorne PS. (2014) Toxicity Assessment of ZnO Nanoparticles using Sub-acute and Sub-chronic Murine Inhalation Models. *Particle and Fibre Toxicology, 11*(15), 1-15. PMC: doi:10.1186/1743-8977-11-15.
   2. O'Shaughnessy PT, Adamcakova-Dodd A, Altmaier R, Thorne PS (2014). Assessment of the Aerosol Generation and Toxicity of Carbon Nanotubes. Nanomaterials, 4(2):439-453.
   3. Parizek NJ, Steines BR, Haque E, Altmaier R, Adamcakova-Dodd A, O'Shaughnessy PT, Thorne PS (2020). Acute in vivo Pulmonary Toxicity Assessment of Occupationally Relevant Particulate Matter from a Cellulose Nanofiber Board. NanoImpact, 17:100210.
   4. Areecheewakul S, Adamcakova-Dodd A, Givens B, Steines B, Wang Y, Meyerholz DK, Parizek N, Altmaier R, O'Shaughnessy P, Salem A, Thorne PS (2020). Toxicity assessment of metal oxide nanomaterials using in vitro screening and murine acute inhalation studies. NanoImpact, 18:100214.
3. Assessment/Enhancement of Aerosol Sampling Devices and Sensors: A third area of my research directly involved with this grant application concerns the assessment and/or enhancement of aerosol sampling devices and sensors. Both gravimetric samplers and direct-reading instruments are commonly used to assess aerosol exposures in both inhalation toxicology and workplace settings. My research has helped to establish the use of direct-reading aerosol sensor in a wide variety of settings. Particular emphasis has been devoted to the assessment of airborne nanoparticles. As such I have aided the field of industrial hygiene by providing guidance on the use of hand-held particle counters for assessing engineered nanoparticles that escape from fabrication equipment and become an inhalation hazard in workplaces**. Examples of publications in this area include the following:**
   1. Schmoll L, Peters TM, O'Shaughnessy PT. (2010) Use of a condensation particle counter and an optical particle counter to assess the number concentration of engineered nanoparticles. *Journal of Occupational and Environmental Hygiene, 7*, 535-545
   2. O'Shaughnessy PT (2013). Occupational health risk to nanoparticulate exposure. Environmental Sciences: Processes and Impacts, 15(1):49-62
   3. O'Shaughnessy PT, Cavanaugh JE (2015). Performing T-tests to Compare Autocorrelated Time Series Data Collected from Direct-Reading Instruments. Journal of Occupational & Environmental Hygiene, 12:743-752.
   4. O'Shaughnessy P, Stoltenberg A, Holder C, Altmaier R (2020). Laboratory evaluation of a personal aethalometer for assessing carbon nanotube exposures. Journal of Occupational and Environmental Hygiene, 17(6):262-273
4. Modeling and Assessment of Respirators: A fourth area of my research involves the modeling and assessment of respirators in the lab and workplaces. This research originated with the perceived need to protect workers in swine facilities within which engineering controls to minimize dusts are limited. More recent research has focused on the lack of respirators in hospital setting during the first two years of the Covid pandemic. Modeling of respirator performance and the use of those models to optimize their performance continues to be a major aspect of my current research.
   1. Ramirez J, O'Shaughnessy PT (2016). The Effect of Simulated Air Conditions on N95 Filtering Facepiece Respirators Performance. *Journal of Occupational and Environmental Hygiene*, 13(7):491-500
   2. Ramirez JA, O'Shaughnessy PT (2017). Filter Penetration and Breathing Resistance Evaluation of Respirators and Dust Masks. *Journal of Occupational and Environmental Hygiene*, 14(2):148-157.
   3. Clinger JC, O'Shaughnessy P (2019). Breakthrough analysis for filtering facepiece respirators impregnated with activated carbon. *Journal of Occupational and Environmental Hygiene*, 16(7):423-431.
   4. O'Shaughnessy PT, Strzelecki B, Ortiz-Hernandez M, Aubin P, Jing X, Chang Q, Xiang J, Thorne Ps, Stapleton JT (2021). Characterization of performance and disinfection resilience of nonwoven filter materials for use in 3D-printed N95 respirators. *Journal of Occupational and Environmental Hygiene*, 18(6):265–275.