PFAS Research & Development Programs

Our world is facing complex environmental challenges that call for innovative solutions – solutions that push the boundaries of scientific discovery and deliver cost-effective services to clients around the world.

Discovering new ways to resolve the environmental challenges of our era is the sweet spot where Golder thrives. We are breaking new ground with our research into testing, assessment and treatment of Per- and Polyfluoroalkyl Substances (PFAS) that will provide leading edge solutions to address the issues posed by this challenging class of emerging contaminants.

Some of our current PFAS research programs include:

TESTING & SCREENING

- **PFAS Insight™ Passive Sampler**
  Scope of the project: Golder-Battelle collaboration deploying and evaluating the PFAS Insight™ passive sampler being developed by Battelle, a global research and development organization committed to science and technology. The PFAS Insight passive sampler, made with polymeric sorbent material for measurement of both ionic and neutral PFAS in groundwater and surface water, provides a quantitative time-integrated monitoring method that is a potential market changer given the current ecological and human health concerns. Other advantages include measurement of the truly dissolved fraction that drives toxicity, improved detection limits, no disturbance of water column, lower risk of cross-contamination, less time in the field and no water disposal.

  Timeframe: First wave of field deployment at Golder sites in August 2019

  Contacts: Blair McDonald and Stefano Marconetto

- **Analytical Tools, Fate and Transport and Toxicity**
  Scope of the project: Partnership between Golder and Örebro University in Sweden to develop and optimize analytical protocols for novel PFAS and total organic fluorine screening; understand fate of structurally different PFAS and PFAS precursors by studying mobility and parameters affecting speciation; conduct broad analysis of PFAS and TOP/TOF analysis in different media to facilitate risk assessment; investigate toxicity drivers and establish effect-oriented chemical and biological analysis using mechanistic studies, metabolomics and genomic methods.

  Timeframe: Project started in 2017. First term ended December 2019. A new 3-year partnership was signed in January 2020

  Contacts: Maria Florberger and Katarina Nilsson

SOIL REMEDIATION/TREATMENT

- **Ball-milling**

  Scope of the project: Conducted in partnership with Queen's University, Royal Military College of Canada and a global oil & gas corporation through an NSERC applied research grant. One of the techniques being developed consists of PFAS destruction in soil/sediment using a ball mill. This technique has been developed by the team over the last few years, demonstrating that it can work on soils, under varying conditions, in the laboratory. Recently, very promising results with significant destruction of all the PFAS measured were obtained using field soils from a fire-fighting training area. A patent application has been filed by Queen's University and the Royal Military College of Canada. Golder is now working with the research team on further optimization, scaling and future field implementation.

  Timeframe: 3-year project that started in October 2018

  Contacts: Andrew Madison, Steve Finn and Stefano Marconetto

WATER/WASTEWATER TREATMENT

- **Electro-oxidation**

  Scope of the project: Golder is participating with McGill University and a confidential manufacturer in a research project that applies electro-oxidation using electrodes to selectively electro-generate hydroxyl radicals to oxidise in-situ surfactants and PFAS without the use of consumables or the generation of by-products. The primary goal is to understand the action mechanisms of the proprietary electrodes and reaction by-products. The secondary goal is to evaluate the estimated cost of this technology compared to conventional technologies.

  Timeframe: Started in January 2019

  Contacts: Valérie Léveillé and Éric Bergeron

- **Non-thermal Ionized Plasma**

  Scope of the project: Research conducted in partnership with McGill University in Montreal. Non-thermal ionized gas mixture of reactive oxygen and nitrogen species collide with gas/water molecules producing secondary electrons, ions and radicals that destroy PFAS. Preliminary results demonstrate that this plasma source can treat PFAS; however, optimized action is required for commercial use. Other non-thermal plasma technologies have also been proven at lab-scale and pilot-scale for PFAS treatment and the project team is currently investigating them for a demonstration project with Golder's clients.

  Timeframe: January 2018 through March 2019

  Contacts: Valérie Léveillé and Éric Bergeron

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