



NSERC Industrial Research Chair

Fertilizer Ore and Exploration

Dr. Peir K. Pufahl

A research collaboration led by Dr. Peir K. Pufahl, with Acadia University, the Natural Sciences and Engineering Research Council of Canada, and industry partners.

The Issue

The impending phosphorus crisis is the gravest natural resource shortage you've never heard of.

Cordell et al, 2009

The looming global shortage of phosphorites reflects the critical need for new geologic methods to identify potential deposits which can be brought into production. In addition to phosphorus, these ores contain many of the micronutrients essential for healthy crops, including chloride, molybdenum, zinc, and selenium.

In the absence of progress, many nations will, like Canada, remain reliant on imported rock phosphate, sourced from a small number of countries with known reserves, many of which are in a state of chronic political unrest.

The Answer

How important is phosphate? Without plentiful supplies, the wheels will come off modern agriculture, with its bountiful harvests and ability to feed a teeming planet

The Globe and Mail, 2013

There is an urgent global need to undertake new phosphorus exploration and production efforts.

Against this background, it is extremely encouraging that the Natural Sciences and Engineering Research Council of Canada (NSERC) has invited Dr. Peir K. Pufahl to apply for a Senior Industrial Research Chair in Fertilizer Ore and Exploration to address this critical problem.

Dr. Pufahl is a world-renowned applied sedimentologist and a Professor in the Department of Earth and Environmental Science at Acadia University. As Canada's only phosphorite specialist his expertise is in high demand and he collaborates extensively with leading researchers and companies, in Canada and in other countries, to understand the geologic processes that create phosphorus ore bodies.

Dr. Pufahl has created ore deposit models which have been successfully applied by industry, resulting in increased production from existing ore bodies, and critically, in the discovery of new exploration targets.

The Project

Our dwindling supply of phosphorous for fertilizer threatens to disrupt food security across the planet during the coming century.

Kuntz, 2010

A primary objective of the Industrial Research Chair is to foster new partnerships between academia and industry, geared to the development and application of state-of-the-art phosphorite exploration models tuned for phosphorus production. Innovative models will also be developed for conventional and unconventional potassium deposits. Progress along these lines will enable us to identify and unlock the potential of untapped reserves around the world.

Understanding the timing and nature of mineralization using an array of microbeam, x-ray, and geochemical techniques will assist in determining the most cost-effective way to concentrate ore. A parallel goal is to create novel methods to extract critical micronutrients during the beneficiation process.

With currently-known global reserves expected to be fully depleted in 50-100 years, it is timely and critically important to look ahead, and to pursue stable and secure sources of phosphorites. New discoveries also hold the promise of a future boon to the fertilizer business world-wide.



The next generation of experts in phosphorites include Dr. Peir Pufahl's M.Sc. students Mariana Carvalho and Justin Drummond.

The Partners

Strong working relationships with industry are essential to the success of the project, and committed industrial partners are being sought.

As a NSERC Industrial Research Chair, Dr. Pufahl will build on his existing industry relationships and foster new collaborations to advance phosphorite research, increasing access to this vital but rapidly diminishing commodity, and attracting investments and partnerships from around the globe.

The Researcher

There is no doubt that [Dr. Pufahl] is one of the top two or three experts globally who understand the economic geology of phosphate, and the only individual in Canada who can fit the need for [the NSERC] Chair.

NSERC Referee Report, 2014



Peir Pufahl has been engaged in phosphorite research for 17 years and has studied some of the largest and richest phosphorus deposits on earth. Central to his internationally-recognized research program are his collaborations with fellow academics, industry, and international government agencies.

As an advisor to the Geological Survey of Western Australia and the Geological Survey of Brazil, Dr. Pufahl is a leader in training the next generation of experts on the geology of economic phosphorites. A lynchpin of this work is his short course, sponsored by the Society of Economic Geologists.

Importantly, Dr. Pufahl's involvement with the Brazilian Survey has helped to develop Projeto Fosfato, a federal phosphorite exploration program that has already discovered several new exploration targets.

Knowledge transfer from existing and new industry collaborations will assist in developing phosphorite ore deposit models and beneficiation processes to address a looming global shortage of a critical resource.

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