Customer Profile | LORAX ENVIRONMENTAL SERVICES LTD.

Canadian Light Source / Centre canadien de rayonnement synchrotron

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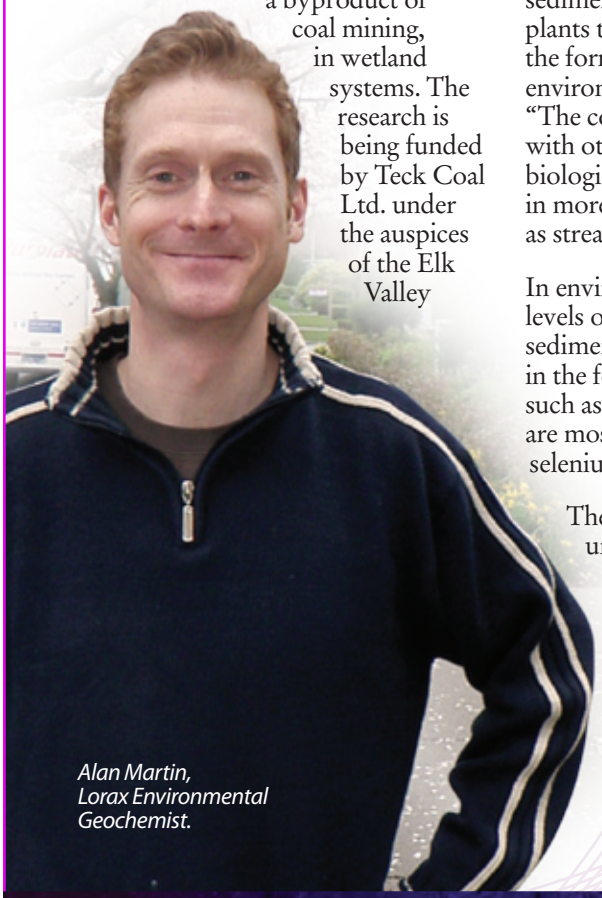
Tracking Selenium in Wetlands

Wetlands have a reputation for filtering and cleaning toxins from the environment. While this is true, in some situations, they can promote the accumulation of selenium in the food chain, posing a potential threat to aquatic wildlife.

Alan Martin, of Lorax Environmental Services Ltd., is part of a collaborative research team working in the Elk River valley that is utilizing the Canadian Light Source (CLS) to assess the behaviour of selenium, a byproduct of coal mining, in wetland systems. The research is being funded by Teck Coal Ltd. under the auspices of the Elk Valley Selenium Task Force. The task force, established in 1998, combines industry and government partners in an effort to best address the environmental management of selenium.



Alan Martin, Lorax Environmental Geochemist.

As Martin explains, "Bioremediation relies on the activities of natural microbial and floral assemblages to remove selenium from mine waters. In the low-energy environments typical to wetlands, selenium is converted to forms that are trapped in sediments and plants." Microbes and plants that live in wetlands also affect the form that selenium takes in these environments. Martin continues, "The compounds that selenium forms with other elements tend to be more biologically available in wetlands than in more energetic environments such as streams and rivers."

In environments exposed to elevated levels of selenium in water and sediments, selenium can accumulate in the food chain. Egg-laying animals, such as fish, amphibians and birds are most susceptible to high levels of selenium.

The research that has been undertaken at the CLS has helped to determine where selenium is stored in wetland systems, and in what forms. This information is key when determining methods of effective bio-remediation that have a minimal impact on wildlife.

"Now that we know the forms in which selenium occurs in water and sediments, we better understand the mechanisms of accumulation and cycling. And knowing such mechanisms is important from the perspectives of bioremediation and ecological risk assessment."

Martin is also excited about another mining-related project ongoing under the Mine Environment Neutral Drainage (MEND) program, and funded by The Mining Association of Canada and several mines across Canada. This project is addressing environmental aspects of sludges generated through the treatment of acid rock drainage (ARD). "Neutralization with lime is a globally-applied method for the treatment of ARD," explains Martin, "although relatively little information is known with regards to the composition of the sludges produced in the process." As Martin states, "The CLS will greatly aid in determining how metals such as copper and zinc are stored in the sludge matrix, which will in turn aid in environmental management."

Thanks to the Canadian Light Source, Martin says, "We are making enormous headway into our understanding of how mine-related products behave and interact with the environment. The CLS is becoming a standard tool that's in our research tool belt. It's not exotic anymore. It's a standard tool for solid phase work in the mining industry—and the mining and regulatory communities certainly recognize the benefits."