



What's Happening in... Environmental & Earth Science

This newsletter describes research that scientists in LEC are conducting in order to understand how chemicals from de-icing activity at airports can be removed from surface water runoff.

New solutions for treating de-icer contaminated water at airports

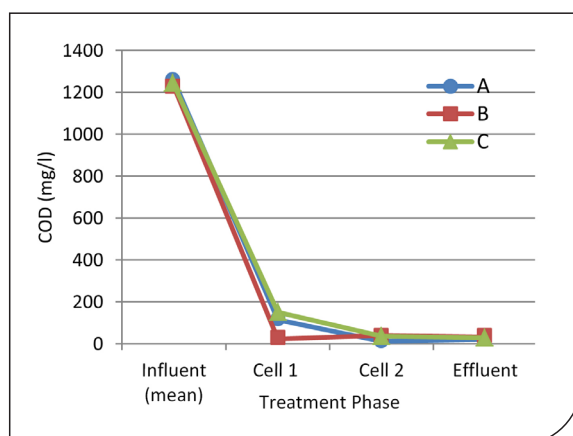
The application of aircraft de-icing fluids, aircraft anti-icing fluids and pavement de-icing fluids, collectively termed de-icers, is required at airports during the winter to facilitate safe air travel. Although critical for airport operations, de-icers made from propylene glycol and acetates are major sources of organic pollutants which contaminate airport surface waters during the de-icing season. Significant decreases in dissolved oxygen concentration can occur if these pollutants reach streams and rivers, imposing stress on organisms such as fish which live within these ecosystems.

Contaminated runoff at airports has traditionally been collected and transferred for treatment at waste water treatment works. However, this is associated with substantial monetary and carbon costs. Researchers in LEC are investigating whether alternative approaches, based on the use of constructed wetlands, can provide a more economically and environmentally viable treatment alternative. In collaboration with The Manchester Airport Group Plc. and Peak Associates Environmental Consultants Ltd, researchers are analysing the mass of de-icing chemicals applied to and discharged from Manchester Airport, to better understand the cycle of these chemicals in the airport environment. The research is also using large-scale field trials to optimise the removal of de-icing chemicals from surface water within constructed wetlands. This involves the combination of artificial aeration and nutrient addition to the wetland to maximise biodegradation of the de-icer chemicals found within runoff. Ultimately, the research seeks to inform the design and operation of full-scale treatment systems for de-icer contaminated runoff at airports.

Students in LEC learn about the hydrological and biogeochemical processes that control the transport and transformation of contaminants in the environment. A number of students are also able to work alongside industry and business partners on practical challenges during their degree, for example as part of their dissertation project. This provides our students with training in cutting-edge research techniques and transferable practical skills for future jobs outside the exciting world of research.

For more details about the reports above or about Earth Science and Environmental Science courses on offer at Lancaster University please contact the Environmental and Earth Science Admissions Staff,

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Images. **Top:** Handling agents applying aircraft de-icing fluid at Manchester Airport following a snowfall event. **Middle:** Field trial designed to test optimal methods for de-icer removal within constructed wetlands. The three cylindrical tanks represent three wetland cells used for treatment. **Bottom:** Reduction in chemical oxygen demand (COD), a pollutant derived from de-icer chemicals, between influent and effluent in field scale constructed wetlands operating under different aeration configurations (A, B and C).