

Ideas on the Edge

Garbage Simulator

LIQUID FROM LANDFILL CAN CONTAMINATE
SURROUNDING WATER AND SOIL.
DR. KERRY ROWE AT QUEEN'S UNIVERSITY,
IS OUT TO STOP THOSE LEAKS.

Not a lot of people care to think about what goes on at the bottom of a landfill, 25 to 50 metres down under all that garbage. But Dr. Kerry Rowe, of Queen's University, thinks about it a lot. In fact, he even builds simulators to recreate that danky,soupy environment.

Dr. Rowe and his team are investigating the effectiveness of geosynthetic liners for containing contamination in landfill sites. The term "geosynthetic" refers to the use

RESEARCH THAT MATTERS
REAL-WORLD BENEFITS FOR ONTARIANS:

- Safer landfill sites.
- Global leadership in the "geosynthetics" industry.

of a range of synthetic materials—usually some form of heavy plastic sheeting or fabric, sometimes combined with clay—to solve problems in soil engineering.

These kinds of liners have been incorporated in landfills for several decades (See *Layers of Protection* on the back), and the approach seems to be working well—so far. "The big question," explains Dr. Rowe, "is how long they're going to continue to perform. Landfills typically



Layers of Protection.

Geosynthetic landfill liners are rolled out in several layers over a base of compacted soil. The first layer is a half-centimetre sandwich of clay between sheets of textile. The second consists of flexible polyethylene sheeting about the thickness of a loonie. Another layer of synthetic textile goes over that, and then a drainage layer of gravel.

have a service life of many, many decades to hundreds of years.”

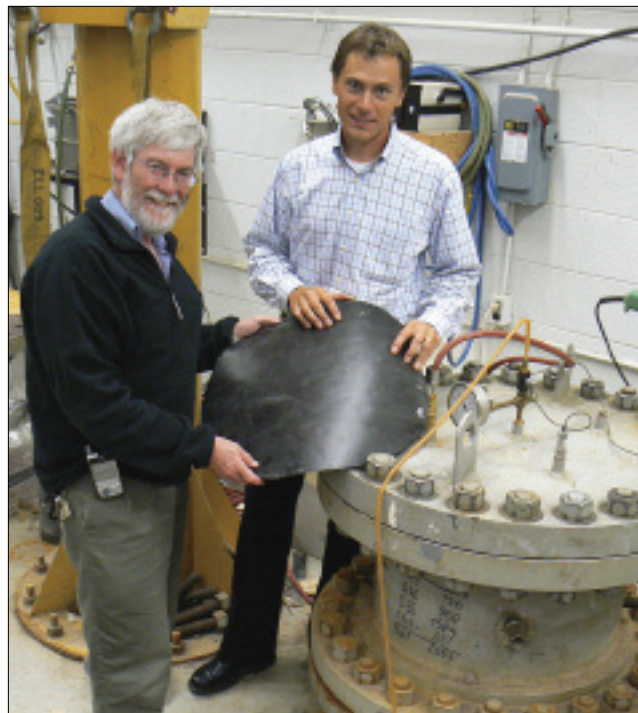
To find some answers, his team has built about 60 cylindrical simulators, with the help of an investment from the Ontario Innovation Trust. Each canister is lined on the bottom with a typical geosynthetic liner system. Liquid is injected to simulate the soupy “leachate” that accumulates at the bottom of a landfill, and adjustable bladders at the top apply pressure to reproduce the effect of varying depths of trash. Researchers can also

control temperature to accelerate wear. By running a simulator at 85°C, for example, they can subject the liner to the equivalent of 600 years of stress in three years.

Each canister is set at its own combination of temperature and pressure to reproduce a variety of landfill scenarios. In some, the

liner has also been wrinkled or otherwise deformed to test the effect this added factor has on performance. While scientists can monitor some effects in real time, the most valuable data emerges when the simulators are taken apart at the end of their runs.

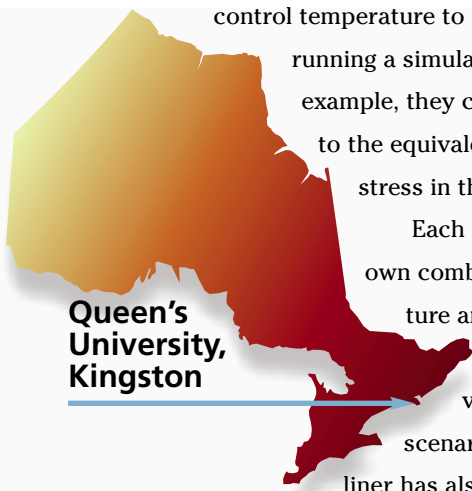
The research is important for obvious environmental



Dr. Rowe and colleague Dr. Richard Brachman with one of the landfill simulators and a sample of polyethylene liner.

reasons. But there’s also an economic factor. “An Ontario company is one of only two producers of geosynthetic clay liners in the world,” explains Dr. Rowe. “They already sell all over North and South America. If we can demonstrate the particular suitability of these kinds of liners, that helps them market their product.”

Project: Ensuring Performance of Geosynthetics Under Extreme Environmental Conditions
Institution: Queen’s University
Research Sector: Engineering
Principal Investigator: R. Kerry Rowe
Trust Investment: \$454,839
CFI Investment: \$660,048
ORF Investment: \$205,209
Total research investment from all sources: \$1,650,121



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Infrastructure for Innovation About the Ontario Innovation Trust

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario’s universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost \$843 million to strengthen Ontario’s position in the global marketplace of ideas. This represents more than a third of the \$2.44 billion in total funding that has been invested in Trust-supported projects.