

Old idea recycled for modern solution

Century-old air compression system refined to create a system that can cool the deepest mines.

The mining techniques used a century ago are very different from those used today. However, research is currently underway in Greater Sudbury to explore the benefits of merging pioneer and modern methods.

Last summer, Dean Millar of Laurentian University's MIRARCO approached senior staff at Science North about installing a research facility, the Hydraulic Air Compressor (HAC) Demonstrator, at the Dynamic Earth site.

Millar had been considering several possible sites in the Sudbury area for this innovative project, but Dynamic Earth seemed like a perfect fit not only because of its physical infrastructure and accessibility, but because of the opportunity to explain the technology and showcase the research to Dynamic Earth's visitors.

The research project revives a 100-year-old air compression system, pioneered in Northern Ontario by Charles Havelock Taylor, with modern technology to create a system that can cool Ontario's deepest mines with the most energy efficient compressor conceivable.

The HAC system uses water, air and gravity to produce compressed air: water flowing down a shaft or pipe takes in air, the air becomes compressed by the water and is separated at the bottom, and the water is returned to surface via a different shaft.

The project requires a structure 30 metres tall so that the piping in the HAC Demonstrator develops the proper wa-



ter flow. The installation at Dynamic Earth will involve erecting a tall structure over the former Big Nickel Mine elevator shaft.

This building will house tanks, piping and monitoring equipment. Pumps will circulate the water to the bottom of the elevator shaft, 18 metres below surface, and back up. An essential part of the project is measurement and verification testing that will lead to the system being certified as an energy efficient technology for air-cooling.

One mission of the project is to show that a HAC could cool the air at the deepest working levels of Creighton Mine by around 3.5 C. This may not sound like much, but the temperature of the air in a mine increases by around 1.0C for every 100 metres depth, so cooling by 3.5C may extend ore reserves 350 metres deeper (approximately 10 mining levels) and keep the mine going for a decade.

"The installation will be a monument to Taylor's genius; I think he is one of Ontario's unsung heroes, but the main point is that the HAC Demonstrator will bring live

Dean Millar of MIRARCO and Brenda Koziol of Science North check out the lab-scale hydraulic air compressor built to guide design of the commercial-scale demonstrator to be installed on the Dynamic Earth site.

science to the science centre," says Millar.

"Visitors to Dynamic Earth will be able to learn about the scientific program and observe the certification tests we'll conduct, through specially designed observation areas. In two years time, we hope the work we'll have done there will lead to this machine being used to help cool the mines, but also that it will fulfill its promise as a carbon capture technology. Imagine that: mining technology helping to win the war on climate change."

Construction, and installation of the HAC system, is set to begin at Dynamic Earth in summer 2015.

This article was written by Brenda Koziol, Dynamic Earth renewal project manager and senior scientist at Science North, and Dean Millar, MIRARCO and Electrale Innovation Ltd.