Jansen Mine, Saskatchewan

Temperature measurement profile with thermistor strings installed along circumference of the frozen soil

Ground vibration measurement with Instantel geophones installed on the Boring machine structure and in the frozen soils

Ground deformation measurement with Geokon borehole A-3 extensometers

Geokon 4850 NATM radial and tangentiel pressure cells installed at the interface of the ground and shotecrete lining

Production and service shafts view, Jansen Mine, Saskatchewan

Over the past few years, the number of potash mining projects has increased substantially. The province of Saskatchewan is the world's largest potash producer. BHP Billiton's Jansen Mine is currently sinking two shafts through clayey material in an area approximately 100 km southeast of Saskatoon. The potash deposit is approximately 1.10 km underground along with deposits of Halite, Sylvinite and Carnallitite.

GKM was initially appointed for the implementation of a relatively small-scale remote monitoring system, but its role has recently grown to include full-time on-site assistance. GKM's tasks include the supply and commissioning of various sensors, the design and installation of a data acquisition system and the configuration of data visualization software for on-line data presentation.

To monitor the mine shaft's behavior under general excavation procedures, sensors are installed in identical sections to provide a reliable profile of the developing ground stresses and shaft deformation. The New Austrian Tunneling Method (NATM) adopted by the designer needed to be adapted for vertical excavation through the frozen upper soil layers and the shale stone below. The multipoint borehole extensometers installed to monitor the convergence of the shaft walls were custom designed to accomodate the particularities of the excavation methods, and the temperature sensor spacing was tailored to suit the designer's needs for providing the most accurate ground temperature profile. This vast number of instruments also include NATM pressure cells and strain gauges installed at the ground shotcrete lining interface.

Sensor arrays are connected to a compact data acquisition system (DAS) designed to withstand the adverse conditions in a mine shaft. Each data acquisition system is hardwired to the surface where the data is sent via a cellular network to GKM's data-hosting service, wich allows for real-time monitoring displayed through a web-based database management and publishing tool.

Full-time on-site assistance has allowed GKM to accomodate the ever-changing needs of both the designer and contractor and to accurately measure the key geotechnical parameters that can influence the shaft design as well as worker safety and ensure the monitoring solution remains 100% relevant throughout the duration of the project.