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Alberta Geological Survey: On the ground, in the hills, in the air

IN 2008, the ERCB's Alberta Geological Survey (AGS) had eyes in the sky, boots on the ground, and cutting edge technology at work high in the Rocky Mountains.

Since 1920, the AGS has supplied data, knowledge, and advice to Albertans about the province's geology, from the earth beneath our feet to the mountains that rise above the province. The AGS also provides scientific data to support the ERCB's regulatory mandate.

The AGS has more than 2000 publications on Alberta geology, including reports, datasets, maps, and mineral assessments, many of which can be viewed on line and downloaded free of charge. As well, the AGS Library is an excellent resource for geosciences information and is available to government agencies, industry, students, and the public. It has a collection of more than 150 journals and 25 000 books and documents.

The AGS was on the ground in 2008 mapping a resource that is not often thought of as a major Alberta natural resource: sand and gravel. In fact, sand and gravel are key mineral resources for both public and private infrastructure. By volume, Alberta produces more sand and gravel than any other non-fuel mineral.

In 2008, this mapping project expanded AGS's inventory of sand and gravel. This project added value to AGS's geology mapping by involving ground geophysics and digging test pits with heavy equipment to verify resource potential.

Over the past year, the AGS conducted fieldwork to locate and describe the quantity and quality of sand and gravel resources in the McLennan area. Geological material was observed in outcrops, at existing sand and gravel pits, and in test holes that were dug by a back hoe.

A total of 53 sites were observed and four ground geophysical surveys totalling 13.8 line kilometres were completed. The surveys resulted in 1220 measurements at 305 different locations.

Work in 2009 will involve testing the utility of airborne geophysical data for sand and gravel mapping.

In 2008, the AGS could also be found in the air on a specially equipped airplane and helicopter as part of an ambitious multiyear groundwater mapping project largely funded by Alberta Environment.

In 2008, the airplane, fitted with sensors that emit electrical currents reaching far below the earth's surface, crisscrossed central Alberta to record underground geological images.

A technically intensive project, the plane records images of Alberta's geology in swaths as wide as 800 metres and to a depth of 250 metres. A helicopter records more detailed images up to 200 metres wide and 100 metres deep.

The airborne survey between Edmonton and Calgary will continue in 2009 and is scheduled to take up to four years.

The AGS could also be found in the hills near the Town of Peace River during 2008.

In 2006, the AGS initiated a project to develop a geological model to better understand the complex geology underlying the Town of Peace River. Perhaps the greatest challenge to continued growth and development in Peace River are the

large, slow-moving landslides common to the valley walls around the town.

While hundreds of investigations and local studies have been conducted for specific infrastructure projects, the overall geological framework that explains the distribution of landslides has not been well documented. Due to the nature of their movement, the landslides around the town pose an ongoing maintenance concern for roads, pipelines, and municipal infrastructure.

As part of the project, the AGS constructed a detailed geological model of the subsurface, including the location of an ancient river valley system that existed prior to the glaciation of Alberta. In 2009, in order to better predict future landslides, the AGS began a detailed field mapping and drilling program around the municipality that relied on high-resolution LiDAR (Light Detection and Ranging) to map the landslide features.

It is hoped that the detailed geological and geotechnical information gathered at Peace River will be applied locally and regionally to better plan for future infrastructure developments and mitigate the effects on existing infrastructure already affected by the unstable geology.