

Product solution for: PhotoSat/Alberta Oil Sands Mines



## DigitalGlobe imagery monitors Alberta's oil sands mines

The vast oil sand deposits of Northern Alberta contain over 1.5 trillion barrels of oil making them one of the world's largest hydrocarbon reserves. Of this total resource more than 160 billion barrels can be economically produced with current technology. This is sufficient to meet total North American oil requirements for more than 20 years at current consumption rates.

### The need for a cost-effective mapping strategy

The greatest environmental challenges of oil sands mining is water use and tailings management. Oil Sands miner Suncor Energy is at the forefront of the development and application of "dry tailings" oil sands technology. PhotoSat and DigitalGlobe have been providing Suncor with regular stereo WorldView topographic mapping, accurate to better than 20cm in elevation, to help Suncor monitor its mine sites and tailings disposal areas.

"Suncor Energy approached us to develop a cost-effective method to map and monitor their active mining sites and tailings disposal areas," says Gerry Mitchell, President of PhotoSat. "Their conventional methods of tracking volume changes involved GPS surveying and annual aerial mapping, both costly and time consuming processes."

### Satellite technology provides a breakthrough

Advances in satellite and data processing technologies are enabling cost-effective mine site monitoring and volumetric measurement from space.

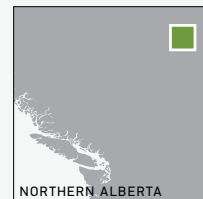
"Digital processing of oil exploration seismic data has been the subject of billions of dollars of research and development," explains Mitchell. "The seismic processing field includes many sophisticated tools for image matching, signal enhancement and noise attenuation that have never been applied to topographic mapping from satellite photos. This transfer of technology is providing a cost-effective way to accurately map these sites."

In December 2012, PhotoSat tested satellite-based topographic mapping for Suncor's Steepbank oil sands mine. Between January and December 2013 PhotoSat deployed both WorldView-1 and WorldView-2 to collect stereo images of the Steepbank mine site fifteen times.

### Company information

PhotoSat creates maps used for the identification, evaluation, and monitoring of natural resources, and the planning and design of resource development projects. PhotoSat's clients include mining, energy, engineering, environmental companies and government agencies. PhotoSat's goal is to provide satellite photos and derived highly-accurate topography and other datasets that improve decision making in less time.

#### OIL SANDS MINES



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## A precise solution that exceeds expectations

Maps are produced from pairs of satellite photos taken one minute apart. As the satellite approaches the mine from the north, it captures the first photo. Travelling at 7km per second, approximately one minute later the satellite captures the second photo resulting in a precise stereo pair of images.

“The orientation and speed of the DigitalGlobe satellites are so precisely controlled and measured that the resulting maps are usually accurate to 2m without any ground survey control,” Mitchell says. “By matching the resulting satellite map to a single ground survey point, the map is usually accurate to 30cm in elevation for up to 10km in all directions from that survey point. Using additional ground survey data to help make fine adjustments to the systematic satellite image distortions brings the elevation mapping to an accuracy of better than 20cm.”

“Suncor mine engineers reported that several hundred GPS survey checks established the accuracy of the PhotoSat WorldView topographic map to be better than 20cm in elevation. That level of accuracy greatly exceeded expectations, approaching the accuracy of LIDAR survey data at a fraction of the cost and with much shorter delivery times.”

## A solution that can be replicated worldwide

Suncor uses WorldView topographic grids along with daily GPS surveying to keep the mine site map and volumetric measurements up to date. Daily GPS surveys provide continuous updates, while the periodic satellite grids provide instantaneous snapshots of the entire mine, including the tailings beaches and other mine site areas that are not accessible by the GPS surveyors.

*“By providing instantaneous snapshots of the elevation surfaces of the entire mine, we are giving Suncor access to critical information it never had before. With the global access provided by satellites, companies with mining operations around the world will have the ability to deploy a consistent mapping process for all their mine sites.”*

GERRY MITCHELL, PRESIDENT OF PHOTOSAT

### Challenge

Create a highly-accurate, cost-effective solution to monitor the ore production and tailings disposal of Suncor’s vast Steepbank oil sands mine in Northern Alberta.

### Solution

PhotoSat created a precise topographic mapping solution using stereo pairs of WorldView-1 and WorldView-2 high-resolution imagery in combination with seismic processing tools and GPS surveys.

### Results

Suncor now has access to elevation surfaces of the entire mine accurate to 30cm to regularly and effectively track production and monitor tailings, a solution that can be replicated globally.

### INDUSTRIES

- » Utilities
- » Environmental Services
- » Government

### USES

- » Mapping
- » Cadastral
- » Elevation Data
- » Water Mapping
- » Water Pipeline Network Design

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