

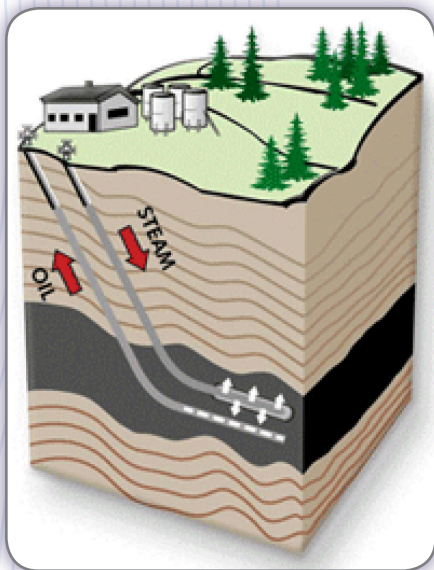


# CH2MHILL

## Applied Sciences Laboratory

### Case Study

## Oil Sand Laboratory Support



*When the Oil Sands layer is deep beneath the surface, bitumen is extracted using SAGD, a process by which steam is injected, and a bitumen/water mixture is extracted.*

The Oil Sands of Northern Alberta are a geological formation containing one of the world's largest oil reserves (estimated to be 1,700 billion barrels). These oil sands consist of a mixture of a thick, heavy crude oil called bitumen, silica sand, clay minerals, and water. Some of the Oil Sands deposits are covered by less than 250 feet of overburden (the geological layers which separate the Oil Sands from the surface). These deposits are mined using traditional surface mining techniques. However, most of the Oil Sands deposits occur deeper beneath the Earth's surface. These deposits are extracted using a process called SAGD (steam assisted gravity drainage). The SAGD process involves injecting high pressure steam deep into the Oil Sands layer to heat the bitumen. Bitumen is a high molecular weight oil which is more or less a solid at room temperature. The bitumen must be heated before it will flow. It typically requires a period of 3 months of steam injection before the bitumen becomes warm enough to flow. Once the bitumen becomes hot enough, it will begin to flow to the lower portion of the Oil Sands layer, where a horizontal, perforated pipe sucks the bitumen and water (condensed steam) mix back to the surface. Back at the SAGD plant, the bitumen and water must be separated, and the water cleaned up to the point where it can be sent to the boilers again to make more steam.



*A typical SAGD wellhead, where steam is injected and a bitumen/water mix is extracted.*

Because water quality is such an important aspect of boiler operations, each SAGD plant is equipped with a number of laboratories to evaluate water treatment processes, water quality, and final bitumen (sales oil) quality. CH2M HILL engineers began working with Oil Sands clients as early as 2003. To improve water qualities, it became necessary for clients to perform additional water tests and introduce quality controls for laboratory tests. Senior ASL chemists initially worked with the clients to evaluate the current laboratory capabilities, develop water test methods, provide documentation, train client operators, develop quality assurance analytical programs, and acquire instrumentation. One client was so impressed with the technical and organizational skills of ASL chemists,

they contracted CH2M HILL to permanently staff and operate their laboratories. Additional CH2M HILL chemists were hired locally and put on the job to operate the water laboratory 24 hours a day, 7 days a week. The laboratory analyzes water for metals using an atomic absorption spectrophotometer, oil and grease by Fourier Transform infrared spectroscopy, as well as several other general chemistry tests. ASL was also selected to design, construct, and staff a new bitumen laboratory for the client.

Other Oil Sands clients have hired CH2M HILL to provide laboratory management services, laboratory design, method development, training, laboratory coordination and oversight. ASL chemists also provide engineering support for a number of Oil Sands projects by analyzing water and bitumen samples, designing and conducting treatability studies, coordinating sample collection and analysis by third party laboratories, and writing detailed engineering reports on study findings.

## Contacts

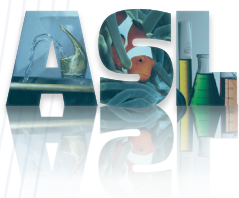
For more information on this and other services CH2M HILL's ASL can provide, please contact:

### **Regan McMorris**

(regan.mcmorris@ch2m.com)  
Senior Technologist  
541-768-3119

### **General Customer Service Questions**

(asl@ch2m.com)  
541-768-3120



**CH2MHILL**  
Applied Sciences Laboratory