

PROFESSIONAL

**SERVICES FOR PROCESS
OPTIMIZATION** IN THE

OIL SANDS



OIL SANDS **OPERATIONS:** **PILOT PLANT** **TESTING**

SGS' APPLIED RESEARCH AND TESTING FACILITY FILLS A GAP FOR THE OIL SANDS INDUSTRY. OUR PILOT PLANT IS COMPLEMENTARY TO RESEARCH BEING CARRIED OUT BY THE INDUSTRY, UNIVERSITIES, AND RESEARCH INSTITUTES. THE FLEXIBILITY AND INDEPENDENCE OF AN SGS MANAGED PILOT PLANT FACILITY ALLOWS YOU TO DO MORE RIGOROUS AND FOCUSED TESTING WITH THE ULTIMATE BENEFIT BEING THE ENHANCEMENT OF THE OIL SANDS PERFORMANCE.

SGS IS THE WORLD'S LEADING TESTING, INSPECTION, VERIFICATION AND CERTIFICATION COMPANY. THE CORE VALUES OF COMPLETE INDEPENDENCE, TRANSPARENCY AND INTEGRITY GUIDE US IN OUR MISSION TO DELIVER FIRST-CLASS SERVICES ON A HIGH QUALITY LEVEL TO CUSTOMERS AROUND THE WORLD.

APPLIED RESEARCH & TESTING FACILITY

Oil sands - 80% sand, 10% bitumen and 10% water - one of the largest energy reserves in the world, but also among the most difficult and costly to process. SGS' Applied Research and Testing Facility fills a gap for the oil sands industry. The flexibility and independence of our ART facility allows you to do more rigorous, focused and confidential testing with the ultimate benefit being optimized & cost-effective processing technologies.

Our Applied Research and Testing facility is designed for safety, environmental sustainability, and operational efficiency. When you need to be sure, trust SGS.

PROJECT MANAGEMENT

SGS is aware that successful pilot plant solutions can have a significant positive impact on your commercial process and investment decisions. We are global technical leaders in this field and continually strive to provide the necessary discipline and methodologies to achieve success with the pilot plant process. At SGS we have learned that the key to successful pilot plant campaigning is the application of rigorous project management protocols, a skilled project manager and knowledgeable operators with experience in the oil sands industry.

The success of your pilot campaign is clear when we have achieved the desired technical result within the scoped time and budget. To achieve this, it is critical that the project manager focuses on project and technical management aspects of the project, utilizing a team approach to the task. SGS brings a well established methodology to the operation of pilot plants worldwide, including experience within the Canadian oil sands industry. Partner with SGS and let the world's leading inspection, verification, testing and certification company successfully operate and manage your oil sands pilot project.



RESEARCH AND TECHNOLOGY WORKING TOGETHER

PILOT PLANTS ARE KEY TOOLS FOR THE OIL SANDS INDUSTRY TO TEST TECHNOLOGIES, FLOWSHEETS, ORES, MIDDLING PRODUCTS AND TAILINGS. THE OBJECTIVE OF PILOT TESTING IS TO OPTIMIZE AND IMPROVE RECOVERIES, PROCESS EFFICIENCIES, PROCESS COSTS, PRODUCT QUALITY AND PRODUCT HANDLING CHARACTERISTICS. THIS REDUCES TECHNICAL RISK WHICH PROVIDES CONFIDENCE FOR FINANCERS, SHAREHOLDERS, MANAGERS OR OTHER KEY STAKEHOLDERS IN THE PROJECT. IN ESSENCE, A WELL-PLANNED AND WELL-RUN PILOT PLANT MITIGATES AND MANAGES TECHNICAL PROJECT OPTIMIZATION AND TECHNICAL RISK.

THE VALUE OF A PILOT PLANT

For the oil sands industry, the SGS Applied Research and Testing Facility in Fort McKay is a key platform for testing technologies. Here it is possible to test different and competing technologies in parallel. Our pilot plant is designed to be extremely flexible, and allows the incorporation of different process units at will.

Pilot plant testing demonstrates and confirms the flowsheet. It is unique in that it operates in an integrated fashion, all unit operations are run in series to provide continuous feed or product, typically until the generation of saleable heavy oil. Throughput can vary from <100 kg/hr to > 2 tonne/hr.

THE NEED FOR FLEXIBILITY

The flexibility and ability to test multiple technologies is the key difference between a pilot plant and a demonstration plant. A demonstration plant is built on a larger scale (relative to a pilot plant) but is configured with one fixed flowsheet. The objective of a demonstration plant is to show, over a long period of time, the result of a particular flowsheet and ensure a high degree of confidence. We have created a pilot facility that has the capability and capacity to operate multiple pilot projects simultaneously for projects focused in:

- bitumen extraction
- froth treatment
- SAG-D technologies
- related tailings and environmental strategies

OUR COMMITMENT TO YOU

- To provide you with the opportunity to mitigate technical and environmental risk by testing process technologies at the pilot scale.
- To offer a safe, flexible and cost-effective venue to demonstrate and optimize production and related environmental aspects.
- To give operators evaluating new technologies a venue for commercial viability prior to capital investment.

The key to a success of a pilot plant project is the application of key management skills and methodologies that ensure that a pilot plant is run well and achieves technical targets on budget and on time. A pilot plant provides the flexibility to permit a range of tests at a scale that is transferrable to a full-scale process plant. The pilot plant can host different and competing technologies for testing.



FACILITY DESCRIPTION

Ore Storage

- 11,000 ft² of refrigerated storage area
- 2,500 tonnes of ore storage capacity
- Multiple ore types are stored in segregated bins

Froth Treatment, Solvent Processes, and Upgrading

- 5,000 ft² enclosed year-round facility expandable to 7,500 ft² and, with addition of a partition, allows two clients to operate separately and in complete privacy
- One tank farm (expandable to two) to support two clients running concurrently
- Class 1 Zone 2 ignition electrical process equipment classification
- Modular plug-and-play configuration allowing process skids to be moved easily
- Currently configured for paraffinic froth treatment but can be modified for naphthenic treatment

- Area classification and our building infrastructure support the testing of primary upgrading processes such as (delayed coking, visbreaking, solvent deasphalting, hydroconversion, etc., process skids would be designed with client or received “as is” and plugged into building infrastructure

Water-Based Extraction

- 2 tonne per hour oil sand feed rate (nominal)
- 12,500 ft² enclosed year-round facility
- Modular plug-and-play configuration to allow easy movement of skid mounted process equipment (process skids)
- Any process flowsheet can be reproduced with existing inventory of unit operations or the addition of client-designed process skids
- Fully instrumented, state-of-the-art ABB distributed control system (DCS) for process control and data acquisition

Technical Staff

- Stable workforce of professional operators, engineers, and tradesmen
- Experienced workforce means that the “learning curve” for new processes is greatly minimized
- Infrastructure and existing unit operations are de-bugged by our staff so the commissioning phase for new projects is very short. This means shorter, less expensive pilot programs that cost less and provide better data.
- Our staff adds value to our clients by offering opinions, based on long experience, throughout all of the program stages (process design, operations, data analysis, and report writing).
- Our technical expertise means that we can address unforeseen problems that arise during the pilot plant stage.

SGS HAS DEVELOPED EXPERTISE THAT IS SECOND-TO-NONE AND A DEFINITIVE SET OF SAFETY PROTOCOLS FOR THE OPERATION OF PILOT PLANTS BASED ON MANY YEARS OF EXPERIENCE BOTH IN CANADA AND AROUND THE WORLD. FROM THESE HUNDREDS OF COMPLEX INDUSTRIAL PILOT PLANTS, WE HAVE DEVELOPED EFFECTIVE PLANNING SKILLS, OPERATIONAL INSTRUCTIONS, AND TARGETS. OUR COMPLETE SET OF DOCUMENTATION ENSURES SUCCESSFUL OPERATION, TIMELY TURNAROUND OF SAMPLE ANALYSIS, AND RAPID RE-CONFIGURATION OF THE CIRCUIT AS REQUIRED.

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FROTH TREATMENT

Froth treatment is a critical step in the overall bitumen production process. As such, the design of this represents an area of considerable technical risk. The SGS froth treatment plant has been designed to handle 400 kg/hr of froth. Our froth treatment plant operates on a continuous basis to service your needs.

The froth treatment plant has tankage for feed slurry, dilute bitumen, solvents, stripped tails and slops. This ensures that the various waste procedures are segregated. This makes it easier to manage product disposal. The froth treatment plant is located in a separate, well ventilated building, independent of the primary extraction pilot plant facility.

TAILINGS TESTING

Understanding the changes in the physical and chemical balance allow us to address any potential hazards. As part of a piloting exercise, tailings are produced and we characterize them for their chemical and physical characteristics. Such assessments can be performed on process waters or solids waste. Tailings are filtered and then chemically treated. Solids go for tailings testing while liquids are recycled back as process water.

SGS offers a large-scale geotechnical batch tests to study tailings characteristics including:

- Settling
- Compaction
- Rheology
- Porosity
- Clarity
- Chemical and bituminous aspects of tailings

EXTRACTION PROCESS

SGS' established Applied Research and Testing Facility draws on our over 40 years of experience in pilot plant operations globally. We can provide all the pilot plant operation protocols./ procedures and philosophy, as well as all the necessary skills and protocols in health, safety and environment, data management, data interpretation and final reporting.

Designed with all known technologies in the extraction, tailings, and froth treatment areas, our pilot plant brings a level of flexibility and applied research that has not been previously available in the oil sands.

We have longstanding experience in operating laboratories and pilot plants where confidential client intellectual property is an issue. Confidentiality is guaranteed, as integrity is a cornerstone of how SGS operates.

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WHEN YOU NEED TO BE SURE

SGS