

Alberta Taciuk Process (ATP) Technology Oil Shale Processing

- Information Bulletin -

UMATAC Industrial Processes is the Developer, Owner, and Licensor of the Alberta Taciuk Process (ATP) Technology. UMATAC began development and application of the ATP Technology to oil shale resources in the mid 1980's. UMATAC provides a comprehensive range of ATP Technology engineering and technical services to Project Developers to support their oil shale project assessment and development activities. This bulletin provides a brief outline of the ATP Technology and UMATAC's services.

The ATP Technology – Demonstrated Capabilities

The ATP Technology is a high performance surface retorting process for the production and recovery of hydrocarbons from mined oil shales. Oil shale is mined, crushed, and then retorted (pyrolyzed) in the ATP Processor which uses the oil shale solids as the process heat carrier. The hydrocarbon vapours produced by the pyrolysis of the oil shale are extracted from the ATP Processor, condensed, and pumped to product tanks.

The performance features and demonstrated capabilities of the ATP Technology include:

Full Resource Utilization	The ATP Processor is designed to process finely sized ore (< 10 mm) with the result that 100% of the ore mined can be processed. This ensures the ore body is fully utilised and prevents any waste of valuable natural resources.
Large Unit Capacity	Individual ATP Processors can be designed to process up to \approx 750 t/h of oil shale depending upon ore properties. Multiple ATP processing trains are installed in parallel to satisfy overall plant capacity requirements. Common upstream, downstream, and utility facilities support multiple ATP trains.
Concentrated Hydrocarbon Vapour Stream	The ATP Processor produces a concentrated hydrocarbon vapour stream which makes product oil recovery and separation straightforward and minimises the size of the equipment.
High Oil Yield	The ATP Technology provides high liquid product oil yields; typically the butane and heavier (C ₄ &+) product yields are > 90% of Modified Fisher Assay (MFA).
Clean Product Oil	Each ATP System incorporates a hydrocarbon vapour scrubber which provides a proven means to remove residual shale fines from the product oil stream. All fines are handled internal to the process – there is no requirement for any filtration or centrifuging operations with their attendant reliability and sludge disposal issues.
High Heating Value Off Gas	The ATP Technology produces a concentrated, high heating value off gas which is available for use as fuel internal to the process plant facility, for steam production, or for electrical generation.
Complete Ore Utilization	The ATP System uses the residual carbon produced during retorting as the process fuel making effective use of the kerogen by-products. All high value liquid and gaseous hydrocarbons are recovered and are not consumed in the process.
Energy Efficient	The ATP Technology employs heat recovery internal to the Processor. Heat from all combustion products is recovered to preheat and dry the incoming feed ore. Heat recovery in the hydrocarbon, ash cooling, and flue gas handling systems provides further benefits in terms of steam production and/or air preheating.

Ore Feed Flexibility	Each ATP System is designed specifically for the oil shale in each deposit. However the ATP Processor is fully capable of handling feed materials having a range in grades and moisture contents. This provides operators with increased flexibility in their mine planning and operations and allows for full use of the available oil shale resource.
Operational Stability	The ATP Processor is a large, refractory lined, rotary mineral processing unit which characteristically provides for stable material handling and thermal processing. Rotary machines are recognised for their tolerance to variations in feed materials and transient operations.
Robust Design	Each ATP Processor is designed and constructed using established heavy rotary machine practises as found in mill and kiln designs. The mechanical design of the Processor machine structure, support systems, and drive trains is fundamentally sound, reliable, and robust.
Environmental Performance – Spent Solids	The ATP Technology produces a dry, hydrocarbon free spent ash. With good mining practices, this material is typically suitable for direct backfill in the mine as part of the pit reclamation and restoration sequence.
Environmental Performance – Flue Gases	Each ATP System is equipped with flue gas scrubbing and emissions control systems engineered for the service and as required to meet applicable regulatory requirements.
Operational Safety	The ATP Processor operates at atmospheric pressure and the process reactions depend upon solids mixing generated by Processor rotation. During upsets (e.g. power failure), Processor rotation ceases which immediately limits hydrocarbon evolution. Proven back-up systems are incorporated in all ATP Plants to provide operators with the means to safely control the plant systems at all times.

UMATAC Industrial Processes – Technical Services

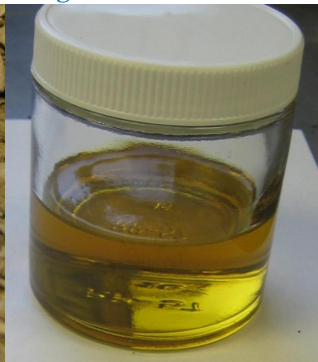
UMATAC maintains a Pilot Plant Facility in Calgary, Canada. Our facility provides test equipment and scale process units which allow us to assess feed materials and develop the basic engineering foundation for the design of commercial ATP plants. The following capabilities are offered by UMATAC to Project Developers in the initial stages of their Project development:

- Basic assessment of oil shale ore properties
- Hydrocarbon bearing ore assays by industry standard methods (MFA, Dean Stark, TIF)
- Bench scale testing (ore drying, preheating, retorting, and combustion)
- Product oil and gas characterisations
- Product solids characterisations
- Produced water characterisations
- Production of by-product samples for testing by third party specialists
- ATP Pilot Plant testing (nominal 4 t/h continuous plant)

Oil Shale Ore



Light Oil Product



Spent Shale Ash



UMATAC Industrial Processes – Engineering Services

UMATAC's engineering office is located in Calgary, Canada. Our experienced engineering group provides a focused and dedicated service to the ATP Technology. Our engineering team offers oil shale Project Developers a range of services including:

- Conceptual studies
- Feasibility studies
- Cost estimating (to suit required level of each study)
- ATP Technology User Licenses
- Front end engineering and design of ATP Systems
- Basic process design for the ATP System
- ATP System detail engineering services
- Field Technical Services (commissioning, start-up, operations support)

UMATAC engineering includes:

- ⇒ Flow sheet development
- ⇒ Mass, energy, and material balances
- ⇒ Process Flow Diagrams
- ⇒ Piping and Instrumentation Diagrams
- ⇒ Major equipment specification
- ⇒ ATP System plant and equipment layouts
- ⇒ ATP System proprietary equipment design
- ⇒ ATP System training for the owner's operating group
- ⇒ Project coordination with the owner's balance of plant and utility system engineering contractors

Alberta Taciuk Process (ATP) Plant - Australia



Petroleum plays a critical role in the transport fuel and petro-chemical feedstock markets. Oil shales will play an increasingly important role in meeting these demands into the future. UMATAC looks forward to supporting continued responsible development of these resources worldwide and to supporting owners in commercial applications of the ATP Technology.