CHATTANOOGA PROCESS™

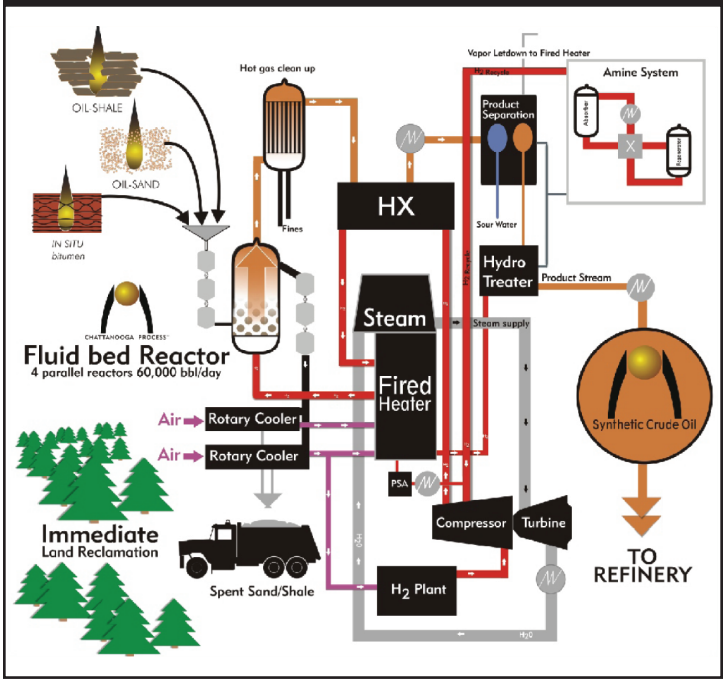
THE CHATTANOOGA PROCESS is a continuous process for producing synthetic crude oil from oil bearing materials such as oil shale, oil sand or bitumen. These materials are treated in a fluidized reactor operating at elevated pressure and temperature in the presence of hydrogen gas only. This process combines all extraction, separation and upgrading steps into one continuous process. As a result, the net energy requirements associated with using the Chattanooga Process are significantly reduced, greenhouse gas emissions are reduced, as are operating costs and capital costs.

HYDROGEN is used as the heat conveyor to the reactor, reactor bed fluidizing gas and reactant. The hydrogen is heated in an adjacent fired heater which is fueled by oil produced by the process to minimize natural gas requirements. Combustion air for the fired heater and also the associated hydrogen plant reformer is preheated by cooling the spent sand or shale discharged from the reactor.

REACTOR overhead gases are cleaned of particulate solids in a hot gas filter, cooled and hydrocarbon products condensed and separated from the gas stream. The liquid product produced at this stage is then further subjected to light hydro-treating to produce a very low sulfur high grade synthetic crude oil.

THE EXCESS HYDROGEN, light hydrocarbon (HC) and acid gases are passed through an amine scrubbing system to remove hydrogen sulfide which is converted to elemental sulfur down stream in a Claus plant. Excess hydrogen and light HC gases, stripped of the acid gases, together with the new make-up hydrogen are admitted to a steam turbine driven centrifugal compressor for re-compression and recycling through the fired heater to the reactor. Steam for the turbine is generated by recovering waste heat from the fired heater. Compressor power requirements are minimized by maintaining a low pressure drop around the process loop.

CHANGING THE TECHNOLOGY



A SLIP STREAM OF RECYCLE GASES is taken from the compressor discharge and passed through a purification system to remove light HC gases produced in the reactor. The purified hydrogen gas stream is returned to the compressor inlet. The light HC gases become feed stock to the integrated hydrogen plant thus again minimizing the requirement for purchased natural gas.

RECOVERY OF WASTE HEAT, power co-generation and the utilization of the light HC gases produced in the reactor as feed stock for the hydrogen plant make the Chattanooga Process virtually self sufficient obtaining its energy requirements form the primary plant feed stock.

FOR MORE INFORMATION
www.chattanoogaprocess.com

CHATTANOOGA PROCESS

CHATTANOOGA PROCESS™

COMPARISON OF PROCESSES FOR PRODUCING OIL FROM OIL SHALE

SUBJECT / FEATURE	CHATTANOOGA	OTHERS*
Reaction vessel	**Fluid bed**	**Retort**
Heat input method for product extraction	No combustion in the reactor. Heat is introduced through heated hydrogen.	Combustion of organics in air or oxygen atmosphere in the retort itself.
CO_2 Production	No CO_2 produced in the reactor. Some amounts produced in the fired heater.	Produces significant CO_2 as a result of breakdown of Calcium Carbonate.
Gas byproducts	No CO_2, NOx or SOx produced in the reactor. Small amounts produced in the fired heater	CO_2, SOx and NOx produced as a result of combustion of organic material in the retort in a air or oxygen atmosphere
Shale Decomposition (GRV)	Spent shale remains intact as Calcium Carbonate	The Calcium Carbonate is broken down into Calcium Oxide and CO_2
Land Reclamation	Spent shale suitable for immediate land reclamation. Requires minimal water for dust control.	Powder like product not practical for land reclamation. Requires significant water for dust control.
Operating Temperature	Below 1000° F	Above 1200° F
Product Yield	125-200% of Fisher Assay	80-90% of Fisher Assay
Reaction Efficiency	Demonstrated almost 100% conversion with minimal coke production	Production of coke and carbon in the retort

*excludes in-situ processes

CHATTANOOGA PROCESS

CHANGING THE TECHNOLOGY

www.chattanoogaprocess.com • www.chattanooga-corp.com