

A Process Using Heated Pressurized Hydrogen Fluidized Bed Producing High Grade SCO from Oil Sand, Heavy Oil, Bitumen, Oil Shale

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Chattanooga Corp

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Calgary, AB



Chattanooga Process Features

- Fluid Bed Reactor
- Hydrogen Environment
- High Quality Stable Product
- Proven sub-processes
- Continuous Operation
- Flexibility: Shale, Sands, Heavy Oil, Bitumen

Fluid Bed Reactor

- **Operating Temperature < 1000°F / 537°C**
- **600 psig operating pressure**
- **Low velocity through reactor zone**
- **Low residence time**
- **No combustion in reactor**

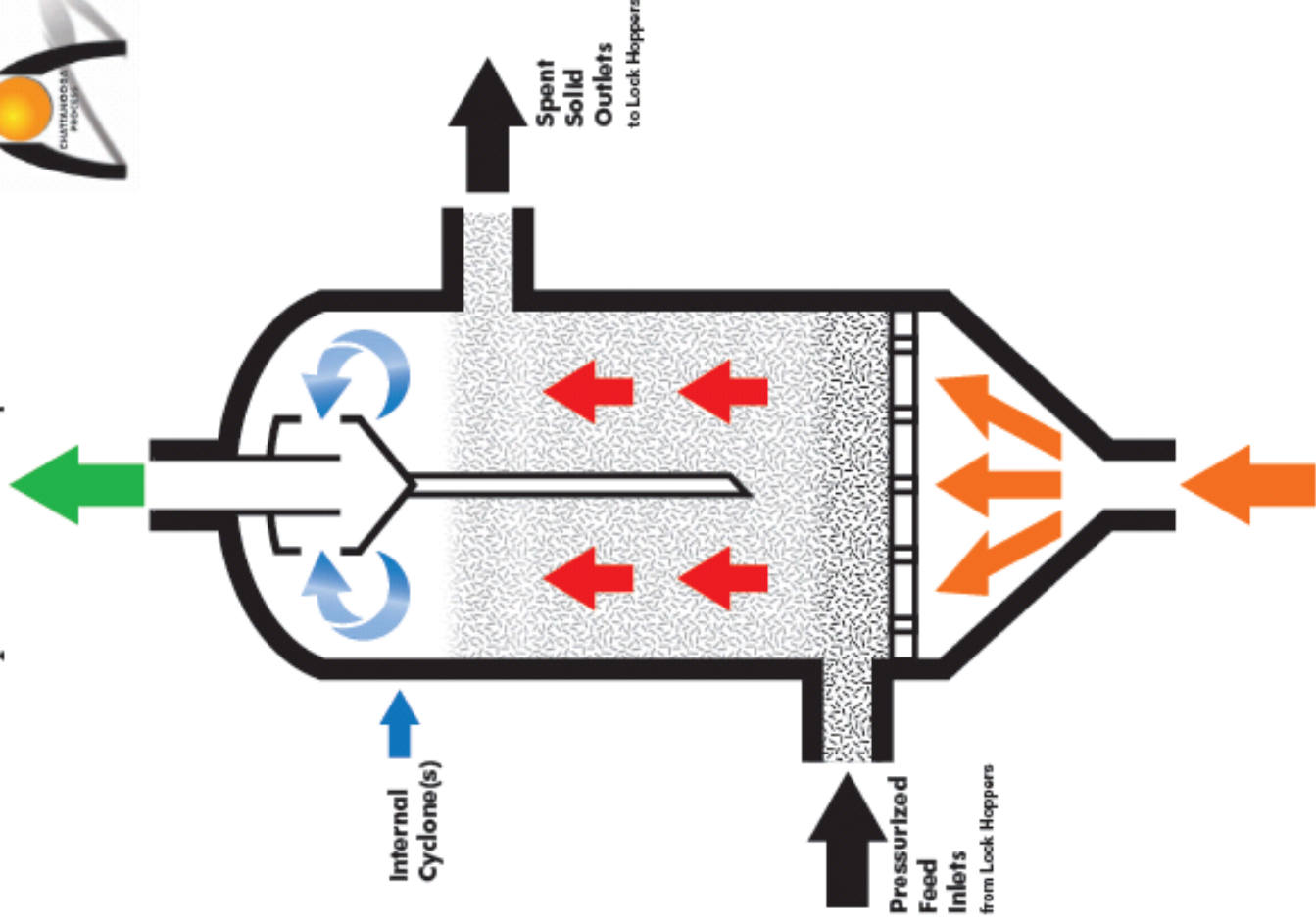
Hydrogen because ...

- Fluidizing medium – excellent compressibility
- Reactant
- Heat transfer
 - High heat capacity
 - High conductivity
 - Low viscosity

Chattanooga's Pressurized Fluid Bed Reactor

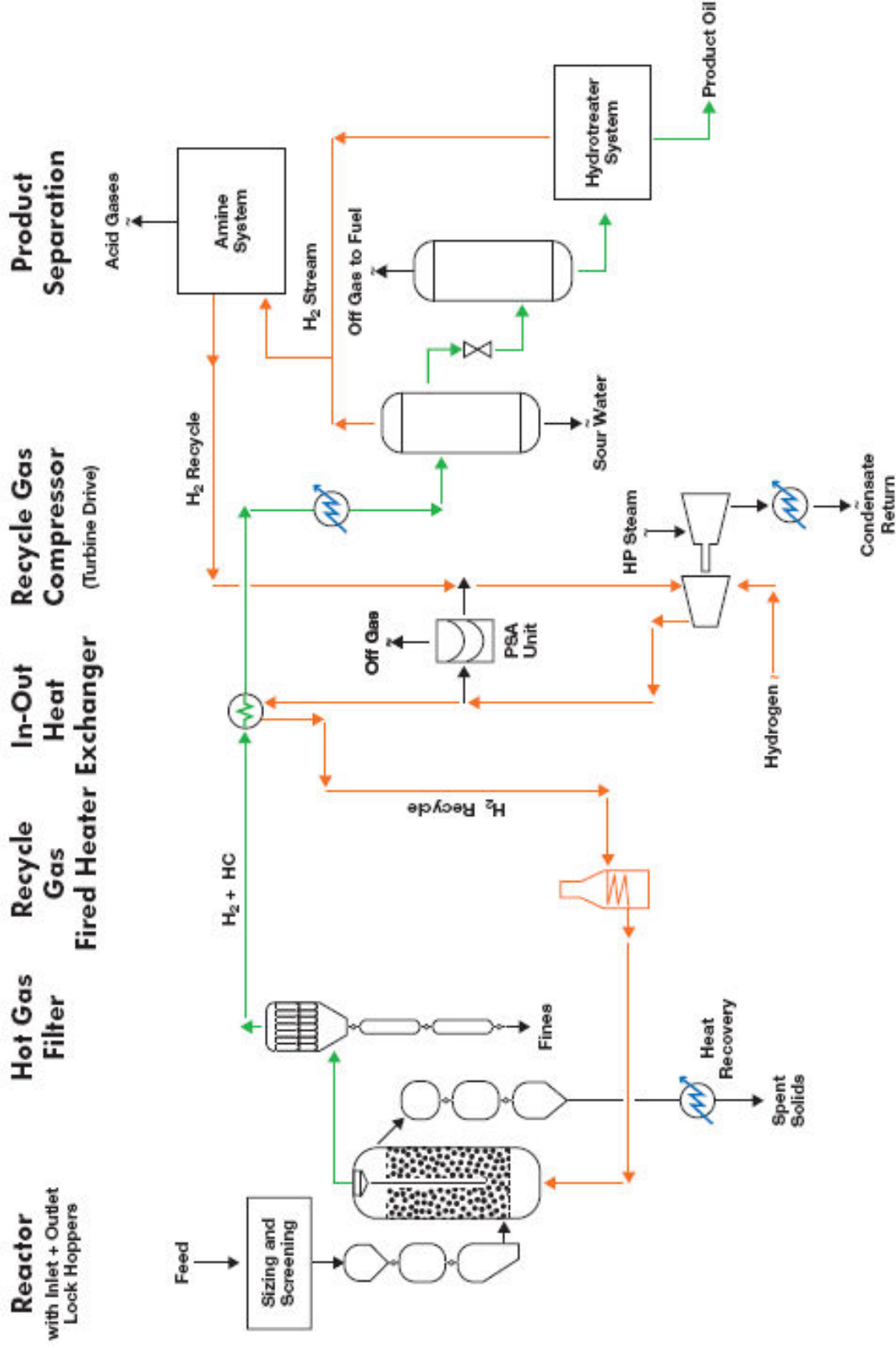


H₂-Rich Product Oil Vapor Outlet



Pressurized Hot Hydrogen Inlet

The Chattanooga Process



Patents

- **Six Issued**
 - **Four United States**
 - **One Canadian**
 - **Recent Notice of Allowance in Canada**
- **Wholly Owned by CC**
- **Additional Patents Pending**

Environmental Benefits of the Chattanooga Process for

Oil Sands

- **50% reduction in CO₂ emissions (~150 lbs/bbl)**
- **Elimination of process generated SO₂ and NO_x**
- **Complete elimination of tailing ponds**
- **No ground water contamination**
- **No significant water consumption**

Chattanooga Process Product Quality

- **High Product Quality**
 - 28°* - 40°** API from Oil Sands/bitumen
 - 20°* - 36°** API from Oil Shale
 - <20 ppm sulfur content **
- **Stable and saturated**
- **Very little coking**
- **Pipeline quality**

* Reactor outlet

** Process Product

Chattanooga Process Economic Advantages

- Lower Capital and Operating costs per bbl
- Reduced energy requirements
- Smaller capacity facilities are feasible
- Capability to self-generate fuel and hydrogen plant make up
- Immediate reclamation of mined areas
- Efficient use of hydrogen

Why Chattanooga Process for Oil Shale ?

- “For all oil shales, major yield increases can be obtained only by adding more hydrogen to the organics.
- Fluid bed reacting gives oil yields of 125% to 200% higher than standard Fischer-Assay.
- Optimal temperature for process: under 1000°F”

The above are the conclusions of Dr. Burt Davis, Center for Applied Energy Research, U of Kentucky

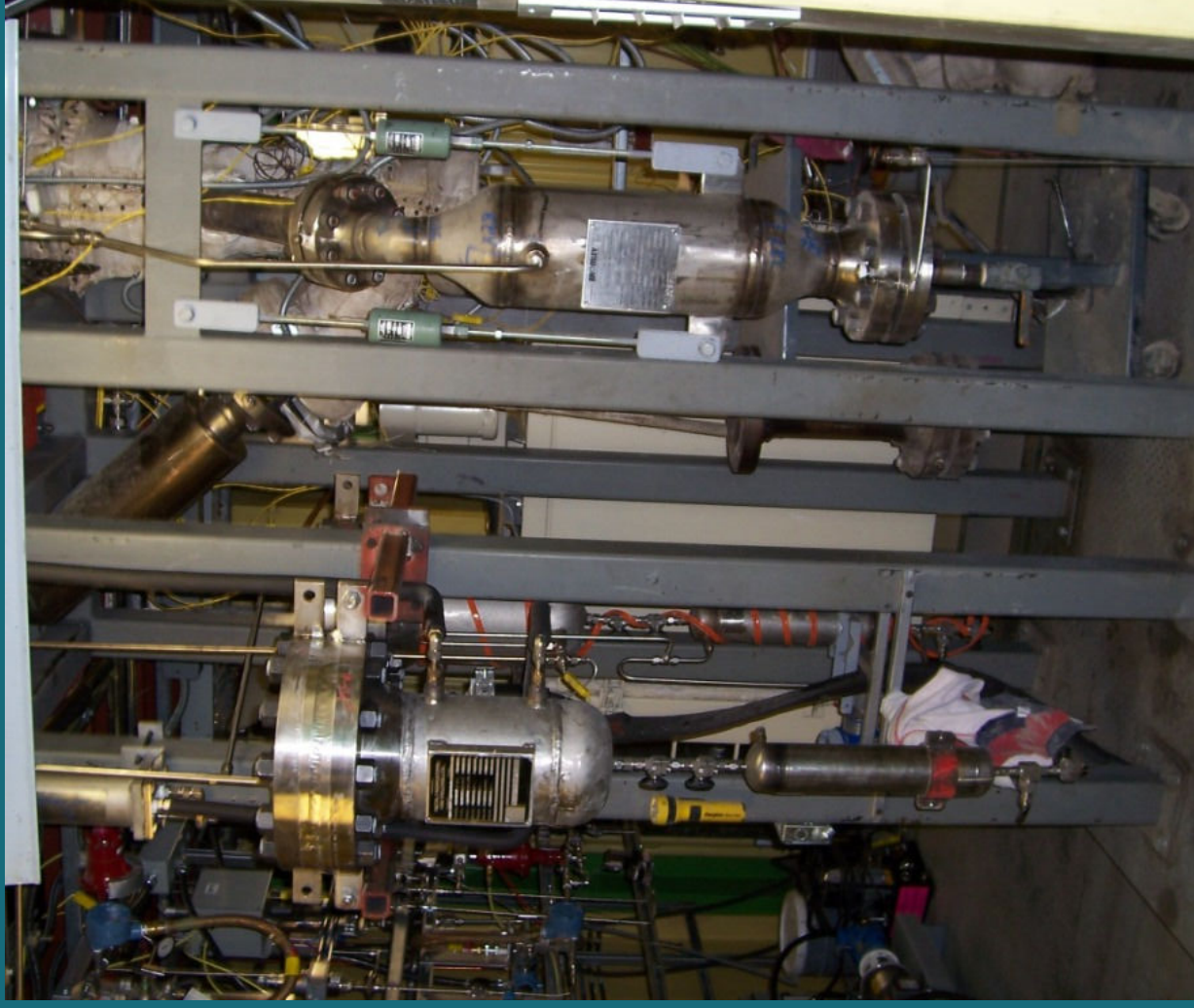
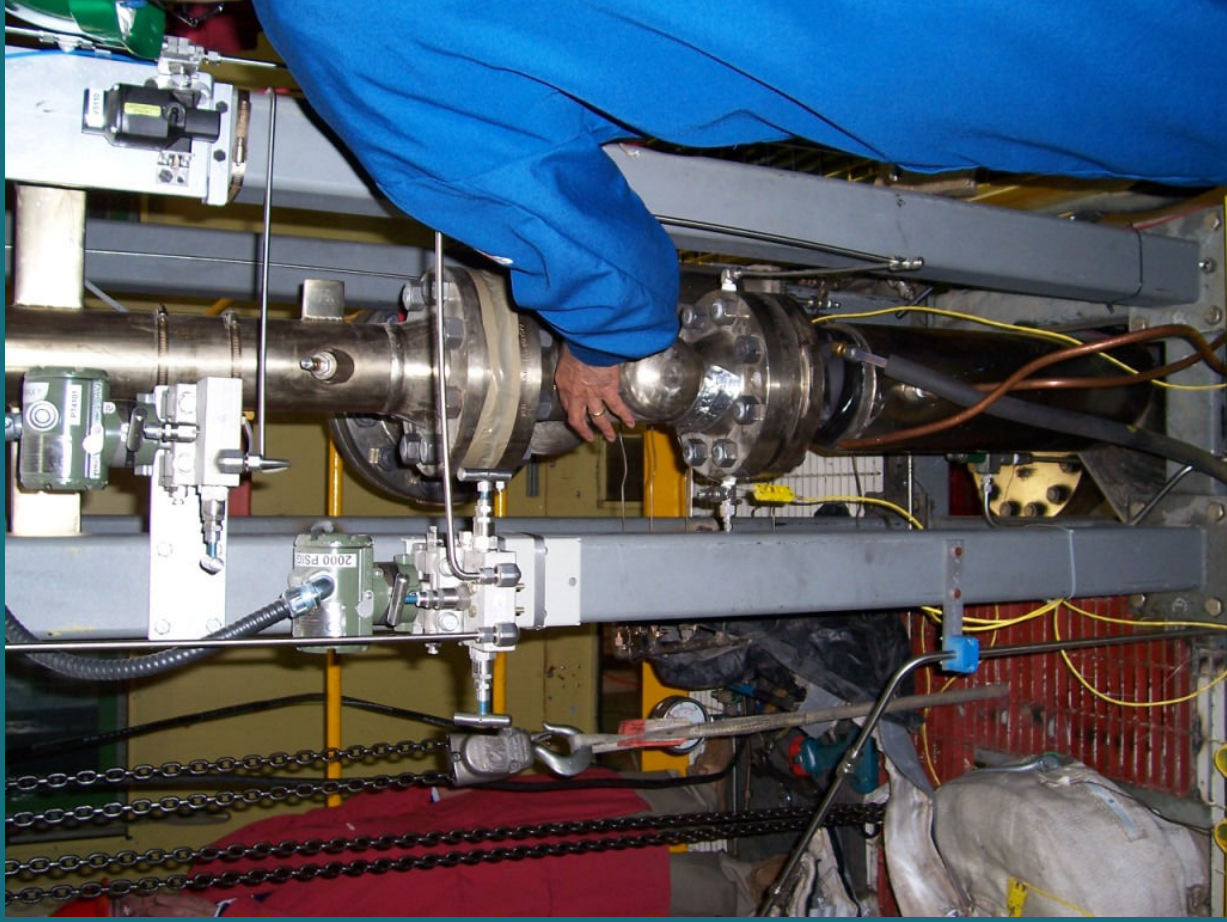
Environmental Benefits over Other Shale Processes

- Negligible Water Required
- No process Waste Water Discharge
- No SO₂, NO_x or CO₂ Produced in Reactor
- Low Emissions
- Immediate Reclamation of Mined Area

Chattanooga Process Pilot Plants

- **National Center for Upgrading Technology**
- **Located in Alberta**
- **Pilot Plant I commissioned in 2000**
- **Pilot Plant II commissioned in 2004**

Chattanooga Process Pilot Plant II



Results of Tests Conducted at NCUT

PILOT PLANT I:

- Proved reaction kinetics for bitumen
- Produced 32° – 36° API stable oil
- >80% liquid yield
- Very little coking (~1%)

PILOT PLANT II:

- Achieved fluidization
- Extracted ~100% of kerogen contained in oil shale

Results of Tests Conducted at NCUT

PILOT PLANT II:

<u>Resource</u>	<u>Yield</u>
Colorado Oil Shale	51.5 gal./US ton *
Kentucky Oil Shale #1	15.4 gal./US ton **
Kentucky Oil Shale #2	12.6 gal./US ton ***

* Fischer Assay - 28.4 g/t

** Fischer Assay - 7.7 g/t

*** Fischer Assay - 6.3 g/t

The company: **Chattanooga Corp**

The direct Team:

M.J. Karpenski, President/CEO,

31 yrs Div. P/CEO Foster-Wheeler

J.A. Doyle, Chairman,

37 yrs EVP, WR Grace Corp

C.G. Kirkbride, Director

son of original Patent author

L.J. McEvoy, Director, VP

34 yrs EVP F-W Corp

F. Hildebrandt, Director, SVP

35 yrs Federated Chem., Ltd.

A.M. Howarth, Director, VP

20 yrs operations & Bell Labs

W.E. Poist, Director, VP

32 yrs CPA & Mgmt Cons.

G.J. Porges, Counsel

32 yrs Mng Partner, PHKP

Extended Team:

P.J. Davies, retired, Chief Mining Eng.,

Bechtel Corp.

Dr. T. Knowlton, Technical Dir.,

Particulate Solids Research Inc.

Dr. R. Thais, Chrnm, Christian Bro. U.

Chem. E Dept Head

Dr. B Davis, Professor, U. Kentucky

Center for Applied Energy Research

The Portfolio: **4 US and 2 CA Patents, 3 US and 2 CA Applications**

Patent Counsel: **Morgan & Finnegan**

Key Relationships: **Alberta Research Council / National Center for Upgrading**

Technology (NCUT) , PSRI, CAER / UK, DOE



Chattanooga Process Summary

Proven Technology

- Ready to move to Demonstration Plant
- Multiple Feed stocks – oil sands processor and bitumen upgrader
- Patent Protection

Sound Economics

- Higher Yield = Higher Profitability
- Superior Product Quality
- Upfront Hydrogen Use = Greater Cycle Efficiency
- Minimal Reclamation Cost

Environmentally Beneficial

- Minimal Emissions and no tailings ponds
- Minimal Water Requirements and Impacts
- Shorter Permitting Cycle

Chattanooga Corp

Martin J. Karpenski, CEO/President

Thank you.

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