

NOVACAT[®] Catalyst

A catalyst route to increase gas phase plant capacity

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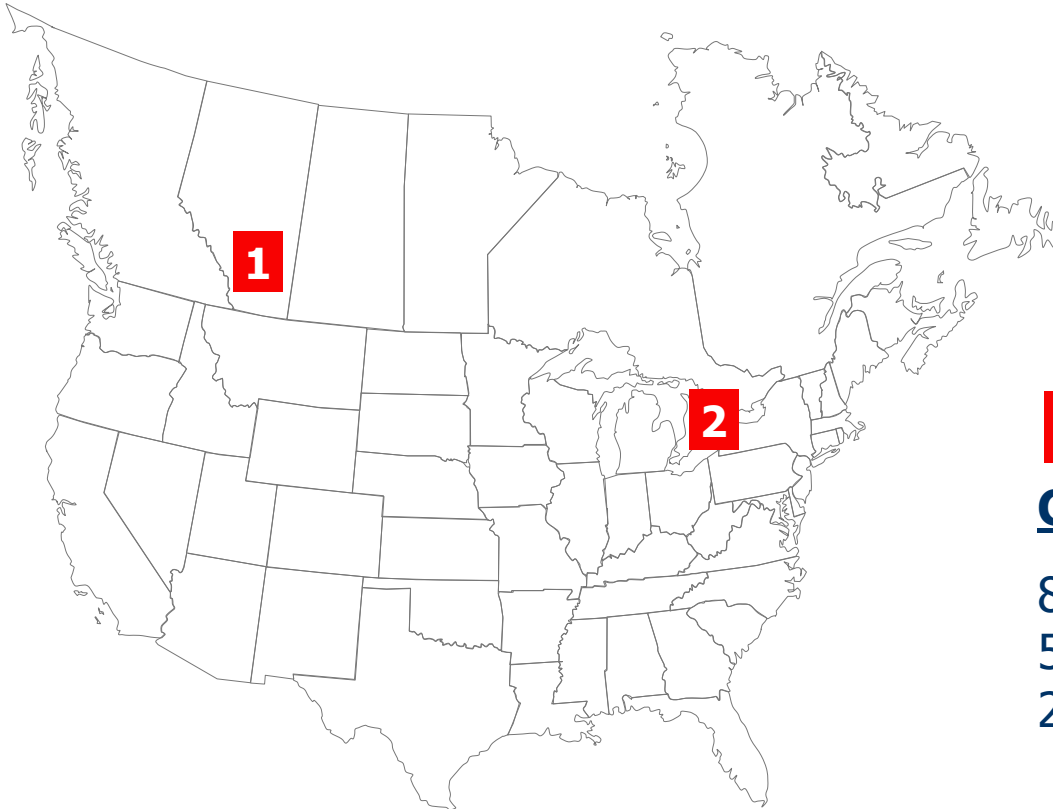
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NOVACAT[®] is a registered trademark of NOVA Chemicals Inc

Outline

1. NOVA Chemicals
2. NOVACAT Catalyst Technology
3. Capacity Increase with NOVACAT Catalyst
4. Summary

Two World Class Complexes



1

Joffre, Alberta

2815 kta Ethylene
1066 kta Polyethylene
376 kta Co-Products

2

Corunna, Ontario

839 kta Ethylene
556 kta Polyethylene
2132 kta Co-Products

NOVA Chemicals Licensing

- SCLAIRTECH™ technology licensed worldwide with installed capacity more than 2700 kTA
- Advanced SCLAIRTECH™ technology
- World leading technology for cracker furnace tube coking-prevention
- Advanced Zeigler-Natta NOVACAT catalyst for Gas Phase Process.

NOVA Chemicals Research & Technology Centre Calgary, Alberta



- A focused world class research facility
- Over 200 research scientists, engineers, technologists
- 11,000 m² of prime research space
- ~ \$25 M annual budget
- Piloting capabilities for all our processes
- Detailed product/process characterization equipment
- Leading edge modeling/simulation capabilities

NOVACAT Catalyst

- Zeigler-Natta catalyst – any PE gas phase process
- Drop in dry-feed catalyst for existing process
- Broad range of butene and hexene copolymers
- Excellent morphology and flow characteristics
- High catalyst productivity

NOVACAT Product Benefits

- Equivalent or better than incumbent product
 - Good physical properties
 - 20% lower hexane extractable (less sticky resin)
 - Permits lowering of resin density to 0.912/0.913
 - Low gels - in some cases 50% lower.
- Densities: 0.915 to 0.938; MI: 0.4 to 20+ ; including HDPE



Drop in product – No customer qualification

NOVACAT Process Benefits

- Stable Rx operation (consistent catalyst)
- Less Rx and downstream fouling (lower fines and less sticky resin)
- Better resin conveying (resin morphology and less sticky resin)
- Condensed mode operation capability (less sticky resin)



Higher Rates

NOVACAT at NOVA Chemicals'

Joffre PE1 plant

Background

- NOVAPOL Gas Phase Process
- LLDPE and MDPE resins
- Copolymers of butene and hexene
- Using NOVACAT catalyst since 2001

NOVACAT - Rate Improvements

- Butene 20MI 0.924 density
 - Doubled our production rates.
- Plant capacity increased by 15% - mainly C6
 - Another 15% identified
- Cost : fraction of that required for a new plant
- Operate all products in condensed mode – less fouling

NOVACAT - Operating Benefits

- Lowered density to 0.915 for market capture
- Reduced plate fouling for MDPE resins (reduced fines)
- Eliminated catalyst related unplanned shut downs.

NOVACAT Catalyst - Opportunity for Other PE Producers

NOVACAT - Sales

- NOVACAT is available for third party use.
- Catalyst quality and performance demonstrated at 4 other PE producers.
- Access to NOVA Chemicals operational experience to implement technology at site.

NOVACAT Catalyst - Summary

- Best-in-class Advanced Z-N catalysts for gas-phase PE
 - ▶ Drop in catalyst – no capex required
 - ▶ 20 to 30% increase in plant capacity possible – minimize capex
 - ▶ Drop in products – No customer qualification

- NOVACAT catalyst available for commercial trial

- Successfully practiced at NOVA Chemicals and other world scale PE plants.

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