

# **Synthetic Crude Logistics in the Enbridge System**

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**January 29, 2004**





## **System Highlights (Nominal)**

### **Canada and United States Liquids System**

- **Enbridge Pipelines Inc. / Enbridge Energy Partners, L.P.**
  - Complete system right-of-way 4,500 miles
  - 9,500 miles of pipeline
  - 180 pump stations
  - 561 pumping units - all electric
  - 34.5 million barrels of line fill
  - 25 million barrels of tankage in 163 tanks

# Commodities Pumped on the Enbridge System

| <u>Natural Gas Liquids</u> | <u>Refined Products</u>      | <u>Crudes</u> |
|----------------------------|------------------------------|---------------|
| NGL                        | Various Grades of Gasoline   | Light         |
| ABS (Sarnia Butane)        | Various Grades of Distillate | Medium        |
|                            | Aviation Fuel                | Heavy         |
|                            |                              | Condensate    |
|                            |                              | Synthetic     |
| (2)                        | (21)                         | (47)          |

Total of 70 different types

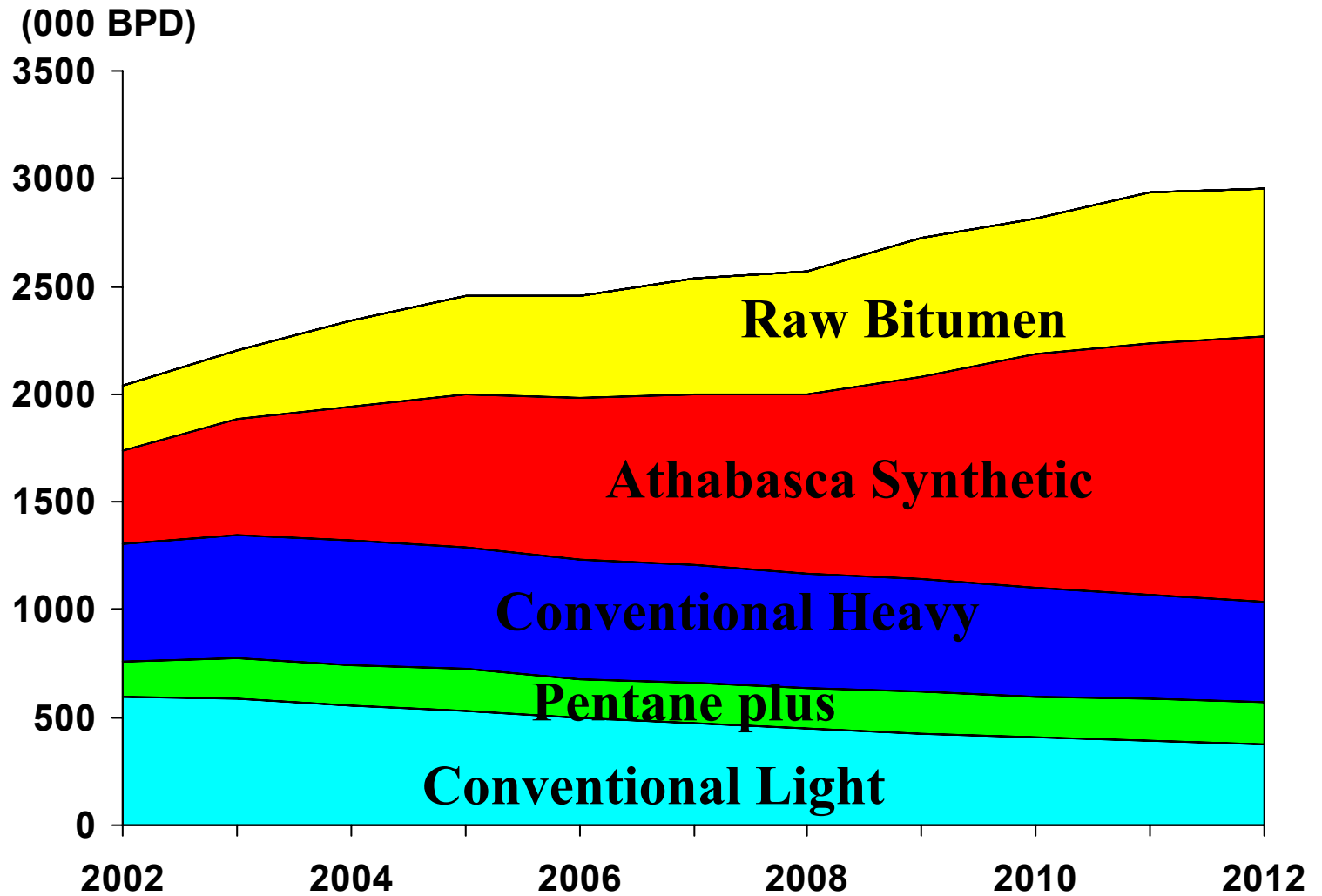
# Commodity Classifications

| <b>Viscosity<br/>(mm<sup>2</sup>/s)</b> | <b>density<br/>(kg/m<sup>3</sup>)</b> | <b>Classification</b>    | <b>Tariff Surcharge</b> |
|---|---------------------------------------|--------------------------|-------------------------|
| <b>100 - 350</b>                        | <b>904 - 940</b>                      | <b>Heavy</b>             | <b>Plus 22%</b>         |
| <b>20 - 99</b>                          | <b>876 - 903</b>                      | <b>Medium</b>            | <b>Plus 8%</b>          |
| <b>2 - 19</b>                           | <b>800 - 875</b>                      | <b>Light</b>             |                         |
| <b>0.4 - 1</b>                          | <b>600 - 799</b>                      | <b>Prod. &amp; Cond.</b> | <b>Less 8%</b>          |
| <b>To 0.3</b>                           | <b>to 599</b>                         | <b>NGL</b>               | <b>Less 10%</b>         |

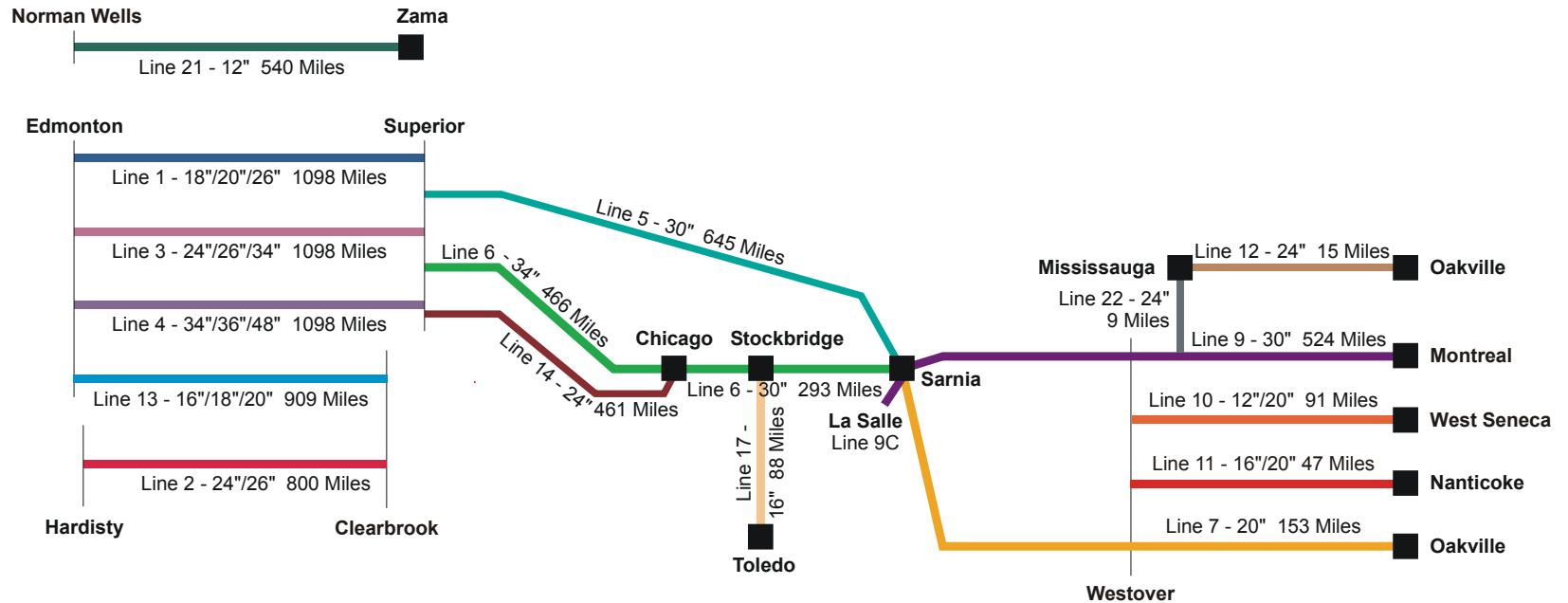
(mm<sup>2</sup>/s) = square millimeters per second

(kg/m<sup>3</sup>) = kilograms per cubic meter

# Forecast 2003



# Pipeline System Configuration



| Line 1  | Line 2  | Line 3  | Line 4   | Line 5  | Line 6  | Line 7  | Line 9   | Line 10   | Line 11   |
|---|---|---|--|---|---|---|--|---|---|
| <ul style="list-style-type: none"> <li>• NGL</li> <li>• Refined Products</li> <li>• Synthetics</li> </ul> | <ul style="list-style-type: none"> <li>• Heavy Crude</li> </ul> | <ul style="list-style-type: none"> <li>• Light Crudes</li> <li>• Medium Crudes</li> <li>• Synthetics</li> <li>• Condensates</li> </ul>  | <ul style="list-style-type: none"> <li>• Heavy Crudes</li> </ul> | <ul style="list-style-type: none"> <li>• NGL</li> <li>• Light Crudes</li> <li>• Synthetics</li> <li>• Condensate</li> </ul> | <ul style="list-style-type: none"> <li>• Heavy Crudes</li> <li>• Medium Crudes</li> <li>• Light Crudes</li> <li>• Condensate</li> </ul> | <ul style="list-style-type: none"> <li>• Light Crudes</li> <li>• Medium Crudes</li> <li>• Heavy Crudes</li> <li>• Synthetics</li> <li>• Condensate</li> </ul> | <ul style="list-style-type: none"> <li>• Light Crudes</li> <li>• Condensate</li> </ul> | <ul style="list-style-type: none"> <li>• Light Crudes</li> <li>• Medium Crudes</li> <li>• Heavy Crudes</li> <li>• Condensate</li> <li>• Synthetics</li> </ul> | <ul style="list-style-type: none"> <li>• Light Crudes</li> <li>• Medium Crudes</li> <li>• Heavy Crudes</li> <li>• Condensate</li> <li>• Synthetics</li> </ul> |
| Line 12   | Line 13   | Line 14   | Line 17  | Line 21   | Line 22   |   |  |   |   |
| <ul style="list-style-type: none"> <li>• Light Crudes</li> </ul>  | <ul style="list-style-type: none"> <li>• Synthetics</li> </ul>  | <ul style="list-style-type: none"> <li>• Heavy Crudes</li> <li>• Medium Crudes</li> <li>• Light Crudes</li> <li>• Synthetics</li> </ul> | <ul style="list-style-type: none"> <li>• Heavy Crudes</li> </ul> | <ul style="list-style-type: none"> <li>• Light Crudes</li> </ul>  | <ul style="list-style-type: none"> <li>• Light Crudes</li> </ul>  |   |  |   |   |

# Pipelining Synthetics 1

- **Fully Hydrotreated bottomless (SSB,OSA,OSC,HSB,NSA,PAS)**
  - Standalone batches
  - Line 1 (NGL buffers)
  - Line 13 re-injections at Clearbrook into Line 3
  - Window selection judicious
  - Line 3
  - Line 5 (light/medium) to Marysville and Ontario
  - Line 6 (light/med/heavy) Chicago and south destinations

# Pipelining Synthetics 2

- **Fully Hydrotreated Heavy Crudes - bottomless**
  - Suncor OSH - high TAN forces follow up flush batch
  - Albian Heavy Synthetic (AHS) travels as 'conventional heavy'
  
- **Partially Hydrotreated crudes - cracked stock**
  - Travel with buffers destined for same facility
  - Approximately 6500m<sup>3</sup> buffer on each side
  - Segregation required at breakout locations

# Pipelining Synthetics 3

## ■ Synbits

- High Tan (MKH) require flush batch for same facility
- Others travel as ‘conventional heavy’

## ■ Dilsynbit

- new commodity type just received

# Pipelining Synthetics

- New flavors/destinations require innovative thinking
- Challenges Continue.....