Bitumen Transportation by Rail from Alberta to the U.S. Gulf Coast
Grizzly Oil Sands Highlights

One of the Largest Oil Sands Land Positions in Alberta

- > 800,000 net acres in the Athabasca and Peace River oil sands regions (100% operated, nearly 100% WI) focused on SAGD development
- Privately owned by Wexford Capital and Gulfport Energy Corporation (NASDAQ : GPOR)

Repeatable & Scalable Development Model

- Plan to have 135,000 bbls/d of bitumen production ready for development in the next 5 years
- Grizzly’s “ARMS” development model enables repeatable and scalable project development, reducing execution and financing risk

Using Rail to Consistently Access Premium Markets

- Rail provides flexible access to the U.S. Gulf Coast and other markets offering world pricing, bypassing pipeline bottlenecks
- The cost (avoiding the diluent penalty) is competitive with pipelines,
- Grizzly is investing in long-term rail infrastructure (terminals, rail cars and logistics paths)
Grizzly Oil Sands

**Grizzly Production Development Plan**

- **Algar Lake**
  - Steam injection at Algar Lake Phase 1 has commenced with first oil delivered March, 2014
  - Ramp up to 6,000 bbls/d bitumen expected by end of Q1, 2015

- **May River**
  - Located ~130 km southeast of Ft McMurray and 8 km from the rail
  - 819 mmbbls of Contingent Resources
  - Initial 12,000 bbls/d regulatory application filed in Q4, 2013

- **Cadotte**
  - Located ~15 km northwest of Peace River and 3 km from the rail
  - 345 mmbbls of Contingent Resources

1. Source: GLJ Petroleum Consultants Ltd., as at December 31, 2013
Windell Terminal, Conklin, Alberta
- 10,000 Bbls/d capacity, started up Mar 2014
- 120 acres of land allows for expansion to unit train (100 cars per day)
- Located ~8 km away from Grizzly’s core May River site,
- Open for third party business - 1.5 MMbbls/d future bitumen production, 0.5 MMbbl/d diluent demand in Windell’s service area

- Truck cost $200/hr, capacity 260 bbls/truck, speed 80 kmph, cost (excluding load/unload) is $1.00/bbl per 50 km (radius of circle)
Grizzly’s Rail Transportation Strategy - Paulina

- Paulina Terminal, South Louisiana
  - MP 150.3 on the River
  - 40,000 Bbls/d capacity
  - Expansion potential to 120,000 Bbls/d
  - Adjacent to existing ADM grain terminal with dock and unit train parking
  - Provides access to River (blue water barges) and global priced market
  - Permitting is underway, FEED is complete, start-up second quarter 2015
Cadotte Heavy Oil Property

CN Rail Head At Peace Valley
The U.S. Gulf Coast is the only location that can handle large quantities of incremental oil sands bitumen:

- 19 Complex Refineries (Houston to the River)
- 6,500,000 bbls/d Refining Capacity
- 1,365,000 bbls/d Coking Capacity (21% of total capacity)

Oil sands bitumen will produce about 50 - 70% vacuum bottoms – this will rapidly saturate USGC coking capacity and require additional cokers or offshore exports.

Growing Eagleford and Bakken light oil supply has already saturated the PADD III market for natural gasoline. USGC refiners do not value C5/C6 highly because it has low octane and high RVP and the refineries are choked on light ends, not heavy ends.

Mt Belvieu condensate going up Explorer Pipeline and Capline to Chicago for Southern Lights pipeline delivery to Edmonton does not create incremental market, if it shows up again re-delivered from Canada in the pipeline supplied dilbit.

Implies that under-diluted rail-bit should become a premium product for filling PADD III cokers and unloading light end processing units.
Market Options Depends on Type of Heavy Oil

- Fuel Oil and asphalt market works for Lloydminster heavy oil
  - Requires 1% water, 3% sulphur, 350 cst at 50°C, TAN<1, flash point greater than 60°C (Lloyd heavy oil flash point is typically greater than 60 °C)
  - Flash point does not blend linearly, other factors do, so Lloyd 12 °API heavy oil can be blended into this market

- Refinery markets required for other bitumen and dilbit
  - Peace River heavy oil has TAN > 2.5 and high sulphur
  - Ft McMurray bitumen has TAN > 2.5 and high sulphur
  - Dilbit has a lower flash point than raw bitumen (because of the diluent)
  - Much of the SAGD processing cost is to achieve 0.5% water cut for Canadian pipeline spec. Water restriction for rail and refineries is unclear
  - Sell either FOB in Alberta at WCS/WTI index (without rail cars) or CIF delivered into market at Brent, Mars, or Maya type index (with rail cars)
USGC Distribution – the Lower Mississippi River should represent the highest value market for Grizzly’s bitumen.

Shell HOHO Line - Heavy Oil has a $0.15/Bbl surcharge - capacity based on a medium gravity oil.
## Complex Refineries Along the River

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>River Miles from Paulina</th>
<th>Barge Cost $/Bbl (1)</th>
<th>Capacity 000 BPD</th>
<th>Coker 000 BPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exxon</td>
<td>Baton Rouge</td>
<td>81 (north)</td>
<td>0.80</td>
<td>514</td>
<td>118.5</td>
</tr>
<tr>
<td>Marathon</td>
<td>Garyville</td>
<td>10</td>
<td>0.41</td>
<td>425</td>
<td>72</td>
</tr>
<tr>
<td>Motiva</td>
<td>Norco</td>
<td>25</td>
<td>0.49</td>
<td>242</td>
<td>23.6</td>
</tr>
<tr>
<td>Valero</td>
<td>Norco</td>
<td>25</td>
<td>0.49</td>
<td>157</td>
<td>56</td>
</tr>
<tr>
<td>Motiva</td>
<td>Convent</td>
<td>18 (north)</td>
<td>0.46</td>
<td>255</td>
<td>52 (resid hydro)</td>
</tr>
<tr>
<td>Conoco</td>
<td>Belle Chase</td>
<td>87</td>
<td>0.83</td>
<td>260</td>
<td>26.7</td>
</tr>
<tr>
<td>Exxon</td>
<td>Chalmette</td>
<td>61</td>
<td>0.69</td>
<td>190</td>
<td>34.5</td>
</tr>
<tr>
<td>Chevron</td>
<td>Pascagoula, MS</td>
<td>266</td>
<td>1.80</td>
<td>325</td>
<td>97</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>2,368</strong></td>
<td><strong>481 (20%)</strong></td>
</tr>
</tbody>
</table>

(1) Based on 2 x 30,000 Bbl barge tow with 1.5 days for load and unload using 2012 leasing prices
Diluent Penalty – Dilbit vs. Rail-Bit vs. Diluent Recovery Unit ($/Bbl of bitumen)

- Optimal SAGD rail-bit is about 12% diluent, 88% bitumen (SG=.97)
- Diluent price = WTI + $3.00 (Edmonton diff) + $3.00 (transport to field),
- **Hi TAN** Dilbit Price = WTI – $25.00 (Hardisty diff) – $3.00 (transport from field)
- Diluent penalty is 12/88 * 34 = $4.60/Bbl
- Rail car capacity drops vs. dilbit by 4%. Transport cost increases $0.80/Bbl
- Steaming and downstream terminal handling cost increase vs. dilbit = $0.50/Bbl
- Total cost vs dilbit of **$5.90/Bbl**

- Regular pipeline dilbit penalty is 30/70 * 34 = **$14.57/Bbl**
  - DRU costs $4 - $5/Bbl @ 95% recovery factor & 95% utilization factor
  - Unrecovered diluent penalty is 2/98 * 34 = $0.70/Bbl
  - Rail car capacity drops vs. dilbit by 8%. Transport cost increases $1.60/Bbl
  - Steaming and downstream terminal handling cost increase vs. dilbit = $1.00/Bbl
  - Total cost vs dilbit of **$7.30 - $8.30/Bbl**
Bitumen Viscosity

Viscosity (cP)

10,000,000
1,000,000
100,000
10,000
1,000
100
10
1

Temperature (deg C)

0 50 100 150 200 250

- Bitumen at virgin reservoir conditions
- Peanut Butter
- Ketchup
- Maple Syrup
- Olive Oil
- Cream
- Water

- Bitumen under SAGD

Rail-bit SG=0.97

350 cst.
Demurrage and weather causes headaches

- Trucking demurrage is $0.40/bbl-hour
  - Road restrictions - accidents, weather, spring break-up, dimensional loads blocking highway

- Rail demurrage is $0.25/bbl-day for a loaded car held by the RR
  - Rail cars back up – winter (below -25 degrees), mainline bunching and lack of daily terminal capacity, other freight taking priority (i.e. grain)

- Barge demurrage is $0.25 - $0.50/bbl-day
  - Barge delays – low river draft, fog, dock access backs up from other users

- Demurrage means loss of capacity for a given fleet
  - And scares crude oil shippers away from commitment to rail
  - But there are third parties willing to provide management for a fee
  - Requires surplus rail cars, parking and extra tank capacity
Carbon Intensity of Heavy Oil Transport — Rail vs. Pipe (source Grizzly)

- Pipeline Case — 420,000 bbls/d bitumen (plus 180,000 bbls/d diluent) for 2,000 miles — 350 cst viscosity heavy oil
  - 30” dilbit pipeline, optimum 40 mile station spacing, 14” diluent return line
- Dilbit line requires 927,500 shaft HP of electricity @ 90% efficiency
- Diluent line requires 272,800 shaft HP of electricity @ 90% efficiency

- Rail achieves 987 Gross Ton Miles/gal (CN 2012) — assume 210,000 lbs of oil cargo per 286,000 lb. tank car and no diluent in the oil

- Using average North American CO2 factors
  - Pipe @ 0.460 kg CO2/kwhr (electricity) * 8721 gwhrs = 4.01 MM Tonnes CO2/yr
  - Rail @ 0.265 kg CO2/kwhr (diesel) * 3000 gwhrs = 0.79 MM Tonnes CO2/yr
    - Rail is typically 30% more miles than pipe so 1.0 MM Tonnes CO2/yr

Rail carbon is 25% of Pipe carbon
Comparative statistics for petroleum product release rates

Comparative statistics for petroleum product release rates: onshore transmission pipelines vs. road and railway (2005-2009)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Average product release per year (gallons)</th>
<th>Release per incident (gallons)</th>
<th>Release per billion ton-miles (gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>477,558</td>
<td>687</td>
<td>13,707</td>
</tr>
<tr>
<td>Railway</td>
<td>83,745</td>
<td>1,688</td>
<td>3,504</td>
</tr>
<tr>
<td>Hazardous Liquid Pipeline</td>
<td>6,592,366</td>
<td>19,412</td>
<td>11,286</td>
</tr>
</tbody>
</table>

Rail product release is 30% of Pipe per ton-mile

1. Source: Fraser Institute October, 2013 - Table 11