Mega-Project Safety in the Canadian Oilsands

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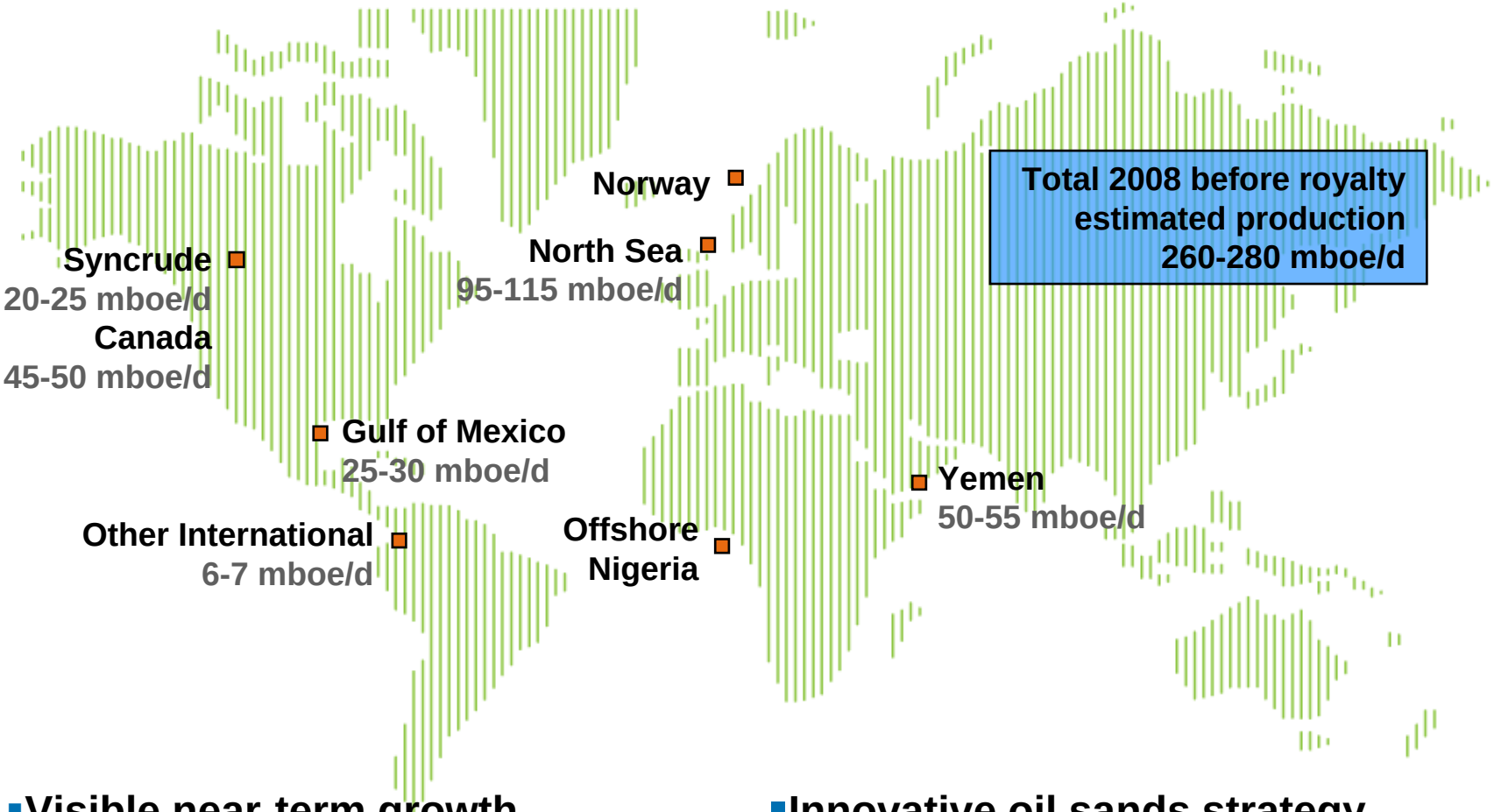
Nexen Inc.

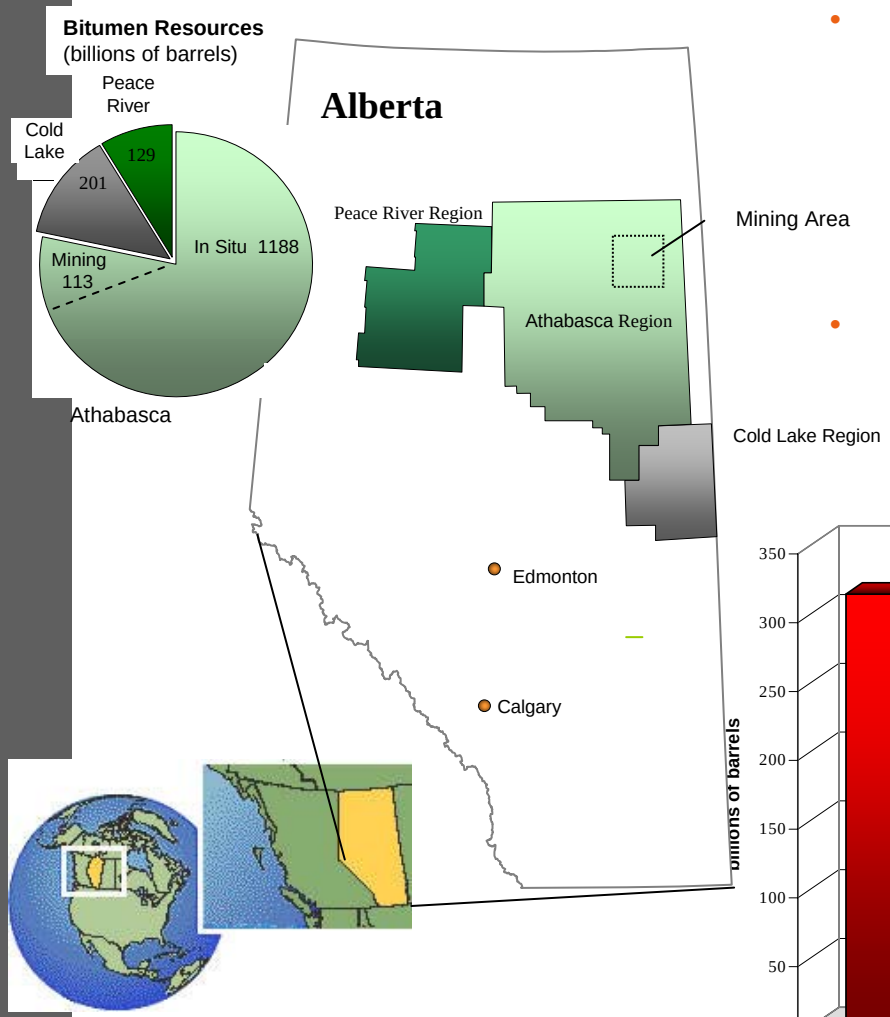
November, 2008

Who is Nexen?



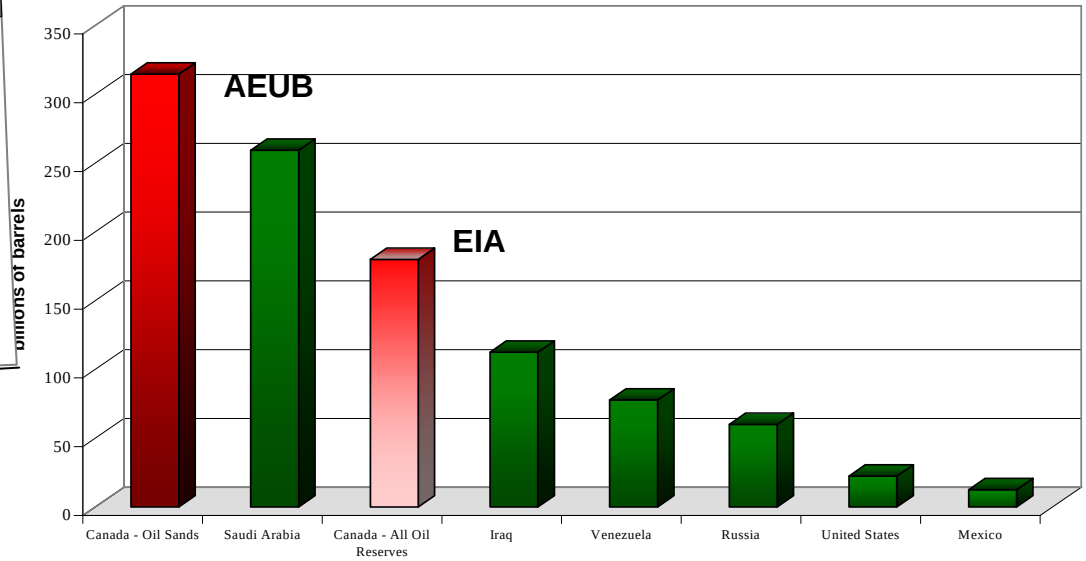
- Visible near-term growth
- Diverse portfolio of assets
- High-impact exploration program
- Innovative oil sands strategy
- Substantial exploration inventory

Overview of Canadian Oil Sands
A World Class Resource



- The Alberta Energy & Utilities Board (**AEUB**) estimates that under current technology, over 300 billion barrels are expected to be recoverable
  - by comparison, Saudi Arabia's current proved conventional oil reserves are estimated at 260 billion barrels
  - the U.S. DOE's Energy Information Administration (**EIA**) estimates Canada to have 180 billion barrels of reserves
- The **International Energy Agency**'s November 2003 WEIO report states that oil sands production will exceed 5.0 million bbl/d by 2030 and require $92 billion of investment over the next 30 years

World Oil Reserves vs Canada's Oil Sands



Sources: International Petroleum Encyclopedia 2003. Canada - Oil Sands sourced from the Alberta Energy and Utilities Board. Canada - All Oil Reserves sourced from the EIA International Energy Outlook.

Overview of Canadian Oil Sands Recovery Technologies

- Oil sands are composed primarily of sand, bitumen and water
  - bitumen, oil that is less than 10 degree API in its raw state, is a heavy, viscous crude oil which contains high amounts of sulphur
  - Two techniques currently employed to produce bitumen:
    - mining and in-situ

- Bitumen is sold in 2 general forms:
  - **as raw bitumen, after blending with a diluent produce a "bitumen blend"; or as a synthetic crude oil ("SCO"), after having been upgraded**
- Both products are sold to North American refineries
  - **bitumen blend competes with conventional heavy oil and SCO competes with conventional medium and light oils (depending on the amount of upgrading)**

A typical mining operation

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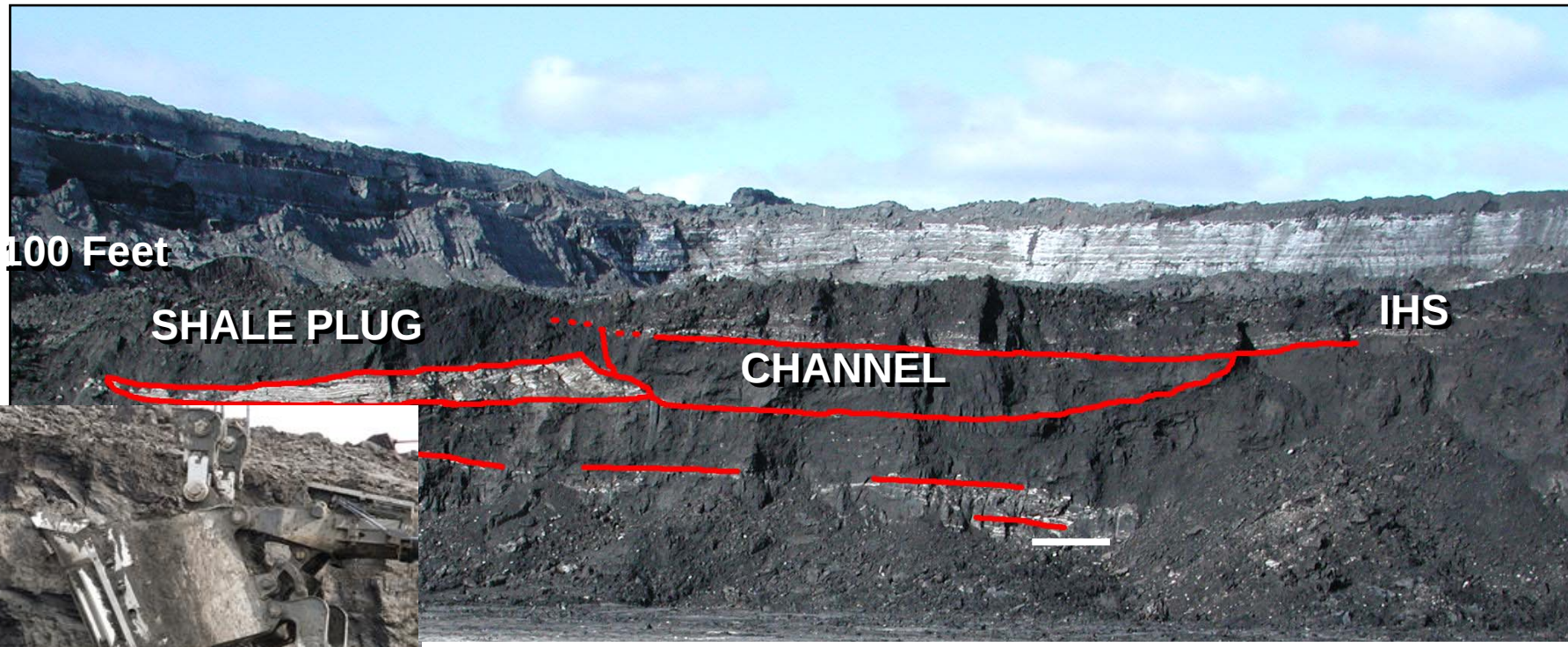
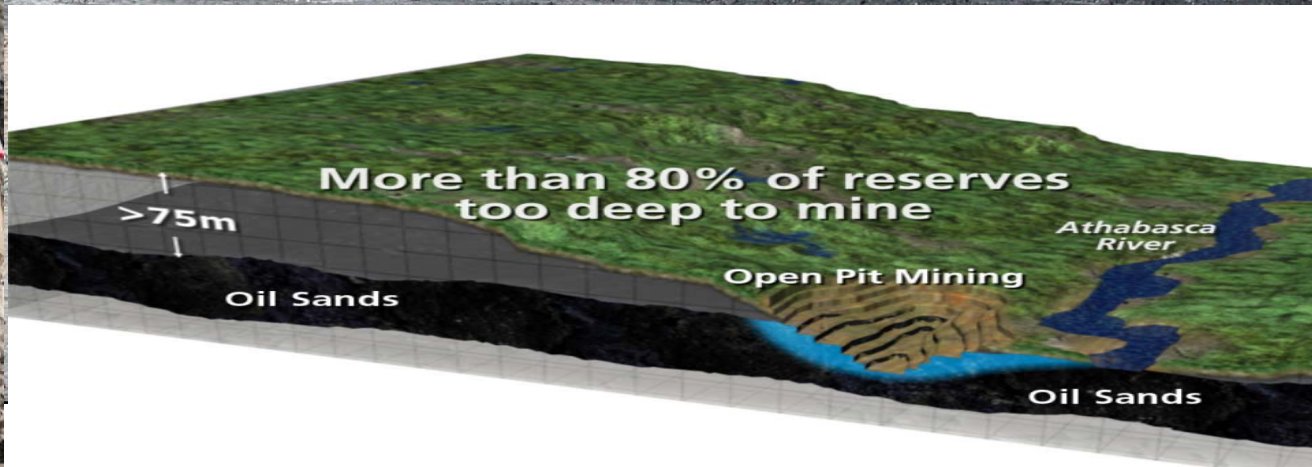
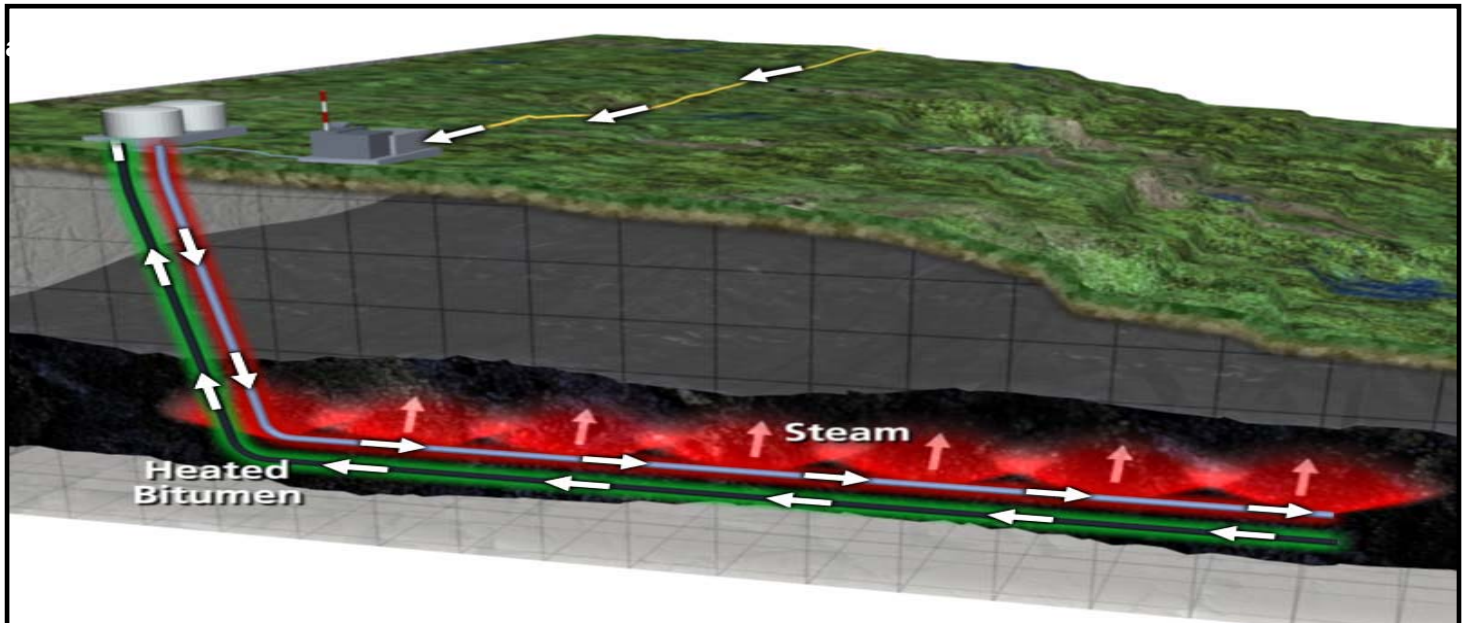


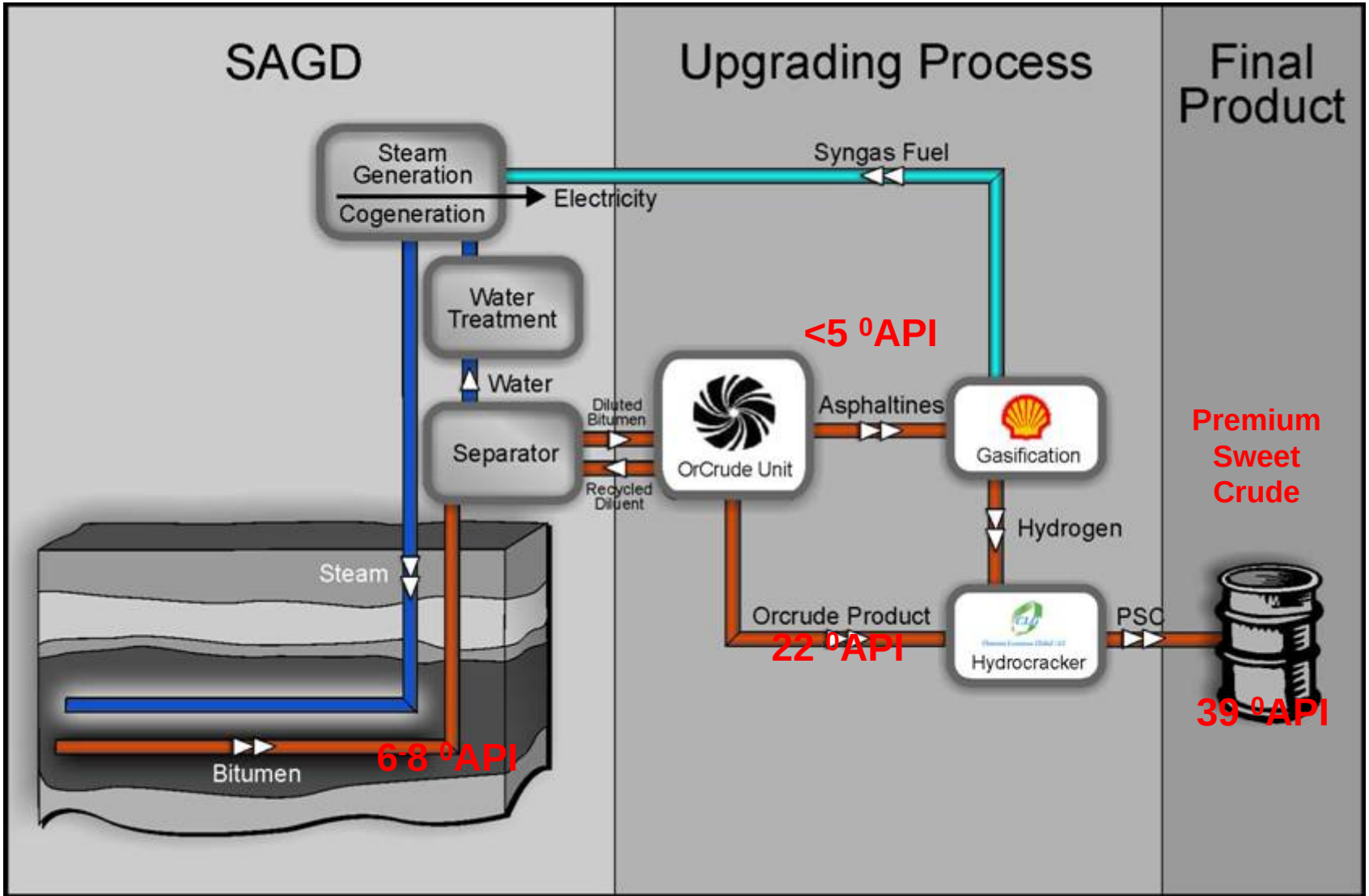


The Long Lake Project Overview
Technology - SAGD Recovery

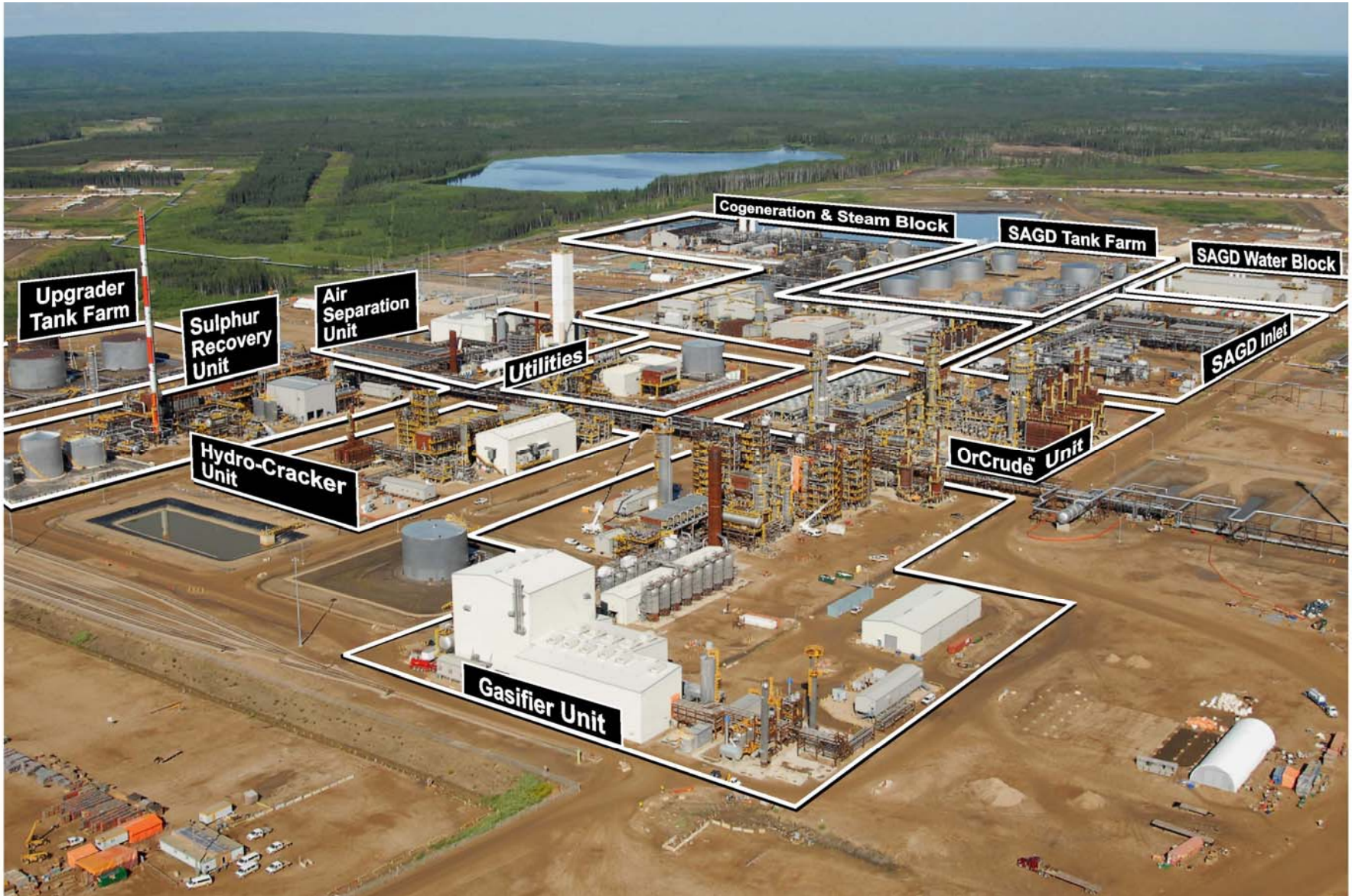
- Steam-Assisted Gravity Drainage (SAGD) process involves drilling pairs of horizontal wells in the oil sands reservoir
- The Steam to Oil Ratio ("SOR"), is the key measure of a thermal project's efficiency - the lower SOR of SAGD is a major advantage
- SAGD recoveries in excess of 70% have been observed at long-running SAGD pilots this compares to 25%-30% for high quality CSS projects



Nexen/OPTI Integrated Extraction and Upgrading Employing Gasification Technology



The approved concept was based on several assumptions and projections



We knew there would be Challenges:

- The first large-scale integration of SAGD (Steam Assisted Gravity Drainage) with onsite upgrading
- The largest single-phase SAGD development in the world (70,000 barrels per day capacity)
- The largest single-train Air Separation Unit in the world
- The first application of proprietary OrCrudeTM technology in Canada
- The first Gasification unit in Canada, a critical first step in future carbon capture

Construction Safety Management

- Nexen and OPTI co-own the facilities
  - Nexen to operate the SAGD and cogen
  - OPTI to operate the Upgrader
- The Prime Contractor Requirement
  - Time and space
  - Nexen assumed role of Prime Contractor
- Owners and 2 lead EPC contractors created a Construction Safety Management System (SMS)
- All potential contractors evaluated against the project SMS
  - Many “bridging” documents were created
- Managed dry camp

E1140
HITACHI
NORTH AMERICAN
EX1100BE

HITAC

CAT
160

Purpose built slant rigs with “mechanical roughneck” – very efficient and very safe

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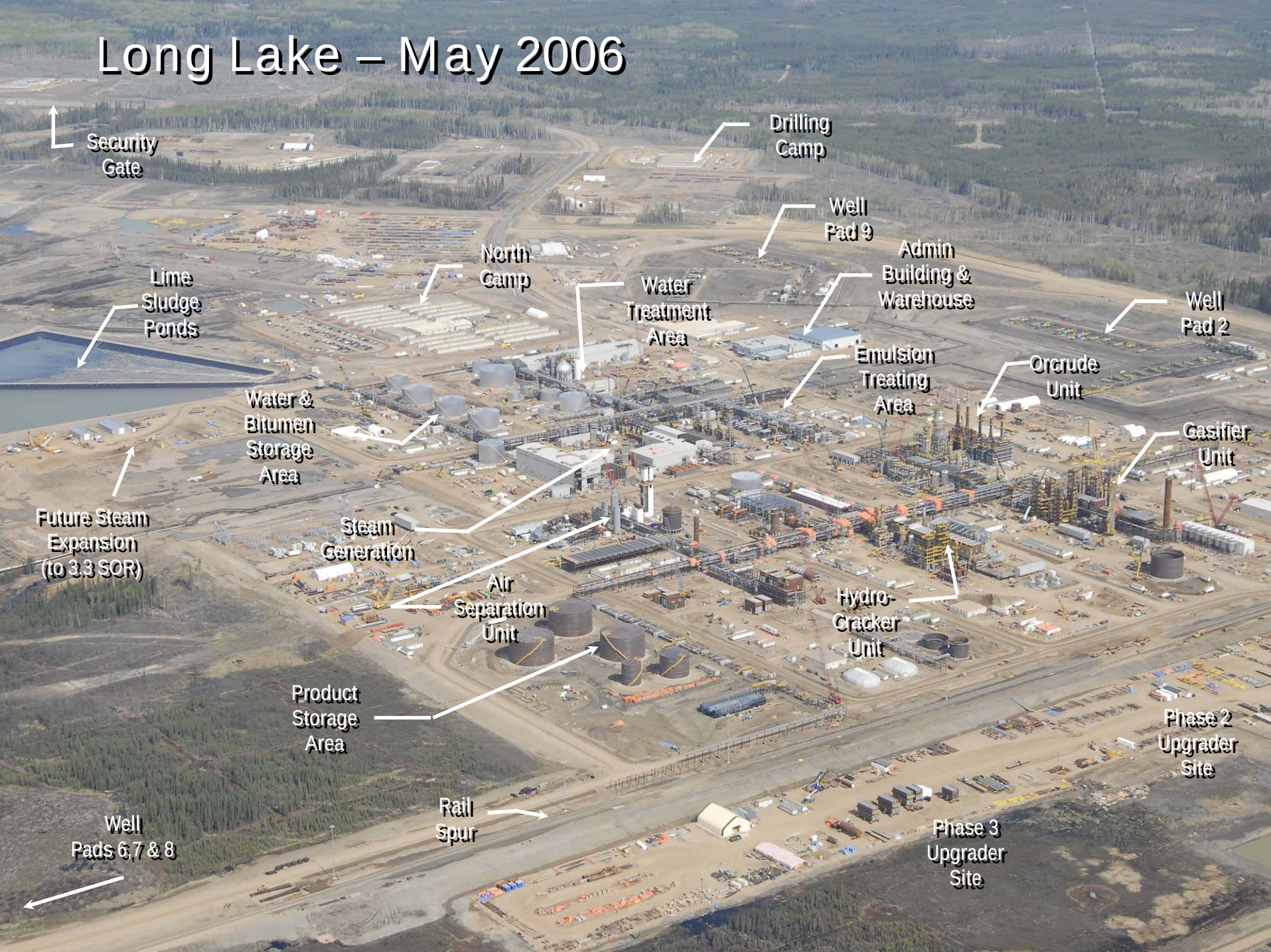
Long Lake October 2005

Long Lake Project – Site Construction

August, 2005

Long Lake – May 2006



By any measure, constructing the Long Lake Project was an enormous undertaking.

- **97** km of underground piping
- **170.6** km of module piping
- **205** km of field installed pipe
- **758 modules**
- **2,138** km of electrical cable and wire
- **17,996 piles driven**
- **23,883** metric tonnes of structural steel
- **46,042** cubic meters of concrete
- **26 million** person-hours
  - over 5 million camp meals served
  - over 35,000 construction orientations (turnover)
  - over 64,000 visitor orientations
  - almost 5,000 non work related clinic visits

Over 1000 “dimension loads” by road and rail – in part due to modularization

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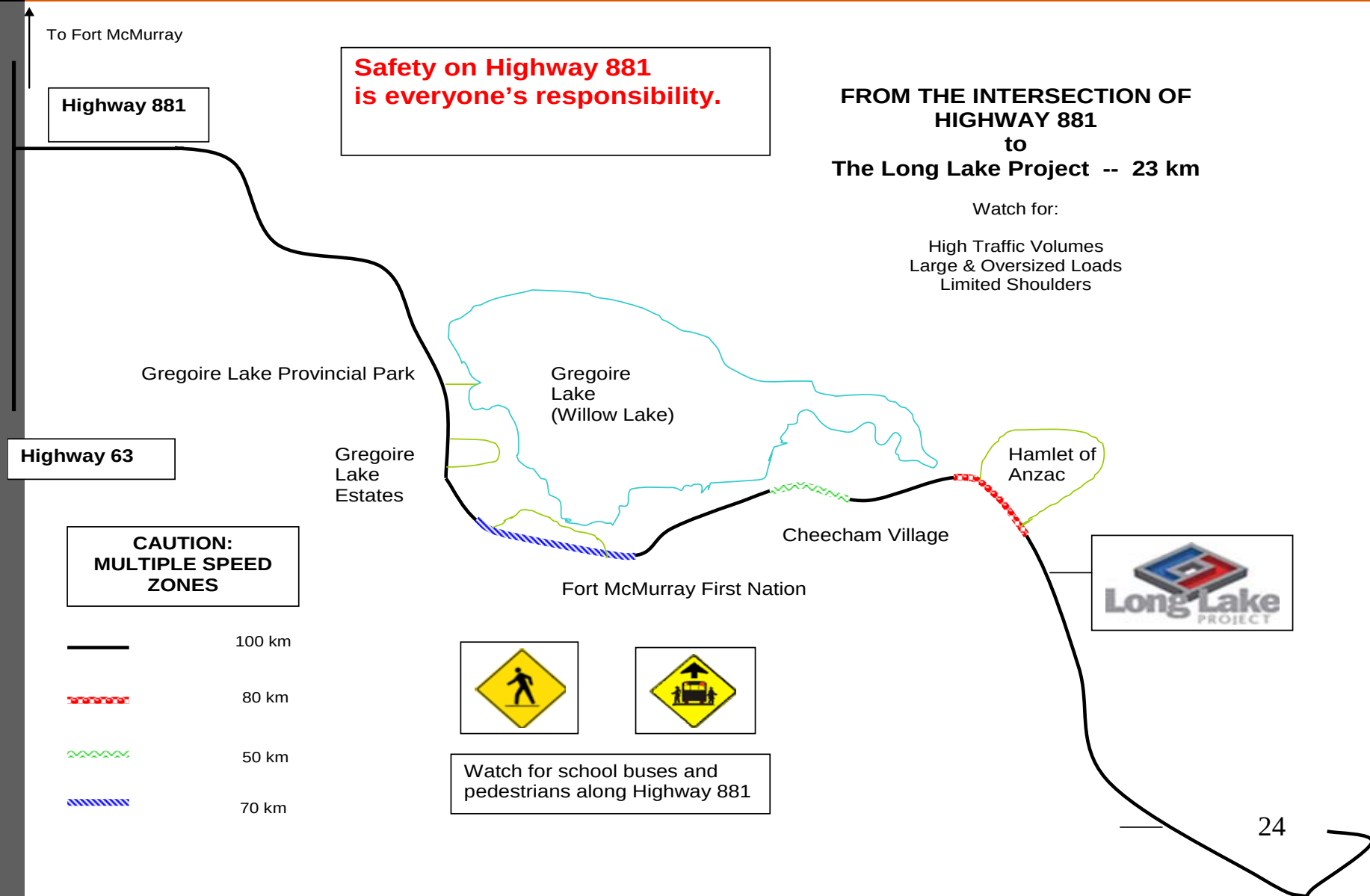
Another “Special Load” arrives on site

Safety and Security concerns extended offsite with respect to transportation



Long Lake October 2nd 2008

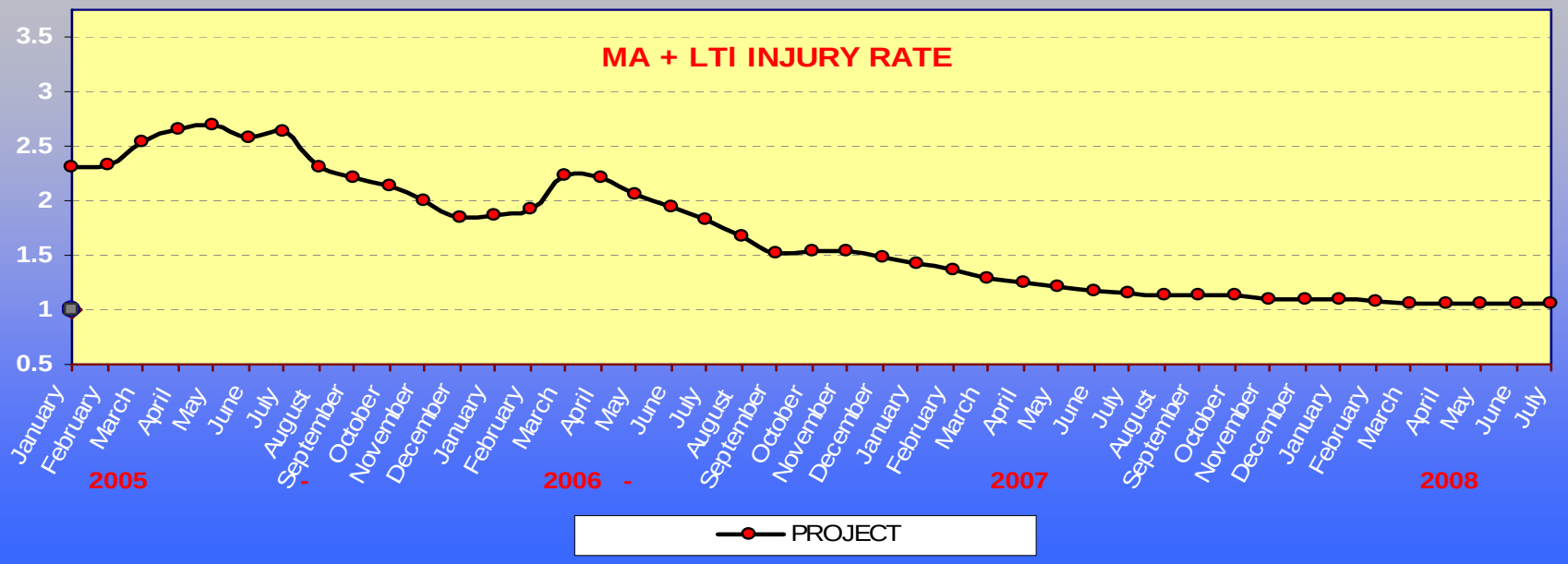
Commissioning and Hand over to Operations

- **FAST FACT**
  - Getting the Long Lake Project up and running involved commissioning 330 systems between the Upgrader and SAGD facilities. This task involved more than 2 million hours of effort and an intense focus on safe work practices. Nexen and OPTI Operations have now logged over 2.5 million hours -- and counting -- without a Lost Time Accident

HSE Challenges

- Workforce
  - Turnover
  - Skill level
  - Diversity
  - Supervision
- Working conditions
  - Weather, congestion, managed open site
- Management of change
  - Change out of contractors, number of contractors, shift changes
- Reporting

HSE Outcome


MA + LTI INJURY RATE
3.5
3
2.5
2
1.5
1
0.5
January
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March
April
May
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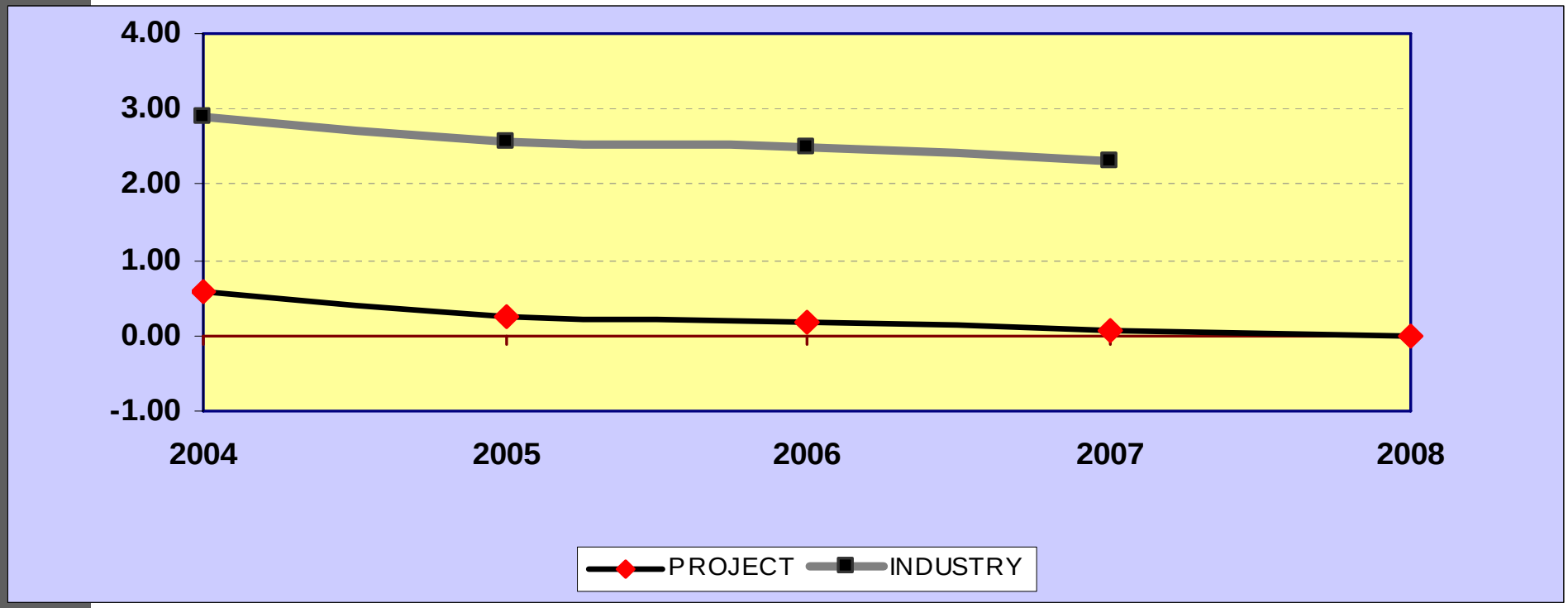
2005 - 2006 - 2007 2008
PROJECT

HSE Outcome



LOST TIME INJURY RATE YTD

	2004	2005	2006	2007	2008
Industry	2.91	2.57	2.50	2.32	n/a
Project	0.59	0.26	0.19	0.08	0.17

Project end LTI rate was 0.17 as of July 2008

HSE - Outcome

- The health, safety and environmental challenges were managed successfully by
  - Strictly following the HSE plan that was established.
  - Development of site rules and enforcement of the rules was key (camp rules, site rules, discipline policy,etc)
  - Having a sufficiently resourced and dedicated HSE team
  - Perception surveys, audits, “Cold Eyes” reviews, and independent third-party evaluators
  - A high degree of security searches to keep the work site as free from drugs and alcohol as possible and continue to provide onsite A&D testing
  - High caliber Emergency Response

Cold Eyes support from the Buzzard Project– UK Sector North Sea

Closing Comments

- Construction safety is a very different game
- Managed Open Site strategy was very successful. Use of Temp Foreign Workers (peaked at 500 to 600 workers) and challenges faced by scheduling and communications to make sure they worked safe.
- The initiatives/incentives taken to develop a safety culture on site
- Working with local stakeholders such as the Traffic Committee and initiatives to improve the fire response for local communities
- Relationship developed with local police dept (RCMP). Our security procedures for the site was leading edge
- The visibility and attitude of the Construction Superintendent is absolutely fundamental

Safety is an integral part of how we do our business – Safety is about People

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