IEA GHG Weyburn – Midale CO_2 Monitoring & Storage Project

Petroleum Technology Research Centre

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Pittsburgh, Pennsylvania

About the PTRC

Mission: "To initiate and support research and development projects aimed at enhancing the production and recovery of Canadian petroleum resources."

- PTRC manages research and delivers basic and applied research results to its partners, for field application
- Partnered with, funded by and liaison to: government, industry and researchers
- Founded in 1998 by
  - NRCan (Federal Gov't)
  - SIR (Provincial Gov't)
  - SRC (Research Organization)
  - UofR (Research Organization)

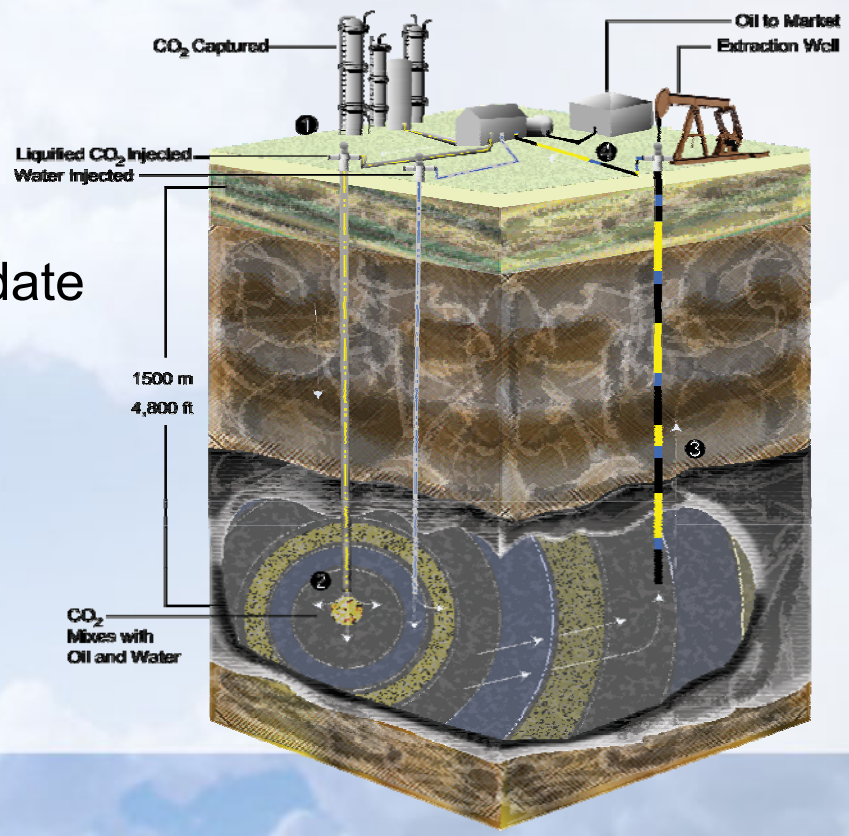
The PTRC
Regina, Saskatchewan, Canada

"Enhanced Oil Recovery Technology with a bigger impact and a smaller footprint"

About: Weyburn-Midale CO_2 Storage Project

- **The world's largest full-scale, in-the-field study of CO_2 storage in a commercial EOR operation**
- **EOR with carbon storage makes environmental and economic sense**

- $80 million project
- 7 million tonnes of CO_2 injected to-date
- 40 million tonnes will be stored
- 18,000 incremental bbl/day
- Currently in Final Phase



Weyburn & Midale Statistics

	Weyburn (*EnCana*)	Midale (*Apache*)
Field Size	70 square miles	40 square miles
Original oil in place	1.4 billion barrels	515 million barrels
Oil recovery (pre-CO2-EOR)	370 millions barrels	130 million barrels
Projected CO2 IOR	155 million barrels	60 million barrels
Projected CO2 stored	30+ million tonnes* (gross) 26+ million tonnes (net)	10+ million tonnes* (gross) 8.5+ million tonnes (net)

***equivalent to removing <u>more than 8 million cars</u> off the road for a year**

Weyburn Operations Update

- **184 BCF source CO_2 injected as of Feb 1st, 2007**
- **Current CO_2 purchase is 125 MMscfd**
- **60 MMscfd of associated gas and CO_2 being recycled**
- **EOR Operations include Phase 1a(start Sept 2000), Phase 1b(start Oct 2002), Phase 1c(start June 2003) and Phase 1d(start July 2004)**
- **Of the 360 producing wells in the EOR area:**
  - 238 producers experienced operational response (CO_2 detected in casing gas)
  - 150 producers experienced incremental production response
- **Current Unit production 30,600 bbl/day**

PTRC: Weyburn-Midale CO_2 Storage Project

Final Phase: *Objectives*

- **Best Practices Manual**
  - Guide all aspects of future CO_2 EOR storage projects
  - Ensure integration across Technical and Policy Research

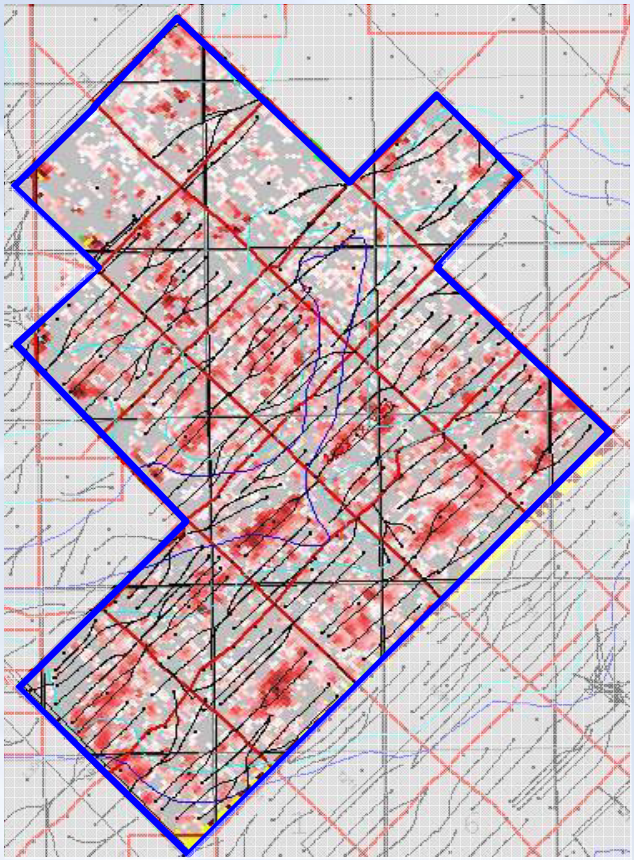
Technical Components ⟷ **Policy Components**

- Site Characterization
- Monitoring and Verification
- Wellbore Integrity
- Performance Assessment

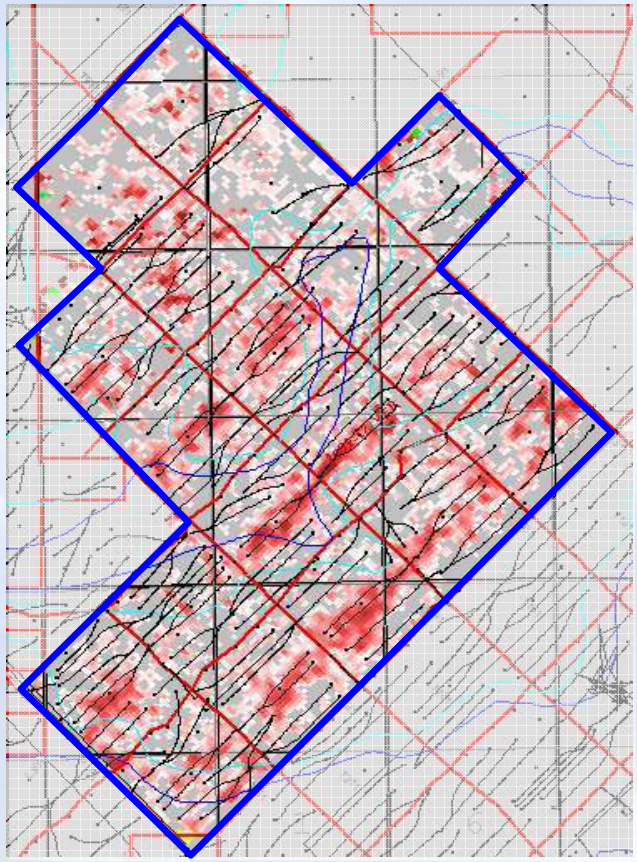
- Regulatory Issues
- Public Communication and Outreach
- Business Environment

Status of Final Phase

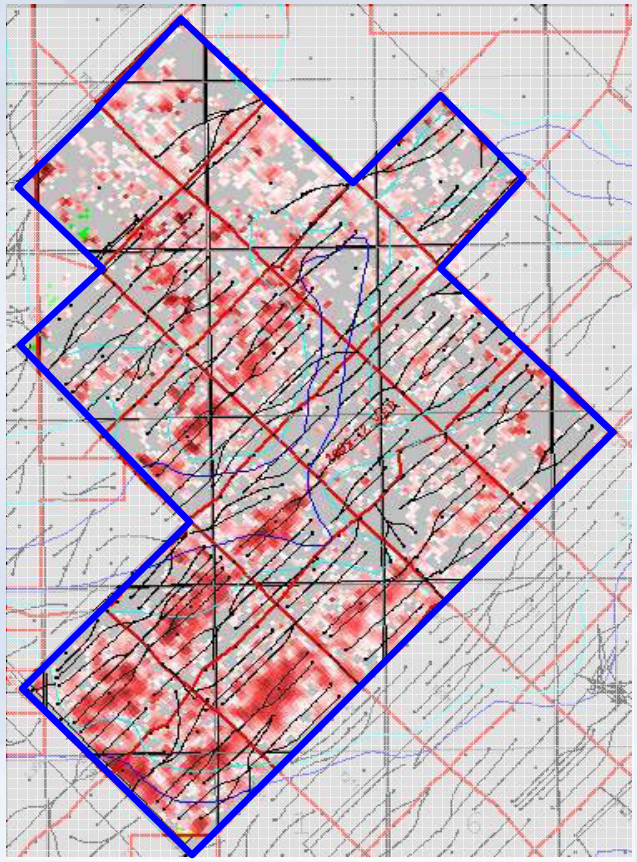
- Ongoing seismic, soil gas, reservoir fluid and groundwater monitoring continue



Baseline - 2001



Baseline - 2002



Baseline - 2004

Source: EnCana Corporation

Status of Final Phase

- Project and Research Provider agreements recently approved
- Improved data sharing network and an enhanced computing infrastructure for sequestration simulations.
- Associated research currently underway: wellbore cement integrity, risk assessment and CO_2 storage optimization
- Regulatory issues, communication and public outreach and the business environment

Conclusions

- Based on preliminary results, the natural geological setting appears to be highly suitable for long-term CO_2 geological storage
- The Project has arguably the most complete, comprehensive, peer-reviewed data set in the world for CO_2 geological storage
- An effective, international team of culturally diverse, high-quality researchers has been established
- Strong international leadership has been demonstrated by Canada, the USA and the EU around Research and Development of CO_2 geological storage
- International credibility and recognition have been achieved through recognition by the IEA GHG R&D Programme and the Carbon Sequestration Leadership Forum
- The Best Practices Manual will serve as a practical, technical guide for design and implementation for CO_2 storage associated with EOR while influencing the development of clear, workable regulations for CO_2 storage, building upon existing, effective regulatory framework

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Questions?

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