The IEA Weyburn CO_2 Monitoring and Storage Project

Problem Definition

- World wide reduction in Green House Gases (GHG) emissions essential
- Sequestration (permanent storage) of CO_2 in geologic formations represents lowest cost option
- There is a need to understand the risks associated with the sequestration option
- Need to develop technologies for monitoring and verification of integrity of CO_2 sequestration

Key Questions

- Is sequestration acceptable to the public and regulatory agencies?
- Can sequestration into geologic formations offer long-term permanent storage for CO_2?
- How much CO_2 can actually be stored and verified?
- What are the economic drivers?

Why This is an Important Project

- An international undertaking providing for storage of US-generated CO_2 in a large Canadian reservoir.
- International participation, including the EC, will help develop international protocols for storage of CO_2 in geologic formations
- Unique opportunity to develop sequestration technology and economics in a new CO_2 miscible project
- Future credits for CO_2 sequestration will improve economics for CO_2 miscible floods

Why the Weyburn Project?

- A world-class CO_2 project (Can$1.5 billion).
- Easily accessible site
- Substantial historical data base
- Extensively drilled
- Baseline data has been gathered
- Supportive industrial partner

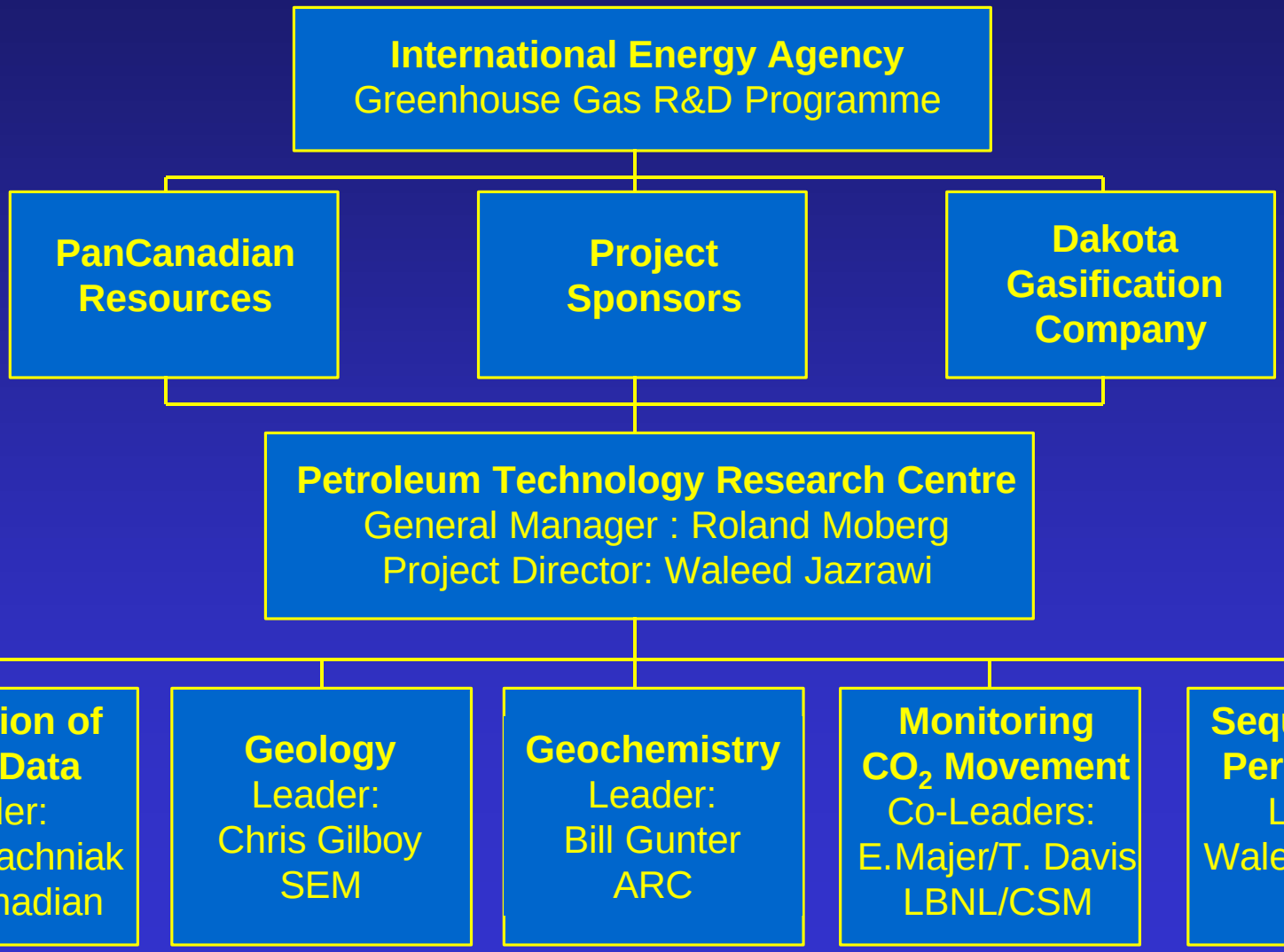
Methodology

- Pre-injection baseline data
- Collection of field performance data
- Geologic description
- Geochemical sampling, monitoring and prediction
- Monitoring CO_2 movement (seismic, reservoir sim)
- Risk assessment – long term fate
- Storage economics

Project History

- The IEA Weyburn CO_2 Monitoring Project began with a workshop on Sequestration in Regina in the fall of 1999
- A research consortium, comprised of public and private-sector research agencies from Canada, the United States and Europe was established.

Project Organization



Research Partners

Canada

- Saskatchewan Energy & Mines
- Saskatchewan Research Council
- University of Alberta
- University of Calgary
- University of Saskatchewan
- University of Regina
- Alberta Research Council

USA

- Lawrence Berkeley National Laboratory, Berkeley, CA
- Colorado School of Mines, Denver, CO.
- Monitor Scientific (Colorado)

Europe

- British Geological Survey (BGS), UK
- Bureau de Recherches Geologiques et Minieres (BRGM), France
- Institut Francais du Petrole (IFP), France
- Danish Geological Survey (GEUS), Denmark
- Instituto Nazionale De Geogisica (ING), Italy
- GEODISC, Australia

Project Sponsors

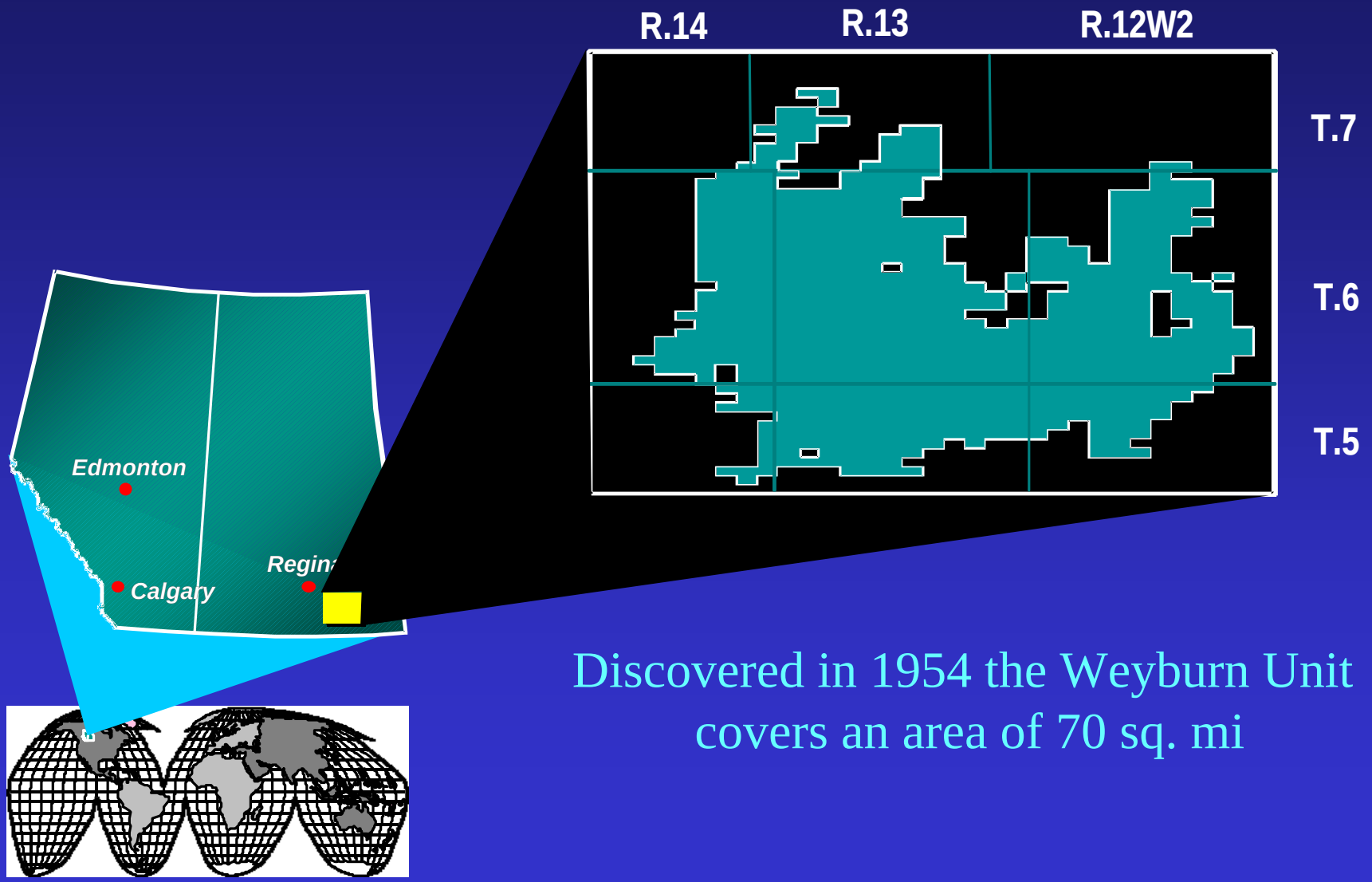
Government

- Saskatchewan Energy & Mines
- Natural Resources Canada
- European Commission
- United Kingdom

Industrial

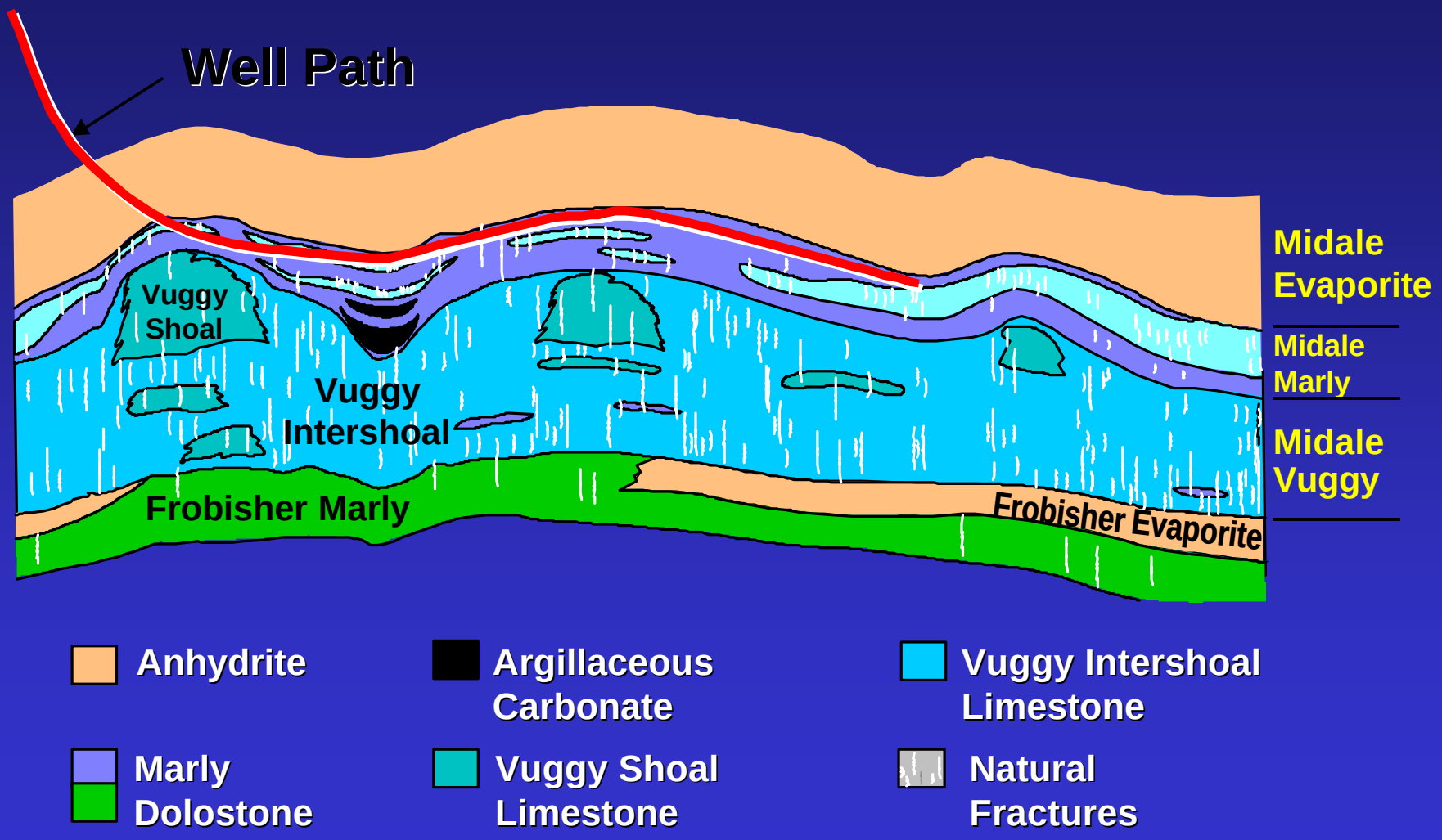
- PanCanadian Resources
- PTRC
- SaskPower
- Wascana Energy Inc.
- BP
- Dakota Gasification Co.
- TransAlta Utilities

Weyburn Unit

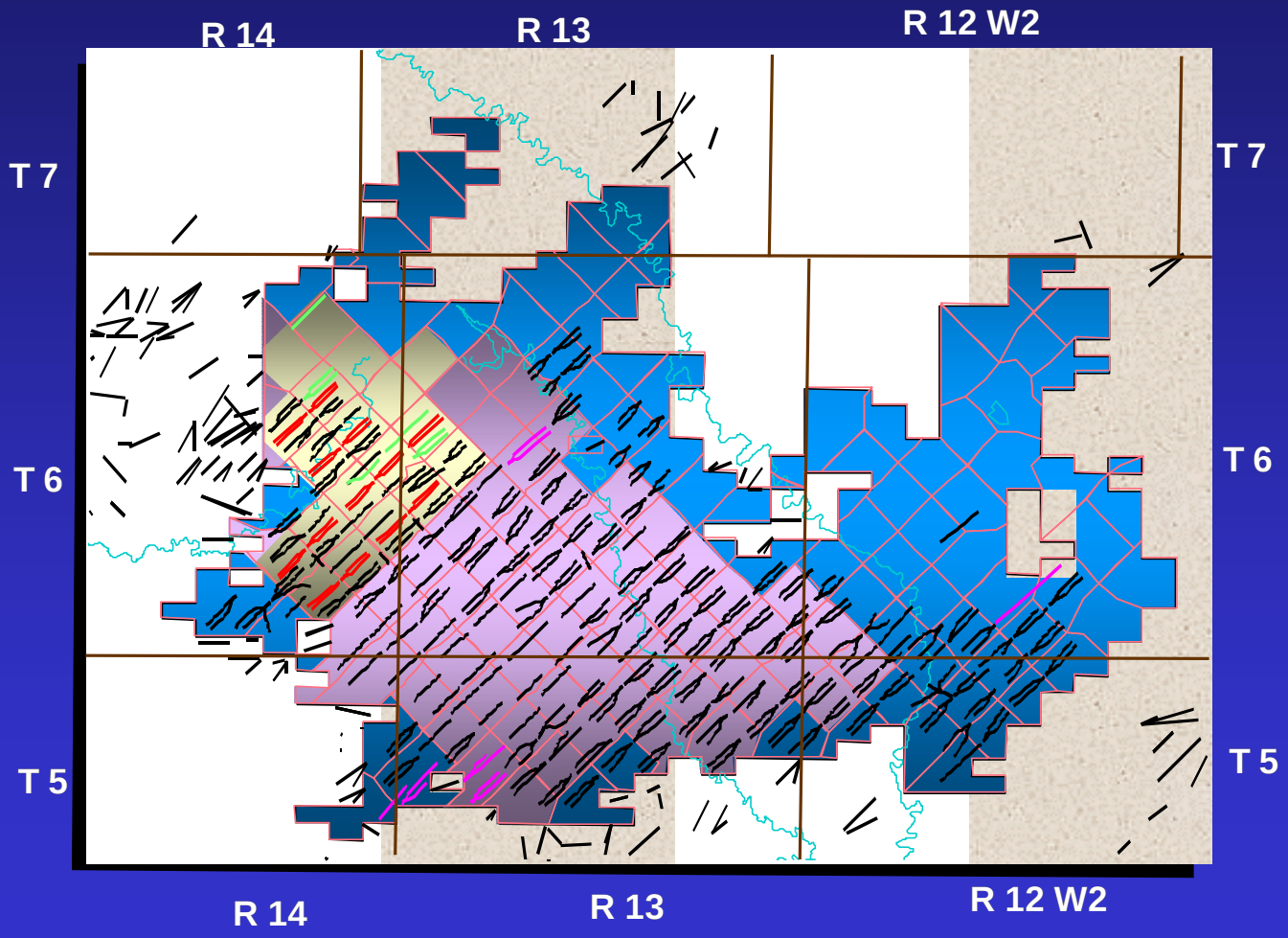


Discovered in 1954 the Weyburn Unit covers an area of 70 sq. mi

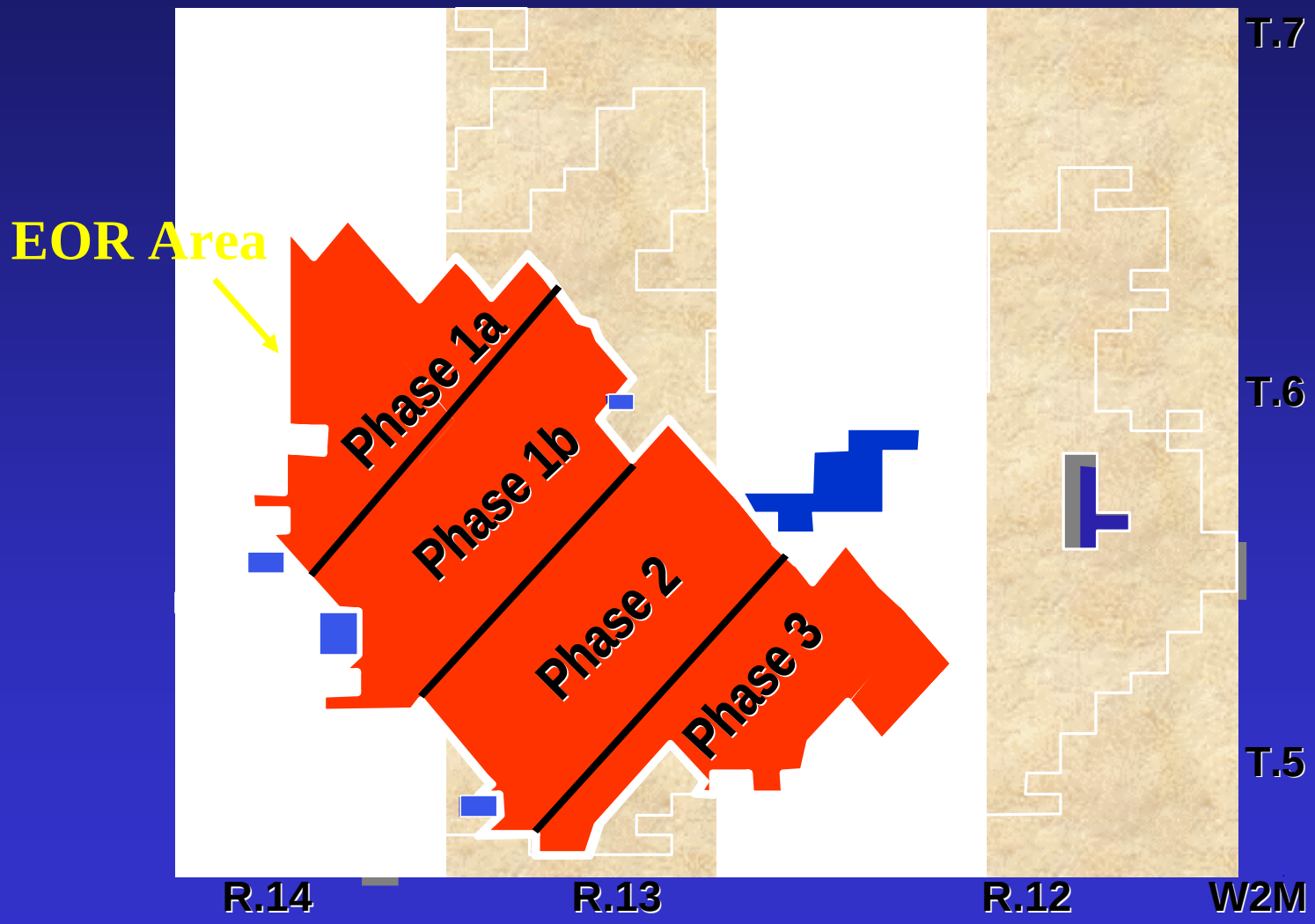
Schematic East-West Geological Cross-Section



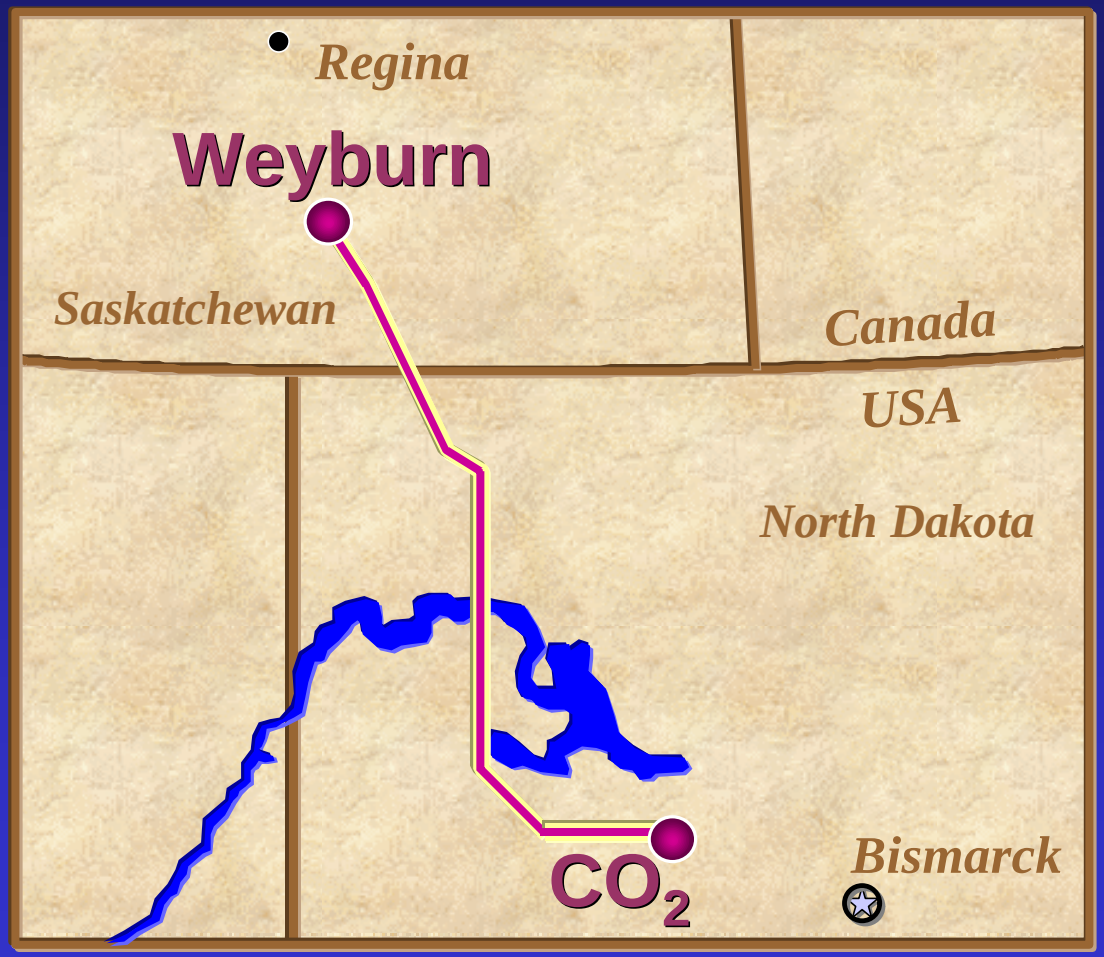
Weyburn Well Layout



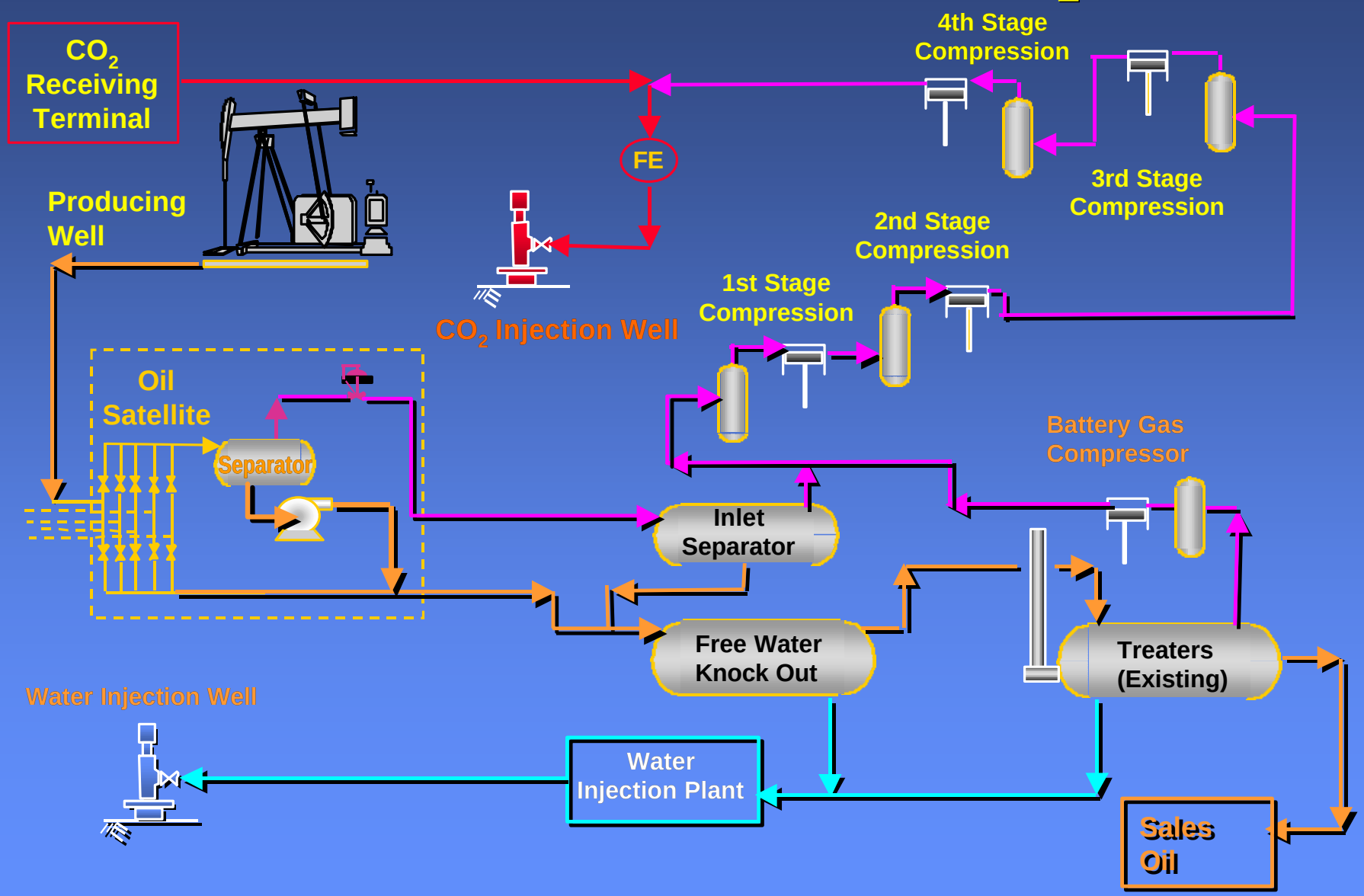
Rollout of the flood



CO_2 Supply


Regina
Weyburn
Saskatchewan
Canada
USA
North Dakota
CO_2
Bismarck

Surface Facilities for CO_2



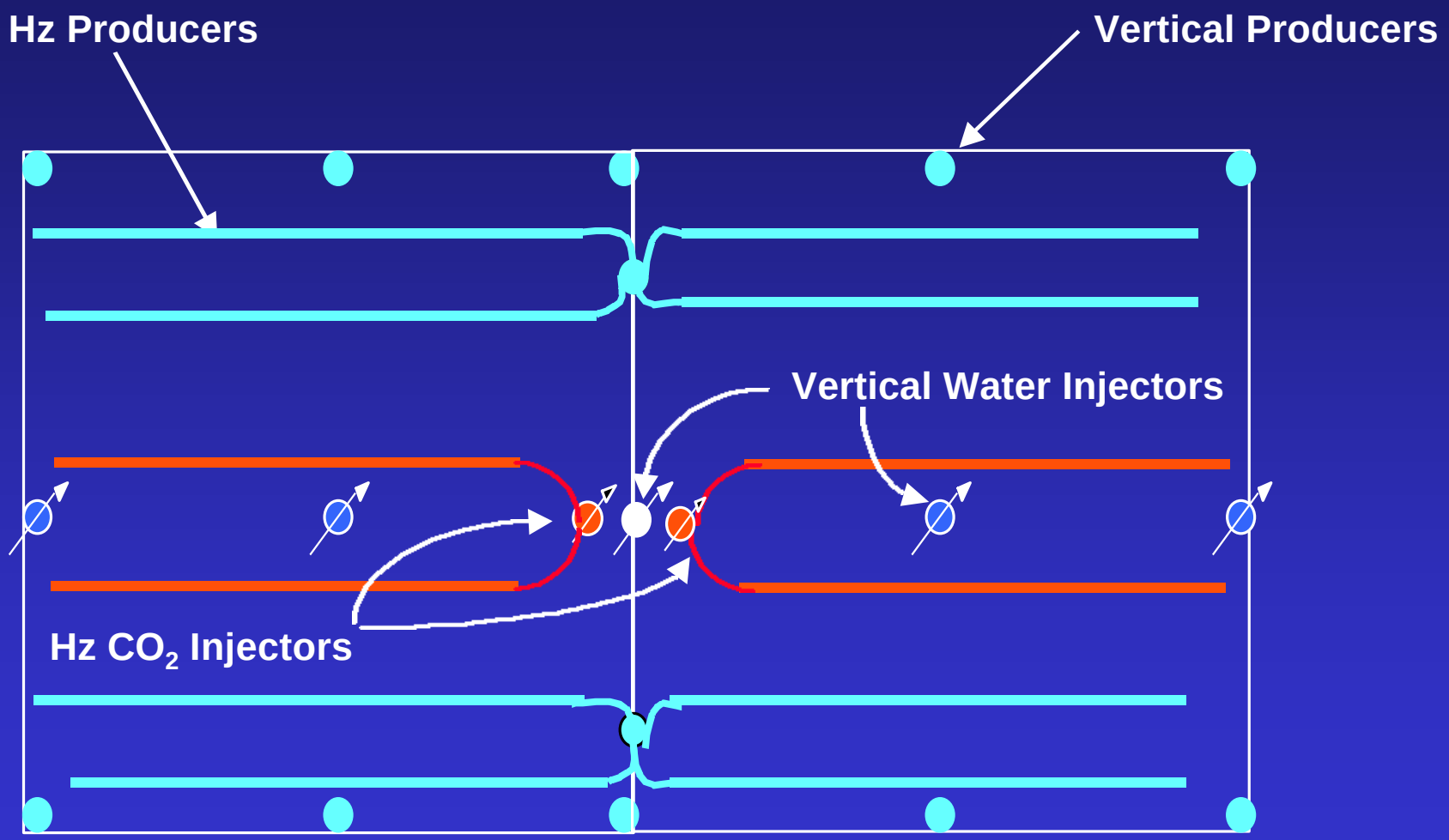
Operational Milestones

- Pre-injection baseline data collected
- CO_2 Injection Date - September 15, 2000
- Phase 1A development drilling and facilities complete
- Tracer study to monitor CO_2 breakthrough to commence January 2001
- Expected breakthrough - 4 to 8 months

Monitoring Techniques

- 4D, 3C surface seismic
- 4D, 9C surface seismic
- 3D, 3C VSP seismic
- Cross-well seismic (horizontal)
- Passive seismic
- Geochemical analysis
- Tracer injection monitoring

2 SSWG Patterns



Preliminary Budget

Currency: Canadian dollars (millions)

Data Collection	$4.8
Geology	$2.0
Geochemistry	$1.5
Monitoring CO_2 Movement	$11.0
Sequestration Performance	$4.0
Total	$23.3

Funding

- Funding is in place from the Federal Government of Canada, the Provincial Government of Saskatchewan and five industry participants, as well as by the European Community.
- A minimum funding level of $10 million Canadian required to launch the project has been achieved.

Benefits of Participation

- Establish credibility with public and regulatory agencies
- Avoid duplication and maximize collaboration
- Capitalize on an existing commercial project
- Access high leverage research
- Integrate research findings into corporate climate change plans
- Participate in project technical meetings & seminars
- Assess future business opportunities for CO_2 sequestration

Participation Terms

- The participation fee is $300,000 (CDN) paid in equal installments of $75,000 over 4 years
- A minimum 1 year confidentiality period beyond project completion will be maintained
- Sponsors will be granted a non-exclusive, royalty-free, world wide use right for developed IP in any sequestration projects

Follow up

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