

# ***PERSPECTIVES ON*** **CONCURRENT CO<sub>2</sub> EOR AND CARBON CAPTURE AND STORAGE (CCS)**

*Enhanced Oil Recovery Institute's  
3<sup>rd</sup> Annual CO<sub>2</sub> Conference  
Casper, Wyoming*

**L. STEPHEN MELZER**  
*Melzer CO<sub>2</sub>nsulting*

*June 2009*



# PERSPECTIVES ON CO<sub>2</sub> EOR AND CARBON CAPTURE AND STORAGE (CCS)

- CO<sub>2</sub> EOR AND CCS CONVERGENCE
- 'SECURE' UNDERGROUND STORAGE
- STATUS OF THE EOR INDUSTRY AND SIZE OF THE TARGETS
- OPPORTUNITY KNOCKS
- THE SKIRMISH LINE: ENVIRONMENTAL AND RESOURCE LAW
- LIMITING FACTORS FOR GROWTH
- POLICY INITIATIVES



# THE CONVERGENCE OF CCS AND CO<sub>2</sub> ENHANCED OIL RECOVERY

- CONTINUING MATURITY OF OILFIELDS
- CO<sub>2</sub> EOR TECHNOLOGY GROWING AND MORE WIDELY APPLIED; SOME RESERVOIRS ARE BEING EXTENDED VERTICALLY (TZs and ROZs)
- REQUIRES 'SECURE' STORAGE AND DOCUMENTATION OF NET CO<sub>2</sub> SEQ VOLUMES
- COMING PROFILARATION OF ANTHROPOGENIC CO<sub>2</sub> SOURCES

- |                            |  |
|----------------------------|--|
| NEAR TERM                  | – MORE EXPLOITATION OF LOW BTU (CO <sub>2</sub> 'LADEN') NATURAL GAS w/ CO <sub>2</sub> CAPTURE)     |
| SOME NEAR, MOSTLY MID TERM | – CAPTURE OF INDUSTRIAL CO <sub>2</sub> SOURCES (FERTILIZER, CEMENT, HYDROGEN, HELIUM, ETHANOL ETC.) |
| LONG TERM? BIG VOLUMES     | – ONSET OF THE AGE OF IGCC, NG AND SUPERCRITICAL COAL POWER PLANTS w/ CO <sub>2</sub> CAPTURE        |



# **'SECURE' CO<sub>2</sub> STORAGE (1)**

## ***EOR INDUSTRY PERSPECTIVES***

- REGULATORY JURISDICTIONAL CERTAINTY (STATE-BASED?)
- PERMITTING THE RIGHT SITES
- COMMERCIALY GROUNDED MONITORING, VERIFICATION AND ACCOUNTING



# **'SECURE' CO<sub>2</sub> STORAGE (2)**

## ***EOR INDUSTRY PERSPECTIVES***

- FACILITATING INITIAL CAPTURE PROJECTS
  - VOLUNTARY OPTION
  - INCENTIVES FOR FIRST MOVERS
  - CAP AND TRADE, ALLOWANCES ('Waxman-Markey')
- LONG TERM FATE OF CO<sub>2</sub> – RISK SHARING
- WHO OWNS STORAGE RIGHTS? WHAT IS THE DYNAMIC BETWEEN THE STORAGE, SURFACE AND MINERAL ESTATES?
- HOW TO AGGREGATE SUFFICIENT RIGHTS?



# CURRENT EOR/CCS ACTIVITIES

- CONVENTIONAL CO<sub>2</sub> SUPPLIES HAVE HAD LIMITATIONS – SOME EXPANSIONS UNDERWAY
- ACTIVITY PRIMARILY CONCENTRATED IN CURRENT EOR AREAS – BUT IS EXPANDING
- INITIAL CO<sub>2</sub> PIPELINES IN NEW AREAS
- USING EOR TO GROW CAPTURE AND BUILDOUT OF INFRASTRUCTURE: INCORPORATING ANTHROPOGENIC CO<sub>2</sub> SOURCES (QUESTION: ARE WE NOW RECOGNIZING THIS WITH THE NEW ADVANTAGES OF ANTHRO CO<sub>2</sub>? e.g., 45Q, Tx HB469, SB1387)







# oil PERMIAN BASIN report

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SUNDAY

March 22, 2009

## SandRidge, Oxy break ground on Century gas processing plant

By Mella McEwen

*Oil Editor*

**A**nounced last summer, the \$1.6 billion Century Plant planned for Pecos County by SandRidge Energy and Occidental Petroleum has moved closer to existence with a recent groundbreaking ceremony.

Under the agreement, Oxy will spend \$1.6 billion to build and operate the new plant and a 160-mile pipeline from the plant through McCamey to Denver City. SandRidge will drill, produce and deliver high-CO<sub>2</sub> gas to the plant, which Oxy will treat under a 30-year agreement. SandRidge will retain all the methane gas and Oxy will keep all CO<sub>2</sub> for use in

enhanced oil recovery projects in the Permian Basin.

It will be completed in three phases and fully operational by 2011.

Speaking at the groundbreaking ceremony, Bill Albrecht, president of Oxy Oil & Gas USA, told the crowd that the project "marks a great partnership between SandRidge and Oxy. It's also a bellwether for our industry, as we dedicate ourselves to increasing domestic oil supplies while also protecting the environment."

He estimated that the new plant will provide Oxy with a major new source of CO<sub>2</sub> for its enhanced oil recovery projects, allowing the company to increase Permian Basin production by at least 50,000 barrels a day within the next five years.

The second prong of the project, said Kevin White, SandRidge's senior vice president, business development, is that the plant will take "what we decree is waste gas," remove the CO<sub>2</sub> and leaving SandRidge with methane gas to market. The new plant will also let it produce more from its Pinon (Overthrust) field, he said, noting that production was ham-

pered by restrictions on plant capacity to produce sour gas.

The third prong of the deal, he said, is that the new plant will benefit the environment by preventing CO<sub>2</sub> — considered a leading greenhouse gas responsible for global warming — from being emitted into the atmosphere.

The current decline in natural gas prices and energy demand has not impacted plans for Century, White said. "It is a big plant and will take awhile to build. We also have a partner in Oxy that has a longer view of the natural gas market and doesn't have a knee-jerk reaction to prices."

Still, White acknowledged that the partners are being cautious moving forward with the project.

"Oil and gas prices are cyclical," he reminded. "Just when we think they'll never go down, they will go down. Just when we think there is no up cycle, it goes up. We have a 30-year agreement with Oxy. Neither company thinks this price level will last 30 years."

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Mella McEwen can be reached at [casell@mrt.com](mailto:casell@mrt.com).

# A LOOK INTO THE MIND OF 'A SUPPLIER'

- A HUGE NATURAL RESOURCE (NAT'L GAS\*)
- A PURIFICATION REQM'T TO SELL THE NAT'L GAS (SEPARATE THE CO<sub>2</sub>)
- A NEED TO AVOID THE BY-PRODUCT CO<sub>2</sub> EMISSIONS
- A LARGE CO<sub>2</sub> MARKET TO READY THE BY-PRODUCT TO DELIVER A PRODUCT OF VALUE

\* IT COULD ALSO BE PETROLEUM COKE, COAL, OR CEMENT PLANT





# A LOOK INTO THE MIND OF 'AN EOR OPERATOR'

- RAPIDLY DEPLETING OIL RESOURCES WITH MARGINAL ECONOMICS
- A LARGE AND RELIABLE RESOURCE (CO<sub>2</sub>) TO FURTHER DEVELOP THE OIL RESOURCES TO THE EOR STAGE
- BUT NO RULES ESTABLISHED TO DOCUMENT (STORED) VOLUMES IN ORDER TO:
  - A) OPT IN TO CONCURRENT STORAGE & EOR or
  - B) GO WITH BUSINESS AS USUAL EOR

## LEAVING

- THE CAPTURER WITH ITS FULL LIABILITY FOR EMISSIONS: DISCONNECTED WITH THE INJECTOR (NO COMMITMENT TO STORE)



# TWO THOUGHTS TO KEEP IN MIND ...

(as a result of the new day\*)

- *CO<sub>2</sub> EOR petroleum professionals are at the center of the ongoing debates over climate change*
- *CO<sub>2</sub> EOR petroleum professionals who become “CCS-certified” should find themselves facing remarkable new business opportunities*



\* 2006, Kipp Coddington (North American Carbon Capture and Storage Association)

# THE COMING PARADIGM ...\*

- Networks of anthropogenic sources will be connected via pipelines in a hub & spoke arrangement
  - ✓ *Such networks are already being built*
- To the extent feasible and relevant, industrial facilities will be collocated with CCS-suitable geologic reservoirs
  - ✓ *This is already being done (FutureGen, ethanol plants, etc.)*
- CO<sub>2</sub> will be purchased, traded and used as a commodity, not regulated as a pollutant
  - ✓ *"Memo to Rest of the World: This has been done successfully in the U.S. for the past 30+ years"*
- Petroleum professionals will play an integral role in these new industries
  - ✓ i.e., Where and where not to put the CO<sub>2</sub> underground
  - ✓ "Memo to listeners: Update your resumes and keep 'em handy"

\* 2006, Kipp Coddington (North American Carbon Capture and Storage Association)



# Two Markets for Same Molecule\*

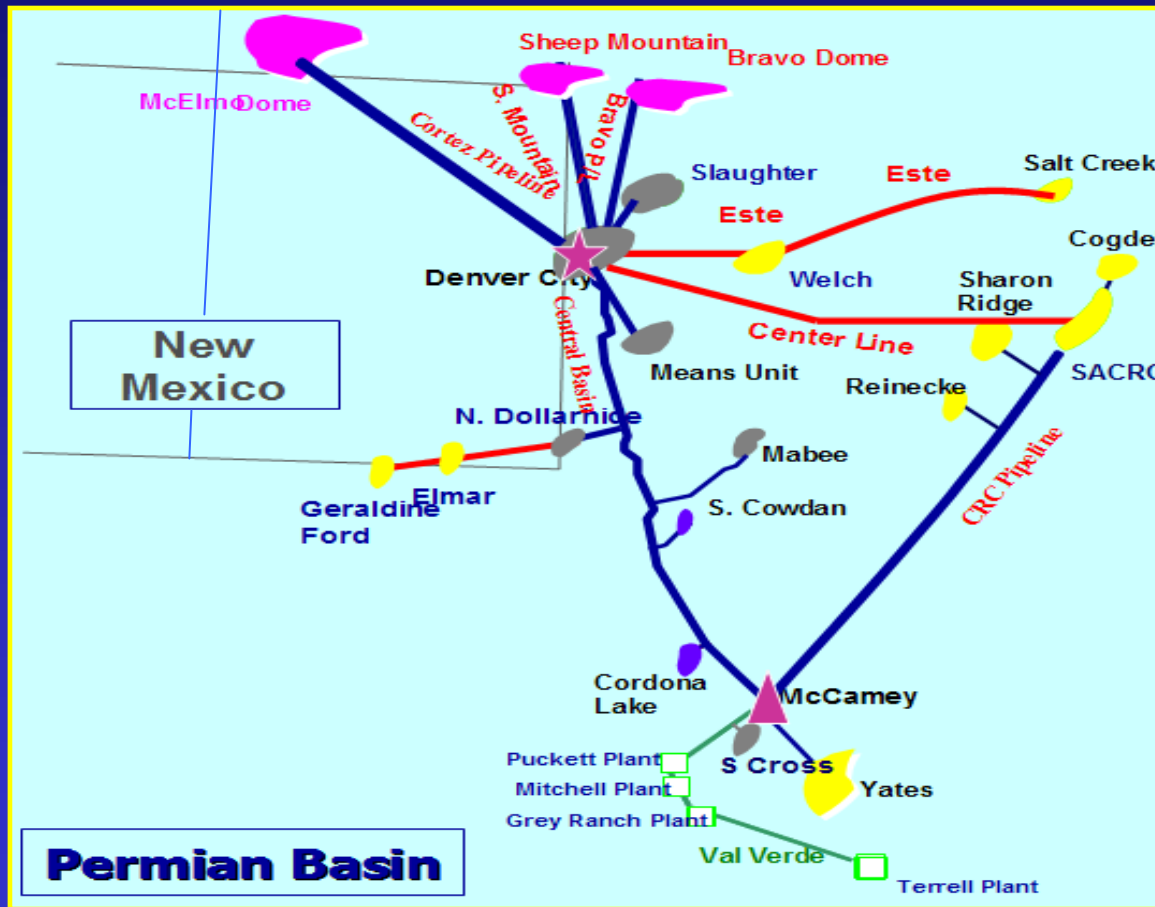
- Commodity CO<sub>2</sub> for Use in Enhanced Oil Recovery in the US and Globally
- Sequestered CO<sub>2</sub> or Greenhouse Gas and Resulting Tradable Offsets (Carbon Allowances)

\* 2006, Mike Moore (EOR Carbon Management Workshop Director)



# THIS CO<sub>2</sub> EOR IS BIG BUSINESS\*

## Case History: Permian Basin Fields & Infrastructure



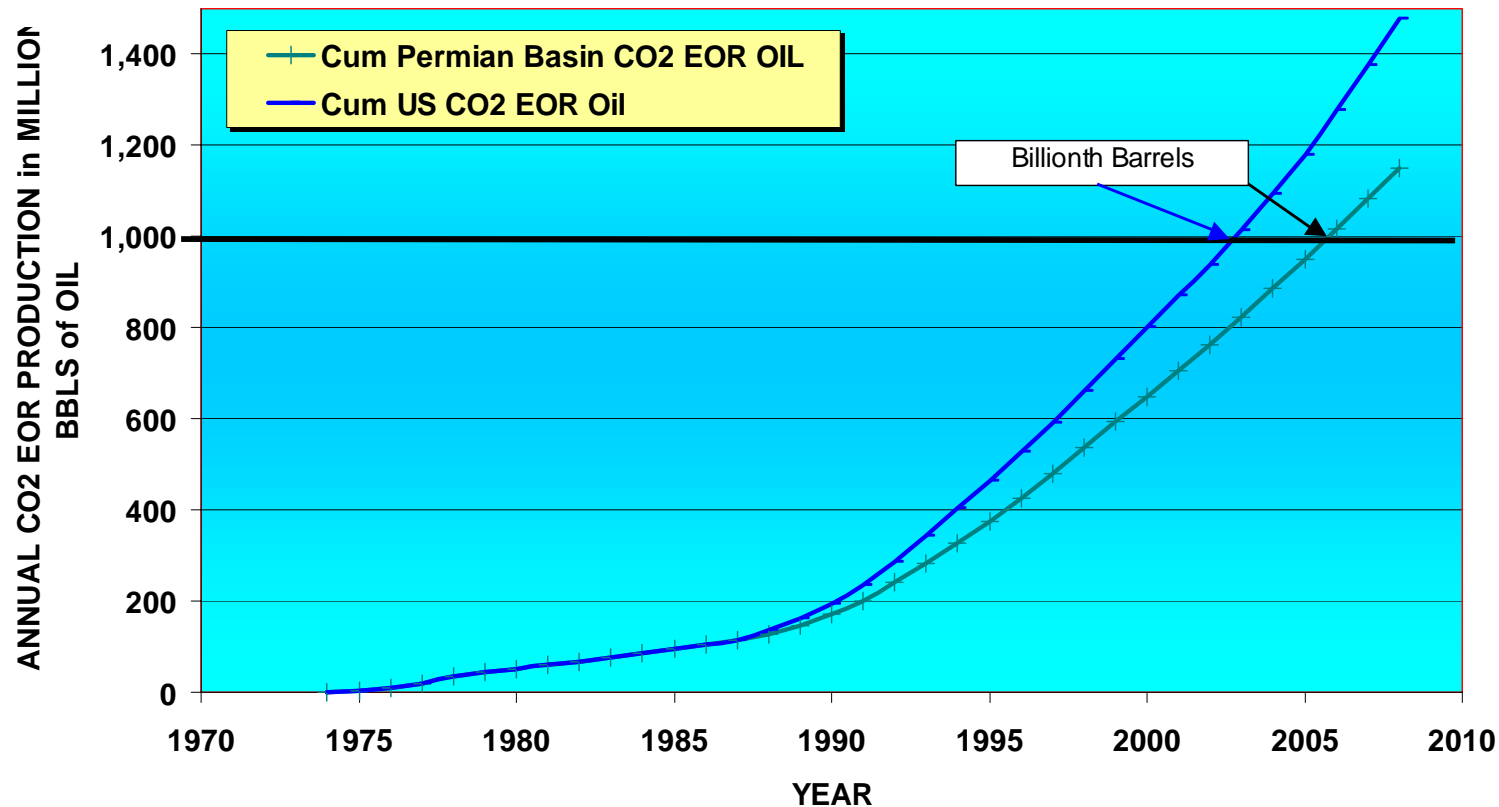
### \* Est. yearly PB figures:

- the 180,000 bopd is directly valued at \$3.3 billion (\$50/bbl)
- The 1.7 bcfpd commodity CO<sub>2</sub> transaction value is ~\$400 million

And just the 2500 miles of CO<sub>2</sub> Pipelines themselves are conservatively worth over \$2 billion

# A Growing and Significant EOR Industry

CUMULATIVE PERMIAN BASIN & U.S. CO<sub>2</sub> EOR PRODUCTION FROM  
THE ONSET OF FLOODING (1974) thru 2007



Melzer Consulting

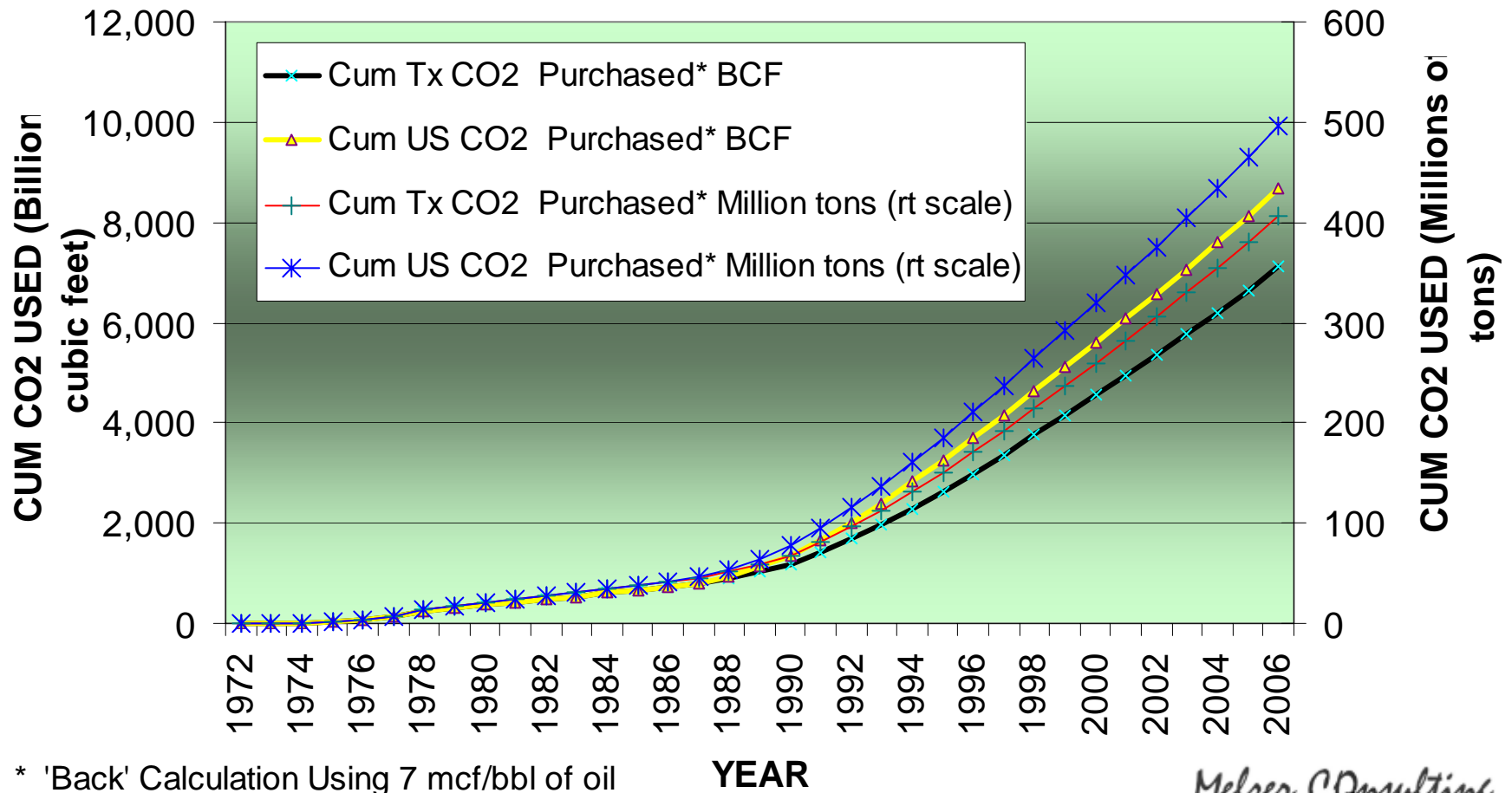
\* Source: Melzer Consulting (2008) and Oil & Gas Journal Biennial EOR Editions



Melzer Consulting

# CO<sub>2</sub> EOR and Storage

## CUMULATIVE CO<sub>2</sub> UTILIZATION IN EOR (TX & U.S.)



Melzer CO<sub>2</sub> Consulting

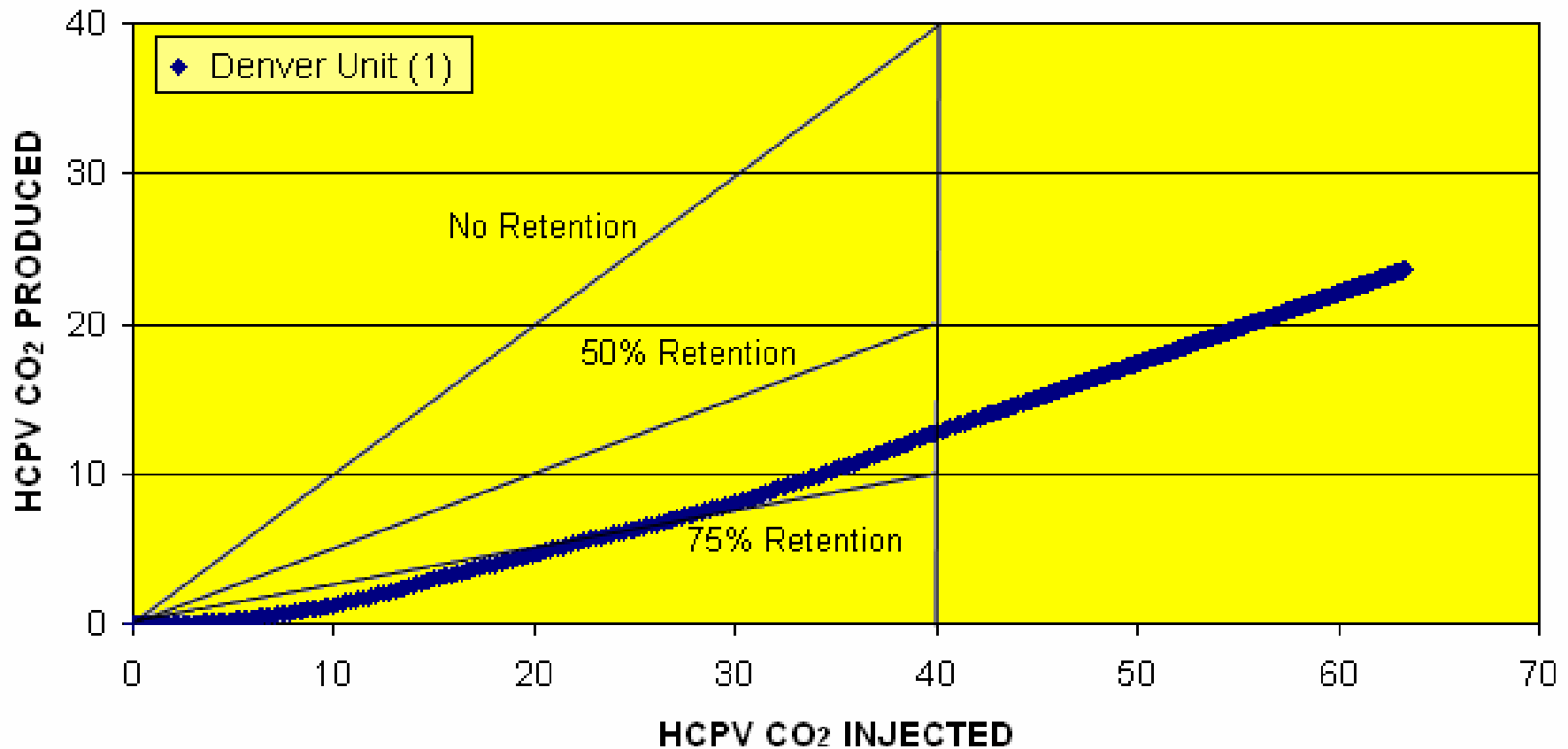


# CONCEPTUAL CO<sub>2</sub> RETENTION

## *with the Denver Unit (West Texas) Example*

Melzer CO<sub>2</sub> Consulting

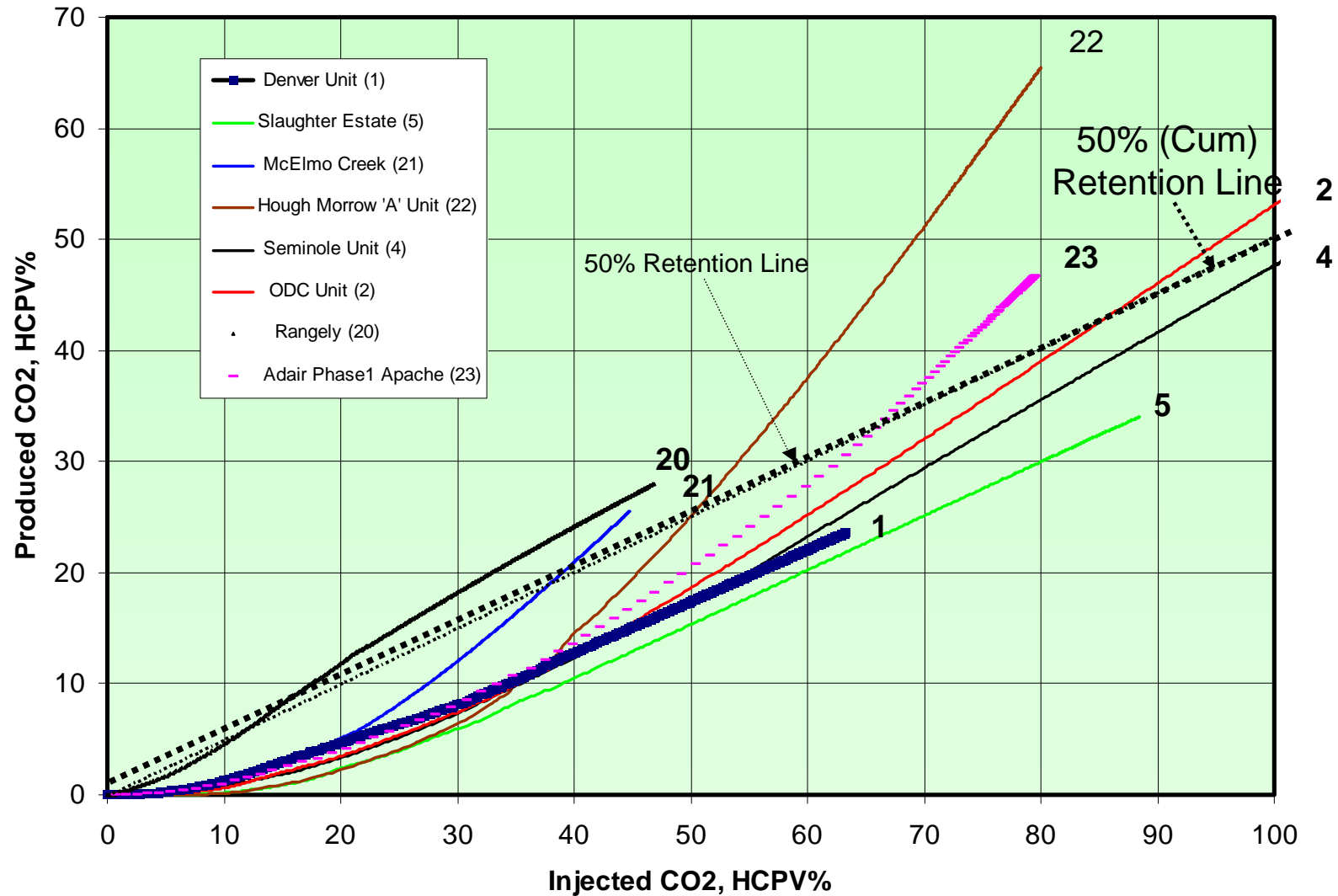
### Conceptual Retention: Denver Unit



# CO<sub>2</sub> Retention: Case Histories

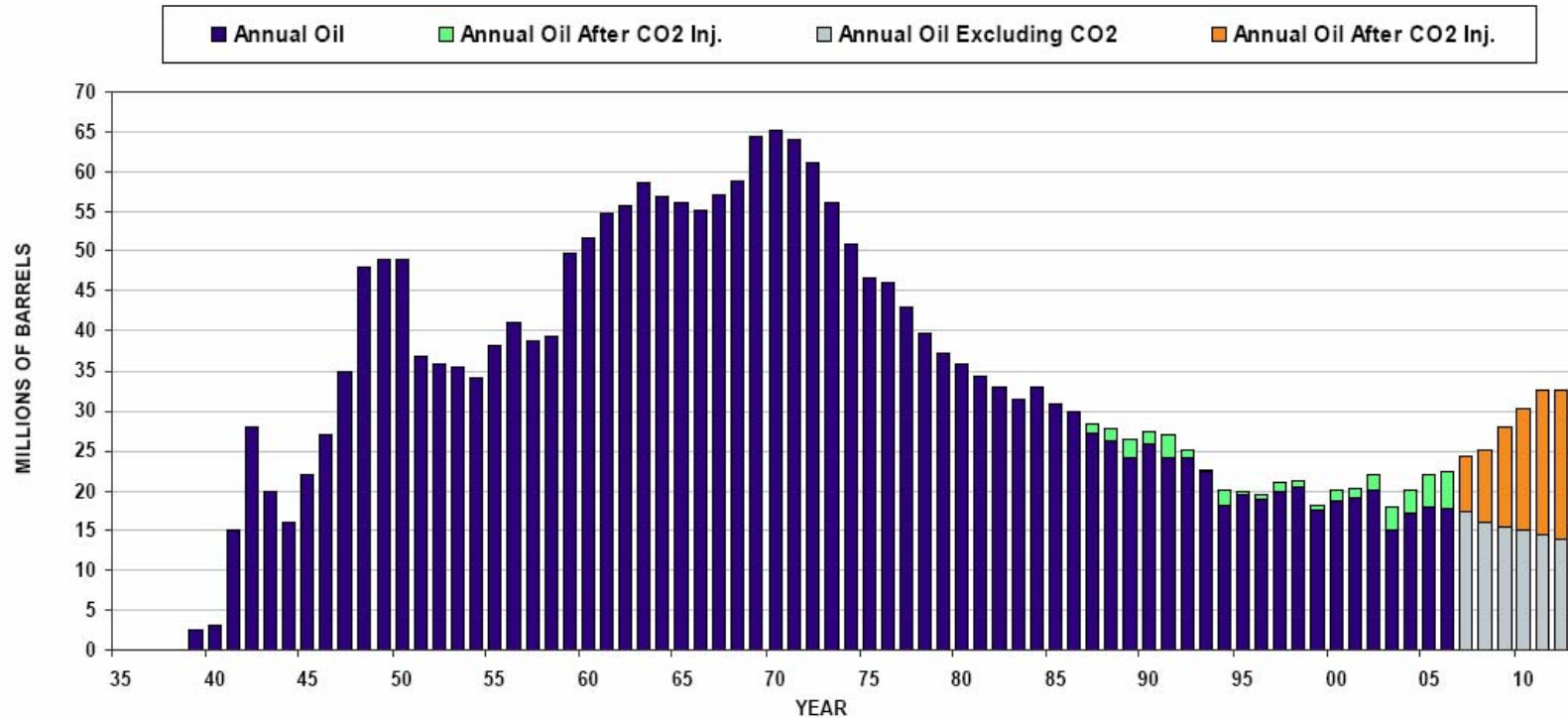
Melzer Consulting

## HCPV CO<sub>2</sub> Produced VS HCPV CO<sub>2</sub> Injected



# Mississippi Annual Oil Production

Total Cumulative Oil: 2.387 Billion Barrels (through 2006)

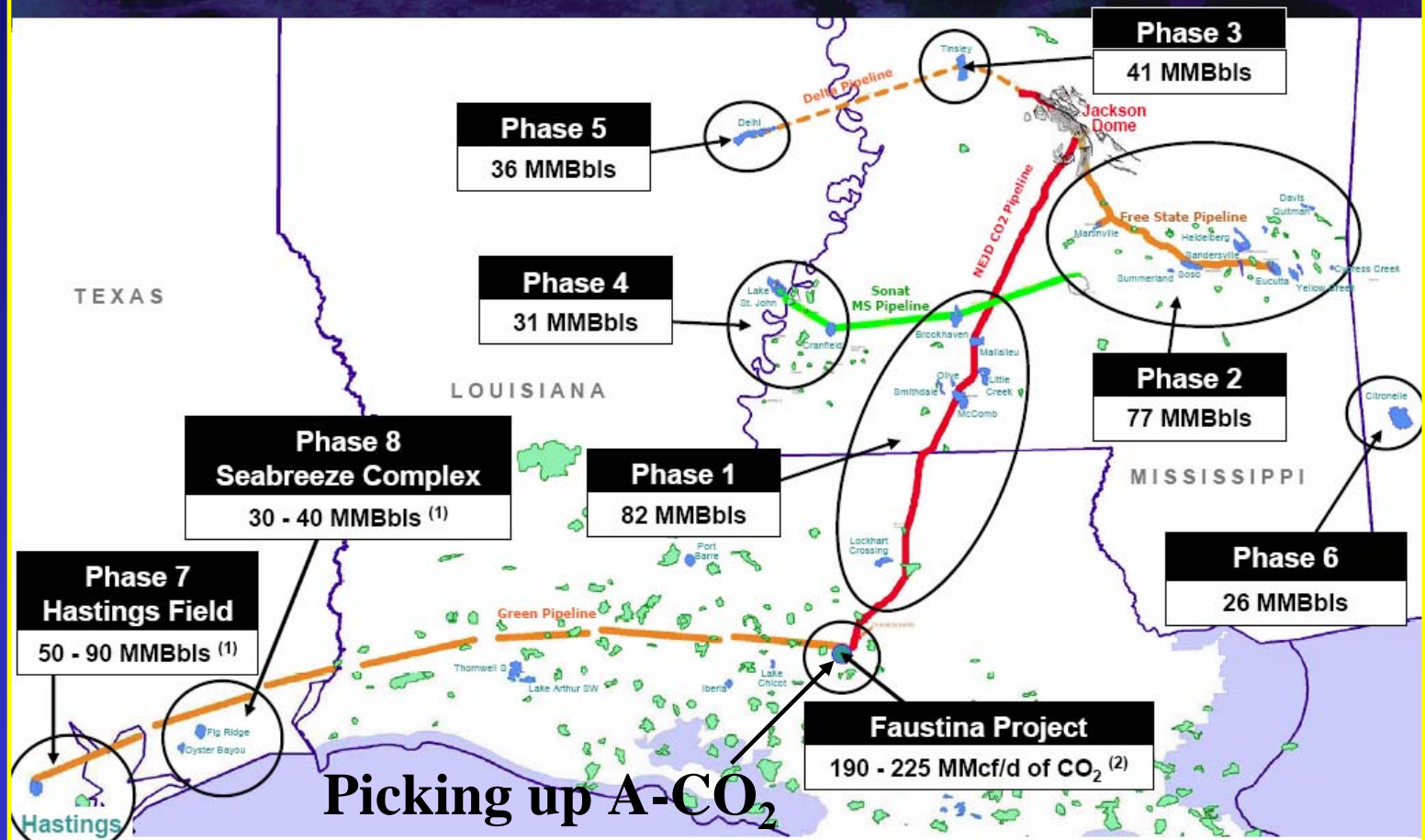


Denbury Resources Inc.

# Denbury's Current & Planned CO<sub>2</sub> EOR Operations

Source: Denbury's May 2007 Corporate Overview

## CO<sub>2</sub> Projects - Total Potential Tertiary Oil Reserves <sup>(1)</sup>



(1) Probable tertiary oil reserves as of 12/31/06 based on 10% to 17% recovery factors. Hastings Field is under contract but not owned.

(2) Projected CO<sub>2</sub> production of petroleum coke to ammonia plant expected to be completed during 2010.

Denbury Resources Inc.

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# SKIRMISH AHEAD?

- Storage: Environmental Law (CCS)
- Oil: Resource Law (EOR)

For Example: Where Should the Regulatory Jurisdictional Bill be Heard?

*House Environmental Regulation Committee*

*or*

*House Energy Resources Committee*



# PERMITTING COMPLEXITIES (1)

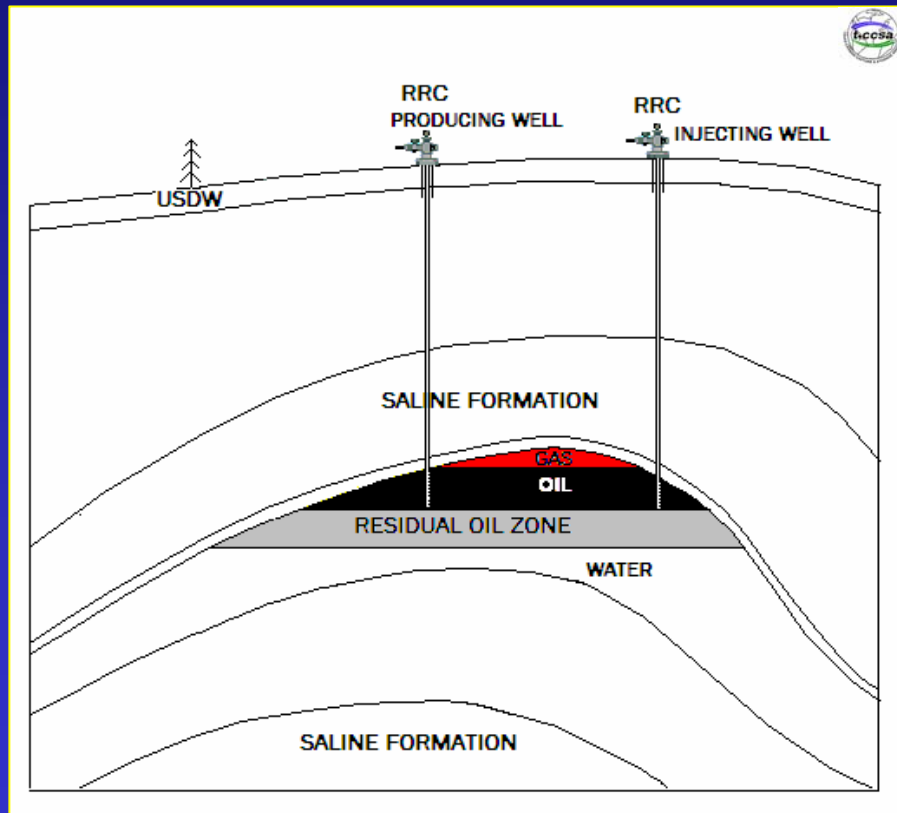
- Resource Extraction (SOGRA<sup>\*</sup>)
  - Have the Underground Injection Experience
  - Have the Tools for Rights Aggregation
- Storage (Environmental Agencies)
  - Are the States' Growing Regulatory Arm
  - But They Bring the Waste Label
- Solution: Divide the Jurisdiction According to Primary Purpose of Injection Activity?

\* STATE OIL & GAS REGULATORY AGENCIES

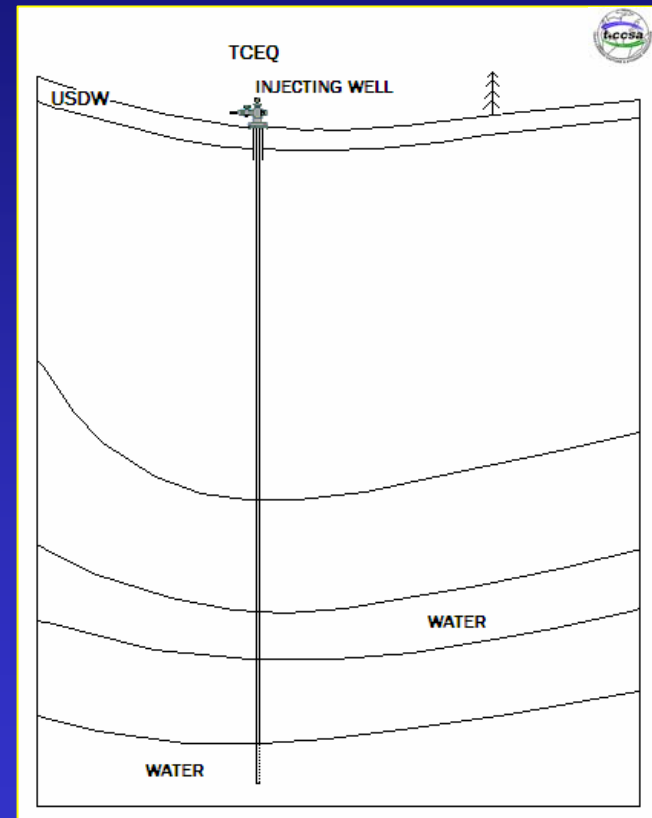


# PERMITTING COMPLEXITIES (2)

## SOGRA PERMIT



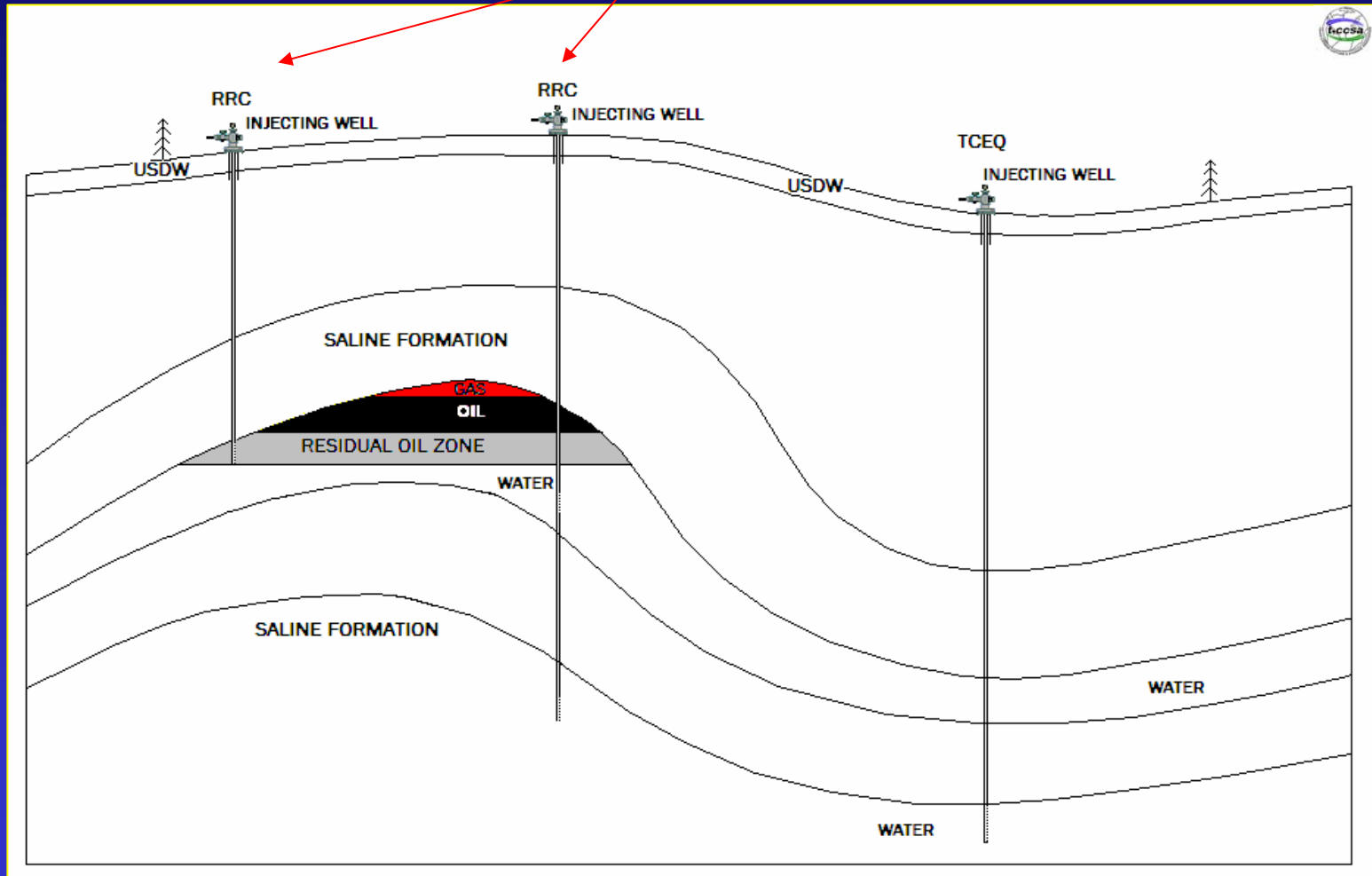
## ENVIRONMENTAL AGENCY PERMIT





# PERMITTING COMPLEXITIES (3)

Who Permits?



# GROWING CAPTURE AND STORAGE



# LIMITING FACTORS

- Qualified Personnel
- Difficult (or Confusing) Policy



# The U.S. CO<sub>2</sub> Policy World

- INTERSTATE OIL & GAS COMPACT COMMISSION
- FEDERAL ACTIVITY
  - Draft EPA Rules on Sequestration
  - Draft GhG Source Reporting Rules
  - Senate Energy Bill
  - Waxman-Markey Climate Change Bill
  - Stimulus (ARRA) Funding
- OTHER ACTIONS (e.g., WRI)
- STATE POLICY ACTIONS
  - Wyoming
  - Texas
  - Others



# The IOGCC Carbon Capture and Geological Storage Regulatory Task Force

## Phase II Task Force Objectives

1. Creation of a nationwide guidance document, **approved by the IOGCC**, which is specific enough to enable each state to develop its own statutes and regulations while at the same time helping to lay the essential groundwork for a state-regulated, but nationally consistent, “cradle to grave” system for the capture and geologic storage of CO<sub>2</sub>.
2. Provide assistance to Regional Partnership Pilot Projects in (a) understanding and complying with regulatory requirements for field testing and injection; and (b) work with member state in implementing draft model laws and regulations and assessing adequacy of those laws and regulations.



# EPA GS Regulatory Recommendations

- Authorized Via Safe Drinking Water Act
- Looks at Subsurface Injection
- Scope Limited to GW Protection
- Extends UIC Approach to GW Protection
- Attempts to Avoid Waste Injection Labels
- Mentions, but Does not specifically treat, Commercial CO<sub>2</sub> Injection activities
- Establishes a Well Class VI for Injection

*Note: Multi-Stakeholder Group Input*



# World Resources Institute's Guidelines for Carbon Capture and Sequestration

- Only Work to Broadly Treat Capture, Transportation, and Sequestration (i.e., Surface and Below Ground)
- Most Thorough Treatment of Subjects
- Actively Recruited Injection Industry's Experience





# The Gathering of Interested Parties

## ENTITY TYPE

## IOGCC

## EPA

## WRI

- Federal Regulators
- Environmental Parties
- Research Organizations
- Service Companies
- State Regulators
- Commercial Injectors



# WHAT IS TEXAS DOING?

- Adding Certainty (SB 1387) to New Projects By Clarifying Who Regulates the Surface and Subsurface Arena
- Adding Incentives for the Risk Takers in this New Age of Energy (HB 2811 and HB 469 “NowGen”)

## WHAT WASN'T DONE (in the 2009 session)

- Assisting Aggregation (Unitization) of Rights
- Clarifying who owns storage rights



# Texas Senate Bill 1387

## An Act Relating to the Implementation of Projects Involving the Capture, Injection, Sequestration, or Geologic Storage of CO<sub>2</sub>

- Defines Anthropogenic CO<sub>2</sub>
- Establishes Jurisdiction of TRRC over Oilfield Related Storage
- Will Define Monitoring Activity Required to Verify CO<sub>2</sub> Storage
- Creates an Anthropogenic CO<sub>2</sub> Storage Trust Fund
- Commissions a Report to Recommend a Framework for Managing Activities on GS on State-owned Lands
- Project Grant and Loan Program (under TCEQ)
- Commissions a Study to Analyze Requirements for Storage into Saline Formations

**Sponsors: Senator Kel Seliger and Congresswoman Myra Crownover**

**Status: Signed into Law by the Governor on May 27, 2009**



# Texas House Bills 469, 1796

An Act (469) Relating to the Establishment of Incentives for the Implementation of Certain Projects to Capture and Sequester CO<sub>2</sub> that Would Otherwise be Emitted into the Atmosphere

- Defines Advanced Clean Energy Project (>50% CO<sub>2</sub> Capture w/ Storage)
- Establishes a New Sales Tax Exemption for CCS Personal Property
- Established 3 ea ACEP projects eligible for up to \$100 million in Franchise Tax Exemptions
- Recognizes CO<sub>2</sub> EOR as sequestration
- Allows some exemptions from taxes on capital items for pollution control
- Affirms TRRC Jurisdiction over Geologic Storage and commissions a Study for Jurisdiction over Saline Reservoirs
- EOR severance tax exemption extended from 7 to 30 years and Requires “a reasonable expectation” that at least 99% of the CO<sub>2</sub> will remain sequestered for at least 1000 years



**Sponsors:** Senator Kel Seliger and Rep. Phil King

**Status:** Passed both House – waiting on Gov signature

*Melzer Consulting*

For More Complete Information on Texas CCS Policy

see the Texas Carbon Capture and Storage  
Association's website:

[www.txccsa.org](http://www.txccsa.org)



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# WHAT WYOMING IS DOING

Wyoming has Moved Quickly and More Broadly than any State so is an Interesting Case History for Modeling how CCS may Further Develop Elsewhere

- HB89 (2008 Session) – “Codified Surface Landowners Ownership of the Pore Space”
- HB90 (2008 Session) – “Defined Regulatory Jurisdictional Authorities for WY CCS”
- HB57 (2009 Session) – “Declared the Mineral Estate Dominant over Pore Space”
- HB58 (2009 Session) – “Declared that the Liability of CO<sub>2</sub> in-situ Lies with the Injector”
- HB80 (2009 Session) - “Outlined the Mechanics of Sequestration Site Unitization”



## OTHER STATES (1)

- **NORTH DAKOTA** (*SB2095, passed in March*)
  - Clarified Surface Ownership of Pore Space
  - Disallows Severance of the Storage Estate from the Surface
  - Declares the Mineral Estate Dominant
  - ‘Amalgamation’ Procedures of Storage Rights (60% threshold)
  - 10-yr Post Closure CO<sub>2</sub> Injector Ownership Whereupon Transfers to State if Meets Criteria of Transfer
  - EOR Separate but Conversion to Storage Allowed
  - Industrial Commission has Regulatory Jurisdiction
  - Storage Fee and Trust Fund
- **MONTANA** (*HB498, Passed in May*)
  - Declared Surface Ownership of Pore Space
  - Sets up a State Trust Fund
  - Declares Intent is to Seek Injection Primacy





## OTHER STATES (2)

- State of Washington
  - First State to Draft Rules
- Kansas
  - Kansas Corporation Commission Empowered by Legislature to Write Rules for non-oil field Sequestration (draft of rules now written but waiting on Board Review)
- New Mexico and Oklahoma
  - Broad Scope CCS Legislation Unsuccessful to Date



## WOTF\*

- Some States are Frozen, **W**aiting **O**n **T**he **F**ederal Rules (e.g., cap & trade, EPA rules)
- Many of These and Other States are Moving only in a Renewable Energy Direction with Enormous Transmission Line, other Infrastructure and Environmental Challenges Ahead

# Summary of Key Items Addressed

## *(For Those Moving Ahead in CCS)*

- 1) Incentives for First Movers
- 2) Regulatory Jurisdictional Authority
  - Separate EOR and Sequestration
  - Concurrent EOR and CCS
  - Site Approvals?
- 3) Storage Rights Ownership
  - Severability, Dominance Issues
- 4) CO<sub>2</sub> Composition?
- 5) Long Term Fate of CO<sub>2</sub> (Trust Fund, State Ownership)
- 6) Rights Aggregation (Unitization)
- 7) Posturing for State Primacy



# The Existing (and Modifying) Underground Injection Control (UIC) Program Reference



# Underground (USDW) Regulation

The Past  
(e.g., UIC)

EPA



The Experience;  
Tx, Wyo, Ok, NM,  
etc.



Inexperienced  
States

Today  
(GS)

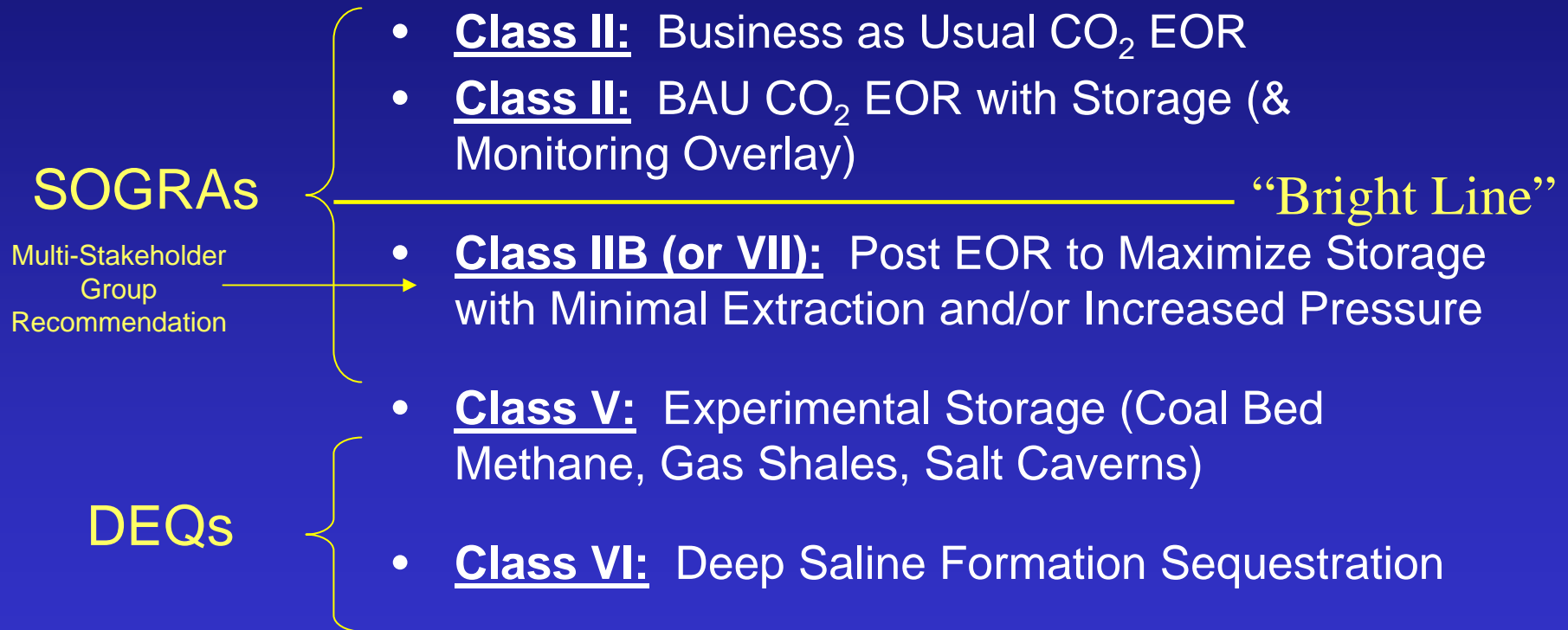
EPA



All States, Broadly  
Prepared (Willing?) or  
Not

# UIC Regulatory Framework

## (Currently Under Revision to Incorporate CCS)



# CONCLUSIONS

- CCS (aka Sequestration) in Texas and the U.S. is “Incidental” and Underway but not yet “Official”
- Concurrent CO<sub>2</sub> EOR & CCS Destined to Become a Major Industry in the US and Globally
- Large CCS Project Opportunities Exist for Potentially Huge Economic Rewards
- Demand for Training and Development of New Geologic Professionals will be Substantial
- The Enabling State and Federal Policy is Underway; More is Needed and is Critically Important to Properly Balance Commercial and Environmental Goals



# WHAT'S AHEAD?

- POLICY FRONT
  - Federal
    - ARRA Stimulus Funding Opportunities
    - Waxman-Markey House Floor Debate
    - Senate Climate Change Bill and Conf Committee
    - Senate (and House) Energy Bill (Liability Provisions)
    - New Draft of EPA Rules on Sequestration
    - EPA Source Reporting
  - States
- PROJECTS AND INFRASTRUCTURE
  - IOGCC Pipeline Transportation Task Force
  - Pipeline Authorities
  - Incentives





# QUESTIONS?



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# Supplemental Slides



# KEY CO<sub>2</sub> REFERENCES



# Key Reference Work (1)

- The Annual Wyoming CO<sub>2</sub> Flooding Conferences
- The Annual EOR Carbon Management Workshop (Held each December in Houston)
- The Annual CO<sub>2</sub> Flooding Conference and Field Trip (Held each December in Midland)
- The CO<sub>2</sub> Flooding Shortcourses (Part of Above)
- The SPE Monograph Volume 22
- The Applied Technology Academy's CO<sub>2</sub> Schools Held Twice a Year in Midland





# IT'S ALMOST GAME TIME!



CO<sub>2</sub> CONFERENCE WEEK KICKS OFF DECEMBER 3.

DON'T SIT THIS ONE OUT; MAKE YOUR GAME PLAN NOW TO ATTEND THE MOST IMPORTANT CO<sub>2</sub> EVENT OF THE YEAR. KEY PLAYERS FROM AROUND THE INDUSTRY WILL BE THERE, SHARING THE LATEST INFORMATION ON TRENDS AND TECHNOLOGY.

**5TH ANNUAL EOR CARBON MANAGEMENT WORKSHOP- IRVING, TEXAS, DEC. 3 - 4  
OMNI MANDALAY HOTEL  
DECEMBER 3**

Pre-workshop seminar "A Hypothetical CO<sub>2</sub> EOR/CCS Deal Designed for the Year 2012"

Kickoff luncheon and Technical Session

Evening reception hosted by Denbury Resources

**DECEMBER 4**

Presentations all day plus luncheon speaker Gareth Roberts, CEO of Denbury Associates

**THE 13TH ANNUAL CO<sub>2</sub> FLOODING CONFERENCE - MIDLAND, TEXAS, DEC. 5 - 7  
DECEMBER 5**

Field trip to Whiting's new North Ward Estes flood and CO<sub>2</sub> handling facilities.

**DECEMBER 6**

Shortcourses including "CO<sub>2</sub> Injection in Subsurface Reservoirs: Geological Parameters Affecting CO<sub>2</sub> EOR and CO<sub>2</sub> Storage"

Theme sessions covering operations and supply issues

Luncheon speaker Kurt Walzer of the Clean Air Task Force: "Coal and EOR in a Climate-disrupted World"

Case histories of on-going CO<sub>2</sub> floods

Evening reception at the Petroleum Museum

**DECEMBER 7**

Case histories continued

**FLOODING CONFERENCE SPONSORS**

Anadarko Petroleum Corp.; Applied Petroleum Technology Academy; Denbury Resources; ExxonMobil Gas Marketing; Kinder Morgan CO<sub>2</sub> Company, LP; Nicholas Consulting Group; Occidental Permian, Ltd.; the Petroleum Technology Transfer Council's Southwest Region; Russell K. Hall and Associates; Trinity CO<sub>2</sub>, LLC; Hess Corporation; The Society of Petroleum Engineers - Permian Basin Section; The University of Texas of the Permian Basin; Midland College's Petroleum Professional Development Center; Whiting Petroleum; and the EOR Institute, University of Wyoming

**WORKSHOP SPONSORS**

Luminant (Host); Kinder Morgan CO<sub>2</sub> Company (Publications); Denbury Resources (Host); BlueSource; PetroSource Energy; Praxair; Alston & Bird; Vinson & Eldins; and Hart Energy Publications

© 2007 CO<sub>2</sub> Conference. (KMC714/1207)



# KICKOFF

**Website: [www.spe-pb.org](http://www.spe-pb.org)**

**5TH ANNUAL EOR CARBON MANAGEMENT WORKSHOP  
DECEMBER 3-4, IRVING, TEXAS**

**13TH ANNUAL CO<sub>2</sub> FLOODING CONFERENCE  
DECEMBER 5-7, MIDLAND, TEXAS**

## Key Reference Work (2)

### The Annual CO<sub>2</sub> Flooding Conference

- Held Each December in Midland, Texas – Home to 57 Active CO<sub>2</sub> Floods
- Concentrates on Actual Case Histories
- Includes a CO<sub>2</sub> Flood Field Visit
- Includes a CO<sub>2</sub> Shortcourse
- Includes an EOR Carbon Management Workshop
- Great Networking Opportunity

Visit: [www.spe-pb.org](http://www.spe-pb.org) or call 432-552-2430



# Key Reference Work (3)

## THE CO<sub>2</sub> FLOODING CONFERENCE SHORTCOURSES

1. Making Money on CO<sub>2</sub> Flooding...Some Innovative Development Concepts for Independents..., May 1995.
2. Is My Field a Candidate for CO<sub>2</sub> Flooding?, September 1995
3. Equipping and Day-to-Day Operations of a CO<sub>2</sub> Flood, December 1995
4. How CO<sub>2</sub> Flood Surveillance Helps Assure a Successful EOR Program, May 1996
- 4a. CO<sub>2</sub> Flood Surveillance and Monitoring, December 2004
5. How to Put Together a CO<sub>2</sub> Flood, December 1996
6. CO<sub>2</sub> Measurements and Metering, December 1997
7. CO<sub>2</sub> Facilities and Plants, December 1998
8. CO<sub>2</sub> Flooding: Sandstones vs. Carbonate Reservoirs, December 1999
9. Issues for Beginning CO<sub>2</sub> Flooders, December 2000
10. Reservoir Modeling and Simulation for CO<sub>2</sub> Flooding, December 2001
11. Wellbore Management in CO<sub>2</sub> Floods, December 2002
12. Carbon Dioxide Health And Safety, December 2004
13. CO<sub>2</sub> Sourcing for Enhanced Oil Recovery, Dec 2006
14. CO<sub>2</sub> Injection in Subsurface Reservoirs: Geological Parameters Affecting CO<sub>2</sub> EOR and CO<sub>2</sub> Storage

(<http://www.utpb.edu/ceed/co2/shortcourses.html>) or phone 432-552-2430



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# The Applied Petroleum Technology Academy CO<sub>2</sub> School

- Conducted Twice a Year in Midland (late January and August), limited to 40 students
- Four Days: Covers the Practical Side of Commercial CO<sub>2</sub> Injection with 'lite touch' of the Theory
- A Nice Dose of Emphasis on Reservoirs and Building CO<sub>2</sub> Demand for the Coming Industrial Supplies of CO<sub>2</sub>
- Includes a Field Trip to a 'NGL Recovery' and a 'BGF'\* Recycle Plant and Flood

\* BGF = "blood, guts and feathers" reinjection project

Ref: [www.aptapb.org](http://www.aptapb.org) or call Midland College's Petroleum Profession Development Center (432-683-2832)

