Final Report of the Advanced Coal Technology Work Group

Clean Air Act Advisory Committee

January 31, 2008

ACT Work Group

- CAAAC charged Work Group 9/2006
- First meeting: 1/2007
- Charge: Discuss and identify the potential barriers and opportunities to create incentives under the Clean Air Act for the development and deployment of ACTs, including technology to capture and store CO2.
- Work Group: appropriate/useful to examine opportunities outside the Clean Air Act.

ACT Work Group

- Wide spectrum of participants in a collaborative process

- Development of a set of recommendations and complementary actions to be undertaken by different stakeholders will provide greatest potential to accelerate the use of ACTs

Introduction

- Substantial consensus on recommendations
- Defining an ACT
- On three recommendations, there were 2 or 3 perspectives on *applicability.*
- Recommendations:
  - Apply to technologies that move coal towards CCS
  - Apply towards all ACTs
  - Apply exclusively to CCS

#1: National Policies

- Wide-scale commercial deployment unlikely without market driver
- National GHG reduction legislation an effective way
  - If it establishes price for carbon
- Prioritize and encourage early deployment

#2: A “Toolkit” of Incentives

- **Government agencies should use variety of regulatory, financial and other incentives, as needed, to accelerate CCS and other ACTs**
  - Tax credits, loan guarantees, accelerated depreciation, and long-term purchase contracts
  - Different incentives to address different risk factors (contain government cost)
  - Many incentives already exist, some need improved coordination, funding
  - Applicability

#3: Early Deployment Fund

- **Congress should immediately create:**
  - Quasi-governmental CCS Early Deployment Fund
  - Paid for by a broad-based funding mechanism(s)
  - $1b annually
  - Expected results: rapid deployment of 5-10 commercial-scale projects
  - Demonstrate integrated CCS
  - Future Gen vs. RCSPs vs. Early Deployment Fund?

#4: State Actions

- State legislatures should take action to enable PUCs, other state agencies to accelerate ACT deployment
- Measures could include:
  - Cost recovery
  - Carbon to be priced in Integrated Resource Planning
  - Power purchase agreements
- Applicability

#5: Improving Efficiency at Existing Plants

- EPA conducts detailed study on energy efficiency improvements
- EPA, considering available information and once available, study results, should take advantage of opportunities to encourage efficiency improvements
- Provided that upgrades do not increase in criteria pollutants, and do not delay CCS

#6: Technology Advancing Agreements

Stakeholders should consider multi-party negotiations where appropriate

- New or existing
- Pre-permit
- Encourage ACTs or CCS demos
- Advance environmental performance and technologies, increase certainty
- Voluntary, leaves intact stakeholder rights
- Avoid or minimize litigation
- Applicability

#7: EPA's Underground Injection Control and Sequestration Policies

EPA should designate new well class for CO2 Injection/sequestration

- Recognizes the unique properties and behavior of CO2
- "Adaptive"
- Liability and financial assurance mechanisms
- OAR, OW coordination on broader policies

#8: EPA Outreach on CCS

- **EPA should immediately develop public outreach effort to explain CCS**
  - In consultation with other agencies
  - Answer, “What is CCS?”
  - Benefits and risks
  - Security of CO2 injected at properly selected sites
  - Need for early deployment

#9: EPA CO2 Accounting Protocol

- **EPA should publish CO_2 accounting protocol for CCS**
  - Allowances under cap
  - Offset in a tax or alternative system
  - Capture, transport, injection
  - Use existing protocols or adopt them
  - Multi stakeholder
  - Public comment

#10: EPA Training Program

EPA Should Sponsor Training Program

- For Regulators and PUC Officials
- How to Permit and Monitor CCS Projects
- Federal, Tribal, and State agencies
- Best practices

#11: CO2 Quality Specifications

- **ASTM (or similar body) should establish specifications for CO_2 quality**
  - For long-term sequestration of CO_2
  - Considering source, transportation alternatives, and end-use

#12: Existing Clean Air Act Authorities

EPA should take advantage of existing opportunities under the Clean Air Act, and current regulations, to promote the near-term deployment of ACTs that reduce the overall environmental footprint of coal-based facilities.

#13: Pipeline Study

- **Appropriate federal agencies should immediately conduct a study examining CO2 pipeline infrastructure issues**
  - In conjunction with other agencies and groups
  - Legal, technical, financial hurdles

Appendix B

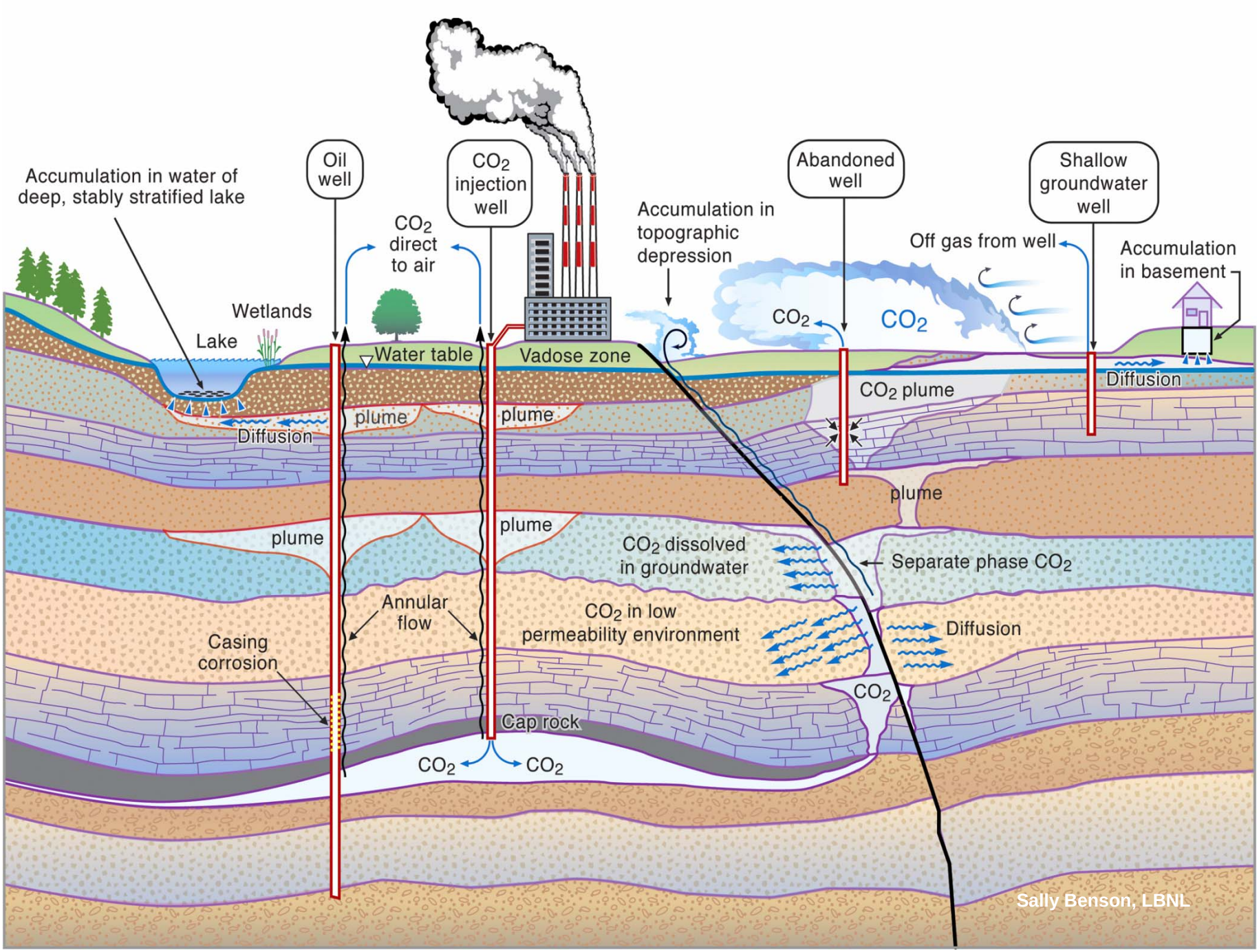
- **CCS Barriers: liability + Property rights**
- **Suggested recommendations without substantial consensus**

Work Group Members

- **60-day Action Plan**

Thank you

Advanced Coal Technology Work Group


Accumulation in water of deep, stably stratified lake
Oil well
CO_2 injection well
CO_2 direct to air
Abandoned well
Shallow groundwater well
Accumulation in topographic depression
Off gas from well
Accumulation in basement
Wetlands
Lake
Water table
Vadose zone
CO_2
CO_2
Diffusion
plume
plume
CO_2 plume
Diffusion
plume
plume
plume
CO_2 dissolved in groundwater
Separate phase CO_2
Annular flow
CO_2 in low permeability environment
Diffusion
Casing corrosion
CO_2
Cap rock
CO_2
CO_2
Sally Benson, LBNL