



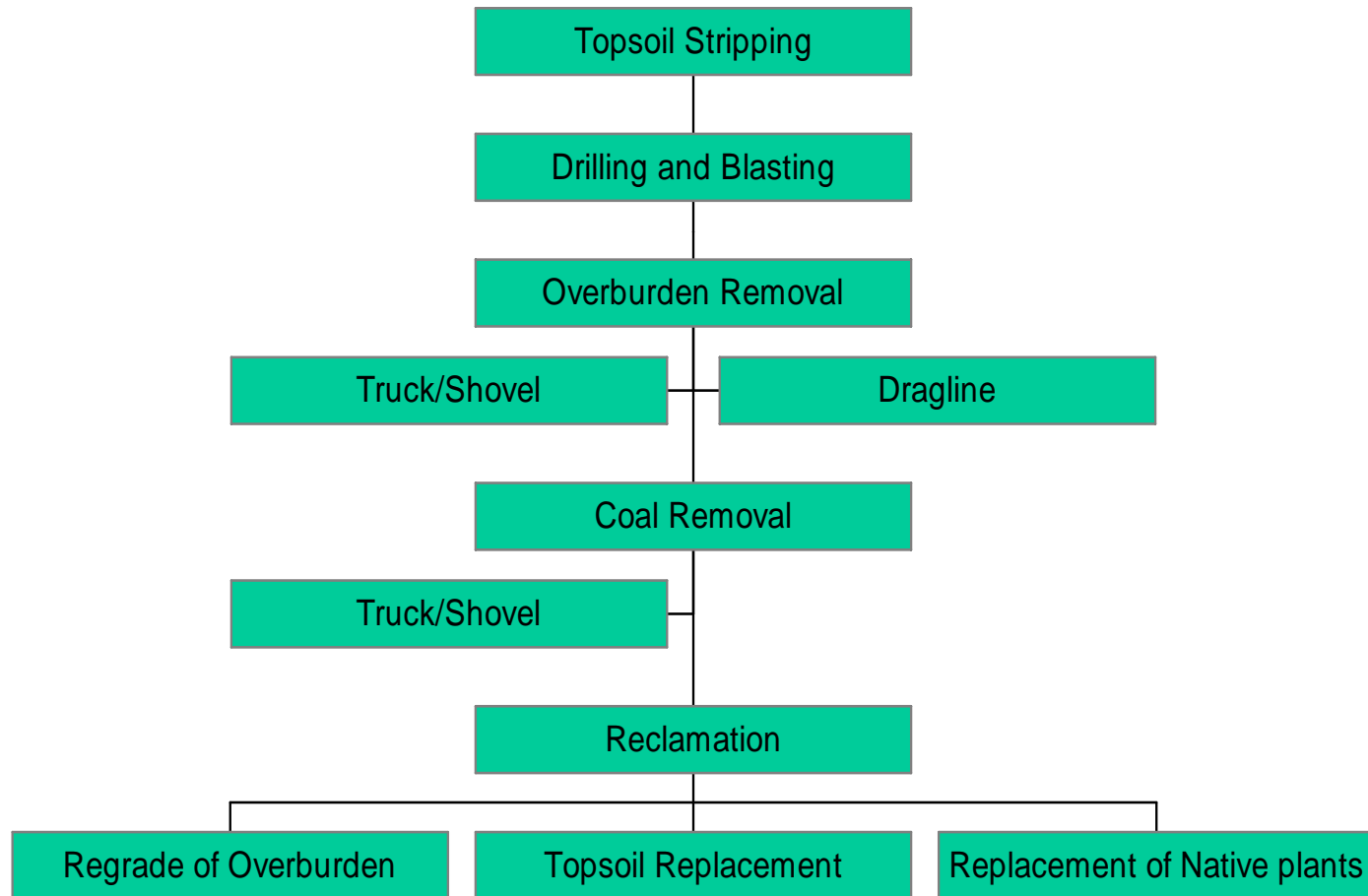
## Carbon Sequestration Working Group Meeting August 14-15, 2008

### **Bonding & Financial Assurance for WY Coal Mining**

Bob Green – Rio Tinto Energy America



# Mining and Reclamation Process



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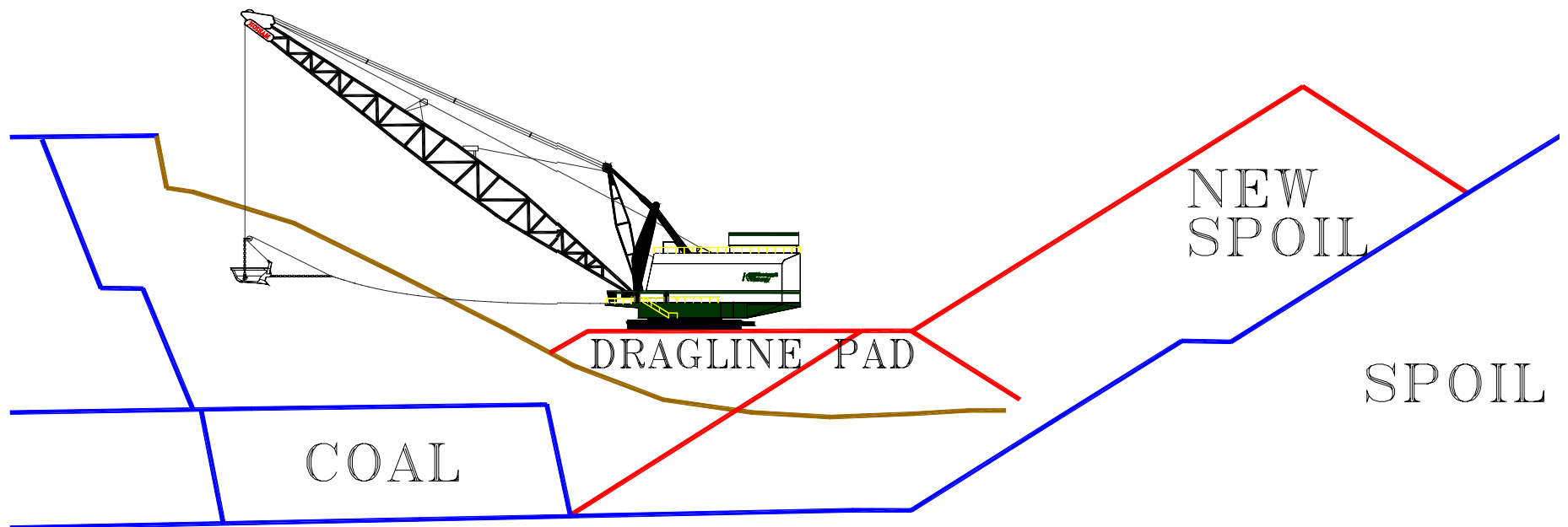


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# DRAGLINE STRIPPING



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# Financial Assurance in Coal Mining – Bonding Aspects



- **Surface Mining Control and Reclamation Act**
- **Primacy State Rules, Regulations and Enforcement**
- **Bonding** – Reclam performance bond generally assumes worst, walk-away
- **Area Bond** – estimated costs of rough backfilling all voids
  - Generally the majority of bond total
- **Incremental Bond** – estimated costs of recontouring, drainage control, grading, topsoil, seedbed preparation, and revegetation
  - Greatest burden to demonstrate adequacy
- **Bond total**
  - Operator's estimated costs to reclaim current and minimum one-year advance disturbance; reviewed by State for concurrence
  - Contingency costs - State's estimate of additional costs to contract the work, manage the project, address unknowns
  - Reviewed annually

# Reclamation Performance Bond Components



- **Backfill and Grading**
- **Stockpile Removal**
- **Topsoil Reapplication**
- **Revegetation**
- **Facilities Demolition & Disposal**  
(buildings, roads, wells, etc)
- **Contingencies**
  - Postclosure Monitoring
  - Engineering & Redesign
  - Final Closure Investigation & Stabilization
  - Closure, Security & Liability
  - Closure Administration & Project Management
  - Factors for unknowns



# Bonding Liability Periods



- **Area Bond**
  - Duration sufficient to assure backfilling achieved to standards
- **Incremental Bond**
  - Entire duration of the disturbance and a minimum 10-year revegetation responsibility
- **Area Bond Release**
  - Verified backfilled to standards
- **Partial bond release up to 60% of incremental bond**
  - Decrease in total number of acres disturbed and unreclaimed
  - WDEQ retains total amount for permit area sufficient to reestablish vegetation
- **Full Bond Release**
  - All reclamation requirements completed to standards & permit commitments



# Corporate Sureties for Required Bond Amounts in Liability Periods



## Qualifications

- **Licensed in Wyoming**
- **Estimated bond amount does not exceed ‘limit of risk’**
  - No insurer shall retain any risk on any one subject of insurance in an amount exceeding ten percent (10%) of its surplus to policyholders
- **Surety must agree not to cancel bond without:**
  - 90 days prior notice
  - WDEQ written consent (only provided when bonded reclamation requirements met)
- **Can replace bond with an equivalent qualifying surety**
- **Surety must agree to be jointly and severally liable with the permittee**
- **If Surety fails, operator has 30-60 days to replace with equivalent**

# Standard Bonding Instruments



- **Surety bonds**

- Contract Guarantee
- Non-cancellable during their terms
- Bonding crisis of early 2000's is essentially over
- Surety bonds reasonably available again

- **Irrevocable Letters of Credit**

- Irrevocable during their terms
- Must be payable upon demand by WDEQ under forfeiture terms of the letter
- Amount  $\leq$  10% of bank's capital surplus account
- Amount  $\leq$  3 times the total of [20% of unimpaired capital stock of the bank + 20% of its unimpaired surplus fund + 20% of unimpaired undivided profits]
- LOCs have become reasonably available again; US and internationally

- **Collateral**

- Security interest in real or personal property
- Perfected first lien with right to sell the property in the event of forfeiture

- **Certificates of Deposit/Cash**



# Self-Bonding / Guarantees



- **Financial Qualifiers for Self-bonds:**

- Moody's or S&P rating of A or higher  
**or**
- Tangible net worth  $\geq$  \$10M  
Total Liabilities : Net Worth  $\leq$  2.5 and  
Current Assets : Current Liabilities  $\geq$  1.2  
**or**
- Fixed assets in US  $\geq$  \$20M  
TL : NW  $\leq$  2.5 and  
CA : CL  $\geq$  1.2



- **Can self-bond up to 25% of tangible net worth in the US**

- 35% with demonstration of TL:NW  $\leq$  1.5 and CA:CL  $\geq$  1.7
- 30% for same demonstration by parent corporation guarantor

- **Public Interest Groups generally do not support this mechanism**

# Other Potential Assurance Mechanisms



- **Insurance**
  - NV, NM
  - Very few takers
- **Trust Funds**
  - NM, PA, (TN-OSM)
  - High cash outlay
  - Trustee, Investment Manager
  - Investment Policy
  - Control over the fund
  - Conditions for distribution of funds
- **Bonding Pools**
  - NV
  - Large operators vs small operators



## Estimated range of bonding costs



- Pricing is dependent on the financial strength and integrity of the entity seeking the bond
- For mid-term bonding (< 20 years) expect \$5-\$10/\$thousand
- For longer-term bonding (20-40 yrs) expect costs to range up to \$20-\$25/\$thousand
- Bonding period longer than 40 years is relatively unprecedented



# Key Aspects of CCS Assurance Considerations

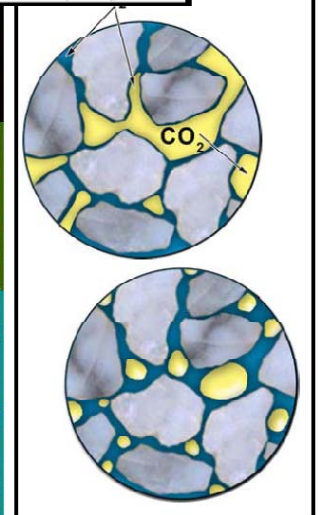
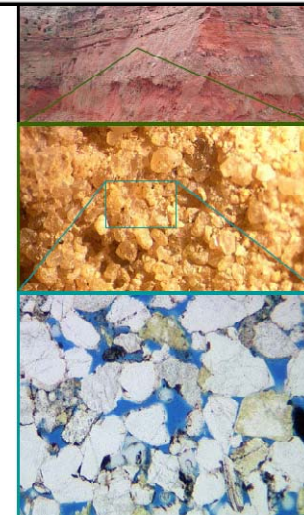
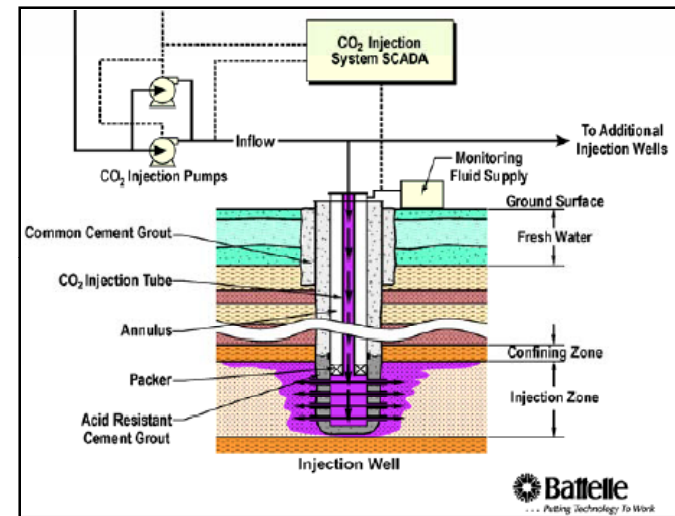


- **Short-term:** Compressor, Injector and Pipeline Integrity
  - The majority of CO<sub>2</sub> for CCS injection will likely need to be compressed, piped to an injection location and then injected into suitable geologic formations
  - Similarity to coal mining & reclamation phases
- **Longer-term:** Storage Site Integrity
  - Deep geologic formations with the following general characteristics:
    - Deep formations, generally at depths greater than 4000 feet
    - Target formation is topped with one or more layers of impermeable caprock- this is the “seal” for the injected CO<sub>2</sub>.
    - Target formation has good “injectivity” (sufficiently porous to accept the injected CO<sub>2</sub>).
    - Target formation is free from significant fissures, cracks, faults, etc., which may compromise formation integrity.



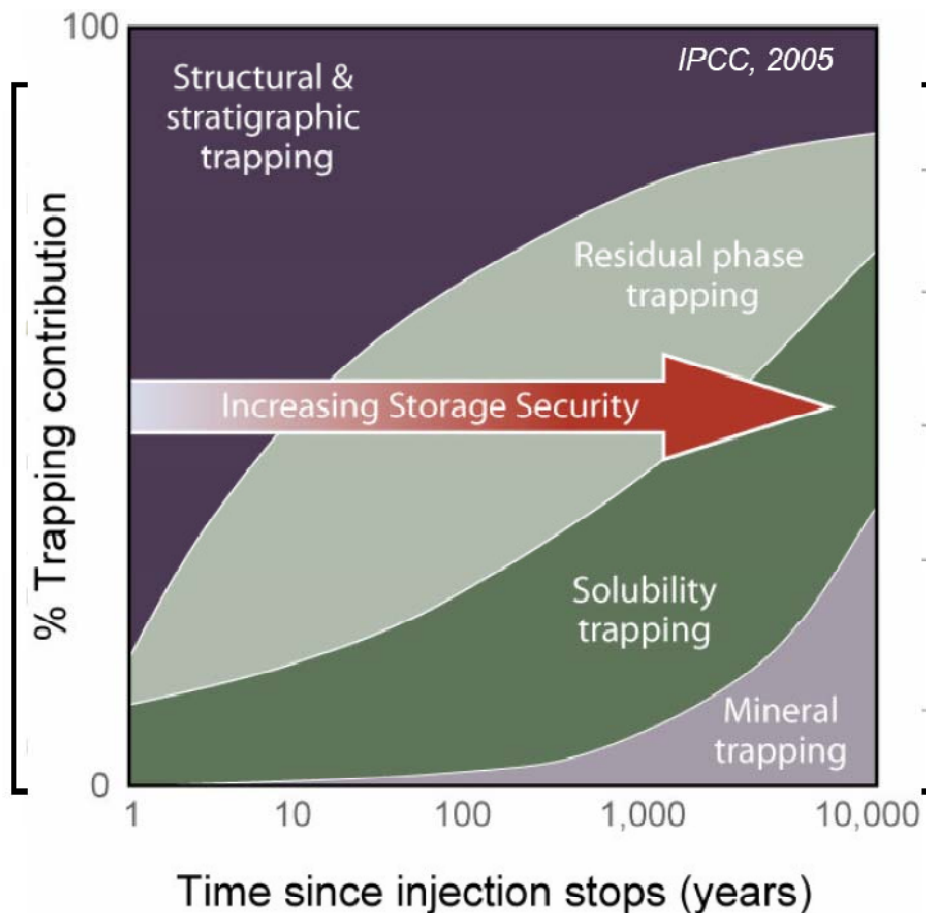
## What happens to the CO<sub>2</sub>?

- Physical trapping:
  - The buoyant, supercritical CO<sub>2</sub> will flow upward from injection to the caprock layer, which effectively traps the CO<sub>2</sub>
  - This mechanism is effective, unless the caprock is breached or compromised
- Residual trapping:
  - At low saturations levels, the CO<sub>2</sub> occupies interstitial spaces in the formation, trapped by capillary forces
  - In this state, the CO<sub>2</sub> is essentially immobile.
- Dissolution / Mineralization:
  - Over time, the CO<sub>2</sub> will dissolve in the brine
  - This carbonic acid can react with minerals to form carbonates





## Storage security increases over time



- There are multiple mechanisms working over multiple timescales
- Over geologic time, the storage security increases
- Over time, the overall risk profile decreases