Coal: China, Energy and Kyoto
I. Evaluating Coal Leases for Potential Mining

James D. Myers
Department of Geology & Geophysics
University of Wyoming

Phone: 307-766-2203
Email: magma@uwyo.edu

The Comrade Coal Group
Coal Lease Evaluation

Based on exploratory boreholes that all intersected coal seams, The Comrade Coal Group has paid $107 million for exclusive exploratory rights on three potential coal leases. To determine which, if any, of these leases the company should bid on for permanent development rights, they have assigned your geologic team the task of completing the assessment of each lease. As part of the assessment, your team is to devise a drilling program that will characterize, i.e. determine the depth, thickness, dip, rank, quality, variability and lateral extent, the coal seams associated with each lease. Based on your assessment, the company wants you to determine if mining is feasible for any of the seams you found. If so, you are to recommend the type of mining, e.g. surface vs. underground. Your recommendation must identify the most likely mining method to be used.

For this assessment program, you have been given a budget totaling $16 million. This budget will have to cover the cost of your drilling program as well as all the analyses you have done. Your report to the company's Board of Directors will be due next week.

Evaluation Program **Budget: $16 million**

A. Assessment Program
   1. Devise and implement a drilling program designed to:
      a. locate and define the depth and lateral extent of any coal seams underlying each lease;
      b. evaluate the variation in seam thickness;
      c. determine the rank and grade, i.e. quality, of each seam and how variable these quantities are;
   2. Use this information to:
      a. construct a N-S (A-A') and an E-W (B-B') cross-section for each lease;
      b. draw the subcrop extent of the topmost coal seam on the topographic map for each lease;
      c. draw the structural contours on any dipping seam you encounter

B. Mining Planning and Development
   1. Based on you geologic information you have acquired, determine:
      a. if development of the lease should proceed or not;
      b. if development is to be pursued, select the most appropriate mining class (surface vs underground) that should be used
      c. determine the mining method, e.g. room and pillar, longwall, open-pit, etc. most appropriate for extracting the coal.

Exploration Costs:

		borehole depth		
drilling		**<500 ft**	**500-1500 ft**	**>1500 ft**
	diamond	$46/ft	$105/ft	$138/ft
	rotary	$32/ft	$57/ft	$108/ft
	percussion	$15/ft	$37/ft	-
logging				
	gamma			
	density			
	neutron			
	sonic			
	caliper			
coring		$28/ft	$70/ft	$150/ft
plug & abandon borehole		$500/borehole		

Analytical Costs:

sample description	cost
cuttings	$17/ft
core	$34/ft
analysis	
proximate	$85/sam
ultimate	$95/sam
complete (proximate & ultimate)	$160/sam

Geologic Report

The geologic report you prepare for the company's board of directors describing the coal reserves you found on the leases must include:

- a lease map showing:
  - the locations of your boreholes (symbols: open circle - non-cored borehole, solid circle - cored borehole; half-filled circle – partially cored borehole)
    - the drilling method used for each hole (d – diamond; r –rotary; p – percussion)
    - depth each borehole was drilled to
  - subcrop extent of the uppermost coal seam underlying the lease
    - strike and dip symbols on seam indicating its orientation
- your geologic cross-sections showing
  - the location of your boreholes
  - the core results for any well that was cored
  - the depth to which each well was drilled
  - the coal seams you infer to underlie each lease, including the seam thickness and orientation
- tables summarizing
  - the characteristics of the coal seams
  - your evaluation project budget