Appraisal of Mineral Properties

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Appraisal of Mineral Properties

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- Certified General Appraiser:
  - Pennsylvania
  - Delaware
  - Texas
  - Florida
  - Georgia
  - Virginia
  - Mississippi
  - Indiana
  - Alabama
  - Ohio
  - Illinois
  - Alaska
  - West Virginia
  - Kentucky
  - New Jersey
  - New York
  - North Carolina
- Pennsylvania Certified Evaluator
- Member
  - American Institute of Mineral Appraisers
  - American Society of Appraisers
  - International Association of Assessing Officers
  - Institute of Business Appraisers
  - Minerals Economics and Management Society

Drag Line and Dozer

Minerals to be Valued

What is a mineral?

- Coal – Anthracite, Bituminous, Lignite
- Clay
- Crushed Stone
- Dimension Stone (Granite, Limestone, Slate)
- Gypsum
- Iron Ore
- Natural Gas
- Oil
- Phosphate
- Sand and Gravel
- Other Mineral Commodities

Minerals Defined

Minerals are defined in terms of economics.

Given legal, environmental, and political factors, can the material or commodity be:

- Identified and processed,
- Extracted from the ground,
- Processed for market, and
- Delivered to market

At a competitive price ?

Why Appraise Mineral Properties ?

- Sale or Acquisition of Operating Companies or Reserves
- Investment and Operating Decisions
- Tax planning
- Reports to federal agencies (Securities Exchange Commission)
- Financing
- Income, severance, and ad-valorem taxation
- Condemnation

Mineral Value

What is Mineral Value ?

- After processing unit value of a commodity:
  - Price per processed and delivered ton of coal
  - Price of delivered gasoline
  - Price of a diamond ring
- FOB Price at the mine site
- In-place value in the ground
- Speculative value for future development

A Mineral Property only has value as it relates to its ability to produce future income

Sand and Gravel

Categories of Mineral Property Value

- Active Extractive Operations
  - Mines
  - Quarries
  - Wells
- Reserve
  - Properties included in active operational control
  - Properties which are situated for future extraction
- Resources
  - Properties which may contain future reserves

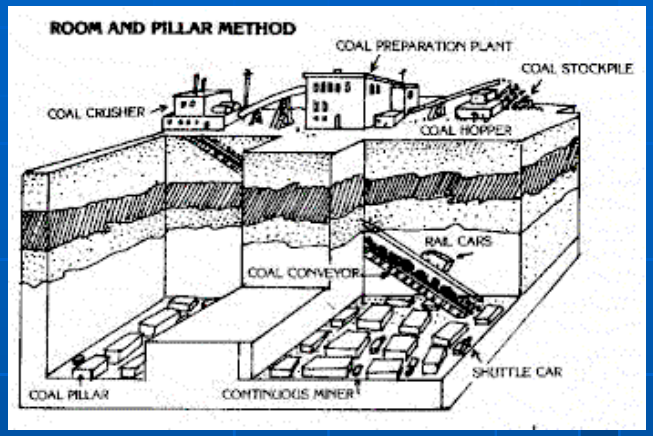
Minerals are Just Like....

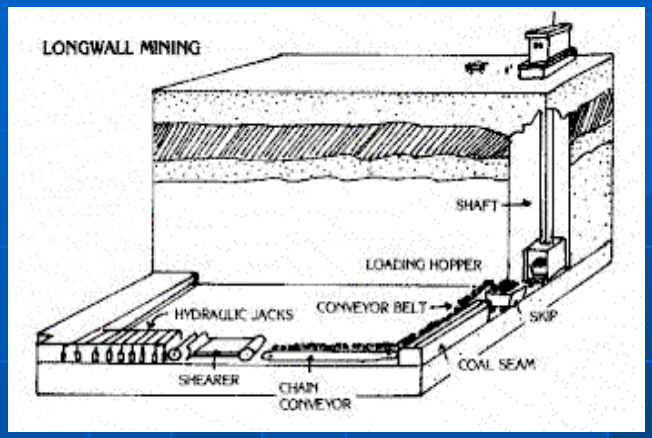
Active Mine ➡ **Commercial Real Estate**
➡ **Industrial property**

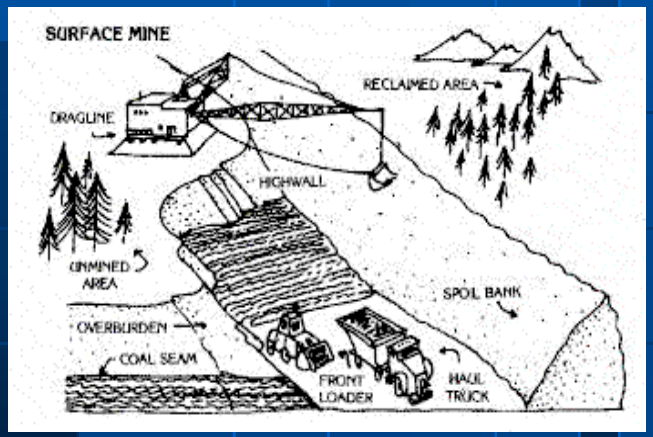
Active Reserve ➡ **Undeveloped parcel in a growing industrial or commercial area**

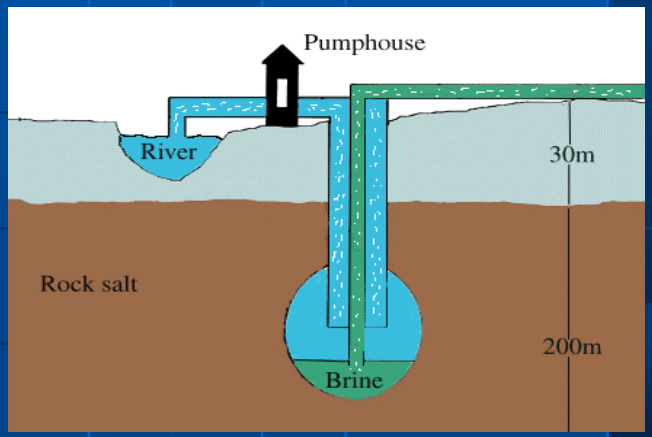
Reserve ➡ **Undeveloped parcel which may have future developmental possibilities**

Typical Mining Methods









Highest and Best Use

Just like any other property

- **Possible:**

–Does the asset exist, is there a sufficient quantity of the appropriate quality of resource, and is it technically possible to use it?

- **Legal:**

–Is it legal or permissible to exploit the asset?

- **Feasible:**

–Can the asset be utilized or exploited in a realistic manner? Is there appropriate access (in mineral properties, this may include rights to mine, rights of ingress and egress, wheelage rights, air shaft, and water control rights)?

- **Economic:**

–Can the resource be exploited in such a way as to return a positive economic return on the investment necessary to exploit the resource? Is there a potential profit in the present or foreseeable market place?

Ownership

Ownership Defines Use and Availability

- Fee Ownership – **complete mineral and surface rights**
- Surface Lease – **control by lease of surface rights**
- Mineral Lease **– control by lease of mineral rights**
- Surface Only – **ownership of surface rights**
- Mineral Only**– ownership of mineral rights**
- Adverse – **properties not owned or leased**

Whitney Benefits Facts

- Whitney Benefits' land of 1327 acres which were irrigated and subirrigated by the Tongue River alluvial valley floor.
- The land was leased to PKS in 1974, and advanced royalties were paid to Whitney.
- PKS expended exploration costs of $1 million in 1976
- PKS filed a permit application with the Wyoming Department of Environmental Quality (DEQ).

Whitney Benefits Facts

- A year later, SMCRA was enacted.
  - » No permit or application shall be approved if it should "interrupt, discontinue or preclude farming on alluvial valley floors that are irrigated or subirrigated
  - » Thus, Whitney's right to mine the coal on its property was invalidated by the enacted legislation of SMCRA and was the basis for the alleged taking in 1983.

Whitney Benefits Exchange Failed

- SMCRA provided for an exchange mechanism as a "method for ascertaining and paying just compensation”
- 1981: PKS had requested an exchange for federal lands to the BLM:
  - BLM offered Ash Creek PKS spent $130,000 on exploration costs on it.
- BLM also offered the Hidden Water tract, which PKS refused *as it had mined it in the late 40s to early 50s and was not interested in the remaining coal.*
- PKS and Whitney proceeded with their 1983 claim under the Tucker Act for a 5th Amendment regulatory taking

Whitney
Is it a Taking?

Consider three factors:

1 The economic impact of the restriction

The Court found that:

-There was a market for Whitney coal

-The coal was economically and technologically mineable

-SMCRA had a "devastating economic impact on the property“

2 The restriction's interference with investment expectations

-Investors could reasonably expect the returns on investments as projected.

-In-place assigned reserves were valued at $1.01/ton, and residual reserves at $.20/ton.

3 The character of the government's action

-There were no economically viable alternative uses for the property.

Court’s Conclusion: "... the substantial public interest at stake does not outweigh the private interest so that plaintiffs must bear the full burden imposed by the government action".

Whitney Findings

The Court established a final sum of $60,296,000 for the total 1977 value of recoverable Whitney Coal assuming:

- An annual production rate of 2.5 million tons
- Cost of $2 million for backfilling.
- Interest was payable to Whitney from Aug. 3,1977 to date of payment.

The amount was intended to represent what a willing purchaser would have paid Whitney *as a willing seller, to mine the Whitney Coal after calculating all mining related costs.*

The Court held that:

- *the enactment of SMCRA totally eliminated economic value of plaintiffs' coal and constituted a taking under the Fifth Amendment;*
- *the taking occurred at the time SMCRA became effective:*
- *the valuation method incorporating discounted cash flow approach offered reliable method for determining the fair market value of the coal on the day of the taking*
- *the plaintiffs were entitled to pre-judgment interest*

Specific Legal Valuation Requirements

In addition to the prices paid in sales of similar lands, due regard must be given to the physical features of the property to be valued. The formation of the coal strata should be taken into account as well as:

- **number of veins**
- **depth**
- **thickness**
- **pitch**
- **basins**
- **proximity to outcrop**
- **character of the separating rock formation**
- **quality of the coal**
- **gaseous or nongaseous nature**
- **kind of overlying surface**
- **availability of the coal**
- **difficulty in mining it**
- **probable quantity of the merchantable coal in the ground with allowance for loss in mining**
- **demand for the product**
- **all elements which a prudent purchaser would take into consideration**

▪In 1988, the Commonwealth Court, in the appeal of CNG Coal Company v. Greene County Board of Assessment Appeal (551 A.2d 328), cited earlier decisions (Ciafonnia v Washington County Board of Assessment Appeal, 535 A.2d 247 and Philadelphia & Reading Coal & Iron v Commissioners of Northumberland County, 323 Pa. 185)

Factors to be Investigated

- Resource / Reserves
- Quality and Processing
- Environmental Considerations
- Current Operations
- Mining Plans
- Production Costs
- Markets and Transportation
- Valuation Techniques

Resources / Reserves

- Resources
  - Naturally occurring concentration or deposit
  - Economic extraction is potentially feasible
- Reserves
  - Only Potentially Recoverable Mineral
  - Economic exploitation probable
  - Classified as:
    - Inferred
    - Indicated
    - Measured
- Active
  - Current mining occurring in definable deposit

Sand and Gravel Dredge

Reserves

The ore body defines the future use of the deposit

- Geology
  - Thickness and consistency of deposit
  - Overlying strata (roof or overburden)
  - Geologic disturbances or anomalies
- Topography
- Surface features
  - Flood plains
  - Drainage areas
  - Aquifers

Surface Mine Reserves

- Overburden ratio (stripping ratio)
  - Volume of overlying material which must be removed to extract a ton of coal (cu ft / ton)
  - Difficulty in removing overburden
    - Hard rock
    - Difficult access
    - Water
    - Disposal Problems
- Dilution
  - Contamination of ore with overburden during the mining process
- Multiple Seam Mining (e.g. Mountain Top Removal)
  - Improving ratio
  - Able to retrieve otherwise “non-economic” seams

Bucket Wheel Loader

Deep Mine Reserves

- Roof Rock
  - Types of control measures required
  - Control not possible
- Floor Rock
  - Mining equipment moves freely
  - Condition pose problems to movement
- Water
  - Seam above drainage can be mined with water controls
  - Seam below drainage requiring significant water control and treatment
  - Seam can not be mined without significant water drainage problems

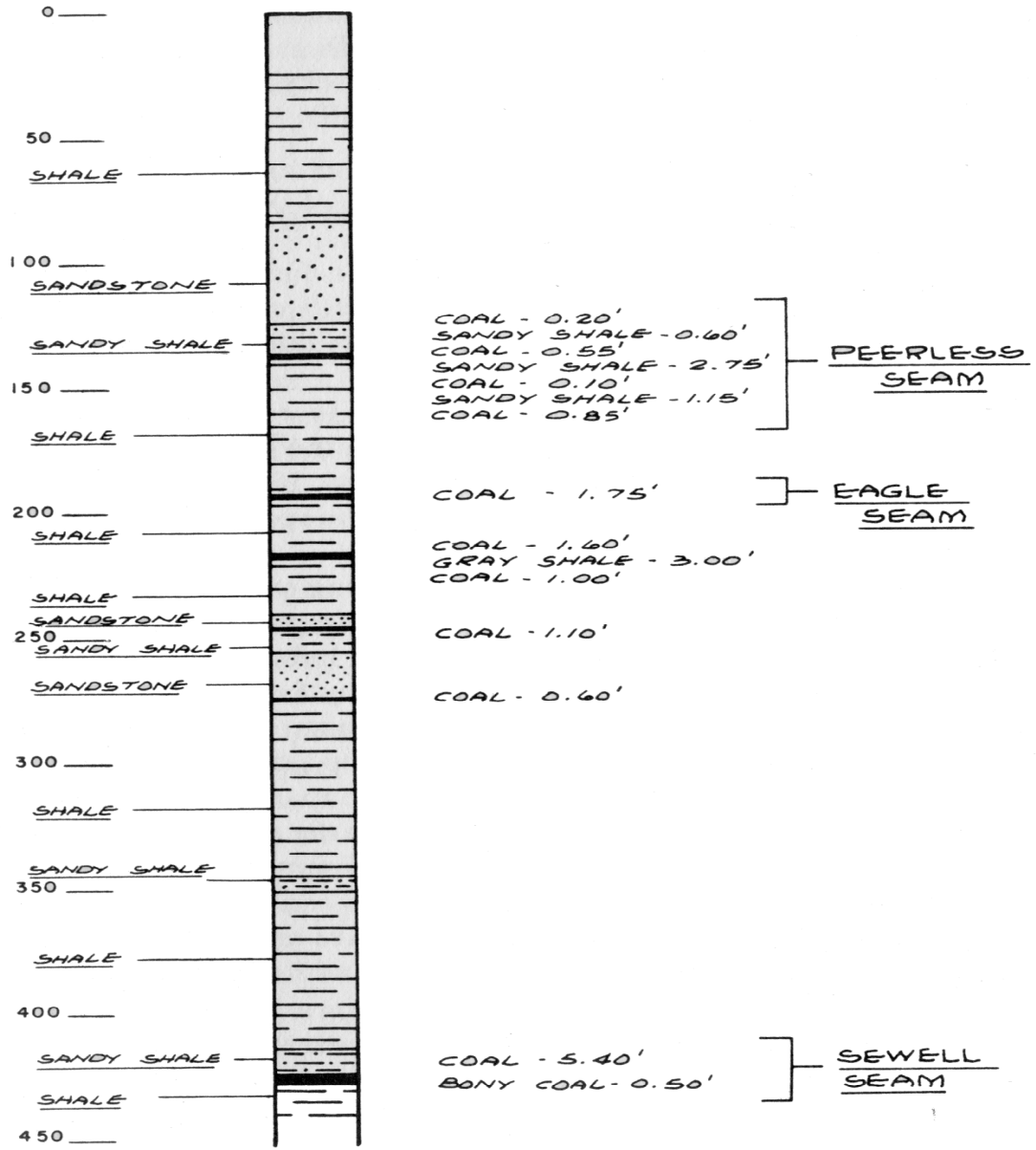
Long Wall Mining Machine

Reserves: Data Sources

- Geologic maps and Data
  - USGS
  - State Geologic Survey
- Topographic maps
- Permit Data
  - DEP Offices
  - Court House records
- Public Reports
- Confidential Mining Company Maps and Reports

DRILL HOLE NO. 6

COLLAR ELEVATION 2062'



Ownership Data Sources

- Deeds – **may or may not show considerations**
- Leases – **may or may not show royalty amounts**
- Memoranda – **never shows any $$$**
- Permit files – **will provide details**
- SEC files – **will provide details**
- Assessment files – ???

Quality

- **Market Identification**
  - What market will the commodity serve?
- **Price Estimation**
  - What price will the commodity fetch?
- **Absorption**
  - How much can be sold annually?
- **Production Costs**
  - What is the cost to produce (process)?

Quality and Processing

Coal

- Ash %
- Moisture %
- Heating Value – Btu per pound
- Sulfur %
- Volatile Matter
- Friability
- Grindability
- Fixed Carbon

Sand and Gravel Stackers

Quality and Processing

Aggregate: Crushed Stone, Sand Gravel

- Absorption
- Hardness/Integrity
- Color
- PH
- Fracture
- Skid resistance

Dimension Stone Mine

Dimension Stone Saw Shop

Environmental Considerations

- Air Pollution
- Water Pollution
- Noise and Vibration
- Waste Disposal
- Physical Appearance
- Subsidence
- Reclamation

Environmental Controls

Permits required

- Mine Drainage
- Mining
  - **Surface Mine**
  - **Underground Mine**
  - **Auger Mine**
- Pollution
  - **NPDES**
- Safety
  - **MSHA**
- Specific Mining Modules
  - **Subsidence**
  - **Coal Waste Disposal**
  - **Blasting**
  - **Sedimentation and Erosion**

Current Operations

A key to assessing the future

- Identify likely market
- Furnish insight into operational characteristics
- Provide information concerning resources
- Contribute information concerning location and transportation
- Provide comparative basis for estimating:
  - Absorption // production rates
  - Royalty and discount rates
  - Valuation
    - per acre
    - per unit
    - per operation

Current Operations

Information Sources

- DEP records:
  - Regulatory Files:
    - Inspection reports
    - Permit Files
    - Annual Production reports
  - Environmental Information:
    - Geologic Studies
    - Annual reports
- Industry sources:
  - Keystone Coal Manual/ Coal Outlook
  - Aggregates Manager
- Operator records

Drag Line

Mining Plans

A KEY TO PREDICTING THE FUTURE

- Pre Mine Development
- Mine Life
- Annual production
- Equipment
- Capital Costs
- Production Costs
- Reclamation Procedures

Filed with the state prior to start-up, and periodically during operation

Long Mining Machine

Production Costs

- LABOR COSTS
- SUPPLIES / MATERIALS
- POWER
- ROYALTIES
- PROPERTY TAXES
- INCOME TAXES
- DEPRECIATION
- PENALTIES AND FINES

Transportation

- Transport is a significant cost
- Transport costs can preclude economic viability of a deposit
- The higher the unit value the longer the transport distance:
  - Gold is transported world wide
  - Crushed stone is transported 30 ± miles
- Transport cost relate to methods
  - Conveyor – $0.07 to 0.13 ± per ton mile
  - Barge – $0.09 to 0.20 ± per ton mile
  - Rail – $0.12 to 0.25 ± per ton mile
  - Truck – $0.17 to 0.30 ± per ton mile

Market

- Reliability of Supplier (Supply)
- Reliability demand by purchaser
- Quantity of Reserve
- Quality of Reserve
- Production Cost vs. Market Price
- Transport Cost
- Delivered Price

Market Prices

- Contract
  - Specific needs of supplier and purchaser
  - May include other factors
- Spot
  - Open market bidding
- Sources of Information
  - Industry Publications
    - Coal Outlook
  - Public Utility Commissions
  - Energy Information Agency (US DOE)
  - UGSS
    - Commodity Surveys

Valuation Methods

Valuing the Property, not the Business

- Comparative Sales
- Royalty Analysis
- Operational Analysis (Residual)
- Mass Appraisal

Comparative Sales

Pros and cons

- **Advantages**
  - Government agencies generally prefer
  - Direct comparison easiest to present

- **Disadvantages**
  - Almost never any really comparable properties – particularly active mines or active reserves
  - Sufficient data may not be available
  - While some properties resemble others in some aspects, they may be extremely dissimilar in other aspects

Operational Analysis (Residual)

- Mine Life
- Annual Production
- Cash Flow
- Depreciation
- Gross Profit before Income tax
- Federal Taxes
- Net Income after Tax
- Capital Expenditures
- Sales per Year
- Sales Revenue

Operational Analysis (Residual)

Pros and Cons

- Advantages
  - Method used by most companies
  - Generally considered the preferred method of valuation
- Disadvantages
  - Requires significant information
    - Confidential company data
    - Many business assumptions
  - Time Consuming
  - Subject to considerable interpretation

Continuous Mining Machine

Royalty Analysis

Modified Operational Analysis

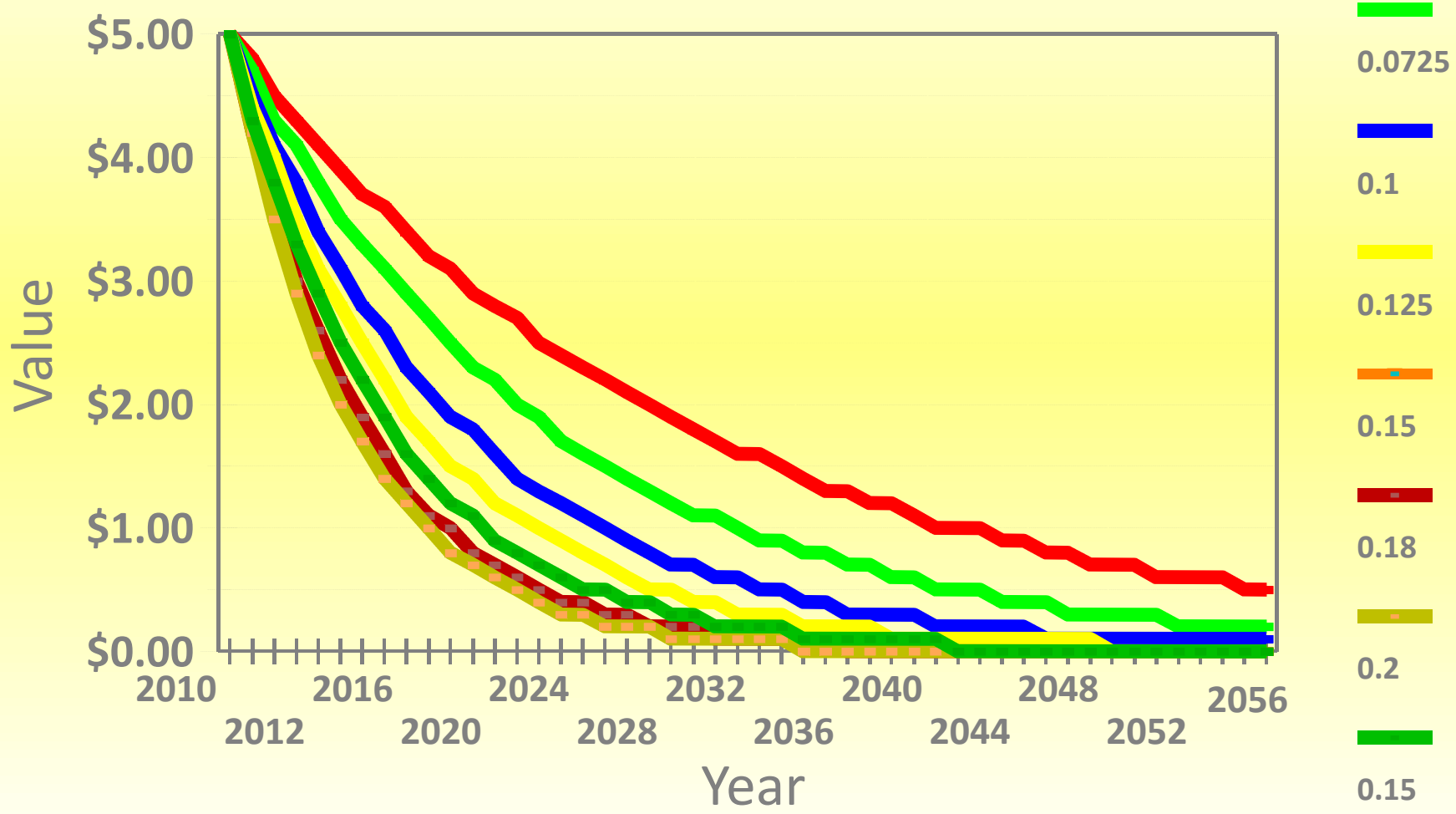
- Seams (deposit)
- Terms
- Selling Prices
- Royalty Payments
  - Advance Minimum royalty
  - Production royalty
- Monthly Production Reports/Estimates

Royalty Analysis

Advantages and Disadvantages

- Advantages
  - Market Driven
  - Comparisons easier
  - Relatively easy to compute
  - Based on common economic and appraisal principles
  - Focuses on resource in-place, not the business
  - Approximates the in-place value of the resource (represents what a will buyer pays a willing seller)
- Disadvantages
  - Not as property specific as operational analysis
  - Requires access to lease royalty comparisons

$5.00 Royalty


$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
Value
2010
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
2052
2056
Year
0.05
0.0725
0.1
0.125
0.15
0.18
0.2
0.15

Basic Valuation Principles

- Dollar today is worth more than a dollar tomorrow
- Principle of substitution appropriate
- Production will approximate optimal market absorption rate

Thick	25		2013	2014	2015	2016	2017	2018	Total		
Weight	2100									Per Acre	Per Ton
Acres	12.0	Mining	100,000	100,000	100,000	100,000	100,000		500,000		
Acres Mineable	11.2	Gross Income	$750,000	$750,000	$750,000	$750,000	$750,000	$250,000	$4,000,000		
Tons in Place	588,235										
Recovery Rate	0.85	Royalty	$37,500	$37,500	$37,500	$37,500	$37,500		$187,500		
Tons Producible	500,000										
		Cost	$1,072,500	$322,500	$322,500	$322,500	$322,500	$25,935	$2,362,500		
Price	$7.50										
Royalty %	5%	Net Operating Income	-$360,000	$390,000	$390,000	$390,000	$390,000	$224,065	$1,200,000		
Royalty $	$0.38										
		Present worth Calculation									
Start up Cost	$750,000	Royalty	$35,576	$32,018	$28,816	$25,935	$23,341	$0	$145,686	$12,140	$0.248
Operating Cost	43%	Business	-$331,904	$305,628	$259,784	$220,816	$187,694	$91,660	$642,018	$53,501	$1.091
	$3.23										
Equipment resale	$250,000	Total	-$296,328	$337,646	$288,600	$246,751	$211,035	$91,660	$787,704	$65,642	$1.339
Annual Production	100,000										
Discount Land	0.1										
Discount Business	0.15										

Processing

Coal Preparation

Lime Kiln

Questions and Answers

Night Ops