



Platt's 19th Annual Coal Properties And Investment Conference

**Export Growth, New International
Markets, and Regulatory Challenges**

Palm Beach Gardens, Florida
March 15 – 16, 2011

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Regional Coal Quality – Technical Issues Impacting Coal Finance And Investment

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Overview

◆ Stating the obvious –

**Both Lenders and Investors
Have Vested Interests In A
Coal Mine's Performance**



Overview

- ◆ Performance is judged against expectations.
- ◆ One of the expectations is that the coal produced will satisfy the requirements for its use.



Overview

- ◆ **Technical (quality) issues are key to satisfying such requirements.**



Overview

◆ Examples – (First)

- Unanticipated change in ash fusion temperature creates slagging in boilers.
- Utility requires corrective/remedial measures.
- Costs producer money.



Overview

◆ Examples – (Second)

- Unanticipated change in fluidity reduces coke oven performance.
- Coke maker requires corrective/remedial measures.
- Costs producer money.



Overview

◆ Examples – (Third)

- Unanticipated change in emission levels of (insert name of element) occurs by regulatory action.
- Renders coal unsuitable/too costly for use.
- Costs producer money.



Overview

◆ Examples – (Fourth)

- Any of the above or any other similar occurrence causes the loss of a sales agreement.
- Costs producer lots of money.



Overview

- ◆ **Impact Can Be Contractual or Regulatory**



Overview

◆ Key Word –

Unanticipated



Overview

◆ Key Result –

Costs Producer Money

◆ Further Key Result –

Costs Lender/Investor Money



Overview

◆ What To Do?

DUE DILIGENCE



Presentation Outline

- ◆ **Understanding Coal**
- ◆ **Key Quality Issues**
- ◆ **Regional Overview**
- ◆ **Notable Current Concerns**
- ◆ **Risk Avoidance**



Understanding Coal



Understanding Coal

- ◆ Coal often believed to be a relatively simple and homogeneous material.

NOT SO!



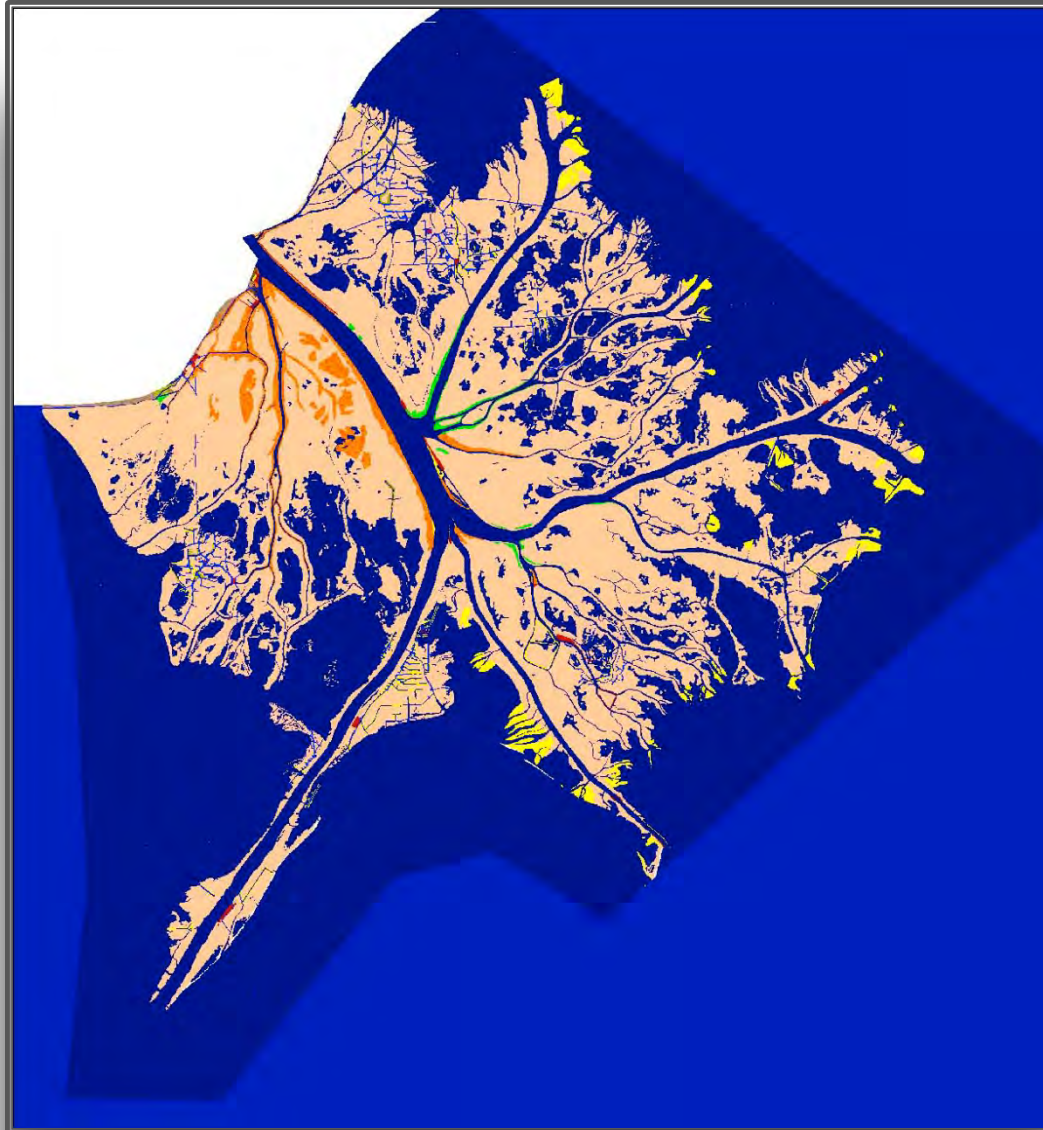
Understanding Coal

◆ Consider its origin –

A combustible rock comprised of metamorphosed plant remains and formed in swamps

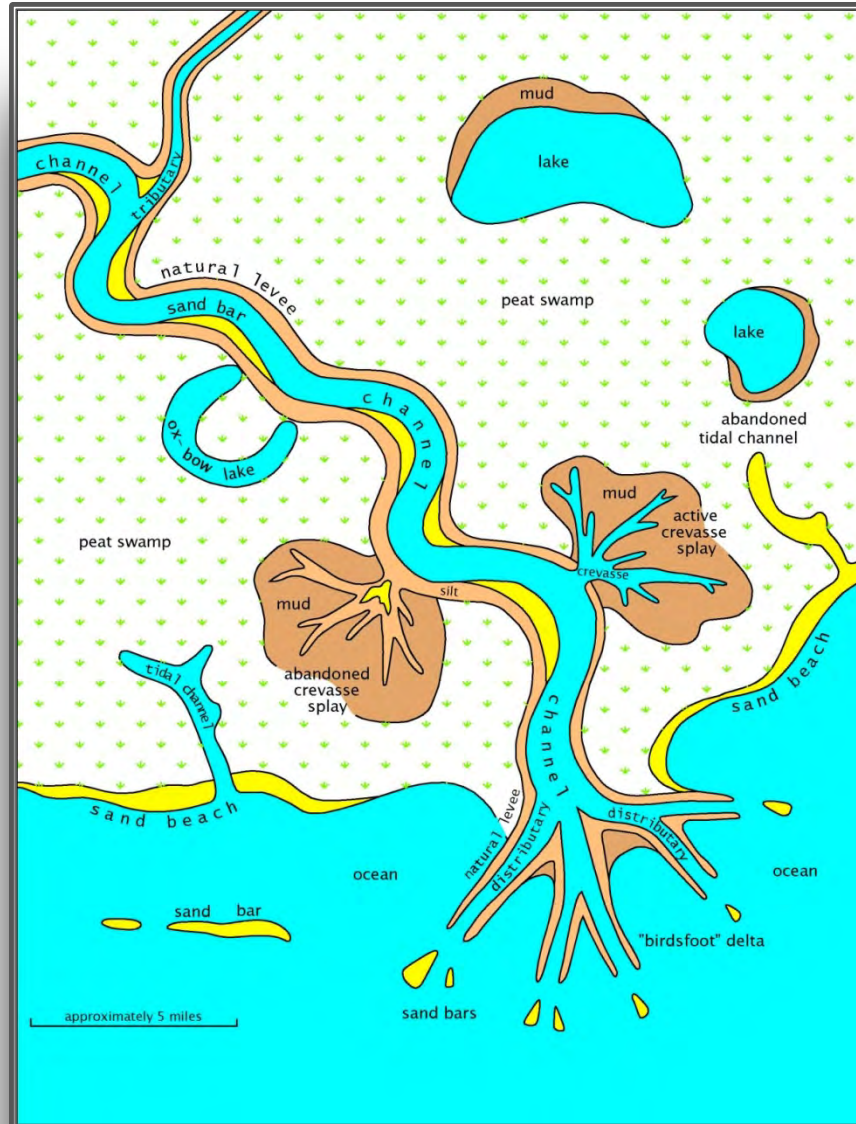


Mississippi River Delta





Idealized Fluvial System





Understanding Coal

- ◆ **Location within depositional system influences coal quality**
- ◆ **Nature of plant material influences coal quality**



Understanding Coal

What Does This Mean?



Understanding Coal

◆ From 30,000 Feet –

**All Coal Beds In A Region Do
Not Have The Same Quality**



Understanding Coal

◆ From 10,000 Feet –

**Any Given Coal Bed In A
Region Does Not Have The
Same Quality**



Understanding Coal

◆ From 1,000 Feet –

**Any Given Coal Bed On A
Property May Not Have The
Same Quality**



Understanding Coal

◆ From 100 Feet –

**Any Given Coal Bed In A Mine
May Not Have The Same
Quality**



Understanding Coal

Two Key Points

- ◆ **Quality Can Vary Horizontally**
- ◆ **Quality Can Vary Vertically**



Key Quality Issues



Key Quality Issues

◆ Thermal Coal – Basics

- Ash
- Sulfur
- Heat
- Volatile Matter
- Fixed Carbon



Key Quality Issues

◆ Thermal Coal – Physical

- Hardgrove Grindability
- Ash Fusion Temperature



Key Quality Issues

◆ Thermal Coal – Ash Chemistry

- Sodium
- Chlorine
- Mercury
- Selenium



Key Quality Issues

◆ Metallurgical Coal – Basics

- Moisture
- Ash
- Sulfur
- Volatile Matter
- Fixed Carbon



Key Quality Issues

◆ Metallurgical Coal – Physical

- Free Swelling Index
- Fluidity
- Reflectance
- Dilatation



Key Quality Issues

◆ Metallurgical Coal – Physical

- Oxidation
- Maceral Composition



Key Quality Issues

◆ Metallurgical Coal – Ash Chemistry

- Phosphorous
- Chlorine
- Sodium



Regional Overview



Regional Overview

- ◆ Coal is widely distributed in U.S.
- ◆ Deposits have been identified in 36 of the 48 contiguous states and in Alaska.
- ◆ During the past several decades, production has been reported in 27 states.

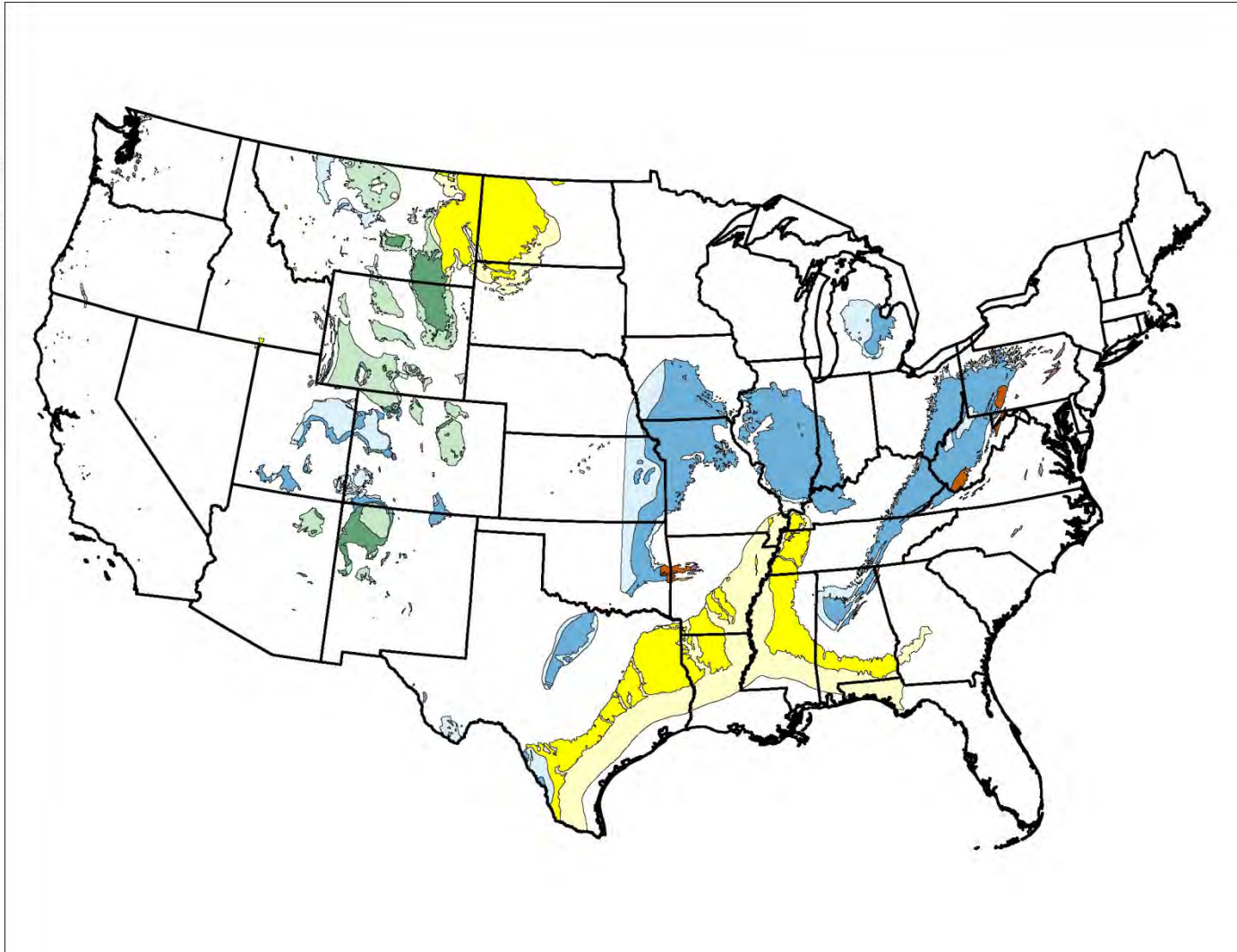


Regional Overview

- ◆ Production encompasses entire spectrum of coal rank from lignite to anthracite.
- ◆ Coal-producing areas in the U.S. subdivided on the basis of geology and geography into a variety of provinces, regions, and fields.



United States Coal Fields





Regional Overview

Principal Regions - Eastern U.S.

◆ Eastern Province

- Appalachian Region

◆ Interior Province

- Eastern Region (Illinois Basin)
- Western Region



Regional Overview

Principal Regions - Eastern U.S.

- ◆ **Gulf Coast Lignite Province**
 - Texas Region



Regional Overview

Principal Regions - Western U.S.

◆ Northern Great Plains Province

- Fort Union Region
- Powder River Region

◆ Rocky Mountain Province

- Green River Region
- Uinta Region
- San Juan River Region



Regional Overview

Principal Types and Uses

- ◆ **Northern Appalachian Region**
 - Bituminous
 - Generally high sulfur
 - Thermal coal predominantly
 - Modest metallurgical production



Regional Overview

Principal Types and Uses

- ◆ **Central Appalachian Region**
 - Bituminous
 - Generally low to medium sulfur
 - Thermal coal predominates, but
 - High quality metallurgical production is significant



Regional Overview

Principal Types and Uses

- ◆ **Southern Appalachian Region**
 - Bituminous
 - Generally low to medium sulfur
 - Thermal coal predominates
 - Has metallurgical production and potential



Regional Overview

Principal Types and Uses

- ◆ **Eastern Region (Illinois Basin)**
 - Bituminous
 - Generally high sulfur
 - Thermal coal
 - Has produced metallurgical coal but no longer competitive quality



Regional Overview

Principal Types and Uses

- ◆ **Western Region (Arkansas and Oklahoma)**
 - **Bituminous**
 - **Generally low sulfur**
 - **Contains high quality metallurgical coal but difficult mining conditions**
 - **May develop production**



Regional Overview

Principal Types and Uses

- ◆ **Western Region (Arkansas and Oklahoma)**
 - **Bituminous**
 - **Generally low sulfur**
 - **Contains high quality metallurgical coal but difficult mining conditions**
 - **May develop production**



Regional Overview

Principal Types and Uses

◆ Texas Region

- Lignite
- Thermal
- Mine mouth generating stations



Regional Overview

Principal Types and Uses

◆ Fort Union Region

- Lignite
- Thermal
- Mine mouth generating stations



Regional Overview

Principal Types and Uses

◆ Powder River Region

- Subbituminous
- Generally extremely low sulfur
- Thermal



Regional Overview

Principal Types and Uses

- ◆ **Rocky Mountain Province**
 - Subbituminous to bituminous
 - Generally low sulfur
 - Thermal



Examples of Notable Concerns



Notable Concerns

◆ Mercury

- Compliance will be required under the 2005 Clean Air Mercury Rule
- New standards expected to be issued this week



Notable Concerns

◆ Mercury (continued)

- Mercury content of coal varies widely across geographic regions
- Content is related to relative abundance of other elements such as chlorine and sulfur



Notable Concerns

◆ Mercury (continued)

- Association with other elements can influence mercury capture for various emission control technologies



Notable Concerns

◆ Selenium

- Concerns date to 1970's from fish kill resulting from coal ash entering lake in North Carolina
- Causes reproductive failure and physical deformities in aquatic wildlife



Notable Concerns

◆ Selenium (continued)

- Apparent relative increases observed in streams in NAPP and CAPP
- Clean-ups mandated and increased regulatory controls in-place in Mud River watershed in West Virginia



Notable Concerns

◆ Selenium (continued)

- Showing up downstream from coal ash disposal site along Ohio River
- Increased concentrations noted in water at site of ash disposal discharge at Kingston generating station



Notable Concerns

◆ Selenium (continued)

- Higher than average concentrations have been found in coal beds in a defined stratigraphic interval in NAPP and CAPP
- Uncertain whether source in streams is from overburden or coal beds or both



Notable Concerns

◆ Selenium (continued)

- Affecting discharge standards
- Increasing cost of regulatory compliance for some coal mine permits



Risk Avoidance



Risk Avoidance

◆ Know Potential Quality Issues and Concerns

- For region
- For property
- For markets to be served



Risk Avoidance

- ◆ **Emphasize quality during due diligence**
 - **Review analytic data to the same extent as reserve data**
 - **If insufficient data, require additional testing**



Risk Avoidance

◆ Rationalize Contract Specifications With Coal Quality

- Compare specs with analyses
- Investigate potential for quality excursions



Risk Avoidance

◆ Address in project economics

- Incorporate risk assessment
- Can cost be quantified



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