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Central Appalachia Coal The Future

What Coke Makers Want

- Coke makers seek the lowest cost to meet coke specifications
- Blend coals based on value in use to achieve lowest cost and minimize supply risks
- MV coals are in strong demand, LV use limited by oven wall pressure
- HVs are important components, particularly where by-product plants are in use

	Aust PLV	US LV	Aust PMV	HCC 64	Semi Hard	HV A	HV B	Semi Soft	
ТМ	10	9	9.5	9.5	<10	<9	<9	<9	
Ash	>10	<9	9.5	9.5	<10.5	<9	<9	<9	
CSR	>70	>67	>66	64	40-60	50-60	45-55	<40	
VM	19-21	19-21	22-26	25	19-33	29-34	32-38	34-38	
Sulfur	0.6	0.8	0.6	0.6	<1.0	<0.9	<1.3	0.6	
Fluidity	200-400	<100	>2000	1700	>200	30,000	25,000	>200	
% of PLV Price	100	97	>95	85-95	75-90	85-95	80-90	67-70	
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		LV		MV		HV	(Other	
Coke Blend		10-15%		40-50%		30%		5-10%	

CAPP, NAPP and SAPP Comparisons

- Southern Appalachian coals are most like Australian MV and LV coals
- CAPP and NAPP coals are high in sulfur
- US HV coals are not commonly found elsewhere

Volatile Type	Quality Parameter	Northern Appalachia	Central Appalachia	Southern Appalachia
	Ash Content (wt %)	8.5% - 10.5%	4% - 12%	8% - 10%
Low-Vol	Volatile Matter Content (wt %)	17% - 21%	15% - 21%	18% - 21%
Hard Coking	Sulfur Content (wt %)	1.1% - 1.4%	0.4% - 1.1%	0.5% - 0.6%
Coal	Gieseler Fluidity (ddpm)	< 50	50 - 500	700 - 2,000
	Reflectance	1.45 - 1.75	1.45 - 1.75	1.45 - 1.60
	Ash Content (wt %)	8.5% - 10.5%	5% - 9%	9% - 11%
Mid-Vol	Volatile Matter Content (wt %)	22% - 26%	22% - 27%	22% - 26%
Hard Coking	Sulfur Content (wt %)	1.0% - 1.2%	0.7% - 1.0%	0.7% - 1.0%
Coal	Gieseler Fluidity (ddpm)	700 - 4,000	500 - 7,000	1,000 - 8,000
	Reflectance	1.20 - 1.40	1.15 - 1.40	1 15 - 1.35
	Ash Content (wt %)	6% - 9%	5% - 9%	5% - 8%
High-Vol	Volatile Matter Content (wt %)	29% - 37.5%	29% - 36.0%	29% - 36%
Hard Coking	Sulfur Content (wt %)	0.9% - 1.8%	0.7% - 1.2%	0.5% - 1.2%
Coal	Gieseler Fluidity (ddpm)	15,000 - 45,000	15,000 - 30,000	20,000 - +100,000
	Reflectance	0.8 - 1.10	0.85 - 1.10	0.90 - 1.10

Typical North American coking coal

Typical Quality Trends

- As CSR increases, so does oven wall pressure
- Blending coals provides a lowest cost outcome to meet required coke quality





BLACKACRELLC Coking Coal Pricing

- Historically US coals are discounted to Australian coals
- Most Australian brands are not blends (although this is changing amongst tier two brands)
- Recently US LV and HV discounts have decreased
- Possibly due to larger volumes of Australian coal moving into the Chinese market.....where price floors are set by domestic coking coal prices



BLACKACRELLC Market Developments of the Past 5 Years

Shorter term contracts....Annual to quarterly to monthly (only partially successful thus far)

• Increase in index linked pricing

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• More market transparency/knowledge in pricing





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BLACKACRELLC W. Douglas Blackburn, Jr Challenges – Metallurgical Coal Costs Comparison

- Rail and Port charges have a significant impact on US competitiveness
- Australian miners have been effective at reducing costs



BLACKACRELLC Many US Mines are Currently Uneconomic



*Nomura's seaborne coking coal cost curve is constructed using direct operating cost and margin data compiled by Wood Mackenzie and applying a "quality adjustment based on our estimation of individual mines' coal characteristics and their relative market value.

Source: Wood Mackenzie, Nomura research

BLACKACRELLC Successful Cost Reduction in Australia

- Through shelving projects in development
- Production increases
- Focus on lowest cost production











Source: Company data, Nomura

*Note: AAL reported data is for combined met/thermal operations Source: Company data, Nomura W. Douglas Blackburn, Jr

Source: Company data, Nomura

Pricing Headwinds

- AUD weakness before significant market rebalancing
- New projects from Australia steamrolling onto the market
- Average production costs for new projects >\$120/t FOB



Source: Bloomberg, Nomura research

Global Met Coal Projects Currently under Construction

			Project Start Up	Production
Mine	Company	Country	Year	Capacity
Baralaba expansion	Cockatoo Coal	Australia	2014	3.5
Caval Ridge	BHP Billiton Mitsubishi Alliance (BMA)	Australia	2014	5.5
Ashton SEOC	Yancoal Australia	Australia	2015	2.4
Moatize II	Vale	Mozambique	2015	11.0
Grosvenor underground	Anglo American	Australia	2016	5.0
Appin Area 9	BHP Billiton	Australia	2016	3.5
Eagle Downs	Aquila Resources / Vale	Australia	2017	4.5
Total				35.4

Source: Company documents, BREE, and FBR Research

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North American Metallurgical Coal Regions and Ports



North America coking coal regions and ports

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CAPP Coal Prices and Labor Productivity by State



Changes in Annual Coal Production by State



Markets for Central Appalachian State Coal



US Coal Export Destinations

- Importance of Europe grows
- Competing with Australia, Indonesia and Mozambique to India and China difficult





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Power Plants Burning CAPP Coals – Retirement Plans



Central Appalachian Demand Vulnerability

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Percentage of Central Appalachian Coal by Type

• Met coal as a percentage is growing



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Central Appalachian Coal for Power Generation

• Shows Vulnerability to Market and Regulatory Changes



BLACKACRELLC Southern West Virginia Coal Utilization 2011

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Source: EIA (2012j).



Coal Production Trends 2001-2011

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BLACKACRELLC CAPP Metallurgical Coal Mining Complexes

Kanawha Boyd Cabell Nicholas Energy Putnam Clay dy-R COAL DOCKS Charleston, W\ DOCKS 25 km Nicholas WEST 8 Mammoth/Kanawha Energy VIRGINIA Kanawha Eagle High Panther Green Valley Boone Lincoln Maple Coal Samples Fayette **Open Fork** Mid **Midland Trails** Wayne Independence/Omar Elk Run Kingston Greenbrier Minerals **OW** Marfork Logan Wells Marginal Greenbrier Rocklick Mingo Logan County Martin Eagle Energy Magoffir Toney's Fork Snap Creek Mining Beckley **KENTUCKY** Wyoming Raleigh CSX. Hampden Coal Coal Mountain Left Fork Processing Cobra NR Monroe Summers Spring Fork Glen Alum Floyd To Hampton Roads hall Cobalt Coal Pinnacle Pike Apex Energ Bay Star Keystone Mercer Clintwood Elkhorn 2 Clintwood Elkhorn Wellmore Knott ⁴ Eckman Premier Elkhorn McDowell Buchanan NS Jewell Smokeless Buchanan Dickenson **Red Fox** Bland McClure Knox Creek Letcher Baltimore Wise Tazewell Red River (VA) Gardner Norton VIRGINIA umberland River Hampton -Harlan Moss-AREA Roads Wythe Russell OF Norton

Smyth

DETAIL

Atlantic

Ocean

Kanan

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CAPP coking coal complexes

A & G Coal