

PAH NEWS PIX

- XSTRATA WINS BID FOR LAS BAMBAS
- PERU TO AUCTION BAYOVAR, MICHQUILLAY
- OSM WANTS ABANDONED MINE LANDS PROGRAM REAUTHORIZED
- NORTH AMERICAN GOLD MINERS TO INCREASE EXPLORATION

CALENDAR

- **MINExpo 2004**
September 27–30, 2004
Las Vegas Convention Center
Las Vegas, Nevada
email: jnaccarato@heixpo.com
Visit PAH at Booth 1459
- **China Mining 2004**
Congress and Exhibition
November 15–18, 2004
Beijing Hotel and Conference Centre
Beijing, China
email: max.hare@china-mining.com
- **Mines & Money London 2004**
November 30 – December 2, 2004
London West Hotel and Convention Centre
London, United Kingdom
email: jane.burman@mining-journal.com
- **Northwest Mining Association's 110th Annual Meeting**
December 6–10, 2004
Red Lion Hotel at the Park
Spokane, Washington
email: -pheywood@nwma.org

Trends in U.S. Domestic Coal Markets Are Higher Prices and Higher Price Volatility Here to Stay?

Introduction

Coal prices, like the prices of most other commodities, have risen dramatically throughout 2003 and 2004. Of equal note, coal price volatility has also increased substantially.

Prices for coal are less transparent than prices for many other commodities such as natural gas and oil. This relative lack of transparency is due to a number of factors, which include a history of confidential bi-lateral agreements, a limited futures markets,¹ relatively low liquidity,² and, again compared to natural gas, oil, and other more transparent commodities, a relatively small dollar volume.³ As a result, reliable coal price data are difficult to obtain.

In order to provide such price data to clients, PAH compiles and maintains a proprietary

coal price history. These price series are so-called "consensus" histories, which aggregate coal price estimates from numerous sources, then combine them to form a consensus opinion. PAH's coal price series begins with January 1990 data and are continually updated. The series cover eight important U.S. domestic coals: NYMEX, Central Appalachian Compliance, Northern Appalachian, Illinois Basin, two specifications for Powder River Basin, Colorado, and Utah.⁴ Data are usually presented on a weekly or monthly basis.

A Perspective on Historical Coal Prices

Figure 1, page 2, is a graph of these price histories. Monthly coal prices are presented on a nominal dollars per ton basis.⁵ Three periods during the overall 1990 through 2004 time frame are notable.

¹ Coal futures are traded on only one commodity exchange, the New York Mercantile Exchange, or "NYMEX". Only one grade of coal, the eponymous "NYMEX" coal, is traded. The NYMEX futures contract is a contract for approximately one barge (1,550 tons) of 12,000 BTU/lb., <1.0% sulfur Central Appalachian coal delivered FOB barge at coal terminals near the confluence of the Big Sandy and Ohio Rivers. While the nominal volume is 1,550 tons, the contract is actually expressed in terms of millions of BTUs. Other coal quality specifications also apply.

² For example, on the NYMEX as of the end of trading on September 10, 2004, the so-called "open interest" or number of outstanding October 2004 futures contracts were: 157,307 for light sweet crude oil, 68,520 for natural gas, and 100 for coal.

³ According to recent Energy Information Agency data, U.S. consumptions of crude oil (equivalents), natural gas, and coal are about 7 billion barrels per year, 23 trillion cubic feet per year, and one billion tons per year, respectively. At current market prices, these volumes translate into annual dollar volumes of about \$300 billion, \$100 billion, and \$24 billion for crude oil, natural gas, and coal, respectively.

⁴ In addition to these coals, the price series for which are continually updated, PAH also has data archives that allow development of more limited price histories for other coals.

⁵ Different FOB points and specifications apply. Contact PAH for a complete description.

■ XSTRATA WINS BID FOR LAS BAMBAS

Switzerland's Xstrata had the winning bid in an auction to acquire Peru's Las Bambas copper deposit. Xstrata's bid of \$121 million was three times the base price of \$40 million. Rival offers came from Brazil's CVRD, Anglo-Australian miner BHP Billiton, and U.S. miner Phelps Dodge. One reason given for the high bid was the fact that there has not been much exploration in the metal commodities area over the past few years and there are not a huge number of major projects available for acquisition. Xstrata has six years to develop Las Bambas in southern Peru's Apurimac region, the country's poorest, and determine whether to build a mine. Las Bambas is 14,800 feet above sea level and consists of 79,000 acres. The potential open-pit copper mine is expected to produce more than 200,000 tonnes/year of copper in concentrate.

■ PERU TO AUCTION BAYOVAR, MICHICULLAY

The Peruvian government is expected to auction off two properties soon, the Bayovar phosphate project and the Michiquillay copper project. The Bayovar auction is expected to take place in December, but participating companies will decide the final schedule. Bayovar has an estimated mineable reserve of 816 million tonnes, equivalent to 262 million tonnes of rock phosphate at 30 percent phosphorus content. Potential reserves are estimated at 10 billion tonnes. The Michiquillay copper project has estimated reserves of 544 million tonnes with a grade of 0.69 percent copper as well as some gold and silver. It is located near Cajamarca in the northern Andes.

■ OSM WANTS ABANDONED MINE LANDS PROGRAM REAUTHORIZED

The Office of Surface Mining (OSM) has issued a warning regarding the consequences of not renewing the federal Abandoned Mine Lands (AML) program, which is expected to expire at the end of September. At the heart of the warning is the plan to shift more AML funding into the eastern United States, where most of the old mine sites are located but do not contribute proportionately to AML's per-ton production fee. In a letter to Congress, the OSM stated that more than \$2 billion worth of high priority coal reclamation in primacy states will remain unreclaimed if the AML is not renewed, leaving millions of people who live, work and recreate in the national's coal fields to continue to be exposed to the many dangers these areas present.

The first of these is the period from January 1990 through the middle of 2000. As can be seen in Figure 1, prices were virtually flat during this period. This lack of price movement is somewhat surprising, given that a number of significant changes in coal markets occurred during this time period. U.S. coal demand continued to grow. Both Phase I and Phase II of the 1990 Clean Air Act Amendments were implemented. Major shifts in regional production occurred, as western producers, particularly Powder River Basin (PRB) producers, gained significant market share. Overall productivity continued to increase.

The second period of note is roughly the year 2001. Early in that year, prices for all coals increased sharply, peaking during the summer months, and then fell almost as precipitously. Figure 2 presents a slightly different perspective on these price increases. In this figure, relative coal price movements are highlighted by presenting coal price data on an index basis. The graph shows changes in coal prices from their respective January 1990 levels, i.e., January 1990 = 100.

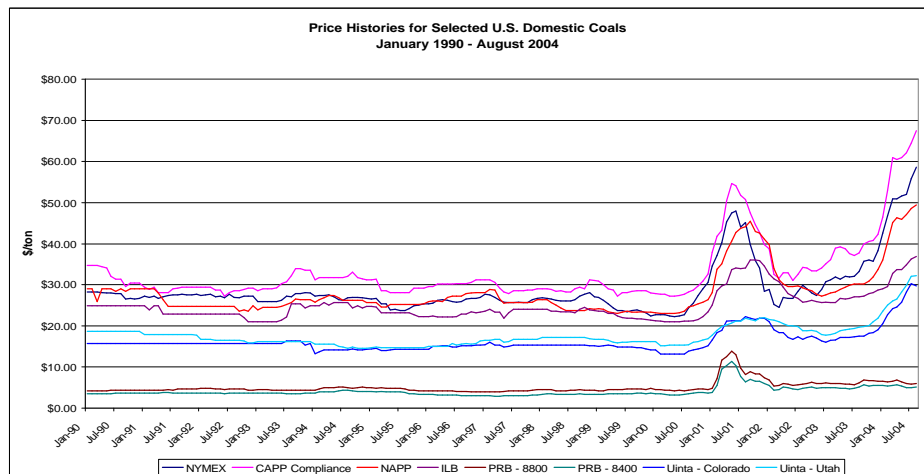
Figure 2 shows that in early 2001 prices for all coals were at or slightly below their January 1990 levels. Less than six months later, PRB prices had increased

to over three times their January 2001 levels. Prices for bituminous coals had increased by over 100%. Prices then plummeted. By January 2002, the prices for PRB coal were only about 20% above their January 2001 levels. Prices for the various bituminous coals retreated even further. By January 2002 they were, in some cases, back to their January 2001 levels.

Many reasons have been advanced for the behavior of coal prices in 2001. The so-called "perfect storm" theory suggests that the price run-up was due to a convergence of numerous events. High coal demand caused by the California electricity crisis, high prices for alternative fuels such as natural gas, low hydroelectric supply due to drought in the Pacific Northwest, and little available nuclear capacity, collided with constrained supply due to years of under-investment, in turn a factor of the sustained low prices discussed above. The "perfect calm," a reversal of some, but not all, of these factors, then resulted in the rapid price decreases. Suggestions that markets were manipulated, particularly by non-producers, have been made, but never proven.

The third period of note is the latest year to eighteen months, roughly the period from January 2003 to present. As noted at the outset of this article,

Figure 1
Coal Price Histories for Selected U.S. Domestic Coals
January 1990 – August 2004



this period has seen a sustained rise in bituminous coal prices. PRB prices, which did not fall as far from their 2001 peaks as bituminous coal prices, have not risen as dramatically, so that bituminous and sub-bituminous coal prices are, relative to their January 1990 base, both approximately 50% to 100% higher.

Most industry observers believe that the price increases in this most recent period are different than the price increases that took place in 2001. According to this school of thought, eastern bituminous coal price increases have been caused by several factors that are not likely to change in the near future. These include high demand due to high natural gas prices, continuing environmental and permitting problems in eastern coal fields, closure due to bankruptcy of many marginal mines, and a resurgence in metallurgical coal exports due to increased global demand, particularly from developing countries such as China and India. In response, western bituminous coal prices have also increased, as western bituminous coal, particularly Colorado coal, has moved into traditional eastern market to fill the gap created by the factors mentioned above. This same school of thought holds that the relative price stability of PRB coals is due to the fact that these factors have not affected sub-bituminous markets in similar ways.

Some Thoughts Associated with Future Coal Price Trends

PAH forecasts coal prices using several different methodologies. These include regional supply/demand studies with attendant cost curves, univariate ARIMA models, and scenario analysis. The discussion that follows is an abbreviated example of the last of these methodologies, scenario analysis.

None of the factors underlying the recent increases in coal prices appears likely to change soon. Although natural gas prices have ameliorated, they remain quite high compared to coal prices. Eastern coal fields are unlikely to sharply increase production. International metallurgical coal demand is not likely to significantly decline. Although a number of new metallurgical coal mines, primarily in Australia and Canada, are slated to begin production soon, these mines may serve only to satisfy additional emerging demand, not fundamentally alter the existing supply/demand (im)balance. As a result, then, many industry observers believe that the current increase in coal prices may be considerably more sustained than the 2001 price spike.

Coal Price Volatility

The behavior of coal prices has been mirrored by the behavior of coal price volatility. The term "price volatility" is

■ NORTH AMERICAN GOLD MINERS TO INCREASE EXPLORATION

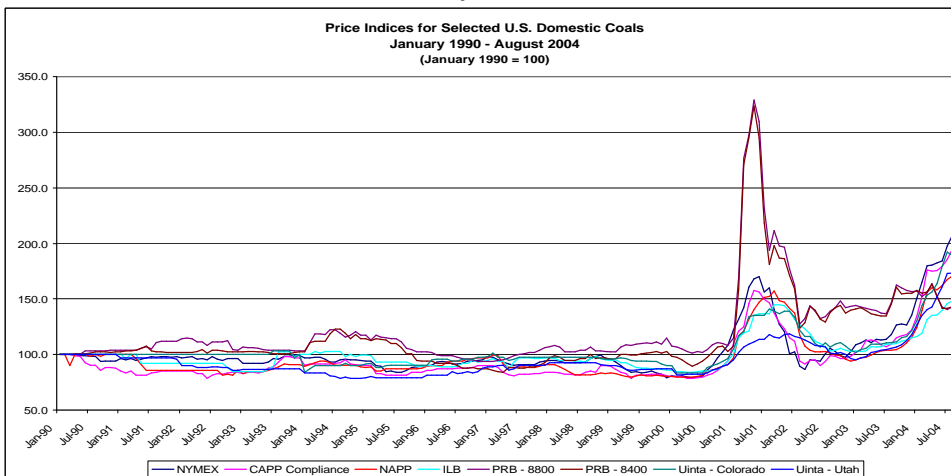
North America's gold miners are taking advantage of a strong bullion price to spend more money on exploration. Exploration budgets have been increasing over the past several years, up 20 percent in the second quarter and up 75 percent from two years ago. Cash flow increases when gold prices rise and as a result, miners can afford to spend more. North America's 11 biggest gold miners increased their expensed exploration budgets to \$28 an ounce in the April-June quarter, the highest since 1996. The per ounce measure takes the dollar set aside by miners for exploration in a quarter and then divides that figure by the ounces of gold that they mined and sold in that period. Placer Dome was the biggest spender in exploration, spending \$38 an ounce and Newmont Mining spent \$29 per ounce.

Minerals Corner—

Burbankite (Na, Ca)₃(Sr, Ba, Ce)₃(CO₃)₅, Sodium Calcium Strontium Barium Cerium Carbonate

Burbankite is a strontium and cerium carbonate mineral and is so rare it is not considered a mainstream gemstone. Burbankite's crystal habit is similar to apatite but its color (pale yellow, pale orange, beige, white and colorless with some color zoning) and size are generally quite different. Burbankite's hexagonal crystals are typically quite small but well formed and make good micromounts. This mineral is enriched in rare elements such as strontium, barium and cerium. Burbankite is found in Mont Saint-Hilaire, Quebec and Chapman Lake, Ontario, Canada; Khibina, Kola Peninsula, Russia; and the type locality Vermiculite Prospects, Big Sandy Creek, Hill County, Montana, USA. The North American record holder for this species is a large 6.62 carat orange stone cut from Mont Saint-Hilaire. Burbankite was named in 1955 for U.S. geologist Wilbur Sweet Burbank.

Figure 2
Coal Price Histories for Selected U.S. Domestic Coals
January 1990 = 100



used to describe price fluctuations of a commodity. More specifically, price volatility is a function of the standard deviation of price movements. Because standard deviation, in turn, is measures the breadth of price changes, higher price volatility results when prices increase and decrease relatively rapidly and in differing amounts. Note, for example, that the price volatility of a commodity whose price increases at a constant rate and the price volatility of commodity whose price is high, but unchanging, are both zero.

Since price is a function of supply and demand, it follows that price volatility is a result of the underlying supply/ demand characteristics of the market. Therefore, high levels of volatility reflect high levels of uncertainty regarding supply and demand.⁶

Prices of energy commodities are usually more volatile than the prices of other

commodities due to consumers' relative inability to alter near term consumption.⁷ This generalization is clearly true for coal markets. With coal-fired generation comprising over 50% of U.S. electricity generation and alternative sources of generation either operating at capacity, e.g., nuclear and hydro, or relatively high priced, e.g., natural gas, electricity producers are somewhat constrained in their ability to dramatically reduce coal consumption in response to higher prices.

These statements are borne out by actual coal price volatility data. Using the same series of coal prices discussed above, PAH calculated coal price volatilities for each of the years 1990 through 2004. Figure 3 presents these data.

Coal price volatilities were generally in the single digit range, a level regarded as low, during the 1990s and 2000.

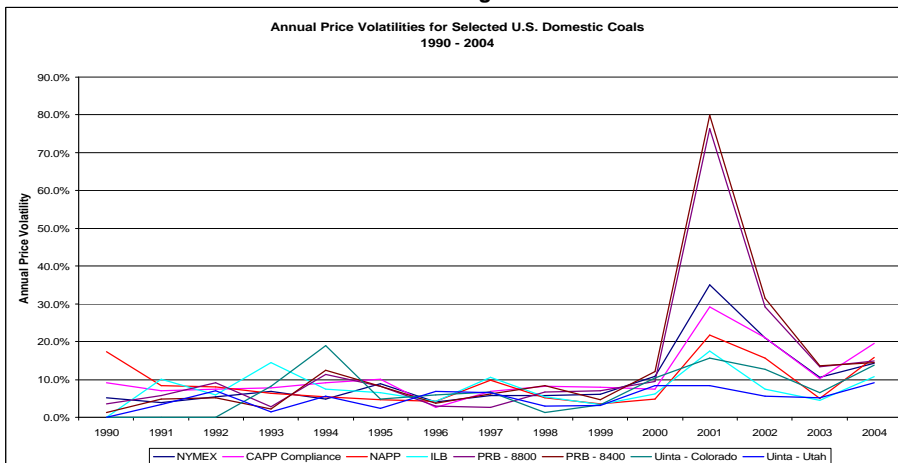
The jump in coal prices during 2001 described above coincided with a sharp increase in coal price volatility. (As mentioned above, an increase in prices does not necessarily result in an increase in price volatility nor do high prices by themselves mandate high price volatility.) Although coal price volatilities have retreated from their 2001 highs, they remain substantially higher than they were prior to the 2001 price spike.

PAH believes that coal price volatilities are likely to remain high. Again, this forecast is fundamentally different than the conclusion reached above, i.e., that coal prices themselves are likely to remain high. Our forecast of continued high price volatility is based on the prospects for continued uncertainty in coal markets. This uncertainty results from many of the same factors discussed above, i.e., the impact of foreign metallurgical coal demand, environmental and permitting constraints, producer financial considerations, etc. In addition, however, events that do not fundamentally alter the supply/demand balance but do affect short-term market activity, most notably transportation disruptions, can also contribute to high price volatility.

PAH concludes, therefore, that the low prices and low price volatilities that characterized coal markets during the 1990s are unlikely to be seen again soon. The coal markets of the future will likely be higher priced and change more rapidly and dramatically than they did in the past.

This month's article was provided by Casey J. Kaptur, Senior Financial Analyst – Coal and Energy casey.kaptur@pincock.com

Figure 3
Annual Coal Price Volatility for Selected U.S. Domestic Coals
1990 through 2004



⁶ http://tonto.eia.gov/oog/info/ngw/historical/2003/10_23/Volatility%2010-22-03.htm

⁷ *ibid.*



PINCOCK ALLEN & HOLT
Delivering smarter solutions

Pincock, Allen & Holt is a consulting and engineering firm serving the international mineral resource industry. Your comments and suggestions are always welcome. Contact Pincock, Allen & Holt • 274 Union Blvd., Suite. 200, Lakewood, Colorado 80228 • TEL 303.986.6950 • FAX 303.987.8907 • www.pincock.com. Pincock Perspectives is published as a free information service for friends and clients. Information for News Pix is paraphrased from various sources; references available upon request.