Barite & The Future Bull Market

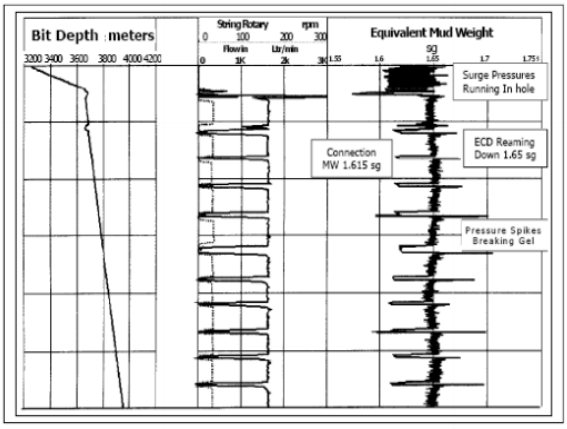
Critical Strategic Mineral

The following is a basic analysis on Chinese oil and gas companies from publicly released data. This analysis is pointing towards a bullish trend as it relates to Chinese barite supply and demand over the next four years. China is the largest barite supplier to world markets.

This analysis should set off alarm bells for barite consumers and afford investors an opportunity to position themselves - within the barite miners space - for a long term growth period.

Currently worldwide barite exploration and mine development has hit a low point with many mines shutting down. This is because the barite mining business tracks the cycles of the oil and gas industry. When the oil and gas sectors recover, expect to see a tightening of supply. When the energy sector fully recovers; expect major shortages of quality barite supply across the globe.

This analysis is only looking at shale gas development in China. It is not considering the expected 61% increase in conventional and coal bed methane gas production in China by 2020 projected by the National Development and Reform Commission (NDRC) http://www.oilandgas360.com/china-sees-falling-crude-rising-natgas-production-2020/. Obviously, this will have an additional impact to the barite supply demand dynamics in China.



Currently shale gas wells in China can consume 1000 tonnes to 2000 tonnes of barite on a single well.

"Shale gas wells in China are tough, deep wells, usually horizontal and can be complex to drill. They have challenges with losses, high pressures, wide temperature ranges from surface to TD. The drilling fluids employed are both water base muds & oil base muds but increasingly water base muds for less environmental impact. Barite (weighting agents) in drilling fluids pulverize to sub-colloidal size in directional wells due to string mechanical forces on the low side. They are not salvageable; solids control equipment cannot process them – so they simply must be discarded and replaced. This Barite attrition will mean reduction by using multi pad drilling and reuse with barite recovery techniques have technical

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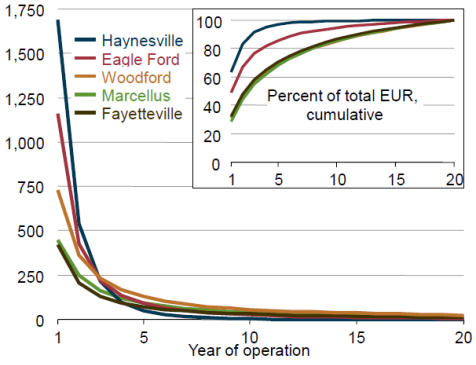
limits. If the well count goes up, barite consumption will follow." (David J Lawson, Business Development Manager Vertechs Oil & Gas Technology Co., Ltd. Chengdu, China)

Based on PetroChina's current production from +-3,500m deep wells (not including horizontal section), they are producing 2.3BCM per year of shale gas from 120 wells (6,301,369 CM/day). That is equivalent to 222,530,986 CF per day which is 222.5 MMCF per Day. 120 wells is equivalent to 1.85 MMCF per day per well. I will use this number as a base line for the analysis. In British Columbia, the average daily production rate is 2.2 MMCF/Day. The decline rates are variable depending on the geological formations. Chinese shale gas formation should have similar decline rates as US fields. For this analysis, I am using 1.85 MMCF/Day average over 4 years of production.

Figure 54. Average production profiles for shale gas wells in major U.S. shale plays by years of operation (million cubic feet per year)



Petro China has stated that it will be producing 10 BCM/yr by 2020.

"PetroChina last year produced 2.3 bcm of shale gas in Sichuan province, mostly from 120 production wells in the Changning-Weiyuan pilot zone, Xinhua said. It also laid 220 kilometres of pipelines.

For 2017, the state oil and gas company plans 19 new rigs to drill 110 wells in the area, part of a total 600 wells planned over the coming four years, Xinhua said."

http://www.rigzone.com/news/oil_gas/a/148254/Petrochina_Aims_To_Meet_A_Third_Of_Chinas_Shale_Gas_Target_By_2020

The Chinese Government has set their goal to producing 30 BCM (2,903 MMCF/Day) by 2020. Based on this analysis the Chinese will require to drill upwards of 1,565 wells per year by 2020 based on 1.85 MMCF per well. I do not know what percentage of these wells will end up being plugged and abandoned, I will assume that 5% of these wells will be dry holes. This will result in 78 dry wells in addition to the 1,565 wells for a total of 1,643 wells drilled per year. With this analysis, I will assume a conservative constant of 411 wells drilled per year. This is low consider the production of 0.5 Bcf per day required 120 wells per year drilled, as quoted below.

"China has been among the first countries outside of North America to develop shale resources. In the past five years, China has drilled more than 600* shale gas wells and produced 0.5 Bcf/d of shale gas as of 2015. Shale gas is projected to account for more than 40% of the country's total natural gas production by 2040, which would make China the second-largest shale gas producer in the world after the United States (EIA)."

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During 2015, world barite production was 7,460,000 tonnes, China produced 3,000,000 tonnes (40%), consumed 1,450,000 tonnes of barite (19% world production) and exported 1,550,000 tonnes (21%). USGS

It took China approximately 5 years to drill the first 600* wells; 120 wells per year = 120,000 tonnes of barite per year for shale gas drilling (based on 1,000 tonnes ba/well). Therefore all "Other" conventional oil & gas, coal bed methane and industrial applications consumed 1,330,000 tonnes in 2015.

If China increases domestic barite consumption at a rate of 5% per year with "Other" non-shale gas barite consumption. The result will be 1,633,707 tonnes/year of barite consumption by 2020. Drilling requirements in 2020 will be 1,643 shale gas wells per year to maintain 30BCM/yr of gas production. This will result in consumption of barite at approximately 1,643,478 tonnes per year. Thus, by 2020 my estimates show that China will be consuming 3,277,186 tonnes of barite per year.

China's barite mine production has consistently been declining since the peak in 2011/2012 when they produced 51% of the worlds production at 4,000,000 tonnes per year. To put this into perspective, this production rate is equivalent to 20 large Nevada open pit mines. China has been declining in production from 2011 to 2015 at a rate of 8% per year.

An aerial photo taken on Jan. 24, 2017 shows Jiaoye-84 shale gas platform in Fuling, southwest China's Chongqing. The shale gas field here, a project of China's largest refiner Sinopec, produced more than 5 billion cubic meters of gas in 2016. (Xinhua/Liu Chan)

Assuming this trend does not correct itself and due to current lower world demand we will project a 5% decrease in production per year from 2015 to 2020.

As a result, the 2020 production rate in China is estimated at 2,321,343 tonnes Ba per year and the shale gas barite consumption rate at 1,643,478 tonnes per year. China may need to import 955,843 tonnes of barite per year in 2020 to meet the 3,277,186 tonnes of total domestic demand.

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The barite market moving forward into 2020 will become very volatile due to the China factor and the recovery of the oil and gas industry. Securing barite supply will become more critical and a major priority for all energy service companies and industrial barite consumers.

During 1980, Western Canada experienced a barite supply shortage. The result was that energy service companies who were unable to have a proven stockpile of barite - could not secure drilling fluid contracts.

The five-year outlook for barite supply and demand points to major shortages that can not be corrected unless substantial investment is made into exploration and development of barite resources in the immediate future.

The reality is that investment will not be injected in time to prevent major supply shortages. The barite market is on the verge of a major boom for barite mining companies.

Investors should consider getting exposure to barite miners for growth portfolios'. The gains, due to the apparent near term shortages, could be substantial.

Brent Willis, BSc.Eng

COO, Voyageur Minerals Ltd. VM:TSXV

About the author: *Mr. Brent Willis has a degree in Petroleum Engineering, extensive experience in the drilling fluid business and over 20 years' experience in the barite industry.*