

Molybdenum Supply Forecasting

October 2009 Update

The original of this paper was published as an article in the July of 2007 issue of “Mining Engineering” magazine. An update was written in the fall of 2008 and this is another update written in the fall of 2009. The major developments of the past year affecting markets, existing production, and potential new mines are listed below followed by the article which has been updated to reflect the new information.

Recent Developments – 2008 & 2009

China Uncertainty Dominates Molybdenum Markets

Molybdenum producers and developers have been on a roller coaster ride for the past year. Between 2004 and 2008, molybdenum (moly) prices seemed to have found a home in the US\$30 to US\$35 per pound range. And even as most other base metals went into freefall during the summer of 2008, moly prices held. However, as fears of world recession or depression spread in late October of 2008, the bottom dropped out. Moly prices fell swiftly through US\$20 all the way to less than US\$8 per lb.

During the summer of 2009, moly prices rebounded north of \$18 per pound as Chinese exports fell dramatically and imports expanded. Then late in the summer, buying out of China dried up and prices began to weaken. As this is being written, prices have come down to the \$11 per pound range.

Outside of the overall economic disaster of the past year, what are the specifics that have affected moly? This article will attempt to have a few answers and observations that may help moly producers, moly project developers, and investors in moly stocks chart a rational course.

Before we get to specifics, the reader needs to understand that one of the factors affecting market forecasting is a lack of confidence in the reliability of production and sales information coming out of China. Since China accounts for 30 percent of world production (at a minimum), forecasting world supply and demand for moly will continue to be a difficult and frustrating task. This uncertainty is illustrated by looking at two sources of China moly production data for 2008. The Minerals Information Office of the USGS reports China moly production at 132 million pounds. However, Ryan’s Notes, a market newsletter, reported 2008 production at 180 million pounds, a difference of 36 percent.

2008: Overall world production in 2008 is estimated at 467 million pounds, a 5 million pound increase over 2007. This record production reflects the price strength of the prior 5 years. There was a very quick and large market price fall in October of 2008, all the way from over \$30 per pound down to less than \$8 per pound. Why the sudden price break?

About 80% of world moly production is consumed in the steel industry to make high-strength steel. Moly is bought primarily by steel mills in anticipation of, or as a result of, orders for specific projects. With high world economic growth, steel mill operators had been quite confident of a smooth stream of orders. So these mills kept relatively large inventories of moly

and other commodities so they could be assured of their ability to meet demand and maintain market share. However, as the U.S. credit crisis spread around the world and fears of a world recession grew, there was a new level of uncertainty surrounding future projects. So steel mills just stopped ordering moly and even cancelled some orders already placed. This meant steel mills would not be ordering moly until they had consumed their inventory and the order flow picked up. This left many moly traders with unsold inventory, most of which was financed with bank credit lines. Panic selling set in as the credit lines were called in by banks which were fighting their own battles for survival. So the sell-off in moly was quick and ugly.

Another factor may have intensified the sell-off. There is currently no futures market for moly, so prices are determined by current trades between consumers, producers and some traders. The published market price for moly is based largely on anecdotal reports of trades by a few trusted sources, not on any exchange traded index. There is no buffering of pricing that might be expected if futures contracts were available for trading.

2009: World production in 2009 is estimated at 424 million pounds, 41 million pounds (9%) less than 2008. Primary producers made substantial cutbacks, and did so more quickly than has been typical for mineral producers in the past. Mines have become more automated and can react more quickly to market changes. Mine productivity has increased dramatically over the past 20 years so production cutbacks can be accomplished without the loss of large numbers of key personnel. The largest producer, Freeport's Henderson Mine, produced 40 million pounds in 2008, but within days of the price collapse in late 2008, Freeport announced Henderson would be cut back to 60 percent of its capacity. Freeport also quickly announced suspension of the reopening of the Climax Mine, even though close to \$200 million of the \$500 million required to reopen the mine had already been committed.

In the spring of 2009, demand in Europe and North America began to pick up as steel mills finally worked through most of their stocks of moly and the order stream began to pick up. During the winter of 2008 – 2009 most mills were operating at something under 50% of capacity, when before the crash, most were operating at above 85% of capacity.

Production in China is estimated to be reduced in 2009 by 30 million pounds, mostly from high cost producers where some observers estimate the cost of production at about \$13 per pound. This may be an indication that long term moly prices might stabilize at something above \$13 per pound. The price rebound in 2009 has been attributed to mine closures in China and strong demand from Chinese buyers. The big question has been whether Chinese buyers have been building inventories or actually consuming the metal. In the first half of 2009, China was a net importer of 35 million pounds as compared to net exports of 25 million pounds in the first half of 2008.

Anecdotal evidence suggests inventories were being built as Chinese consumers were apparently taking advantage of what they perceived to be low prices for moly. The price decline this fall is partially attributed to the fear that these stocks will come back in to the market soon.

2010: Increased production from copper mines that produce moly as a byproduct is forecast to increase world production to an estimated 471 million pounds in 2010, an increase of an estimated 10 percent over 2009. This would surpass the previous record of 467 million pounds produced in 2008. The byproduct producers are more sensitive to copper prices, which are currently strong. While they may be able to stockpile moly production if moly prices weaken substantially, the incentive is to go ahead and sell the moly, no matter the price. The largest

increases will come from Anglo/Extrata's Collahuasi Mine (from 7 to 13 million pounds), Mercator Mineral's Mineral Park Mine (10 million pounds of new production), and Rio Tinto's Bingham Canyon Mine (from 23 to 30 million pounds). The demand for moly is not expected to keep pace with this estimated production increase. Unless primary producers reduce even more than has already been done, oversupply conditions may dominate the market for the next couple of years.

Significant Project News of the Past Year

Climax & Henderson Mines: In early November of 2008, Freeport announced its intention to delay construction at Climax and reduce production at its Henderson Mine by 10 million pounds per year. Earlier, Freeport had committed US\$500 million to reopen the Climax mine. Mill testing was scheduled for the fourth quarter of 2009, and 2010 production was estimated at 28 million pounds. Announced full capacity is 30 million pounds per year, or about 6% of world production. Approximately \$200 million of the \$500 million cost was committed before the decision to delay construction was made.

Many industry observers believe Freeport will use the Climax and Henderson mines to meter production to levels that maintain good market prices. Together, Freeport's Climax and Henderson mines could produce about 70 million lbs. per year, or about 15% of world production (also located in Colorado, Henderson is the world's largest primary producer of molybdenum). Freeport's choice is to either produce at high levels and get depressed prices, or cut back production to preserve its assets and get higher prices in the long term. Obviously, Freeport has made the decision to reduce moly production in the short term.

Metering production at these mines is relatively easy as they are primary moly producers. It is more difficult to meter production at copper mines where moly is a byproduct. Freeport says that Climax production could be doubled to 60 million lbs. moly per year if market conditions warrant, though many market observers believe the odds of this expansion going forward are low. Their view is that Freeport is "saber-rattling" to discourage the opening of other large primary moly mines. Even though prices have rebounded in 2009, as of this writing, there has been no announcement by Freeport that the Climax Mine will be reopened in the near future. It will take about 18 months to reopen the mine once Freeport decides to restart construction.

Spinefex Ridge: Moly Mines of Australia announced recently that Hanlong Mining Investment of China had committed to US\$700 million in debt and equity financing for the development of the Spinefex Ridge moly/copper project. Although the Spinefex Ridge resource might technically be called a byproduct producer, the copper grade is low at only 0.08 percent and the copper represents only a small percentage of the ore's value. So the project should be viewed as a primary moly producer with minor copper credits. Originally planned as a 20 million tonnes per year operation with an estimated CAPEX of US\$1.1 billion, a revised plan developed over the summer of 2009 calls for a 10 million tonnes per year operation with an estimated CAPEX of US\$553 million. This announcement is significant on a number of levels.

- 1) It indicates Chinese moly consumers may be concerned about the ability of Chinese producers to meet expected Chinese demand.
- 2) The investment by Hanlong may also be a result of the China's need to purchase hard assets with its large reserves of US currency, which may see significant depreciation in the years ahead.

3) In their August 2009 updated 43-101 report on Spinefex, Moly Mines expressed the view that the high cost smaller moly mines in China that had closed in late 2008 and early 2009, would not reopen even if moly prices increased. While no verification of this is available, it is significant that it is expressed in a document that was presumably written during a time when the company was in deep negotiations with a Chinese partner.

4) With a moly equivalent grade of 0.063 percent, the Spinefex Ridge resource is only 60 percent of the average grade of existing surface moly producers. And of the 46 relatively advanced potential new moly primary or byproduct mines, it has the sixth lowest grade. While ore grade is only one factor in the determination of whether a resource will be economic, it is certainly one of the most important.

5) In its revised planning, Moly Mines uses long term moly and copper price forecasts of \$20 and \$12.60 per pound respectively. It is presumed Hanlon would not have invested \$700 million with Moly Mines if Hanlong believed these price forecasts to be too optimistic.

Mt. Hope: General Moly has been working toward bringing its Mt. Hope project in central Nevada into production by late 2010 or early 2011. The company says the project will produce 40 million lbs. per year for its first five years, and capital costs are estimated at more than US\$1 billion. As is the case with Climax, this production may create an oversupply situation. However, unlike Climax, where Freeport has the financial strength and the market presence to meter production, it is likely Mt. Hope will be highly leveraged, thus making it difficult for General Moly to reduce production in the face of market surpluses. Because of the recent price volatility, General Moly has placed the project on hold.

CUMO: Mosquito Consolidated Gold Mines' CUMO project is a relatively new, but large and high grade moly project in Idaho. Drilling and a Scoping Study identified a 600 million tonne indicated resource grading 0.11 percent moly and 0.06% copper for a resulting moly equivalent grade of 0.12 percent. The project's estimated startup costs including mill and pre-stripping is US\$2.2 billion at a production rate of 91,000 tonnes per day, and cash costs are estimated at US\$3.90 per pound of moly equivalent. If these numbers are confirmed by a detailed feasibility study, the CUMO project should be more attractive than most any of the other potential new moly projects that might come on stream in the next 10 years except for possibly the reopening of the Climax Mine in Colorado. Of course raising \$2.2 billion will be a challenge as will permitting such a large mine in Idaho.

Chile: In Chile, molybdenum production of state-owned Codelco is forecast to be much reduced in 2008 and 2009 due to lower moly grades in their copper-moly operations. Codelco produced 68 million pounds of moly in 2006, 60 million lbs. in 2007, and only 46 million pounds in 2008. Its Chuquicamata Mine, at 29 million pounds in 2008, is expected to maintain and grow its production slightly over the next 10 years. Its Salvador Mine, currently producing 3 million pounds per year, is expected to cease production after 2011. Its Andina Mine is expected to increase moly production from 5 million pounds in 2008 to 12 million pounds by 2015.

China: The Chinese economy has grown at annual rates near 10% for the past 20 years. Data from the U.S. Geological Survey indicate that 2007 moly production in China increased by 36% over 2006, up 35 million lbs. to 132 million lbs. In 2008, China's moly production is estimated at 170 million pounds, a 29% increase. With the price weakness in 2009, and the closure of many small and high cost mines, production in 2009 is estimated at 140 million pounds. All of these numbers need to be viewed with a large amount of skepticism as the data cannot be verified by reliable or independent sources. Because of this uncertainty, and the fact that China now

accounts for about 30 percent of world molybdenum production, the overall reliability of world production and consumption forecasts is much less than might otherwise be the case.

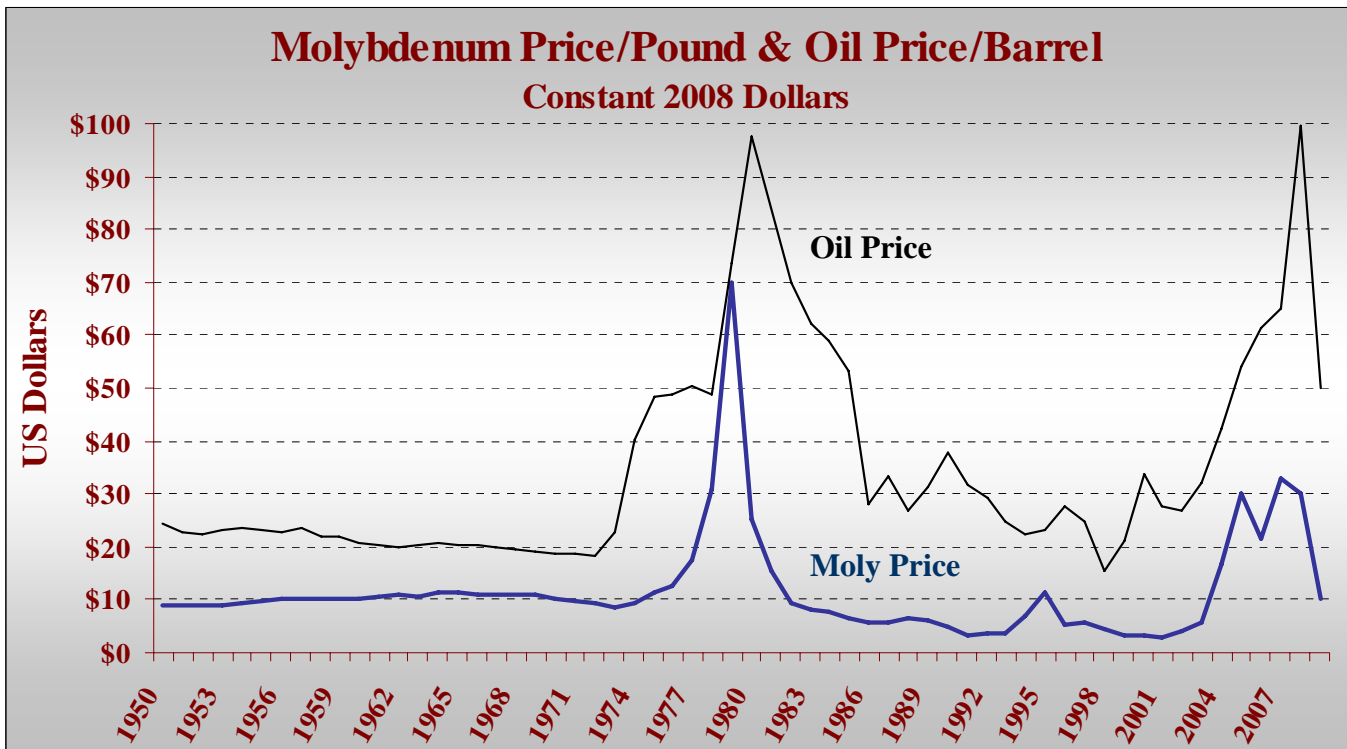
New Projects Delayed: The credit crisis has already had an impact on new moly projects. In addition to the delay of Climax, in early November, Inca Pacific Resources announced that it would cancel its orders for long-lead time equipment at its Magistral copper/moly project in Peru, and focus on obtaining its permits before deciding on mine construction. Most all of the planned projects, with the exception of Spinefex Ridge in Idaho, have been placed on a delayed or suspended development status. Thompson Creek announced the suspension of the development of the Davidson Project in British Columbia and Quadra took a similar step at its Mamlbjerg Project in Greenland. However, with the price strength in the summer of 2009, Thompson Creek announced it would be producing a bit more from its mines than earlier forecasts.

Long Term Price Forecast

As outlined above, oversupply conditions may dominate the market for the next couple of years. In the longer term, the demand for moly should outpace world economic growth. There will be a need for new oil production and nuclear plants, both of which consume large quantities of moly. Governments around the world have initiated economic stimulus plans that include large infrastructure projects. And new uses for the metal continue to be found. The case for a return to high long-term moly prices depends to some extent on continued high world economic growth. But the specifics of moly demand may support higher prices in the longer term, even if we see slower overall growth around the world.

Beyond 2012, existing producers are not forecast to be able to increase molybdenum production and any increase in world consumption will require the opening of new mines. Conventional economic thought is that the price of a commodity in an expanding market will be set at the marginal cost of bringing in new production. Excluding the Climax Mine, the marginal cost of bringing the new moly projects on stream is estimated at something north of \$15 per pound. Some of the big swing producers are a number of smaller mines in China where the estimated cost of production is \$13 per pound or more.

Another factor in molybdenum price has been its very high statistical correlation (over 90 percent) with the price of oil. The following chart shows this relationship.



While correlation does not necessarily mean causation, molybdenum has significant uses in oil pipeline and drill steel and it is used as a catalyst to remove sulfur from fuels. If this relationship continues, it implies that at \$67 oil, the price of molybdenum should be \$22 per pound.

The recent price volatility has created a problem for primary moly project developers. In order to obtain project financing, most of these projects require long term moly prices of \$14 or more per pound to be attractive. Even though most long term price forecasts for moly are at that level or higher, price risk is certainly higher and bank project financing terms are going to be tough. The uncertainty of the production and consumption numbers coming out of China adds another level of risk. Copper projects with byproduct moly will have an easier road, but it will be very tough for primary moly project developers to obtain financing on reasonable terms, especially when the cost of development is in the \$1 billion range. If any new primary mines do get financed, as in the Spinefex Ridge financing described above, the prospects for financing other primary projects will be increasingly difficult. These risk factors will very likely delay new primary moly mine production.

So a long term forecast for moly in the \$14 to \$17 per pound range seems reasonable.

Obviously there are going to be short term oversupply or undersupply conditions that take prices substantially above or below this level for periods of a few quarters at a time.

Introduction

The dramatic increase in molybdenum prices from the low of less than \$2.50/lb in 1999 to over \$40/lb in 2005 certainly caught the attention of molybdenum mine owners and exploration project developers. Since 2005, and up until October of 2008 prices stabilized in the low \$30 per pound area. The huge price increase has motivated most existing producers to expand production and those with molybdenum prospects to accelerate the development process for earliest possible production. Unknown is how much new production will come from existing mines, how much production will be needed from new mines if demand continues to grow and how many potential new mines might be available to meet future demand.

Molybdenum Markets

There are some unique characteristics of molybdenum markets that must be understood before looking at molybdenum production, demand and price data.

By Product Producers: About 52 percent of current molybdenum supplies are generated as a byproduct of copper mining. Many of the large copper mines around the world have small percentages of molybdenum in the ore, typically 0.02 to 0.03 percent Mo. It is relatively simple and cheap to recover the molybdenum. This means that a large portion of molybdenum supply comes from very low cost producers. During periods of low or declining demand, byproduct producers have been in control of prices. Primary producers have found it difficult to compete in such times since market prices are at or below their marginal cost of production (cash costs). It should be recognized that many of the new copper mines expected to be in production in the next few years will be producing copper from oxide ores using the low cost solvent extraction electrowinning (SX/EW) process. Mines using this process do not recover molybdenum. So even though recent high copper prices have encouraged expansion at existing mines and the opening of new copper mines, a proportionate increase in byproduct molybdenum production is not likely.

Low Price Elasticity: The molybdenum market has shown very low price elasticity in recent years. With the recent higher prices, there has actually been an increase in demand, just the opposite of what classical economics would predict. This is partially because about 80 percent of molybdenum production is used as an alloying additive in steel. Typical molybdenum steel may have only a quarter or one-half percent molybdenum. So even though molybdenum prices are high, these high prices don't translate into a substantial impact on the price of the steel to the consumer. Some consumers in this market have expressed the opinion that large changes in price cause more stress than the actual price level. Steel makers must bid jobs for future delivery. If the price of molybdenum increases dramatically between the bid date and the production date, the steel maker may be required to absorb the difference. Prices of alternative alloying agents have also increased, but molybdenum is the only element that is suitable for a substantial number of applications.

No Futures Market: There is currently no futures market for molybdenum. The prices listed in periodicals are based on actual sales for the prior week. There are a few molybdenum traders around the world that will inventory the metal, so this gives the market some stability. When commodity futures are available, current prices tend to be influenced by the expectations for future supply and demand. There tends to be some buffering of short-term supply shortages or surpluses and commodity markets are more efficient. For example, molybdenum prices have

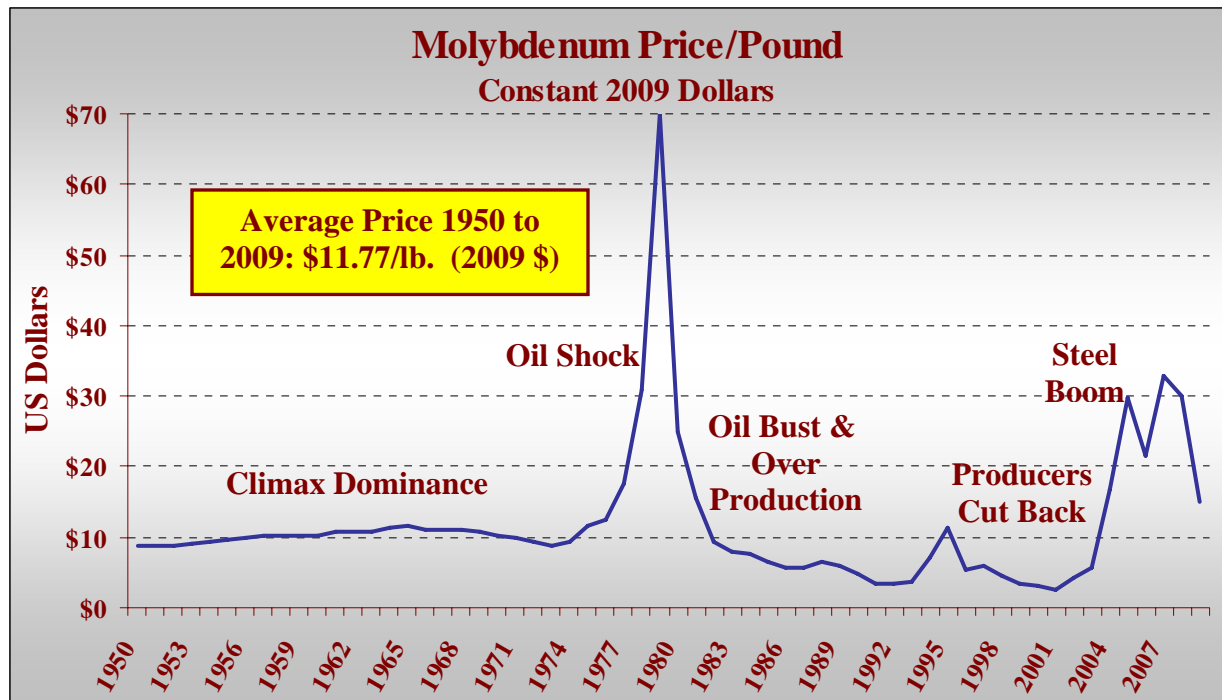
been somewhat more volatile and markets less efficient than copper markets. This may change soon as the London Metal Exchange (LME) has announced it will soon offer molybdenum contracts.

Mo vs. MoS₂: We see MoS₂ grades quoted by some producers and project developers. In fact, some Chinese production figures are quoted in tonnes of MoS₂. Mo is 60 percent by weight of pure MoS₂ (Atomic weights: Mo - 95.94, S - 32.06). Also be aware that the price quoted in magazines or newspapers is usually Molybdenum Oxide. The quoted price is only for the contained Mo by weight. This article will always use pounds of Mo for price and production statistics.

Historic Data

The best source of free historical information on most commodities is the Minerals Information Team of the U.S. Geologic Survey (USGS). World molybdenum production and price data are collected and updated monthly, and data are available going back to early in the 20th Century. Figure 1 shows molybdenum prices between 1950 and 2008 in constant 2008 U.S. dollars. The Consumer Price Index was used to adjust real prices to 2008 dollars. The following section will look at some major time frames to see what may have influenced prices during those times.

Figure 1



1950 to 1980: Climax Molybdenum dominated markets up until about 1980. The Climax Mine in Leadville, Colorado, produced about 50 percent of the world supply during this period. In 1976, the Henderson Mine, also owned by Climax, began producing and reached full production in 1981. Prices were stable until the late 1970's as Climax based its pricing primarily on the cost of production at the Climax Mine. Prices rose above the stable trend in 1977 primarily in response a supply shortage and the belief at the time that demand would continue to increase at about 7 percent per year as it had over the period between 1962 and 1976. The oil boom of 1979 gave a boost to molybdenum demand as steel makers were asked to produce large amounts of molybdenum steel for drilling and pipelines. The supply shortage encouraged copper producers to add molybdenum circuits and new primary mines opened. The boom didn't last and there was a glut of drilling rigs for many years following the boom causing low demand for molybdenum from that market segment.

1986 to 2001: The high prices of 1977 to 1981 encouraged new production from both primary and byproduct mines and demand fell to levels in 1986 where byproduct producers dominated the market. The Climax Mine ceased production and was put on "care and maintenance" in 1986. Because byproduct producers' costs were so low, molybdenum prices fell to levels well below the historical average of about \$12/lb (2008 dollars). During this period, Cyprus Minerals

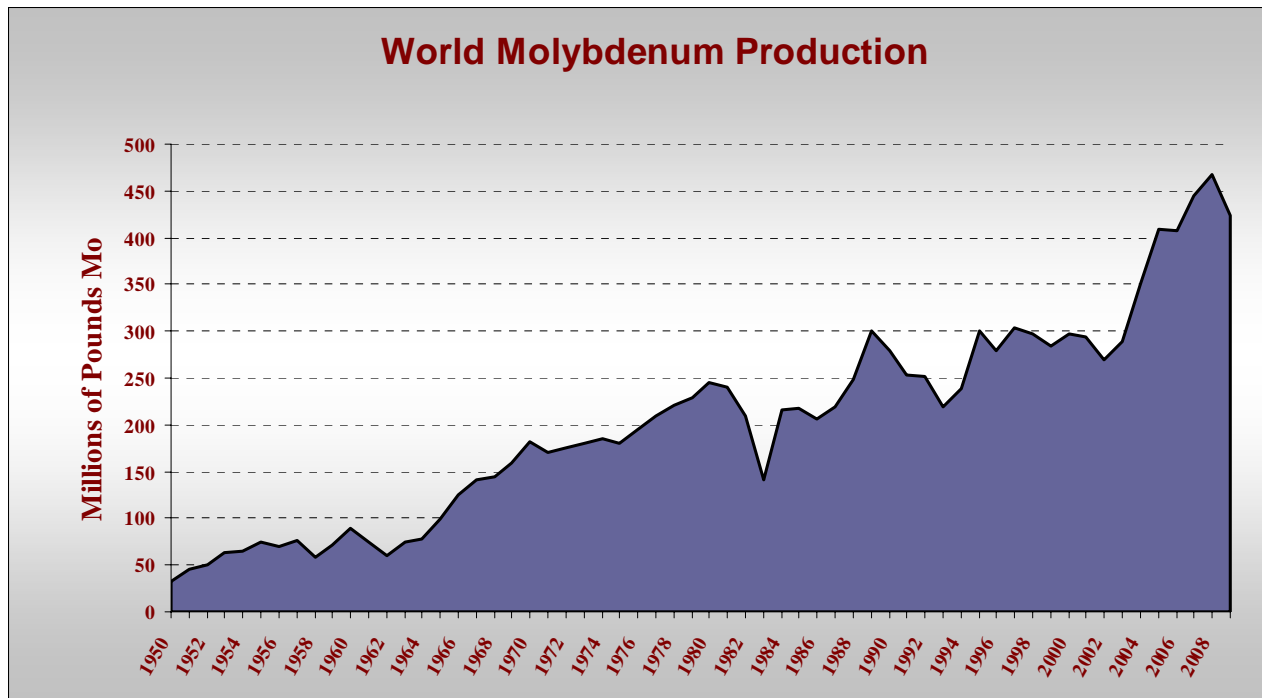
purchased Amax (parent of Climax Molybdenum), so Cyprus then controlled the Climax and Henderson Mines. The Climax Mine was reopened for a short period in 1995 during a period of price strength. In 1999, Phelps Dodge bought Cyprus. Phelps Dodge had a number of byproduct producing mines in Arizona and New Mexico. It recognized that high production of molybdenum was hurting the market. So in 2001, Phelps Dodge reduced production of molybdenum (along with reductions in copper production) at most of its mines, hoping to see higher prices. Kennecott and Chile's Codelco also reduced production of molybdenum.

2004 to 2008: A world boom in steel production occurred in 2004 and has continued through 2008. Chinese steel production increased, the demand for pipeline steel and drill steel has been strong, and the use of molybdenum in the production of low-sulfur diesel fuel has been expanding. These effects on the demand side, along with earlier production cutbacks and constraints in molybdenum refining (roaster) capacity, sent the price of molybdenum to almost \$40/lb (2008 dollars) in mid-2005. Late in 2005, it was thought the high prices could not last as additional roaster capacity came on stream and production increased. The expectation was that prices would pull back and average about \$15/lb in 2006. This did not happen and prices were steady at the \$25/lb level throughout most of 2006 and into 2007.

Between 2006 and 2008 there have been production problems in Chile, Mexico, and China that were not foreseen. At Chuquicamata in Chile in 2007, the main conveyor was damaged by a rock slide. In Mexico in 2007, there were a number of strikes. In China, a number of small mines were temporarily closed in 2005 due to environmental and safety issues. So there was actually a slight reduction in overall supply in 2006, thus keeping supplies short and prices stable.

Figure 2 shows molybdenum production during the same period as the price chart above. USGS data was used through 2007. The USGS estimate for 2008 has been adjusted slightly by the author to reflect data gathered on a mine by mine basis. Molybdenum consumption for each year varies a bit from production, but not enough to be significant when looking at long-term trends. The author's estimate for 2009 is based on the best information available from all sources as of November of 2009.

Figure 2



If just the 1990 to 2009 period is considered, it would look like there has been a huge increase and breakout from a trading range of around 300 million pounds per year. But a look at the trend since 1950, shows that the recent growth has not resulted in a breakout from the long-term trend of about 4.5 percent per year. Of course, the 4.5 percent average growth rate has not been smooth. Between 1963 and 1981, a period of almost 20 years the growth rate averaged 7.7 percent. From 1981 to 1983, there was a 42-percent drop. From 1989 to 1993 there was a 27-percent drop. And, from 2002 to 2008 there was a 74 percent increase.

Supply & Demand Forecast

Figure 3 is a forecast for production or announced production expansion at existing mines until 2027. No new mines are included in the forecast. Table 1 shows the forecast numbers by year for the next 11 years along with a tabulation of 4.5% and 7% growth rates in consumption.

A special note is necessary here. Last year's forecast started with 2008 production (467 million pounds) and applied the 4.5% and 7% growth rates to that beginning number. Since years just prior to 2008 had higher than historical market growth, starting with this high number probably resulted in an unrealistically high market growth forecast. By the same token, if we start this updated forecast with estimated 2009 production (424 million pounds), a year in which the market has experienced unusual upheaval, the forecast for growth would very likely be biased to the low side. This updated forecast splits the difference and assumes a starting point of 445 million pounds in 2009. With this in mind, if demand grows by the historical rate of 4.5 percent, the market will be in a surplus condition until 2015. If demand grows by 7%, the market will be in a surplus condition until 2013.

Figure 3

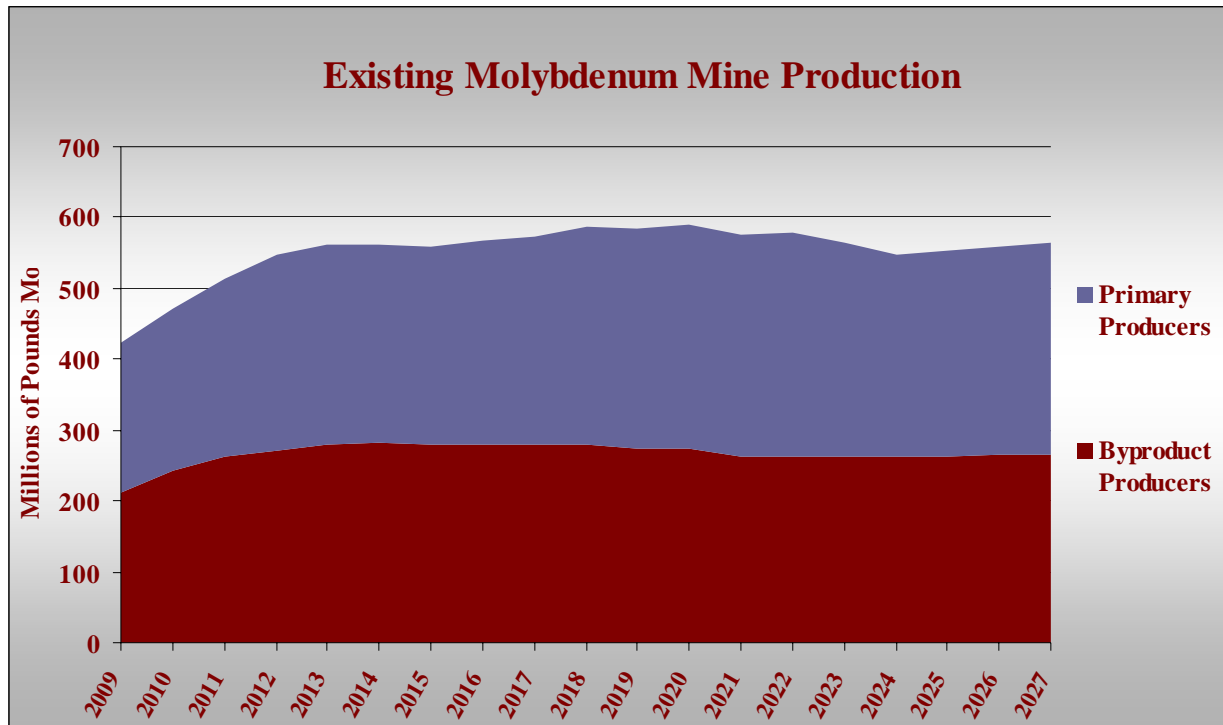


Table 1: Existing Producers Forecast Production

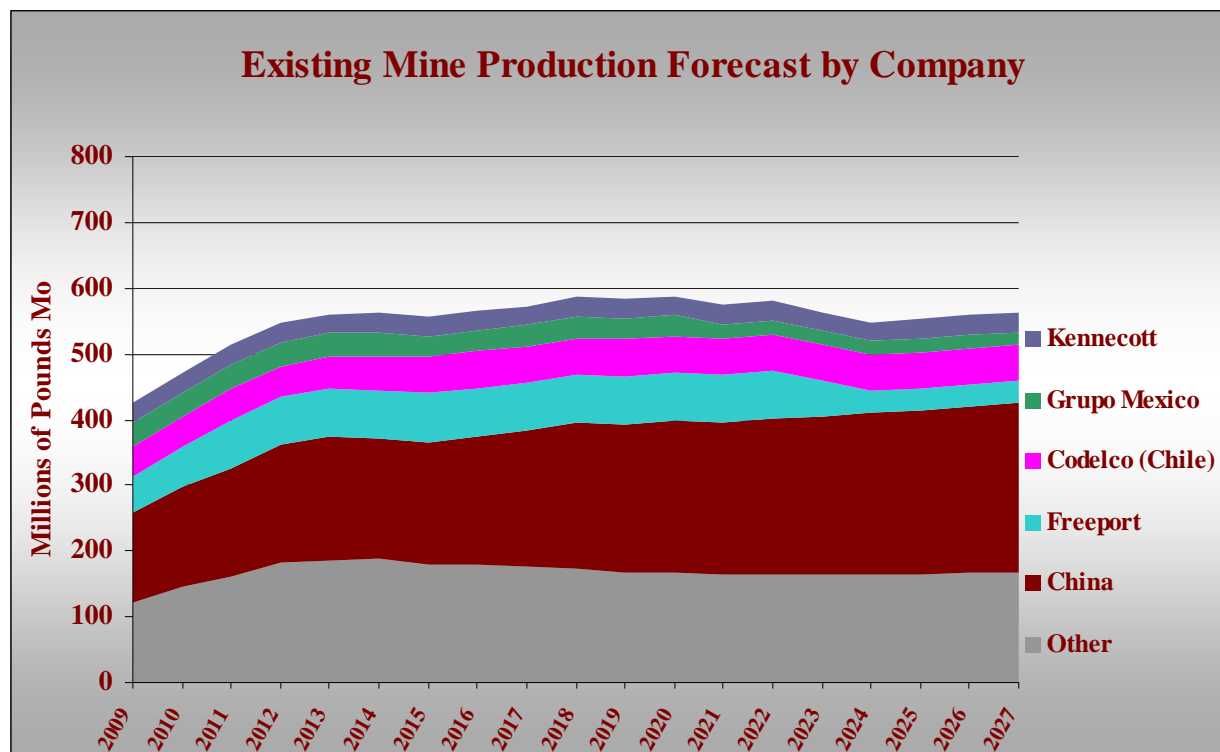
	Millions of Pounds Mo											
	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>
Byproduct Producers	212	244	262	271	279	281	279	279	280	280	274	274
Primary Producers	<u>213</u>	<u>227</u>	<u>252</u>	<u>275</u>	<u>282</u>	<u>281</u>	<u>278</u>	<u>287</u>	<u>293</u>	<u>308</u>	<u>311</u>	<u>315</u>
Total	425	471	513	546	561	562	557	566	573	588	585	589
4.5% Growth	425	466	487	509	532	556	581	607	634	663	693	724
Deficit/Surplus	0	5	27	37	29	6	-23	-40	-61	-75	-108	-135
7% Growth	425	477	510	546	584	625	669	716	766	820	877	938
Deficit/Surplus	0	-6	3	0	-23	-64	-112	-149	-193	-232	-292	-350

It should be recognized that published forecasts of current reserves or mine life are typically not an accurate reflection of the future production from a mine. More often, mine life is extended through improvements in mining methods, the discovery of new ore zones, or both. For example, Thompson Creek has redesigned its Thompson Creek Mine pit based on a projected molybdenum price of \$10/lb. Previous planning used a price of \$5/lb. This will allow higher strip ratios and the inclusion of lower grade ores that would have previously been considered waste. Many producers have published such plans and they have been included in the forecast for future production and mine life used in Figure 3. Where there is no production forecast or reliable reserve published by a particular source, such as China or other countries where reserve reports are not available, the author assumed there would be a 4-percent annual growth in production.

One of the conclusions one might draw from Figure 3 is that demand would need to drop by 40 percent or so to reach a level where byproduct producers will again be dominant in setting prices. It is evident that substantial production from new mines will be needed beginning in the mid part of the next decade.

Figure 4 is the same as Figure 3, but showing the share of the market held by the major producers. Note that currently, more than 50 percent of production is generated by Phelps Dodge, Codelco, Grupo Mexico and Kennecott. Note also that China is forecast to produce about 30 percent of world supply in 2009.

Figure 4



Molybdenum Demand: It is beyond the scope of this article to look into the details of all the market segments of molybdenum consumption to develop a forecast of molybdenum demand growth. However, it seems that market observers with expertise in molybdenum market segment consumption tend to fall back to a conclusion for overall demand that is based on the historical growth rate of approximately 4.5 percent a year. Apparently it is next to impossible to forecast demand in many market segments because it would require information on the future plans of all steel producers around the world – information that the producers are reluctant to share as it would likely end up in the hands of competitors.

There are indications the growth rate during the next few years or so may be higher than the historical average due to the huge drop in 2008 and 2009 which may be followed by a recovery where growth rates are higher than average. The jury is still out on whether we will have a robust recovery or a very slow climb out of the current problems. Molybdenum demand may be faster than the average due to other factors. There is the potential for expanding markets related to oil and gas pipeline construction demand, atomic waste storage container demand, and increased use of molybdenum in petroleum refining and other new markets for the metal. China's economy continues to expand at a high rate, although recent forecasts are lower than the 11 percent annual rate of prior years. China has more than 550 million tonnes of annual steel production capacity, as much as all of North American and Europe combined, and more is planned.

Probable and Possible New Molybdenum Production: It is evident that even if we see demand increase by 7 percent per year, no new mine moly projects will be needed until 2014. If demand increases by the historical average of 4.5 percent per year, no new moly projects will be needed until 2016. What molybdenum projects are available that could come on stream by 2014? The author searched the InfoMine.com database for worldwide projects that have at least an inferred resource defined. The assumption is made that these are the projects that have a chance

to be developed within the next 10 years. The author has chosen to create two categories of potential new mines that might be developed. “Probable” new mines are those that either have very high ore grades, or they have average or above average grades and are being developed by companies that clearly have the financial strength to obtain funding. “Possible” new mines are those that have average or below average grades and/or are being developed by junior companies with limited access to financial markets. Table 3 is a list of the existing molybdenum mines, Table 4 lists the “probable” new mines, and Table 5 lists the “possible” new mines.

The author has ranked the potential new projects according to type (byproduct surface, primary surface, and underground), and within each type, by moly equivalent ore grade. A copper price of \$2.50/lb and a molybdenum price of \$15/lb are used to calculate Mo equivalent grade (\$5/lb or \$100 per short ton unit was used for the tungsten projects). Obviously, other factors will come into play when determining which projects may make it into production. These include reserve size, location, management capability, the availability of financing, and permitting. However, when evaluating whether a particular project has relative merit, the place to start is resource quality, including grade, reserve size, location, and whether the resource can be surface mined.

Tables 6, 7, and 8 show estimated future production by year for existing mines, probable mines, and possible mines respectively, based on the owners’ published expectations. Since many of the potential new mines are controlled by companies that have yet to secure financing for development, these companies tend to present their projects in the most favorable light and thus publish optimistic schedules for production. The author has in most cases used the companies’ forecasts for future production, but in some cases the published production schedule has been delayed a year or two.

It should also be recognized that the process for bringing any new mine into production is filled with difficult hurdles and challenges. Another factor is that the first projects to obtain financing will likely bump other large projects back at least a few years. Once a few large projects are committed, the remaining large projects will find it more difficult to secure financing.

Figure 5 adds potential new mine production to existing mine production. Rather than passing judgment on individual potential new mines, the author has chosen to account for the uncertainty of specific projects by including 70 percent of probable new mine production and 30 percent of possible new mine production in the forecast of overall mine production. Table 2 shows the forecast numbers by year until 2020 along with a tabulation of 4.5% and 7% growth rates in consumption. If demand grows at the historical average of 4.5 percent, the market will have surpluses until 2025. If demand grows at 7 percent, the market will be in a surplus condition until 2020. Obviously, there will need to be much higher demand growth to support all of the potential new mines, or most of them will be delayed for at least a few years.

Figure 5

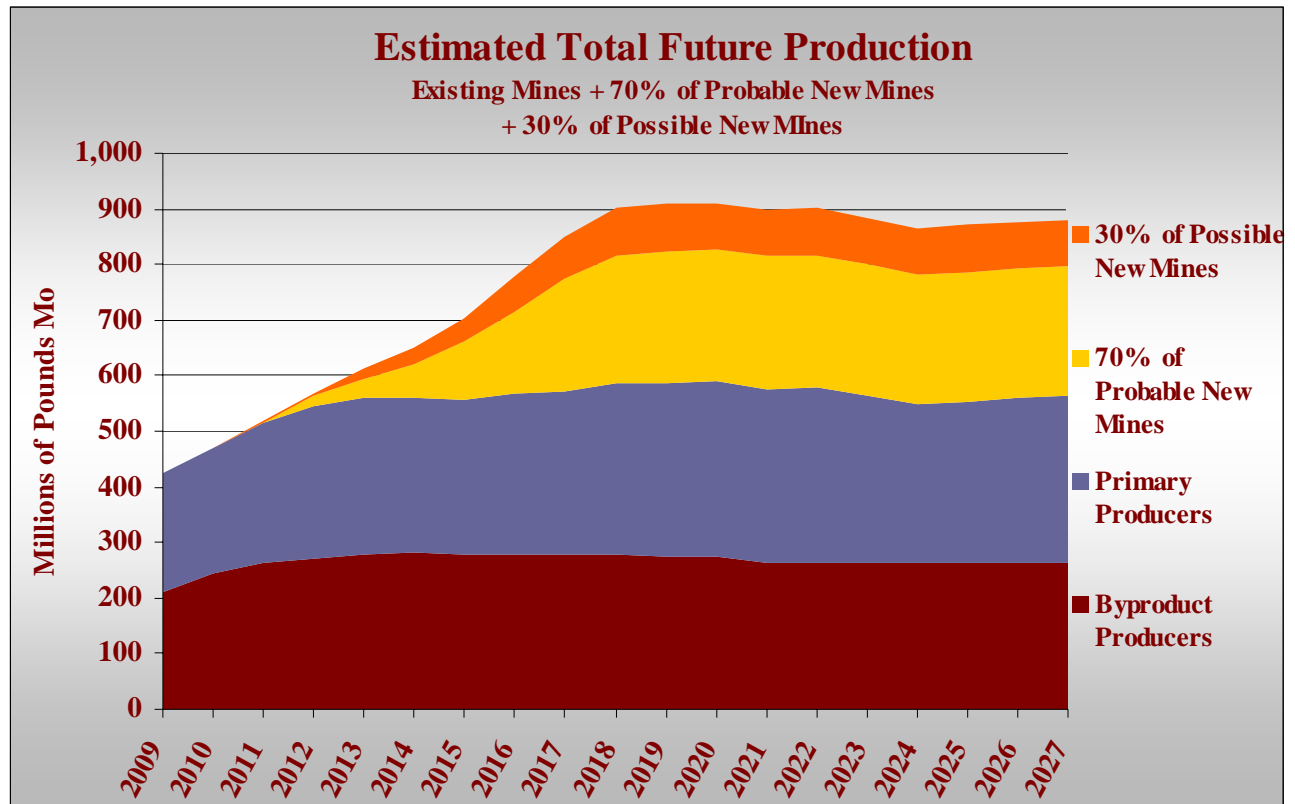


Table 2: Existing, Probable & Possible Forecast Production

	Millions of Pounds Mo											
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Byproduct Producers	212	244	262	271	279	281	279	279	280	280	274	274
Primary Producers	213	227	252	275	282	281	278	287	293	308	311	315
70% of Probable New Mines	0	0	3	16	34	60	103	151	207	238	249	249
30% of Possible New Mines	0	0	1	7	17	28	43	63	74	81	81	79
Total	425	471	517	569	612	649	704	781	853	907	915	917
4.5% Growth	425	466	487	509	532	556	581	607	634	663	693	724
Deficit/Surplus	0	5	30	60	80	93	123	174	219	244	222	193
7% Growth	425	477	510	546	584	625	669	716	766	820	877	938
Deficit/Surplus	0	-6	7	23	28	24	35	65	87	87	38	-22

Table 3: Existing Molybdenum Producers

<u>Property</u>	<u>Company</u>	<u>Country</u>	<u>Tonnes Reserves</u>	<u>Grade %Mo</u>	<u>Grade %Cu (W)</u>	<u>Mo Equiv. Grade</u>
<u>Byproduct Producers</u>						
Sierrita	Freeport	US - Arizona	1,467,000,000	0.029%	0.250%	0.071%
Bagdad	Freeport	US - Arizona	766,000,000	0.021%	0.350%	0.079%
Chino	Freeport	US - New Mexico	47,000,000	0.016%	0.620%	0.120%
Cerro Verde	Freeport	Peru	2,735,000,000	0.014%	0.370%	0.075%
Morenci	Freeport	US - Arizona	185,000,000	0.023%	0.550%	0.115%
Toquepala	Grupo Mexico (SCC)	Peru	4,294,020,000	0.021%	0.442%	0.095%
Cuajone	Grupo Mexico (SCC)	Peru	2,446,155,000	0.019%	0.517%	0.105%
La Caridad	Grupo Mexico (SCC)	Mexico	3,800,122,000	0.029%	0.223%	0.066%
Mission	Grupo Mexico (Asarco)	US - Arizona	n/a	n/a	n/a	n/a
Bingham	Kennecott (Rio Tinto)	US - Utah	618,000,000	0.044%	0.510%	0.129%
Codelco Norte (Chuququi.)	Codelco	Chile	5,163,000,000	n/a	0.660%	0.110%
Salvadore	Codelco	Chile	63,000,000	n/a	0.610%	0.102%
Andina	Codelco	Chile	5,698,000,000	n/a	0.780%	0.130%
El Teniente	Codelco	Chile	4,204,000,000	n/a	0.910%	0.152%
Escondida	BHP/Rio Tinto/Mitsubishi	Chile				
Los Bronces	Anglo American	Chile				
Los Pelambres	Antofagasta	Chile	1,451,000,000	0.019%	0.660%	0.129%
Highland Valley	Teck	Canada - BC	451,000,000	0.007%	0.380%	0.070%
Antamina	Mitsubishi/Xstrata/Teck/BHP	Peru	303,000,000	0.035%	1.110%	0.220%
Collahuasi	Anglo/Xstrata	Chile	1,017,000,000	0.025%	1.010%	0.193%
Continental Pit	Montana Resources	US - Montana	364,000,000	0.027%	0.340%	0.084%
Alumbrera	Xstrata/Goldcorp/Yamana	Argentina	377,083,000	0.014%	0.400%	0.081%
Minera Valle Central	Amerigo Resources Ltd.	Chile	700,000,000	0.001%	0.032%	0.006%
Kajaran	Cronimet	Armenia	n/a	n/a	n/a	n/a
Zangezur	Cronimet	Armenia	n/a	n/a	n/a	n/a
Tekhut	Armenian Copper Programme	Armenia	n/a	n/a	n/a	n/a
Erdenet	Erdenet Mining Corp.	Mongolia	1,300,000,000	0.013%	0.460%	0.090%
Gibraltar	Taseko	Canada - BC	472,400,000	0.008%	0.315%	0.061%
Sarcheshmeh	National Iranian Copper	Iran	1,000,000,000	0.030%	0.737%	0.153%
Huckleberry	Imperial Metals	Canada - BC	165,060,000	0.005%	0.352%	0.064%
Mineral Park	Mercator Minerals	US - Arizona	437,000,000	0.027%	0.114%	0.046%
Shorskoye	Centroferve Ltd.	Kazakhstan	20,000,000	0.970%	0.057%	0.980%
Total/Average			38,526,840,000			0.110%
<u>Primary Producers (Surface)</u>						
All	All	China	900,000,000	0.100%		0.100%
Thompson Creek	Thompson Creek Mining	US - Idaho	232,100,000	0.076%		0.076%
Endako	Thompson Creek Mining	Canada - BC	492,100,000	0.043%		0.043%
Almalyk	Almalyk	Uzbekistan				
Zhirekensky + Kyrgystan		Russia Kyrgystan				
Total/Average			1,624,200,000			0.079%
<u>Primary Producers (Underground)</u>						
Henderson	Freeport	US - Colorado	149,000,000	0.176%		0.176%
Questa	Molycorp (Chevron)	US - New Mexico	125,000,000	0.330%		0.330%
MAX (Trout Lake)	Roca Mines Inc.	Canada - BC	42,940,000	0.200%		0.200%
Ashdown Mine	Win-Eldrich Mines	US - Nevada	132,000	2.900%		2.900%
Total/Average			317,072,000			0.241%

Table 4: Probable New Molybdenum Producers

<u>Property</u>	<u>Company</u>	<u>Country</u>	<u>Tonnes Reserves</u>	<u>Grade %Mo</u>	<u>Grade %Cu</u>	<u>Mo Equiv. Grade</u>
<u>Probable Future Byproduct Mines</u>						
Little Wizard	Ivanhoe	Australia	13,000,000	0.800%	0.200%	0.833%
Cinco de Mayo	Mag Silver	Mexico				
MacLeod Lake	Western Troy	Canada - QC	20,042,000	0.093%	0.577%	0.189%
Las Bambas	Xstrata	Peru	860,000,000	0.020%	0.930%	0.175%
Pashpap	Northern Peru Copper	Peru	101,400,000	0.049%	0.640%	0.156%
Los Chancas	Southern Copper	Peru	355,000,000	0.050%	0.620%	0.153%
Magistral	Inca Pacific Resources	Peru	195,500,000	0.052%	0.510%	0.137%
Quellaveco	Anglo American	Peru	761,000,000	0.023%	0.570%	0.118%
Agua Rica	Yamana Gold	Argentina	797,723	0.034%	0.490%	0.116%
Michiquillay	Anglo American	Peru				
El Pachon	Xstrata	Argentina	980,000,000	0.016%	0.580%	0.113%
Sierra Gorda	Quadra Mining	Chile	715,935,000	0.027%	0.480%	0.107%
Toromocho	Chinalco	Peru	1,200,000,000	0.019%	0.528%	0.107%
Tampakan	Xtrata	Philippines	2,200,000,000	0.007%	0.600%	0.107%
Quebrada Blanca (hypogene)	Teck/Cominco	Chile	1,030,000,000	0.020%	0.500%	0.103%
Esparanza	Antofagasta PLC	Chile	535,000,000	0.011%	0.550%	0.103%
Pebble	Anglo/Northern Dynasty	US - Alaska	4,620,000,000	0.026%	0.460%	0.102%
Tekhut	Armenian Copper Programme	Armenia	876,000,000	0.023%	0.450%	0.098%
Relincho	Teck/Cominco	Chile	876,000,000	0.023%	0.450%	0.098%
Petaquilla	Teck, Inmet, Petaquilla	Panama	1,115,000,000	0.015%	0.500%	0.098%
Cananea	Grupo Mexico (SCC)	Mexico	2,511,000,000	0.000%	0.577%	0.096%
Galeno	Northern Peru Copper	Peru	765,000,000	0.014%	0.490%	0.096%
Spinefex	Moly Mines Ltd.	Australia	450,835,000	0.050%	0.080%	0.063%
Aitik	Boliden AB	Sweden	n/a	n/a	n/a	n/a
Tintaya	Xstrata	Peru	n/a	n/a	n/a	n/a
Total/Average			20,181,509,723			0.107%
<u>Probable Future Primary Surface Mines</u>						
Malmbjerg	Quadra	Greenland	216,800,000	0.198%		0.198%
Climax	Freeport	US - Colorado	165,000,000	0.165%		0.165%
Mt. Hope	General Moly	US - Nevada	1,000,000,000	0.110%		0.110%
Liberty	General Moly	US - Nevada	433,000,000	0.071%	0.070%	0.083%
Bugdainskoye	Norilsk Nickel	Russia	627,000,000	0.090%		0.090%
Total/Average			2,441,800,000			0.112%
<u>Probable Future Underground Mines</u>						
Resolution (Cu/Mo)	Rio Tinto/BHP	US - Arizona	1,340,000,000	0.040%	1.510%	0.292%
Davidson	Thompson Creek Mining	Canada - BC	77,200,000	0.169%		0.169%
Total/Average			1,417,200,000			0.285%

Table 5: Possible New Molybdenum Producers

<u>Property</u>	<u>Company</u>	<u>Country</u>	<u>Tonnes Reserves</u>	<u>Grade %Mo</u>	<u>Grade %Cu</u>	<u>Mo Equiv. Grade</u>
<u>Possible Future Byproduct Mines</u>						
Los Verdes	Virgin Metals	Mexico	7,050,000	0.137%	0.657%	0.247%
Rio Blanco	Monterrico Metals	Peru	498,000,000	0.022%	0.630%	0.127%
Cobre Grande	Linear Metals Corp.	Mexico	49,800,000	0.040%	0.500%	0.123%
Ikiztepe/Demirkoy	Anatolia Mineral Development	Turkey	200,000,000	0.050%	0.410%	0.118%
Liberty	General Moly	US - Nevada	150,000,000	0.091%	0.070%	0.103%
Ann Mason	MacMag Metals Ltd.	US - Nevada	810,000,000	0.040%	0.400%	0.107%
Berg	Terrane Metals Corp.	Canada - BC	506,000,000	0.037%	0.300%	0.087%
Rosemont	Augusta Resource	US - Arizona	546,340,000	0.015%	0.450%	0.090%
Getty North	Getty Copper	Canada - BC	25,650,000	0.015%	0.432%	0.087%
Costancia	Norsemont Mining	Peru	320,000,000	0.011%	0.430%	0.083%
Casino	Western Copper	Canada - BC	320,000,000	0.011%	0.430%	0.083%
Red Bird	Torch River Resources	Canada - BC	81,500,000	0.065%	0.070%	0.077%
Ochtina*	Mega Moly	Slovakia	125,134,000	0.062%	0.046%	0.077%
Bahuerachi	Jinchuan Group (Tyler Resources)	Mexico	524,510,000	0.008%	0.400%	0.075%
Northern Dancer*	Largo Resources Ltd.	Canada - BC	242,000,000	0.031%	0.130%	0.074%
Schaft Creek	Copper Fox Metals Inc.	Canada - BC	812,231,000	0.020%	0.301%	0.070%
Yandera	Marengo Mining	Papua New Guinea	660,000,000	0.013%	0.340%	0.070%
Vizcachitas	Los Andes Copper	Chile	572,000,000	0.013%	0.340%	0.070%
Morrison	Pacific Booker Minerals	Canada - BC	206,869,000	0.005%	0.390%	0.070%
Anduramba	D'Aguilar Gold	Australia				
Molyhil	Thor Mining	Australia				
Okeover	Eastfield Resources	Canada - BC	56,800,000	0.014%	0.310%	0.066%
Copaquire	International PBX Ventures	Chile	396,000,000	0.043%	0.102%	0.060%
Sisson Brook*	Geodex Minerals	Canada - NB	147,900,000	0.034%	0.067%	0.056%
Cuatro Hermonos	Virgin Metals	Mexico	763,772,000	0.021%	0.180%	0.051%
Louise Lake	North American Gem	Canada - BC	151,000,000	0.009%	0.237%	0.049%
CUMO	Mosquito Gold	US - Idaho	3,957,000,000	0.035%	0.073%	0.047%
Total/Average			12,122,506,000			0.069%
<u>Possible Future Primary Surface Mines</u>						
Kitsault	Avanti Mining	Canada - BC	291,000,000	0.091%		0.091%
Creston	Creston Moly Corp	Mexico	146,705,000	0.077%	0.049%	0.085%
Bald Butte	Bolero Resources	US - Montana	105,000,000	0.071%		0.071%
Storie	Columbia Yukon	Canada - BC	139,820,000	0.064%		0.064%
Lucky Ship	Nanika Resources	Canada - BC	61,500,000	0.068%		0.068%
Ruby Creek	Adanac Moly Corp	Canada - BC	275,354,000	0.067%		0.067%
Ajax	Creston Moly Corp	Canada - BC	552,000,000	0.062%	0.030%	0.067%
Chu	TTM Resources	Canada - BC	456,800,000	0.065%		0.065%
Moly Brook	Creston Moly Corp	Canada - BC	118,000,000	0.062%		0.062%
Cannivan Gulch	United Bolero	US - Montana	324,300,000	0.060%		0.060%
Zuun Mod	Erdene Gold	Mongolia				
Koktenkol	Dala Mining	Kazakhstan				
Total/Average			2,470,479,000			0.069%
<u>Possible Future Underground Mines</u>						
Lucky Jack	Thompson Creek	US - Colorado	22,500,000	0.701%		0.701%
Silver Creek	Bolero Resources	US - Colorado	44,000,000	0.300%		0.300%
Kingsgate	Auzex	Australia	5,000,000	0.300%		0.300%
Copper Creek	Redhawk Resources	US - Arizona	110,000,000	0.014%	0.700%	0.247%
Victorio*	Galway Resources	US - New Mexico	28,500,000	0.130%	0.120%	0.170%
Red Mountain	Tintina Mines Ltd.	Canada - Yukon	187,000,000	0.160%		0.160%
Total/Average			397,000,000			0.233%

* Co-Product is Tungsten

Table 6: Forecast of Existing Molybdenum Mine Production

Millions of Pounds Mo

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Byproduct Producers																			
Sierrita	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Bagdad	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Chino	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cerro Verde	2	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Morenci	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Toquepala	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Cuajone	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
La Caridad	15	15	15	15	15	15	12	12	12	12	12	12	12	12	12	12	12	12	12
Mission	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bingham	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Codelco Norte (Chuququi.)	29	29	30	31	32	33	34	34	34	34	34	34	34	34	34	34	34	34	34
Salvadore	3	3	3																
Andina	4	4	6	6	8	10	12	12	12	12	12	12	12	12	12	12	12	12	12
El Teniente	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Escondida			4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Los Bronces			2	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Los Pelambres	18	20	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Highland Valley	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Antamina	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Collahuasi	7	13	14	15	16	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Continental Pit	7	9	9	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Alumbrera	4	4	4	4	4	2													
Minera Valle Central	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kajaran	10	13	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Zangezur			2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Tekhut				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Erdenet	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Gibraltar	1	1	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Sarcheshmeh	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	10
Huckleberry																			
Mineral Park		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Shorskoye	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Sub Total	212	244	262	271	279	281	279	279	280	280	274	274	262	263	263	263	264	264	264
Primary Producers (Surface)																			
All	140	149	164	180	188	182	188	195	206	223	226	229	233	237	241	245	249	254	258
Thompson Creek	17	17	12	16	17	22	14	15	13	12	12	12	12	12	12	12	12	12	12
Endako	9	10	15	17	17	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Almalyk	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
Zhirekensky +	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Kyrgystan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sub Total	178	188	202	224	233	232	229	238	247	263	266	270	273	277	281	285	290	294	299
Primary Producers (Underground)																			
Henderson	28	30	40	40	40	40	40	40	40	40	40	40	40	40	20				
Questa	5	5	5	5	5	5	5	5	5	5	5	5	5						
MAX (Trout Lake)	2	2	2	4	4	4	4	4	2										
Ashdown Mine	0	2	2	2															
Sub Total	35	39	49	51	49	49	49	49	47	45	45	45	40	40	20	0	0	0	0
Total Existing Mines	425	471	513	546	561	562	557	566	573	588	585	589	576	580	564	549	553	558	564

Table 7: Probable New Molybdenum Mine Production

Millions of Pounds Mo

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
<u>Probable Future Byproduct Mines</u>																			
Little Wizard						10	10	10	10	10	10	10	10	10	10	10	10	10	10
Cinco de Mayo																			
MacLeod Lake							3	4	4	4	4	3	3	3	2				
Las Bambas							4	8	10	15	15	15	15	15	15	15	15	15	15
Pashpap				1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Los Chancas							3	5	7	7	7	7	7	7	7	7	7	7	7
Magistral					2	4	6	6	6	6	6	6	6	6	6	6	6	6	6
Quellaveco					3	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Agua Rica					5	10	15	15	15	15	15	15	15	15	15	15	15	15	15
Michiquillay									15	15	15	15	15	15	15	15	15	15	15
El Pachon							3	7	7	7	7	7	7	7	7	7	7	7	7
Sierra Gorda					3	6	9	9	9	9	9	9	9	9	9	9	9	9	9
Toromocho					5	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Tampakan								2	4	4	4	4	4	4	4	4	4	4	4
Quebrada Blanca (hypogene)							2	6	11	11	11	11	11	11	11	11	11	11	11
Esperanza							4	4	4	4	4	4	4	4	4	4	4	4	4
Pebble							5	10	20	30	40	50	50	50	50	50	50	50	50
Tekhut				1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Relincho						1	2	2	2	2	2	2	2	2	2	2	2	2	2
Petaquilla					2	4	6	6	6	6	6	6	6	6	6	6	6	6	6
Cananea					2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Galeno					2	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Spinefex					5	8	11	7	9	32	33	18	22	23	23	23	23	23	23
Aitik			2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Tintaya			2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		0	4	8	24	56	96	124	162	202	213	207	211	212	211	209	209	209	209
<u>Probable Future Primary Surface Mines</u>																			
Malmberg							7	15	20	20	20	20	20	20	20	20	20	20	20
Climax				15	25	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Mt. Hope						3	20	40	40	40	40	40	35	33	31	31	31	31	31
Liberty							10	19	19	19	19	19	19	19	19	19	19	19	19
Bugdainskoye						10	10	10	10	10	10	10	10	10	10	10	10	10	10
		0	0	15	25	30	50	85	119	119	119	119	114	112	110	110	110	110	110
<u>Probable Future Underground Mines</u>																			
Resolution (Cu/Mo)											5	10	15	15	15	15	15	15	15
Davidson							1	2	4	4	4	4	3	0	0	0	0	0	0
		0	0	0	0	0	1	2	4	4	9	14	18	15	15	15	15	15	15
Total Probable New Production		0	4	23	49	86	147	211	285	325	341	340	343	339	336	334	334	334	334

Table 8: Possible New Molybdenum Mine Production

Millions of Pounds Mo

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
<u>Possible Future Byproduct Mines</u>																			
Los Verdes				1	2	2	2	2	2	2	2								
Rio Blanco						4	5	5	5	5	5	5	5	5	5	5	5	5	5
Cobre Grande							1	1	1	1	1	1	1	1	1	1	1	1	1
Ikiztepe/Demirkoy								2	4	4	4	4	4	4	4	4	4	4	4
Liberty									19	19	19	19	19	19	19	19	19	19	19
Ann Mason						7	14	20	20	20	20	20	20	20	20	20	20	20	20
Berg					2	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Rosemont					3	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Getty North					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Costancia					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Casino										13	13	13	13	13	13	13	13	13	13
Red Bird				3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Ochtina*			2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Bahuerachi					1	2	3	3	3	3	3	3	3	3	3	3	3	3	3
Northern Dancer*			2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Schaft Creek								5	7	11	11	11	11	11	11	11	11	11	11
Yandera							9	9	15	15	15	15	15	15	15	15	15	15	15
Vizcachitas							2	2	2	2	2	2	2	2	2	2	2	2	2
Morrison					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Anduramba					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Molyhil				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Okeover								1	1	1	1	1	1	1	1	1	1	1	1
Copaquire									3	6	6	6	6	6	6	6	6	6	6
Sisson Brook*								1	2	2	2	2	2	2	2	2	2	2	2
Cuatro Hermonos																			
Louise Lake							1	0	1	0	1	0	1	0	1	0	1	1	1
CUMO								5	10	15	15	15	15	15	15	15	15	15	15
Sub Total		0	3	10	21	38	61	100	130	142	142	142	142	142	142	142	142	142	142
<u>Possible Future Primary Surface Mines</u>																			
Kitsault						5	10	10	10	10	10	10	10	10	10	10	10	10	10
Creston						6	12	12	12	12	12	12	12	12	12	12	12	12	12
Bald Butte						3	6	6	6	6	6	6	6	6	6	6	6	6	6
Storie					3	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Lucky Ship					1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ruby Creek									2	14	14	10	11	11	9	9	8	7	8
Ajax							5	10	10	10	10	10	10	10	10	10	10	10	10
Chu				2	14	14	10	11	11	9	9	8	7	8	9	9	9	9	6
Moly Brook							5	10	10	10	10	10	10	10	10	10	10	10	10
Cannivan Gulch				3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Zuun Mod																			
Koktenkol																			
Sub Total	0	0	0	5	24	41	61	72	73	84	83	79	79	79	79	79	79	77	75
<u>Possible Future Underground Mines</u>																			
Lucky Jack								8	12	15	15	15	15	15	15	15	15	15	15
Silver Creek								8	12	15	15	15	15	15	15	15	15	15	15
Kingsgate				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Copper Creek								1	1	1	1	1	1	1	1	1	1	1	1
Victorio*							3	6	6	6	6	6	6	6	6	6	6	6	6
Red Mountain				7	10	13	17	20	20	20	20	20	20	20	20	20	20	20	20
Sub Total	0	0	0	8	11	14	22	44	52	58	58	58	58	57	57	57	57	57	57
Total Possible New Production	0	0	3	23	56	92	145	216	255	285	284	280	280	279	278	278	278	277	274