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VIEWES I

Exploration Approaches: Comparison of the Former Soviet Union with the Rest of the World



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(SEG 1999 F)

In recent issues of this *Newsletter*, a discussion was initiated on why discoveries, particularly of world-class deposits, have not kept pace, despite the recent upward spiral of money invested in exploration. I look at this situation from the position of having worked, both as an explorer and in academia, in many different business cultures and systems, including the Soviet Union, and then independent Russia, Kazakhstan, Kyrgyzstan, and Uzbekistan, plus Mongolia and China, as well as several Western countries (Canada, Australia, the EU, and Turkey). My experience suggests that the problems contributing to this situation are universal regardless of the system.

Dan Wood mentioned in the January 2010 *SEG Newsletter* (no. 80) that there are two principal approaches to explore for and delineate orebodies: a cautious spacing between follow-up drill holes and the initial discovery hole vs. quick, bold assessment with widely spaced holes. Growing the assets slowly by closely spaced drilling is particularly encouraged by stock price-driven considerations and the need for additional phases of fund-raising. As a result, the mineral endowments in most Western deposits tend to grow with time. However, major companies and some of the

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well-funded intermediate and junior companies (e.g., Ivanhoe at Oyu Tolgoi, Hunter Dickenson at Pebble, Imperial at Red Chris) drilled deep holes and stepped out boldly. This approach helps to recognize the upside potential relatively quickly, although the deposits must still be carefully drilled out for proper delineation of the resources.

In the Former Soviet Union (FSU), the exploration approach was designed to cover and quickly assess vast territories of the world's largest country by zooming in from regional to local scales, with recognition of the largest possible mineral potential of an occurrence, classified as P1 to P3 resources. "P" stands for prognosticated or potential, with P3 being the least certain; resource in this case is not used in a Western sense. Russia, for example, declares itself as possessing the largest gold resources after South Africa, but most of this resource is in the "P" categories. Still, there are some notably well-explored but undeveloped resources like Sukhoi Log (Au), Natalka (Au), and Udokan (Cu-Ag).

Further testing of this potential would usually convert the initially large "P" resources into smaller-sized C2 and C1 categories, roughly equivalent, respectively, to inferred and indicated resources in the West. These could then be converted to B (during preparation for mining) and A (after reconciliation with the actual recovered metal). As a result, the endowment of deposits in the FSU had a noticeable tendency to shrink with time during conversion from "P" to "C." However, this does not always mean that the initial "P" estimate was incorrect, although it is often very speculative and overly optimistic.

Because of such an approach to exploration and resource delineation, there is a split in opinion whether the FSU is over- or underexplored. On one hand, the entire FSU territory (one-sixth

of the world's land surface) is mapped and sampled at a scale of at least 1:200,000 (i.e., it is covered by geological traverses or geochemical samples with 2-km spacing). This means that the FSU geologists, especially in Russia, just scratched the surface and, therefore, the potential of most areas remains large.

My focus here starts with an analysis of some recent world-class discoveries about which I have first-hand knowledge, both in the FSU and the rest of the world, to set the scene for a comparison and contrast of various systems, followed by discussion of the differences and implications for the future of the mineral resource industry.

BROWNFIELDS VS. GREENFIELDS

Brownfields Exploration

In Russia, an old saying by explorationists is "Explore for ore near the ore" (in Russian: Ищи руду возле руды), and this seems to be internationally universal. Indeed, the leap-frogging of Goldcorp into the Top 10 gold producers was possible after a 1998 brownfield discovery at deeper levels of their 60-year-old mine in Ontario, Canada. In 2009, Gold Fields announced the recognition of 4 Moz gold potential at its mature St Ives gold mining camp in Western Australia. These two examples are the result of better geological understanding and slow endowment growth in mature mining camps through additional detailed exploration.

In the FSU, recognition by Polyus Gold during last five years of a huge (>60 Moz gold) resource at Natalka in Magadan took place at a mine that had been in production since 1945. The large, low-grade resource potential of Natalka, in the P1+P2 categories, was

known for many years; there were several failed attempts to convert an underground mine of relatively narrow high-grade (~5.5 g/t Au) veins into a bulk-minable operation in the 1980s and 1990s. A new exploration effort to convert this potential into C1 and C2 categories was fuelled by increasing gold prices, which justified exploration expenditure and allowed economies of scale to be potentially applied; this is now being investigated with construction of the pilot plant. The Natalka example was quickly followed with varying degrees of success by Russian junior companies in adjacent Pavlik, Ridionovskoye, and other deposits of the Tenka mineral district in Kolyma. However, a similar approach by Polyus Gold at the Nezhdaninskoye gold deposit in Yakutia was not as successful because of an overestimate of geological similarities with Natalka. In essence, this brown-fields exploration activity in the Russian Far East is similar to what happened during the 1980s in Western Australia, when expansion of the Golden Mile and other Yilgarn projects was realized.

Greenfields Exploration

The discovery of the >6 Moz Kupol gold-silver epithermal deposit in Chukotka, Russia, would have been unlikely if the country was overexplored. What were the critical factors at Kupol? Chukotka is remote, mapped mostly at 1:200,000 scale; the epithermal veins at Kupol have a north-south strike, occurring close to the north-south boundary of the map sheets. For these reasons, as emphasized by the late Dr. Sergey Strujkov, the area of outcropping veins was simply not visited, falling between the 2-km-spaced, north-south-oriented traverse lines of the mapping survey. However, samples with anomalous gold were found in the 1980s at small prospects nearby and plotted on the maps; field checks of these occurrences by the local Russian exploration company in 1996 (in spite of the map boundaries) led to discovery of a 3-km-long vein with initially modest resource. The full potential of the deposit was then recognized by Bema Gold during a few years of aggressive drilling. Bema Gold was subsequently purchased by Kinross, which is building on this success by acquiring underperforming assets nearby, such as the recently announced Dvoinoe acquisition, located ~80 km north from Kupol.

Kupol-like experiences drive explorationists into immature terranes to conduct greenfield exploration. The risks are definitely higher, but the rewards can be significant, sufficient to overcome the costs related to a common lack of infrastructure. One of the best recent examples is the Oyu Tolgoi Cu-Au porphyry in Mongolia, an area where the FSU approach was previously applied as well. In the 1990s, the future Oyu Tolgoi property was acquired by Magma Copper, and Garamjav, a Mongolian geologist hired by the company, recommended returning to a turquoise hill (Oyu Tolgoi, in Mongolian) that he had observed during Soviet exploration, which was indicated as a molybdenum occurrence in the government database. The deposit was subsequently first drilled by BHP in 1998 after they acquired Magma Copper. The BHP exploration philosophy was to identify a large, open-pitatable deposit with 1×1 km Andean-style footprint within 2 to 3 years from first recognition, employing widely spaced drilling in the first instance, an approach similar to that of the FSU. However, in contrast to the Soviet-style exploration, which would focus on the same promising prospect for up to 10 years, BHP management advice was to not fall in love with a project, and if necessary, walk away to hunt for another one. BHP drilled relatively shallow holes in the hunt for an open-pit porphyry target with secondary enrichment, and identified a medium-size (~400 Mt), mostly hypogene potential resource; however, the 1998 economic crisis forced it to reconsider its exploration strategy. As a result, the license was optioned to Ivanhoe Mines, who then identified a giant resource via closely spaced drilling of deeper and vertically elongated targets, with the larger deposits being essentially blind. It is now more than 10 years since the discovery of Oyu Tolgoi, but only in late 2009 was an agreement reached with the Mongolian government for development. Thus, timing-wise, the result is not so different from the practice used in the FSU. Persistence is therefore essential regardless of the politico-economical system! A similar persistent approach also led to the discovery of the giant Pebble East porphyry in Alaska.

Only a few examples of recent world-class discoveries have been mentioned here. With the exception of Kupol, they have been discovered under cover, typically using indirect evidence. As there is some degree of database

available for almost all areas, many companies now employ a probabilistic approach. The outcomes of these studies drive explorationists to work in underexplored regions, which tend to include politically and culturally less familiar and less stable countries in Africa, Asia, and the FSU, most closed to international exploration before the 1990s.

POLITICAL, ECONOMIC, AND HISTORICAL CONSIDERATIONS

We currently live in a time of global economic uncertainty. The earlier crisis affected everyone everywhere to a varying degree, but countries responded differently. Crisis is also a time of opportunity and we have witnessed economic repartitioning of the world, with the Chinese government and public companies being more aggressive in the last couple of years.

The international activity of Chinese companies is largely inversely proportional to the economic situation outside China, owing to it possessing the world's largest hard currency reserves. This has led to a major expansion of Chinese investment worldwide during the economic upheaval. In countries such as Canada and Australia, this has taken the form of huge investments in major mining companies, sometimes blocked by protective governments. In South America and Africa, Chinese companies have made major acquisitions of mining and development projects.

In Russia, the government remains protective, using legislative means to prevent foreign entrance into its natural resources sector, although recently some potential liberalization was announced. Because major Russian companies prefer not to enter into greenfields projects domestically due to their high risk, only three large discoveries have been announced in Russia since the breakup of the FSU in 1991: Kupol epithermal Au in Chukotka, Blagodatnoye orogenic Au in Krasnoyarsk, and Bystrinskoye Cu-Au skarn in Chita.

After accumulating a large amount of cash before the current crisis, Russian companies also started international expansion, but they are more comfortable expanding into FSU countries to acquire past Soviet treasures, as they feel it is easier and faster to buy rather than to spend years conducting greenfields exploration.

The lack of attention to greenfields

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exploration from modern Russian companies has an historical basis. Geological education was usually broad to allow for coverage of large territories, but the practical experience of individual geologists was rather narrow, and they were never asked to think in economic terms. As a result, the exploration divisions of most modern major Russian companies are run by non-geologists with an education in economics or finances; thus, there is a wide gap in expectations and understanding between management and geologists. Consequently, greenfields risk is not now undertaken by Russian management; rather, the Russian government funds early stage projects (with a \$200M budget in 2009), essentially taking the same risk that junior companies do in the West. On a much smaller scale, some other FSU governments are doing similar things.

The Metals Economic Group (MEG), which surveyed the budgets of 1,846 companies worldwide, reported that the FSU region accounted for seven percent of the global \$7.32 billion exploration budget in 2009. According to MEG, five percent (or \$366M) of this expenditure was spent in Russia alone, sharing fifth place with Mexico and Chile, after Canada (16%), Australia (13%), Peru (7%), and the United States (6%). In reality, exploration expenditure in Russia is much higher if greenfields expenditure by the government is added in. The Russian Ministry of Natural Resources has just released a report stating that foreign and domestic companies invested about \$600M in exploration work in 2009, indicating that the total exploration expenditure was around \$800M, much higher than the MEG estimate.

DIFFERENCES IN EXPLORATION APPROACHES BETWEEN THE FSU, CHINA, AND THE WEST

In summary, the main difference in exploration approaches between the FSU, China, and the West is how early-stage projects are funded. In the West, governments are unwilling to fund risky greenfields projects. This role is undertaken by the stock exchange or private money. The risk is high, but the reward can be high as well. As a result, it is not uncommon for several exploration companies

(as many as 7 or 8) to have worked on the same ground, resulting in a long lead time to discovery of an economic deposit. Even in terms of producing mines, Western governments generally prefer to simply collect taxes, a fundamental historical difference between the diversified Western economies to the emerging markets of the FSU and China.

In FSU countries, economies are based on mineral resources. Consequently, some governments (e.g., Uzbekistan and Tadjikistan) directly control the mineral resource extraction and access to exploration, whereas others (e.g., Russia and Kazakhstan) are less restrictive. But in general, with few exceptions, FSU governments allow limited access to their potential wealth, thus preventing or delaying the discoveries of new deposits, possibly because they do not want to deal with the organized chaos of Western-style exploration.

China, with its cheap labor, became a global factory for the world; however, from my point of view, the country is relatively deficient in base metals, both geologically and relative to its huge population. Consequently, there is also no easy access to its ground for international exploration. The country also has a cultural and historical tradition of not allowing direct access by foreigners. This restriction is aided by a language barrier and different economic traditions. Also, many deposits are worked at grades below international standards, which is possible to achieve through a combination of cheap labor and Chinese efficiency.

SPECULATION ON FUTURE TRENDS

What might future exploration trends and economic plus corporate tendencies be over the next 10 to 20 years? The structure of country economies is unlikely to change within such a short period of time. In addition, the current decline in discoveries in the Western world suggests that mining companies will have to "sweat" their existing mines while becoming more sophisticated in the exploration for and discovery of blind deposits in more mature terranes, or they will need to enter the riskier markets, which in the case of the FSU means forming 50/50 JVs to minimize the risks.

The FSU territory is underexplored. The lack of discoveries during recent years largely reflects small and inefficient investment. Being largely driven by the resource-oriented structure of their economies, FSU governments are likely to remain restrictive in allowing access to their ground. For example, after expansion of the gold resource at Kupol, Russia introduced a law on strategic deposits that limited access foreign companies can have to mineral assets above a certain size. For instance, the threshold for gold deposits was set at 1.6 Moz, obviously to prevent potential world-class deposits from ending up in the hands of foreigners, whether from the West or China.

One possible scenario could be that Russia and other FSU countries will try to establish a role as mineral resource suppliers to China. FSU companies may become more active in their own well-endowed regions (and adjacent jurisdictions), perhaps with some increased penetration into Africa.

Chinese companies will have to look for opportunities in other areas of the world. However, it is unlikely that the world will be dominated by Chinese resource companies in 10 to 20 years, as these companies generally feel uncomfortable outside their native domain. Rather, Chinese companies prefer to acquire substantial stakes in Western resource companies, a move that may be supported or restricted depending on different Western governments. Perhaps China is more likely to provide finance for new developments against off-take and equipment for international projects, just as Japan did for many years; by contrast, China is likely to continue exploitation of its low-grade domestic resources.

What will be the response from Western companies? Who will develop the most effective approach to exploration? I hope to receive answers to these questions in ongoing discussion in future *Newsletter* columns. 

