

Invited Discussions:

2. R.J. Cathro

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Julian Boldy and I agreed that we'll look at the subject today from opposite ends of the country. I'm looking at it through the eyes of a westerner and he as someone who has worked primarily in eastern Canada. I think two things are clear from what we have heard this afternoon. First, George Mannard doesn't agree with DeVerle and second, we are all of us still confused about what predictive metallogeny is, though I think we're starting to zero in on the problem.

My first-hand experience with resource estimation started about 15 years ago when Barry and Freyman applied the Delphi technique that Don Sangster referred to earlier and which was somewhat like the one DeVerle talked about. Barry and Freyman toured Canada, primarily in the west, and asked a number of knowledgeable explorationists who had worked in the Yukon and British Columbia to try to estimate mineral potential for a large number of small cells. The results were synthesized and appear to have been remarkably perceptive. I am sure that none of us who took part in that project 15 years ago would have guessed that it would turn out so well.

My second involvement with resource estimation was through a paper that was published in the *CIM Bulletin* (v. 85, April 1982) on base metal deposits that we refer to as the sedex type, a contraction of sedimentary exhalative. Julian Boldy, when he was chairman of the *CIM Geology Division*, had asked us to write a summary paper on the deposit type and we did not start out with a mineral appraisal in mind, but it was something in which we became involved while we were writing the paper because we thought that it fleshed out the descriptions and we wished to cover all aspects, and not just the mineralogy and lithology. Furthermore, it would also give some idea of whether or not it was an important resource. When you look at the paper you'll see that it's a different approach used to try to estimate resources and reserves, and it is patterned more on the lines used in the petroleum industry to estimate quantities of oil and gas.

I think the title "Predictive Metallogeny" is perhaps an unfortunate choice because it means different things to different people depending on point of view. I think George Mannard and I would agree that it's a modern term to describe what we've always thought of as exploration planning. It's obviously being used today to talk about mineral appraisal. Those are two different things; they overlap to some degree but

are certainly not the same and they are leading us in different directions. To me, it means the use of metallogenic studies to predict how and where to explore. If I understand Dr. Rundquist correctly, his approach in the USSR is probably closer to what we are doing in the industry in North America. That is not surprising, as his agency is involved in one of the steps of straight exploration.

I'd like to reiterate what George just said about the style that's being adopted by the GSC. The example displayed here by Dave Sinclair (1982) is also a very good way to go. I like it for the same reason that George does: it stops at the qualitative step and doesn't get onto thin ice by trying to become quantitative. Serious problems may arise when you try to quantify, because many of the deposit types are just too highly unpredictable. The sedex type about which we wrote the paper is more internally predictable. Once you find one, you have a pretty good idea where it will go and how large it will be, unless it is cut off by erosion or faulting. You know that you are looking at something that might be as small as 5 million tons and as large as 200 million tons and you have a pretty good idea of what the grade and the geometry are going to look like. But even some deposits that shouldn't be isolated or unique turn out to be notoriously so, e.g., Sullivan, for which no mate has been found in 75 years of search, even though common sense indicates that it should be part of a cluster. Another Cordilleran example is the Cantung deposit, the largest tungsten deposit in the Americas and perhaps in the western world. Common sense said that there had to be similar deposits in that part of the Cordillera because there were many areas with similar geological setting. Yet it was completely impossible to predict where they were going to be found. More have been discovered and there are probably even more to be found, but you would have been lucky to have been within 50-100 km of the location if you tried to predict just after Cantung was found. Even after the good geological mapping and the intense exploration, it's still almost impossible to determine where the next one is going to be.

In spite of the problems, there is no doubt in my mind that the process of preparing mineral appraisals is going to have to continue and improve. My involvement in the British Columbia and Yukon Chamber of Mines has given me valuable insight into just how seriously the mining industry is suffering from the lack of mineral appraisal preparations in the past. If the 1970s were notable for anything it was for the amount of high mineral potential land that was being either withdrawn from exploration or

being considered for withdrawal. The process is going on unabated today, particularly in the west.

In addition to a late start, we've also had to face the problem that park proponents got a big jump on our scientists in capturing the initiative in preparing appraisals and also they were able to procure adequate funding in the days when there was a good amount of government money. Now they have budgets, even if restrained, that are large enough to prepare these things, while we do not. It's easier to count birds and fish and trees than it is to measure mineral potential, so it's even more incumbent upon us to begin this process and to work out the best ways of doing it.

I'd like to interject a word of caution before I close, and that is that it's often tempting for those who perform mineral appraisal to forget that their customers are the government and the general public; it's not the mining industry. It is very seldom that this type of appraisal is going to be used by the industry except by newcomers on the scene. Mineral appraisal is being done every day in every decent mineral exploration office, and believe it or not, some of the techniques being used are quite sophisticated and appear to work well. So I think it's important to direct your efforts and your money towards preparing the type of thing that your client, which is not the exploration industry, needs. If you want to do something for exploration I think you are far better off to put your efforts and money into a better understanding of the deposits models.

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