RPA’s Graham Clow: Red flags investors should heed

BY TRISH SAYWELL

Even in the best of times the mining industry can be a financial minefield for investors.

Graham Clow, chairman of consulting firm Roscoe Postle Associates (RPA), warned at a recent seminar in Toronto, hosted by the Mineral Resource Analyst Group, that it’s important for investors to watch out for the most common pitfalls associated with bringing mineral deposits into production.

Such pitfalls include the wide range of quality and accuracy in National Instrument 43-101 reporting; uneven policing by government regulators of those reports or of Qualified Persons (QPs); and capital cost overruns in the industry that average as much as 20–25%, and have been much higher in recent years.

“We started tracking these twenty-five years ago, and it’s pretty consistent where things do go wrong,” Clow, a mining engineer by training, said during his presentation to mining executives, analysts, bankers, investors and media at the St. Andrew’s Club & Conference Centre on Oct. 27. “The last time I gave this talk was in 1990, when I was with Strathcona Mineral Services ... how little things have changed.”

Difficulties can emerge as early as the scoping study or preliminary economic assessment (PEA) stage. While this first level of economic study can be a good early benchmark, PEAs often receive “an undeserved level of credibility,” as their overall accuracy can range by plus or minus 30%, or more. The accuracy range refers to all assumptions and estimates in the study — i.e., tonnes, grades, costs and metallurgy — not cumulatively, but to the bottom line cash flow and net present value.

“People forget that the numbers could be 30% out,” Clow said. “There is a wide range of quality of PEA studies, and one is not the same as another in terms of the level of effort put into it.”

While that’s less true of economic studies at later stages, there are still issues with accuracy. Prefeasibility studies can range in accuracy from plus or minus 20–25%, while the range for feasibility studies can vary from minus 15% to plus 15%. “And it’s pretty much always a plus, never minus,” Clow said.

An RPA review of failed or troubled projects since 1985 identified 75 projects that failed to meet expectations, and of them: 35 were related to grade; 10 to mining methods; 16 were associated with processing problems; eight had to do with capital costs; seven with operating costs; six were traced to social, permitting or government issues; and five to metal prices and timing.

Clow’s list of potential red flags includes:

Not enough skilled workers to go around — Studies show that cost overruns are higher when markets and metal demand are overheated. This results in a shortage of skilled workers. This shortage of skilled workers in all aspects of the industry — from technicians and metallurgists to mine engineers and project managers — can drive up costs. In Canada, this is particularly evident because so many workers have migrated to the oil patch. While there are many highly skilled workers in the industry, if those with the right skills and experience aren't available, companies have to resort to less qualified employees and contractors, many of whom are less experienced and less productive. “What we’re seeing is that a lot of people aren’t skilled enough, and with the pressures of a hot market, people are stretched,” Clow said. “It’s a big factor and contributes to the capital cost overruns.” This is not confined to the mining industry, he adds. The same thing is happening in general construction of industrial projects.

Management team too small — Teams are often understaffed (especially for mega projects), and it is not uncommon to see “TBD” or “Vacant” on organizational charts, which should be a warning sign. In general, larger teams are able to respond better in crises during execution, drive better practices and are typically integrated, RPA says.
Owner-operator at the construction stage — Owners that want to put mines into production themselves can add additional risk. "There are operating people and there are construction people, and they are two very different types," Clow said. "It's not to say it can't be done, but it puts an additional air of risk into the whole [engineering, procurement and construction management] side of things, and quite often it's done for cost-saving purposes, rather than better project management." How this manifests itself is usually in the project execution plan and project controls. Often, the owner won't have access to project management scheduling and cost control software or the experience to use it optimally, RPA says.

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Not enough engineering — The more engineering completed on a project before construction the better, and this should bring confidence. The American Association of Cost Engineers publishes standards for the various levels of studies. For a class-3 or feasibility study, the level of engineering can be as low as 10%. Pay attention to percent engineering complete.

Lack of benchmarking — On the operating cost side, one of the best tools in addition to detailed engineering is benchmarking against similar operations. There's no standard or easy way to do it because sometimes it's difficult to determine true operating costs. "Experience shows there is usually a very real downside case," Clow said. "As with the capital cost overrun situation, a lot of the time, people want to move too fast and not do the engineering required." Benchmarking is particularly useful in determining fixed costs and things like corporate general and administrative expenses. "We've seen cost estimates where people forget to fuel," Clow says. Even simple benchmarking will highlight that something may not be quite right in a cost estimate.

The term "optimization" — A project rarely gets cheaper with further study. "Optimization generally means the capital cost is too high and the company wants to cut costs," Clow said. "While this is a worthwhile objective, unless there are some fundamentally better assumptions or concepts, and the basics of the project can be changed, it's not often that a lot of that optimization can be realized."

Insufficient metallurgical test work — Lab studies are needed to develop a process flow sheet. Risk goes up if metallurgical sampling does not represent the deposit and/or not enough testing has been done. Without developing an economic process for extraction and ore treatment, all the geology and mine design work is of questionable value. Sixteen of the 75 unsuccessful projects RPA analyzed had metallurgical problems. "Sampling involves a drilling program, and drill programs can be expensive," Clow commented. "But the orebodies and deposits can be complex in shape and geology, so completing a drill and sampling program that is representative of the deposit is important."

Too much mining dilution — Dilution is the number-one thing RPA looks at when it audits reserves and production forecasts in projects, because it is consistently underestimated. "An orebody will let you mine at a certain rate based on the size, shape and ground conditions ... and if an operator tries to push it to achieve a production target, what happens is that the mining people will try to deliver the required, but those extra tonnes likely won't have as much ore in them. This is dilution, and the grade will come down," Clow explained. For example, in a longhole stoping method, if dilution is estimated at 10–12%, that's usually a red flag. It depends on the nature of the deposit and the extraction method, but chances are that in a long-hole situation, dilution would be 15% to 20%. For determining the capability of an orebody, a rule of thumb is that if more than 50 metres vertical is being developed underground each year or more than 8 to 12 benches a year in an open pit, there could be dilution problems coming. "If they are exceeding that, you need to make sure there is enough development support and access, and all the things you need to keep the stopes going and allow for flexibility," Clow said. "In the case of open pits, it is ensuring that stripping is kept up. It is entirely appropriate to try to drive down costs by increasing production rates, but there is a limit that is determined by the orebody. If that limit is exceeded, it pretty much always ends up in resource dilution and lower head grade."

Productivity problems — Make sure the right mining method is chosen for the type of deposit and that there are enough workplaces to ensure flexibility. What is the number of workplaces, and is it right? Production estimates are based on those, and in underground mines, if you don't have enough flexibility you won't have the workplaces you need. "Look at any narrow vein gold mine," Clow said. "If there is a lack of
development then there is probably not enough flexibility, so miners have to take the face that is in front of them, and that might not be ore. When we look at the number of workplaces required in an underground mine, depending on the mining method, it could be as much as 20 to 30 times the number determined from simple productivity calculations. Flexibility in workplaces is absolutely critical to be able to properly control dilution.

Mismatched mill size — Make sure the size of the mill reflects the deposit and ensure that it matches all the way through the production system. Clow advises that “the mill size depends on what the orebody will allow you to do.”

Unrealistically low ramp-up times — Don’t underestimate how long this part of the process can take. This is a stage that is unpredictable. “Some people may overestimate how fast the mill will ramp up, and there’s a lot of literature out there about how fast they do start up,” Clow said. “It is beneficial to show revenue coming in sooner ... people can get a bit too optimistic.”

Cut-off grade too low or too high — Reserve estimates are generally completed at a break-even grade, but most operators mine to incremental grades, which are lower, resulting in lower head grades. Problems can also arise if the cut-off grade is too high. Clow explained that if you use this “to drive your overall resource grade up, what generally happens is that the orebody starts to checkerboard, or fall apart. It breaks down into smaller blocks, and continuity is compromised. This increases the requirement for waste or low-grade development, and unless development is kept up, flexibility is lost and dilution increases.”

Errors in resource grade estimation — RPA has observed that when it comes to geological interpretation, many people find it easier to sit and look at a computer screen rather than go into the field and go underground or into the pit, or look at core and get it right in understanding the mineralization and what the geological controls are. “That’s fundamental,” he said. “You have to confine grades to where they belong rather than smearing them around the deposit. There are many, many examples of that, and they continue to happen.”

Mining low-grade deposits — If you’re mining a 1 gram per tonne gold deposit and your calculations are off by 0.2 gram gold, that’s the equivalent of losing 20% of your deposit. “It’s not like being out by 0.2 gram on a 5-gram-per-tonne deposit,” he said. “You need to understand the sensitivity of the deposit to variations in the grade estimate and make sure people making the decisions understand these risks.”

Inappropriate bulk-density measurements and not recognizing the difference between specific gravity and bulk density, which takes ore porosity into account — The classic example of this is the 1980s case of Canamax’s Ketza River gold project in the Yukon, where the reserve tonnes had to be written down by 30% because the resource estimate had used specific gravity rather than bulk density — failing to take into account the highly porous nature of the oxide orebody. “If anyone had gone underground and lifted up a sample of the ore, they would have known the assumptions were incorrect,” Clow explained. “It’s an extreme example, but doing enough work to get the tonnage right is important.”

Lack of capping — Capping is used to handle nuggety deposits, and RPA swears by the practice. “Many will argue to the contrary, but we don’t think there are many real alternatives out there,” Clow said. He admitted that it’s “still kind of a brute force tool,” but that “it isn’t arbitrary, and there is science behind it.”

Lack of qualifications and experience of the QPs — QPs are required to have a minimum of five years of experience, but that’s not much. “There’s a hole there and there’s no policing of these studies,” Clow said. “People think the reports are vetted by the regulators, but they can’t possibly check every SEDAR filing. In practice only selected ones are reviewed. If an NI 43-101 report has been posted on SEDAR, do not take that to mean it has been reviewed by any regulator.”

On the positive side, Clow pointed out that there are many projects that finish on time and budget, and meet grade and revenue expectations. “There are a lot of capable people doing very good work,” he said. “And experience shows that in periods when markets are quieter, such as now, project results improve.”