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PERSPECTIVES

ISSUES WITH FEASIBILITY STUDIES IN MINING ARBITRATIONS

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Feasibility studies are often at the heart of disputes in the mining and mineral processing industries. Conflicts often arise when the actual execution of a mining project differs from what was anticipated in the feasibility study. In many cases, these conflicts have resulted in international arbitration proceedings between the parties. In this article, we review a number of the key sources of disagreement, and discuss means by which negotiating parties can seek to minimise and control the effects of project uncertainties stemming from the feasibility study phase.

What is a feasibility study?

According to the Canadian Institute of Mining, Metallurgy and Petroleum, a feasibility study is "a comprehensive study of a deposit in which all geological, engineering, operating, economic and other relevant factors are considered in sufficient detail that it could reasonably serve as the basis for a final decision by a financial institution to finance the development of the deposit for mineral production[.]" ('Standards and Guidelines for Valuation of Mineral Properties', Special Committee of the Canadian Institute of Mining, Metallurgy and Petroleum on

Valuation of Mineral Properties (CIMVAL), February 2003, p. 9.) The principal purpose of a feasibility study is to demonstrate the technical and economic viability of a proposed project to expert third parties for the purpose of obtaining financing for the project. If a feasibility study demonstrates that a project is technically and economically viable, and its sponsors are successful in securing financing (either from internal corporate sources or external parties), a project will then typically proceed to a definitive engineering and cost estimate stage.

Feasibility studies are notoriously unreliable ex post. For example, in a paper evaluating the performance of feasibility studies, Chris Grypton of Hecla Mining Co. states, "an analysis of 60 Western Hemisphere mining projects developed since 1980 leaves little room for doubt that the average feasibility-study estimate is a lot less accurate than you or your banker would like." ('How Have We Done – Feasibility Performance Since 1980', Chris Grypton, E&MJ, January 2002, pp. 40-41.) On average, the projects in his sample exceeded estimates by 22 percent, and almost half had cost overruns of 20 percent or more.

Why do feasibility studies perform so poorly on average? In most cases, mining project feasibility studies are developed using a set of assumptions that are based on test results or other experimental information. It is common for test work and analyses to be performed on sample materials. This can lead to uncertainty from a large number of factors. For example: (i) samples may not be representative of the overall ore body; (ii) ore samples may not have been fully characterised in all aspects of mineralogy and metallurgy; (iii) test results may be highly variable, leading to potentially more or less conservative processing assumptions; (iv) market conditions may change between the time of the feasibility study and actual project start-up and operation; and (v) costs for critical input factors (e.g., construction labour, supplies, energy) can change dramatically from those assumed in the feasibility study.

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These and other factors can result in the actual situation faced by a mining project differing substantially from the situation that was anticipated in the feasibility study. These differences can lead to changes in the project execution that can lead in turn to disputes between project sponsors, investors and other stakeholders.

Given that the execution of mining projects can differ from what was expected during the feasibility study, it is not surprising that disputes often arise. Some of the major sources of disputes include: (i) cost overruns; (ii) failure to meet production or cost targets; (iii) changes in product mix; (iv) changes in project scope; and (v) failure to meet employment projections.

In these disputes, the feasibility study is often used as the baseline comparator. It is not uncommon for one side to cite the fact that the feasibility study was not followed as the primary basis for a claim against the project sponsor. On the other side, project sponsors will often argue that the changes were necessary due to 'unforeseeable' changes in either market conditions, mineral characteristics or other additional information that become known only after the feasibility study was completed.

Feasibility study limitations and discrepancies

In most cases, feasibility studies involving mining projects will contain significant background material regarding the bases for the assumptions and design criteria used in the technical and economic sections of the study. These sections are often quite detailed and contain important information regarding the samples analysed, test work performed and the

results of the tests. For a technical or industry expert, these sections can provide a wealth of information regarding the degree of certainty associated with the design assumptions. The quality and robustness of the technical testing can have a significant effect on the overall performance of a project.

For example, the technical testing program can have a dramatic effect on production ramp up rates. In one of the most commonly cited studies of project start-up, Terry McNulty evaluates 41 mining projects and categorises them into four series based on their performance of operating rate versus time. ('Developing Innovative Technology', Terry McNulty, Mining Engineering, October 1998, pp. 51-52.) In this analysis, only those projects that relied on mature technology and "thorough pilot-scale testing of any potentially risky unit operations such as semiautogenous (SAG) milling" achieved 100 percent of design capacity within 18 months of commissioning or start-up. Projects with one or more deficiencies, including those where "pilot-scale test work is incomplete or may have been conducted on non-representative samples" or where "feed characteristics, such as ore mineralogy, were not fully understood" were able to achieve only 90 percent and 70 percent of design capacity (respectively) after 18 months.

Thus, not surprisingly, the best place to start when investigating disputes that stem from execution that differs from the assumptions in the feasibility study is often with the feasibility study itself. Where detailed background information is not contained in the feasibility study, it is instructive to evaluate the claims and representations made by the project developer during the negotiation process. While differences of opinion as to the cause of changes are not uncommon, it is sometimes possible to address these by examining the background of the feasibility study and other claims in detail. It is also important to evaluate the effect of any changes.

In some cases, project developers' experience with the actual minerals and processes will cause them to change the specific processing steps used to produce the desired product. For example, in an iron ore concentrator, the operating party may decide to substitute one form of separation technology for another due to ongoing test work and production experience. Operators continuously evaluate ways to improve throughput, product specifications and recoveries. As they gain experience, they can decide to deviate from the feasibility study process. In these situations, the evaluation should start with determining if the process changes resulted in material reductions in: production volumes; product mix; product specifications; and product values.

If any of the above were substantially reduced due to process changes, it is reasonable for investors and other stakeholders to seek and obtain justification for the process change. Sometimes, the change will be due to the uncertainty inherent in the behaviour of naturally occurring minerals in a production process; in other cases, the operator may have substituted a lower capital cost set of operations in order to save money. Of course, it can sometimes be a combination of the two – a lower cost process is substituted based on additional test and production results. It is this last case that can be the most difficult to address. This has been particularly difficult in recent times where cost inflation in mining projects has made even 'lower cost' process changes more expensive than envisioned in the feasibility study for the more costly process.

Situations where the experimental bases for the process design are not clearly defined in the feasibility study can be more difficult to assess. Sometimes, a project developer will claim that a process has been 'fully tested' and 'proven', but withholds the specific details due to confidentiality or other concerns. As noted above, unless the test and pilot work has been done using representative samples of the actual ore, the process is likely to experience difficulties in ramping up and operations. In these cases, the claims made during the negotiating process must be carefully evaluated and compared with the actual performance to determine the extent to which any performance shortfall was the result of misrepresentations of the state of process development or other factors.

There are also cases where changes result in material differences in other factors, such as employment levels and product mix. This situation is more common where a government entity is involved in providing funding – whether direct investment, infrastructure or special tax relief – on the basis of the feasibility study. In some cases, governments seek additional downstream processing of minerals in order to create more jobs and add more value to the minerals in their jurisdiction prior to exporting. These goals can be in conflict with a project operator, who is likely to be seeking to maximise the value of the project, which can mean producing a saleable product as quickly as possible. Adding downstream operations can delay the production of saleable products due to the added complexity of additional operations.

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Of course, there may be situations where the additional downstream processing that was anticipated in the feasibility study becomes less desirable as the project progresses, due to market, technology or other factors. However, even in these cases, it would generally be advisable for the project manager to consider consulting with other relevant stakeholders before finalising decisions to defer or abandon the downstream processing that was included in the feasibility study.

Conclusion

In summary, while feasibility studies are critical to the development of any mining or processing project, they often contain uncertainties that will result in changes to the project as it is developed. All participants should be aware of the uncertainties and any changes to the original project as a consequence should be made in a manner that retains as much of the original intent of the project as possible. CD

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