

Tailings Management & Sustainable Developmentⁱ

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The International Institute for Environment and Development was commissioned in 1999 to undertake the Mining, Minerals and Sustainable Development (MMSD) project. This led to a partnership between MMSD, the International Institute for Sustainable Development and the Mining Life-Cycle Center at Mackay School of Mines (Reno), which produced *The Seven Questions to Sustainability: How to Access the Contribution of Mining and Minerals Activities*, a framework for evaluating mineral development in terms of sustainable development. Each of the Seven Questions follows along with a discussion of how the might be applied in a tailings management context – specifically, how tailings can be managed in the developing world while advancing the goals of sustainable development.

1 - Engagement. *Are engagement processes in place and working effectively?* As an industry we are becoming better at engaging affected communities and stakeholders and bringing them closer to the decision-making processes. However, we still tend to avoid engagement when considering focused elements of a project, such as siting or selecting specific tailings management technologies, even though both the site selected and technologies engaged can significant affect the community. Changing this can bring both better project concepts and reduce local conflicts.

2 - People. *Will people's well-being be maintained or improved?* It almost goes without saying that modern tailings management is intended to be, and usually is, safe. Beyond that, does the site and technology selection process consider the well being of the local population and the workforce? Has the suitability of local labor and local contractors, for example, been considered in the technology selection? Transferable skills learned by construction and operational personnel include pipe laying, operating and maintenance of pumps and controls, surveying, earthworks, liner construction and maintenance, slope and erosion control, reclamation and revegetation, and various other aspects of civil construction. All of these have broad applications outside the mineral industry and technologies that favor transferable skills (e.g., conventional or thickened slurry) tend to advance sustainability more than highly specialized ones (e.g., paste and dry stacking). Further, technologies that favor labor will tend more towards sustainability than equipment-intensive technologies.

3 - Environment. *Is the integrity of the environment assured over the long term?* Arguably one of mining's biggest legacies is failures of dams and dumps (either structural failure or loss of containment). For many of us names like Omai, Rosia Montana and Los Frailes are well known. In terms of catastrophic failures, tailings dams and waste dumps are the principal cause of fatalities (not related to direct mine workplace accidents) causing an average of 10 deaths per year, and it is not clear if this trend is improving (Smith, 2002 and Martin, 2002). Simply reducing reliance on conventional tailings disposal is of itself a move towards sustainability (Leduc, et al, 2004). On the other hand, the history of alternative technologies such as co-disposal, paste and dry

stacking is short, limited and often does not enjoy broad acceptance by communities and regulators.

4 - Economy. *Is the economic viability of the project or operation assured, and will the economy of the community and beyond be better off as a result?* We tend to be very good at verifying the economic viability of the project, but the community gets much less attention. One of the common criticisms of our industry is that, while mining investment is very large, because it is highly capital-intensive the size of the investment overstates the benefits to the local community. For example, consider the planned Rio Blanco copper-moly project in Northern Peru, with a total capital cost of US \$1.44 billion. A similar investment in public infrastructure would touch nearly every person in Peru, something that a single mine cannot hope to achieve. On the other hand, mining is very good at generating tax revenue. Historically the industry has assumed that it was the governments' job to properly distribute and use tax revenue; however, we now know that those systems are often dysfunctional. In Peru, for example, the tax law provides for a portion of the federal tax to be allocated to the local communities for local development projects. Though this law has been in place for a decade none of the money has been spent because, in part, the local communities lack the capacity to even create development plans that meet the federal government's requirements. Some of the mining companies are now responding by creating direct funding mechanisms for local social capital and infrastructure projects, completely bypassing the cumbersome – and often corrupt – central government. While this increases costs by effectively creating another tax, it directly solves the community-based problems, eases social unrest and can significantly improve mining's perception among affected communities.

5 - Traditional and non-market activities. *Are traditional and non-market activities in the community and surrounding area accounted for in a way that is acceptable to the local people?* By expanding employment in areas with transferable skills, a more sustainable workforce results. Many of these skills are directly applicable to traditional activities, such as irrigation, erosion control, stone masonry, slope stabilization, and so forth. Admittedly the tools and techniques used at a modern mine are not directly applicable to traditional rural life, but certainly some work areas have high transferability.

6 - Institutional arrangements and governance. *Are rules, incentives, programs and capacities in place to address project or operational consequences?* The key here is having systems in place to address project consequences, especially unforeseen ones (since the foreseen consequences should already have been provided for). In many cases the affected communities are small and lack any strong government, and the regional or federal government is ineffective at the local level or has different objectives. As we are seeing in Peru, some direct intervention by the companies with the local communities is sometimes the only way to reduce conflict and address community needs. This may take the form of direct funding, or through helping the communities build governance and social capacity through training, education, and collaborative participation. Since the latter takes patience, a long-term vision, and success is hard to measure, it is also often sidelined. However, improved governance and social systems is often the only truly sustainable development we leave our host communities.

7 - Synthesis and continuous learning. *Does a full synthesis show that the net result will be positive or negative in the long term, and will there be periodic reassessments?* Applying this to tailings management suggests a very holistic view of the process, including the obvious (site selection, technology trade-offs, operations and closure) to the less obvious (cultural impacts, historic land use patterns and future trends, the likelihood of the community honoring our intended post-closure land use and *visa versa*, and so forth). It also clearly points to the need for continuous learning – a process of engagement with the community whereby they come to know us better and, importantly, we come to know them. And it is through this knowing that true sustainability can only be achieved.

References

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