



# Miners face closure challenge

Mine closure has come a long way in the last 20 years, with miners becoming much less resistant to finding more sustainable, environmental and community-friendly ways to cap off mining activities at their sites

**"M**iners are starting to think differently," Agnico Eagle senior vice president for sustainable development Louise Grondin says. "I remember the days when talking to mine designers about putting some waste back into pits was way too complicated for them to include in their planning. It was not something they wanted to do. Now, everybody's open to it."

A growing acknowledgement that closure is a long-term process which needs to be considered in the earliest stages of mine planning and development is permeating through the industry. This increasing awareness is bolstered by industry organisations, like the International Council on Mining and Metals (ICMM), which have produced industry guidelines for planning integrated mine closure.

Even with this evolution in approach, there are several complicating factors and impediments facing the industry which need to be resolved before all mines can benefit from a thorough mine closure plan.

## MANAGEMENT, OPERATIONS

Though the industry has been making strides in its mine closure processes, there is still a need to go further in

bringing management on board with operations needs.

"There's always been a separation between operations and closure on many sites, but we're starting to see that separation disappear," SRK Consulting Group chairman Jeff Parshley says.

Companies have been working to bring closure into operational thinking and planning for the last 20 years, he says, and are increasingly looking to strategically make small changes in operations that could decrease closure expenditures down the line.

Forcing mining companies to consider mine closure in the early stages of projects, as many regulations now do, can improve the economics of a project, McKinsey & Co's vice president of MineLens Nathan Flesher says.

"Closure can fall into a category of 'important' but 'not urgent'," he says. "It's always a bit of a side project." But regulations, which force that to be accounted for more consistently, now make closure a much bigger part of the operations, prompting many mining operations to 'rehabilitate as you go'.

But there is still very much a need for a significant mindset shift, principal mining engineer

Shervin Teymouri of Vancouver-based Minelt Consulting says, emphasising that the industry needs to move beyond the 'closure' label into something more all-encompassing.

"It's not 'closure', it's 'closure management'," he says. "You need to manage closure from the beginning [of a project]," he says. "And you need to be constantly managing that. If you change the closure timelines, objectives and plans, you can create that sort of thinking."

## AN HR CONUNDRUM

Another substantial challenge facing the industry, as it faces a period of increasing mine closures, is the lack of employees who have had hands-on experience in managing the process.

The last major period of mine closures happened in the 1990s, SRK's Parshley says. Very few of those workers are still in the industry, given the supercycle of the past few years.

"The industry itself has the experience," he says. "But closure projects always benefit from individuals who have been through it [first-hand]. And right now, younger people don't have the actual experience of closure." ►

*Agnico Eagle says it integrates biodiversity conservation and land use planning considerations through all stages of business and production activities*

*Photo: Page Burt*



*As a result of Agnico Eagle's restoration work, the Manitou site will be reclaimed, with wildlife habitats being recreated and land use optimised*

*Photo: Agnico Eagle*

► However, more and more mining companies are working on progressive rehabilitation – or mine closure-related activities to bring land not currently used for mine activities to post-closure level – while active mining continues. This is giving the younger generation of mine employees first-hand experience in closure activities, Agnico Eagle's Grondin says.

"You don't have to wait for a mine to close to rehabilitate part of it," she says, pointing to Agnico's approach at one of its Mexican gold mines to take heap-leach pads out of commission once they were no longer in use.

"There's an incentive to start early to test methods. Progressive rehabilitation is a much better way to start your closure process," she says.

Agnico is also working with local doctoral students in Quebec's Abitibi region in Canada to come up with new solutions to environmental challenges presented with closure. Along with five other companies, Agnico is sponsoring a research institute and tailings and waste rock management to improve closure methods.

"It's almost like we're building expertise while operating," Grondin says.

Anglo American's head of mine closure planning, Carl Grant, points out that there are many advantages to undertaking closure while the mine is still in operation.

"Undertaking more progressive rehabilitation throughout the life of the mine not only minimises the disturbance footprint, but also can assist in addressing dust, water and

visual amenity impacts for surrounding communities," he says.

### **BIGGER TAILINGS DAMS**

Mine closure is becoming more complicated now because of the way mines are being built, Stantec's mining leader Andrew Watson says.

"We seem to be building bigger and bigger tailings dams because mines are getting bigger," he says. "In terms of the risk they represent, tailings dams remain a high-hazard structure for a very, very long time."

Tailings dams, while representing an environmental and potential reputation risk, especially in the wake of the Mount Polley disaster, are also a financial millstone for mining firms.

"All other elements of a mine you can make go away to an extent, but you have this big lurking thing that remains," Watson says, referencing the tailings dams. "It's a liability for the corporation for a long time past closure – so how we close these facilities is going to continue to be a big deal."

Deeper and more expansive mining is also dredging up a "new stew" of metals and minerals, many of which can be harmful, Memorial University of Newfoundland's Dr John Sandlos says.

"There's not that many mineral deposits in the world left, which means breaking up more rock and getting an infinitesimally small percentage of metals, with the rest being waste," he says. "It can include a whole stew of heavy metals. In small doses, things like zinc aren't toxic. But other minerals are, namely arsenic and mercury."

### **LAND REUSE**

A surging global population is putting a higher premium on land, which mining companies increasingly must take into consideration in their mine plans.

"Thinking what the mine can be later separates forward-thinking mine companies in cooperative jurisdictions from others who aren't thinking ahead," McKinsey's Flesher says.

"A closed mine isn't a permanent wasteland," he says, adding that land formerly used in mining operations can be a good place to put future schools, airports, shopping centres and roads.

"A large percentage of major infrastructure in West Virginia [in the US] is built on past mines," he adds.

*Regular surface water sampling downstream of the Manitou site is being performed, showing a neutral pH and a significant decrease in metal loadings*

*Photo: Agnico Eagle*



Looking to post-mining development can also help build relations with the local community, McKinsey mine expert with MineLens Karilyn Farmer says.

"It allows an earlier consultation with local groups about what closure means to them and how infrastructure will be used by them once the mine closes," she says.

Even when a good collaborative relationship between the community and the mining company exists, expectations of the community must be managed effectively, Stantec's Watson says.

"Mining companies have an opportunity to manage the discussion better, because the closure of a mine has a tremendous social impact," he says.

Having an upfront conversation about what post-mining scenarios will look like will shift community assumptions, while also altering the company culture to be positioned to the post-mining future, he adds.

"[The land] is never really going to be put back the way it was," he says. "[In the future], we won't say 'we're done and we're leaving'. We'll say,

'we changed it, we changed it in a manner that is considered sustainable by the community that's living there now, who will continue to benefit from it'."

### SMALL MINERS' STRUGGLE

Though much in the mine closure process has changed, one element has remained the same: the cost of closure is still much easier for major mining firms with a variety of assets on the books to weather than it is for smaller, one- or two-project mining companies.

"Larger companies will have stronger balance sheets," PWC's Canadian mining leader Dean Braunsteiner says. "They'll be able to find ways to finance reclamation costs or future bonding requirements much more easily than smaller one-mine asset companies. They're the ones that struggle with it, because a lot of [closure] funding comes out of operational cash flow."

Smaller firms are also less capable of riding out delays in permitting, he notes.

"The permitting process is a big challenge. We've gone from a place

where mining companies were able to permit a mine between 5 and 10 years. Now, it's between 10 and 20 years."

The high costs around closure mean that mines run by smaller firms will start the process much later, Teymouri says.

"At the end of the day, for small miners, it comes down to the business case. They have to put so much money and time and effort into these things, so they try to avoid it, and try to put it on the back burner as much as they can," he says.

Governments should provide clear and simplified guidelines for mining companies to follow for their closure plans, which would ease pressure on small mining firms, which often do not have the money or manpower to devote to crafting a specialised plan for their project, Teymouri says.

"Regulations have to provide clearer objectives for short-term, mid-term and long-term closure objectives," he says. "A mine is a dynamic eco-system. A closure plan [needs] to be fully integrated, and has to be integrated and updated every year." ►

**"The cost of closure is still much easier for major mining firms with a variety of assets on the books to weather"**



**Diemme  
Filtration**

### DIEMME® FILTRATION GHT 4x4 FILTER PRESS



With its unique overhead beam design and four pull-to-close hydraulic rams, the GHT 4X4 outperforms all traditional filter presses through superior capacity, efficiency and reliability. It is fully automatic and designed to dewater large volumes of slurry with maximum speed and efficiency.

**A brand of  
Aqseptence Group**

[www.aqseptence.com](http://www.aqseptence.com)

► Clearer regulations will make it much easier for smaller mine companies to implement better closure management plans, he adds.

### POST-CLOSURE MANAGEMENT

Even after closure is completed, mining companies are unable to walk away, as they will still be held responsible for any lingering effects of the mine. One such concern, which has yet to be addressed by the industry, is the attraction of closed mines to artisanal miners, SRK's Parshley says.

Describing artisanal miners on closed mine sites as "a new type of risk", Parshley says it's particularly of concern to mines digging up high-value commodities like diamonds and gold.

"Mines are inherently unsafe without safety measures in place," he adds. "You're going to have dangerous conditions if people try to go in [and mine after the area has been closed down]."

Moreover, artisanal miners on the post-closure site can reverse the positive outcomes of a successful mining closure procedure.

"If artisanal miners come in after you've closed the mine, it can compromise some of the measures implemented during closure to protect human health, public safety and

the environment, and end up in a situation where closure works are actually compromised," he notes.

Mining companies are at a loss as to how to prevent post-closure artisanal work, but he notes that finding a solution is urgent.

"This issue has the potential to pose a long-term reputational risk to a mining company if their work, no matter how well it was done, is compromised, and there are public safety problems or environmental damage. Their reputation and licence to operate become affected."

Post-closure, there is also a real risk of mines being abandoned by mining companies, with responsibility for care and maintenance falling to local communities and governments, Memorial's Sandlos says.

Abandoning mines is not just a concern for mines at their end of life, he notes. Local and federal governments in Canada do not have the means to force mining companies to maintain these sites if firms no longer have the capacity to do so. "There's nothing to prevent mining companies to pull out early in the projects and declare bankruptcy."

The industry as a whole must find a way for mining companies to better balance their non-operating mines,

Stantec's Watson and Resa Furey say in a paper prepared for Planning for Closure in 2016. Mining companies face diminishing cash flow and staff availability when handling 'mine closures without end', while abandoned mines shift the burdens first to investors, and then the public.

### IN SUM

Getting mine closure right must be a top priority for the industry, as it is an integral part of companies' sustainable development strategy, PWC's Braunsteiner says.

"It's really their future calling card, because if they get it wrong, they won't get the opportunity to go into another jurisdiction and open a second, third or fourth mine," he says.

Yet there are reasons to be hopeful about the future of mine closure, Bennett Jones partner David Burse says from Vancouver. "There's always work to be done, but there has been an acceptance among progressive mining companies trying to establish clear and progressive policies that respond to these rising social expectations."

Companies are aware that they "need to be seen to be transparent about how they approach business and follow best practices", he says. "The world is always watching." ♥

*During caribou migration, traffic on the all-weather access road and outdoor activities on Agnico's mining sites are shut down*

*Photo: Page Burt*

