

On the record

Managing environmental impacts can create a significant burden for mining companies

MINING operations have a potentially significant impact on the environment throughout their life cycle, from exploration and construction to operation and closure. Companies seeking to manage and minimise these issues often implement environmental policies that commonly state, as a minimum, compliance with legislation.

Perhaps the most obvious form of legislation are environmental permits that impose site-specific conditions on an operation, and force companies to manage environmental impact responsibly. These, of course, vary from country to country, although there are common themes.

They require the permit holder to meet operational procedures and practices, including management details for unusual occurrences. Some regimes (Europe and US) also introduce the need to use particular technology ('best available technology' in Europe), which, for example, will produce the least waste, use less hazardous materials or enable recycling.

Permits also require an ongoing monitoring programme, with defined targets for many of the variables measured. Particular sampling may be needed around waste rock dumps, tailings facilities and sewage outfalls. Breaches need to be addressed and reported to regulators; sometimes within 24 hours of the event occurring.

Remedial measures need to be put in place and repeated violations can, in extreme cases, result in prosecution and withdrawal of permits. The data also needs to be reported both internally and externally in differing formats and at regular intervals. Such processes create a significant burden on many companies.

STAKEHOLDER INFLUENCE

Various stakeholders, including local communities, indigenous groups and NGOs, also have an ever-increasing demand that issues effecting the environment are well managed.

Neighbours, for example, are likely to be concerned about the local environment and will make their feelings known. These expectations of voters have sometimes resulted in governments making it obligatory for companies to collect and report publically on the release of pollution.

BY GRAHAM HOLTOM

The National Pollution Inventory (NPI) in Australia, for example, requires qualifying companies to report on the release of 93 substances identified as a result of their potential impact on the environment and health.

Similarly, the Toxics Release Inventory in the US, born from the Emergency Planning and Community Right to Know legislation, places obligations on industry to report information. Indeed, in the US, firms have to produce particular reports to fulfil this requirement, such as discharge monitoring reports (DMR).

North of the border, the Canadian counterpart to the toxics-release inventory exists as the Canadian National Pollution Release Inventory.

In Europe, similarly, such data is reported through the European Pollutant Release and Transfer Register (E-PRTR), which contains data reported annually from some 24,000 industrial facilities covering 65 economic activities across Europe.

With rising concerns about global warming, many countries also report data nationally on greenhouse gas emissions. This takes place through emissions trading schemes in Europe and North America.

In Australia, the National Greenhouse Gas and Energy Reporting Act 2007 (NGER) has created a national framework for reporting emissions, and obliges qualifying companies to do so.

In each case the process may work slightly differently, but all require qualifying companies to collect and report on data, and with the international emphasis on global warming this can only increase.

BUSINESS PERFORMANCE

In addition to legislative processes, some aspects of environmental management are driven directly by business performance. Many companies will instigate an environmental management system (EMS) whereby improved environmental performance may also seek to reduce costs. Examples include reduced energy use, waste production or water usage.

Other objectives of an EMS will have a less tangible benefit, such as improved compliance and better relationships with regulators, but will nevertheless deliver a business benefit.



MINE DEVELOPMENT STAGES

Stage	Measured parameters
Exploration	Area of land disturbed; energy use; dust and noise (depending on location)
Construction	Background data before construction begins and comparison during and after construction Metals and pH in groundwater; toxicity in surface water; cyanide; sulphate; oil and grease; alkalinity; bacteriology; conductivity; turbidity; groundwater levels and surface water flows; water temperature; flora and fauna; dust; noise
Operation	Groundwater depth and quality, including metals; dissolved solids; cyanide; pH; conductivity; dissolved oxygen Surface water includes water flow; taste; total nitrogen and phosphorus; carbonate; bicarbonate; nitrate; sulphate; silicon dioxide; aquatic life (speciation and totals) Land quality may also be measured. Dust; noise and vibration; particulates from stack emissions; sulphur dioxide; arsenic; spill incidents; meteorological data
Closure	As above, but includes mapping and trends analysis. Revegetation

BENEFITS OF SPECIALISED DATA MANAGEMENT SYSTEMS

Proposed benefit	System features
Time/cost savings	Several authorised users can access the same information at the same time Automated processes exist (eg import and QA/QC of data, alerts of breaches or near breaches and production of regulatory reports) Monitoring schedules may be set up to notify individuals of due tasks and managers of late ones Data may be imported automatically and quality checked User-defined calculations of raw data to produce KPIs and aggregated data across different geographies
Improved stakeholder confidence/brand image	Data is fully auditable System produces timely and accurate reports Software may be independently accredited Environmental breaches can be reported rapidly Data is easily summarised across geographically disparate businesses Improved understanding of data as software enables staff to focus on the value of data rather than input
Improved environmental performance	Visible and well-managed adherence to performance targets Data can be shared around the organisation, leading to awareness of environmental issues
Risk reduction	Reporting and data awareness improves relationship with stakeholders Validated data can demonstrate concerns regarding health impacts on employees and local residents Information can be easily disseminated more widely among all stakeholders (regulators, investors, local community)

For many companies, an EMS will also dovetail into a broader process of sustainability and corporate social responsibility.

Sustainability aims to meet the needs of the present generation without compromising the needs of future ones. It aims to create growth and wealth without any of the drawbacks.

Sustainability is therefore broader than environmental management and a company needs to develop its own key performance indicators (KPIs), as guidelines to meet sustainability goals. Some of these are qualitative; however, others are based on clear data generation by the business.

There are a number of national and sector-specific groups developing guidelines for sustainability and relevant KPIs (Mining Association of Canada's Towards Sustainable Mining initiative), but, globally, perhaps the most widely recognised are those produced by the Global Reporting Initiative (GRI).

DATA COLLECTION

All of this means that companies need to collect, manage and report data, sometimes in vast quantities. This information can come from a range of sources, including monitoring carried out by employees, consultants, contractors and analytical laboratories.

Furthermore, while there have been many advances in monitoring and logging data, analysis and reporting are often laborious tasks that are carried out in Microsoft Excel or similar software.

This brings a whole range of problems, including:

- How do managers know they are on top of all of their monitoring and data collection?
- How can companies easily judge performance and compliance (eg with permit thresholds)?
- How can data be shared?

- How can organisations regularly and efficiently produce their reports for internal or external stakeholders?
- How can users view historical trends in data over many years?
- Can users defend their data and audit it?
- How much time does all of this take?
- How many errors are in the system?

Many companies spend a good deal of money on data collection and collation; in some cases up to US\$350,000 at a single site. Yet they are not able to capture the full value.

This can result in staff working inefficiently crunching numbers, reporting is often late and the system becomes error-prone, damaging relationships with regulators and other stakeholders.

EHS Data has been providing specialist software tools to help with data management for 15 years and now provide systems to a variety of sectors, including mining companies, around the world.

These systems enable data to be managed in a secure, auditable environment, bringing significant benefits to clients.

Over the years the data-management task has grown and changed drastically in terms of volume. An increase in complexity has also arisen as companies need to collate and report data in different ways, for different purposes and across different geographical and language barriers. Without specialist tools these processes can become burdensome.

Within these rapidly changing circumstances, specialised data-management tools bring opportunities to reduce costs, strengthen relationships with stakeholders, reduce risk and, at the same time, improve environmental performance.

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This article was compiled with the help of clients who include: Catherine Wharton of Kalgoorlie Consolidated Gold Mines and president of Goldfields Environmental Management Group (Western Australia); Cheyne Mann of Newmont's Boddington operation; Ben Ferris of Harmony Gold, Papua New Guinea; and Brent Hamblin of Inmet Mining, Canada