Establishing a culture of dry floors has led to dramatic reductions in water use in many industries

Learning from manufacturing

Other industries are a great place to learn more about water use efficiency, Resa Furey of MWH explains

How water is used and whether it is used efficiently are of strategic importance in mining. Rapidly depleting aquifers, communities set on protecting water sources, and increasingly strict regulations and effluent standards present risks to be managed if production targets, returns and stakeholder relationships are to be maintained.

Industries including oil and gas, and manufacturing go to great lengths to understand the risks and costs associated with their water and they share ambitious goals with the mining industry to reduce water use. Following are some lessons that can be learnt.

MEASURE AND ANALYSE

Measuring and monitoring provides information so that operators can make good decisions. Manufacturers generally buy water from, and discharge wastewater to, municipalities. They are charged for water in and out, and the quality is closely monitored. As a result, manufacturers generally go to great lengths to collect water flow and quality data, which is then measured, and carefully managed.

This data helps to fine-tune the metrics on water use and accomplish goals. At manufacturing plants, data collection is facilitated by the fact that flows are often smaller than those commonly found at mines, and the process is closed, whereas mines are exposed to various factors (precipitation, evaporation and other environmental variables) that complicate the water balance.

In addition to passive data collection, conducting water audits that define the sources, uses, volumes and quality requirements help identify the 'thirsty' areas of plant or mine. Water audits can identify inexpensive fixes that can be prioritised and implemented quickly, as well as longer-term projects.

In contrast, most mines use ground and surface water, and often consider it to be 'free of charge'. Yet the true cost of water includes costs for permitting, well installation, investigations, pipelines, pumping, maintenance, treatment and disposal of water, as well as the impact that water quality has on extraction efficiency. These costs make effective use of the water worth measuring.

The water balance in any operation and the chemical mass balance of those water streams is an extremely important source of information. Every mine and manufacturing plant needs a full understanding of the water balance (water inputs versus outputs) and what is in the water.

Imagine the water balance for a food and beverage company where water is one of the main ingredients in the product: if water withdrawal is limited, too much residual use could stop production. A water balanced operation means taking an 'only what you need' approach to water, because you know how much you need.

Knowing what is in the water and understanding which streams can be reused with minimal treatment can improve the water equation and shift the balance in your favour.

SET GOALS

With this information, operators can set water reduction goals. An example of one such goal is: "By 2020, safely return to communities and nature an amount of water equal to what we use in our finished beverages and their production."

Achieving goals like this means going beyond conservation to embrace projects with at least one of four objectives:

- Improve access to water and sanitation;
- Protect watersheds;
- Provide water for productive use; and/or,
- Educate and raise awareness about water issues, including engagement on water policy.

ACT

In every industry, conservation is often the first goal and the beginning to mitigating water-supply risks. There is a reason why reduce, reuse, recycle is said in this order – because conserving water is the easiest and least expensive of the three.

Reusing and recycling water are two other effective ways to conserve. Water recycling takes place when water is sent back or used again within the same process, regeneration (aka treatment) may occur prior to recycling.

Water reuse takes place when water is taken from one process and used in another – regeneration may occur before the water is recycled. Adding infrastructure such as pipes and treatment circuits to enable reuse and recycling can be costly, which is why most companies look for opportunities to conserve water.

All reuse and recycling circuits must consider the quality and chemistry of the incoming water and compare those metrics to the water stream that is needed. Opportunities for water reuse and recycling are best considered at the plant design stage since retrofitting an existing operation to accommodate reuse or recycling can be even more expensive.

It should be noted that miners are – in many cases – far ahead of the manufacturing industry when it comes to water reuse and recycling, it is not uncommon for up to 90% of the water used in mineral processing to be reused.

One poignant conservation lesson that can be learned from manufacturers comes from the idea of establishing a culture of dry floors. This has led to dramatic reductions in water use in many industries, and with some effort can also be adopted in mining.

Sharing production metrics and costs with employees is done routinely across most manufacturing industries. Some sites go so far as to also communicate the water costs and volume used. Including these numbers on the daily production board communicates the importance of water and can be a significant motivator in driving water conservation. Sharing this information helps set realistic goals and allows operations to be held accountable towards reaching their goals.

Adding an element of fun or "gamification" such as turning water-use reduction goals into a contest is one tactic used in other industries. When posted in a conspicuous place (such as the employee lunch room), this daily reminder reinforces which goals are important and how well the company is doing at achieving them.

Finally, another lesson other industries provide is the idea of making treatment part of the business – while not directly transferable to all miners, some large chemical manufacturers, for example, also play in the water treatment industry, ie treatment is part of their business. While treatment may be a necessary cost of operation for a mining company, leaving behind a legacy of clean water can only be beneficial.

Leveraging the best practices from other industries can inform our approaches to reducing, reusing, recycling and replenishing water resources. What is precious must be used wisely.

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