AVEVA

Vale SA: Responsible mining with data

Vale SA - www.vale.com
Industry - Mining and metals

Challenges

- Monitoring environmental impact of operations

- Complying with environmental regulations and reporting

- Limiting operational downtime

Solution

- Deployed AVEVA™ PI System to centralize all 35 environmental monitoring stations' data in real time, designed simple and readable dashboards using AVEVA™ PI Vision and generated reports using AVEVA™ PI Datalink™ to ensure regulatory compliance

Results

- Monthly operator field trips decreased from an average distance traveled monthly of 600km to 200km, reducing the exposure of operators to field risks, reducing vehicle carbon emissions and increasing operational efficiency

- Average time spent collecting and reporting air quality data went from five hours to two minutes

- Average time required to update all data went from seven days down to five minutes

- Average time to implement communication infrastructure and integrate a station into the monitoring platform went from one month down to three days

- Automated reports and alarms reduced failure response time, improved data traceability and enhanced data consistency

- Mitigated risk of environmental fines and ensured regulatory compliance

From cars to medical devices, rollercoasters to guitar strings, the metals from Vale SA mines make up the essential material of our lives. The nickel and iron ore these mines extract become our entertainment, our shelter and our tools. The steel made from iron ore even keeps the hinges of our refrigerator doors from breaking. However, if mismanaged, mines can wreak havoc on surrounding communities and ecosystems, as well as pose serious safety risks for workers. And with more than 80 operational units in over 30 countries, Vale SA is conscious of its carbon footprint. How, the global mining company asked, can it more responsibly extract and transport these natural resources while minimizing its environmental impact? How can it prioritize the safety of its workers and surrounding communities? How might Vale balance the need for natural resources with environmental conservation?

"Using AVEVA PI System, we avoid the exposure of operators to field risks. It has increased the health and safety of operators as well as operational efficiency."

—
Thayse Rodrigues
IT Consultant, Ihm Stefanini

Monitoring mines with data

Vale invested in a digital transformation of its Environmental Control Center to answer some of these questions. Vale's Environmental Control Center uses monitoring stations around the world to measure things like the suspended particles in the air from ore transportation and the water condition of rivers and lakes, alongside weather and forest fire detection data.

Vale used a digital platform based on AVEVA PI System to centralize all 35 environmental monitoring stations' real-time data. This platform includes simple, readable dashboards with smart data analytics to make quick decisions about environmental impact and operational efficiency.
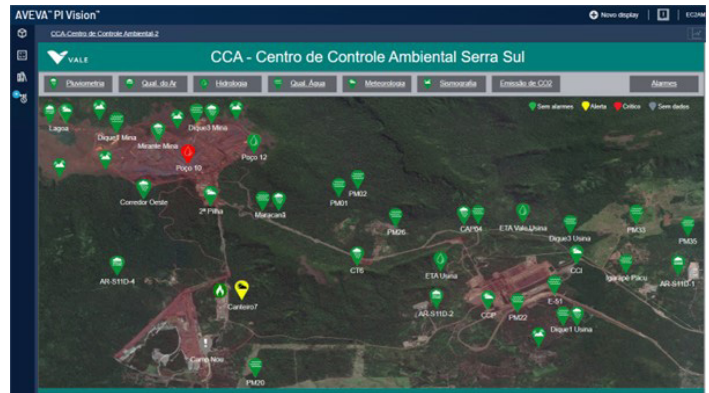

Operators can see all 35 monitoring stations on one screen. Users can immediately see the station theme, where it's located, measurements and any alerts.

Collecting, analyzing and visualizing station data

Vale SA gathers data across its 35 monitoring stations, which are broken up into five themes: air quality, water quality, hydrology, weather and forest fire detection. It then transmits this data to AVEVA PI System, which acts as a central repository that stores, enhances and delivers the data. Applying calculations using AVEVA PI Server's analytics, operational teams use current and historical data to understand environmental conditions and act on automatic alerts.

Vale uses AVEVA PI Vision for easy visualization of monitoring station data. Its 27 screens, including data from 600 tags, show information for all 35 stations. Users can get a quick view of all stations with the same theme or click on a particular station and see more detailed information, including alarm detail, custom graphics and trends, and all measurements needed to evaluate operations. They can easily compare real-time and historical data from one station or different station and analyze this data in seconds.

Part of Vale's monitoring strategy includes measuring and managing its energy use. This energy use includes the fossil fuel and ethanol consumed by Vale's operational vehicles, the electricity consumed by process plants, and the emulsion used in mine blasts.
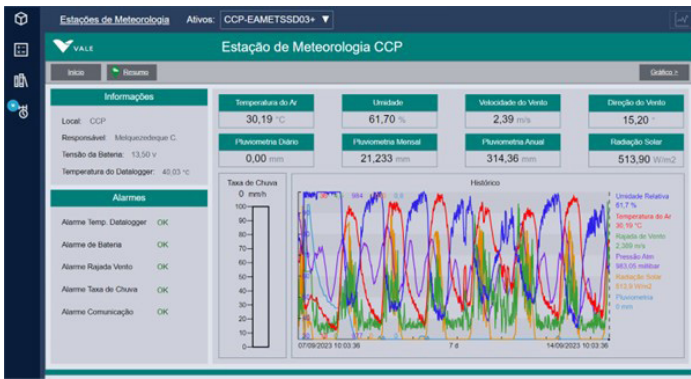
A weather station dashboard provides general information, alarms, measurements, trends and customized graphics.

Using AVEVA PI Vision dashboards, users can compare data from different monitoring stations and analyze this data, both real-time and historical, in seconds.

An emissions screen in AVEVA PI Vision calculates and stores data on carbon emissions and shows all variables involved in the calculation—per day, per month, and per year. The company then uses AVEVA™ PI DataLink™ to share operational and emissions data in a standardized, sharable format, which makes it easy for Vale to report to government regulatory agencies and ensures consistency across all data.

Remote monitoring and operational efficiency

Before the Environmental Control Center implemented its new data platform, all its monitoring was done manually. The team had to travel long distances through remote areas to manually collect water samples, download information from air quality stations, and bring it to the lab for analysis and assessment. Before the project, the average time Vale spent collecting and reporting air quality data was over five hours. Now, the average time for Vale to generate air quality reports is two minutes.

Remote travel exposed the team to field risks, which not only posed safety concerns for workers but also increased response time and decreased operational efficiency.

Now, monitoring stations transmit data every five minutes, as opposed to the seven days it used to take to collect this data manually. This quick access to data enables faster, more agile decision making, which means teams can respond more quickly to any events that could negatively impact the environment.

This operational efficiency is good for Vale and good for the environment. Vale knows that the only way forward for the mining industry is to keep sustainability initiatives at the forefront of operations. Responsible mining means balancing the need for natural resources, the minerals and metals we need to live and thrive, with environmental conservation. With its smart data platform, Vale can further its net-zero goals while also keeping workers safe and optimizing operations—a win across the board.

[Watch the full presentation]

Citation

Moreira, L., Rodrigues, T., & Marques, Y. F. "Pollution prevention & netzero carbon: Vale's digital journey to achieve sustainable goals."
https://resources.osisoft.com/presentations/vale--pollution-prevention-and-netzero-carbon--vale-s-digital-journey-to-achieve-sustainable-goals