

CASE STUDY

Vigilante Air Quality Station™

Return safely and quicker to the face.



Vigilante AQS™ Case Study at Nevada Gold Mines - Cortez Mine



Nevada Gold Mines is a joint venture between Barrick (61.5%) and Newmont Corporation (38.5%), creating the single largest gold-producing complex in the world. The mining operation comprises eight mines along with their associated infrastructure and processing facilities. Nevada Gold Mines is operated by Barrick.

Cortez Gold Mine is located approximately 75 miles (120 km) southwest of Elko, Nevada, USA. The Cortez Hills Underground Mine (CHUG) is fully mechanized, with large scale equipment using a combination of cut and fill mining with cemented backfill and primary and secondary longhole stoping with cemented and uncemented backfill.

Identifying the mining industry's demand for real-time data to monitor and control air quality, Maestro Digital Mine worked with Cortez Mine to address the challenges associated with working in the harsh underground mining environment by protecting miners from acute or chronic gas related health conditions. Nevada Gold Mines integrated Maestro Digital Mine's vital and life saving digital technology, the **Vigilante AQS™** air quality

stations, to measure environmental conditions in real-time for worker health and safety and to reduce the total installed infrastructure costs.



The Challenge

Underground mines have challenging environmental conditions, including toxic gases from blasting, operating vehicles and/or gases given off by the surrounding strata rock. At greater depths, the air is denser and continues to pick up heat from the exposed rock causing worker heat stress concerns.

Nevada Gold Mines goal is to make its operations as safe and efficient as possible, at the lowest possible cost.

To ensure worker safety, fixed environmental sensors transmit real time data from the underground workings to the surface command center. The sensors allow miners to return safely to their working areas more quickly, allowing significant productivity increases along with monitoring critical areas for potential fires. All critical sensors require frequent maintenance and calibration to maintain accurate and reliable measurements. The previous used technology required underground calibrations at each individual location using test gases and calibration equipment. However, several physical and environmental challenges prevented accurate and repeatable calibrations. Calibrating gas sensors underground is very difficult, time consuming and fraught with calibration errors thereby limiting the confidence of the legacy monitors.

Cortez Mine required a digital technology solution that could accurately and reliably calibrate their environmental sensors (airflow, airflow direction, CO, O₂, worker heat stress and temperature). The solution needed to be simple, cost effective and easy to maintain.

The Solution

Working in partnership with the Team at Cortez Mine to meet their, Maestro aided in installing the **Vigilante AQS™** Air Quality Stations that feature digital gas sensors that can be calibrated on surface in a stable controlled environment. The digital sensors then can be “hot swapped” by a ventilation technician without the requirement of any sort of underground calibration. Built upon the IoT (Internet of Things), the digital sensors compensate for barometric pressure and temperature and have a complete suite of real-time diagnostics to help determine the health of the complete system and provide maximum system uptime.

The **Vigilante AQS™** accurately measures airflow and direction, wet and dry bulb temperature, worker heat stress, barometric pressure, gas concentration and dust particulate matter – reducing downtime and enabling miners to return to the face sooner and safer.

CHUG is accessed by twin declines driven to the upper level of the deposit. Currently access for the Middle and Lower zones is by a spiral ramp adjacent to the orebody. The twin declines are interconnected at regular intervals and these connections contain air doors to separate the intake and exhaust airways. An additional set of twin declines, for access to the Lower Zone and the Deep South Zone are being developed.

Vigilante AQS™ air quality stations have been strategically located to monitor the complete ventilation system as well as monitoring the motor load centers (MLC) for potential fires. Carbon monoxide, oxygen, temperature and airflow are all monitored and used for optimizing blast clearance times. The blast cycle is done during shift change and the real-time environmental conditions are collected and displayed allowing the miners to safely return to the face quicker.



Clifton Mauldin, Process Controls at Nevada Gold Mine’s Cortez Mine states, “The real benefit to the **Vigilante AQS™** is that they are just so reliable for one thing. Secondly, the configuration and digital communications are simple and they always work. Easy to calibrate, install, and maintain. No troubles when it comes to calibrating on surface and rotating the gas sensors.”

Mauldin goes on to say, “Essentially, it is a “Plug and Play” device that is small and compact with PoE capabilities. So, we don’t even need to run power to them, we just run a PoE Ethernet to them and they run off on that power.”

In addition to the Vigilante AQS, Cortez Mine has also installed **SuperBrite Marquee™ Displays**.

Cortez Mine is using the Marquee Displays down in the headings where the mining activity is taking place. Located at the beginning of the headings, the dispatcher is connected to the Marquees which displays critical information such as the level, what equipment is being used in the active heading, activities such as drilling and blasting, mucking etc. to keep people informed in real time. It is vital for the miners to know what is happening in real time on the heading and can call dispatch if they have any questions about what information is on the Marquee Display.

Cortez Mine also uses strobe lights to communicate through the remote IO in the Marquee Display to activate the strobe lights. So, if they are mucking in the heading, the dispatcher can trigger that strobe light which are attached to the Marquee for additional precaution and communication with the miners.

Mauldin shared that, “Since we implemented this innovative process to our communications, we got the strobe lights set up to the Marquees from the dispatcher, it makes it really simple for them to just go to a webpage in our SCADA and they can just push a button and bring it right up and do it from there.”



Outcomes

Mauldin remarks, “We like to standardize the equipment throughout the mine, so all the gas monitors (Vigilantes) are the same and when we get a new device, we very easily integrate it...pretty much just do a copy and paste and it is done. The set up and installation of the Vigilantes are easy and takes very little time.”

“My experience with Maestro Digital Mine has been a really good for many years now. Their support and ongoing service is first rate. I highly recommend working with the team at Maestro and would recommend any of their products and solutions. They are always thinking of the next innovation and new applications that can be integrated throughout the mine”, states Mauldin.