



Dust Control at Mining Operations Valé Iron Ore Facility, Brazil



Site Report

LOCATION:

Guaíba Island Terminal, Brazil

CUSTOMER:

Valé

DISTRIBUTOR/CONTRACTOR:

IRRICOM Intelligence

RAIN BIRD PRODUCTS USED:

- SiteControl
- WS-PRO2 Weather Station
- 1005M-DC Rain Gun
- 25BJP Impact Sprinkler
- 35A-TNT Impact Sprinkler
- Falcon® 6504 Rotors
- 7005 Rotors
(8005 Rotor replaced the 7005)
- 300BPE Valve

RAIN GUN ADVANTAGES:

- Large trajectory (angle of spray) for use on large sloping stockpiles.
- Height of water stream can reach 79 feet (23,7 meters).
- Radius of throw can reach 182 feet (55,4 meters).
- Durable aluminum, stainless steel and bronze construction.
- Available for International markets specifically for mining and industrial applications.

IMPACT SPRINKLER ADVANTAGES:

- Riser-mounted for use on large sloping stockpiles.
- Rugged brass, bronze, and stainless steel construction.
- Straight-through flow for superior performance in dirty water.

FALCON 6504 ROTOR AND 7005 ROTOR ADVANTAGES:

- Stainless steel riser for added durability.
- Pop-up rotors have a low profile, which make them ideal to use in areas with foot and machine traffic.
- Radius of throw can reach up to 80 feet (24,7 meters).*

* Using the 8005 rotor, which replaced the 7005 rotor.

CENTRAL CONTROL ADVANTAGES:

- Manage multiple watering schedules for field controllers via central computer.
- Linked with weather station, watering schedules can be updated on a daily basis using the latest weather data.

WS-PRO2 WEATHER STATION:

- Collects weather data: Air temperature, relative humidity, solar radiation, rainfall, and wind speed and direction.

Rain Bird Sprinkler System Provides Dust Control at Mining Operations

Air Quality Compliance Improves 53% at Valé Iron Ore Facility

At Guaíba Island Terminal in Brazil, the third largest iron ore port in Brazil, iron ore is delivered by railcars, off loaded into stockpiles, processed, and loaded into shipping containers for export to other countries. The dust created by these activities regularly exceeded the upper limits for airborne particulate matter and jeopardized long-term operations at the facility. Valé, the owner and operator of the facility, installed a Rain Bird® sprinkler system with a central control system and weather monitoring to control airborne dust.

WHY DUST CONTROL IS IMPORTANT

Dust is classified as fine, dry particulate matter and can be made up of pollen, minerals, soil, and many other particulates found in the local environment. Companies in the mining industry are tasked with monitoring and controlling their dust emissions, because dust is created in every step of the mining process: mine construction, extraction, processing, storage and transportation. In the United States, Canada, and the EU, particulate emissions standards are set and monitored by government agencies, and as more mines are brought on-line in developing countries, air quality concerns are sure to become an issue.

Dust can cause a host of problems for mining operations, such as low-visibility issues and equipment failure, and can also be linked to health problems, such as asthma, lung cancer, and heart disease. Airborne dust can adversely affect employees working at mines or at transportation facilities, residents who live nearby, and the surrounding environment. In some countries, dust levels that are consistently above acceptable air quality levels set by governments can result in fines and can potentially shut down operations temporarily. And it is not just government regulations that mining operators have to contend with but also public perception and activism that can turn a negative spotlight on uncontrolled dust and the mining operator's ownership of the problem.



USING WATER TO CONTROL DUST

Water is used to help control dust during the excavation and processing of ore, on tailings and storage piles, and throughout the transportation process. Not only does water help suppress dust that is already airborne, but it also binds mineral dust to the ore's surface. On unpaved haul roads, large trucks go in and out of mines multiple times a day creating large amounts of airborne dust. The dust created by this traffic is controlled mainly by the use of water trucks. Because water trucks have to move at a slow pace in order to deliver the appropriate amount of water to wet down the road, they can impede traffic, slowing up other trucks carrying more important cargo. The use of water trucks is considered by many in the mining industry to be one of the most inefficient ways to control dust.

Effective dust control using water at mines and on haul roads requires uniform wetting and monitoring of weather conditions, like air temperature, relative humidity, and wind direction and speed. Installing a sprinkler system with weather monitoring, centralized control, and proper water distribution components can be an effective and operationally efficient solution for using water to help control dust.



RAIN BIRD PROVIDES SOLUTIONS FOR DUST CONTROL

IRRICOM Intelligence, a Rain Bird distributor and contractor in Brazil, designed and implemented the sprinkler systems at Guaíba Island Terminal to help prevent and control airborne dust. The system uses Rain Bird SiteControl, which are central control systems that allow Valé to monitor system performance, manage watering schedules, and update weather data for multiple field controllers from a single location. The water used by the system is pumped from the Sahy river basin along 13 km of pipeline, a booster pump provides the pressure needed to move the water along the pipeline to the sprinkler system. The system sprays water onto stockpiles, roadways, and railways using a combination of Rain Bird Rain Guns, impact sprinklers and pop-up rotors. These components were chosen for their trajectory (angle of spray), throw radius, durability, and performance in dirty water conditions.

IRRICOM Intelligence designed and installed “a system where we showed an intelligent solution, integrating Rain Bird’s hardy agricultural Rain Guns and impact sprinklers, reliable operation with our control valves, and central operation of our central control systems, the result was the best cost benefit solution for the customer”, said José Giacoia Neto, Rain Bird General Manager in Brazil.

CENTRAL CONTROL AND MONITORING

SiteControl is a central control system that offers a key operational advantage – users are able to program and adjust watering schedules, and monitor system performance from a central computer. The computer is connected to satellite controllers or two-wire decoders in the field via hardwire or wireless connections. Instead of traveling to the controller in the field to program or adjust the schedule, the user can make the program adjustments from the central computer. SiteControl is used for a single contiguous site. IRRICOM chose a central control system for the Guaíba site because Valé wanted a solution that could be operated efficiently without increasing labor costs.

Air temperature, relative humidity, solar radiation, rainfall, and wind speed and direction have a direct effect on moisture content in iron ore stockpiles and dirt roads surrounding the port. In order to monitor these key weather conditions, a WS-PRO2 Weather Station was installed. The weather station sends the data directly to the SiteControl system every 24 hours. The control system makes automatic updates to the watering schedules incorporating the most recent weather data. Monitoring weather conditions daily allowed Valé to apply the right amount of water to stockpiles and roads, and because the system automatically made the adjustments, Valé was able to monitor system operations without increasing labor costs.

PROPER WATER DISTRIBUTION COMPONENTS CONTROLS DUST ON MULTIPLE SURFACES

Rain Bird Rain Guns, impact sprinklers and pop-up rotors were used to wet large stockpiles of iron ore, roadways, and railways. Rain Guns are used to wet stockpiles because of the trajectory (or angle of the spray) and radius of throw. The 1005M-DC Rain Gun used at the Guaíba site has a 43° trajectory angle and the height of the water stream can reach 79 feet (23,7 meters). The throw radius can reach a maximum of 182 feet (55,4 meters). All of these features make Rain Guns ideal for this application. In addition, two types of brass impact sprinklers, the 25BJP and 35A-TNT, were used in combination with the Rain Guns to provide adequate coverage for the sloped stockpiles. The impact sprinklers were riser-mounted, lifting them off the ground. The impact sprinklers have a maximum throw radius of 51 feet (15,6 meters).

Along roadways and railways two different types of Rain Bird pop-up rotors were installed, the Falcon® 6504 and the 7005. These rotors were used in areas with foot and machine traffic, where riser-mounted impact sprinklers were not suitable. And, the rotors were also installed with stainless steel risers. The stainless steel adds an extra layer of strength to guard against damage from side impact.

DIRTY WATER SUPPLY

The water supply used for the sprinkler system was captured from the Sahy river basin. Each of the components used at this site were designed to perform reliably in dirty water conditions like this. The Falcon 6504 and the 7005 rotor feature a pressure-activated wiper seal and tapered riser. This wiper seal keeps the stem clear of debris so the rotor will reliably pop up and down. The impact sprinklers feature straight-



through flow, so dirty water can easily pass through the nozzle. IRRICOM installed 121 300BPE valves to control the flow of water. The body of the valve is constructed from brass which provides durable and long-lasting performance and the bonnet is made from glass-filled nylon, which makes the valve more economical. Each of these components perform reliably in industrial applications with dirty water and high pressure.

AIR QUALITY COMPLIANCE IMPROVES 53%

The dust levels at Guaíba Island Terminal were regularly monitored before and after the Rain Bird sprinkler system was installed. Before the sprinkler system was installed, 67% of the air quality readings for airborne particulate matter exceeded the upper limit. After the sprinkler system was installed, the percentage of air quality readings exceeding the upper limit fell to 31%. The installation of the system had an immediate benefit on dust levels and air quality.

PROPER WEATHER MONITORING AND WATER DISTRIBUTION

Rain Bird sprinkler systems offer a complete solution when effective dust control is needed. Labor-saving central control systems combined with automatic weather monitoring can control airborne dust by applying the correct amount of water based on current weather conditions. Combining this technology with the proper water distribution components for various surface areas and topography can ensure that water is uniformly applied throughout the site. Durable components and technologically advanced control systems from Rain Bird can help successfully control dust with a comprehensive and effective solution.



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