



CASE STUDY

Anglo American Mining Corp.
South Africa

Aspirating Detection System Case Study



Anglo American PLC, Kumba Iron Ore, Sishen Iron Ore Mine, Kathu, South Africa.

Substations, Control Rooms, Server and UPS Rooms

Following the successful implementation of their Pyroshield IG55 Fire Extinguishing System a number of years ago, Alien Systems & Technologies (Pty) Ltd AST presented the Protec Cirrus Pro aspirating fire detection solution to Anglo American Mining Corp.

The Cirrus Pro 100 aspirating detector was identified as a detection system solution which could potentially, solve the issue the mining site has with unwanted Fire Alarms from dust contamination. Despite dust prevention measures, such as room pressurisation systems, the level of dust contamination is such that it effectively renders optical detection methods ineffective. The alternative heat type point detection method only provides a response time that would be too long resulting in significant damage prior to detection/intervention.

Cirrus Pro aspirating detectors are unique within the aspirating detection industry as they utilise 'Cloud Chamber' detection technology. The two main benefits of this technology are immunity to unwanted alarms from dust and early warning fire detection in advance of any optical based aspirating smoke detection technology.

Approximately 120 Cirrus Pro 100 units were installed around the site within Substations, Control Rooms, Server and UPS Rooms; as was specified by the customer in their own internal documentation and procedures. They have specified that the Cirrus Pro is to be used as a zone input on a conventional fire control panel and there must always be a minimum of two Cirrus Pro detectors (one on each zone).

The use of Cirrus Pro detectors to signal the operation of Pyroshield IG55 Gaseous Fire Extinguishing Systems, indicated the confidence the customer has in this product to deliver a reliable fire alarm signal in what is probably their worst kind of environment for triggering false alarms.

Following the installation of the Cirrus Pro 100's, it has been proven to be a reliable system for this environment detecting a number of actual fire situations as detailed in the Fire Event Reports and to date, shows a 100% alarm response success rate.

Anglo American Fire Alarm Specification for Substations - Eng-Spec-002-Rev 00

Protec Cirrus Pro Aspirating Fire Detector have been specified by Anglo American for their Substations Fire Detection Systems. Anglo American requested the following requirements within their engineering specification of which the Cirrus Pro meets in every respect:

The Aspirating Fire Detection System shall be of a 'cloud chamber' type like that of the Cirrus Pro or similar. The system must be capable of recognising the normal quantity of air-bourne sub-micron particles within each protected area, and to detect an abnormal or alarm quantity of sub-micron particles produced by combustion, electrical arcing or overheating. The system must have the capability of detecting particles of 0.0025 microns as created by combustion, electrical arcing or overheating.

The system must NOT be responsive to false alarm conditions resulting from ordinary dust, moisture (water vapour), air currents (change in air pressure and/or velocity) or ambient thermal changes.



Other mining clients within South Africa

Fire Event Reports



Drum Plant Substation, 11Kv Room – July 2019

Within the switchgear, a malfunctioning SF6 breaker overheated which resulted in a fire. Both Cirrus Pro 100 units detected this event and initiated a fire signal to the Conventional Fire Control Panel. This raised the alarm and signalled the operation of the Pyroshield IG55 Fire Extinguishing System. This resulted in minimal damage to the room and only scorching and charring occurred ensuring only a single tier of switchgear was required to be replaced.



G1000 Substation, UPS Room – June 2019

Smouldering wires on an obsolete battery tripping unit caused a fire in the UPS room. Both Cirrus Pro 100 units detected this event and initiated a fire signal to the Conventional Fire Control Panel. This raised the alarm and signalled the operation of the Pyroshield IG55 Fire Extinguishing System.



Stacker 772, E-house Room – November 2018

Within the E-House on the Stacker 772 Machine, a malfunctioning fan within the air conditioner overheated and caught fire. As per the specification requirements both Cirrus Pro 100 units detected this event and triggered a fire signal to the Conventional Fire Control Panel and the Pyroshield IG55 Fire Extinguishing System was initiated. Only a small amount of damage occurred and considering that the client could only determine the source of the alarm as a fire event after thorough investigation and removal of the air conditioning unit cover, it proves the Protec Cirrus Pro 'cloud chamber' detector is able to identify fire threats at a very early stage and signal to supporting fire extinguishing systems in unmanned rooms.



Drum Plant Substation, 380V Room – November 2018

Within the floor void of a substation, a cable joint overheated due to a higher than normal resistance on the joint. Two Cirrus Pro units detected the overheating cable and triggered a fire signal to the Conventional Fire Control Panel and initiated the operation of the Pyroshield IG55 Fire Extinguishing System. There was no significant evidence suggesting that flames had occurred, which suggests the Cirrus Pro detected the incident prior to it becoming a significant fire event. Only distortion of the cable insulator and charring around the joint cover occurred.

380V Room image on the right shows interconnections between a Cirrus Pro 100 aspirating detector and the Conventional Fire Control Panel. On the initiation of signals from two separate Cirrus Pro 100 aspirating detectors, a further signal is then raised to instigate operation of the Pyroshield IG55 Fire Extinguishing System.

As a result of the 100% success rate detailed above, Sishen Iron Ore Mine are now considering the deployment of Cirrus Pro Locators to be used when the Cirrus Pro 100 goes into pre-alarm. The portable Pro Locator can then be used to discover the source of the pre-alarm prior to it resulting in a fire event.



Overheated SF6 Breaker



Sampling pipe installation



E-House Room



Stacker 772 Machine



380V Room

Other Mining Projects in South Africa in Namibia

- **Khumani - Iron Ore Mine** - Substations, E-House Substations, PLC Monitoring Equipment Rooms.
- **Black Rock - Manganese Mine** - Surface and Underground Substations
- **Glencore GGV Open Cast Coal Mine** - Surface Substations and Conveyor Tunnels
- **Husab Uranium Mine Namibia** - Data Centres
- **Pretoria Portland Cement** - Conveyor Tunnel - Operating Water Mist Suppression Systems



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