Air Quality Management

Fact Sheet

Introduction

Palabora operates one of the largest underground copper mines in the world. Palabora also operates a concentrator, smelter and refinery to produce refined copper products. In addition, Palabora produces vermiculite, magnetite and sulphuric acid.

Copper concentrate is smelted, converted and cast in the reverberatory furnace, converter and anode sections respectively. Reverberatory off-gas, which is not rich in sulphur dioxide (SO_2), is emitted to the atmosphere via a tall stack. Converter off-gas, which is rich in SO_2, is routed to the acid plant for conversion to sulphuric acid and only a fraction is emitted into the atmosphere.

Dust can be generated from various activities. Palabora utilises various impoundments for the storage and disposal of wastes and by-products. The impoundments include storage dams, ore stockpiles, a waste rock dump and copper tailings dam.

Regulatory Requirements

Palabora has an Atmospheric Emission Licence (AEL) which stipulates the requirements for air quality management. The ambient air quality limits are listed below:

Sulphur dioxide (SO_2)	
10-minute average	191ppb
Hourly average	134ppb
Daily average	48ppb
Annual average	19ppb

**ppb = parts per billion*

Particulate Matter (PM10)	
Daily average	
Annual average	
Particulate Matter (PM2.5)	
Daily average	
Annual average	

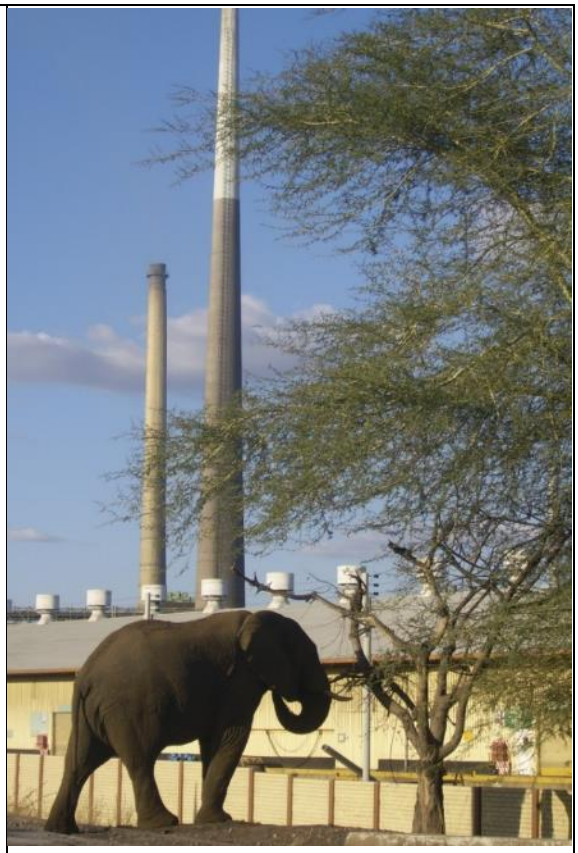
Dust Fallout	
Residential limit	≤ 600 mg/m^2/day
Non-residential limit	≤ 1200 mg/m^2/day

Emission Reduction Measures

Sulphur Dioxide

Sulphur dioxide (SO_2) is emitted as a result of sulphur, contained in the copper concentrate, combining with oxygen during the smelting process. This waste product is then utilised to produce sulphuric acid. The acid plant thus serves as an air cleaning / pollution prevention system.

Palabora has invested significant capital to reduce the impact of SO_2 since its activities commenced.



Some of these capital projects include:

- Upgrading secondary hooding and acid plant mist precipitators
- Fluoride scrubber upgrade at the acid plant
- Replacement of primary hooding to minimise fugitive SO_2 emissions
- Gas handling and scrubber repairs
- Shutdowns (annual and opportunistic)

Dust

Electrostatic precipitators were installed at the reverberatory furnace and at the converters to capture dust particles in the gas stream. When the reverberatory precipitator is not available due to maintenance, for example, the gas scrubbing plant is utilised to capture the particulates.

Dust generation on gravel roads is controlled by regular spraying with water bowsers and / or chemical dust suppressants. Conveyor belts, stockpiles and underground draw points are fitted with water sprays to suppress dust. Spillage along fixed infrastructure that conveys or crushes ore is regularly cleaned up in order to limit fugitive dust sources.

Operational plants which generate dust are fitted with dust control systems such as extraction fans, baghouses and electrostatic precipitators. A well-defined preventative maintenance programme maintains acceptable availabilities and efficiencies of these systems.

Ambient Air Quality Monitoring Programme

Palabora maintains an air quality monitoring system comprising of eight air quality monitoring stations. Five of the eight measure SO_2 and weather data (meteorology), another measures meteorology only, one SO_2 only and the remaining station samples ambient particulate matter (PM_{10} and $PM_{2.5}$).

Data is transmitted to Palabora and can be viewed on Palweb, Palabora's internal information network system. The data is used to manage impacts on the environment and community. When the risk exists that the legal limits may be exceeded, action is taken to reduce the concentrations. This includes reducing or halting smelter production until atmospheric conditions are more favourable again.

Dust fallout is also passively measured on and off-site to determine nuisance dust levels. Dust fallout gauges are serviced once per month and results are measured in $mg/m^2/day$.

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