

## **Control of Fugitive Dust Emissions In Surface Mining Operations**

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### **ABSTRACT**

A significant environmental problem in surface mining is the control of fugitive dust. Fugitive dust is defined as dust that is generated from non-point sources or non-stationary sources such as haulage equipment or blasting operations. In many mining operations the control of fugitive dust is an important facet of the surface mining operation. While fugitive dust from mine haulage equipment, blasting, and general movement of mine materials is generally considered the main source of fugitive dust, a significant source of fugitive dust can also be generated from the fine-grained material in the mine milling process. Typical mine milling operations generate a significant quantity of waste products or tailings, which consists of finely ground rock from the processed ore. It is common for the tailing's average particle size to be in the 20-micron range. In this size range the particles are very susceptible to dusting during dry windy conditions. Since the tailings are exposed to atmospheric conditions, it is common for dusting to occur during dry conditions in the summer months. However, it has been observed that significant dusting can also occur during freezing periods as well. In fact, some of the largest fugitive dust events have occurred immediately after freezing conditions in the fall time of the year when cyclical freeze-thaw occurs. When this type of dusting happens, personnel at the mines generally refer to the dusting as a dry freeze event. Technically, the "dry freezing" is the sublimation of the near surface ice frozen in the tailings where the ice under a given set of temperature and pressure conditions transforms from a solid directly into a gas. The thermodynamics of sublimation of ice have been studied by a number of researchers and is an important process in the processing of food products as well as related the generation of dust on coastal roads during the winter time. To study fugitive dust a portable wind tunnel was constructed and used to assess various dust control strategies. The working section of the wind tunnel was 1 m wide, 1.2 m high and 10 m long. Sustain wind speeds of 19.1 m/sec (31 mph) were achieved. The paper will present the results of our testing program on three different tailing basins using a number of dust control agents and paper waste from two paper mills.