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Atmospheric Emissions at the Giant Mine

The Department of Renewable Resources recently released results of an investigation of arsenic and sulphur dioxide emissions from the roaster stack at Royal Oak Mines' Giant Mine at Yellowknife.

All of the gold in the ore from the Giant Mine is present as sub-microscopic grains locked inside an arsenic sulphide mineral called arsenopyrite. The arsenopyrite is extracted from the waste rock and then roasted at high temperature to break down the mineral matrix. In the roasting process the arsenic and sulphur are converted into a gas. The arsenic, as arsenic trioxide, is cooled and filtered out of the roaster gas stream while the sulphur is released from the stack as sulphur dioxide.

This process enables the mine to recover 88% of the gold contained in the ore. Gold recovery without roasting the arsenopyrite has been measured at less than 20%. In contrast, the ore mined at the Con Mine in Yellowknife is not as refractory and yields recoveries in the order of 88 to 90% without the need for roasting. It was recognized from the start of mining at Giant in 1946, that a roasting plant would have to be operated if the mine were to be economically viable.

The Giant Mine has operated a roaster in Yellowknife since the early 1950's. The company has voluntarily upgraded its gas cleaning equipment and procedures over the years to apply the best available economic technology. Consequently arsenic emissions from the Giant roaster have been significantly reduced and are in compliance with standards applied in other Canadian jurisdictions. (The N.W.T. has no air emission standard for either arsenic or sulphur dioxide).

In 1992, the mine emitted on average 20.7 tons of sulphur per day in the form of sulphur dioxide from its roaster stack. Historically the mine has emitted in the range of 30 to 35 tons per day of sulphur dioxide as measured and verified in stack testing conducted by both Environment Canada and by the company. Economic technology to reduce this level of emission is not yet available. Processes such as scrubbers or acid plants are not viable given the geographic

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location, distance from by-product markets and the small volume of sulphur dioxide generated.

The company continues to employ diligence in the maintenance and operation of its gas cleaning equipment to ensure that levels of arsenic and sulphur dioxide emissions remain in compliance with air standards applicable in southern Canada where such standards are in place.

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