

**ROYAL OAK MINES INC.
NWT DIVISION - GIANT MINE**

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(Including Cover Sheet)

COMMENTS: *I really wish I had a bit more time to study options to your SO₂ Removal Testwork Proposal. One such option might be to add liquid ammonia to cool Cottrell Off-Gas, precipitating ammonium sulphate to be caught along with the arsenic in the Baghouse. The cooling air volume reduction could then be bled back in down stream from the Baghouse restoring the Stack discharge volume, further reducing the SO₂ discharge concentration. This idea might also produce ammonium arsenic compounds, (ammonium arsenite can be a CCA manufacturing intermediate) or such arsenic compounds might not even be captured in the Baghouse.*

I know we must show the GNWT that we are pursuing options and I hate to sound too negative but I have strong doubts with the proposed test program. The tailings solids showed very slow reaction kinetics with 0.1 M sulphuric acid when the pH was kept near neutral. The 1992 test (Summary attached) showed that dropping the slurry pH from 8.9 to 7 by adding 96.8 ml of acid (to 2 litres containing 390 grams solid) required 24 hours of stirred reaction to recover to pH 8. The day intervals between acid additions particularly show the slow rate of pH recovery, for example from day 3 to 4 the pH came back to 7.85; but from day 4 to 7 it came back to 8.1. Surely the reactions would have been faster had the pH been lowered much more but strong acid conditions would require expensive materials of construction for any full scale treatment.

I feel strong agitation not available in a flotation cell would likely be necessary for mass transfer of SO₂ from 1% SO₂ gas in bubbles to the liquid. The SO₂ will not be concentrated at the bubble interface. Consequently, I think we would have unscrubbed SO₂ available immediately. Pure cold water has a solubility of 22.8 gm SO₂/l and some will react with water forming H₂SO₃. Once saturation is reached almost all the gaseous SO₂ will pass straight through the slurry. A small amount will dissolve replacing the dissolved gas that will have reacted with the solids. Dissolved SO₂ and Sulphurous acid will react quite a bit slower than

sulphuric acid which has a demonstrated slow reaction with Tailings solids.

I prefer Kent Morton's idea of setting up the testwork out at the Opacity Shack by the flue. Hopefully we can get the CIL Circuit back together soon for the after roast tailings products and the CIL Tails blend can be the prime target for this testwork. Year round SO2 cyanide destruction, plus any excess lime in the calcine would reduce SO2 going up the stack and also save on ETP costs.

Realistically the only way I can see Giant Mine reducing SO2 emissions from 50 to 5 tonnes per day by the year 2006 is by finding a new "elephant" ore zone. Then maybe we could set up a kiln at Pine Point and process the huge piles of limestone overburden there, supplying the necessary daily truckloads needed to neutralize scrubbed SO2.

Also find attached a quote for equipment for lab testwork. Have a good day Larry.