

# MEMORANDUM

TO: J. Moore  
CC: K. Blower, G. Halverson  
FROM: K. Morton  
DATE: June 21, 90  
SUBJECT: WAROX - FLOWSHEET DEVELOPMENT

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We have not yet collected any data from the pilot plant, so equipment sizing is still not definite, but we have refined the flowsheet to include gas volumes and maximum solids loadings throughout the circuit.

Some interesting features of the new flowsheet:

1. The new arsenic reactor does not require an external fuel source, there is more than enough excess heat in the roaster exhaust to heat the particulate and fume the  $As_2O_3$ .
2. The volume of cooling air required to precipitate the arsenic is reduced to less than half the present volume.
3. The total volume of gas through the existing baghouse is about half the present volume.
4. The number of baghouse sections in operation at one time can be reduced to half the present number.
5. Total weight of arsenic emissions from the stack will be about half the present weight. The concentration of about 20 - 30 mg/scm will remain unchanged.
6. The concentration of  $SO_2$  in the stack gas will be doubled to about 2%. Dilution air may be required downstream of the baghouse to reduce environmental effects of higher concentrations. If gas scrubbing is required in the future, equipment and operating costs will be lower than under present conditions.
7. Tuyere design in the reactor must be capable of handling dust laden roaster exhaust gas. Some settling of dust in the windbox could likely be handled by recycle to the roaster if necessary.

Canadian Blower/Canada Pumps Ltd responded positively to my query about a booster fan and there is no obvious reason why this installation cannot proceed as proposed. The operating parameters given to CB/CPL were somewhat more rigorous than what the new flowsheet indicates and

Heat Content of Fe2O3            33622.64 cal/kg dust

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Heat required to sublime As2O3

Heat of Sublimation of As2O3            15.25 kcal/mole As2O3

Heat Required for Sublimation            38510.10 cal/kg feed

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Total heat required per kg crude dust

As2O3            27815.95

Fe2O3            33622.64

As2O3 sub 38510.10

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99948.70 cal/kg dust

Total heat available            1817294. cal/min

Heat Loss (10 %)            272594

Net Heat Available            1544700.

Dust feed            15.45493 kg/min

22.25510 t/day

Calculations for - Inertial burning 22.0 t/d  
but continuously 22.0 t/d with 1.

the cost of the equipment is expected to be less than the \$63,000 quoted. Our stated requirements were for a fan rating of 11,000 ACFM at 40" SP and 400 deg C. Our actual requirements will be more likely 8,500 ACFM at 30" SP and 360 deg C.

I talked to Fred Pethick of Fluid Dynamics re their offer to design the filter installation and gas handling system modifications. They will be invited to visit when the pilot plant is operating smoothly, perhaps mid July. The new filter elements that they are preparing will be even finer than the original 0.3 micron nominal that they originally provided. They apparently reviewed the RPC test data and think that the new elements may be better. This certainly does not square with Pall's idea that 10 micron filters are what is required.



Kent Morton

# WAROX Process Flowsheet

Basis - 7000 mty As<sub>2</sub>O<sub>3</sub>  
250 operating days  
7 DAYS/WK @ 24 HRS/DAY

doesn't account for As<sub>2</sub>O<sub>3</sub> gas vol. 5.0/900 6,100 cfm

solids inerts 19.2 mtd  
gas flow 7970 ACFM  
temp 371 deg C  
As<sub>4</sub>O<sub>6</sub> 19.2 mtd (59.0 gm/m<sup>3</sup>)

fluosolids sublimator

hi temp porous  
metal filter

booster  
blower

cold baghouse

stack

stack fan

Heat balance? BTU.  
5 m/s op rate  
(2,843 cfm)  
x 300

crude As<sub>2</sub>O<sub>3</sub>  
total 21.9 mtd  
As<sub>2</sub>O<sub>3</sub> 50% 11 mtd  
inerts 50% 11 mtd

Aux Heat → 10' pressure

solids 19.2 mtd

cold air  
20 deg C  
10514 acfm

mixing fan  
gas flow 18446 ACFM  
temp 110 deg C  
As<sub>2</sub>O<sub>3</sub> 19.2 mtd

742°F →  
Too high?  
roaster off gas 8700 acfm  
temp 430 deg C  
As<sub>4</sub>O<sub>6</sub> 58.6 ACFM 23.2 g/m<sup>3</sup> 8.2 mtd  
inerts 0.655 g/m<sup>3</sup> 8.2 mtd

to gold extraction

purified As<sub>2</sub>O<sub>3</sub>

