



research and productivity council  
conseil de recherche et de productivité

April 19, 1989

Mr. Kent Morton  
Giant Yellowknife Mines  
P.O. Box 6000  
Yellowknife, NWT  
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Dear Mr. Morton:

**RE: Scintered Metal Filter Testwork**

As per your request (fax April 14, 1989) the following should answer the questions from Marek Stefanski regarding the scintered metal filter testwork. I have organized my response according to Marek's questions (1-5).

1. Scintered metal filters, depending on the type and grade of alloy selected, are utilized at temperatures ranging from  $230^{\circ}\text{C}$  to  $926^{\circ}\text{C}$ . Typical particulate removal efficiencies of 99.99% up to 99.999% are achievable using this type of filter medium. Scintered metal filters are available from various suppliers from 0.5 to 100 microns nominal opening. Finer sizes down to 0.1 microns are also available. Filter elements come as either single elements or clusters of three or more. Individual elements generally measure 2.5" in diameter by 48" in length (other sizes are also available) and are equipped with venturi nozzles for pulse blow back.

Typical air to cloth (or scintered metal) ratios vary with the dust loading, generally 8-10 ACFM gas/ft<sup>2</sup> filter area. Selection of mesh size is dependent on the particular application.

2. RPC Operating Parameters

RPC's present pulse blowback, high temperature baghouse will be modified to duplicate Pall Inc. pulse blowback system. The existing tubesheet and blowback system will be modified to accept a single scintered metal element. The element will have a nominal mesh opening of 10 microns and will be 2.5" in diameter by 48" long with a venturi throat. The single element represents a ratio of ACFM gas/ft<sup>2</sup> of approximately 8.

13 ACFM

1.64 ft<sup>2</sup>

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The pilot plant at RPC consists of a 6" bubbling fluidized bed, hot baghouse, condenser, cold baghouse and venturi scrubber (see flowsheet attached). Feed will consist of a blend of CBH and HBH products from previous runs and -42 mesh silica sand. Feed will be transported pneumatically to the fluidized bed from a live bottom bin hopper/volumetric screw feeder mounted on a weight scale. The propane burner system provides both process heat and low oxygen concentration (0.5-1.5%) desirable to prevent formation of ferric arsenates.

The plant will be operated at the following parameters:

a) Temperature °C:

Combustor	=	788
Bed	=	500-550
Freeboard	=	480
HBH Inlet	=	450
HBH Outlet	=	425
Condenser Inlet	=	400
Condenser Outlet	=	150
Cold baghouse Inlet	=	120
Cold baghouse Outlet	=	110

b) Pressures "H<sub>2</sub>O:

Freeboard	=	-2
HBH Diff.	=	5-10
System Diff.	=	20-25

c) Flows:

Feed Rate	=	10 kg/h
Carrier Gas Flow	=	30 l/m
Condenser Flow	=	40 SCFM
Coolant Flow (Air)	=	10 l/m
Burner Air (Fluidizing)	=	250 SCFM
Propane Flow	=	70 l/m

During the test, samples of HBH products will be collected and tested for gold leachability using 48 hr bottle roll tests. Both CBH and HBH will be assayed for Sb, As and Fe to insure that the various products meet specification (Sb <0.2%, Fe <0.02% CBH; As, 1% HBH).

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3. RPC has recently completed the experimental work in connection with a study of the fuming of crude arsenic trioxide baghouse dust for Giant Yellowknife Mines Ltd. The program included testing of both current crude baghouse dust and dust stockpiled underground during operation of the Giant Yellowknife roaster.

A continuous pilot plant, incorporating the principle features of the conceptual flowsheet developed from the results of the bench-scale testwork, was constructed at RPC. A key component of the flowsheet was a high temperature baghouse (hot baghouse), using woven ceramic fibre filters, capable of sustained operation at elevated temperatures ( $1150^{\circ}\text{C}$ ). The hot baghouse was used to separate the non-volatile components of the feed material from the gas phase containing the arsenic trioxide. Subsequent cooling of the gas phase yielded a high quality arsenic trioxide product.

Baghouse dust from current production was successfully treated in the pilot plant over a temperature range of  $260^{\circ}\text{C}$  to  $450^{\circ}\text{C}$ , the feed rate varying from 5 kg/h to 16 kg/h. A continuous run of 252h duration was successfully completed during which more than 2000 kg of current production baghouse dust was treated. A high quality arsenic trioxide product, meeting the specification with respect to antimony and iron content, was consistently produced.

The study has demonstrated successfully the process concept for the treatment of current production crude baghouse dust. The arsenic trioxide product meets the chemical specifications for the marketing of the product. Of the gangue elements in the feedstock, iron and antimony are present at the highest concentrations. The specification for the elements in the final product is 0.02% and 0.2% respectively. Current production crude baghouse dust contains 0.7 to 3.0% Fe and 0.1 to 0.2% Sb.

When stockpiled crude baghouse dust, containing 3 to 5% Fe and 2 to 3% Sb, was treated, the final product failed to meet the antimony specification. Under all conditions examined in the test program, greater than 50% of antimony in the feedstock reported to the final product, which itself comprises more than 80% by weight of the original feed. An additional series of tests using 0.5 micron porous metal elements in place of the woven ceramic filter bags was successful in reducing the antimony levels to less than 0.1% (down to 0.03%).

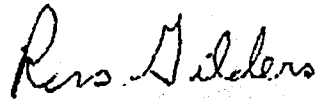
4. The sintered metal filters to be tested at RPC is a commercial filter and scale up of the pilot test HBH will simply involve adding elements according to the increased throughput of the Warrox Plant and the basis of ACFM gas/ft<sup>2</sup> filtering area.

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5. The residue from the filtration will contain 21% Fe, 5% Sb, <1% As and 2-6 oz/ton Au and be treated in Giants cyanidation circuit for gold recovery. Disposal of the residue will be handled as per conventional plant tailings.

Sincerely yours,



Ross Gilders  
Minerals & Fuel Technology

RG:cm

FAX

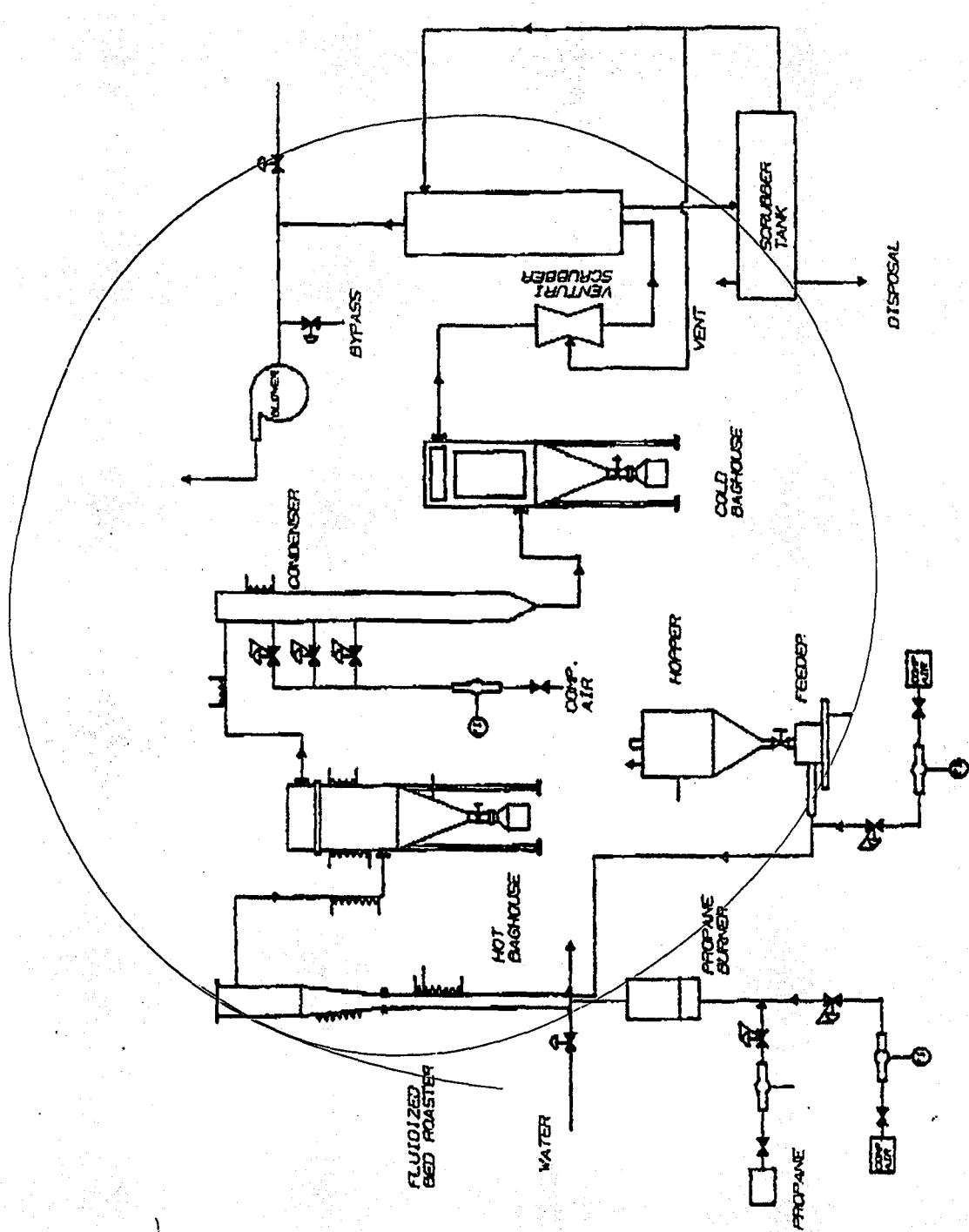


Figure 4.1 Pilot Plant Flowsheet