



Hazen Research, Inc.
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August 4, 1997

FAX AND MAIL TRANSMITTAL

Mr. Terry Pepper
Highwood Resources, Ltd.
5593 Golf Course Drive
Morrison, Colorado 80465

Re: Production of As_2O_3 from Baghouse/Flue Dust
HRI Proposal 97-280

Dear Terry:

It is my understanding that you would like Hazen Research, Inc. to pilot a process for producing As_2O_3 from baghouse/flue dust and produce 200 kilograms (kg) of As_2O_3 product. As you and I have discussed, this can probably be accomplished in a batch process based on leaching the dust with hot water and crystallizing As_2O_3 from the leach liquor as it cools. A block flowsheet diagram of the process is enclosed as Figure 1.

In addition to producing the 200 kg of As_2O_3 , the scope of work would include obtaining a material balance on the process for As, Sb, and possible a few other soluble impurities which might build up in the leach liquor. We would also obtain material handling and solid/liquid separation data which will be useful in process scaleup.

A preliminary cost estimate for the work is shown in Table 1.

There are several unknown aspects of the process, such as settling and filtration rates, crystallization time, and product purity, which will have a large impact on the estimated costs. Also note that the literature (Mintek Report M2240) shows that the dissolution of the As_2O_3 is influenced by the concentration of As_2O_3 in the leach liquor. The dissolution of As_2O_3 may require a two-stage process or a greater liquid/solid ratio. Some preliminary bench-scale experiments should give information that will allow a better cost estimate for the production of 200 kg of As_2O_3 . We will revise the cost estimate after the completion of the bench-scale experiments.

Hazen's manager of safety and environmental affairs, Steve Flaniken, states that the dust is a "D Code" waste. Hazen can conduct a "treatability study" on up to 1,000 kg of this material. We are required to maintain an inventory of the hazardous material, and there are reporting requirements that must be satisfied.

Enclosed is a copy of Hazen's standard Professional Services Agreement (PSA) which outlines the terms under which Hazen conducts business. In particular, please note that the hazardous waste must

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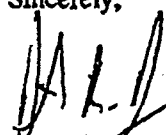
Table 1. Preliminary Cost Estimate

| Item | Cost, \$ |
|-------------------------------------|----------|
| Preliminary bench-scale experiments | 5,000 |
| Design equipment/process | 3,000 |
| Assemble/construct equipment | 16,000 |
| Purchase equipment | 6,000 |
| Operate process (labor) | 15,000 |
| Clean up/dismantle | 3,000 |
| Treat waste solution/ship waste | 4,000 |
| Data reduction/report | 4,000 |
| Environmental reporting | 2,000 |
| Supervision | 3,000 |
| Analytical | 6,000 |
| Subtotal | 67,000 |
| Contingency @ 20% | 13,400 |
| Total | \$80,400 |

be returned to the client. Also, we are limited in the total amount of such material that can be maintained on site, so an effort will be made to return the material promptly. If you decide to proceed with the described work, two completed copies of our PSA will be sent to you for execution.

I roughly estimate the time for producing the 200 kg of As_2O_3 at eight to ten weeks. Please call if you have any questions.

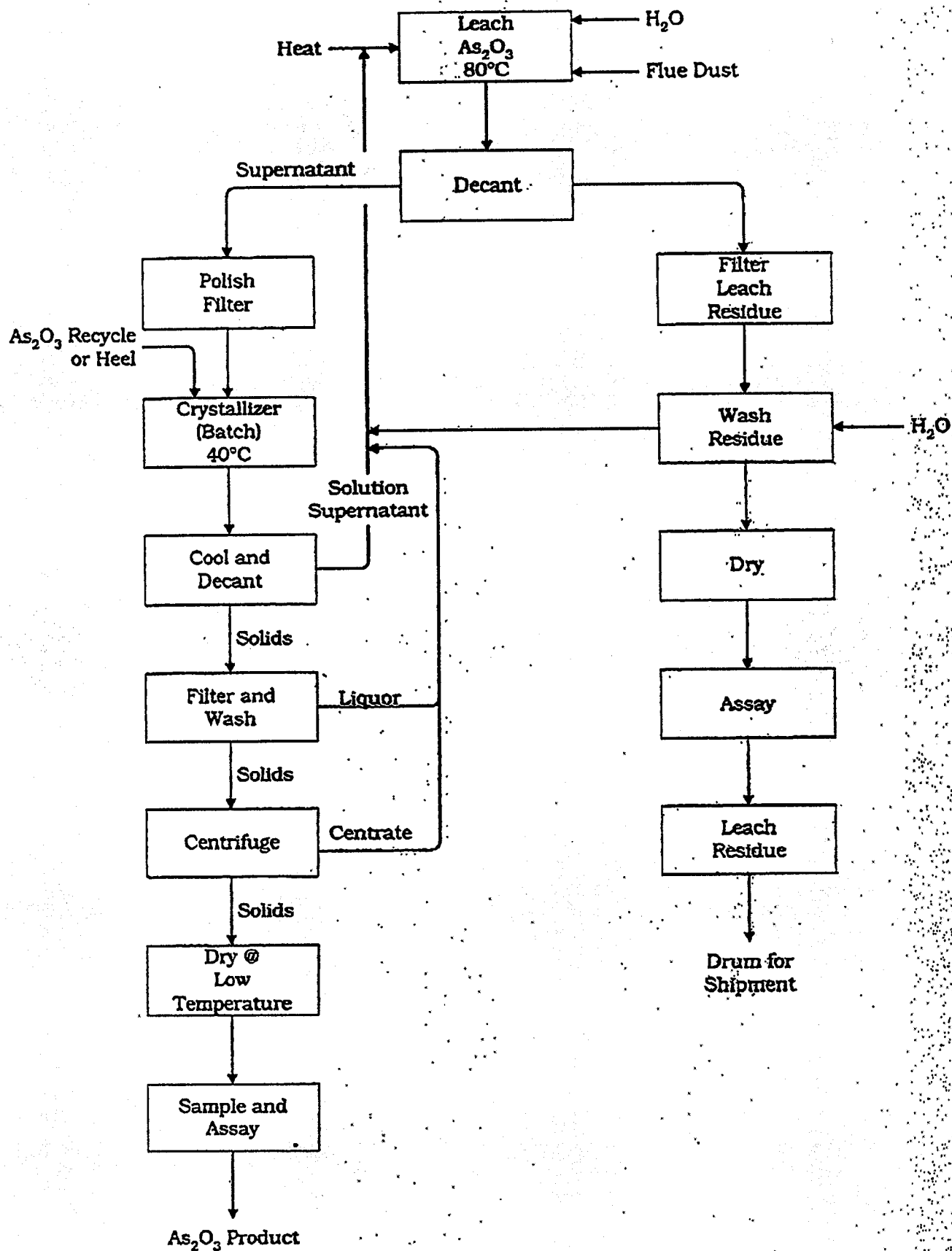
Sincerely,



David R. Baughman
Senior Project Engineer

DRB/ydh

Enclosures

 **As_2O_3 Recovery**

Hazen Research, Inc.