

MEMORANDUM

TO: S. El-Alfy
CC: S. McAlpine, K. Blower, G. Halverson
FROM: K. Morton
DATE: August 19, 1988
SUBJECT: RPC SITE VISIT, AUGUST 16 and 17, 1988

Introduction

The RPC pilot plant was visited by S. El-Alfy, G. Halverson and K. Morton for the purpose of learning details of the plant and process, and to decide what additional testwork will be required. These objectives were achieved, all concerned now being familiar with the purification process and a test program has been outlined to complete the primary objectives of the pilot program.

Summary

During a series of meetings with M. Chalkly over the two days of the visit, recent production data was reviewed for the purpose of determining what additional information is necessary for design of the full scale plant. From the data, it seems clear that purification of current production dust will not present any difficulties, product grades consistently exceeding 99.5% being achieved. Hot baghouse product too, though rather more inconsistent, has been of high quality during the final few days of operation and arsenic recoveries of >99.5% should be possible in full scale operation.

Experience to date indicates that about 50% of the antimony in the feed will be taken out in the hot baghouse and, as long as antimony concentrations in the feed are low (<0.4%), on spec product (<0.2%) can be produced. Unfortunately feed from the earlier stopes such as B2-14 and B2-35 have Sb concentrations averaging >2.5% and 50% elimination will not be adequate to produce on spec product. Testwork to improve product quality through temperature control is scheduled for the last few days of the test program which is scheduled for completion August 26, with the final report being delivered by mid-September.

Apparently Chalkley will be leaving RPC to work for Sherritt Gordon in Fort Saskatchewan. He will therefore not be available to conduct additional testwork once the scheduled pilot test is completed. There are other scientists at RPC capable of doing the work however and additional tests related to condensation of the As₂O₃ fume could be undertaken if we so desire.

Discussion

Wet Feed

While we were at RPC, the plant was not in operation though efforts were being made to start up. The problem was in the moisture content of the B2-35 feed that was being tested. Though the moisture concentration was only 2.2%, this was sufficient to cause serious hangups in the feed-hopper and the material could not fluidized to be fed into the roaster. To solve the problem, the twelve drums of dust from B2-35 and the 4 drums from B2-14 are being dried in large drying ovens before being dumped into the hopper.

The problems encountered in fluidizing this relatively dry feed illustrates the extremely poor flow characteristics of this material and the care we must take in plant design and bulk handling equipment selection. If we are not able to handle wet or damp feed, it may be necessary to dry the feed prior to surface storage and delivery to the fuming reactor.

Condenser Design

RPC's condenser is now operating quite successfully in that it no longer plugs up with scale in the throat or annulus. Neither is it capable of growing large crystals however, the majority of the product being in the 3 micron range, about half the size of the original feed. A dusty product with poor flow characteristics and a density of 30 to 40 lbs/cu.ft. is all that can be achieved with particles of this size. To provide a superior product it is necessary for the product to be non-dusting with good flow characteristics and a density >90 lbs/cu.ft.

There are a number of ways to achieve this and tests to agglomerate fines through pelletization or compaction have been arranged with Ferro-Tech and are expected to be conducted next week. Ideally though, a coarse, dense product will be produced in the condenser and there will be no need for compaction, crushing, screening, etc. equipment in the plant. Other plants seem to be capable of growing large crystals in their condensers and we should try to do the same.

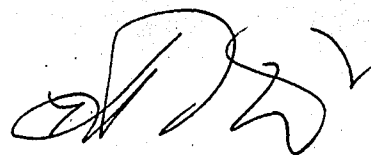
The literature points to two methods of growing arsenic trioxide crystals in condensers. The simplest being a large flue hundreds of feet long equipped with large chambers in which reduced space velocity permits arsenic trioxide crystals to drop out of the gradually cooled gas stream. Advantages of this system are that it needs no externally supplied cooling air and it is quite simple to operate. Disadvantages are the space required for the installation, the need to enter the chambers from time to time to clean out scale formed on walls and the need for crushing and screening equipment to handle scale. The IMM plant in Mexico uses this method of crystal formation.

The other type of condenser used in arsenic production is a scraped wall unit that is operated by deliberately causing crystal formation on cold surfaces. The resulting scale is scraped off the walls and the scale

sent for crushing and screening. The Anaconda plant in Montana converted to this technology after first using the system now in use at IMM.

A third type of condenser that has so far only been used to produce a very fine crystal, is the type in use at Campbell Red Lake and at Giant Yellowknife. Though the shapes of the condensers are quite different, the operating principles are identical and both rely upon keeping the arsenic trioxide vapours from cold surfaces by very rapid mixing with large volumes of cold air. The resulting flash crystallization produces very fine crystals and an air stream that no longer contains arsenic trioxide vapour, hence no buildup on condenser walls.

RPC uses the latter type of condenser and it is possible that using final product to provide seed crystals for nucleation in the cold air stream could result in larger crystals being formed. Additional work to test the possibility may be scheduled at RPC following completion of the primary testwork.

A handwritten signature in black ink, appearing to be 'K. Morton', with a stylized, cursive script.

K. Morton