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ENGINEERS AND CONTRACTORS

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22nd March 1984

Your ref.

Our ref. 84-058/IWS

Falconbridge Nickel Mines Limited
P O Box 40
Commerce Court West
Toronto
CANADA M5L 1B4

*file
Grant yk*

ATTENTION : MR. P. RALEIGH

Dear Sirs,

VISIT TO ROASTING PLANT - KWEKWE

Enclosed please find 2 copies of my visit report to the plant at Kwekwe.

We do not know how much information they have sent you about their plant, so I hope I have given enough information to you for you to reply to their enquiry.

If you would like more information from us, please do not hesitate to contact us.

Yours faithfully,
SIMON-CARVES (AFRICA) (PTY) LIMITED



I.W. STUART
Process Engineering Director

/jmr-c



REPORT ON VISIT TO THE ROASTING PLANT AT KWE KWE ON FRIDAY, 16th March 1984

PRESENT: Mr. R.M. KADENHE - Manager - The Roasting Plant
 Dr. M. KANYANGARARA - Manager - Research & Development -
 Zimbabwe Mining Development Corp.
 I.W. STUART - SCAF

A visit was made to the Roasting Plant at Kwe Kwe in Zimbabwe on Friday, 16th March 1984, as we had heard from Sim Chem and Falconbridge that they were considering the installation of a roasting plant to treat Arseno Pyrites.

The Roasting Plant is a Quasi Government installation which roasts various pyrites on behalf of 12 Mines in the Kwe Kwe area. Of the 12 mines, 7 are major suppliers, 2 provide a small amount of concentrates regularly, 2 small amounts irregularly and 1 provides concentrates only once every three months. The Roasting Plant combine these concentrates into a mixture to obtain a reasonable composition for the heat balance in the two Edwards roasters which were built in 1941 and 1942 respectively. The present throughput of the roasters is approximately 35 M.T. per day of dry concentrates. Future capacity could increase to between 45 and 60 MTPD. The concentrates contain 8 - 10% moisture in the wet season and 4% moisture in the dry season.

A typical schedule of analyses for the concentrates handled in July 1983 was handed over. Most of the analyses are still typical, except for Globe and Phoenix, whose revised analysis is given at the foot of the page.

Cam and Motor, owned by Rio Tinto, who have a low sulphur, high antimony concentrate are looking at alternative means of treating their concentrate. If they drop out, then the Sulphur average should increase and the antimony average should drop which should help gold recoveries.

Globe and Phoenix feel that the Roasting Plant are taking too long to sort out the roasting problems and build a new plant. Thus they, and one or two of the other suppliers, have proposed building their own plant, which may be on the existing roaster site, so as to get a quick solution. However, this plant would also have to be financed and they would like the Roasting Plant to buy the new equipment from them in the long term. To keep the costs of the whole installation down, they are prepared to quench cool and dispose of all the dust leaving the roaster cyclones and only recover the gold from the roasters and cyclones. They feel that this would still give them a better gold return than the present roasting plant.

During the last 6 months the gold recovery efficiency has dropped from over 80% to about 70%. In this period one of the major concentrate suppliers, Globe & Phoenix, has started to re-treat some of their dumps which has given rise to an increase in the antimony content. The Roasting Plant feel that this increase in antimony content may be contributing to the decrease in gold recovery. For this reason they are investigating the installation of a two stage fluid bed

roaster system to try and improve the gold recovery from the plant. Although the Edwards roasters are very old, they still appear to be running fairly well, but with frequent breakdowns of the rabble system, and apparently give rise to a reasonable gold recovery on most of the pyrites. Due to the age of the existing plant, they would like to replace the Edwards roasters and re-use as much existing equipment as possible. Alternatively, they may consider a small roaster in parallel to the existing Edwards to treat the difficult pyrites.

Their main problem is cost. Because their method of operation, whereby they charge a service fee per ton of concentrate treated, does not recover much money it would appear that it may be difficult to pay for the installation of a new roasting plant. Due to foreign exchange problems and availability of capital it would appear that they will want a finance deal. Canadian finance is apparently available to them.

The present Edwards roasters discharge their gases into a brick-lined concrete flue which has been installed in recent years, and the cooled gases at a temperature of about 100°C. are passed through an old Lodge Cottrell precipitator before passing to the atmosphere. The stack appearance at present is slightly misty. The residues collected from the brick-lined flue and the dust precipitator contain 60-70% As_2O_3 . This material is put into a small furnace where the arsenic is sublimed off to give a product with over 95% purity of As_2O_3 . At present they do not have a market for the arsenic trioxide and it is being stockpiled in their store. To minimise the capital cost of the proposed new installation they would like to re-use whatever equipment possible from the existing plant. Budget prices given to them of approximately R3M for a complete installation were much higher than they appeared prepared to pay. They are looking for a design package from which they could build the whole installation themselves using maximum Zimbabwean equipment content. The finance for the engineering package would probably have to come from an external finance deal. They had hoped that they would be able to buy a set of drawings for an existing plant and so save some of the costs of a new engineering package.

If the sulphur content in the concentrates is too low for a fluidised bed roaster they are prepared to mix pyrites containing 32% sulphur and 31% iron from Iron Duke Mine in with the concentrates to raise the sulphur content. They would rather do this than add coal to the concentrates to increase its heating value.

As an alternative to a new roaster, they are investigating the Haber process from Haber Industries in New Jersey, U.S.A. This process, for which they could not give me any details, is supposed to give a gold recovery of over 99% and is not affected, so they say, by the presence of minerals such as arsenic, antimony, copper, lead etc.

They were advised that the first thing they should do would be to test their mixed feed to the roasters plus one or two other combinations of the "difficult" concentrates to see if a two stage roasting system could give them the required gold recovery efficiencies. The finance for these tests would have to be provided by others, unless the gold mines themselves were prepared to pay for them. A meeting will be held between all the interested parties on March 29th to discuss their future actions.

Mr. Kadenhe plus his colleagues propose visiting Giant Yellow Knife and Campbell Red Lake plants in June or July to see an existing installation.

CIRCULATION:

RDF
ACC
IWS
D.L. FILE
KWE KWE FILE

SimChem (2)
Falconbridge

/jmr-c