Discussion on the paper: 'Effect of frother and depressant interaction on flotation of Great Dyke PGM ore'

by T. Mberi, L.L. Mguni, and F. Ntuli

which was published in the January 2018 issue of the *Journal*

This is a well-conducted and useful investigation of the often confusing and sometimes controversial effect of what can at times be two antagonistic reagents in the flotation of sulphide minerals where naturally floatable gangue minerals are present in the ore. Some of the older readers of the *SAIMM Journal* may recall that the writer was an enthusiastic developer and marketer of gangue depressant for the flotation of both Merensky Reef and Great Dyke platinum ores.

During the 1970–1990 period the writer suggested, based on laboratory flotation experiments, that optimum grade and recovery results could be obtained by operating at the minimum frother addition needed for good recovery combined with the maximum depressant addition that could be used without reducing recovery. The authors' results appear to support this.

The concept that the writer operated on was that excessive frother addition promoted the reporting of floatable gangue to the concentrate. This may have been due to actual frother adsorption on the floatable gangue mineral surface or to gangue mineral entrainment in the increased mass pull of froth into the concentrate. High frother additions can promote both these phenomena.

At the same time, insufficient depressant addition has two adverse effects. Firstly it allows gangue minerals to adsorb on the bubble surface and therefore reduces collection of sulphide minerals on the bubble. Secondly it results in too much gangue being sent to the cleaner stages.

In the flotation of ores from the Great Dyke and the Merensky Reef, commercial plants employ circuits that usually contain rougher, scavenger, cleaner, and recleaner stages. For this reason a rougher flotation test alone may not indicate the optimum addition of frother and depressant to the rougher or other stages. Cleaner tests and possibly scavenger and recleaner tests should also be carried out.

The relative additions of frother and depressant in each of these stages are often varied in order to obtain the optimum results. For example, in the writer's opinion sufficient depressant should be added to the rougher stages to keep the bubble surface clear of attached gangue mineral and therefore provide the best conditions for sulphide recovery. In addition, the rougher stage should not produce a concentrate that is of such a low grade that the cleaner cells cannot cope with a high concentration of floatable gangue in their feed. But at the same time, sufficient frother and collector should be added to the rougher stage to ensure optimum sulphide mineral recovery. There is always competition between the depressant addition and the frother/collector addition.

In the cleaner stages there will probably be sufficient frother present in the feed pulp, and a minimum of depressant should be added in order to maximize grade.

J.M.W. (Murdoch) Mackenzie