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Optimisation of reagent addition during flotation of a nickel sulphide ore at the Nkomati Mine concentrator

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EXAMINERS COMMENTS

NOTE: Examiners comments in black and student comments in red

Examiner 1 Corrections and comments

Synopsis

pg. ii, paragraph 3, last line: the statement "..were evident of increased.." is not clear and needs to be corrected. Correction made

pg. iii, paragraph 3: The entire paragraph does not fit the format of an abstract. An abstract is not a reflection of what you intend to do but should report major findings of what was actual done. Report the major findings of the work in this section. The findings are mentioned in this paragraph, I do not feel there is a need to mention specific values which is what the examiner may have been looking for. Instead, the findings were of a relative nature.

Chapter 1

Start Chapter on new page

pg. 1, paragraph 1, line 2: should read "..ore body.." I have always written and seen the word orebody written as one word. I guess it may be something that is used as one word or two words depending on the writer. Supervisor did not object to the use as a single word, therefore, kept as such.

Your aim, objectives and key questions should be put in this chapter not after the literature review. Noted and changed accordingly

Chapter 2

pg. 8, paragraph 2, line 2: "..massive ore.." is the reference to massive sulphide ore? Corrected accordingly

pg. 19-21, Section 2.8-2.10: Move this part to Chapter 1. Standard practice in scientific writing. Corrected

Chapter 3

pg. 24, paragraph 2, point 2: QEMSCAN should first be written in full followed by abbreviation since its mentioned for the first time in the document. Corrected

pg. 27, 28 & 39: Contents of Tables 3-3; 3-4 and 3-12 should all be on the same page. Corrected

pg. 40: paragraph 2, last line: "The table below.." refer to tables by specific number e.g. Table 3-13.. Corrected

Chapter 4

pg. 48: paragraph 1, line 1: "The table below.." be specific on the table you are referring to. Corrected

pg. 60: paragraph 4, line 2: "..Figure 4-16 to Figure 4-18." Should be on same line. Corrected

pg. 73 (last line) & pg. 76 (line 8) : If the result obtained were deemed inconsistent then you should have repeated the tests to reach so conclusive point could be reached. Funding was stopped on this project, therefore, this was kept as a recommendation so as to highlight the gap in the research.

General comment

There is a need of an overall conclusion of the entire work and highlights of major recommendations that ties together the whole work and its major contribution. Individual chapter summaries and

recommendations alone are not sufficient. Overall key findings of the work need to be presented. Corrected

Examiner 2 Corrections and comments

Page ii – Rephrase Sentence to make it clear that coarse grind is being considered to minimize losses in the fines . Sentence was rephrased to clarify statement

Page 1 ignore comment, it was an erroneously highlighted by my Pdf reader. Noted

On page 3 you need to include the role of bubble collision in the flotation mechanisms. Same applies to Figure 2.1 on page 5 Corrected

Page 12 Revise the definition of entrainment as particles caught in the wake of rising bubble are carried to the froth layer even without forming any bubble-particle attachment. Thus both hydrophilic and hydrophobic can be transported to the froth layer in this way. Corrected

Figure 2.3 use 0.5 instead of .5 to be clearer. This was a picture taken from a referenced document (reference is made clear in the Figure number and title)

Page 22 Figure 2-7, seem incomplete. Where are the cleaner tails going to? The movement of all streams has to be shown for us to understand the behavior of the circuit. I don't understand, all streams are shown accordingly.

Page 29 and 30, student needs to refer us to the appropriate table in the appendix to help us appreciate how the recoveries of different elements were computed. Corrected.

Page 41, I don't understand how recovery is increased by recleaning, only the grade should improve while recovery normally goes down. Ignore the second comment on page 41 as a Chapter 5 has addressed the matter. It was clear that over the period that the samples were taken that the mass pull from the cleaner section was low, resulting in a lower recovery. Recovery from the cleaner section is reduced if the metal is not removed, this causes a build-up in the circuit and eventually bleeds out in the rougher tailings; thus, a loss in recovery is possible from the cleaner section.

Page 56, why was there no arrangement to collect more quick fractions at the beginning of flotation? We needed to see if there is an initial plateau before grade starts dropping with recovery. No change made, but comment noted.

Page 70 The depressants dosages tested are quite high already and probably grinding optimization needs to be looked at instead. This may be true, but the optimisation was from a practical point of view, and this would not be possible considering the capital requirements of this suggestion

Figures 4-18 to 4-20, indicate that both Ni and MgO are affected similarly and we needed to see how Talc is affected. In other words the depressant is not a good selector between Ni and MgO. This would require mineralogical evaluation which was not available on site.

Page 64 – You should consider the dangers of excessive collector dosages, which can reverse hydrophobicity. A stronger collector may be better but it is less selective. Why wasn't a weaker collector like SEX not tested as its being a better selector might result in lower depressant being

required to suppress weakly floating material. Please include this discussion in your literature. Comment and recommendation included.

The student should also use a more conventional flotation cell symbols as I have indicated in Figure 1. Corrected

There was a comment in the appendix regarding the mass balance: “How can you have 100% MgO in the tails when you have also got so much in the concentrate: Greater than 100% because the mass balance is relative to the rougher flotation feed from the milling circuit; the tails that are returned from the cleaners to the roughers allow the recovery to be higher than 100% and the streams balance.