



Assessment of the Doctoral Thesis by Aung Myo Thu “Geology and Genesis of the Nwe Yon-Kwinthoneze Gold District, Central Myanmar: Insights from Mineralogical, Fluid Inclusions and (S, C, O, H, Pb) Isotopes, and supervised”

This Doctoral Thesis presents new mineralogical and geochemical data from the Nwe Yon-Kwinthoneze gold district in central Myanmar, and discusses the possible mechanism for the conditions of formation of the mineralization. Apart from the geological context and the mineralogical paragenesis of the mineralization, the candidate applied ICP-MS analyses of whole-rock and bulk-ore, EPMA in the sulfides, as well as fluid inclusions and stable and radiogenic isotopes. The manuscript is interesting and includes new results, which are useful for a better understanding of the metallogenic evolution of the deposit and the enrichment in Au and Te.

The structure of the manuscript is good but a revision is required because there are many repetitions and the reader is confused. The section “1.6 Methodology” includes very briefly some of the analytical methods that were used in this study. However more details of the laboratory work are presented later, in other sections. This causes much confusion to the reader. I strongly advise the candidate to add a new chapter, after Chapter 3 with the geological setting, and present the information about all the methodology process.

Moreover, the candidate must move all the mineralogical, textural and paragenetic data from Chapter 6 to Chapter 5. The reader is confused when he reads twice the same information in different parts of the manuscript. For this reason the Chapter 5 must be written as MINERALOGY, TEXTURE AND PARAGENESIS OF THE MINERALISATION.

English language is very good. However, the candidate uses both USA and UK English (e.g. sulfide and sulphide, mineralization and mineralisation and many others) and must homogenize them.

The candidate used the relevant and appropriate literature and research methods for his doctoral dissertation. The discussion of the research results is systematic and thorough, and the aim of the doctoral research has been accomplished. The candidate provides original solutions to the scientific problem, and he has a good theoretical background, so that he can conduct independent research work. He also provides some practical applications of his research suggesting implications for exploration of this gold deposit. Moreover, I did not notice any irregularities.

For these reasons I am positive for Aung Myo Thu to be a Doctor.

Some issues have to be addressed before this doctoral thesis is finally submitted. These issues are not so critical and important and my final assessment does not change. The author has to focus on the following concerns and must revise the manuscript accordingly:

1. Page 50: According to the candidate, the ore bodies consist of disseminated, massive and vein types of mineralization. But in many parts of the text, he refers only to the vein type, possibly indicating all the ore bodies. This issue must be addressed.

2. Page 55: *A2 and New A2 deposits have many of the same paragenetic and geochemical characteristics, which shows that they are part of the same ore-forming fluid system:* this not

a correct conclusion. More data are required in order to reach in this suggestion. It is better to delete this conclusion here.

3. Page 71: The candidate claims that there is a *metal zonation from pluton-proximal Au-Ag-Pb-Zn-Sb to distal Au-Ag-Bi-Te±W assemblages*, but in the typical intrusion related systems this is opposite; the Au-Ag-Bi-Te±W assemblages are proximal and the Ag-Pb-Zn-Sb assemblages are distal. This must be clarified.

4. Page 80: Porphyritic granite appears here for the first time. Are granite and porphyritic granite the same rock? Please clarify.

5. Page 106: *diagenetic pyrite* means that pyrite was formed under sedimentary processes. Is this conclusion correct or not? Please keep only the term “*pre-ore pyrite*”.

6. Page 106: The use of the term *electrum* in the text is doubtful, because electrum is an alloy of Au (<80 wt.%) and Ag (>20 wt.%). The chemical analyses shown in section 6.3.5.1 and table 6.5 show that there is an overlapping of the chemical composition in terms of Ag contents, of electrum and native gold. The candidate must clarify from the beginning what is the meaning of electrum in his thesis.

7. Page 107, Table 5.1: The candidate, in the paragenetic sequence, presents 3 types of gold: (native) gold in sulphides, (native) gold in tellurides, and free (native?) gold. He must clarify this uncertainty.

8. Page 107, Table 5.1: The presence of *wolframite in rutile* is also doubtful. As I realized from the section presenting the results from the EPMA, this mineral is a W-rich rutile and not a wolframite. This must be revised in the whole text.

9. Page 108: Pressure shadows form under metamorphic conditions, when a rock or mineral is deformed. However, there is not any figure showing pressure shadows in the manuscript. The candidate must clarify this from the beginning, although he mentions later that this texture is an indication that the mineralization was metamorphosed/deformed.

10. Page 145, Chapter 6: The title is not correct. Instead of using the term “*WHOLE-ROCK ORE*” the candidate must use the term “*BULK-ORE*”. Please revise this in the whole text. Also, the candidate must move all the analytical methods to a new Chapter that will present all the methodological and analytical processes.

11. Page 150: The geochemical data and the distribution of some elements in pyrite are discussed briefly and not extensively. The candidate must add some more details and discuss the diagrams of figure 6.3.

12. Page 152: The same as in pyrite. The candidate gives information about the mineralogical texture of chalcopyrite, but he does not discuss the geochemistry of chalcopyrite.

13. Page 161: Following my comment 3, the candidate has to describe the difference between gold and electrum. The reason is that he presents analyses of gold with Au concentration of <80 wt.% in Figure 6.8C, that overlaps the electrum composition in Figure 6.8A.

14. Page 164: The candidate mentions that there is also tetradymite in the Nwe Yon-Kwinthoneze gold district, cited by other researchers. Therefore, this mineral must be added in Fig. 5.1 and in the discussion about the mineralogical composition of the mineralization.

15. Page 170: Following my comment 5, the candidate confuses the wolframite in rutile with the W-bearing rutile. He must clarify which is the case, in the whole text. From the analysis I understand that this is a W-bearing rutile.

16. Page 174: In the text and in Table 6.8, the concentrations of 0.00 wt.% are not correct. Please change them to “bdl”.

17. Page 189: The gold fineness of the Nwe Yon-Kwinthoneze Gold District overlaps the fineness of gold from many ore deposits, and the conclusion that the deposit is most likely similar to intrusion-related gold deposits is not correct, and must be omitted.

18. Page 192: The candidate concludes that the pyrite in the Nwe Yon-Kwinthoneze Gold District is probably hydrothermal, but previously he stated that pyrite of stage 1 is diagenetic and has been later metamorphosed. This must be clarified.

19. Page 232: The candidate claims that the fluids are rich in $H_2O-NaCl+CO_2$, but CO_2 was not detected and so it must be deleted. Therefore, the conclusion that the *homogenization temperatures and salinities indicate that the ore-forming fluids in the Nwe Yon-Kwinthoneze gold district are ... consistent with most typical intrusion-related Au deposits*, is incorrect, and be also deleted. This is an over-interpretation.

I also submit an additional PDF file that includes numerous minor corrections and suggestions for revision of the initial manuscript.

Sincerely yours

A handwritten signature in blue ink, appearing to read 'V. Melfos', with a horizontal line underneath.

Vasilios Melfos