Characterizing of Vein Quartz Occurrences in Sri Lanka

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Introduction

Sri Lanka endowed with vast potential and exquisite varieties of industrial minerals. Unique physical and chemical properties of high grade quartz as a raw material for high-tech products. The characteristics of vein quartz vary with the geological environment, and although it is primarily composed of silicon dioxide, gaseous, liquid , solid trace elements can occur within crystals or between crystal boundaries.

In Sri Lanka, silica is available in two forms as free silica and combined with other elements and compounds. Quartz with extreme purity over 99 percent of SiO_2 is found in many parts of Sri Lanka as discordant veins and they are mainly confined to the central Highlands. Highland/Vijayan complexes boundary zone. contain vein quartz apart of the deposits within Highland complex. The origin and provenance of vein quartz in Sri Lanka is highly a debatable aspect.

Materials and Methods

This study is focused in developing a model for the vein quartz occurrences along the H/V boundary considering detail surveys conducted on major deposits. illukpelessa and Randeniya deposits were considered for this study as these deposits were investigated in detail. Under these detailed studies; geological mapping, geophysical investigation and core-drilling were conducted at the above locations.

Result and Discussion

Orientation of veins are in regular manner, short vein segments with equal thickness, appear with clearly define sharp contact are the significant features in vicinity of Randeniya occurrence. These field relations suggest nearly contemporaneous events within a single geological episode. Based on geological, textural and mineralogical data suggest that quartz veins bear evidence of single stage crystallization.

Preliminary focused on Randeniya vein quartz occurrence that exhibits glassy nature of mineral grains. It means, crystal grains have not its defined regular crystal habits or crystal boundaries due to fast cooling processes of crystallization. Fast cooling of materials, which may be caused of high temperature disparity of country rock and hot aqueous solution.

In many instances of Mahagama, Randeniya and Illukpelessa vein quartz ridge is mainly associated with part of outer calc-gneissic rim with contact between two lithologies is clearly visible.

Vein quartz occurred as narrow concordant or discordant bodies as dykes (Mahagama), lenses (Randeniya), pods and veins in high-grade metamorphic rocks. In sense of geology, extension of the vein quartz ridges are almost aligned to the strike direction of the rocks. Concentrated on field observations Cross-cutting field relationship of large vein quartz deposits is hardly visible in Randeniya vein quartz occurrence.

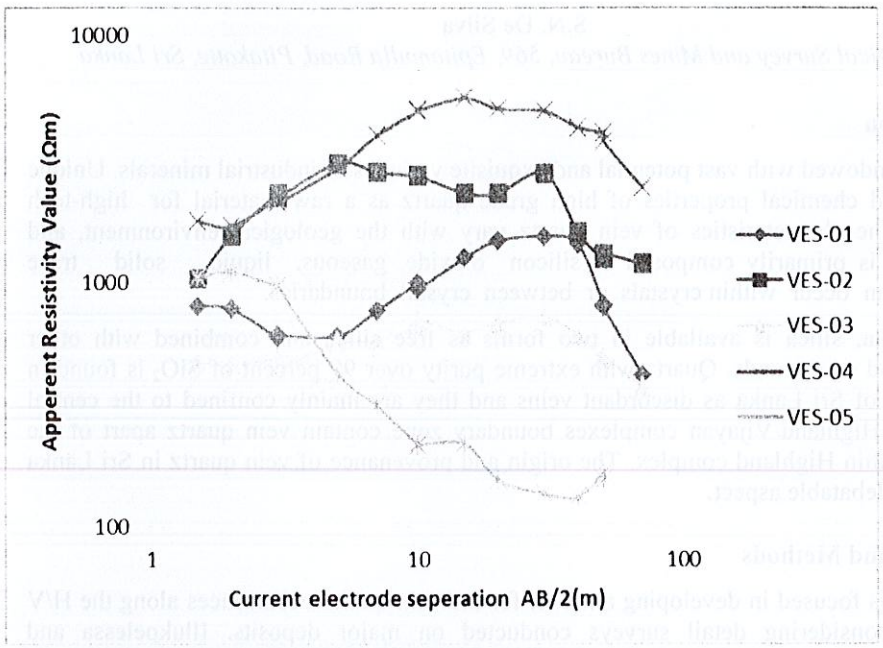

Figure 1: 1- D Resistivity curves plotted on the double-log paper. Selected few VES locations in Randeniya vein quartz occurrence

Based on the pattern of the above curves in figure 1, few curves were exhibit unique characteristic of vein quartz occurrences at the subsurface. The flat nature of the 1-D curve over 1000 Ωm resistivity range is an indicative for subsurface extension of vein quartz occurrences (VES-01, VES-02, VES-03 and VES-04). Significant different between resistivity curves of bed rock and vein quartz occurrence, which is the bedrock characterized in 1-D curves with a positive gradient with an angle over 40^0. 1-D curves with a steep negative slope scene special characteristic of weathered rock materials.

Above selected location is reflected the highest potential area with varying maximum thickness (nearly 20 m-25 m) of vein quartz extending to the subsurface.

In order to assess most reliably the subsurface vertical extension of vein quartz core drilling was necessary. It is significant outcome for quantitative (depth of extension) and qualitative assessment (compositional variation etc.) of the occurrence (Figure 2).

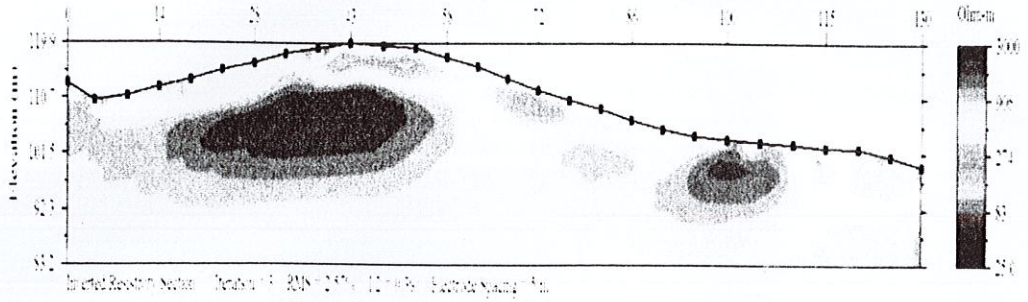

Figure 2: 2-D Resistivity image analyzed –Selected location at Randeniya vein quartz occurrence.

Conclusion

Dissimilarities of mode of the occurrence , cooling history and characterizing changes of vein quartz in Central Highland and H/V boundary is clearly distinguish to achieve a clue. Existing most acceptable model of vein quartz occurrence suggested pegmatitic origin, where quartz may have been separated from the hydrothermal solution at later stages of crystallization of granitic magmas. According to above explanation suggesting the presence of a root for each sporadic vein quartz occurrence is very improbable when the lateral extent of the studied deposits is taken in to consideration. This study and other previous studies on vein quartz lead to the conclusion that the subsurface extension of vein quartz is very limited although the main occurrence is bulk in appearance.

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