

Paragenesis and economic evaluation of the Mana Sar nephrite in prospect of mining, district Bajaur, Pakistan

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The study was conducted in District Bajaur in order to study the paragenesis and economic evaluation of the Nephrite. The chemical formula of Nephrite is $\text{Ca}_2(\text{Mg}, \text{Fe})_5[\text{Si}_8\text{O}_{22}](\text{OH})_2$. It can be composed either of iron-rich (actinolite) or magnesium-rich (tremolite) varieties. Its colour varies from onion-green to greenish-Gray, white, pinkish, yellowish, bluish to black depending on iron content and some admixtures of other minerals (serpentine, chlorite, calcite, magnesite, and talc). Nephrite have a hardness of 6 to 6.5 on Mohs scale, monoclinic crystal system and specific gravity ranging from 2.95-3.21 g/cm^3 . During field work, three main veins were identified as V1, V2 and V3. The parageneses of the nephrite veins were Metasomatic replacement of serpentine. All of three veins were of low to medium quality. The hardness of the veins increases with depth, which is a good sign for mining. All of the veins can be accessed through a single link road, making them easily reachable. The veins are located within a distance of 500 meters. V1 has a dipping angle of N05W/38W degrees, which makes excavation easier due to its location on top of the mount. V2 is a wedge shape dipping having N76E/86N, and V3 has two units that have a hardness of 4 to 5 within 3ft. All of the veins have open space for dumping material, which is cost-effective. There are different sets of joints in the veins, including along the bedding, across the bedding, and some cross-joints. It is believed that the amount of deposit may be much higher than estimated due to changes in inclination with depth. All of the visited veins are of the lensed type, which is known to produce the best quality nephrite in the world.

Keywords: Nephrite; Paragenesis; Mohs Scale; Economic Evaluation