

Paper Number: 3516

## **MINING AND BENEFICIATION POTENTIAL OF THE SEMI-PRECIOUS GEMSTONE RESOURCES IN THE NORTHERN CAPE PROVINCE OF SOUTH AFRICA**

Rasmeni, S.K., Moeletsi R., Sebola, T.P., and Legoale, T.

Mineralogy Division, Mintek, Randburg South Africa  
SonwabileR@mintek.co.za

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The mining industry in the Northern Cape Province has been the backbone of the Province's economy for many years. Mining has evolved around the four large resources of diamond, manganese, iron, and copper ore. However, not much attention has been paid to small scale mining of lower-priced commodities such as semi-precious gemstone in the region. A wide variety of semi-precious stones is found throughout the province, although the updated statistical information is not well documented and readily available. This is due to the fact that most of the semi-precious stones are mined on a small-scale basis with little or no available production and sales information. Mintek has researched the semi-precious mineral potential in the Northern Cape Province. The aim was to understand artisanal mining activities and where necessary assist the small scale miners to better understand the geological occurrence, mineralisation, safe mining methods and ultimately, sustainability of these operations in terms of gemstone supply.

This study was undertaken as part of the Medium Term Expenditure Framework (MTEF) Project at Mintek and the information obtained was used as a baseline for planned and commissioned beneficiation centres in key towns in the Northern Cape Province. The study has shown that: i) Semi-precious stones such as tiger's eye, red aventurine and rose quartz occur in large enough quantities to make a lasting impression on the world market. Fluorite deposits also occur in significant amounts. ii) Important deposits of tiger's eye located near the towns of Prieska, Griekwastad and Niekerkshoop are mined on a small scale and informal basis by various individuals and groups of the local community. The tiger's eye is unevenly distributed and occurs as lenses of various sizes. It is interbedded in gently folded metasedimentary rocks of mostly banded iron formation (BIF) belonging to the Kuruman Formation in the Asbestos Hills Subgroup. iii) The red aventurine deposit in the Pella area is unique in South Africa, and is sustainable over a long period of time (~50 years). Apart from that, aventurine is commonly green in colour, but the intrigue with the aventurine from Pella is that it is a pale reddish to mauve colour. This is a result of randomly orientated flakes of pink Mn- and Fe- rich muscovite that is directly responsible for the colour of the gemstone. This deposit is underlain by a complex array of metamorphosed igneous and sedimentary rocks, which form part of the Namaqua Mobile Belt. Although very limited exploitation has taken place, most of the red aventurine is transported, sorted and stockpiled on a farm located along the N14 for export to overseas clients via Cape Town harbour. The red aventurine deposit will add value to the local beneficiation industry. iv) Two rose quartz mines in the Kakamas area also export other varieties of semi-precious stones to countries like China and Italy, and are expected to remain in production for the next 30 years to come. Rose quartz-bearing pegmatite deposits in the Riemvasmaak area also present significant supply potential. These rose quartz deposits are of high quality and compare well with rose quartz from the other surrounding areas and countries. The disadvantage of this deposit, however, is its remoteness to the nearest village or town, and poor road infrastructure to access the deposit. v) The fluorite deposit in the Riemvasmaak area contains

highly sought after, transparent emerald green, perfect octahedral crystals of fluorite. At present the market revolves around mineral collectors and prized crystal specimens are sold to mineral dealers in the area, who market and sell at mineral shows or on the internet. The industrial quality fluorite, which is blue, purple, orange, yellow and colourless, presents an opportunity for local beneficiation. However, the market has not been established. vi) Other semi-precious stones such as agate, jasper, green aventurine and sodalite do not have high value, are often widely scattered and are found in relatively small quantities. If properly managed, the tiger's eye, red aventurine and rose quartz resources, together with the other scattered and limited under-exploited semi-precious resources, present an immediate possibility to be converted into sustainable industry through the two already established, as well as other planned, beneficiation centres. Such opportunities will benefit various communities in the region.

