

ORIGIN OF SPINEL MACROCRYST OF 1.1GA KIMBERLITE CLAN ROCKS FROM CENTRAL INDIAN DIAMOND PROVINCE

Pankaj Kumar Tiwari¹, Abhijeet Mukherjee¹, E.V.S.S.K. Babu², G. Prabhakar³ and C.B. Verma¹

¹NMDC Limited, Khanij Bhavan, Castle Hills, Masab Tank, Hyderabad

²CSIR-National Geophysical Research Institute (NGRI), Uppal Road, Hyderabad

³Department of Geology, Osmania University, Hyderabad

Abstract

Spinel from 2 kimberlite pipes from the Central Indian Diamond Province (CIDP) have been analysed. Most of the spinels are classified as high-chromium chromite (Chr) and xenocryst spinel (Xen) representing two significant stages of spinel formation. Most of the spinel in the study are dominated by Magnesiochromite composition in the range of $Cr/(Cr+Al) > 0.5$ and $Fe^{2+} / Fe^{2+} + Mg < 0.5$. These composition ranges are characteristic of a depleted peridotite, which formed as a result of magmatic depletion processes. Majority of spinel grains are interpreted to be xenocrysts, derived by the disintegration of garnet bearing mantle peridotites, that later were swept up by kimberlite magma. Three compositional trends can be observed from spinel analysis, Trend T1 ($Cr/(Cr+Al) = 0.80$ to 0.90) representing the primary spinel, crystallizing directly from kimberlite and Trend T2 ($Cr/(Cr+Al) = 0.60$ to 0.80) & T3 ($Cr/(Cr+Al) = < 0.60$) assumed to be the product of interaction between the depleted peridotite and fertile fluids or magma (refertilization).

Keywords: Spinel, Kimberlite, Majhgawan, Atri, Central Indian Diamond Province (CIDP).