**Mantle melt modelling components**

**Primitive Depleted MORB Carbonatite**(3) **PM+1 DMM+1**

**Mantle** (1) **Mantle** (DMM) (2) n=4

La 0.687 0.192 474.0 5.42 4.873

Ce 1.775 0.55 863.75 10.40 9.06

Nd 1.354 0.581 362.75 4.97 4.11

Sm 0.444 0.239 55.33 0.99 0.76

Eu 0.168 0.096 14.97 0.32 0.235

Gd 0.596 0.358 37.47 0.98 0.725

Dy 0.737 0.505 20.30 0.93 0.699

Yb 0.493 0.365 7.56 0.56 0.421

Y 4.55 3.328 91.575 5.42 2.034

Zr 11.20 5.082 23.58 11.32 4.462

Nb 0.713 0.149 154.06 2.246 1.626

Ba 6.989 0.563 1250.5 19.43 12.74

References: (1) Sun & McDonough (1989), (2) Workman & Hart (2005), (3) Hoernle et al (2002). PM+1 = Primitive mantle plus 1% Carbonatite, DMM+1 = Depleted MORB Mantle plus 1% Carbonatite.

Non Modal Batch Melting used:

Cl/Co = 1/(Do + F(1-P))

Non Modal Fractional Melting used:

Cl/Co = 1/Do (1-PF/Do)(1/P-1)

Where Cl = concentration of element in residual melt,

Co = original concentration of element in source

Do = Bulk distribution coefficient of trace element in original source

P= Bulk distribution coefficient of trace element in consumed minerals

F = wt fraction of liquid remaining.

**Typical peridotite source modal mineralogy** (in wt fractions)

**Mineral** **Melting Mode**

Olivine 0.62 0.15

Orthopyroxene 0.25 0.20

Clinopyroxene 0.08 0.35

Garnet (0.05) (0.30)

Spinel (0.05) (0.30)

Where parenthesis indicate presence or either/or.