1998b, 2000). A polynomial (eqn. 19) was fitted to the data of figure 105 and used to estimate calendar years from the apparent unadjusted radiocarbon age (Libby half-life),

$$\text{Cal. Yrs. B.P.} = -173.94 + 1.1713A - 2.0521\times10^{-5}A^2 + 4.0150\times10^{-9}A^3 - 2.4519\times10^{-13}A^4 + 5.7738\times10^{-18}A^5 - 4.6915\times10^{-23}A^6, \quad (19)$$

where A is the unadjusted radiocarbon age (Libby half-life) in years. Over the range of most of the unadjusted radiocarbon ages of the waters in the MRGB, the calendar year age differs from the unadjusted radiocarbon age by between 0 and about 3 ka. The correction that is added to the apparent unadjusted radiocarbon age to correct to calendar years is given in figure 106. Waters from the Tijeras Arroyo and Central zones (zones 10 and 12) have median unadjusted radiocarbon ages of approximately 5 ka and, for these, the average calendar age is less than 1 ka greater than the unadjusted radiocarbon ages. Water from the Northern Mountain Front, Northwestern, Rio Puerco, Southwestern Monutain Front, Abo Arroyo, Eastern Mountain Front, and Tijeras Fault Zone zones (zones 1, 2, 5-9, and 11) have, on average, calendar year ages that are about 1 ka greater than the apparent unadjusted radiocarbon age. The oldest waters sampled in the MRGB, from the West-Central and Western Boundary zones (zones 3 and 4), have unadjusted calendar year ages that are typically 3 ka older than the unadjusted radiocarbon ages. The unadjusted radiocarbon ages and calendar year ages of DIC for all the MRGB waters are given in table 10. Although the radiocarbon calibration data obtained from tree rings (Stuiver and others, 1998) and $^{230}Th/^{234}U$ dating or corals (Bard and others, 1998) are relatively precise, greater uncertainties in radiocarbon calibration are associated with data obtained from varves (Kitagawa and van der Plicht, 1998a, 1998b). Recently, additional calibration data have been obtained from a stalagmite in the calendar year age range of 11 to 45 ka that indicate large variations in atmospheric ^{14}C activity between 33 and 45 ka (Beck and others, 2001; Bard, 2001). Although radiocarbon calibration to about 20 ka now seems well established, extension of the calibration to the dating limits of the radiocarbon method (about 45 ka) is currently under investigation by the radiocarbon scientific community. Most of the radiocarbon ages from the MRGB are in the range of 0 - 20 ka, where calibration data are most reliable. Nevertheless, in keeping with previous work in the hydrochemical sciences, all radiocarbon age information used in this report is based on the (unadjusted) radiocarbon age, rather than calendar years. However, a companion report (Sanford and others, 2004) uses the calendar year ages in calibrating a ground-water flow model.