$$p7 = A_0 + A_1 T + A_2 T^2 + A_3 T^3 + A_4 T^4$$
$$p8 = B_0 + B_1 T + B_2 T^2 + B_3 T^3$$
$$p9 = D_0 + D_1 T + D_2 T^2$$
$$p10 = E_0 + E_1 T + E_2 T^2 + E_3 T^3$$
$$p11 = F_0 + F_1 T + F_2 T^2$$
$$p12 = G_1 + G_2 T + G_3 T^2$$
$$p13 = H_0 + H_1 T + H_2 T^2$$

The bulk modulus is:

$$K = p7 + S(p8 + p9\, S^{1/2}) + P\left[p10 + S(p11 + G_0 S^{1/2}) + P(p12 + p13\, S)\right]$$

$$\left.\frac{\partial K}{\partial S}\right|_{T,P} = p8 + 1.5\, p9\, S^{1/2} + P(p11 + 1.5\, G_0 S^{1/2} + P\, p13)$$

$$\left.\frac{\partial K}{\partial P}\right|_{T,S} = p10 + S(p11 + G_0 S^{1/2}) + 2P(p12 + p13\, S)$$

$$p14 = A_1 + 2A_2 T + 3A_3 T^2 + 4A_4 T^3$$
$$p15 = B_1 + 2B_2 T + 3B_3 T^2$$
$$p16 = D_1 + 2D_2 T$$
$$p17 = E_1 + 2E_2 T + 3E_3 T^2$$
$$p18 = F_1 + 2F_2 T$$
$$p19 = G_2 + 2G_3 T$$
$$p20 = H_1 + 2H_2 T$$

$$\left.\frac{\partial K}{\partial T}\right|_{S,P} = p14 + S(p15 + p16\, S^{1/2}) + P\left[p17 + p18\, S + P(p19 + p20\, S)\right]$$

The "in situ" density becomes

$$Rho = (Rho\phi * K) / (K - P)$$

$$p21 = K(K - P)$$
$$p22 = -P\, Rho\phi$$
$$p23 = Rho(K - P)(K - P)$$

The thermal expansion coefficient becomes

$$\alpha = -\left(\frac{\partial (Rho\phi)}{\partial T} p21 + \frac{\partial K}{\partial T} p22\right) / p23$$

The Saline contraction coefficient becomes

$$\beta = \left(\frac{\partial (Rho\phi)}{\partial S} p21 + \frac{\partial K}{\partial S} p22\right) / p23$$