$$TI = T_c + \frac{1}{2C_v}\int_{v_c}^{v} I[p + (v_o - v)\frac{dp}{dv_H}]\, dv \quad (17)$$

with

$$I = \exp \int_{v_c}^{v} dv/f(v)$$

was used to calculate temperature on the 25^oC Hugoniot above ($T_c = 522.1^oC$, $v_c = 0.661$ cc/g). The integral term in Eq. 17 was evaluated numerically with a constant value of $C_v = 1.3735 \times 10^{-2}$ kbar cm^3/g^oC equal to the constant value along the 296^oC isentrope. Since C_v is constant along an isentrope, the significance of temperatures calculated with Eq. 17 depends on the variation of C_v with volume along the atmospheric isobar above $v = 1.35$ cc/g. In the case that C_v increases with increasing volume above $v = 1.35$ cc/g, it also increases with the increasing pressure along the Hugoniot curve, and the values of temperature calculated with Eq. 17 under the assumption of constant C_v would be upper estimates for shock temperature above 58 kbar. The values of temperature calculated with Eq. 17 are listed in Table III.

For comparison the method of Walsh and Christian[2] was also used to calculate temperature along the 25^oC Hugoniot curve with Eq. 17. The integral was evaluated under the assumption that C_v and f(v) were constant along the Hugoniot curve and that the values of these constants were the values of C_v and f(v) evaluated at 25^oC. The calculated temperatures where the 158.5^oC, 256^oC, and 296^oC isentropes intersect the 25^oC Hugoniot are 296.8^oC, 507.1^oC, and 561.5^oC. The values of temperature above 58 kbar calculated by this method are also listed in Table III.

VI. SUMMARY AND CONCLUSIONS

Because of the scarcity and inaccuracy of experimental data, it was necessary to assume a simple form of the (e-p-v) equation of state to calculate the thermodynamic properties of silicone fluid. The particular form of the (e-p-v) relationship, e = pf(v) + g(v) with f(v) and g(v) arbitrary functions of volume, was suggested from the shock wave data and also from the variation of $(\partial e/\partial p)_v$ along the atmospheric isobar. Values of f(v) calculated from the shock wave data and values of f(v) calculated from atmospheric static data with the identity $(\partial e/\partial p)_v = -C_p(\partial v/\partial p)_s(\partial T/\partial v)_p$