(Here ϵ_s is the strain in the uniaxial stress case.) Now let

$$Y = Y_o + H\ (\epsilon_s - \epsilon_s^1)$$

where H = 0.014 Mbar from Dawson's data on silver.

Using $\epsilon_x = \ell n(V/V_o)$, we find

$$W_{PD} = -\frac{2}{3} V_1 (1+ \frac{H}{3\mu}) \{C(\frac{V}{V_1} -1) - \frac{2}{3} H [\frac{V}{V_1}(\ell n \frac{V}{V_o} -1) - \ell n(\frac{V_1}{V_o} -1)]\}$$

where $C \equiv Y_o + \frac{2}{3} H\ \epsilon_x^1$. Resulting work of plastic deformation in shocked silver as function of compression is shown in Fig. 6.

In addition to work hardening there is also an effect of hydrostatic pressure on yield strength. Deformation of single-crystal copper in torsion by Abey showed for a given strain $\frac{d\tau}{dP} = 3.8 \times 10^{-3}$ (Abey, 1973). A value of 1.55×10^{-2} for $\frac{d\tau}{dP}$ was used by Erkman and Duvall (1965) to get agreement between experimental and calculated rarefaction profiles for copper. However, Barker (1968) was able to fit measured stress-time profiles using only work hardening and Bauschinger effect. Abey's result implies an increase in τ of 0.4 kbar at P = 100 kbar for copper. This indicates the pressure effect on yield strength may be significant for shock deformation but probably is less than the work hardening effect. Since no pressure effect data were available for silver, the effect was not taken into account in computations in the present work.

E. Temperature Calculations

An equation of state was developed for calculating temperatures (Sec. III.C). An expression was given for

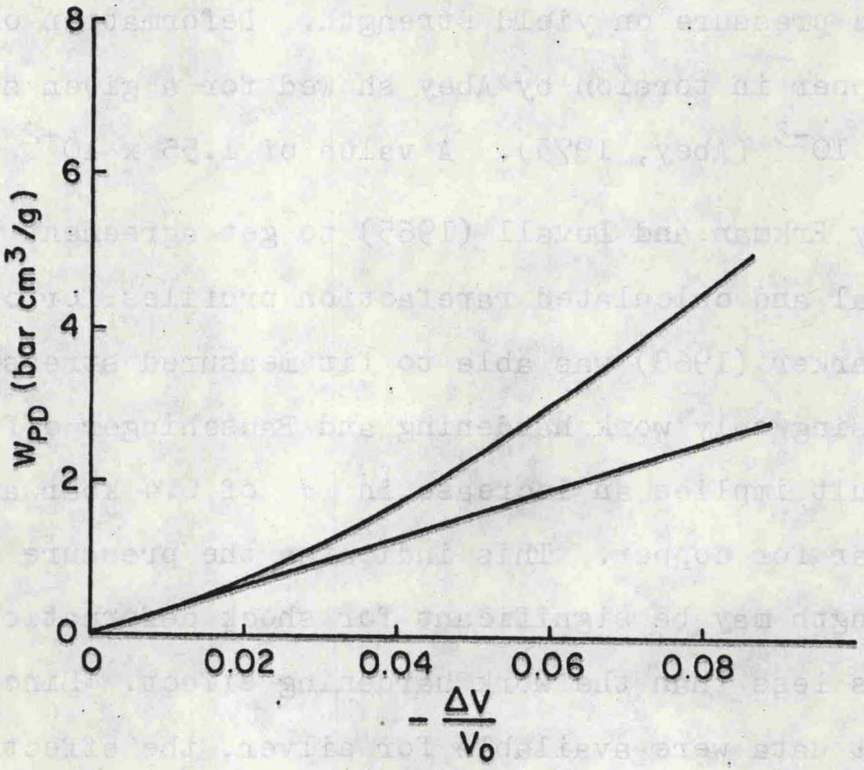

Fig. 6. Work of plastic deformation versus compression. Upper curve includes work hardening.