There is not enough overlap in volume of the Hugoniots of solid and porous Teflon to permit more than two energy-pressure points to be obtained at one volume. Values of Gruneisen's ratio computed from the offsets in pressure and energy along the Hugoniot curves vary by a factor of 2 (0.7 to 1.4). The zero pressure value estimated from static values of the bulk modulus, thermal expansion coefficient, and specific heat is about 0.313 (Ref. 2).

Sound speeds computed from the time of arrival at the gages of the rarefaction originating from the back surface of the aluminum projectiles on Shots 12,897 and 12,873 appear anomalously high. An estimate of the slope of the Hugoniot in the P-V plane can be obtained from the slope of the Teflon Hugoniot in the shock velocity-particle velocity plane (U-u plane). Since the U-u Hugoniot has less curvature than the P-V Hugoniot, the derivative dU/du can probably be more accurately determined from a plot of the data than can the derivative dP_H/dV. The two derivatives are related by

$$\frac{dP_H}{dV} = \rho_o^2 U^2 \left[\frac{u \frac{dU}{du} + U}{u \frac{dU}{du} - U} \right] \tag{7}$$

The "Hugoniot sound speed" C_H is then defined by

$$C_H^2 = -V^2 \frac{dP_H}{dV} \tag{8}$$

C_H should be an upper limit for the sound speed of a hydrodynamic material. From a graphical evaluation of the slope of the U-u curve for Teflon at the Hugoniot points for Shots 12,897 and 12,873, values of C_H have been estimated (Table IV).

Table IV

TEFLON SOUND SPEED DATA

Shot No.	Pressure (kbar)	U (mm/μsec)	u (mm/μsec)	$\frac{dU}{du}$	C_H (mm/μsec)	C(meas) (mm/μsec)
12,897	10.8	2.00	0.208	2.22	2.37	2.82
12,873	33.5	2.67	0.578	2.00	3.31	3.77