is a generalization of the Slater, Dugdale - MacDonald and Free Volume relations between $\gamma(V)$ and $P_K(V)$ which has been used by Grover et. al.[22] in their comparison of static and dynamic high-pressure data on the alkali metals. Values of t of 0, 1 and 2 correspond to the above theories, but the value of t can be chosen to give the proper thermodynamic value of γ at the Hugoniot centering point. Further, if the expression for $\gamma(V)$ obtained from differences between the Hugoniot curve and the zero Kelvin curve is equated with the above expression for γ, the Hugoniot centering point is taken to be at zero pressure and temperature, and a linear u_s-u_p Hugoniot is used, an integro-differential equation for $P_K(V)$ is obtained. When solved this gives not only $P_K(V)$, but also a $\gamma(\eta)$, where $\eta = 1-\rho_0 V$, that parametrically depends only on t and the slope, s, of the u_s-u_p Hugoniot. At zero compression, this reduces to the relation

$$\gamma_0 = 2s - (t + 2)/3 \qquad (7)$$

between γ_0, t, and s. A linear u_s-u_p Hugoniot for NaCl that passes through most of the shock wave data and the measured sound speed has $s = 1.429$. With the correct γ_0, (7) yields $t = 1.761$. The $\gamma(\eta)$ obtained in this fashion will not significantly differ from one where the precise experimental Hugoniot is used as input and where the difference between the temperature of the Hugoniot centering point and zero temperature is taken into account. The resulting $\gamma(\eta)$, as well as others, are shown in Fig. 2. This $\gamma(\eta)$ may be accurately represented by a polynominal in η for $0 < \eta < 0.5$.

$$\gamma = 1.6044 - 0.9955\eta + 1.4961\eta^2 - 1.9284\eta^3 \qquad (8)$$

This representation, along with the more precise Hugoniot fit, was then used in the numerical code that calculates the isotherm. The resultant curve, labelled (1), is shown in Fig. 3. An ionic solid may not be the best place to use such a theory for $\gamma(\eta)$, but it does offer an alternate $\gamma(\eta)$ behavior to compare with the base isotherm.

Another $\gamma(\eta)$ behavior is offered by Decker[2]. A term linear in the change in lattice parameter was added to γ_0 to give the best fit to high temperature (i.e., a slight increase in volume) thermal expansion data. This should give the right initial slope of $\gamma(\eta)$ but as Decker says, it is uncertain whether this volume dependence remains accurate to the large volume changes obtained in the shock wave data. This $\gamma(\eta)$ is given by

$$\gamma = 1.6044 + 2.55\left((1-\eta)^{1/3} - 1\right) \qquad (9)$$

Decker actually used the value $\gamma_0 = 1.59$. A polynominal fit to (9) was used to calculate isotherm (2) in Fig. 3.

Isotherms (3) and (4) show the effect of varying γ_0 by plus and minus 10%. For these isotherms $(\partial E/\partial P)_V$ was kept constant. Isotherms (5) and (6) show the effect of scaling C_v by plus and minus 10%. This was done by changing the value of 3nk in the calculations. Isotherms (7) and (8) were obtained by adding and subtracting, respectively, 0.05 km/sec to c_0 in the input Hugoniot.