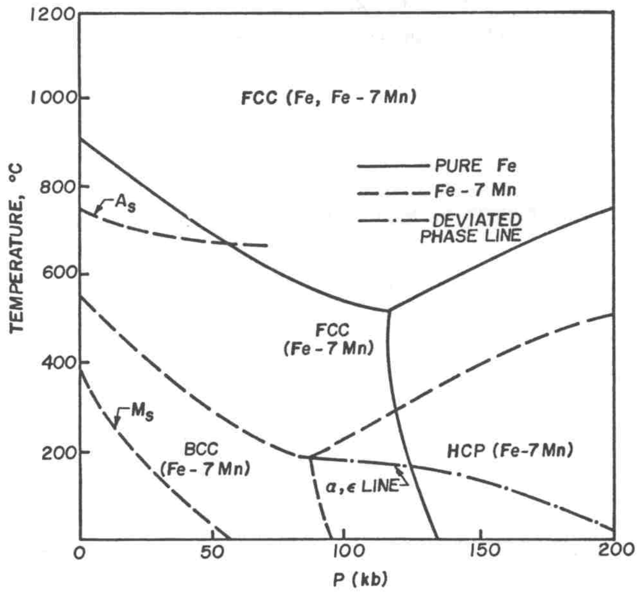

FIGURE 1 Temperature-Pressure Diagram for Fe-7Mn

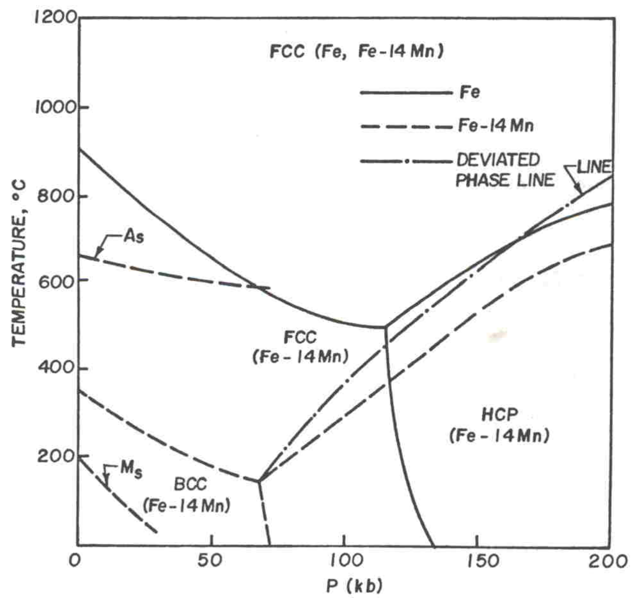

FIGURE 2 Temperature-Pressure Diagram for Fe-14Mn

$$T_H - T_o = \frac{C}{3Nk}\left[\frac{P}{2\rho_o}\left(1 - \frac{V}{V_o}\right) - (u(V) - u(V_o))\right] \quad (4)$$

where $\rho_o = 7.87\ g/cm^3$, $T_o = 300°K$. Table I gives the estimated temperature rise in shocked Fe-7 wt% Mn and Fe-14 wt% Mn.

TABLE I

THE EFFECT OF MANGANESE ON THE PEAK TEMPERATURE

Alloy	Shock Pressure (kbars)	Peak Temperature (T_H) (°C)
Fe-7 wt% Mn	90	150
	150	625
	300	836
	500	1227
Fe-14 wt% Mn	90	430
	150	575
	300	738
	500	1000

The net result of a shock followed by a rarefaction wave is an increase in temperature and internal energy.

As shown in Table I, the peak temperatures attained by the Fe-7 wt% Mn alloy are sufficiently high to result in an $\alpha \rightarrow \gamma$ transformation since the T_H, P states for this alloy are within the γ field (Figure 1). The peak temperatures attained by the Fe-14 wt% Mn alloy are sufficiently low so that the T_H, P states for this alloy are entirely within the ε field.

3. Static Experiments at 300°K

The hydrostatic method of applying high pressures is not accompanied by the shock heating effects that are present during shock deformation. The static pressure transformations are therefore abaric.(4) From Figures 1 and 2, the effect of pressurization at constant temperature (300°K) will result in an $\alpha \rightarrow \varepsilon$ transformation for the iron rich iron manganese alloys. This conclusion has been verified by reference (4). Therefore, shock heating which accompanies dynamic pressurization of Fe-Mn and is not present during the static experiments, results in a BCC to FCC transformation and not a BCC to HCP.