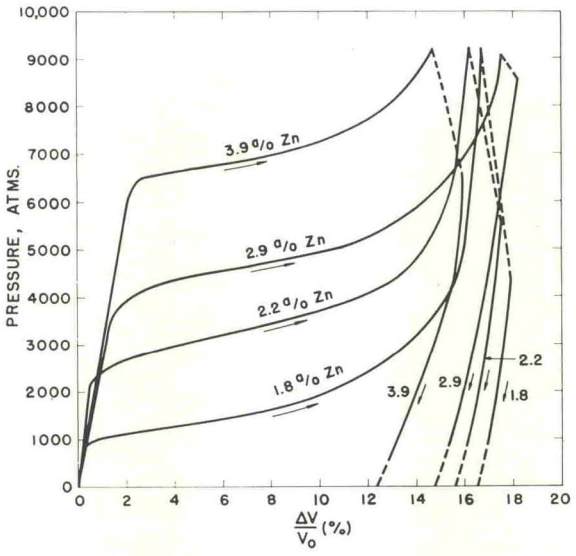

Fig. 5. Curves showing the effects of a cycle of compression and decompression on the per cent change in volume of delta-plutonium alloys containing zinc in the concentrations of 1.8–3.9 a/o. All of these alloys transform, at least partially, from delta to lower allotropes.

compound, $PuZn_2$, were also seen in the microstructures, but there was no definite evidence that the amount of this phase increased after transformation. Figure 6 shows the transformation pressures and volumes of transformation of the Pu-Zn alloys plotted against atom per cent zinc. Again, these transformation pressures and volumes are seen to vary linearly with zinc content over the range of the experimental measurements, and extrapolation shows that the zero transformation pressure occurs at about 1 a/o Zn. It is expected that the transformation pressure will increase linearly with atom per cent zinc up to the limit of solid solubility of zinc in delta plutonium. The transformation pressure should then remain constant with increasing zinc content throughout the two-phase region, delta plus $PuZn_2$.

The compression curve of a delta-stabilized Pu-In alloy, containing 3.4 a/o In, is not illustrated, but it is similar in appearance to the curve of the 1.7 a/o Al alloy shown in Figure 3. This metastable delta phase Pu-In alloy transformed at 1520 atm, and the transformation

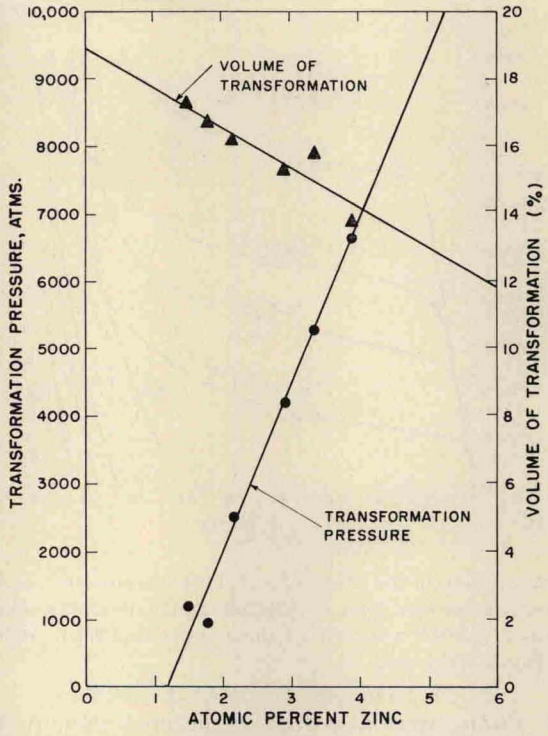

Fig. 6. Curves showing the effect of zinc content on the pressure necessary to cause plutonium-zinc alloys to transform from delta to lower allotropes and on the per cent change in volume associated with the transformation.

was found to result from the irreversible change of delta into a mixture of alpha plus delta. Experiments were also made on other Pu-In alloys containing more than 3.4 a/o In, but the results are not meaningful because the alloys were inhomogeneous.

Figure 7 shows the compression curves of some of the Pu-Ce delta-stabilized alloys containing between 3.4 and 6.0 a/o Ce. Note that these alloys undergo double transformations under compression. The transformation pressures and volumes of transformation of the Pu-Ce alloys are shown in Figures 8 and 9, respectively, plotted against atom per cent cerium. Extrapolations show that zero transformation pressures occur at 3.4 a/o Ce for the lower pressure transition, and at 1.9 a/o Ce for the higher pressure transition. When a