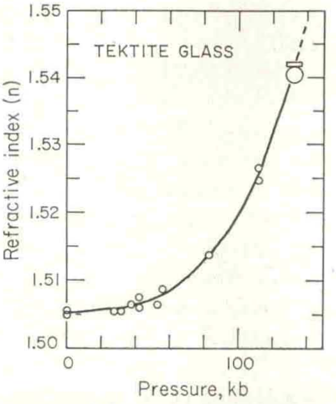

Fig. 3. Refractive index–shock pressure graph of tektite glass data. The sizes of the open data-point circles indicate the precision of the data.

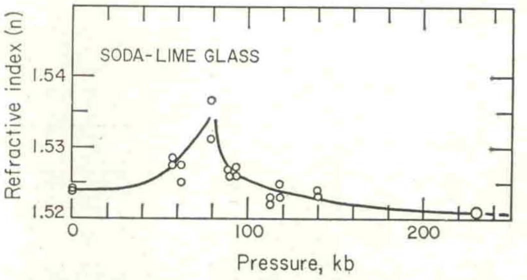

Fig. 4. Refractive index–shock pressure graph of soda-lime glass data. The sizes of the open data-point circles indicate the precision of the data.

TABLE 3. Refractive Index Measurements of Shock-Loaded Fused Silica

Shot Number	Shock Pressure, kb	Refractive Index (n): Interference[a] Method	Immersion[b] Method	Average
...	0	1.4579	1.4588	1.4584
R1[c]	170	1.4894	1.4855	1.4875
R2[c]	198	1.5180 1.5116	1.5070	1.5122
R5[d]	160	1.4902 1.4805		1.4851
156	92 ± 2		1.4828	1.4828
157	132 ± 5	1.5109 1.5203	1.4930	1.5081
158	82 ± 2	1.4570 1.4590	1.4626	1.4595
159	81 ± 2	1.4606	1.4628	1.4617
R7[c]	192	1.4908 1.4885 1.5147		1.4980
R8[c]	136	1.5036 1.5122		1.5079
R9[c]	314	1.4794		1.4794
R10[c]	290	1.5068 1.5096		1.5082
R11[c]	242	1.5057 1.5155		1.5106
R12[c]	200	1.4884 1.5191		1.5038
R13[c]	180	1.4902 1.4702		1.4802
R14[d]	376	1.4774 1.4638		1.4706
R15[d]	418	1.4617 1.4818		1.4718
R16[d]	460	1.4756 1.4703		1.4730

[a] Error, ±0.0002.
[b] Error, ±0.0010.
[c] Brass flyer plate used.
[d] Tungsten alloy flyer plate used.

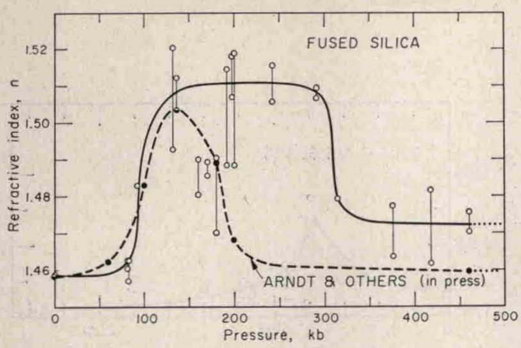

Fig. 5. Refractive index–shock pressure graph of fused silica data. The sizes of the open data-point circles indicate the precision of the data; lines joining circles indicate the range of refractive index observed in some specimens. The filled circles are the data of *Arndt et al.* [1971], which have been reproduced for comparison.

isothermal static compression by *Bridgman and Simon* [1953] and others. It is equivalent to the proportion of the shock compression that has become locked into the glass upon adiabatic release to zero pressure. We do not know whether this shock-produced irreversible densification is in part represented by the formation of a high-density phase (the pressures are within the mixed-phase regimes of the respective Hugoniots), since we have not observed any crystalline stishovite in these samples.

The behaviors of the fused silica and soda-lime glass at pressures above 140 and 80 kb, respectively, are anomalous; although the post-shock specific volumes calculated for fused silica are compatible with release-adiabat data (Figure 7 and *Rosenberg et al.* [1968]), the interesting double-valued nature of the refractive index–pressure graphs does warrant discussion.

For the soda-lime glass one explanation may be that the refractive index decrease above 80 kb is an annealing effect of high shock and postshock temperatures. *Ahrens et al.* [1970] calculated these temperatures for this soda-lime glass to pressures of 100 kb; the maximum calculated temperature increase was only 55°C at 80 kb. However, the release adiabat data for fused quartz suggest that their values may be an extreme lower bound to the actual post-shock temperature. *Chao and Bell* [1968] and *Bell and Chao* [1969] have carried out experiments on the annealing effects of high tempera-

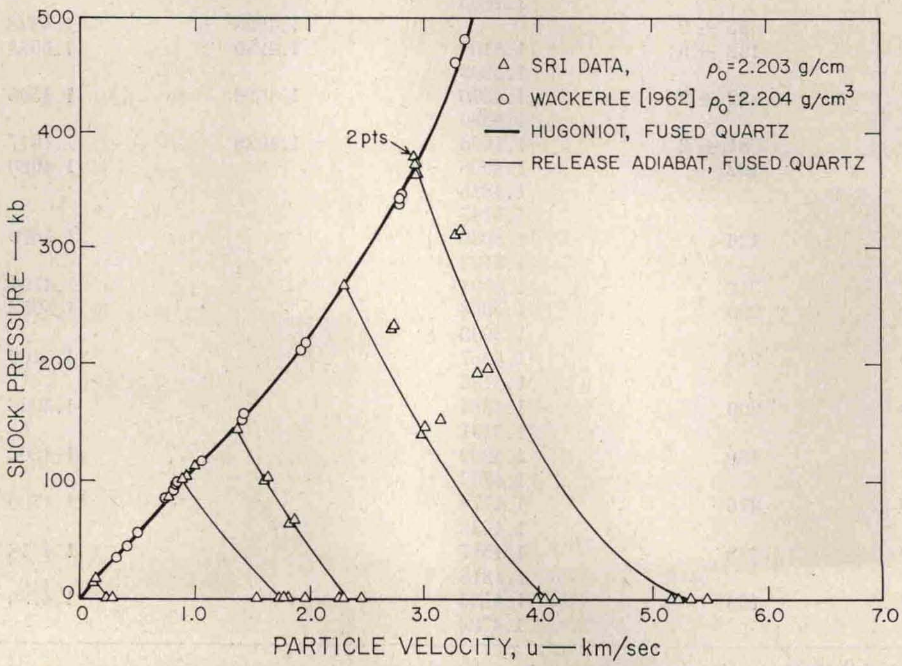

Fig. 6. Shock pressure–particle velocity Hugoniot and release adiabat data for fused silica (reproduced from *Rosenberg et al.* [1968]).