others, 1964). Together with other scattered well data, the most likely age of the basement layering is 1,200–1,400 m.y., although this is not a very well-constrained estimate (Brewer and others, 1981).

This Precambrian layering is seen also on a Chevron U.S.A., Inc., regional seismic line recorded 150 km to the southwest (fig. 24) (J. Fairborn, personal communication, 1981), which suggests that the inferred Proterozoic basin extends along the south side of the Wichita Mountains. North of the mountains, under the Anadarko Basin, there is no seismically distinguishable layering, in the Precambrian crust, of the thickness and character of that south of the mountains. Although this is conceivably due to total attenuation of seismic energy in the thick Paleozoic sedimentary succession, I feel it is more likely that the northern boundary of the Proterozoic basin underlies the Wichita Mountains. This northern boundary is probably fault-bounded, since basins of similar age elsewhere in the world are commonly bounded in this way (Salop, 1977).

The Precambrian layering is abruptly truncated along the south side of the Wichita Mountains (fig. 26). This truncation, seen in both the COCORP and Chevron data, occurs coincidentally with the trend of Pennsylvanian faults along the south side of the mountains (Burch and Waurika–Muenster Faults). The magnitude and sense of offset of the Precambrian layering cannot be explained just by Pennsylvanian fault movements (about 1 km, in a reverse dip-slip sense), suggesting that Precambrian or Cambrian (that is, pre-basal Upper Cambrian Reagan Sandstone) faulting, perhaps in conjunction with intrusions of granitic composition, caused the truncation. The COCORP data suggest that this faulting was normal, with downthrow to the north, because discontinuous seismic events occur within the Wichita block (north of the Burch Fault), which could then be explained as remnants of the Precambrian layering. However, equivalent events are not seen in the Chevron data, which might therefore be more consistent with major reverse faulting, with upthrow to the north. The normal-faulting interpretation is tentatively favored. Note that this prominent truncation does not correspond to the northern margin of the Proterozoic basin (assumed to be fault-bounded, but downthrown to the south), which is inferred to be farther north, under the main part of the Wichita Uplift.

The Meers Quartzite, found as inclusions in the granites and rocks of the Glen Mountains Layered Complex of the Wichita Mountains (Ham and others, 1964), is interpreted to be remnants of the Proterozoic basin. Ham and others (1964) suggested that the Meers Quartzite is part of the Tillman Group. The Tillman Group may comprise part of the Precambrian layering south of the Wichita Mountains, and my interpretation of the pre-Late Cambrian structural framework differs from Ham and others in that I believe that a large, pre-Late Cambrian basin existed south of and under the Wichita Mountains, but not farther north, under the Anadarko Basin.

2. *Thrusting along the northern flank of the Wichita Uplift.*

Major thrusting of the Wichita Mountains over the southern margin of the Anadarko Basin is suggested from dipping seismic events that can be traced from the subcrop of faults of the Frontal Fault system. The Mountain View Fault, the northern boundary of the Frontal Fault system with the relatively undeformed sedimentary rocks of the Anadarko Basin, is imaged best and can be traced to approximately 20–24 km in depth, with an approximate average south-southwesterly dip of 30°–40° (figs. 27, 28). The southern boundary of the Frontal Fault system with the massive crystalline rocks of the Wichita Mountains (the Meers Fault) is less well imaged, but it may have a similar dip. Farther south, in the middle of the Wichita Mountains, other events occur in the upper few kilometers with a dip subparallel to the Mountain View Fault. Possibly these are other thrusts, although there is little evidence for them in the exposed igneous rocks (Gilbert, 1982). Few coherent reflections are recorded from sedimentary rocks within the Frontal Fault system, which are known to be intensely folded and faulted in the upper 2–3 km (Harlton, 1963, 1972; Takken, 1968). The COCORP data are the first reported indications of the attitude and depth extent of the faults, which most workers have assumed to be nearly vertical at depth.

The dip of the faults suggests significant crustal shortening during Pennsylvanian uplift of the Wichita Mountains. Palinspastic reconstruction, based on the attitudes (poorly imaged) of the sedimentary rocks under the hanging walls of faults of the Frontal Fault system, suggests as much as 10–15 km, and perhaps more, of crustal shortening in the region of the COCORP profiles. This crustal shortening implies that subsidence of the Anadarko Basin during Pennsylvanian time was due largely to thrust-loading by the overthrust Wichita Mountains.

3. *Normal faults and hanging-wall anticlines within the Anadarko Basin.*

Sedimentary rocks are correlated from published well data, in particular the Lone Star 1 Rogers, which bottomed in carbonates of the Upper Cambrian–Lower Ordovician Arbuckle Group (Rowland, 1974). From extrapolations of the depth of the Upper Cambrian Reagan Sandstone (about 11.2 km; Rowland, 1974), there is apparently 1.5–2.5 km of seismically definable pre-Reagan Sandstone layering beneath the Anadarko Basin. Ham and others (1964) assumed that any such layering would be composed largely of Tillman metasediments and basalts; however, the thickness of this layering in the region of the COCORP profiles is much less than they suggested. The age of this layering is unknown, but it is probably either Middle Cambrian [as suggested by Ham and others (1964) from data from the Stanolind Perdasofpy well (fig. 25) in the Frontal Fault system] or perhaps similar to the inferred age of the Proterozoic