

eous shales in upper part; some very thin bedded, silty, shaly layers form wide notches in cliff edge above stream; shaly in lower 3 ft; contact gradational	114.0
9. Covered interval	27.0
8. Sandstone, grayish orange (10YR7/4) to light brown (5YR6/4) with dark gray (N3) wavy laminae, thick-bedded, blocky, very highly calcareous, very fine grained, well cemented	2.5
7. Shale, silty, olive black (5Y2/1), with thin laminae of siltstone and very fine grained sandstone, highly calcareous, mostly poorly exposed, except at base of unit	66.0
6. Sandstone, grayish orange (10YR7/4) to pale yellowish brown (10YR6/2), very fine grained, calcareous, contains numerous grayish black (N2) blebs and streaks	2.3
5. Siltstone, black (N1), with olive gray (5Y4/1) streaks and lenses, ripple-bedded to lenticular-bedded, burrowed, noncalcareous	30.0
4. Sandstone, light gray (N7) with abundant black streaks, blebs, and films; very fine grained; highly calcareous; carbonaceous; very thin bedded;	

ripple-bedded, lenticular-bedded; indistinct trace fossils; base gradational, upper contact sharp 3.0

SPRINGER FORMATION

UNNAMED SHALE

3. Shale, black (N1), noncalcareous, fissile, no iron-stone observed in outcrop ~118.0

LAKE ARDMORE MEMBER

2. Sandstone, brownish black (5YR2/1) with dark reddish brown (10R3/4) staining, thin-bedded, parallel-bedded, ripple-bedded, lenticular-bedded, very fine grained, noncalcareous, carbonaceous; forms resistant ledge across creek, but tends to be friable and crumbly; upper and lower contacts sharp 2.4

UNNAMED SHALE

1. Shale, black (N1), weakly calcareous, silty; includes two, 4-in.-thick, dense, brownish gray (5YR4/1) siderite layers in upper part; total thickness not exposed; ~58.0

Total ~800.0



Figure 17. The Lake Ardmore Sandstone Member of the Springer Formation (Unit 2, Fig. 14) exposed in the valley northeast of the church at Stop 3. The 2.4-ft-thick sandstone bed (shown by arrow) is overlain and underlain by black, weakly calcareous to noncalcareous shales (Units 1 and 3, Fig. 14) in the upper part of the Springer Formation.

the Golf Course Formation. The contact is sharp; however, some thin sandstone layers and lenses occur in the lower part of the Gene Autry Shale. The entire Primrose Member is >300 ft thick (as interpreted in Measured Section, Stop 3), but ~60% of the member consists of siltstones and shales, together with other minor constituents.

The Primrose Sandstone is lower Morrowan and was included in the Springer field trip to contrast its lithology with the lithologies of the sandstones of the Springer Formation. We did not do a detailed analysis of depositional environments in the Primrose; thus, the following discussion is generalized.

In the Ardmore basin, the Primrose is considerably more “dirty” and its sandstone beds are much thinner than in the subsurface of the Anadarko basin. At the Stop 3 outcrop, the Primrose has considerable amounts of interstitial and interbedded clay and shale. The conspicuous color, in various shades of olive gray, is probably due to the presence of chlorite as an alteration of glauconite. Sedimentary structures are sparse but include horizontal and crude ripple bedding. No fossils or burrowing were identified, and the sandstone is very calcareous. Sandstone intervals have multiple cycles with poorly defined textural profiles that appear to be “cleaning” (coarsening) upward (Fig. 16; note two possible cycles).

The very fine grained, “dirty” character of the sandstone and the thinness of individual sandstone cycles in the Primrose at Stop 3 indicates that it probably was deposited in a mid-shelf environment, more basinward (farther from shore) than was the Morrow Primrose of the Anadarko basin. The abundance of glauconite is a clear indicator of low-energy, low-sedimentation, and relatively shallow marine conditions. The abundance of cal-