placed the Mississippian–Pennsylvanian (Chesterian–Morrowan) boundary at the base of the Target limestone, which occurs in a shale unit above the lowermost sandstone bed of the Lake Ardmore Member. The Springer Formation ranges in thickness from >1,400 ft to >3,200 ft (Fig. 3). Lithologic subsurface logs from the upper part of two wells drilled on the Caddo anticline show the relations of the members of the Springer in that area (Appendixes 2 and 3).

The Primrose Member of the Golf Course Formation overlies an unnamed shale of variable thickness at the top of the Springer Formation (Fig. 3). This unnamed shale unit is composed of dark gray ferruginous shale and scattered layers of rhythmically bedded siltstones (Meek, 1983, p. 44). As described in this guidebook (Part II, Measured Section, Stop 3, Unit 3), a black, noncalcareous, fissile shale, devoid of ironstone concretions, occupies the interval between the Lake Ardmore Sandstone and the Primrose Sandstone. The Primrose Sandstone is overlain by the Gene Autry Shale in the northern part of the Ardmore basin and by an unnamed shale containing the Jolliff Limestone in the south (Fig. 3). The 204 ft of the Gene Autry Shale just above the Primrose Sandstone consists mostly of dark gray to olive gray, highly calcareous shale containing interstratified layers of highly calcareous siltstone and very fine grained sandstone (Part II, Measured Section, Stop 3, Units 15–17 [this guidebook]). The overlying 104 ft consists of medium gray, noncalcareous shale containing numerous ironstone layers (Part II, Measured Section, Stop 3, Unit 18 [this guidebook]).

Stratigraphy

Rod Club Sandstone

The Rod Club Sandstone is the basal member of the Springer Formation as recognized by the Oklahoma Geological Survey (OGS). It is correlated with the Sims sand in the subsurface of the Ardmore basin (inside back cover). The 250–490-ft-thick Rod Club Member consists chiefly of shales but contains several ledges of discontinuous sandstone (Fig. 3). Meek (1983, p. 21) identifies as many as 11 sandstone beds in the Rod Club, which he describes as fine-grained, green-gray and buff, well-sorted quartzarenites containing wood fragments. According to Meek (1983), the depositional environments for the sandstones were, in general, marine bars and turbidites; paleocurrent data from flutes, ripples, cross-bedding, and soft-sediment microfaults indicate that the source area was to the northwest.

McBride (1986, p. 52, 54) reports that the Rod Club Sandstone in sec. 15, T. 3 S., R. 3 E., is a very fine grained, angular to subangular, well-sorted, porous quartzarenite that contains *Calamites*. Clay constituents include kaolinite and only minor amounts of illite and smectite. Cementing agents include quartz overgrowths and asphaltic hydrocarbons. Porosity (12–27%) in the Rod Club is mainly secondary, created by the dissolution of the clay matrix and framework grains (McBride, 1986).

Overbrook Sandstone

The Overbrook Sandstone is 800–1,000 ft above the Rod Club Sandstone and is 45–105 ft thick on the outcrop (Tomlinson and McBee, 1959, p. 11) (Fig. 3). It is correlated with the Humphrey's sand in the subsurface of the Ardmore basin (inside back cover). According to Meek and others (1988, p. 192), the Overbrook consists of discontinuous sandstone lenses deposited in a typical coarsening-upward deltaic sequence, and their paleocurrent data and the isopach indicate a sediment source to the northwest. We agree that the Overbrook has a coarsening-upward textural profile. However, our interpretation is that the Overbrook was deposited as a submerged, detached marine bar (offshore) in a relatively shallow, inner- to middle-shelf environment (see Stop 2, Part II, this guidebook).

According to McBride (1986, p. 54–55), the Overbrook Sandstone in sec. 6, T. 3 S., R. 3 E., is a very fine to fine grained, moderately well-sorted, subangular to well-rounded, locally porous subarkose. The clay matrix of the Overbrook Sandstone is similar to that in the Rod Club, and it accounts for as much as 33% of the total rock. It too consists of brownish kaolinite and minor amounts of illite and smectite. Quartz overgrowths and hematite, which are present as authigenic cements, constitute ~1% and ~50% of the rock, respectively. Porosity ranges from <1% to as much as 34%.

Lake Ardmore Sandstone

The Lake Ardmore Sandstone is the uppermost named member of the Springer Formation. It lies 234–700 ft above the Overbrook and is 16–500 ft thick (Tomlinson and McBee, 1959, p. 11; Meek, 1983, p. 26) (Fig. 3). It is correlated with the Aldridge sand in the subsurface (inside back cover). The Lake Ardmore is an interval of discontinuous sandstones interbedded with shales that typically includes three sandstones; at one locality, it includes the Target limestone lentil, a mixed skeletal packstone. The Lake Ardmore sandstones are similar to those of the Overbrook Member. They are commonly thin-bedded to massive, silica cemented, noncalcareous, and porous (Meek, 1983, p. 30). Limited data suggest transport of sediment from the north and the west, but the dominant source area was to the north (Meek, 1983, p. 33).

McBride (1986, p. 56–57) reported that the Lake Ardmore in sec. 15, T. 3 S., R. 3 E., is a light gray, very fine grained, well-sorted, angular to subrounded sublitharenite to litharenite. The matrix in the Lake Ardmore Sandstone is a smectitic clay, which constitutes 10–30% of the rock. Porosity is 0–22%.

Primrose Sandstone

The Primrose Sandstone marks the base of the Golf Course Formation of the Dornick Hills Group (Fig. 3). It lies 70–500 ft above the Lake Ardmore Member of the Springer Formation (Meek and others, 1988, p. 193). It consists of 100–360 ft of thinly bedded, light gray, calcareous sandstones and shales, and a few thin limestones (Meek, 1983, p. 38). The name "Primrose" applies to the same stratigraphic interval in the subsurface and in surface exposures (Jordan, 1957, p. 158) (inside back cover).

According to Meek (1983, p. 38–39), "the sandstones of the Primrose are distinctly different in mineralogy from the underlying Springer sandstones. The Primrose sand-