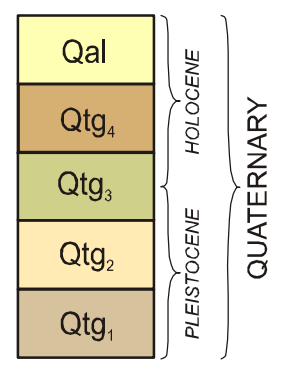


CORRELATION OF MAP UNITS

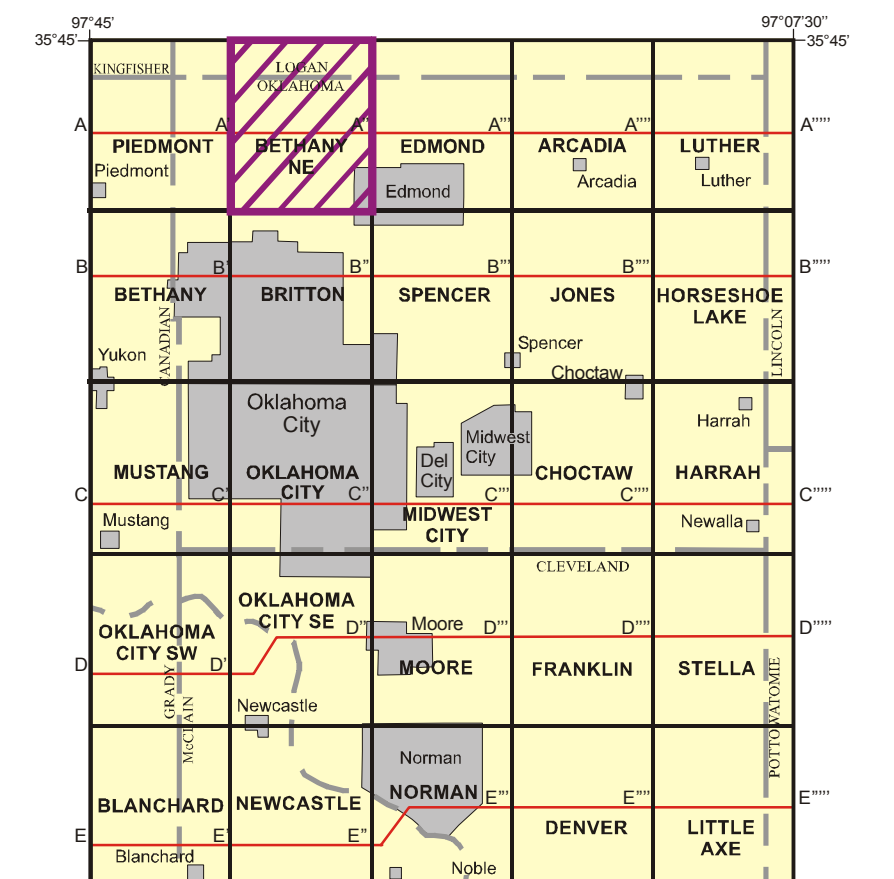


DESCRIPTION OF UNITS

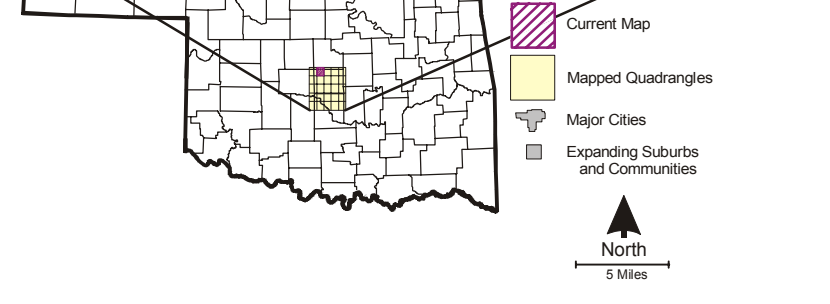
- Qal** ALLUVIUM (Holocene)—Clay, silt, sand, and gravel in channels and on flood plains of modern streams and rivers
- Qtg₁** TERRACE DEPOSITS (Holocene)—Clay, silt, sand, and gravel on terraces immediately above and adjacent to modern flood plains. Consists entirely of locally derived sediment
- Qtg₂** TERRACE DEPOSITS (Holocene and/or Pleistocene)—Clay, silt, sand, and gravel on terraces immediately above and adjacent to modern flood plains. Contains a significant amount of distally derived sediment, mostly subrounded quartz and quartzite cobbles and pebbles
- Qtg₃** REMNANTS OF TERRACE DEPOSITS (Pleistocene)—Concentrations of distally derived sediment, mostly subrounded quartz and quartzite cobbles and pebbles, about 15 to 20 ft above modern flood plains. Probably represents part of former course of North Canadian River
- Qtg₄** REMNANTS OF TERRACE DEPOSITS (Pleistocene)—Concentrations of distally derived sediment, mostly subrounded quartz and quartzite cobbles and pebbles, more than 20 ft above modern flood plains. Probably represents part of former course of North Canadian River
- Phy** HENNESSEY FORMATION (Permian)—Shale, silty, moderate reddish brown (10R4/6) to dark reddish brown (10R3/4); minor siltstone and sandstone, very fine grained to rarely fine- to medium-fine-grained (near base), typically moderate reddish brown (10R4/6) to light brown (5YR5/6) to moderate reddish orange (10R6/6), rarely yellowish gray (5Y8/1) (10R4/6) to light brown (5YR5/6) to moderate reddish orange (10R6/6), rarely yellowish gray (5Y8/1). Silty shale mostly poorly stratified, weathers to small, angular fragments and more rarely to flakes. Contains common iron-reduction spots, light greenish gray (5GY6/1) to gray (5GY8/1), as large as 2 in. in diameter. Channelform deposits rare. Commonly weathers to bare, rounded outcrops and/or "badlands"-type topography. Silty siltstone generally stratified, less commonly unstratified, and contains rare trace fossils, cross bedding, ripple marks, and shale rip-up clasts. Beds commonly about 1 to 4 in. thick. Circular iron-reduction spots as large as 4 in. in diameter common, locally concentrated parallel to bedding planes. Siltstone commonly weathers to small chips, rarely spheroidal or angular blocks, in places has a "hackly" appearance. Calcite veinlets and vugs common. Interbedded siltstone and shale weather to "badlands"-type or bench-and-slope topography. Sandstone beds typically cross-bedded and contain ripple marks. Lenticular- and wavy-bedding, burrows, trace fossils, mudcracks, shale rip-up clasts, and soft-sediment deformation features uncommon. Some beds show evidence for scour and channelform bases. Circular yellowish gray (5Y8/1) iron-reduction spots as large as 4 in. in diameter and thin, greenish gray beds common. Sandstone friable, weathers platy to flaggy. Thickness: about 120 ft, top not exposed
- Pgr** GARBER FORMATION (Permian)—Sandstone, fine-grained to medium-fine-grained, moderate reddish brown (10R3/4); pale reddish brown (10R5/4), moderate reddish orange (10R6/6), moderate orange pink (10R7/4), less common siltstone and shale, moderate reddish brown (10R4/6). Sandstone generally porous and friable; less commonly variably cemented by hematite, calcite, and/or silica. Large- and small-scale cross-bedding and trough cross-bedding common, bedding planes in outcrops typically inclined. Locally forms channelform deposits and/or is lensoid, showing pinch-and-swell. Less commonly parallel- or wavy-bedded. Shale rip-up clasts common; ripple marks common. Iron-reduction spots extremely rare, although sandstone locally has banded appearance. Weathers to slabs, flagstones, or thin plates. Siltstone and shale sandy, locally with iron-reduction spots and/or is banded. Siltstone and shale appear to be more common near top of formation. Thickness: about 60 ft, base not exposed

SYMBOLS

- Unit contact; dashed where approximate
- Mappable bed
- x Outcrop, geologic observation
- x→ Outcrop, bearing of paleocurrent direction
- ↖ Outcrop, azimuth of paleocurrent direction
- Exotic (quartz, quartzite) pebbles and cobbles
- Petroleum well. Includes oil, gas, oil and gas, dry, service (water supply or injection), junked and abandoned, unknown. Modified from Natural Resources Information System database
- Municipal water well
- ⊗ Quarry



EXPLANATION

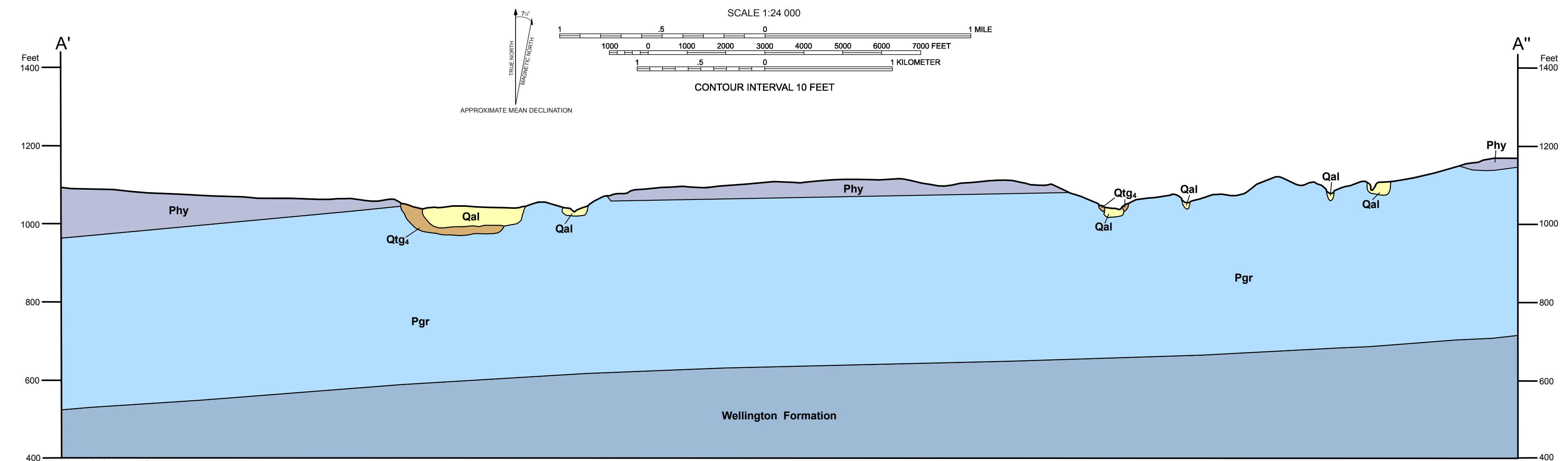


Base Map Credits

The base map was compiled by the U.S. Geological Survey. Topography by photogrammetric methods from aerial photographs taken 1954. Field checked 1965. Revisions from aerial photographs taken 1981 and other sources. Map edited 1985. Universal Transverse Mercator (UTM) projection, 1927 North American Datum, 10,000-foot grid ticks based on Oklahoma coordinate system, north and south zones, 1,000-meter UTM grid, zone 14.

Geologic Map Credits

Geology by Neil H. Suneson and LeRoy A. Hemish, 1997-1998. Research supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under Assistance Award Number 1434-HQ-97-AG-01768. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government. Published originally as Open-File Report 98-28 as an author prepared, black and white paper map. Digitally reproduced in color as Open-File Report OF9-2004. Map revised and published as OF9-2004. Cartography and layout prepared by G. Russell Standridge, 2002.



10x vertical exaggeration.
Base of Hennessey Formation in subsurface in Oklahoma County from Parkhurst, D.L.; Christenson, Scott, and Breit, G.N., 1996, Ground-water-quality assessment of the central Oklahoma aquifer, Oklahoma - geochemical and geohydrological investigations: U.S. Geological Survey Water Supply Paper 2327, p. C10.

**GEOLOGIC MAP OF THE BETHANY NE 7.5' QUADRANGLE,
LOGAN AND OKLAHOMA COUNTIES, OKLAHOMA**

Neil H. Suneson and LeRoy A. Hemish
1998