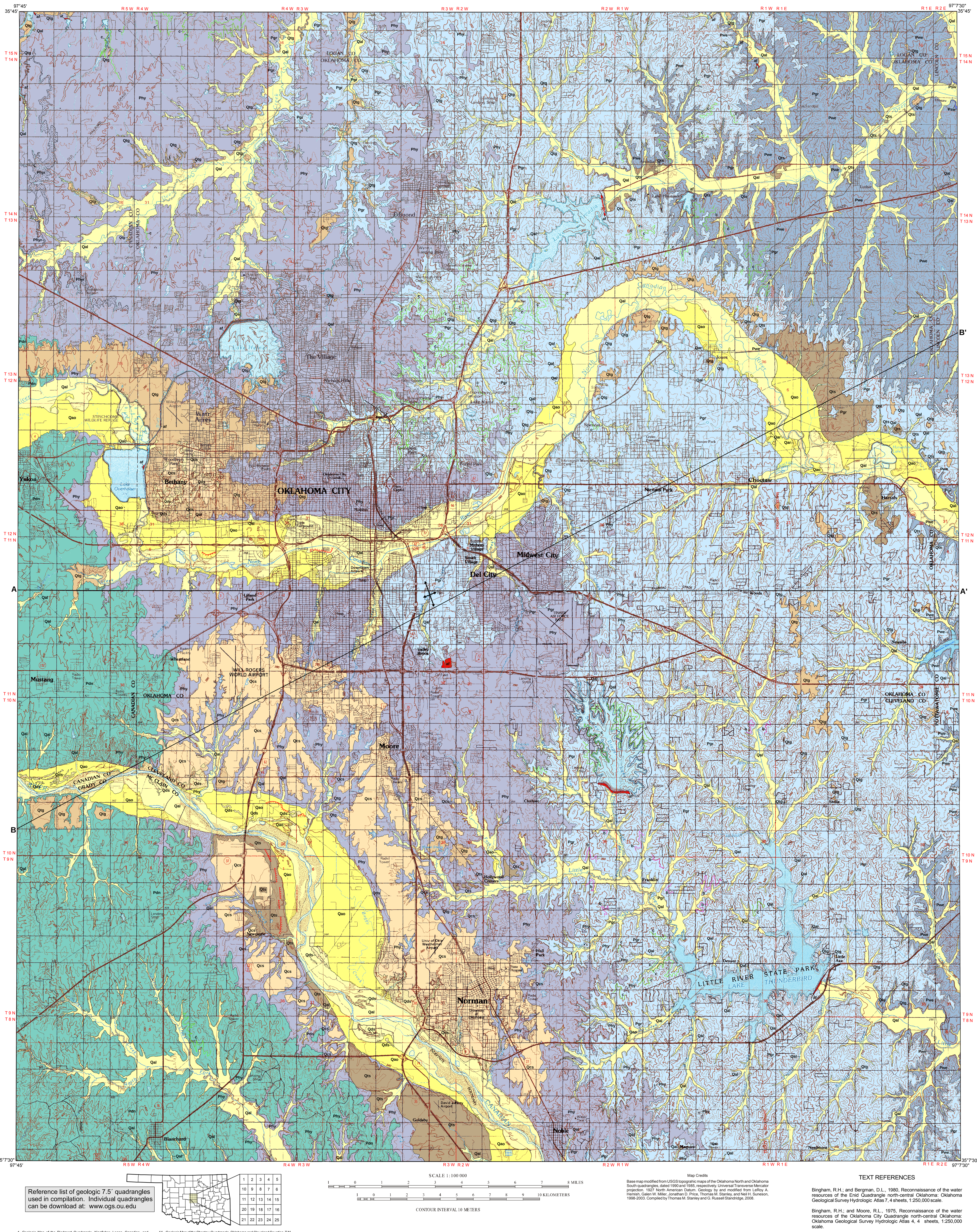
OKLAHOMA GEOLOGICAL SURVEY
G. Randy Keller, *Interim Director*

Oklahoma Geologic Quadrangle **OGQ-74**
Geologic Map Compilation of the OKC Metro Area



CORRELATION OF MAP UNITS

QUATERNARY	HOLOCENE	af, Qal, Qao, Qar, Qds, Qcs	
	PLEISTOCENE	Qts, Qtg	
UNCONFORMITY			
PERMIAN	LEONARDIAN	Pdn, Phy, Phyr, Pgr, Pwe	
	WOLFCAMPIAN	Psw	

SYMBOLS

- Unit contact
- Conglomerate bed
- Barite bed
- Axis of anticline
- Strike and dip of bed. Dip given in degrees
- Dome; position inferred
- Scarp in alluvium of North Canadian River
- Quarry

DESCRIPTION OF UNITS

af ARTIFICIAL FILL—Natural or artificial talus, slumps, and tailings covering formally exposed areas. Most deposits of this type found around man-made earthen dams and large-scale land-fills. Thickness variable.

Qal ALLUVIUM (Holocene)—Unconsolidated deposits consisting of locally derived clay-, silt-, sand-, and rarely gravel-sized sedimentary material; found in channels and on flood plains of modern streams. Includes terrace deposits of similar composition located directly above and adjacent to modern channels and flood plains. Deposits occurring within most drainage systems, and represent areas of frequent flooding. Thickness: 0 to about 40 ft. (0 to about 12 meters), Rarely greater than 40 ft.

Qao OLDER ALLUVIUM (Holocene)—Unconsolidated deposits consisting of locally derived clay-, silt-, sand-, and rarely gravel-sized sedimentary material; represent slightly older terrace deposits than those formed in modern flood plains; predominantly found adjacent to, and 5-10 ft. above, modern alluvial deposits of major drainage systems. Areas rarely subject to flooding. Thickness: unknown, possibly as much as 50 ft (15 meters).

Qar REMNANTS OF OLDER ALLUVIUM (Holocene and/or Pleistocene?)—Unconsolidated deposits consisting of locally derived clay-, silt-, sand-, and rarely gravel-sized sedimentary material; found as small, isolated remnants about 5-10 ft. above Qao deposits. Areas probably never subject to flooding. Thickness: unknown, possibly as much as 20 ft (6 meters).

Qds DUNE SAND (Holocene and/or Pleistocene?)—Fine- to coarse-grained, moderately- to poorly-sorted, unconsolidated sand formed into definite dune and ridge structures. Consists mainly of rounded to subrounded quartz grains, rarely with silt- and clay-size material. Dune features best found on the north side of major east-west trending drainages; probably represents aeolian reworking of Pleistocene and slightly younger fluvial terrace deposits. Thickness: 0 to 40 ft (0 to 12 meters).

Qcs COVER SAND (Holocene and/or Pleistocene?)—Unconsolidated, very fine-grained sand to coarse-grained silt and clay, moderately to poorly sorted. Consists mainly of rounded to subrounded quartz grains, with abundant silt- and clay-size material. Forms extensive nearly flat topographic surfaces as much as 80 ft above modern alluvial valleys. Probably represents aeolian reworking of Pleistocene and slightly younger fluvial terrace deposits. Thickness: from a thin veneer to as much as 30 ft (9 meters), averages closer to 5 ft (1.5 meters) thick.

Qts OLDER TERRACE SANDS (Pleistocene)—Unconsolidated deposits consisting mostly of locally derived sand-, silt- and clay-sized sedimentary material, with minor amounts of distally derived sand- and gravel-sized material. Sand commonly medium- to fine-grained, subangular to subrounded, poorly sorted to very poorly sorted, and usually having a light brown to reddish-brown color. Deposits typically occur 0-50 ft. above major drainages, particularly the Canadian and North Canadian drainage systems. Thickness: typically 0 to 35 ft. (0 to 11 meters), but some deposits may be as much as 100 ft. (30 meters) thick.

Qtg OLDER TERRACE GRAVELS (Pleistocene)—Unconsolidated deposits consisting mostly of distally derived sand- and gravel-sized sedimentary material, with minor amounts of locally derived silt-sized and rarely clay-sized material. Sand commonly medium- to coarse-grained, subangular to subrounded, and very light colored; gravel consists of concentrations of rounded to well-rounded, oblate-shaped pebbles and cobbles of quartz, chert, and meta-quartzite; basalt and gneiss clasts rare. Deposits typically occur 0-50 ft. above the Canadian, North Canadian and Deep Fork drainage systems. Thickness: typically 0 to 35 ft. (0 to 11 meters).

Pdn DUNCAN FORMATION (Permian, Leonardian)—Mostly friable to weakly indurated sandstone, fine- to very fine-grained, rarely medium-grained, with mudstone- and siltstone-pebble conglomerates, and thin siltstone interbeds locally. Lower half of section consisting of moderate reddish orange (10R6/6) to light red (5R6/6), thin- to medium-bedded, fine-grained sandstone, siltstone, and siltstone-pebble conglomerates that locally fine upward into moderate reddish brown (10YR5/4) to moderate reddish orange (10R6/6) very fine-grained sandstone. Trough cross-laminations, parting lineations and oscillation ripple marks common in sandstones. Conglomerates are indurated to well indurated, consisting of slightly imbricated siltstone and mudstone clasts, set within a fine-grained, quartz-rich sandstone matrix that may exhibit poorly developed tabular cross-bedding; typically pale brown (5YR5/2) in color; usually cemented with calcite, but barite cement may occur locally. Upper half of unit consisting of interbedded friable to weakly indurated sandstones and moderately indurated mudstone- and siltstone-pebble conglomerates, and local occurrences of thin intervals of siltstone and mudstone. Sandstones are massive, rarely exhibiting internal bedding; are moderate reddish brown (10YR5/4 and 10R4/6), moderate reddish orange (10R6/6), to pale brown (5YR5/2) in color; and are texturally fine- to very fine-grained quartz-rich sandstones. Iron oxide and/or clay is predominant cement, although calcite cement does occur in patches. Sandstones may laterally grade into moderately indurated siltstone- and/or mudstone-pebble conglomerates, similar in composition to those in lower half of formation. Siltstone and mudstone intervals lenticular, average only 3 ft. in thickness and extend only tens, to sometimes hundreds of feet along strike; mudstones blocky bedded, slickenside bedding and shrinkage cracks common; siltstone normally occurs as thin partings separating mudstone and sandstone intervals. Locally, greenish gray (5GY6/1) colored bands, beds, and irregular splotches occur in sandstones, siltstones and shales; burrows and root casts(?) Common.

The Duncan Formation now includes parts of what was previously mapped as Chickasha Formation of Canadian, Grady, and McClain Counties (see Davis, 1955; Bingham and Moore, 1975). Where observed, contact with underlying Hennessey Formation is sharp and planar, placed at base of lowest mappable fine-grained sandstone bed of the Duncan. Thickness: about 360 ft (100 meters), top not exposed in map area.

Phy HENNESSEY FORMATION (Permian, Leonardian)—Mostly a silty claystone or clayshale depending on whether bedding is laminated (bedding <=1cm thick: clayshale), or thin (>1cm thick: claystone), with local intervals of fine- to very fine-grained sandstone and coarse siltstone. The Reeding Sandstone is the only mappable bed that can be traced with any certainty in the Hennessey Formation. Overall, the thickness of the Hennessey Formation varies between 850 to 900 ft. (260 to 275 meters), with a general trend of thickening to the west and northwest and thinning to the southeast.

Claystones and clayshales are silty, to rarely sandy, non-calcareous, typically unstratified to fissile laminated; unstratified claystones commonly have small-scale slickensides and shrinkage cracks that are evidence of paleosol development. Color a moderate reddish brown (10R4/6) to light brown (5YR5/6), locally banded with yellowish gray (5Y7/2) and light greenish gray (5GY8/1) beds. Iron-reduction spots and bands commonly found in more indurated clayshale lithologies, less so in claystones; color of spots light greenish gray (5GY6/1 to 5GY8/1) to pale green (10G6/2) to very pale green (10G8/2), size of spots usually less than 1/8 inch in diameter, but some may be as large as 5 inches in diameter; iron-reduction bands the same color as spots, and occur subparallel to bedding. Where well exposed, shale locally weathers to blocky, very fractured, or "hackly" appearances, forming bare, rounded outcrops and/or badlands-style topography; however, shale usually weathers to muddy soil with abundant small calcareous nodules (calcrete?). Siltstones moderately indurated to indurated, sandy, and non-calcareous; usually occur as thin laminated intervals of no more than 3 ft. thick, or as thin partings separating predominantly shale intervals from sandstone intervals; typically, siltstone intervals weather into small chips; color same as shale intervals. Sandstones are friable, silty to argillaceous, non-calcareous, usually found in thin, lenticular intervals of no more than 3 ft. in thickness; locally contain low-angle, tabular cross-bedding with associated ripple marks along bedding surfaces, rarely find trough-cross-bedding except in the thickest sandstone intervals; the thin, lenticular geometry exhibiting little basal scouring of most sandstone intervals suggests that sand was deposited within shallow tidal channels, probably as a late depositional plug; trace fossils and shale rip-up clasts present but very rare; color same as shale intervals. Sandstone and siltstone intervals more common in middle third of formation; base of formation mapped at the stratigraphically highest occurring fine-grained, trough-cross-bedded sandstone of the Garber Formation.

Reeding Sandstone Bed (Phyr): Sandstone, very fine-grained, light brown (5YR5/6) to moderate reddish brown (10R4/6) to moderate reddish orange (10R6/6), and minor moderate brown (10R4/6) siltstone. Contains conspicuous light greenish gray (5GY8/1) circular iron-reduction spots and bands similar to the Hennessey proper. Low-angle, tabular cross-bedding common. Sandstone bed well defined at base, exhibiting a very sharp, planar contact with underlying Hennessey shales; upper contact appears gradational over 5 to 10 ft. in vertical thickness. Shales, siltstones and sandstones occurring in the Hennessey above the Reeding Sandstone are similar in character to those occurring below. Thickness of the Reeding Sandstone Bed varies from 0 to 35 ft. (0 to 11 meters), thickening to the northwest.

Various investigators (see Bingham and Moore, 1975; Carr and Bergman, 1976; Bingham and Bergman, 1980; Morton, 1980) have attempted to elevate the Hennessey Formation to Group status, while breaking out a number of different "mappable" formations extending from the Kansas-Oklahoma border, southward. It is the current opinion that these "formations" should only be considered as members having very limited, and local, stratigraphic significance. The term "Hennessey Group" should be abandoned, while the interval that traditionally encompasses lithostratigraphic units falling between the Garber and Duncan Formations, north of the Wichita Mountain uplift, should be considered the Hennessey Formation.

Pgr GARBER FORMATION (Permian, Leonardian)—Predominantly a friable to locally a moderately indurated sandstone, fine-grained to less commonly very fine-grained, with varying proportions of claystone, siltstone, and sandstone- and siltstone-pebble conglomerates and breccias.

Overall, color of sandstones, from most to least common, a moderate reddish brown (10R4/6), moderate reddish orange (10R6/6), moderate red (5R5/4), light brown (5YR5/6), and dark yellowish orange (10YR6/6); large- and small-scale trough-cross-bedded abundant, producing numerous outcrops characterized by inclined bedding that truncate along channel-form lower contacts; tabular cross-bedded and associated asymmetrical ripple marks, and planar lamination less common; sandstone, siltstone, and shale rip-up clasts, along with vertebrate bone-beds commonly occur as lag deposits at the base of channel-form contacts. Cement mostly an iron-oxide and clay, although a calcite, barite, and rarely silica cement, may occur locally; in areas with a calcite or silica cement, the Garber sandstone weathers out as indurated, grayish black (N2) colored chips and blocks that commonly form lag deposits across weathered outcrops; also sandstone outcrops with abundant calcite and barite cements often weather into form small sandstone spheroids that form as a lag along weathered surfaces; barite roses also common on weathered Garber outcrops in areas south of Edmond and west of Lake Thunderbird dam. Thickness of individual sandstone intervals vary from as little as 3 ft. to as much as 75 ft. thick, most average about 20 ft. thick.

Silty and sandy claystones and sandy siltstones more common near base and top of formation; color similar to sandstones; typically unstratified, blocky bedded, with slickenside fracture surfaces, curved shrinkage fractures and calcareous nodules (calcrete) suggesting paleosol development common. Siltstones commonly occur as partings and thin laminated intervals that separate predominantly claystone intervals from sandstone intervals. Thickness of individual claystone and siltstone intervals usually 3 ft. thick or less, but locally may attain a thickness of 7 ft.

Conglomerates and breccias occur as well defined beds more commonly found in the lower parts of the formation, both are predominantly cemented by calcite, or rarely by a weak silica cement. Breccias are usually moderately indurated, consist of angular sandstone clasts set within a sandstone matrix; they are most likely formed by incipient paleosol development on an exposed sand or sandstone surface, created by shrinkage cracks that are later filled in by a fine-grained sand and/or silt; most breccia beds, or zones, are correlatable over several miles, and as such represent various periods of sub-aerial exposure of the Garber delta; color of breccias same as for the Garber sandstones. Conglomerates are sedimentary in origin, indurated, consisting of fine- to medium-pebble sized, rounded, sub-discoidal to sub-prismoidal, sandstone, siltstone, shale, limestone, and dolomite clasts set within a medium- to coarse-grained sandstone matrix; color usually a moderate red (5R5/4) to pale red (5R6/2). Thickness of conglomerate and breccia beds from 0.5 to 3 ft. thick, averaging close to 1.5 ft; a prominent, 7 ft. thick conglomerate bed occurs about 10 ft. below the top of the formation.

Base of the Garber mapped at the stratigraphically lowest occurring conglomerate of definite sedimentary origin, or the lowest Garber sandstone that occurs in conjunction with the stratigraphically highest occurrence of a Wellington concretionary shale. Thickness of the Garber Formation varies from 450 ft. (140 meters) in the north, to 1050 ft. (320 meters) in the south part of the map area.

Pwe WELLINGTON FORMATION (Permian, Leonardian)—Formation mostly an interbedded sandstone, claystone and concretionary clayshale, with minor siltstone and sandstone breccias locally.

Sandstones similar to those of the Garber Formation, except Wellington sandstones tend to be slightly finer grained, and exhibit fewer channel-form lower contacts; mostly friable, fine- to very fine-grained, slightly argillaceous and calcareous; color, from most frequent to least frequent, a moderate orange pink (10R7/4), moderate reddish brown (10R4/6), moderate reddish orange (10R6/6) to pale red (5R6/2); large- and small-scale trough-cross-bedding common, which locally form outcrops with steeply inclined bedding; most lower sandstone contacts planar, although some outcrops do show scoured and channel-form lower contacts; cement generally an iron-oxide, with some local patches of calcite cement. Individual sandstone intervals vary in thickness between 2 to 5 ft., rarely attaining 7 ft. thick. Basal third of formation consists of thicker intervals of friable, trough-cross-bedded, fine- to locally medium-grained sandstone belonging to Fallis Sandstone Member; texturally, Fallis sandstones somewhat coarser grained than those sandstone intervals of upper Wellington, and they are slightly more friable due to lack of calcite cement in Fallis; color is a moderate brown (5YR4/4) to moderate reddish brown (10R4/6). Upper contact of Fallis Member is highly gradational with the rest of the Wellington, the base of the Fallis Member, which also marks the base of the Wellington, coincides in places with a 2 ft. thick dolomite conglomerate bed (Patterson, 1933).

Claystone and clayshale intervals moderately to very silty and sandy, mostly non-calcareous, except locally a weak calcite may occur; color a moderate reddish brown (10R4/6), moderate red (5R5/4), with local light greenish gray (5GY8/1) streaks; concretions and septarian nodules with conspicuous calcite, dolomite and possible barite crystals lining radiating fractures common; concretionary clayshales are more common in upper two-thirds of formation. Thickness of individual shale intervals varies from 5 ft. to 8 ft. thick, rarely exceeding 10 ft. thick except near top of formation.

Sandstone breccias and dolomite conglomerates, similar to those observed in the Garber Formation, may occur at the base of sandstone lenses and channel-form sandstone deposits, or at the tops of shale intervals. These beds usually no more than 1 ft. thick.

Siltstones typically color-banded, consisting of pale reddish brown (10R5/4) and light greenish gray (5GY8/1); Usually occur separating sandstone-dominant from shale-dominant intervals.

Often the top of the Wellington Formation is marked by a 15 to 30 ft. thick concretionary shale interval that has a well-developed paleosol horizon. Total thickness of the formation about 710 ft. to 850 ft. (216 to 260 meters), unit generally thins to the south.

Psw STILLWATER FORMATION (Permian, Leonardian and Wolfcampian?)—Poorly exposed, consists of moderate red (5R5/4) to moderate reddish brown (10R4/6) silty, non-calcareous claystone; non-laminated, massive to blocky in appearance. Top of the Stillwater Formation placed at first occurrence of Fallis Member at the base of the Wellington Formation. Only about the upper 20 ft. (7 meters) is exposed in the far northeast part of the map area.

Reference list of geologic 7.5' quadrangles used in compilation. Individual quadrangles can be download at: www.ogs.ou.edu

1	2	3	4	5
10	9	8	7	6
11	12	13	14	15
20	19	18	17	16
21	22	23	24	25

1. Geologic Map of the Piedmont Quadrangle, Kingfisher, Logan, Canadian, and Oklahoma Counties, by N.H. Suneson and L.A. Hemish. 1998.
2. Geologic Map of the Bethany NE Quadrangle, Logan and Oklahoma Counties, by N.H. Suneson and L.A. Hemish. 1998.
3. Geologic Map of the Edmond Quadrangle, Logan and Oklahoma Counties, by L.A. Hemish and N.H. Suneson. 1998.
4. Geologic Map of the Arcadia Quadrangle, Logan and Oklahoma Counties, by L.A. Hemish and N.H. Suneson. 1998.
5. Geologic Map of the Luther Quadrangle, Lincoln, Logan, and Oklahoma Counties, by G.W. Miller and T.M. Stanley. 2003.
6. Geologic Map of the Horseshoe Lake Quadrangle, Lincoln and Oklahoma Counties, T.M. Stanley and G.W. Miller. 2003.
7. Geologic Map of the Jones Quadrangle, Oklahoma County, T.M. Stanley and N.H. Suneson. 1999.
8. Geologic Map of the Spencer Quadrangle, Oklahoma County, T.M. Stanley and N.H. Suneson. 1999.
9. Geologic Map of the Britton Quadrangle, Oklahoma County, N.H. Suneson and T.M. Stanley. 1998.
10. Geologic Map of the Bethany Quadrangle, Canadian and Oklahoma Counties, N.H. Suneson, T.M. Stanley, and J.D. Price. 1999.
11. Geologic Map of the Mustang Quadrangle, Oklahoma, Canadian, and Cleveland Counties, N.H. Suneson and T.M. Stanley. 2000.
12. Geologic Map of the Oklahoma City Quadrangle, Oklahoma and Cleveland Counties, N.H. Suneson and T.M. Stanley. 2000.
13. Geologic Map of the Midwest City Quadrangle, Oklahoma and Cleveland Counties, T.M. Stanley and N.H. Suneson. 2000.
14. Geologic Map of the Choctaw Quadrangle, Oklahoma and Cleveland Counties, T.M. Stanley and N.H. Suneson. 2000.
15. Geologic Map of the Harrah Quadrangle, Cleveland, Lincoln, Oklahoma, and Pottawatomie Counties, T.M. Stanley and G.W. Miller. 2003.
16. Geologic Map of the Stella Quadrangle, Cleveland and Pottawatomie Counties, T.M. Stanley and G.W. Miller. 2003.
17. Geologic Map of the Franklin Quadrangle, Cleveland County, T.M. Stanley and N.H. Suneson. 2001.
18. Geologic Map of the Moore Quadrangle, Cleveland County, T.M. Stanley and N.H. Suneson. 2001.
19. Geologic Map of the Oklahoma City SE Quadrangle, Cleveland and McClain Counties, N.H. Suneson and T.M. Stanley. 2001.
20. Geologic Map of the Oklahoma City SW Quadrangle, Canadian, Cleveland, Grady, and McClain Counties, N.H. Suneson and T.M. Stanley. 2001.
21. Geologic Map of the Blanchard Quadrangle, Grady and McClain Counties, G.W. Miller and T.M. Stanley. 2002.
22. Geologic Map of the Newcastle Quadrangle, Cleveland and McClain Counties, G.W. Miller and T.M. Stanley. 2002.
23. Geologic Map of the Norman Quadrangle, Cleveland and McClain Counties, T.M. Stanley and G.W. Miller. 2002.
24. Geologic Map of the Denver Quadrangle, Cleveland County, T.M. Stanley and G.W. Miller. 2002.
25. Geologic Map of the Little Axe Quadrangle, Cleveland and Pottawatomie Counties, G.W. Miller and T.M. Stanley. 2003.

SCALE 1:100 000

CONTOUR INTERVAL 10 METERS

Map Credits

Base map modified from USGS topographic maps of the Oklahoma North and Oklahoma South quadrangles, dated 1990 and 1985, respectively. Universal Transverse Mercator projection, 1927 North American Datum. Geology by and modified from LeRoy A. Hemish, Galen W. Miller, Jonathon D. Price, Thomas M. Stanley, and Neil H. Suneson, 1998-2003. Compiled by Thomas M. Stanley and G. Russell Standridge, 2008.

TEXT REFERENCES

Bingham, R.H.; and Bergman, D.L., 1980, Reconnaissance of the water resources of the Enid Quadrangle north-central Oklahoma: Oklahoma Geological Survey Hydrologic Atlas 7, 4 sheets, 1:250,000 scale.

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Carr, J.E.; and Bergman, D.L., 1976, Reconnaissance of the water resources of the Clinton Quadrangle west-central Oklahoma: Oklahoma Geological Survey Hydrologic Atlas 5, 4 sheets, 1:250,000 scale.

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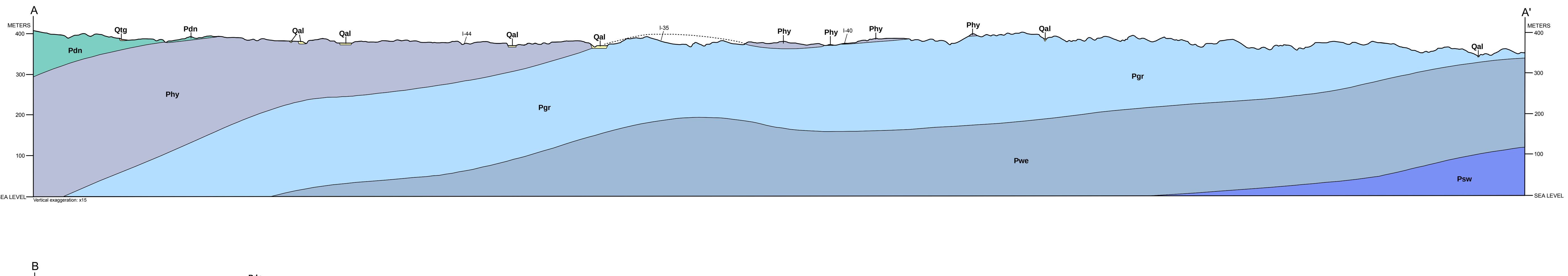

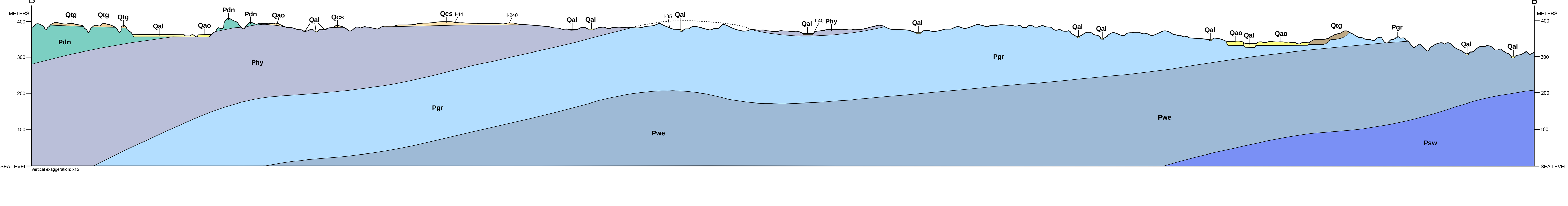

GEOLOGIC MAP COMPILATION OF THE OKLAHOMA CITY METRO AREA, CENTRAL OKLAHOMA

by

Thomas M. Stanley and G. Russell Standridge

2008