

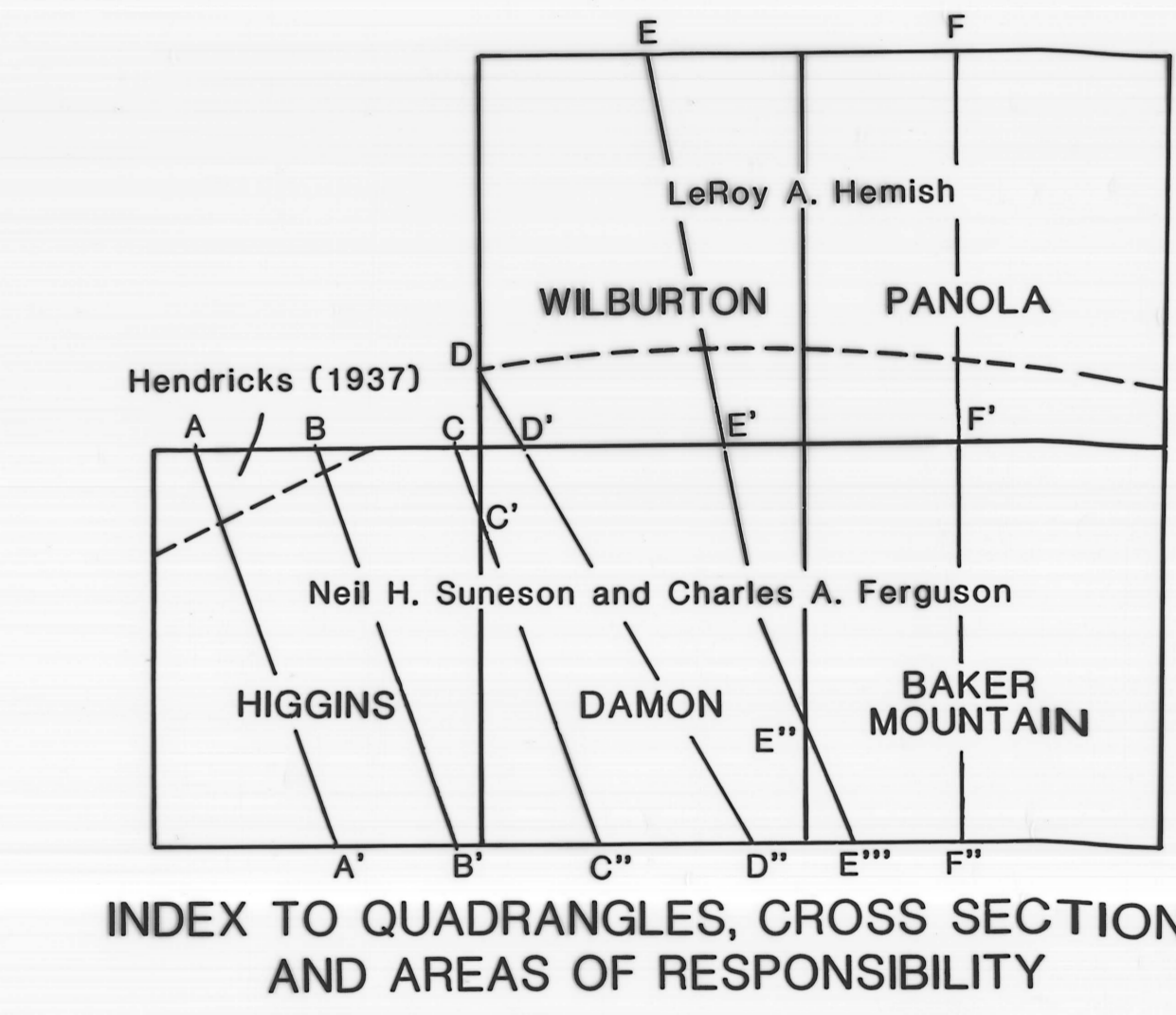
CORRELATION OF MAP UNITS

Qa	QUATERNARY
Q1	
Units North of Choctaw Fault	
Pb4	PENNSYLVANIAN
Pb3	
Pb2	
Pb1	
Pbbj	
Psv7	
Psv6	
Psv5	
Psv4	
Psv3	
Pm	PENNSYLVANIAN
Psv	
Psv2	
Psv1	
Pmk	
Pmt	
Pmmc	
Pmc	
Pmi (?)	
Pmw	
Pmm	PENNSYLVANIAN
Phh	
Ph	
Pass	PENNSYLVANIAN
Pa	
Pw	
Pa1	PENNSYLVANIAN
Pw	

- DESCRIPTION OF MAP UNITS**
- QUATERNARY**
- Qa ALLUVIUM (QUATERNARY)—Gravel, sand, silt, and clay on flood plains of present-day streams
 - Q1 TERRACE DEPOSITS (QUATERNARY)—Subangular to subrounded cobbles, gravel, sand, and silt, forming a veneer, generally about 4-10 ft thick, on the surfaces of terraces that stand about 40-50 ft above the beds of present-day streams.
- UNITS NORTH OF CHOCTAW FAULT**
- Pb4 BOGGY FORMATION (PENNSYLVANIAN)—Predominantly sandy, silty, gray to olive-gray to grayish-black shales and siltstones (Pb) with scarp-forming sandstones. At base is the Bluejacket Sandstone Member (Pb4). 170-260 ft thick. Numbered units (Pb2, Pb3, Pb4) are mappable, except locally, yellowish-brown sandstones. A 20-ft-thick, grayish-green shale unit occurs about 60 ft below the top of the Bluejacket Sandstone. Based on projections, a thin stringer of coal (Pb4c) may be present in the shale unit just above the Bluejacket Sandstone. Thin unmapable sandstone lenses are present in the shale units. Top of formation eroded. Thickness: 700-800 ft
 - Pb3 SAVANNA FORMATION (PENNSYLVANIAN)—Predominantly brown to olive-gray to dark-gray shales (Psv) with several mappable brown, fine-grained sandstone units (Psv1, Psv2, Psv3, Psv4, Psv5, Psv6, Psv7). Psv1 and Psv2, over most of the area, are split into two units separated by shale in the northeastern part of the quadrangle. Psv1 and Psv2 are not mappable as separate units, and are designated Psv1 and Psv2, undifferentiated. Psv3 in places contains two shale units separating the main sandstone into three units (Psv3a, Psv3b, and Psv3c). Psv4 is a single unit that appears to merge with Psv3 in the northeastern part of the quadrangle, where the units are mapped as Psv3 and Psv4, undifferentiated. Psv5 is a difficult-to-map group of sandstone units of variable thickness separated by shales that wedge out at several localities. Psv5 is split into two units separated by shale in the northwestern part of the quadrangle, but in the north-central part it is represented only by a thick, single sandstone unit. Similarly, Psv7 is split into three units separated by shale in the northwestern part of the quadrangle, but is represented by only a thin, single sandstone unit in the north-central part. Most shales include thin, unmapable sandstone beds. Thickness: 1,500-2,000 ft
 - Pb2 McALESTER FORMATION (PENNSYLVANIAN)—Predominantly dark-gray to black, blocky shales containing abundant nonconformable, McCurtain Shale Member (Pm), at the base, is approximately 900 ft thick. A discontinuous, brown, shaly, thin, unnamed sandstone unit (Pmnu) lies approximately in the middle of the McCurtain Shale Member. The Warner Sandstone Member (Pm), overlies the McCurtain Shale Member. It is a resistant, fine-grained, ridge-former, sandstone of variable thickness, and locally is split into upper and lower sandstones separated by shale. These named, brown, fine-grained, thin-bedded sandstone units occur in the shale (Pm) above the Warner Sandstone Member. Cameron Sandstone Member (Pmc), Tamaha Sandstone Member (Pmt), and Keota Sandstone Member (Pmk). A fourth sandstone (Pmi), which may be correlatable with the Logan Sandstone Member, occurs in a limited area in sections 1 and 2, T. 5 N., R. 20 E., in the shale interval between the Warner Sandstone Member and the Cameron Sandstone Member. Unexposed McAlester and Upper McAlester coal beds (Pmcc) occur in the shale interval between the Cameron Sandstone Member and the Tamaha Sandstone Member. Thickness: 2,000-2,400 ft
 - Pb1 HARTSHORNE FORMATION (PENNSYLVANIAN)—Brown to very light-gray, very fine-grained, ripple-marked, bioturbated, thin-bedded to massive sandstone interbedded with silty gray shale (Ph). Contains the Lower and Upper Hartshorne coal beds (Phc). Thickness: Approximately 300 ft
 - Psv4 ATOKA FORMATION (PENNSYLVANIAN)—Predominantly silty, brown to gray to grayish-black, noncalcareous shale (Pa) with discontinuous, ridge-forming, brown, fine-grained sandstones (Pass). Approximately 1,200 ft of upper part exposed north of the Choctaw fault
- UNITS PRESENT SOUTH OF CHOCTAW FAULT**
- Pa ATOKA FORMATION (PENNSYLVANIAN)—Predominantly poorly exposed olive-gray (5Y3/2) to grayish-olive (10Y4/2), slightly silty, noncalcareous, poorly laminated shale and mudstone. Contains thin beds of laminated siltstone and thicker beds of sandstone. Lower shale (Pa1) mapped separately. Sandstone is light olive-gray (5Y5/2) and grayish-orange (5Y7/2) where fresh, and grayish-orange (10Y7/4) where weathered. Mostly fine-grained, rarely medium-grained, poorly to moderately sorted, noncalcareous, and composed of about 95% quartz, 3% feldspar and lithic fragments, and conspicuous white mica parallel to laminae. Individual beds vary from several centimeters to several meters thick and average about 60 cm. Amalgamated beds common. Thicker beds are generally massive (corresponding to Fa of Burns turbidite sequence) to parallel laminated (Tb); thinner beds commonly are ripple cross-laminated (Tc). Sole marks (flute, groove, and load casts, trace fossils) at base of sandstone beds locally common. Dish-and-pillar structures and ripple marks typical of some beds. Contains local concentrations of plant debris and organic matter on bedding planes. Maximum thickness of lower part approximately 3800 ft (1150 m) south of Choctaw fault
 - Pa1 LOWER ATOKA SHALE (PENNSYLVANIAN)—Poorly exposed, olive-gray (5Y3/2) to grayish-olive (10Y4/2), noncalcareous, poorly laminated shale and mudstone with thin siltstone beds. Locally mapped separately from Atoka Formation (Pa). Maximum thickness approximately 1000 ft (300 m) south of Choctaw fault
 - Pws SPIRO SANDSTONE MEMBER (INFORMAL) OF WAPANUCKA FORMATION (PENNSYLVANIAN)—Well-exposed, light-brown (5Y5/6) to very pale-orange (10Y8/2) to pale-yellowish-orange (10Y8/6), mostly well-sorted, coarse, medium-grained, stratified quartz arenite. Quartzose, mostly noncalcareous, locally with abundant trace fossils (Asterozonia) and bioclastic limestone. Locally slightly spicular. Micrite locally nodular, slightly petroliferous odor; packstone locally sandy. In southeastern corner of quadrangle, includes thin, poorly exposed shale similar to that in Atoka Formation (Pa) that locally contains sandstone oololiths. Limestone mostly underlying but locally intertonguing with Spiro sandstone member (informal). Maximum thickness approximately 300 ft (100 m) south of Choctaw fault
 - Pw WAPANUCKA FORMATION (PENNSYLVANIAN)—Predominantly poorly to moderately well-exposed, medium-gray (N5) to medium-dark-gray (N4), wavy-bedded, sparsely fossiliferous and bioclastic limestone. Locally slightly spicular. Micrite locally nodular, slightly petroliferous odor; packstone locally sandy. In southeastern corner of quadrangle, includes thin, poorly exposed shale similar to that in Atoka Formation (Pa) that locally contains sandstone oololiths. Limestone mostly underlying but locally intertonguing with Spiro sandstone member (informal). Maximum thickness approximately 300 ft (100 m) south of Choctaw fault
- SYMBOLS**
- CONTACT—Dashed where approximately located
 - MARKER BED
 - COAL BOUNDARY—Approximate outcrop boundary of coal bed (named on map); triangle indicates exposure of coal
 - THRUST FAULT—Sawtooth on upper plate; dashed where approximately located; dotted where concealed; queried where probable
 - FAULT—Arrows show relative horizontal movement; dashed where approximately located; dotted where concealed; queried where probable
 - FAULT—Dashed where inferred; dotted where concealed; U, upthrown side; D, downthrown side
 - ANTICLINE—Showing crestline; arrow shows direction of plunge; dashed where approximately located; dotted where concealed
 - SYNCLINE—Showing troughline; arrow shows direction of plunge; dashed where approximately located; dotted where concealed
 - OVERTURNED ANTICLINE—Arrows show direction of dip of limbs; dashed where approximately located; dotted where concealed
 - STRIKE AND DIP OF BEDS
 - Leader to location of measurement
 - Strike and dip of beds, facing direction unknown south of Choctaw fault
 - Strike and dip of beds, upright
 - Strike and dip of beds, overturned
 - Vertical beds, facing direction unknown
 - Vertical beds, ball indicates top of beds
 - OIL AND GAS WELLS
 - Leader to location
 - Status unknown as of January 1, 1988
 - Dry hole, abandoned
 - Gas well

LIST OF WELLS SPUDDED BEFORE JANUARY 1, 1988

- Samson Resources Co. 1 Rothbaum, Spud 11/8/82, TD 15,300'
- Tenneco Oil Co. 1-18, Jankowsky, Spud 10/13/81, TD 14,200'
- Leben Drilling Inc. 1-16 Parsons, Spud 12/25/83, TD 10,950'
- Leben Drilling Inc. 1-17 Parsons, Spud 6/9/83, TD 10,200'
- Shell Oil Co. 1-16 Parsons, Spud 11/21/81, TD 10,340'
- Dyco Petroleum Corp. 1 Parsons, Spud 10/7/75, TD 10,325'
- Texas Oil & Gas Corp. 1 Parsons A, Spud 1/18/80, TD 10,448'
- Texas Oil & Gas Corp. 1-16 Parsons, Spud 1/18/80, TD 10,628'
- Shell Oil Co. 1-15 Foster, Spud 9/27/85, TD 9,150'
- Amoco Production Co. 2 Garrett Unit, Spud 5/29/86, TD 10,635'
- Microwave Oil Corp. 1 Garrett, Spud 5/19/84, TD 9,970'
- Amoco Production Co. 2 Gardner Unit, Spud 1/28/86, TD 9,706'
- Microwave Oil Corp. 1 Gardner, Spud 7/25/82, TD 13,811'
- Amoco Production Co. 2 White Unit, Spud 4/2/86, TD 13,250'
- Samson Resources Co. 1 Golightly, Spud 4/1/82, TD 13,870'
- Amoco Production Co. 1-19 Parsons, Spud 9/14/81, TD 14,230'
- Tenneco Oil Co. 1-20 Swart, Spud 4/8/82, TD 14,112'
- PITCO 1-21 Swell, Spud 4/11/79, TD 13,695'
- Shell Oil Co. 1-21 Jankowsky, Spud 8/25/84, TD 14,460'
- Dyco Petroleum Corp. 1 Music, Spud 10/7/74, TD 9,500'
- Microwave Oil Corp. 1 Sorrells, Spud 11/6/82, TD 15,811'
- PITCO 1-24 Young & Cooper, Spud 6/13/78, TD 9,500'
- Samson Resources Co. 1-30 McKinney, Spud 10/23/86, TD 8,450'
- Humble Oil & Refining Co. 1-19 Foster, Spud 9/29/74, TD 12,800'
- Tenneco Oil Co. 1-30 Pierce, Spud 11/5/80, TD 14,800'
- Tenneco Oil Co. 1-29 Pierce, Spud 8/21/82, TD 13,600'
- Donaki C. Slawson 1-27 P.J. Spud 12/23/81, TD 14,381'
- Mustang Production Co. 1-26 Young & Cooper, Spud 2/1/81, TD 13,892'
- Whitmer Exploration Co. 1-30 McKinney, Spud 10/15/81, TD 14,128'
- Leads Oil & Gas Inc. 1-19 Parsons, Spud 6/23/79, TD 14,731'
- Mobil Oil Co. 1-19 Parsons Unit, Spud 6/23/79, TD 14,731'
- Mustang Production Co. 1-33 Parks, Spud 8/17/80, TD 13,977'
- Mustang Production Co. 1-35 Foster, Spud 2/28/80, TD 12,871'
- Mustang Production Co. 1-36 Austin, Spud 8/16/84, TD 13,362'
- Tenneco Oil Co. 1-11 Schaff, Spud 12/5/84, TD 12,750'
- Fortuna Energy Corp. 1-6 Lively, Spud 5/6/84, TD 12,281'
- Donaki C. Slawson 1-5 McKee, Spud 2/23/87, TD 12,416'
- Unit Drilling & Exploration Co. 1-19 Parsons, Spud 10/28/83, TD 12,283'
- Dyco Petroleum Corp. 1-19 Parsons, Spud 5/20/77, TD 7,671'
- Unit Drilling & Exploration Co. 1-19 Parsons, Spud 12/11/81, TD 11,720'
- Mustang Production Co. 1-3 Cash Mitchell, Spud 5/8/83, TD 11,577'
- Mustang Production Co. 1-3 Cash Mitchell, Spud 11/10/78, TD 14,343'
- Mustang Production Co. 1-2 Booth, Spud 2/23/78, TD 12,853'
- Mustang Production Co. 1-2 Adams, Spud 12/15/83, TD 12,359'
- Gulf Oil Corp. 1-1 W. C. Booth, Spud 11/12/78, TD 13,424'
- Donaki C. Slawson 1-1 Foster, Spud 8/23/83, TD 13,429'
- Willford Energy Co. 1-12 Otto Ems, Spud 4/20/84, TD 12,350'
- Willford Energy Co. 1-12 Otto Ems, Spud 11/29/82, TD 12,350'
- Unit Drilling & Exploration Co. 1-10 Colvard, Spud 1/17/83, TD 12,000'
- Mustang Production Co. 1-11 Robinson, Spud 1/12/85, TD 12,350'
- Mustang Production Co. 1-11 Robinson, Spud 6/14/81, TD 14,017'
- Tenneco Oil Co. 1-13 Hallett, Spud 2/14/84, TD 12,338'
- Unit Drilling & Exploration Co. 1-13 Hallett, Spud 2/14/84, TD 12,338'
- Unit Drilling & Exploration Co. 1-13 Hallett, Spud 6/22/83, TD 13,550'
- Edwin L. Cox 1-1 Shay, Spud 11/14/77, TD 7,252'
- Humble Oil & Refining Co. 1-1 Shay Unit, Spud 2/14/86, TD 14,503'
- Bert Wheeler 1-1 H. T. Jennings, Spud 7/21/59, TD 9,761'
- Pan American Petroleum Corp. 1-1 J. A. Johnson Estate, Spud 7/17/67, TD 12,187'



GEOLOGIC MAP OF THE PANOLA QUADRANGLE,
 LATIMER CO., OKLAHOMA

By
 LeRoy A. Hemish, Neil H. Suneson, Charles A. Ferguson
 1990

Geology by L. A. Hemish, N. H. Suneson, C. A. Ferguson
 1988

Maped, edited, and published by the Geological Survey in cooperation with the Oklahoma Highway Department, Oklahoma Water Resources Board, and Oklahoma State Soil Conservation Board.

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1976. Field checked 1977. Map edited 1979

Projection and 10,000-foot grid ticks: Oklahoma coordinate system, south zone (Lambert conformal conic)

1000-meter Universal Transverse Mercator grid, zone 15 1927 North American datum

To place on the georeferenced North American Datum 1983 move the projection lines 6 meters south and 21 meters east as shown by dashed lines

Five red dashed lines indicate selected fence and field lines that generally visible on aerial photographs. This information is unclassified

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092 AND BY THE OKLAHOMA GEOLOGICAL SURVEY, NORMAN, OKLAHOMA 73099

A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST