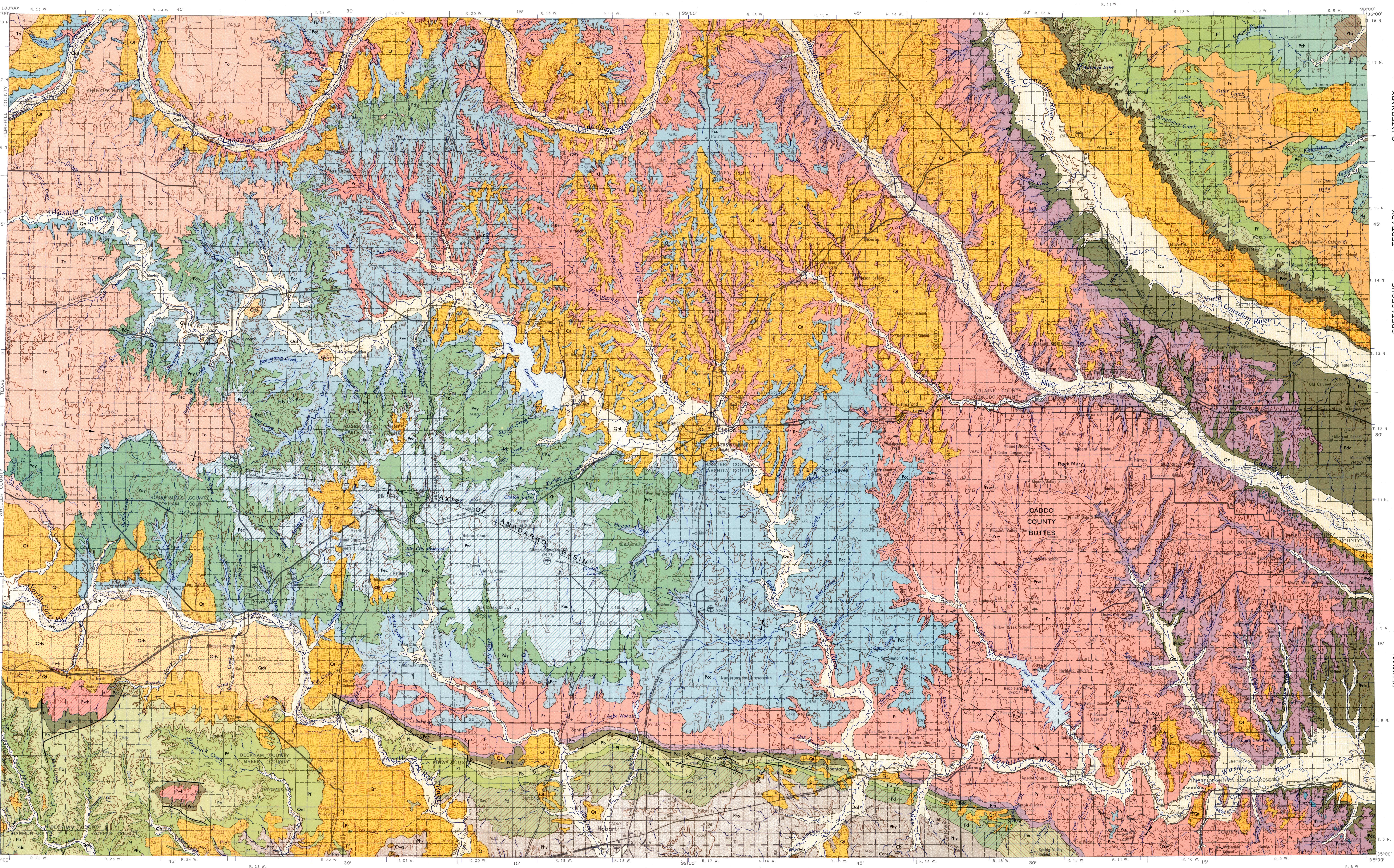

Base from U.S. Geological Survey 1:250,000 series: Clinton quadrangle, 1964

Compiled by Jerry E. Carr, U.S. Geological Survey, 1972, and Robert O. Fay, Oklahoma Geological Survey, 1975

Scale 1:250,000

CONTOUR INTERVAL 100 FEET
WITH SUPPLEMENTARY CONTOURS AT 50-FOOT INTERVALS
DATUM: MEAN SEA LEVEL

Figure 2. Geologic map.

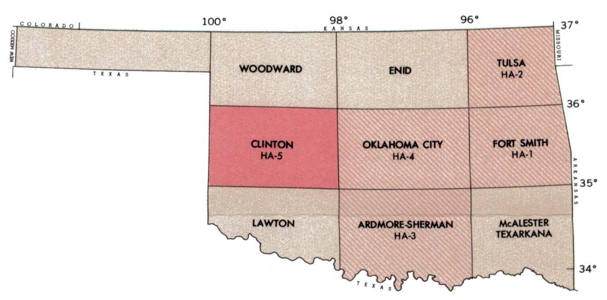

Figure 1. Location of Clinton quadrangle.

EXPLANATION

The stratigraphic nomenclature and age determinations used herein are those accepted by the Oklahoma Geological Survey and do not necessarily agree with those of the U.S. Geological Survey.

QUATERNARY

Qds — DUNE SAND
Wind-blown sand; thickness ranges from a thin veneer to about 70 feet.

Qal — ALLUVIUM
Stream-laid deposits of sand, silt, clay, and gravel; thickness ranges from 0 to about 170 feet.

Qt — TERRACE DEPOSITS
Stream-laid deposits of sand, silt, clay, gravel, and volcanic ash; thickness ranges from 0 to about 120 feet.

UNCONFORMITY

TERTIARY

To — OGALLALA FORMATION
Gray to light-brown, fine- to medium-grained sand with some clay, silt, gravel, volcanic ash, and caliche beds; locally cemented by calcium carbonate. Thickness ranges from 0 to about 320 feet. The formation thins eastward.

UNCONFORMITY

CRETACEOUS — Comanchean

Kd, Kk — KIOWA FORMATION AND DAKOTA GROUP
Outliers of the *Kiowa Formation*, Kk, dark-gray shale with some thin beds of fossiliferous tan limestone, range in thickness from a few feet to about 20 feet. Associated in some places is a 5- to 10-foot, gray to brown, coarse-grained sandstone and conglomerate assigned to the overlying *Dakota Group*, Kd (lower sandstone part). Several hundred outliers occur (generally too small to show on map) west of U.S. Highway 183, resting on units ranging from the Rush Springs Formation to the Elk City Sandstone.

UNCONFORMITY

PERMIAN — Custerian

Pec — ELK CITY SANDSTONE
Reddish-brown, fine-grained sandstone with minor amounts of silt and clay, weakly cemented by iron oxide, calcium carbonate, and gypsum; maximum thickness 185 feet, top eroded.

Pdy — DOXEY SHALE
Reddish-brown, silty shale and siltstone; thickness, about 190 feet.

Pcc — CLOUD CHIEF FORMATION
Reddish-brown to orange-brown shale, interbedded with siltstone and sandstone in the middle part and some dolomite and much gypsum in lower part; thickness about 400 feet, thinning northward to about 175 feet. The *Moccasin Creek Gypsum Member* is at the base.

Pwh, Prs, Pm, Prw, Pv — WHITEHORSE GROUP
Predominantly orange-brown, fine-grained sandstone, the *Whitehorse Group* is mapped as Pwh where separate formations have not been distinguished and as the *Rush Springs Formation* and the *Marlow Formation* where identified.
Rush Springs Formation, Prs, orange-brown, cross-bedded, fine-grained sandstone with some dolomite and gypsum beds. Thickness, about 300 feet, thinning northward to about 186 feet. The *Weatherford Gypsum Bed*, Prw, is about 30 to 60 feet below the top (mapped in southeastern part only).
Marlow Formation, Pm, orange-brown, fine-grained sandstone and siltstone, about 100 to 130 feet thick, thinning northward. This formation has 2 gypsum and (or) dolomite beds in upper 20 feet—the *Emanuel Bed* (at top) and the *Relay Creek Bed* (20 feet below top). Two thin, pink shales occur; the first is 1 foot below the top (*Grace*mont) and the second is 55 feet above the base (unnamed). The *Verden Sandstone Lentil*, Pv, is a coarse-grained, calcareous, fossiliferous sandstone (2 to 10 feet thick) that occurs in the middle of the Marlow, about 25 feet below the Relay Creek Bed and 85 to 95 feet above the base.

PERMIAN — Cimarronian

Per, Pdc, Pb, Pf, Pch, Pc — EL RENO GROUP
Primarily evaporites and reddish-brown shale, with deltaic clastics to the southeast. Where separate formations have not been distinguished, the *El Reno Group* is mapped as Per; the formations listed below have been distinguished and mapped within the Clinton quadrangle as part of the El Reno Group.
Dog Creek Shale, Pdc, reddish-brown shale with thin beds of siltstone and dolomite; thickness, about 220 feet; gradational eastward into the Chickasha Formation.
Blaine Formation, Pb, 3 to 4 gypsum and dolomite beds, about 100 to 200 feet thick, separated by reddish-brown shale. Gradational southward and eastward into Chickasha Formation.
Flowerpot Shale, Pf, reddish-brown shale containing several salt and gypsum beds in the upper part. Thickness, about 300 to 450 feet; gradational southward and eastward into the Chickasha Formation and Duncan Sandstone.
Cedar Hills Sandstone, Pch, greenish-gray siltstone and reddish-brown shales; thickness, about 180 feet; gradational southward into Duncan Sandstone.
Chickasha Formation, Pc, reddish-brown to maroon mudstone conglomerate with some shale, siltstone, and fine- to coarse-grained sandstone; thickness, about 600 feet; gradational northward and westward into the Flowerpot Shale and the Blaine Formation, and westward into Dog Creek Shale.
Duncan Sandstone, Pd, light-gray and reddish-brown, cross-bedded, fine-grained sandstone and mudstone conglomerate with some interbedded yellowish-gray and reddish-brown shales; thickness, about 200 feet; gradational into the Cedar Hills Sandstone northward and into the Flowerpot Shale northward and westward.

Phy, Pbi — HENNESSEY GROUP
Reddish-brown shale with some thin, greenish-gray siltstone and orange-brown sandstone and siltstone beds; thickness, about 500 feet. The *Hennessey Group* is not subdivided in the southern part of the Clinton quadrangle; in the northeastern corner of the quadrangle, the upper part of the *Bison Formation*, Pbi, is exposed as reddish-brown and greenish-gray, fine-grained sandstone and siltstone. The Bison is gradational southward into reddish-brown shale; it thins southward and is about 120 feet thick.

UNCONFORMITY

ORDOVICIAN

Ovb — VIOLA LIMESTONE AND BROMIDE FORMATION
Limestone, limestone and shale interbedded, and sandstone; thickness, about 900 feet; one outlier is shown in southern part of quadrangle. Simpson and lower units covered.

CAMBRIAN — Upper Cambrian

Ca — ARBUCKLE GROUP AND TIMBERED HILLS GROUP
Limestone and dolomite; one outlier at southern end of quadrangle, about 1,200 feet thick.

UNCONFORMITY

CAMBRIAN — Middle Cambrian

Ccr — CARLTON RHYOLITE GROUP
Rhyolite flows and tuffs; about 4,500 feet thick; one outlier is shown in southern part of mapped area.

Cwg — WICHITA GRANITE GROUP
Pink, medium-grained granite; three outliers have been mapped in southern part of quadrangle.

Contact

Fault, approximately located; dotted where concealed; U, upthrown side; D, downthrown side

INTRODUCTION

Urbanization, economic growth, and improved standards of living in rural areas of Oklahoma require ever-increasing amounts of water. Basic information on the availability and usability of water is needed in many parts of the State by planners and individual water users for development of this vital resource. To provide this information on a regional basis, the U.S. Geological Survey, in cooperation with the Oklahoma Geological Survey, is making reconnaissance appraisals of the water resources, with special emphasis on ground water, throughout the State. This report presents information on the distribution and hydrologic characteristics of the various aquifers and on the chemical quality of ground water, and it summarizes available data on the chemical quality and availability of surface water in the Clinton quadrangle (fig. 1).

Information used to appraise the water resources of the Clinton quadrangle was obtained in the field, from U.S. Geological Survey reports and files, and from published and unpublished records of State and other Federal agencies. Special acknowledgement is due the Oklahoma Water Resources Board, U.S. Soil Conservation Service, U.S. Public Health Service and city officials. Many individuals who provided useful information are also acknowledged for their cooperation and assistance.

Additional studies are needed to determine the potential of alluvium and terrace deposits along the Canadian and North Canadian Rivers as sources of agricultural, industrial, and municipal water supplies. Alluvium along the upper Washita River is an important aquifer and should be studied in detail to provide information to guide its future development.

GEOLOGIC SETTING

Carbonates, shales, sandstones, and evaporites, ranging in age from Cambrian to Permian, with a maximum aggregate thickness of about 38,000 feet, were deposited in the Anadarko basin, which is the dominant structural feature in the Clinton quadrangle (fig. 2). Most of the quadrangle, an area of 7,800 square miles, is included in the Anadarko basin, although a small area in the southern part is within the Wichita Mountain uplift (fig. 3). The axis of the basin trends in a west-northwesterly direction from southern Caddo County into the Texas Panhandle.

Uplift of the Wichita Mountains during Pennsylvanian time resulted in the erosion of many thousands of feet of Paleozoic rock and in the exposure of rocks of Cambrian and Ordovician age. In the southern part of the quadrangle, Cambrian and Ordovician rocks crop out as isolated hills surrounded by strata of Permian age.

Formations of Permian age lie at the surface over most of the quadrangle, and comprise a sedimentary-rock sequence with a maximum thickness of about 4,500 feet. These rocks consist mainly of reddish-brown shales, sandstones, and siltstones, with interbedded and disseminated gypsum in some formations. Regional dip ranges from 10 to 100 feet per mile toward the axis of the Anadarko basin. The dip is steeper on the south side of the basin, and the formations increase in thickness downdip.

In the northwestern part of the quadrangle, sand, silt, clay, and caliche beds of the Ogallala Formation overlie the permian rocks. These sediments were derived from the erosion of the Rocky Mountains during Pliocene time. From a thickness of a few hundred feet near the western border of the quadrangle, the Ogallala thins eastwardly to a feather edge.

Alluvium and terrace deposits of Quaternary age lie adjacent to and along the rivers and creeks in the quadrangle. These deposits consist mainly of irregular beds of sand, silt, clay, and gravel, which vary greatly in thickness over the quadrangle. Terrace deposits on upland areas and alluvium along tributaries generally are thin (20 to 50 feet). Along the major streams, however, the alluvium may be as thick as 170 feet, and the terrace deposits may be as thick as 120 feet.

SOURCES OF GEOLOGIC INFORMATION

The sources of information used to compile the geologic map in the Clinton quadrangle are listed below; the area included in each source is shown on figure 3.

1. ALEXANDER, W. B., 1965, Areal geology of southern Dewey County, Oklahoma: University of Oklahoma unpublished M.S. thesis, 42 p. (Geologic map revised by R. O. Fay, 1972.)
2. BURCHUM, J. M., 1963, Areal geology of northwestern Dewey County, Oklahoma: University of Oklahoma unpublished M.S. thesis, 33 p. (Geologic map revised by R. O. Fay, 1972.)
3. BOWERS, J. R., 1967, Areal geology of the Cheyenne area, Roger Mills County, Oklahoma: University of Oklahoma unpublished M.S. thesis, 62 p. (Geologic map revised by R. O. Fay, 1972.)
4. BULLARD, F. M., 1928, Lower Cretaceous of western Oklahoma, a study of the outlying areas of Lower Cretaceous in Oklahoma and adjacent states: Oklahoma Geological Survey Bulletin 47, 116 p.
5. BURTON, L. C., 1965, Ground water in terrace deposits of central Beckham County, Oklahoma: Oklahoma Water Resources Board Bulletin 25, 30 p. (Geologic map revised by R. O. Fay, 1967.)
6. DAVIS, L. V., 1955, Geology and ground-water resources of Grady and northern Stephens Counties, Oklahoma: Oklahoma Geological Survey Bulletin 73, 184 p. (Geologic map revised by R. O. Fay, 1969.)
7. FAY, R. O., 1962, Stratigraphy and general geology of Blaine County, *part 1 of* Geology and mineral resources of Blaine County, Oklahoma: Oklahoma Geological Survey Bulletin 89, 258 p.
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9. HOWERY, S. D., 1960, Areal geology of northeastern Caddo County, Oklahoma: University of Oklahoma unpublished M.S. thesis, 79 p.
10. JOHNSON, K. S., and HAM, W. E. (in preparation), Geology and mineral resources of the Permian Blaine Formation and associated strata in southwestern Oklahoma: Oklahoma Geological Survey Bulletin.
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14. MEINERT, J. G., 1961, Areal geology of the Starvation Creek area, Roger Mills and Beckham Counties, Oklahoma: University of Oklahoma unpublished M.S. thesis, 66 p.
15. MILLER, H. D., and others, 1954, Geologic map of Oklahoma: U.S. Geological Survey and Oklahoma Geological Survey, scale 1:500,000. (Revisions made by R. O. Fay, 1970–71.)
16. O'BRIEN, B. E., 1963, Geology of east-central Caddo County, Oklahoma: University of Oklahoma unpublished M.S. thesis, 72 p.
17. SMITH, A. H., 1964, Areal geology of Elk City area, Beckham and Roger Mills Counties, Oklahoma: University of Oklahoma unpublished M.S. thesis, 61 p. (Geologic map revised by R. O. Fay, 1969.)
18. STEVENSON, R. H., 1958, Areal geology of the northwest portion of Canadian County, Oklahoma: University of Oklahoma unpublished M.S. thesis, 74 p. (Geologic map revised by R. O. Fay, 1969.)
19. TANAKA, H. H., and DAVIS, L. V., 1963, Ground-water resources of the Rush Springs Sandstone in the Caddo County area, Oklahoma: Oklahoma Geological Survey Circular 61, 63 p. (Geologic map revised by R. O. Fay, 1972.)
20. TRAPNELL, D. E., 1961, Areal geology of southwestern Canadian County, Oklahoma: University of Oklahoma unpublished M.S. thesis, 63 p. (Geologic map revised by R. O. Fay, 1969.)

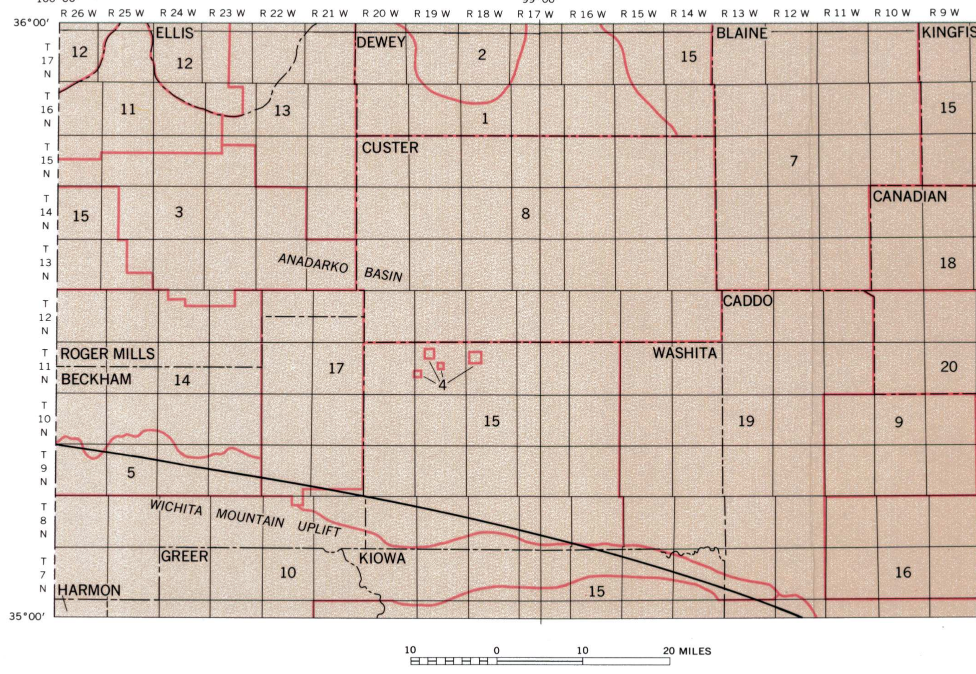

Figure 3. Geologic provinces and index to geologic mapping.

RECONNAISSANCE OF THE WATER RESOURCES OF THE CLINTON QUADRANGLE, WEST-CENTRAL OKLAHOMA

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U.S. Geological Survey

1976

Cartographic preparation by Oklahoma Geological Survey