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Kaufman, Bradley, *systems analyst, SURFACE III*
Keener, Barbara, *library assistant (Wichita)*
Kleinschmidt, Melvin K., *drilling/field operations*
Knapp, Ralph W., *geophysicist*
Kraxner, Anna, *word-processing typist, geohydrology*
Kroeger, Melvin D., *GIS technician, DASC*
Macfarlane, P. Allen, *hydrogeologist*
Magnuson, Larry Mike, *analytical chemist*
Maples, Christopher, *paleontologist; chief, geologic investigations*
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McClain, Barb, *assistant director for administration*
McElwee, Carl D., *hydrologist/geophysicist*
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Whitemore, Donald O., *environmental geochemist*
Wilson, Frank W., *geologist*
Yewell, Andrea, *secretary*
Young, David P., *hydrologist*

and over 75 undergraduate and graduate students

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Bibliography
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Janice H. Sorensen

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Cover Map

The "Map of Kansas, Showing the Geological Position of Springs and Wells" was prepared by W. R. Crane, a mining engineer, and appeared in "The University Geological Survey of Kansas, Vol. VII, Special Report on Mineral Waters" by Edgar H. S. Bailey and assistants, published in 1902. Bailey was a chemist and is the namesake of Bailey Hall at the University of Kansas. Originally built for the chemistry department, Bailey Hall today is home to the School of Education. This geologic map contains triangles and dots that represent mineral springs and mineral wells, respectively, that are discussed in the report. The map differs somewhat from modern maps of the state, especially in eastern Kansas. One notable difference is the stratigraphic nomenclature which was in vogue at the time. In the extreme southeastern corner of the state is a black area labeled Sub-Carboniferous. This represents the cherty limestones that crop out there and cover much of the Ozark Plateau extending into adjacent parts of Missouri, Arkansas, and Oklahoma. Today, the Sub-Carboniferous is known in North America as the Mississippian Period named for outcrops in the Mississippi Valley of the Midwest. Beyond the Sub-Carboniferous to the north and west are areas mapped as Lower-Carboniferous and Upper-Carboniferous. Carboniferous means coal-bearing and is recognized as a single geologic period everywhere except in North America. Here the Carboniferous is divided into two separate geologic periods, the Mississippian and the Pennsylvanian. This division is based on changing environments in much of what was North America at that time. This resulted in drastically different rock types as is apparent in southeast Kansas. There, the predominantly marine limestones of the Mississippian Period are overlain by shales, siltstones, and sandstones of the Pennsylvanian Period that are terrestrial in origin as well as by coal beds. These coal beds are the same age as those in the coal fields of Pennsylvania for which the period was named. The Lower-Carboniferous is today considered Middle Pennsylvanian and the Upper-Carboniferous is known as Upper Pennsylvanian. The division between the Pennsylvanian rocks and those of the next geologic period, the Permian, is a little farther west on the 1902 map than it is on modern maps. It is placed slightly higher stratigraphically and the prevailing westward dip of the rocks at the surface results in a westward shift. This boundary also extends much farther up the valleys of the Blue, Kansas, Neosho, and Cottonwood rivers than is today recognized. An area in Sedgwick and Sumner counties has a cross-hatching pattern that does not appear in the legend accompanying the map. This area should be mapped as Permian, the same as the area to the east across the Arkansas River. A draftsman's error apparently omitted the other set of cross-hatching. The Red-Beds in south-central Kansas are not assigned an age in the legend. The age of these nearly fossil-free formations had been debated for a number of years; however, the text of the report correctly assigns them to the Permian. The area mapped as Dakota

also includes rocks that are today mapped as Kiowa Shale and Cheyenne Sandstone which underlie the Dakota Formation. Although the Dakota is not assigned an age in the legend, it is correctly identified as Cretaceous in the text. The Upper-Cretaceous on the 1902 map corresponds quite well with the Upper Cretaceous as mapped today, except outcrops are more extensive in Smith and Phillips counties and extend up the valley of the South Fork of the Solomon River in Rooks and Graham counties. Much of western and south-central Kansas is mapped as Tertiary. The Ogallala Formation of Tertiary age underlies much of western Kansas. But in southwestern Kansas, the Great Bend of the Arkansas River, the Equus Beds north of Wichita, and in the Arkansas River below Wichita, Quaternary rocks are at the surface. Likewise glacial deposits of Quaternary age bury parts of the glaciated region in northeast Kansas and appear on modern maps.

In Bailey's report he defines mineral waters as "those natural waters which contain an excess of some ordinary ingredients or a small quantity of some rare ingredients, and which on this account are used as remedial agents." Bailey devotes 28 pages of his report to the therapeutics of mineral waters covering both internal as well as external uses. In all, 108 different mineral waters from wells and springs were analyzed for their dissolved constituents and then classified and arranged according to general chemical groups and compared to similar waters from famous springs and spas throughout the world. Nearly all the waters discussed occur in eastern Kansas. The westernmost water mentioned is the Victoria Spring in eastern Ellis County. The vast underground water resources contained in the High Plains aquifer go unmentioned. The fresh nature of these waters most likely excludes them from Bailey's definition of mineral waters. Likewise some springs of historical note in Kansas such as Big Springs and Alcove Spring on the Oregon Trail, and Diamond, Wagon Bed, and Middle Springs on the Santa Fe Trail are left out. Again, the fresh nature of these waters plus the abandonment of the trails some 30 years earlier probably account for their omission.

The highly mineralized nature of the ground water in central and eastern Kansas is due to the marine origin of much of the bedrock. When these ancient sediments were buried, the sea water they contained was often buried with them. This plus the presence of buried evaporites such as rock salt and gypsum account for the high mineral content of the region's nonalluvial ground water. Some of the mineral wells mentioned by Bailey are artesian. Named for a region of France, Artois, where they were common, these are wells that tap zones where water is under enough pressure to rise up and flow to the surface. Despite the advertising claims of various bottlers and brewers, water being artesian is no guarantee of purity. For instance, the Abilene artesian well produced water with a salinity five times that

Introduction

The Kansas Geological Survey has long recognized the importance of collecting bibliographic information on geologic research in Kansas. In 1989, with Bulletin 221, the Survey published an updated comprehensive bibliography on Kansas geology that included 9,500 references covering the period from 1823 to 1984. This volume, Bulletin 234, lists over 2,400 references, most of them published from 1984 to 1989, and stands as the next installment supporting published bibliographies on earth-science research in Kansas. A concentrated effort was made to locate and add references previously omitted (pre-1985) from Bulletin 221.

At present, bibliographic data files are stored on the Survey's main-frame computer allowing for two primary functions of the bibliographic data base—production of published bibliographies and indexes, and custom on-line literature searches. Nearly 12,000 references from all areas of the geological sciences have been collected, including references on water and mineral resources, geochemistry, soil science, and environmental geology. In addition to references appearing in published sources, the titles of many unpublished manuscripts, such as open-file reports, theses, and dissertations, have been included in the data base.

In 1993, the Survey released its first CD-ROM, "Data-base Sampler CD-ROM," which contains nine data bases. The searchable on-line version of the bibliography, supported by commercial software, is included on the sampler. The retrieval software allows for the choice of specific field searches (i.e. author, county) or global field searches and the ability to combine searches using boolean logic. Information on the CD-ROM is available from the Survey's Publication Sales Office.

Organization and Use

The bibliography is arranged alphabetically by the author's last name and initials, and then chronologically by publication year. The bibliography is followed by three indexes: subject, county, and rock-unit. To aid in using these last two indexes, a map of Kansas counties and a geologic map are shown in fig. 1. The subject index is based on broad-to-narrow search logic modeled after and modified by the GeoRef system of the American Geological Institute. Synonymous terms as well as many second- and third-level terms have been cross referenced to direct users to the appropriate index entry. Most users with interest in a particular geographic area or stratigraphic interval should start their search with the county or rock-unit indexes. In an effort to aid users, references listed under a given entry in these indexes have been further categorized by primary subject content as well. The rock-unit index contains rock-stratigraphic geologic names as they have been used in references. Therefore, formal and informal terms, provincial names, and outdated terms have been listed as they appear in references. Whenever possible, informal terms and outdated terms have been cross referenced to probably formal equivalents.

Availability

Most published references listed are available from libraries or the publishers. However, the Survey's on-line bibliographic data files do include location sources for most articles and reports. If a report or article is difficult to locate, contact the Survey's library for assistance. Reports published by the Federal government are often available for purchase from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161. Available NTIS report numbers have been included with the bibliographic citation. Reports and maps published by the U.S. Geological Survey are only available from Branch of Distribution, U.S. Geological Survey, P.O. Box 25286, Denver, CO 80225. Open-file materials released by the U.S. Geological Survey are sold through Open File Reports—ESIC, U.S. Geological Survey, P.O. Box 25425, Denver, CO 80225. Theses and dissertations are available for inspection at the institution granting the degree or through the interlibrary-loan services of participating libraries. In addition, the Survey's library maintains a set of about 125 theses and dissertations as part of the Survey's open-file collection. Unbound photocopies of such reports may be purchased from the Library, Kansas Geological Survey, Lawrence, KS 66047. Microform and paper copies of most dissertations completed after 1955 also are available for purchase from University Microfilms International, 300 North Zeeb Road, Ann Arbor, MI 48106-1346.

Corrections

Whenever possible, articles and papers listed in the bibliography were examined to verify citation information and to assist with indexing. To maintain the quality of the data, titles have been recorded as they appear in the original source. In spite of considerable attempts at accuracy and completeness, this listing undoubtedly contains errors and omissions. Please submit any corrections or additions to the Survey's library.

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Janice Sorensen
Kansas Geological Survey
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paleoecology: Bifano, F.V., 1974a; Maisey, J.G., 1988; Maples, C.G., 1988b
petroleum: Carr, R.M., 1925; Evenson, R.A., 1989; Jordan, D.W., 1987; Kesler, L.W., 1928a; Netzler, B.W., 1989; Ross, J.A., 1989f, 1989g, 1989h, 1989i; Schrubben, F.W., 1972; Wenger, L.M., 1986, 1987, 1988, 1988a; Wierick, G., 1932
popular geology: Bridge, T.E., 1988c
sedimentary rocks: French, J.A., 1988a; Hatch, J.R., 1989; Henning, L.G., 1985; Lane, Michael, 1986; Mosier, E.L., 1989; Silfer, J.A., 1985, 1986, 1986a; Wenger, L.M., 1987a
sedimentary structures: Maples, C.G., 1989a; Puterbaugh, Jacqueline, 1987
sedimentation: Merriam, D.F., 1986a; Spencer, R.S., 1989
sediments: Aber, J.S., 1985a, 1988a; Law, M.S., 1986
stratigraphy: Bridge, T.E., 1988, 1988a; Denesen, S.L., 1985, 1985a; Ezerendu, F.O., 1987; French, J.A., 1989; Harris, J.W., 1989; Lamoreaux, S.B., 1986; Pabian, R.K., 1989a; Skelton, L.H., 1986; Sporleder, J.C., 1987; Staton, M.D., 1987; Sutton, M.J., 1985a; Twiss, P.C., 1988
structural analysis: Berendsen, Pieter, 1986a
tectonophysics: Meyer, W.V., 1987
uranium ores: Willoughby, K.L., 1981
vertebrate paleontology: Chorn, J.D., 1988, 1988a; Daly, Eleanor, 1988, 1988a; Foreman, B.C., 1988, 1988b; Gottfried, M.D., 1988, 1988a, 1988b, 1989; Maisey, J.G., 1988a; Mapes, G.K., 1988; Mapes, R.H., 1988; McAllister, James A., 1988, 1988a, 1988b; Reisz, R.R., 1988, 1988a; Schultze, H.-P., 1986, 1988, 1988a, 1988b, 1988c; Zidek, Jiri, 1988, 1988a, 1988b, 1988c
water resources: Cowgill, E.B., 1897; Kansas State Planning Board, 1936b

H

Hamilton County

engineering geology: Vogler, L.D., 1985
ground water: Dunlap, L.E., 1985; Kume, Jack, 1985; McLaughlin, T.G., 1940b, 1942a
hydrology: Arruda, J.A., 1989; Hinderlider, M.C., 1905; Stullken, L.E., 1988; U.S. Geological Survey, 1925a, 1925b, 1928a, 1929, 1930, 1930d, 1931a, 1931b, 1931c, 1932a, 1932b, 1932d, 1932e, 1932g, 1932h, 1933, 1933a, 1933b, 1935a, 1936, 1936b, 1937, 1940a, 1941a
invertebrate paleontology: Cobban, W.A., 1987, 1988
natural gas: Anonymous, 1985, 1985b, 1985c, 1987, 1988a, 1989, 1989a; Gold, T., 1987; Paul, S.E., 1975; Petzet, G.A., 1985, 1985a, 1985b,

hydrology: Sophocleous, M.A., 1986b, 1987a
 petroleum: Hotchkiss, H.G., 1939a; James, Alfred, III, 1985; Morrison, Ernie, 1985; Ross, J.A., 1989j; Wilson, M.E., 1988
 soils: Hoffman, B.R., 1986
 statistical analysis: Sutterlin, P.G., 1986
 stratigraphy: Charpentier, R.R., 1988, 1989
 water resources: Sophocleous, M.A., 1989
 well-logging: Doveton, J.H., 1989a

L

Labette County

areal geology: Blair, K.P., 1989; Kisvarsanyi, E.B., 1989; McCauley, J.R., 1989; Moore, R.C., 1942b; Pratt, W.P., 1989
 biostratigraphy: Cocke, J.M., 1989a
 coal deposits: Brady, L.L., 1989d
 geochemical surveys: Erickson, R.L., 1985, 1989
 geochemistry: Bullock, J.H., Jr., 1989, 1989e, 1989r; Imes, J.L., 1988
 geophysical surveys: Branham, K.L., 1986; McCafferty, A.E., 1989
 ground water: Carr, J.E., 1986; Macfarlane, P.A., 1987
 hydrology: Pope, L.M., 1985, 1988; Steps, W.E., 1942; U.S. Geological Survey, 1925a, 1925b, 1928a, 1929, 1930, 1930d, 1931a, 1931b, 1931c, 1932a, 1932b, 1932d, 1932e, 1932g, 1932h, 1933, 1933a, 1933b, 1935a, 1936, 1936b, 1937
 invertebrate paleontology: Pavlicek, J.A., 1986
 lead ores: Nuelle, L.M., 1989
 metal ores: McFarland, M.C., 1989
 mineral deposits: Palmer, J.R., 1989
 mineral resources: Ohle, E.L., 1989; Pratt, W.P., 1989b, 1989c
 petroleum: Chesser, K.C., 1987a; Netzler, B.W., 1989; Ross, J.A., 1989h; Sloan, W.L., 1925; Trent, T.H., 1989
 sedimentary rocks: Bouquet, D.J., 1984; Brenner, R.L., 1989; Johnson, C.T.L., 1973; Mosier, E.L., 1989
 sedimentation: Heckel, P.H., 1988
 soils: Throckmorton, R.I., 1942
 stratigraphy: Denesen, S.L., 1985, 1985a; Ece, O.I., 1986, 1987; Knight, K.L., 1985, 1985a; Staton, M.D., 1987; Sutton, M.J., 1985a; Watney, W.L., 1989, 1989d
 structural analysis: Imes, J.L., 1989
 water resources: Kansas State Planning Board, 1936b

Lane County

areal geology: McClain, T.J., 1987
 geochemistry: Stell, M.J.A., 1988
 ground water: Clark, A.B., 1988; Dague, B.J., 1985a, 1986a, 1987a; Gillespie, J.B., 1988; Kume, Jack, 1985
 mineral resources: Heidenreich, W.L., 1952
 petroleum: Albright, M.C., 1985; Hotchkiss, H.G., 1939a; Ross, J.A., 1989d
 water resources: Kansas State Planning Board, 1936c

Leavenworth County

ground water: Lohman, S.W., 1940f; Miller, Rachel E., 1987a
 hydrology: U.S. Geological Survey, 1932, 1932c, 1932f, 1935, 1935b, 1936a, 1938, 1940, 1941, 1942
 natural gas: Goebel, E.D., 1987
 paleoecology: Hakes, W.G., 1985
 petroleum: DuBois, M.K., 1985; Ross, J.A., 1989c, 1989g
 sedimentary rocks: Bergstrom, R.E., 1953a; Brenner, R.L., 1989; McNeice, B.T., 1987; Nelson, M.R., 1985
 sedimentation: Strickland, M.O., 1987
 soils: Welch, J.E., 1986
 stratigraphy: Ball, D.S., 1985, 1985a; Harris, J.W., 1989; Pabian, R.K., 1989a
 structural analysis: Callen, J.M., 1985
 water resources: Kansas State Planning Board, 1936e, 1936h

Lincoln County

geophysical surveys: Wojcik, K.M., 1985
 hydrology: U.S. Geological Survey, 1927, 1930a, 1930b, 1930c
 invertebrate paleontology: Herrington, H.B., 1958; Taylor, D.W., 1965
 mineral resources: Heidenreich, W.L., 1952
 oil and gas fields: Hedberg, H.D., 1926
 paleobotany: Kovach, W.L., 1987, 1988, 1988a
 petroleum: Newell, K.D., 1988; Ross, J.A., 1989a, 1989b, 1989e, 1989f
 sedimentary structures: Batt, R.J., 1987, 1987a
 soils: Barker, W.L., 1985
 stratigraphy: Newell, K.D., 1987, 1987a; Twiss, P.C., 1988a
 structural analysis: Johnsgard, S.K., 1988
 vertebrate paleontology: Guilday, J.E., 1972; Nelson, M.E., 1989

Linn County

areal geology: Brady, L.L., 1989c
 coal deposits: Whelan, J.F., 1988
 diagenesis: McKibben, M.E., 1986
 fluid inclusions: Goebel, E.D., 1989
 geochemistry: Imes, J.L., 1988
 geophysical surveys: Steeples, D.W., 1988b
 guidebooks: Heckel, P.H., 1985a
 hydrology: Bevans, H.E., 1983; Kansas Water Resources Board, 1958e; Pope, L.M., 1985, 1988; U.S. Geological Survey, 1925, 1926, 1927
 lead ores: Blasch, S.R., 1985, 1986, 1987, 1988
 petroleum: Ross, J.A., 1989g
 sedimentary rocks: Emerson, J.W., 1987
 sediments: Law, M.S., 1986
 stratigraphy: Ece, O.I., 1986, 1987; French, J.A., 1989a; Harris, J.W., 1989; Pabian, R.K., 1989a; Sutton, M.J., 1985a; Watney, W.L., 1989
 structural analysis: Imes, J.L., 1989
 water resources: Kansas State Planning Board, 1936f
 zinc ores: Ragan, V.M., 1987, 1988

Logan County

biostratigraphy: Martin, L.G., 1989
 geochemistry: Stell, M.J.A., 1988

geomorphology: Wells, P.V., 1987a
 ground water: Kume, Jack, 1985; Nellis, M.D., 1987; Shaukat, Nadeem, 1987a
 invertebrate paleontology: Hasenmueller, W.A., 1985, 1985a
 mineral resources: Heidenreich, W.L., 1952
 paleobotany: Wells, P.V., 1987
 paleoecology: Stewart, J.D., 1985
 petroleum: Frankamp, Steve, 1985; Hotchkiss, H.G., 1938d; Langrehr, J.A., 1985; Ross, J.A., 1989, 1989d
 sedimentary rocks: Caldwell, C.D., 1985
 vertebrate paleontology: Buchanan, R.C., 1987
 water resources: Kansas State Planning Board, 1936a

Lyon County

absolute age: Marvin, R.F., 1988
 areal geology: Bridge, T.E., 1988b; Maples, C.G., 1988; Moore, R.C., 1942b
 data processing: Nordeng, S.C., 1986
 geochemistry: Schroeder, D.C., 1989
 hydrology: Bevans, H.E., 1983; Carswell, W.J., Jr., 1985; Hinderlider, M.C., 1905; Jordan, P.R., 1985a; Kansas Water Resources Board, 1958e; Michel, D.C., 1986; Rodriguez Castro, J.A., 1985; Schroeder, D.C., 1987; Steps, W.E., 1942
 invertebrate paleontology: Warner, D.J., 1972
 paleoecology: Bifano, F.V., 1974a
 petroleum: Ross, J.A., 1989f, 1989g
 sedimentary rocks: Bisby, C.G., 1985a, 1986; French, J.A., 1988a; Silber, J.A., 1985, 1986, 1986a
 sedimentation: Merriam, D.F., 1986a; Shields, D.C., 1987a
 sediments: Aber, J.S., 1985a, 1988a; Law, M.S., 1986
 soils: Throckmorton, R.I., 1942
 stratigraphy: Barrett, F.J., 1989; Cunningham, C.R., 1989; Skelton, L.H., 1986; Sporleder, J.C., 1987; Sutton, M.J., 1985a
 structural analysis: Berendsen, Pieter, 1986a; Johnsgard, S.K., 1988
 uranium ores: Willoughby, K.L., 1981
 vertebrate paleontology: Foreman, B.C., 1988b
 water resources: Kansas State Planning Board, 1936b, 1936f
 well-logging: Collins, D.R., 1986

M

Marion County

geophysical surveys: El-Hussain, I.W., 1986
 ground water: Chaffee, P.K., 1986, 1988; O'Connor, H.G., 1986, 1987; Spinazola, J.M., 1985
 hydrology: Jordan, P.R., 1985a; Michel, D.C., 1986; Rodriguez Castro, J.A., 1985
 oil and gas fields: Hedberg, H.D., 1926
 paleobotany: Johnson, W.C., 1985
 petroleum: Kesler, L.W., 1928a; Newell, K.D., 1988; Ross, J.A., 1989f

N

Nemaha County

absolute age: Marvin, R.F., 1988
 environmental geology: U.S. Department of Agriculture, 1988a
 geochemistry: Denne, J.E., 1986, 1987
 geomorphology: Abdelsaheb, I.Z., 1988; Aber, J.S., 1988c; Denne, J.E., 1987a
 ground water: Melia, A.S., 1987; Miller, Rachel E., 1987a
 hydrology: Abdulmumin, S., 1987
 invertebrate paleontology: Warner, D.J., 1972
 paleoecology: Bifano, F.V., 1974a
 petroleum: Longman, M.W., 1987; Newell, K.D., 1988; Ross, J.A., 1989b, 1989c
 sedimentary rocks: Caldwell, C.D., 1985a; Hatch, J.R., 1987
 structural analysis: Johnsgard, S.K., 1988; Stander, T.W., 1989a
 well-logging: Collins, D.R., 1986

Neosho County

areal geology: Blair, K.P., 1989; Kisvarsanyi, E.B., 1989; McCauley, J.R., 1989; Moore, R.C., 1942b; Pratt, W.P., 1989
 coal deposits: Brady, L.L., 1989d
 diagenesis: McKibben, M.E., 1986
 geochemical surveys: Erickson, R.L., 1985, 1989
 geochemistry: Bullock, J.H., Jr., 1989e, 1989g, 1989l, 1989q, 1989r, 1989t; Imes, J.L., 1988
 geophysical surveys: McCafferty, A.E., 1989
 ground water: Clark, A.B., 1988; Macfarlane, P.A., 1987
 hydrology: Steps, W.E., 1942
 lead ores: Nuelle, L.M., 1989
 metal ores: McFarland, M.C., 1989
 mineral deposits: Palmer, J.R., 1989
 mineral resources: Ohle, E.L., 1989; Pratt, W.P., 1989b, 1989c
 paleobotany: Rogers, R.A., 1985
 petroleum: Chesser, K.C., 1987a; Joers, J.C., 1950d; Netzler, B.W., 1989; Ross, J.A., 1989h
 sedimentary rocks: Bouquet, D.J., 1984; Dawson, W.C., 1985; Mosier, E.L., 1989
 sedimentary structures: Dawson, W.C., 1986
 soils: Perkins, A.T., 1948; Throckmorton, R.I., 1942
 stratigraphy: Denesen, S.L., 1985, 1985a; Dubiskas, R.A., 1985; Harris, J.W., 1989; Pabian, R.K., 1989a; Staton, M.D., 1987; Sutton, M.J., 1985a; Watney, W.L., 1989, 1989c
 structural analysis: Imes, J.L., 1989
 water resources: Kansas State Planning Board, 1936b

Ness County

geochemistry: Stell, M.J.A., 1988
 geophysical surveys: Foote, R.S., 1987; Hall, D.J., 1985
 ground water: Gillespie, J.B., 1988; Kume, Jack, 1985; Waite, H.A., 1942b
 mineral resources: Heidenreich, W.L., 1952

petroleum: Bieber, D.W., 1985; Hotchkiss, H.G., 1939a; Kornfeld, J.A., 1941b; Ross, J.A., 1989d, 1989e
 sedimentary rocks: Nodine-Zeller, D.E., 1985
 water resources: Kansas State Planning Board, 1936c

Norton County

absolute age: Marvin, R.F., 1988
 areal geology: Eversoll, D.A., 1988
 environmental geology: U.S. Bureau of Reclamation, 1971b
 geochemistry: Stell, M.J.A., 1988
 ground water: Spruill, T.B., 1985
 mineral resources: Heidenreich, W.L., 1952
 petroleum: Hotchkiss, H.G., 1938c; Ross, J.A., 1989, 1989a
 stratigraphy: Bennett, D.K., 1985

O

Osage County

areal geology: Maples, C.G., 1988; Wilson, F.W., 1988a
 engineering geology: Szpakiewicz, M.J., 1987; Wilson, F.W., 1987a
 geophysical surveys: Kalik, A.J., 1988; Miller, R.D., 1987, 1988
 hydrology: Bevans, H.E., 1983; Kansas Water Resources Board, 1958e; Pope, L.M., 1985, 1988; U.S. Geological Survey, 1926, 1927, 1928, 1930a, 1930b, 1930c, 1931, 1935, 1935b, 1936a, 1938, 1940, 1941
 petroleum: Ross, J.A., 1989g
 sedimentary rocks: French, J.A., 1988a; McNeice, B.T., 1987; Silber, J.A., 1985, 1986, 1986a
 sedimentation: Spencer, R.S., 1989
 sediments: Aber, J.S., 1985a, 1988a; Law, M.S., 1986
 soils: Dickey, H.P., 1985
 stratigraphy: Harris, J.W., 1989; Pabian, R.K., 1989a; Sutton, M.J., 1985a
 vertebrate paleontology: Foreman, B.C., 1988b
 water resources: Kansas State Planning Board, 1936f

Osborne County

geophysical surveys: Wojcik, K.M., 1985
 ground water: Kume, Jack, 1985a; Macfarlane, P.A., 1988d
 hydrology: U.S. Bureau of Reclamation, 1960b, 1970a; U.S. Geological Survey, 1923, 1925, 1926, 1927, 1928, 1930b, 1931, 1932, 1932c, 1932f
 mineral resources: Heidenreich, W.L., 1952
 petroleum: Douglass, H.M., 1985, 1985a; James, John, 1985; Newell, K.D., 1988; Ross, J.A., 1989a
 stratigraphy: Newell, K.D., 1987, 1987a
 water resources: Burnett, R.D., 1985, 1986

Ottawa County

geophysical surveys: Wojcik, K.M., 1985
 ground water: Gillespie, J.B., 1986
 hydrology: Flaxman, E.M., 1937; Jarvis, C.S., 1936; Russell, W.G., 1902; U.S. Geological Survey, 1902, 1921b, 1923, 1925, 1926, 1927, 1928, 1930a,

1930b, 1930c, 1931, 1932, 1932c, 1932f, 1933c, 1935, 1935b, 1936a, 1938, 1940, 1941, 1942
 mineral resources: Heidenreich, W.L., 1952
 paleobotany: Kovach, W.L., 1987, 1988, 1988a
 petroleum: Newell, K.D., 1988; Ross, J.A., 1989b, 1989f
 stratigraphy: Newell, K.D., 1987, 1987a
 structural analysis: Johnsgard, S.K., 1988
 vertebrate paleontology: Nelson, M.E., 1989

P

Pawnee County

environmental geology: Sophocleous, M.A., 1988
 ground water: Coble, G.R., 1989, 1989a; Gillespie, J.B., 1988; Hathaway, L.R., 1980c; Kume, Jack, 1985; Sophocleous, M.A., 1987, 1989a; Stullken, L.E., 1987; Waite, H.A., 1942c; Whittemore, D.O., 1989a, 1989b
 hydrology: Arruda, J.A., 1989; Sophocleous, M.A., 1986; U.S. Geological Survey, 1925a, 1925b, 1928a, 1929, 1930, 1930d, 1931a, 1931b, 1931c, 1932a, 1932b, 1932d, 1932e, 1932g, 1932h, 1933, 1933a, 1933b, 1935a, 1936, 1936b, 1937, 1940a, 1941a
 petroleum: Beauchamp, D.W., 1985; Callewaert, D.L., 1987; Ross, J.A., 1989e; Taylor, F.B., 1937
 water resources: Kansas State Planning Board, 1936c; Sophocleous, M.A., 1989

Phillips County

geochemistry: Stell, M.J.A., 1988
 ground water: Spruill, T.B., 1985
 hydrology: U.S. Bureau of Reclamation, 1950b; U.S. Geological Survey, 1923, 1925, 1926, 1927, 1928, 1930b, 1931, 1932, 1932c, 1932f
 invertebrate paleontology: Taylor, D.W., 1965
 mineral resources: Heidenreich, W.L., 1952
 paleoecology: Ostlie, W.R., 1986; Stewart, J.D., 1985
 petroleum: Hotchkiss, H.G., 1938c; Kornfeld, J.A., 1941b; Newell, K.D., 1988; Ross, J.A., 1989a
 sedimentation: Watney, W.L., 1985c, 1986
 soils: Palmer, C.D., 1987
 stratigraphy: Bennett, D.K., 1985

Pottawatomie County

absolute age: Marvin, R.F., 1988
 biogeography: Davis, L.C., 1987
 geomorphology: Bowman, M.W., 1986; Dort, Wakefield, Jr., 1987a; Richter, J.G., 1988
 ground water: McGregor, K.M., 1988; Miller, Rachel E., 1987a
 hydrology: Gray, M.W., 1964; Hinderlider, M.C., 1905; Jian, Xiaodong, 1988; Medina, K.D., 1987a; U.S. Geological Survey, 1923, 1925, 1926, 1927,

sedimentary rocks: Zink, L.A., 1985
sedimentary structures: Laferriere, A.P., 1988a
sedimentation: Watney, W.L., 1985c, 1986
seismology: Armbruster, J.G., 1989
stratigraphy: Laferriere, A.P., 1987
vertebrate paleontology: Martin, L.D., 1986; Stewart, J.D., 1987a
water resources: Burnett, R.D., 1985, 1986

Rush County

absolute age: Marvin, R.F., 1988
geochemistry: Stell, M.J.A., 1988
geophysical surveys: Knapp, R.W., 1989b
ground water: Kume, Jack, 1985; Macfarlane, P.A., 1988d
hydrology: Macfarlane, P.A., 1985
mineral resources: Heidenreich, W.L., 1952
petroleum: Bieber, D.W., 1985; Ross, J.A., 1989e
sedimentation: Watney, W.L., 1985c, 1986
stratigraphy: Charpentier, R.R., 1988, 1989
uranium ores: Erickson, R.L., 1954
water resources: Kansas State Planning Board, 1936c

Russell County

absolute age: Marvin, R.F., 1988
areal geology: Valerius, M.M., 1925
engineering geology: Butcher, D.L., 1988
enhanced recovery: Poyser, L.A., 1987
environmental geology: Hargadine, Susan, 1985
geophysical surveys: Coyle, W.G., III, 1989; Knapp, R.W., 1989b; Steeples, D.W., 1986a
ground water: Macfarlane, P.A., 1988d
hydrology: Castro, Joffe, 1985; Macfarlane, P.A., 1985; Morris, C.C., 1989; U.S. Geological Survey, 1942
invertebrate paleontology: Cobban, W.A., 1988; Elder, W.P., 1987, 1987a
mineral resources: Heidenreich, W.L., 1952
oil and gas fields: Hedberg, H.D., 1926; Hintze, F.F., 1928
paleobotany: Kovach, W.L., 1987, 1988, 1988a
paleoecology: Hattin, D.E., 1986
petroleum: Hotchkiss, H.G., 1938; Kornfeld, J.A., 1941b; Moore, R.C., 1925c; Newell, K.D., 1988; Rains and Williamson Oil Company, 1985; Ross, J.A., 1989a, 1989e; Schoeling, L.G., 1989; Taylor, F.B., 1937
sedimentary rocks: Elder, W.P., 1988
sedimentary structures: Batt, R.J., 1987, 1987a
sedimentation: Watney, W.L., 1985c, 1986
stratigraphy: Hattin, D.E., 1988
structural analysis: Gay, S.P., Jr., 1989a
vertebrate paleontology: Nelson, M.E., 1988, 1989
water resources: Kansas State Planning Board, 1936a
well-logging: Macfarlane, P.A., 1988a\

S

Saline County

data processing: Jorgensen, D.G., 1988
geophysical methods: Hagedorn, D.N., 1985

geophysical surveys: Wojcik, K.M., 1985
ground water: Carr, J.E., 1986; Gillespie, J.B., 1986; Hargadine, G.D., 1988
hydrology: McElwee, C.D., 1985; Russell, W.G., 1902; U.S. Geological Survey, 1902, 1928, 1930a, 1930b, 1930c, 1931, 1932, 1932c, 1932f
invertebrate paleontology: Scott, R.W., 1986a
mineral resources: Heidenreich, W.L., 1952
paleobotany: Kovach, W.L., 1987, 1988, 1988a
petroleum: Newell, K.D., 1988; Ross, J.A., 1989f; Taylor, F.B., 1937
sedimentary rocks: Hatch, J.R., 1987
stratigraphy: Newell, K.D., 1987, 1987a
structural analysis: Berendsen, Pieter, 1986a; Johnsgard, S.K., 1988
water resources: Kansas State Planning Board, 1936a

Scott County

areal geology: McClain, T.J., 1987
geochemistry: Stell, M.J.A., 1988
ground water: Dague, B.J., 1985a, 1986a, 1987a; Kansas State Board of Agriculture, Division of Water Resources, 1938; Kume, Jack, 1985; Stullken, L.E., 1988a; Waite, H.A., 1940c, 1942d
mineral resources: Heidenreich, W.L., 1952
natural gas: Anonymous, 1985, 1985b, 1985c, 1987, 1988a, 1989, 1989a; Gold, T., 1987; Paul, S.E., 1975; Shirley, Kathy, 1986
paleobotany: Brummer, J.E., 1987
petroleum: Hotchkiss, H.G., 1938d; Kamen, K.M., 1989; Ross, J.A., 1989d
sedimentary rocks: Watney, W.L., 1986a
soils: Gwin, R.E., Jr., 1963
stratigraphy: Gutentag, E.D., 1988; Rader, Kathleen, 1987
structural analysis: Dieterich, R.J., 1987
water resources: Kansas State Planning Board, 1936c

Sedgwick County

absolute age: Marvin, R.F., 1988
areal geology: Skelton, L.H., 1987a
engineering geology: Hart, R.J., 1988
geophysical methods: Miller, R.D., 1989
geophysical surveys: Gay, S.P., Jr., 1989
ground water: Heidari, Manoutchehr, 1986; Lohman, S.W., 1938a, 1939b, 1940e, 1942d; Mast, V.A., 1985; Olea, R.A., 1980; Rutledge, A.T., 1989; Spinazola, J.M., 1985; Whittemore, D.O., 1987b
hydrology: Drici, O., 1986; U.S. Geological Survey, 1925a, 1925b, 1928a, 1929, 1930, 1930d, 1931a, 1931b, 1931c, 1932a, 1932b, 1932d, 1932e, 1932g, 1932h, 1933, 1933a, 1933b, 1935a, 1936, 1936b, 1937, 1940a, 1941a
paleoecology: Jaumann, P.J., 1986
petroleum: Kornfeld, J.A., 1941b; Ross, J.A., 1989i
sedimentary rocks: Killen, D.B., 1986; Matzen, T.A., 1985

soils: Perkins, A.T., 1948
stratigraphy: Rogers, R.A., 1985a
tectonophysics: Meyer, W.V., 1987
water resources: Bevans, H.E., 1988, 1989; Pfister, Richard, 1952

Seward County

ground water: Byrne, F.E., 1942a; Kansas State Board of Agriculture, Division of Water Resources, 1938; Kume, Jack, 1985
hydrology: Hinderlider, M.C., 1905; Stullken, L.E., 1988
invertebrate paleontology: Herrington, H.B., 1958; Taylor, D.W., 1965, 1966
natural gas: Anonymous, 1985, 1985b, 1985c, 1987, 1988a, 1989, 1989a; Gold, T., 1987; Paul, S.E., 1975; Petzet, G.A., 1985, 1985a, 1985b, 1986, 1986a, 1987, 1987a, 1988; Shirley, Kathy, 1986
petroleum: Hotchkiss, H.G., 1939a; Kamen, K.M., 1989; Ross, J.A., 1989k
sedimentary rocks: Franz, R.H., 1985; Shonfelt, J.P., 1988; Watney, W.L., 1986a
stratigraphy: Rader, Kathleen, 1987
water resources: Kansas State Planning Board, 1936g

Shawnee County

areal geology: Maples, C.G., 1988
diagenesis: Pratt, W.P., 1989a
environmental geology: Bainum, David, 1989
geomorphology: Aber, J.S., 1988c; Dort, Wakefield, Jr., 1987a
ground water: Miller, Rachel E., 1987a
hydrology: Hinderlider, M.C., 1905; Jarvis, C.S., 1936; Pope, L.M., 1987, 1989; U.S. Geological Survey, 1921a, 1921b, 1923, 1925, 1926, 1927, 1928, 1930a, 1930b, 1930c, 1931, 1932, 1932c, 1932f, 1933c, 1935, 1935b, 1936a, 1938, 1940, 1941, 1942
invertebrate paleontology: Kaesler, R.L., 1985a
paleoecology: Kaesler, R.L., 1988a
petroleum: Ross, J.A., 1989b, 1989c, 1989g
sedimentary petrology: Reams, M.W., 1986
sedimentary rocks: Bergstrom, R.E., 1953a; Bisby, C.G., 1985a, 1986; McNeice, B.T., 1987; Nelson, M.R., 1985
soils: Karlstrom, E.T., 1988; Welch, J.E., 1986
statistical analysis: Schweitzer, P.N., 1986a
stratigraphy: Denver, L.E., 1985; Harris, J.W., 1989; Pabian, R.K., 1989a
structural analysis: Johnsgard, S.K., 1988
vertebrate paleontology: Foreman, B.C., 1988b; Schultze, H.-P., 1986
water resources: Kansas State Planning Board, 1936h

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- Osagean Series**
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see also Mississippian "B", Osagian stage
- Osagian stage**
stratigraphy: McCoy, J.R., 1978
see also Osagean Series
- Oswego limestone**
stratigraphy: Richardson, W.E., 1965
structural analysis: Jones, D.A., 1987
see also Fort Scott Limestone

P

- Paola Limestone Member**
sedimentary rocks: Dawson, W.C., 1985
sedimentary structures: Dawson, W.C., 1986
stratigraphy: Watney, W.L., 1989e
- Pawnee Limestone**
petroleum: Weller, Louise, 1985
sedimentation: Price, R.C., 1985; West, R.R., 1989
- Pearlette Ash Member**
geomorphology: Hallberg, G.R., 1986
- Pedee group**
stratigraphy: Goebel, K.A., 1985, 1985a
see also Douglas Group
- "Pennsylvanian basal conglomerate"**
sedimentary rocks: Killen, D.B., 1986
- "Pennsylvanian basal unconformity"**
petroleum: Bieber, D.W., 1985
- Peoria loess**
geomorphology: Oviatt, C.G., 1988; Welch, J.E., 1987
- Pfeifer Shale Member**
sedimentary structures: Batt, R.J., 1987, 1987a
- Pierre Shale**
engineering geology: Strauss, M.F., 1985, 1985a
geochemistry: Coveney, R.M., Jr., 1988
sedimentation: Gautier, D.L., 1985, 1986, 1987; Pratt, L.M., 1988
vertebrate paleontology: Nelson, M.E., 1989
- Pillsbury Shale**
paleobotany: Barker, G.W., 1989a
sedimentation: Shields, D.C., 1987a
- Plattsburg Limestone**
sedimentary rocks: Peryt, T.M., 1985; Wilkinson, B.H., 1985
stratigraphy: Enos, Paul, 1989, 1989a
- Plattsmouth Limestone Member**
sedimentary rocks: McNeice, B.T., 1987
sedimentation: Merriam, D.F., 1986a
stratigraphy: Dubiskas, R.A., 1985; Wolf, G.V., 1986
- Pleasanton Shale**
stratigraphy: Watney, W.L., 1989i
- Pleasanton Group**
engineering geology: Katzman, M.M., 1988
sedimentary rocks: Nielsen, M.A., 1987
stratigraphy: Feldman, H.R., 1989a; Sutton, M.J., 1985, 1985a; Watney, W.L., 1989h
see also Hepler sandstone member, Seminole formation, Tackett formation
- Plumb Shale Member**
sedimentary rocks: Bisby, C.G., 1985a, 1986
- Pony Creek Shale Member**
sedimentary rocks: Bisby, C.G., 1985a, 1986
- Prescott zinc**
zinc ores: Ragan, V.M., 1987
- "Purdy sandstone"**
petroleum: Witte, T.W., 1985
see also Morrowan Series

petroleum: Bieber, D.W., 1985; Weller, Louise, 1985
 sedimentary rocks: Hylton, Alisa, 1985, 1985a, 1986, 1988
 stratigraphy: Rascoe, Bailey, Jr., 1986
Stoner Limestone Member
 invertebrate paleontology: Pabian, R.K., 1988
 sedimentary rocks: McNeice, B.T., 1987
 stratigraphy: Watney, W.L., 1989a
Stotler formation
 statistical analysis: Sutterlin, P.G., 1986
Stotler Limestone
 sedimentation: Shields, D.C., 1987a
Stranger Formation
 sedimentation: Walton, A.W., 1985b
Stull Shale Member
 invertebrate paleontology: Pabian, R.K., 1985
Sumner Group
 areal geology: Skelton, L.H., 1987a
 salt deposits: Watney, W.L., 1988a
Swope Limestone
 geochemistry: Coveney, R.M., Jr., 1988b
 geophysical surveys: Austin, M.N., 1988, 1989, 1989a, 1989b
 petroleum: Slamal, Bob, 1985
 sedimentary rocks: Schutter, S.R., 1988
 sedimentation: Watney, W.L., 1985a

T

Tacket formation
 invertebrate paleontology: Pavlicek, J.A., 1986
 sedimentary structures: Boardman, D.R., II, 1983
see also "Bourbon flags"
Tarkio Limestone Member
 invertebrate paleontology: Gautier, T.G., 1968
Tebo coal bed
 sedimentary rocks: Killen, D.B., 1986
see also Cabaniss Formation
Terra Cotta Clay Member
 paleobotany: Kovach, W.L., 1988a
 stratigraphy: Hamilton, V.J., 1989
Thayer coal bed
 coal deposits: Hemish, L.A., 1987
"Thirteen Finger lime"
 petroleum: Clark, S.L., 1987
Threemile Limestone Member
 biostratigraphy: Busch, R.M., 1988
Timber Hill siltstone member
 paleoecology: Hakes, W.G., 1985
Tonganoxie Sandstone Member
 environmental geology: Thornton, W.S., 1985
 paleobotany: Stidd, B.M., 1985
 sedimentation: Walton, A.W., 1985b
see also "Stalnaker sandstone"
Topeka Limestone
 diagenesis: Silfer, J.A., 1987
 paleobotany: Mapes, G.K., 1988a
 sedimentary rocks: French, J.A., 1988a; Silfer, J.A., 1986
 sedimentation: Merriam, D.F., 1986a
 stratigraphy: Bridge, T.E., 1988, 1988a; Ezerendu, F.O., 1987; Lamoreaux,

S.B., 1986; Skelton, L.H., 1986, 1986a
 vertebrate paleontology: Foreman, B.C., 1988; Zidek, Jiri, 1988
Toronto Limestone Member
 petroleum: Rine, M.B., 1985
 sedimentary rocks: Linehan, J.M., 1986, 1986a
 sedimentary structures: Grommesh, M.W., 1986, 1987
 sedimentation: Merriam, D.F., 1986a
Towanda Limestone Member
 natural gas: Prezbindowski, D.R., 1988
Towle Shale Member
 sedimentary rocks: Bisby, C.G., 1985a, 1986

U

"upper Bluejacket" sandstone
 sedimentary rocks: Killen, D.B., 1986
see also Bluejacket Sandstone Member
upper Borchers ash
 stratigraphy: Zakrzewski, R.J., 1988

V

"V" shale
 sedimentary rocks: Killen, D.B., 1986
Vanhem Formation
 invertebrate paleontology: Herrington, H.B., 1958
Verdigris Limestone Member
 areal geology: Brady, L.L., 1988
Vilas Shale
 invertebrate paleontology: Wood, Rachel, 1989
 stratigraphy: Watney, W.L., 1989a
Vinland Shale Member
 stratigraphy: Ball, D.S., 1985, 1985a
Viola Limestone
 engineering geology: Bushnag, I.O., 1989
 petroleum: Carlson, M.P., 1989, 1989a; Chenoweth, P.A., 1988; Longman, M.W., 1987; Rogers, J.P., 1985
 sedimentary rocks: Caldwell, C.D., 1985a; Hatch, J.R., 1987; St. Clair, P.N., 1985
 stratigraphy: Siemens, M.A., 1985; Witzke, B.J., 1988
 structural analysis: Berendsen, Pieter, 1986a
 well-logging: Doveton, J.H., 1983, 1989a

W

Wabaunsee Group
 stratigraphy: Merriam, D.F., 1986
 vertebrate paleontology: Schultze, H.-P., 1986
"Walchia beds"
 paleobotany: Moore, R.C., 1936d
Walter Johnson sandstone member
 stratigraphy: Sutton, M.J., 1985a
see also Nowata Shale, "Wayside sand"
Warsaw Limestone
 hydrology: Spruill, T.B., 1987
 petroleum: Wilson, M.E., 1988

sedimentary rocks: Coffey, Bill, 1985
 sedimentation: Strickland, M.O., 1987
 stratigraphy: McCoy, J.R., 1978
Wauneta limestone bed
 stratigraphy: Merriam, D.F., 1989a
"Wayside sand"
 environmental geology: Rocha, C.A., 1988
see also Walter Johnson sandstone member, Nowata Shale
Weir-Pittsburg coal bed
 coal deposits: Hemish, L.A., 1987
 geophysical surveys: Steeples, D.W., 1986
 mining geology: Brady, L.L., 1989b
 sedimentary rocks: Killen, D.B., 1986
see also Cabaniss Formation
Wellington Formation
 areal geology: Lomenick, T.F., 1971; Skelton, L.H., 1987a
 engineering geology: Bradley, J.S., 1985; Dyni, R.C., 1986
 geochemistry: Lazar, Boaz, 1985
 geophysical surveys: McGuire, D., 1989, 1989a; Miller, R.D., 1988a
 ground water: Hargadine, G.D., 1988; Mast, V.A., 1985; Spinazola, J.M., 1985
 hydrology: McElwee, C.D., 1985
 paleobotany: Leisman, G.A., 1989
 petroleum: Brady, L.L., 1977b
 salt deposits: Ainsworth, Samuel, 1909; Watney, W.L., 1988a
see also Marion formation
Wellington shale
 petroleum: Officer, H.G., 1926
Whitehorse Sandstone
 ground water: Kume, Jack, 1985; Watts, K.R., 1985, 1989
"Wilcox sand"
 petroleum: Scholten, Robert, 1959; Sloan, W.L., 1925
see also St. Peter Sandstone
Winfield Limestone
 natural gas: Prezbindowski, D.R., 1988
 sedimentary rocks: Toomey, D.F., 1989
 stratigraphy: Toomey, D.F., 1986
see also Enterprise shale
Winterset limestone member
 sedimentary rocks: Zink, L.A., 1985
see also Winterset Limestone
Winterset Limestone
 sedimentary rocks: Payton, C.E., 1964
 stratigraphy: Dubiskas, R.A., 1985; French, J.A., 1989a
see also Winterset limestone member
Winterset shale member
 statistical analysis: Schweitzer, P.N., 1986a
Winzeler Shale Member
 statistical analysis: Schweitzer, P.N., 1986a
Wolfcampian Series
 invertebrate paleontology: Gautier, T.G., 1968
 natural gas: Rice, D.D., 1988
see also Gearyan Stage
Wolverine Creek formation
 stratigraphy: Knight, K.L., 1985, 1985a; Suchy, D.R., 1987
see also Fort Scott formation

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Kansas Geological Survey
The University of Kansas
1930 Constant Avenue
Lawrence, Kansas 66047-3726