State of Illinois
Adlai E. Stevenson, Governor
DEPARTMENT OF REGISTRATION AND EDUCATION
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Division of the
STATE GEOLOGICAL SURVEY
M. M. Leighton, Chief
Urbana

CIRCULAR 160

SUMMARY OF STRATIGRAPHY SHOWN IN GEOLOGIC CROSS-SECTION OF ILLINOIS BASIN

By

L. E. Workman, D. H. Swann, and Elwood Atherton

Urbana, Illinois
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Introduction and Acknowledgments

The geologic cross-section extending from a point near the center of the eastern border of Illinois southward through eastern Illinois to Hardin County was prepared by members of a Study Group appointed by the Illinois Geological Society. The preparation of this cross-section was undertaken by the Study Group as part of a project to draw a cross-section from northern Michigan to central Mississippi, which was instituted by the Paleozoic District Committee for the Eastern Interior, under the Committee on Geologic Names and Correlations of the American Association of Petroleum Geologists.

Well data for the cross-section were assembled through the cooperative efforts of E. J. Combs, Sun Oil Company, Evansville, Indiana; C. W. Donnelly, Ohio Oil Company, Marshall, Illinois; Homer Easley, Salem, Illinois; Marlowe D. Melvin, Carter Oil Company, Mattoon, Illinois; L. L. Whiting, the Texas Company, Salem, Illinois; and Elwood Atherton and L. E. Workman, Illinois Geological Survey, Urbana. Sample-study logs were prepared and combined with electric logs and photostatically reduced for drafting. Assembling, drawing correlation lines, and drafting were done by the State Geological Survey. This stratigraphic report is the combined effort of L. E. Workman, D. H. Swann, and Elwood Atherton of the State Geological Survey.

Grateful acknowledgment is made to the various organizations listed above for permitting their members to take part in the project. Dr. Gilbert

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1/ Respectively, Geologist and Head, Subsurface Geology Division; Geologist, Oil and Gas Division; and Associate Geologist, Subsurface Geology Division; Illinois State Geological Survey

H. Cady, Head of the Coal Division of the Survey, read and revised the report with regard to Pennsylvanian stratigraphy and Dr. H. B. Willman, Head of the Division of Stratigraphy and Paleontology of the Survey, read the report to check on standard nomenclature.

PLEISTOCENE SYSTEM

Unconsolidated Pleistocene sediments, from 10 to as much as 350 feet in thickness, cover the Paloezoic bedrock of the Illinois basin. In general the present topography in the southern half of the basin conforms in its major features to the pre-Pleistocene surface. Where outcrops are very common, the glacial drift is less than 100 feet in thickness, and the greatest thicknesses tend to be in the areas of preglacial valleys beneath the present floodplains of the wider valleys. In contrast, the topography of the northern half of the basin is controlled very little by the pre-Pleistocene surface, and the presence of preglacial valleys with thick drift fills may not be evident from the present surface. South of the glacial drift border, loess, alluviun, and soil cover the bedrock.

PENNSYLVANIAN SYSTEM

The Pennsylvanian system attains its greatest thickness of approximately 2,500 feet in Wayne County. It is divided into four groups named in descending order the McLeansboro, Carbondale, Tradewater, and Caseyville. Gray shales, commonly carbonaceous and silty, siltstones, and carbonaceous and micaceous sandstones are the most common rock varieties in all four geologic groups; coal beds, underclays and limestones form a small but stratigraphically and economically important portion of the succession.

The McLeansboro group has yielded little commercial oil in Illinois and only minor amounts of coal. It contains more limestone than the lower groups, and several of the limestone beds are useful as structural markers. The youngest of these is the Millersville limestone, a gray- to buff-colored fossiliferous limestone. Some beds contain small granular or fragmental encrusted constituents, and there is some light-colored coquina in the lower part. The limestone, commonly separated into several benches by intervening shale beds, is of varying thickness, with a maximum of about 50 feet, thinning to the south and eventually becoming unrecognizable, or entirely playing out, south of about T. 6 N.

About 200 feet below the Millersville is a light-colored fairly dense limestone in a single bench 6 to 10 feet thick--the Shoal Creek (New Haven) limestone. It is immediately underlain by a black shale. In many areas it is distinguished in electric logs by its high self-potential. It is a useful marker throughout a large portion of the basin, but is discontinuous or lacking in Indiana and near the southern end of the LaSalle anticline in Illinois.

The West Franklin limestone, lying between 150 and 275 feet below the Shoal Creek limestone, is present only in the eastern part of the Eastern Interior basin. It consists of three beds of limestone, each 3 to 8 feet thick, with intervening shale beds of similar thickness. The shale between the two lower benches is red or variegated, and so in places is the shale below the lower bench. The variegated shale exhibits unusually low electric resistivity for Pennsylvanian shale. In places the West Franklin limestone is represented by only one layer of limestone, the exact identity of the bench usually being undeterminable, although it is commonly thought that the middle layer is the most widespread. Generally the West Franklin is underlain by beds giving a monotonously low resistivity which gradually decreases downward for 100 to 150 feet. These are probably mostly shale, but sandstone, siltstone, and thin beds of coal and limestone also make up the succession.

Below this portion of the succession there is a series of beds 125 to 150 feet thick in which alternating relatively thin beds of low and high resistivity are in sharp contrast in the electric log. This zone extends across the contact of the McLeansboro and Carbondale groups and includes six or seven limestones, nine or ten coal beds, and several sandstones. Each individual bed tends to be discontinuous, a characteristic particularly true of the sandstones. The most persistent and generally the thickest of the limestones is the Herrin, an earthy, poorly bedded to coarsely nodular, fusulinid limestone generally closely underlain by the Herrin (No. 6) coal bed, commonly the thickest of the coals. The Herrin limestone and coal beds often produce a pronounced combined double peak of high resistivity some 20 to 60 feet below the top of the succession, making an uneven resistivity curve. Proceeding downward is a strongly irregular resistivity zone. No. 5 coal bed is the last, or next to the last, unit showing high resistivity. No. 6 (Kentucky 11) and No. 5 (Kentucky 9) coal beds are the most important commercial beds in the Eastern Interior province and provide useful structural markers.

Another succession of beds producing low and monotonous resistivity curves lies between No. 5 coal bed and a coal bed 60 to 80 feet lower which in Illinois has tentatively been called "No. 4." These beds thin against the northeastern flank of the Illinois basin and are interrupted by sandstones near the LaSalle anticlinal belt. "No. 4" coal bed is commonly identified in electric logs by a rather weak double peak of high resistivity. Below this double peak for 50 feet or more there is a zone of more varied lithology: shale, sandstones, thin limestones, and thin coal beds, indicated in the electric log by varied resistivity. In this succession a coal bed, tentatively correlated with No. 2 bed of northern Illinois. lies 50 to 100 feet below "No. 4" bed; it (or its underclay) is distinguished in electric logs by a sharp depression of low resistivity between zones of moderate resistivity.

Almost all the oil production from the Pennsylvanian system of Illinois comes from sandstones in the Tradewater and the Caseyville groups. Within these groups there are no strata traceable for considerable distances but there are beds locally suitable for mapping structure. Local names are used for the producing sands, which are notably erratic in distribution.

The Tradewater and Caseyville groups were not deposited over such structurally high areas as the northern part of the LaSalle anticlinal belt, but are overlapped by the Carbondale beds. They reach a combined thickness approaching 1,500 feet near the southern border of the basin.

The base of the Pennsylvanian is uncomformable upon pre-Pennsylvanian beds and overlaps several thousand feet of lower strata from Chester to Devonian ages. This unconformity has local relief in the order of 200 feet where valleys less than a mile wide are incised in the pre-Pennsylvanian surface.

MISSISSIPPIAN SYSTEM

Chester Series

The Chester series consists of a succession of sixteen alternating limestone-shale and sandstone-shale formations that underlies most of the southern half of Illinois. The formations range in average thickness from about 30 to 150 feet. They were beveled by post-Mississippian erosion on the northern borders of the Eastern Interior basin.

The uppermost formation is the Kinkaid, the upper and lower parts of which are prominent beds of massive limestone. The next three formations are relatively minor: the Degonia sandstone; the Clore formation consisting of shale, thin limestones, and sandstone; and the Palestine sandstone. The Menard formation contains a notable electric-log marker bed of limestone in its middle part, known as the "Massive Menard," and at its base a thin limestone known as the "Little Menard limestone." The Waltersburg formation

consists of shale with generally minor sandstone beds that locally are important sand-bar deposits in extreme southeastern Illinois. The Vienna formation is mostly shale underlain by a relatively thin but persistent limestone bed. The Tar Springs formation is one of the major Chester sandstones. The Glen Dean formation includes two limestone beds with minor amounts of shale, the upper bed being locally absent because of pre-Tar Springs erosion. The lower limestone is often used as a horizon for structural mapping. Below this bed is the Hardinsburg sandstone, underlain by the relatively thick Golconda limestone-shale formation. At the base of the Golconda is an excellent marker, the thin, persistent "Barlow" limestone, widely used for structural mapping. The Cypress formation is one of the major Chester oil-bearing sandstones. Below it is the Ridenhower (Paint Creek) shale and limestone, underlain by the Bethel sandstone. The formation called "Renault" in southeastern Illinois is subdivided into an upper Downeys Bluff limestone and a lower Shetlerville shale and limestone. The "Benoist" sandstone lies between these members and is equivalent to the Yankeetown sandstone of western Illinois. Inasmuch as the Paint Creek of western Illinois occupies the interval between Cypress and Yankeetown, it follows that strata equivalent to the Paint Creek in eastern Illinois are the Ridenhower, Bethel, and Downeys Bluff. The basal formation of the Chester series is the Aux Vases sandstone. The formation called "Aux Vases" in the oil fields of southeastern Illinois has been shown to be equivalent to the Rosiclare sandstone member of the Ste. Genevieve formation in Hardin County. Its relation to the type Aux Vases in western Illinois is uncertain.

All Chester sandstones, especially those in the lower part of the series, are important sources of oil in Illinois.

Iowa Series

Meramec Group. - The Ste. Genevieve formation consists of three members: the Levias (Lower O'Hara) limestone above, the Rosiclare sandstone, and the Fredonia limestone below. In Hardin County in southeastern Illinois the Levias member is a relatively thin, pure, oolitic or crinoidal limestone; the Rosiclare member is a very fine-grained sandstone with minor amounts of shale and sandy limestone. The Fredonia member is largely oolitic limestone, with a few thin beds of dolomite, sandy limestone, and sandstone. The oolitic limestone in the Illinois basin includes local zones of high porosity, known as the "McClosky" oolite, which yield quantities of oil in many of the Illinois fields. Sandstone beds become increasingly important in the Fredonia member to the north and west of Hardin County. The resemblance of these sandstones to the Rosiclare has resulted in their confusion with the Aux Vases and Rosiclare sandstones mentioned above. The Ste. Genevieve ranges from 60 feet in the north to 200 feet thick in the southern part along the line of section.

The St. Louis limestone is light gray to brownish gray and is especially recognizable in the subsurface by its high chert content. There is considerable vertical variation in lithologic characters, the textures ranging from lithographic to fine grained; some rocks are oolitic, others sandy. Brown saccaroidal dolomite beds are common. Gypsum and anhydrite occur in the lower third of the formation in parts of Illinois. The thickness along the line of section varies from 240 to 400 feet.

The Salem limestone is buff to brownish gray, partly mottled with dark gray, fine to coarse, and granular. It is fossiliferous, being especially characterized by Endothyra baileyi. Chert which is not abundant, is buff to brown, chalky, and dense. Dolomite and dolomitic zones are common. The formation is commonly porous, carrying salt water and yielding oil in some structures. The thickness varies in the area of cross-section from 35 feet in the north to 375 feet in the south.

Osage Group. - The cross-section shows important facies changes in the Osage group. Near the Indiana border as far south as Well 10, the Osage consists mostly of more or less calcareous siltstone, very fine-grained sandstone, and shale, with some beds of very cherty limestone. Southward the group passes through sandy limestone to very cherty and siliceous limestones that are very fine grained, dark to medium brownish gray and some light gray. The "Carper sand," productive in Clark County, occurs in the basal 150 feet or so of the siltstone facies of the Osage. Throughout a large part of the Illinois basin the base of the Osage is marked by glauconite. The Osage ranges in thickness from 600 to 750 feet along the line of section and is thickest at the location of Well 11.

Kinderhook Group. - At the top of the Kinderhook group is a gray to green, weak shale ranging in thickness from very thin to 20 feet. This lies on the Chouteau (Rockford) limestone, which is white to buff and brownish gray sublithographic with scattered crinoid grains, and which reaches a thickness of 25 feet.

MISSISSIPPIAN-DEVONIAN SYSTEMS

The New Albany shale of Indiana and eastern Illinois is a black shale between well-recognized Mississippian and Devonian strata. It has been shown in Indiana by Campbell to be in small part Mississippian and in large part Devonian. There are some lenses of cherty dolomitic limestone in the lower part. The high resistivity of possibly the Devonian portion is a feature of the electric logs. The thickness of the New Albany ranges from 50 feet in the north to over 400 feet in the south along the line of section.

DEVONIAN SYSTEM

The Devonian system is sharply divisible into upper and lower groups. Along the line of section the upper group overlaps the lower group

and upper Silurian formations, and in western Illinois it overlaps formations down to the Ordovician Galena formation. In downward succession the upper group in western Illinois consists of the Cedar Valley and Wapsipinicon limestones. In eastern Illinois, Indiana formation names are used: the Sellersburg and Jeffersonville limestones above, and the Geneva dolomite below. In southern Illinois the strata consist of the Alto, Lingle, and Grand Tower limestones and the Dutch Creek sandstone. There is considerable disagreement in correlations between the three regions. The combined thickness along the line of section varies from 180 to 247 feet.

The Sellersburg formation consists of buff to brown, somewhat argillaceous, more or less cherty limestone and dolomites. Some beds and zones are sandy and fossiliferous, a common fossil being Tentaculites.

The Jeffersonville limestone is buff, semi-crystalline, lighter colored and purer than the Sellersburg, in places cherty, and generally fossiliferous. In places it contains sand, which increases in abundance downward. The base is marked in many places by a very prominent coral and stromatoperoid zone that has a conglomeratic appearance in cores.

The Geneva formation is a variable series of light gray and buff lithographic limestones, very fine-grained sandy dolomites, and porous to tight dolomitic sandstones above, and brown sandy saccaroidal dolomite below. It is considered by some geologists that the upper light-colored portion is part of the Jeffersonville and that only the lower brown portion is the Geneva. Fossils are practically absent.

Below the base of the Geneva-Dutch Creek strata the lower Devonian group consists of the Clear Creek, Little Saline, and Grassy Knob-Bailey limestones. The Bailey extends as far north as Well 10; progressively younger beds are overlapped southward, which reach a combined thickness of 1,140 feet in Well 1.

The Clear Creek formation is a very cherty, light brownish-gray, very fine to coarse limestone. It contains more or less dolomite, scattered very fine grains of glauconite, scattered very fine spores, and, in the insoluble residues, noticeable amounts of very fine euhedral quartz crystals. Beds of coarsely crinoidal semi-crystalline white limestone similar to the underlying Little Saline limestone occur irregularly in the formation. The thickness increases southward from the wedge edge to over 600 feet.

The Little Saline limestone is coarsely crinoidal, semi-crystalline, white to light gray with some pink and green grains. It contains more or less white chert and scattered very fine to coarse glauconite which is especially prominent in the lower part. Because of its similarity to beds of limestone in the Clear Creek it is considered to be closely related to the Clear Creek, though it is reported to be of Oriskany age and the Clear Creek of Onondaga age. It is a lenticular formation, having maximum thicknesses in a northeast-southwest belt which crosses the line of section near or north of Well 4, where it is about 100 feet thick.

The Grassy Knob-Bailey limestone is very cherty, dolomitic, and very fine grained. It is increasingly argillaceous downward and grades from light brownish gray in the upper part to dark brownish gray in the lower part. Scattered very fine grains of glauconite are present but not in such abundance as in the Clear Creek limestone. Small spores are present in both limestone and chert. The Clear Creek and Bailey are in some places difficult to differentiate. It is impossible in the subsurface to differentiate the "Grassy Knob chert" from the Bailey below. The thickness increases southward from the wedge edge to over 500 feet.

SILURIAN SYSTEM

The Silurian system in Illinois is divided into the Niagaran series above and the Alexandrian series below. The Cayugan series (Salina

and Bass Island), reaching great thicknesses in the Michigan basin, is considered to be thin or absent in Illinois.

Niagaran Series

The Niagaran series comprises most of the Silurian rocks in Illinois. It ranges in thickness from 125 to 700 feet along the line of section, being thickest in central Illinois near Well 13 and thinnest to the south near Well 4. From Well 12 northward the Niagaran consists mostly of dolomite, whereas south of Well 12 it is mostly dolomitic limestone.

There are two principal facies of limestone or dolomite in the Niagaran: (1) reef rock which is non-cherty, non-silty, more or less porous; and (2) interreef rock which is cherty, silty, and compact. A few of the reefs produce oil in Illinois. The southern equivalent of the interreef rock is red, green, and gray silty limestone, extending from Well 7 southward.

Alexandrian Series

The Alexandrian series consists of the Brassfield and Edgewood formations which together reach thicknesses of less than 75 feet along the line of section.

Locally in the north the Brassfield is called the Kankakee formation and in the south the Sexton Creek formation. It is a white to light gray, fairly pure but somewhat cherty rock that is dolomite as far south as Well 13, and limestone beyond. The thickness varies from 20 to about 40 feet.

The Edgewood formation is a very finely sandy to silty, light to dark brownish-gray dolomite and limestone that grades in places to very fine-grained sandstone. In northern Illinois its thickness varies from 5 to 100 feet, as it was deposited in the valleys and across the uplands of pre-

Edgewood erosional surfaces having equivalent relief. Along the line of section, however, it appears to be only 10 to 20 feet thick and in some places it has not been recognized.

ORDOVICIAN SYSTEM

The Ordovician system is divided in Illinois into the Cincinnatian (at top), Mohawkian, Chazyan, and Prairie du Chien series, having a total thickness of almost 2,000 feet in Well 12.

Cincinnatian Series

The Cincinnatian series in Illinois is represented by the Maquoketa formation. It is dominantly shale but contains variable amounts of siltstone. sandstone, and limestone. There are three general zones: (1) greenish-gray smooth to silty and sandy shales with interbedded limestones and some sandstones; (2) speckled gray and brownish-gray limestone and dolomite with more or less interbedded shale; and (3) brownish shale with more or less interbedded brown to brownish-gray limestone which decreases in proportion downward. The thickness of the Maquoketa is 200 to 300 feet along the line of the section.

Mohawkian Series

The Mohawkian series consists mostly of limestone and includes the Galena (Kimmswick), Decorah, and Plattin formations, with total thicknesses of 450 to 680 feet along the line of cross-section, thickening southward.

The Galena limestone is buff to light brown and very finely to moderately crystalline. This is the Kimmswick ("Trenton") formation that produces oil in the Dupo field and elsewhere in the Illinois basin. The thickness varies from 100 to 160 feet in the area of the cross-section.

The Decorah formation is a zone less than 30 feet thick of brown and gray limestones and dolomites having shale partings. It is recognized only in the more northern portion of the cross-section.

The Plattin formation contains a variety of very fine-grained to lithographic brown, buff, and gray limestones. Thin partings of brown, gray, and green shale are sparingly present. The thickness of the Plattin increases southward from 275 to 575 feet along the line of the cross-section.

Chazyan Series

The Chazyan series includes the Joachim, Glenwood, and St. Peter formations. An erosional unconformity which cuts across older formations down to the Galesville sandstone marks the lower boundary of the series in northern Illinois, but in the line of section there is less unconformity.

The Joachim formation consists principally of very finely crystalline buff to brown and some gray earthy dolomite. It contains some beds of limestone, some sandy limestone and dolomite, thin beds of brown and gray shale, and traces of gypsum. The thickness increases southward from 50 to 150 feet in the area of the cross-section.

The Glenwood formation consists of sandstone, gray and green sandy shales, and some gray and green chalky, sandy dolomite. Its thickness varies from 10 to 60 feet along the line of cross-section.

The St. Peter sandstone is white, incoherent, and very fine to medium grained. In the most southerly well (Well 1) it apparently is represented by 77 feet of sandy dolomite grading to a few thin beds of sandstone. The base of the St. Peter, at least as far south as Well 9 and probably farther, is marked by a chert and shale conglomerate reworked from the weathered surface of underlying formations. The thickness of the St. Peter along the line of section varies from 35 to 150 feet.

Prairie du Chien Series

The Prairie du Chien series consists of the Shakopee dolomite at the top, the New Richmond sandstone and dolomite, and the Oneota dolomite at the bottom.

The Shakopee dolomite is light gray, buff, and brown, very fine to fine grained, and cherty, with chalky to dense, partly oolitic chert. It contains lenses and beds of sandstone and sandy dolomite, and "floating" sand grains are typical of the purer dolomite. The thickness in Well 12, which is the only well in the section penetrating the entire formation is 575 feet.

The New Richmond sandstone and sandy dolomite formation reaches thicknesses between 100 and 190 feet in a belt west of the cross-section extending northeastward from St. Louis to La Salle. Well 12 appears to be near but beyond the east edge of the formation.

The Oneota dolomite is white to light gray and generally is more coarsely crystalline than the Shakopee or any other formation of the geologic section in Illinois. It is characterized by "floating" sand grains which become more abundant downward. A basal sandstone in Well 12 may be correlatable with the Gunter sandstone of Missouri. Chalky to dense oolitic chert is characteristic and, so far as has been observed, does not extend downward below the base of the Oneota formation in Illinois.

CAMBRIAN SYSTEM

Well 12 penetrated 1,450 feet of Cambrian strata. It is estimated that there is an additional thickness of 1,300 feet to the top of the Pre-Cambrian, making a total estimated Cambrian thickness of 2,750 feet. The strata consist, from top to bottom, of the Trempealeau, Franconia, Galesville, Eau Claire, and Mt. Simon formations. All are included in the St. Croixan, or Upper Cambrian, series.

St. Croixan Series

The Trempealeau formation consists mostly of very finely crystalline brownish-gray to pink and brown dolomite characterized especially by scattered very fine flakes of glauconite, some crystalline drusy quartz, and lack of chert. The thickness is 300 or more feet along the line of section.

In northern Illinois the Franconia formation consists of very finely glauconitic sandstone, sandy shales, and sandy to fairly pure dolomites. The shales and sandstones range through shades of red, green, purple, and gray. The dolomites are brown to pink. At the location of Well 12 the formation consists largely of dolomite. The base characteristically contains 10 or more feet of coarse-grained, coarsely glauconitic, buff sandy dolomite to dolomitic sandstone, known in Wisconsin as the Ironton member. The thickness in Well 12 is 280 feet.

In northern Illinois the Galesville sandstone consists of 150 to over 200 feet of white to buff, very fine to coarse sandstone that contains thin beds of buff sandy dolomite in the upper half, but is quite open and friable in the lower half, yielding large quantities of groundwater. Southward the dolomite content increases, so that in the vicinity of Well 12 the formation consists almost entirely of compact sandstone and sandy dolomite. Likewise the thickness decreases southward and the formation wedges out in central Illinois. In Well 12 it is 90 feet thick.

The Eau Claire is quite variable in lithology, containing white to gray, very fine to coarse sandstones, brown dolomites, and red, gray, green, and purple micaceous shales and siltstones. The fine-grained sediments commonly contain fragments of Lingula and trilobites. Glauconite is common throughout. The lower part of the formation is characterized by very fine to coarse sandstone the grains of which are thinly powdered with exceedingly

~~big~~ fine pyrite, giving them a "sooty" appearance. A brown oolitic limestone facies which grades laterally to dolomite and siltstone reaches a thickness of almost 200 feet in the middle of the formation in the central part of Illinois. The thickness of the formation is generally about 400 feet in northern Illinois but it increases southward to over 650 feet in east-central Illinois.

The Mt. Simon sandstone is white, fine- to coarse-grained sandstone at the top grading downward to pink and yellow, fine to very coarse sandstone. The sand is incoherent but, apparently, some secondary crystalline quartz on the surfaces of the grains somewhat interlocks them, making the sandstone hard to drill. Feldspar increases in abundance downward in the pink sandstone. There are some red shale layers. The age of the pink sandstone is uncertain, some holding that it is the Pre-Cambrian "red clastics" and should be called Fond du Lac. It is difficult or impossible anywhere in northern Illinois to pick a consistent break between the white and the pink sandstone, but it is estimated that at Well 12 the white sandstone may be about 200 feet thick and the pink sandstone about ~~1,000~~ 1200 feet, making about ~~2,000~~ 1400 feet of sandstone resting on the older rocks.

PRE-CAMBRIAN ROCKS

A few wells in Illinois have penetrated the sediments to igneous rock, which in several wells is red and gray granite, similar to granites in Missouri and Wisconsin. In an area in Pike County one well penetrated a red rhyolite, and another a very fine-grained red granite.

Structure

The cross-section cuts three of the major structural features of Illinois, namely the LaSalle anticlinal belt, the Illinois basin, and the Rough Creek fault zone.

The LaSalle anticlinal belt consists of an enechelon series of folds with steep dips on the west and more gentle dips on the east. It extends from LaSalle County south-southeastward to Wabash County, a distance of about 235 miles. Folding began after deposition of the Mississippian Chester series, and continued during and after deposition of the Pennsylvanian rocks. The time of maximum uplift probably was earlier at the northern than at the southern end. Major oil fields are located along the southern half of the anticline. Well 12 is on the crest. To the east, between Wells 13 and 14, is the Sidell syncline. To the west is the Illinois basin.

The Illinois basin in the restricted sense, as indicated on the map, lies between the LaSalle anticlinal belt on the east and the DuQuoin anticline on the west. Within this major downwarped area are numerous smaller folds. Oil fields are located on many of these folds. Probably the major development of these structures occurred during and after the Pennsylvanian period.

The southern end of the section cuts the Rough Creek (Shawneetown) fault, the Eagle Valley syncline, and ends in Well 1 near the top of Hicks Dome. The area south of the Rough Creek fault is broken by numerous normal faults, many of which have a general northeast-southwest trend. Important fluorspar deposits are associated with these faults. The age of the faulting is believed to be post-Pennsylvanian.

The most important angular and erosional uncomformities in Illinois are those between: (1) the Pre-Cambrian and Cambrian, (2) the Shakopee and St. Peter, (3) the Mississippian and Pennsylvanian, and (4) the Pennsylvanian and Pleistocene.

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