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Marvin P. Carlson

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Lithostratigraphy and Correlation of the Mississippian System in Nebraska

by

Marvin P. Carlson



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LITHOSTRATIGRAPHY AND
CORRELATION OF THE
MISSISSIPPIAN SYSTEM IN NEBRASKA

By
MARVIN P. CARLSON



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Lithostratigraphy and Correlation of the Mississippian System in Nebraska¹

By Marvin P. Carlson

The purpose of this study is to describe and correlate rocks of Mississippian age within the state of Nebraska. Shales, generally classified as "Chattanooga" and commonly referred to as Devonian or Mississippian in the northern Mid-Continent, have been included in this study, although these shales are more generally believed to be Devonian and not Mississippian by most stratigraphers and paleontologists at the present time. Since rocks of Mississippian age are present only in the subsurface of Nebraska, the basic information for this report is derived from the microscopic study of cuttings and cores from test wells drilled within the state.

This investigation has been designed to (1) delineate lithologic subdivisions of the Mississippian in the subsurface of Nebraska; (2) trace these individual units throughout the state, noting extent, thickness, lithologic variations and relationships with underlying and overlying beds; and (3) suggest a tentative correlation of these units with units of the outcrop areas.

General Relationships

Nebraska is mantled by variable thickness of Pleistocene and Tertiary sediments, except for local outcrop areas of Cretaceous, Permian and Pennsylvanian sediments generally along valley sides. Nebraska's location on the southwest flank of the Canadian Shield has resulted in shelf type Paleozoic sediments which are thin compared to the great thicknesses deposited in the marginal geosynclines. This dominant shelf characteristic was modified at various times by the presence of basin and high complexes causing local variations in sediment type and distribution.

Sediments ranging in age from Cambrian to Recent are present in Nebraska but there is a great variation in the sequence present in any specific area within the state because of non-deposition and erosion of some intervals. The oldest outcrops occur in the southeastern portion

¹ Much of the material included in this bulletin was presented as a Master's Thesis to the Department of Geology, University of Nebraska, January 1963. The supervision of Dr. William N. Gilliland, Chairman of the Department of Geology, during the course of graduate study, is gratefully acknowledged.

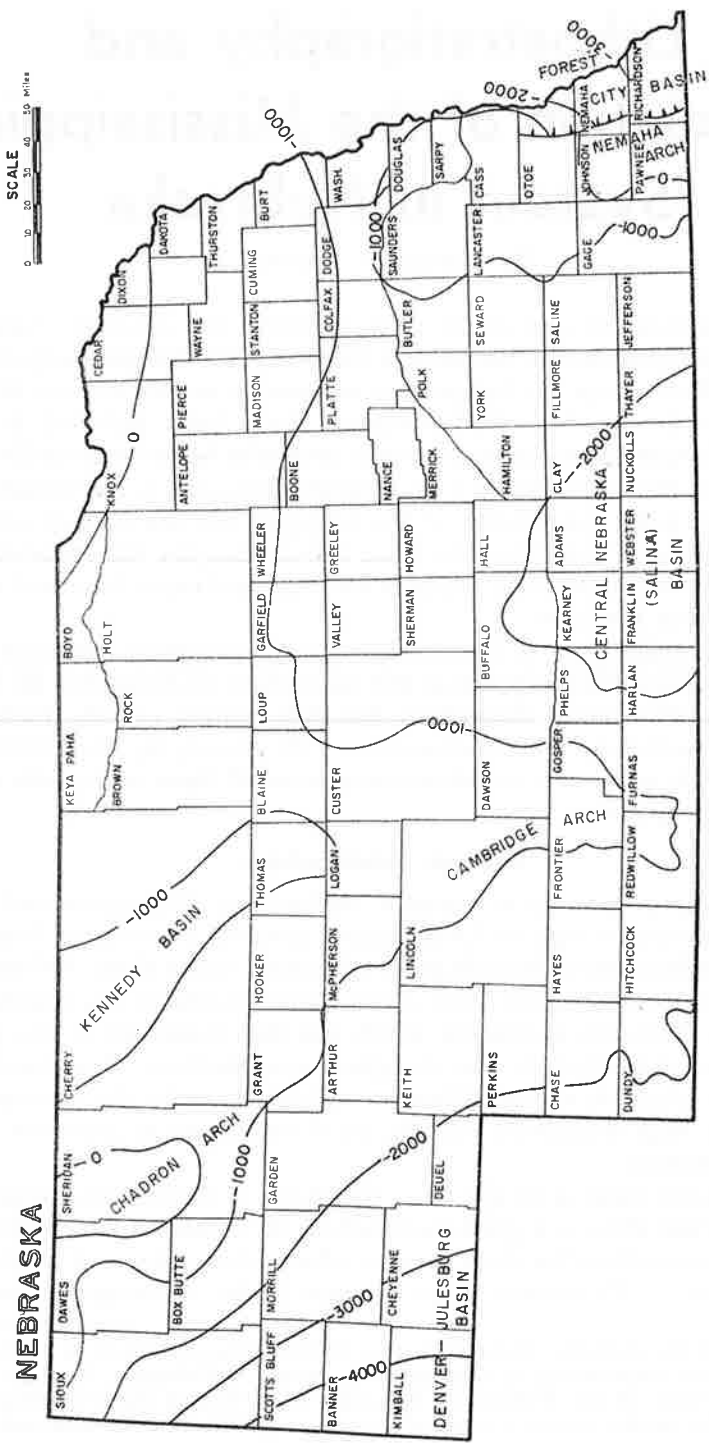


Figure 1. Principal Structural Features of Nebraska. Features shown by 1000-foot contours on the Precambrian surface.

of the state and are Pennsylvanian (Missouri Series) in age. Outcrops of Mississippian age occur in central and southeastern Iowa, north-eastern and southern Missouri, southeastern Kansas, along parts of the Front Range of Colorado, and in the Black Hills of South Dakota.

The principal structural features of Nebraska are shown in Figure 1. Many of these features had their inception in late or post-Mississippian time, as shown by the present configuration of the top of the pre-Pennsylvanian (Plate I), and had little influence on the depositional patterns of the pre-Pennsylvanian.

Previous Work

One of the earliest publications containing correlations of the sub-surface strata in Nebraska was *Deep Wells of Nebraska* (Condra, Schramm and Lugn, 1931). An extension of this work was published by Lugn (1934) describing the general distributional pattern of the pre-Pennsylvanian of Nebraska. A summary of the geologic section of Nebraska was published by Condra and Reed in 1943 and appended by Reed in 1959. Various reports in surrounding states (Lee, 1956, 1946, 1943 and Greene, 1945) mentioned the Mississippian sequence present in the adjoining areas of Nebraska.

Reed discussed the pre-Pennsylvanian in central Nebraska in 1954 and published two articles dealing with the Mississippian in 1946 and 1948. In addition, much unpublished material by Reed dealing with the pre-Pennsylvanian is contained in the files of the Nebraska Geological Survey.

Method of Study

The basic data in this report are derived from a microscopic study of cuttings and cores of deep wells drilled within the state. An investigation of this type is best accomplished as a lithostratigraphic study as defined by Hedberg (1961) as "the determination of the lithologic characteristics of (those) strata, the delineation and classification of (them) as three dimensional lithologically unified bodies."

Except for some closely spaced field wells in southeastern Nebraska, samples were studied and correlated from all available wells penetrating the Mississippian in Nebraska. This involved study of cuttings from approximately three hundred fifty wells and examination of core material from 6 wells. In addition, samples from 15 wells in adjoining areas of Iowa, Missouri and Kansas were examined to determine the lithologic characteristics of the various units recognized in these areas.

The predominant lithology of the Mississippian in Nebraska is a variable sequence of limestone and dolomite. Identification of these carbonates as limestone or dolomite was achieved by noting relative solubilities in cold, dilute (10%) hydrochloric acid. Where this test

was not conclusive, an Alizarine Red S test was made as outlined by Friedman (1959). An uncontaminated sample fragment is immersed in the solution and within two to three minutes calcite is stained a deep red while dolomite does not change color. This test is highly recommended for microscopic study of sample cuttings since a satisfactory differentiation can be obtained quickly.

Gross lithology seemed adequate for identification and correlation, so no quantitative insoluble residues were made. Instead, small portions of specific samples were treated with hydrochloric acid and the residue examined whenever there was doubt as to some constituent of the samples. No paleontological studies were attempted because of the scarcity of identifiable fossils in the cuttings.

Certain descriptive terms, commonly used in describing limestone, dolomite and chert in the study of well samples, are not always understood. The following terms are used herein with the indicated specialized meanings.

Dead gray is applied to a chert texture which is earthy, soft to hard and resembles chalk or tripoli.

Mottled is applied to a color-texture consisting of patches of color, usually darker, superimposed on the dominant color.

Speckled is applied to a color-texture consisting of a dotted or stippled color pattern, usually darker, superimposed on the dominant color.

Lithographic is applied to a limestone texture which is exceedingly fine grained and homogeneous.

Semigranular is applied to a limestone consisting of a microcrystalline matrix with more coarsely crystalline grains present.

Pseudoolitic is applied to texture, usually of a limestone, with inclusions of poorly developed crystals, fossil debris and/or granules in a denser matrix.

Sucrosic is applied to texture, usually of a dolomite, consisting of microscopically fine crystals closely packed without matrix and resembling granulated sugar.

Granoblastic is applied to texture, usually of a dolomite, consisting of a medium to coarsely crystalline mosaic without matrix. "Rhombic" is a common misnomer applied to this texture in microscopic sample study.

GENERAL CLASSIFICATION

Rocks believed to represent the Kinderhookian, Osagean, and Meramecian series of the Mississippian System are present in the subsurface of Nebraska with the most complete sequence present in the extreme southeastern portion of the state. An isopachous map for the

Mississippian is presented on Plate II. The Mississippian rocks were first subdivided into lithologic units and these units were traced into surrounding areas. Formal names which seemed best suited for Nebraska were then applied.

The term "Kinderhook group" was proposed by Meek and Worthen (1861) to include all the beds between the black shale (Grassy Creek) and the Burlington limestone in Pike County, Illinois, and later expanded to include the underlying shales (Grassy Creek). In Nebraska, Kinderhookian Series has usually been applied to the sequence overlying Devonian dolomites and limestone and underlying Osagean strata. This report concurs with the upper boundary as previously defined but excludes the lower main shale body, commonly called "Chattanooga," which is herein classified as Devonian in agreement with the Kinderhookian-Devonian boundary as determined by Collinson (1961).

The name "Osage group" was proposed by Williams (1891) to include the Keokuk and Burlington limestones of the Mississippi Valley area. Present usage includes the underlying Fern Glen and equivalents in the Osagean. In Nebraska two units are classified as Osagean and are probably equivalent to some portion of the Keokuk-Burlington sequence.

The term "Meramec group" was proposed by Ulrich (1904) to include the St. Louis, Spergen Hill, and Warsaw. More recently the Ste. Genevieve has been included in the Meramecian. There is still a difference of opinion as to the position of the Warsaw but the classification used by states adjacent to Nebraska and by Weller et al (1948), placing the Warsaw in the Meramecian, is followed in this report.

The Mississippian in the subsurface of Nebraska is everywhere overlain by rocks of Pennsylvanian age, largely Cherokee (Des Moinesian), although some pre-Cherokee Pennsylvanian may be present in some of the deeper basinal areas. The upper contact of the Mississippian is usually marked by a detrital zone of angular quartz sand and weathered chert. The Mississippian rocks in Nebraska overlie rocks ranging in age from Devonian to Precambrian. A general west-northwest overlap by the Mississippian is apparent in the central and southern portions of the state. The Mississippian has been observed in contact with Devonian, Silurian, Ordovician (both Maquoketa and Viola) and Cambrian (both Bonneterre and LaMotte-Reagan) rocks, and one well in northwestern Nebraska was studied in which the Mississippian directly overlies the Precambrian.

Nine distinct lithostratigraphic units of the Mississippian were recognized in Nebraska and successive numbers were arbitrarily assigned to each unit (Figure 2). Further subdivision is possible in both southeastern and southwestern Nebraska. Nomenclature from surrounding states has been extended to these units in Nebraska and this

SYSTEM	SERIES	GROUP/FORMATION	UNIT THIS REPORT	LITHOLOGY	THICKNESS IN FEET		
MISSISSIPPIAN	MERAMECIAN	STE. GENEVIEVE	9		0 - 25		
		ST. LOUIS	8		0 - 30		
		SPERGEN	7		0 - 35		
		WARSAW	6		0 - 50		
	OSAGEAN	UPPER KEOK. — BURL.	5		0 - 65		
		LOWER KEOK. — BURL.	4		0 - 50		
	KINDERHOOKIAN	GILMORE CITY		3		0 - 85	
		HAMPTON GROUP (CHOUTEAU) GROUP	EAGLE CITY - IOWA FALLS	2	D		0 - 100
			MAYNES CREEK (WASSONVILLE)		C		0 - 50
			CHAPIN (COMPTON)		B		0 - 20
UNNAMED SILTSTONE			A			± 5	
BOICE		1		0 - 100			
DEVONIAN	"CHATTANOOGA"		0		0 - 230		

EXPLANATION

LIMESTONE		SAND EMBEDDED OOLITIC	SHALE		"OOLITIC" HEMATITE
DOLOMITE		CHERTY GLAUCONITIC	SILTSTONE-SANDSTONE		DOLOMITIC

Figure 2. General Columnar Section for Nebraska.

terminology (Figure 2) is recommended for use in Nebraska. However, the basic concept of lithostratigraphic units should be maintained so that, as more precise correlations are available elsewhere, revisions in classification can be applied in Nebraska.

Formational terminology as applied to the Meramecian and Osagean series is in general agreement in adjacent states. The terminology applied to the Iowa outcrop areas of the Kinderhookian Series, however, differs from that applied to the Missouri outcrop areas. The most complete development of the Kinderhookian formations occurs in the subsurface of eastern Nebraska and western Iowa. It was decided that the outcrop terminology in north-central and eastern Iowa nearest this development should be utilized in Nebraska. The Missouri terms, Chouteau Group and Compton formation are included in parentheses in order that the apparent equivalencies are understood.

Mississippian rocks occur in Nebraska in three principal areas (Plate III): approximately the eastern one-third of the state, southwestern Nebraska (Chase, Hayes, Dundy, and Hitchcock counties), and northwestern Nebraska (Sioux and Dawes counties). The most complete development occurs in extreme southeastern Nebraska in Richardson and Nemaha counties (Figure 3). In these counties the limestones and dolomites of the Mississippian (post-Boice) exceed 200 feet in thickness (Figure 4) with all formations represented. The configuration of the top of the Mississippian for this area is shown in Figure 5. The stratigraphy of the Mississippian of eastern Nebraska, where the greatest development occurs, is discussed first and is followed by a discussion of the Mississippian stratigraphy of southwestern and northwestern Nebraska.

ROCKS PREVIOUSLY CLASSIFIED AS DEVONIAN OR MISSISSIPPIAN

"Chattanooga Shale" (Unit 0)

The "Chattanooga" is the shale interval overlying limestones and dolomites of unquestioned Devonian age and underlying the Boice and the Hampton (Chouteau). It is classified as Devonian for the purposes of this report and is equivalent to the interval classified as Devonian or Mississippian in earlier reports.

Distribution and Thickness. The "Chattanooga" is recognized only in the Forest City Basin of eastern Nebraska but is reported to be present on the west side of the Nemaha anticline in Kansas and may extend northward across the state line into Nuckolls County, Nebraska, but no wells have been drilled in this part of Nebraska to date. The area in which the "Chattanooga" was deposited is uncertain because of truncation, but the "Chattanooga" probably extended into at least the southern portion of central Nebraska. Present distribution in Ne-

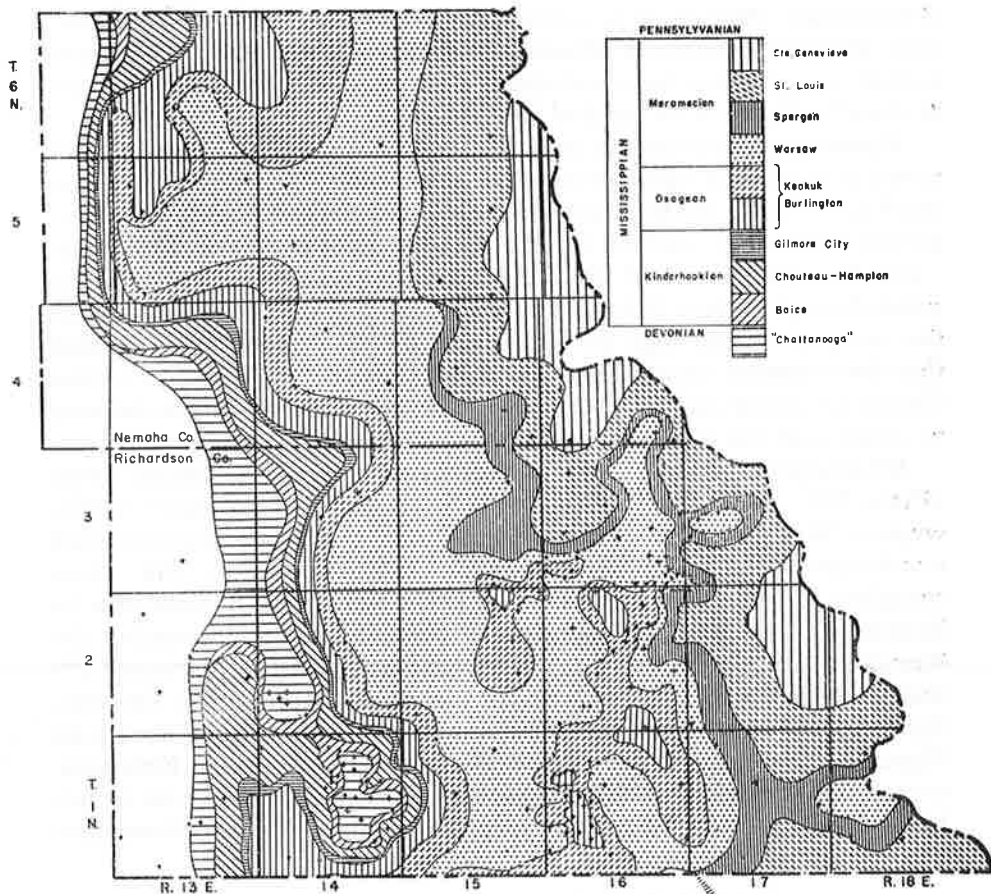


Figure 3. Distribution of Mississippian Formations and "Chattanooga" in South-eastern Nebraska.

braska is confined to the easternmost tier of counties and limited to the west by truncation along the post-Mississippian Nemaha anticline. Thickness of this lithologic unit increases southward from the zero edge in Washington County to 60 feet in Douglas County and over 230 feet in Richardson County. An isopachous map for the "Chattanooga" in Richardson and Nemaha counties is shown in Figure 6.

Lithology. The "Chattanooga" consists principally of gray to gray-green, finely micaceous shale. Some dark gray shale has been noted in the basal portion in local areas in Richardson County. Lenses of argillaceous dolomite are present up to 50 feet above the base of the unit in northeastern Richardson County and become more prominent in areas to the north and northeast. Also in northeastern Richardson County, zones of limonite pellets are present 100 to 150 feet above the base. No definite basal sand of Meisner-Sylamore age has been noted

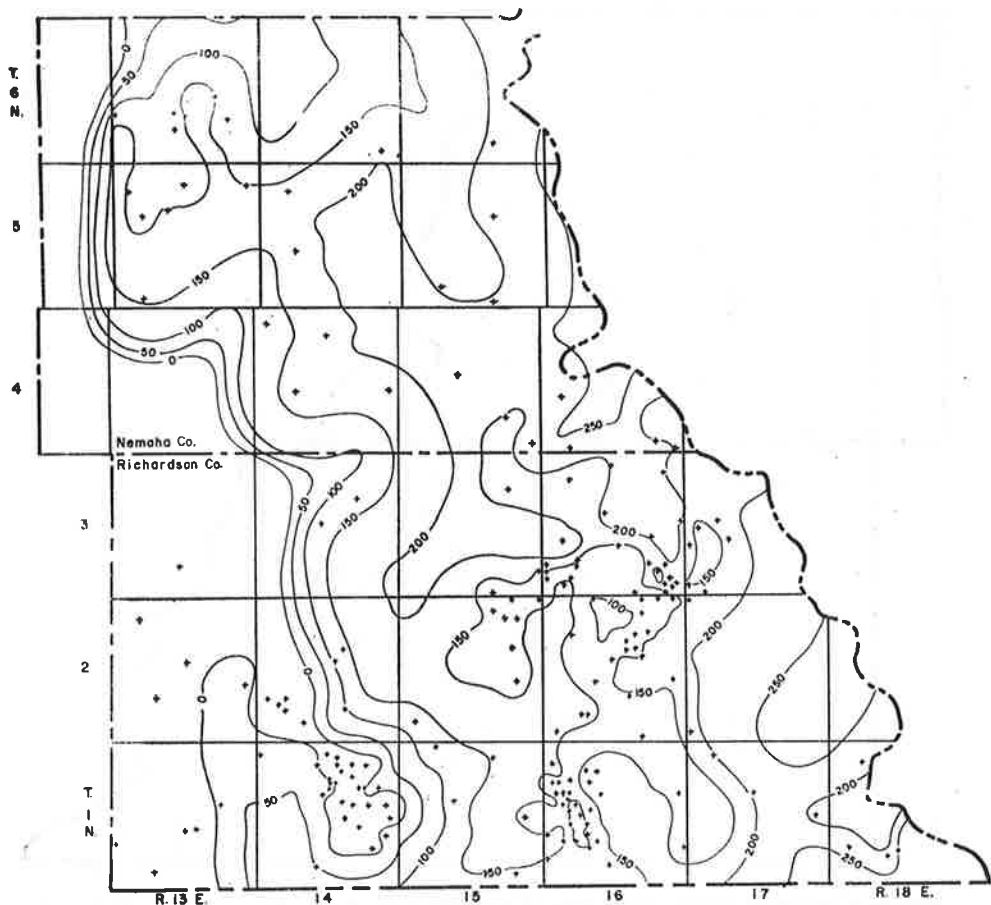


Figure 4. Isopachous Map of Mississippian Limestones and Dolomites (post-Boice Mississippian) in Southeastern Nebraska. Contour Interval 50 feet.

although some cores of the upper Devonian limestones and dolomites have contained scattered sand grains. The uppermost portion of the "Chattanooga" in southeastern Nebraska is characterized by a zone up to 20 feet thick which grades from an argillaceous dolomite to a dolomitic limestone.

A zone of red shale with included "oolitic" hematite immediately overlies typical "Chattanooga" in southeastern Nebraska. This zone is probably the result of weathering after "Chattanooga" deposition.

Stratigraphic Relations. The "Chattanooga," as lithologically defined, is overlain in Nebraska by limestones and dolomites of Devonian age. As the "Chattanooga" is traced northward its lower contact is gradational with these underlying beds; still farther north the "Chattanooga" seems to grade into still younger Devonian limestones and

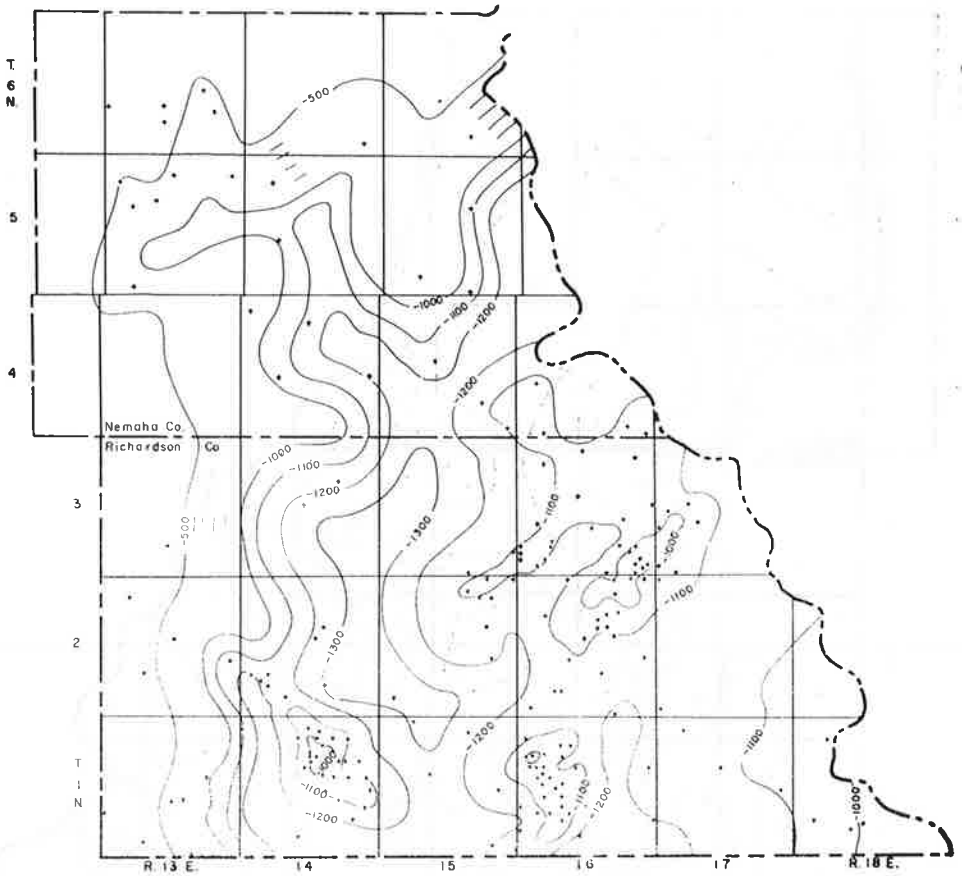


Figure 5. Configuration of the Top of the Mississippian in Southeastern Nebraska. Contour Interval 100 feet. Datum—Mean Sea Level.

dolomites. In the southern portion of eastern Nebraska, the “Chattanooga” is overlain by a red shale—“oolitic” hematite zone which has been included in the Boice (Reed, 1946). To the north, however, the Boice is absent and the “Chattanooga” is overlain by the Hampton (Chouteau).

The lower portion of the “Chattanooga,” which is present as a lithologic unit only in southeastern Nebraska, is equivalent to the lower portion of the Chattanooga Shale in Kansas. It is equivalent to the lower portion of the “Kinderhook” Shale in northwestern Missouri and to the Grassy Creek Shale of northeastern Missouri. This lower portion of the “Chattanooga” is probably the age equivalent of some of the upper Devonian limestones present in central and northern Iowa.

The upper portion of the “Chattanooga” in Nebraska, including the dolomitic part, is equivalent to the upper portion of the Chattanooga

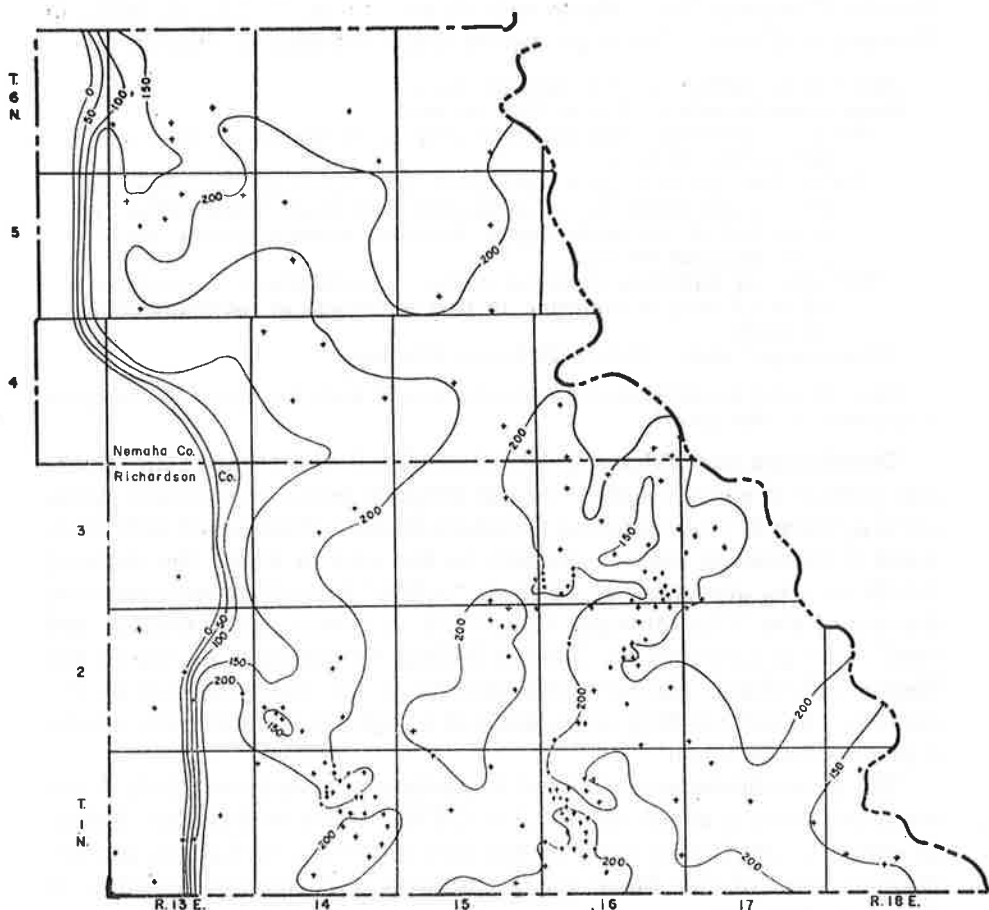


Figure 6. Isopachous Map of "Chattanooga" in Southeastern Nebraska, Contour Interval 50 feet.

Shale in Kansas of Lee's report (1956) where he excluded the Boice Shale and to the upper portion of the "Kinderhook" Shale of northwestern Missouri. This upper portion correlates with the Maple Mill Shale of Iowa and its equivalent in northeastern Missouri, the Saver-ton Shale (Collinson, 1961). The upper dolomitic limestone of southeastern Nebraska is considered to be the age and environmental equivalent of the Louisiana Limestone of northeastern Missouri.

STRATIGRAPHY OF MISSISSIPPIAN SYSTEM

Kinderhookian Series

Boice Shale Formation (Unit 1)

The Boice Shale was defined by Reed (1946) from the Pawnee

Royalty Company No. 1 Boice well in section 18, T. 1 N., R. 16 E., in Richardson County. The type section was described as follows:

Chouteau limestone 1972 to 2041 (69 feet)

Boice shale formation 2031 to 2072 (41 feet)

Siltstone-sandstone, medium dark gray to brownish, calcareous, in part pyritic (2 feet)¹

Shale, dark greenish gray, laminated, with some pyritic areas and some carbonaceous areas, calcareous, with black "Sporangites" in lower 10 feet, interbeds of gray, dolomitic siltstone to silty, argillaceous dolomite (19 feet)

Hematite, in flattened, discoidal oolites or concretions, varying from 0.2 to 1.5 mm. in diameter, in part embedded in rouge-red shale (10 feet)

"Chattanooga" shale 2072 to 2276 feet (204 feet)

¹This interval is excluded from the Boice and included with the Hampton (Chouteau) in this report.

Distribution and Thickness. The Boice Shale is present in the southern portion of eastern Nebraska and extends into southwestern Iowa, northwestern Missouri and northeastern Kansas. Southward and westward in Kansas, in areas peripheral to the area in which the shale of the Boice was deposited, a red shale-"oolitic" hematite zone occurs at the top of the "Chattanooga" (Lee, 1956). A similar occurrence of red "soil" zone is described by Harris (1947) in central Iowa on top of the Maple Mill Shale. The hematitic portion of the Boice as well as the red zones in surrounding areas, suggest a regional unconformity above typical "Chattanooga."

The Boice thickens southward in southeastern Nebraska to a maximum thickness of about 100 feet. Lee (1956) reports thicknesses slightly in excess of 100 feet in areas in extreme northeastern Kansas. An isopachous map of the Boice for Richardson and Nemaha counties is shown in Figure 7.

Lithology. The general lithology of the Boice as described in the type section is typical of the Boice wherever observed by the writer. The main shale body of the Boice is similar to that of the underlying "Chattanooga" although it is usually dolomitic and often contains interbeds of dolomitic siltstone. In many wells there is a zone at the top of the main shale body of the Boice, which contains limonite "oolites" of identical size and shape (flattened, discoidal "oolites") to the red hematite "oolites" occurring at the base of the unit.

Stratigraphic Relations. The uppermost zone of calcareous siltstone-sandstone described in the type section is herewith excluded from the Boice and referred to the basal zone of the Hampton (Chouteau). A similar clastic zone occurs at the base of the Hampton (Chouteau) in areas where both the Boice and the "Chattanooga" are absent and probably represents the initial deposit of the widespread Kinderhookian limestone and dolomite sequence. In this report the siltstone-sand-

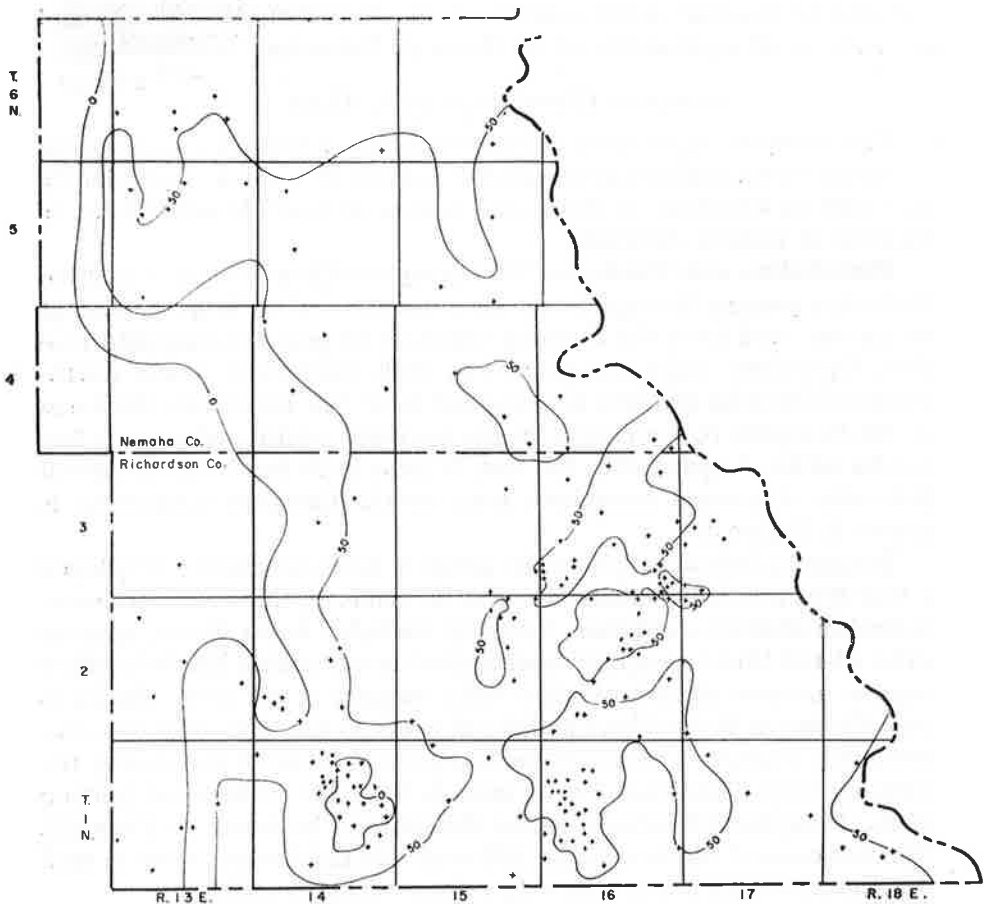


Figure 7. Isopachous Map of Boice Shale in Southeastern Nebraska, Contour Interval 50 feet.

stone has been designated as an unnamed basal subdivision of the Hampton (Chouteau). The name Boice has been utilized in Kansas by Lee (1956) and in northwestern Missouri by Koenig (1961). The Boice overlies and has much the same general distributional pattern as the dolomitic zone in the upper portion of the "Chattanooga." The Boice as used in this report is overlain by the unnamed calcareous siltstone-sandstone zone now referred to the basal portion of the Hampton (Chouteau).

A similar sequence of lithologies is apparent in the Iowa-Illinois-Missouri junction area. There, a shale (Hannibal) is underlain by a limestone of limited distribution (Louisiana) and is separated from the overlying Chouteau by a zone of siltstone-sandstone (Collinson, 1961) (Workman and Gillette, 1956). It seems quite probable that the Hanni-

bal and its possible clastic equivalent, the English River, are age and environmental equivalents of the Boice of Nebraska.

Hampton (Chouteau) Group (Unit 2)

The Hampton (Chouteau) is the dominantly limestone and dolomite sequence which makes up the greater portion of what was previously classified as Chouteau in Nebraska. A general fourfold subdivision is possible in eastern Nebraska.

Distribution and Thickness. The Hampton (Chouteau) or a portion thereof, is present throughout the eastern one-third of Nebraska except where removed from the Nemaha anticline by post-Mississippian erosion. Equivalent rocks are present in both southwestern and northwestern Nebraska and will be discussed later. The maximum thickness of the Hampton (Chouteau) is in the northern portion of eastern Nebraska where it approaches 200 feet. It thins to 60 feet in southeastern Nebraska. A general isopachous map for the Hampton (Chouteau) is shown in Figure 8.

In eastern Nebraska where the group is most completely developed a four-fold lithologic subdivision can be made. In this area, the lower dolomitic siltstone-sandstone, formerly included in the Boice, appears to be a basal time-transgressive deposit of an expanding Kinderhookian marine invasion since it overlies rocks ranging in age from Mississippian (Boice) to Ordovician (Viola) and towards the west, underlies progressively younger portions of the Hampton (Chouteau) and finally the Gilmore City. This basal clastic zone is the most widespread portion of the Hampton (Chouteau) whose distribution is shown on Plate III. The thickness of this basal zone, although difficult to determine in well samples, averages about 5 feet, as evidenced by electric logs.

The Chapin (Compton) formation appears to be confined to the eastern margin of Nebraska. The thickness ranges from 10 to 20 feet but measurement is complicated by facies variations in the overlying Maynes Creek (Wassonville).¹

The Maynes Creek (Wassonville) formation is present throughout extreme eastern Nebraska and may be present in the eastern portion of the Central Nebraska basin. This unit ranges from 35 to 50 feet thick in southeastern Nebraska. In northeastern Nebraska where the Hampton (Chouteau) reaches its maximum thickness, the Maynes Creek (Wassonville) and the overlying Eagle City-Iowa Falls formations cannot be separated but a combined thickness exceeding 150 feet is present, probably largely representing the Eagle City-Iowa Falls.

The upper subdivision of the Hampton (Chouteau), the Eagle City-Iowa Falls formation, is present throughout the eastern one-third of

¹ The Wassonville is the better known, eastern Iowa equivalent of the Maynes Creek of the type section of the Hampton in north central Iowa.

NEBRASKA

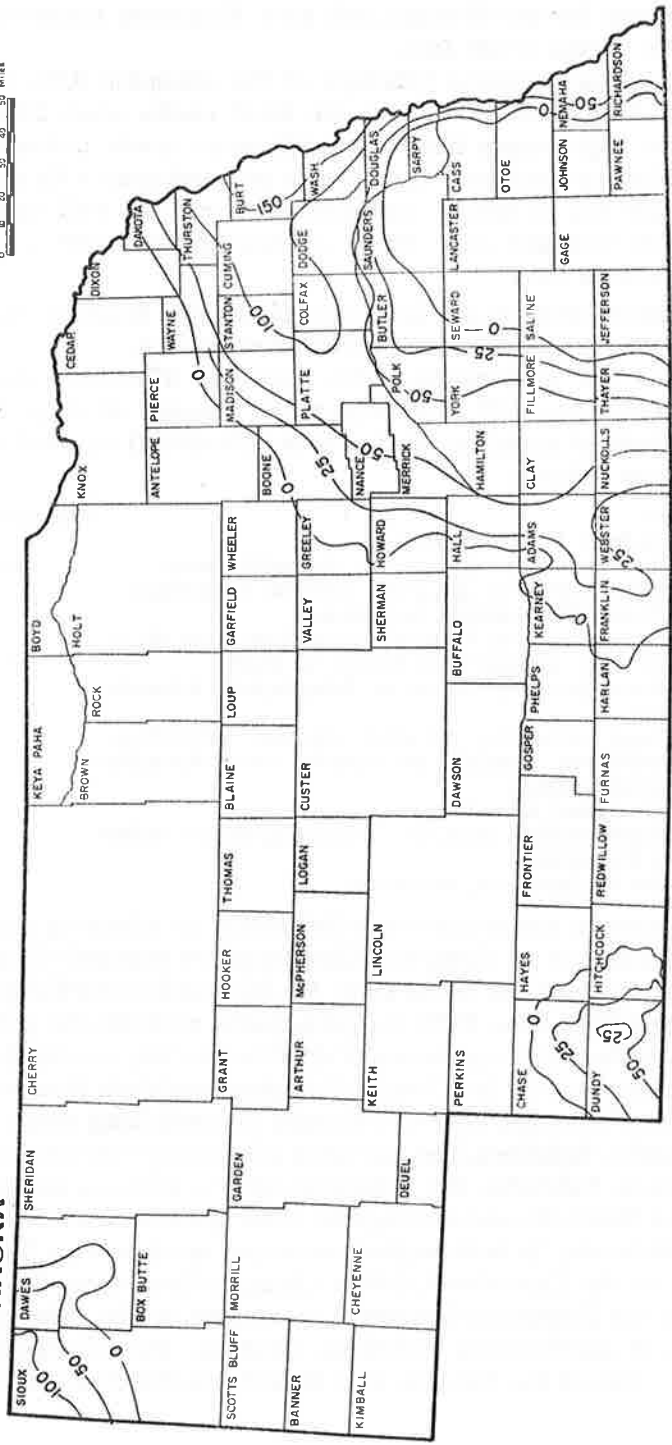


Figure 8. Isopachous Map of Hampton (Chouteau) Group (Unit 2). Contour Interval 50 feet (with supplementary 25 foot intervals).

Nebraska except for the Nemaha arch area. Maximum thicknesses observed are in excess of 100 feet.

Lithology. The dominant lithology of the Hampton (Chouteau) is limestone and dolomite except for the basal clastic zone. This basal transgressive zone ranges from an argillaceous, sandy dolomite to a dolomitic siltstone-sandstone. It is gray to greenish gray with a speckled appearance due to minute inclusions of pyrite. In well samples it may be easily mistaken for a finely sucrosic dolomite unless checked with hydrochloric acid.

The Chapin (Compton) is a light to medium gray, fossiliferous, dense to semigranular limestone which is commonly oolitic.

The upper two subdivisions of the Hampton (Chouteau) are limestones and dolomites with only very minor amounts of shale. A composite lithologic description of Hampton (Chouteau) in southeastern Nebraska is as follows:

Formation	Thickness (feet)
Eagle City-Iowa Falls formation	
Limestone, tan-gray, lithographic, dolomitic zones	0 - 10
Limestone, dolomitic, tan-gray, mottled, crystalline,	10
Maynes Creek (Wassonville) formation	
Limestone, dolomitic, tan-gray, crystalline, with chert, light gray, tan speckled, blocky to dead	5 - 10
Limestone, tan-gray, dense to lithographic, dolomite zones	10 - 15
Limestone, dolomitic, tan-gray, mottled, crystalline, fossiliferous, possibly glauconitic, more dolomitic in lower portion	20
Chapin (Compton) formation	
Limestone, medium gray, dense to semigranular, oolitic	10
Unnamed formation	
Siltstone to Sandstone, dolomitic	± 5

In extreme eastern and southeastern Nebraska and adjoining areas, the upper three zones of the Hampton (Chouteau) are primarily limestone. In the remaining portions of the state, the Maynes Creek (Wassonville) and the Eagle City-Iowa Falls are principally granoblastic dolomites and differentiated by the presence of chert in the Maynes Creek (Wassonville). Limestones of the Chapin (Compton) maintain their medium gray color and lithologic type in Nebraska and adjoining areas.

Stratigraphic Relations. The Hampton (Chouteau) overlies the Boice in southeastern Nebraska, the "Chattanooga" in extreme eastern and northeastern Nebraska and overlaps on rocks of Ordovician (Viola) age in central Nebraska. In both southwestern and northwestern Nebraska it overlaps on the Cambrian LaMotte (Reagan) Sandstone. Over most of the state, the Hampton (Chouteau) is overlain by the Gilmore City. In portions of southeastern Nebraska, however, the Gilmore City is absent and rocks of the Osagean rest directly on the Hampton (Chouteau).

All of the subdivisions of Hampton (Chouteau) have lithologic and stratigraphic equivalents in surrounding areas. The basal dolomitic siltstone-sandstone is equivalent to a thin blanket-type sandstone described by Koenig (1961) as underlying the Chouteau in central and southwestern Missouri. This unit has been variously referred to as the Bushberg or Sylamore. A siltstone-sandstone zone has also been recognized underlying the Chouteau in eastern Missouri and western Illinois (Workman and Gillette, 1956) and is probably equivalent to some portion of the English River Siltstone in southeastern Iowa. This basal clastic zone has not been recognized in Kansas but is undoubtedly present in, at least, the northeastern corner.

The Chapin (Compton) is equivalent to the Chapin Limestone in central Iowa and to the North Hill "Group" of Workman and Gillette (1956) in southeastern Iowa. In Missouri and Kansas the Chapin (Compton) is equivalent to the Compton Limestone of Clark and Beveridge (1952) and the Chouteau (restricted) of Moore (1928) as used by Lee (1956).

The Maynes Creek (Wassonville) is equivalent to the Maynes Creek of central Iowa, the Wassonville of southeastern Iowa, the Sedalia of central Missouri and the lower member of the Sedalia of Kansas.

The Eagle City-Iowa Falls is equivalent to the Eagle City-Iowa Falls of central Iowa, is absent in southeastern Iowa and central Missouri and is equivalent to the upper member of the Sedalia of Kansas.

Gilmore City Formation (Unit 3)

The Gilmore City formation is the persistent limestone overlying the dolomitic limestones of the Hampton (Chouteau) and underlying the dolomites of the Osage Group.

Distribution and Thickness. The Gilmore City is the most extensive Mississippian unit in Nebraska. It is present in all portions of the state where Mississippian is preserved except for local areas in southeastern Nebraska. The Gilmore City overlaps the Hampton (Chouteau) in the northern portion of central Nebraska (Plate III) and trends northward toward South Dakota.

The Gilmore City formation varies greatly in thickness in the state because it is the uppermost Mississippian over a wide area and thus has undergone extensive post-Mississippian erosion. In extreme eastern Nebraska where overlain by younger Mississippian, thicknesses range from 15 feet in the southeast up to 50 feet in the northeast. In central Nebraska, thicknesses of as much as 85 feet have been observed even though unconformably overlain by Pennsylvanian rocks. In the southern portion of central Nebraska where overlying Osagean beds are present, a maximum of 75 feet of Gilmore City is present.

Lithology. The white to light gray limestones of the Gilmore City

formation contrast sharply with the tan limestones and dolomites of both the overlying Osagean and the underlying Hampton (Chouteau). Only in isolated instances does the Gilmore City lose its light color and most of these color changes should probably be attributed to secondary processes.

In its type locality in central Iowa, the Gilmore City Limestone is oolitic and in part dolomitic. In the subsurface of Nebraska this limestone is usually sublithographic to granular in texture with only very rare occurrences of dolomite. Oolitic zones are sporadic both horizontally and vertically. When present, they make up a large percentage of the limestone and are commonly the same color as the surrounding matrix. In some wells the oolites are loosely cemented and appear as free oolites.

In several wells in northeastern Nebraska, a crystalline, fossiliferous, "hashy" textured limestone similar to the higher, upper Keokuk-Burlington was noted in the Gilmore City interval. No chert was definitely observed in the Gilmore City although much chert is commonly present in the samples, probably carried over from the overlying Osagean beds.

Stratigraphic Relations. Due to its distinctive lithology, the Gilmore City is an important marker bed in the subsurface of Nebraska even though it has often been neglected in regional correlations due to its limited exposure in outcrop. The Gilmore City has been recognized in northern and western Kansas, Nebraska, western Iowa and northwestern Missouri. The Chapin (Compton) in southwestern Iowa and northwestern Missouri was erroneously correlated with the Gilmore City by Laudon (1933) and this caused some confusion implying absence of Hampton (Chouteau) in this area and thickening of the Gilmore City limestone. Later reports (Wells, 1960) have mistakenly identified the Chapin (Compton) limestone as the Gilmore City and thus placed the Gilmore City below the Chouteau. In regional studies the Gilmore City is a persistent limestone that overlies the dolomites and dolomitic limestones of the Hampton (Chouteau) and underlies the dolomites and dolomitic limestones of the Osagean.

Osagean Series

Lower Keokuk-Burlington Formation (Unit 4)

The lower Keokuk-Burlington in this report is the lower dolomitic portion of what has been formerly termed the undifferentiated Keokuk-Burlington in Nebraska. It is the oldest bed of Osagean age present in Nebraska. The structure of the base of the Osagean in southeastern Nebraska is shown in Figure 9.

Distribution and Thickness. The lower Keokuk-Burlington is the most extensive post-Kinderhookian Mississippian in Nebraska (Plate

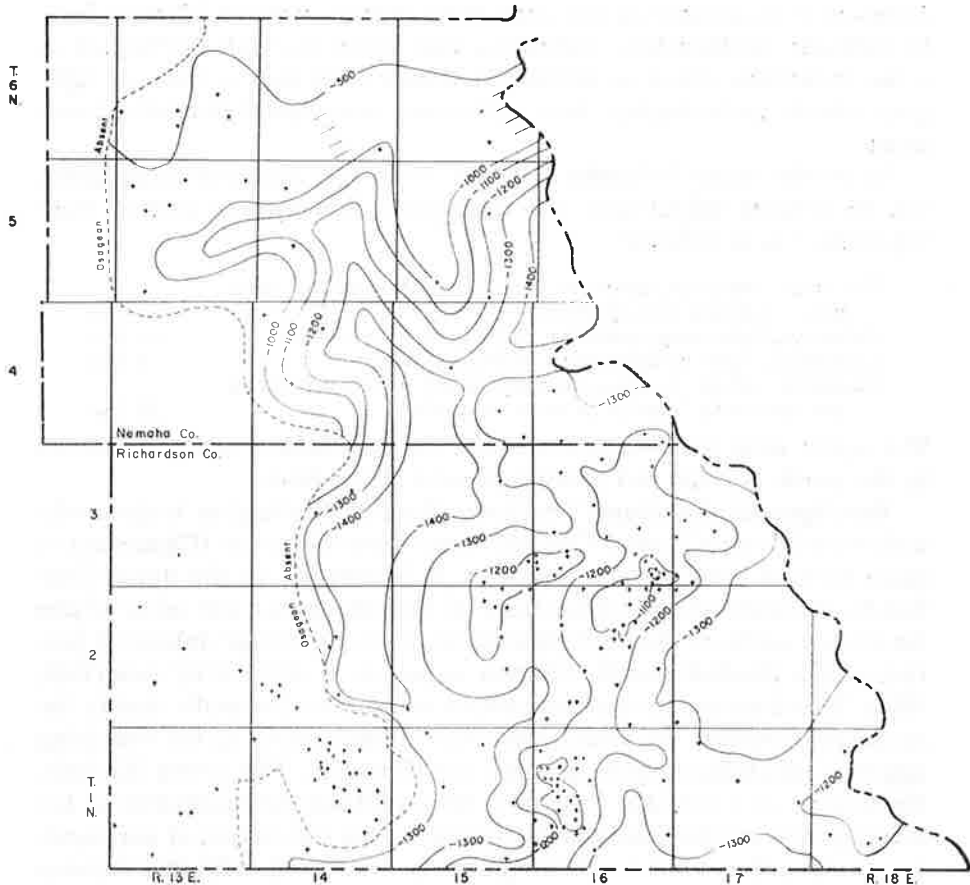


Figure 9. Structural Contour Map of Base of Osagean in Southeastern Nebraska. Contour Interval 100 feet. Datum—Mean Sea Level.

III). It is present in eastern and northeastern Nebraska but has been removed from the Nemaha anticline. It is also present in the southern portion of central Nebraska and equivalent beds are present in southwestern Nebraska. This distribution suggests that this unit was deposited throughout southern and eastern Nebraska.

The thickest deposits of the lower Keokuk-Burlington in the eastern one-third of the state lie along the subcrop edges in south-central and northeastern Nebraska. Here, where overlain by younger Mississippian, a maximum of 50 feet is present. The thickness decreases to the east and only 35 to 40 feet are present along the eastern border of the state.

Lithology. The lower Keokuk-Burlington is dominantly a dolomite in all of its occurrences in the state. In southwestern Nebraska, as described later, this interval may be subdivided. In south-central Nebraska this unit is a gray to tan-gray, dense to very finely crystalline

dolomite with glauconite and gray to blue-gray, mottled, blocky chert. In extreme northeastern Nebraska, the lower Keokuk-Burlington is a tan to brown, dense to sucrosic dolomite with only a trace of light gray, blocky to dead-gray chert with minor amounts of dolomitic limestone.

In southeastern Nebraska a typical lithologic sequence is apparent but no definite subdivision was attempted. A composite section from top to base is as follows:

Dolomite, tan-gray, dense to very finely crystalline, with gray, mottled, blocky chert	10 feet
Dolomite, light gray, granular, with gray, blocky chert	15 feet
Limestone, light medium gray, sublithographic	5 feet
Dolomite, tan-gray, dense to very finely crystalline, with medium gray, blocky to dead-gray chert	15 feet

The upper zone tends to thin and the lower dolomite tends to thicken to the south. A shale bed is often present at the base.

Stratigraphic Relations. The lower Keokuk-Burlington is generally underlain by the Gilmore City but rests upon Hampton (Chouteau) in some parts of southeastern Nebraska. It is overlain by the upper Keokuk-Burlington except where beds of Pennsylvanian age occur above its eroded surface. This unit is equivalent to the lower dolomitic portion of the Keokuk and Burlington sequence as defined by Lee (1944, 1956). This dominantly dolomite phase extends to the south, but to the southeast (towards the Ozark area) limestones similar to the overlying upper Keokuk-Burlington become predominant. The lower Keokuk-Burlington of Nebraska appears to be the lithologic equivalent of the lower portion of the Keokuk-Burlington in the subsurface of surrounding areas and cannot be more precisely correlated with the outcrop areas until the interformational relationship of the Osagean in the outcrop areas is more clearly understood. However, in view of the transgressive relationships of faunal zones within the Burlington as demonstrated by Laudon (1937) and Kaiser (1950), it seems probable that the lower Keokuk-Burlington of Nebraska may be equivalent to some portion of the middle Burlington of the outcrop area.

Upper Keokuk-Burlington Formation (Unit 5)

The upper Keokuk-Burlington in this report is equivalent to the upper portion of the Keokuk-Burlington of other states and to the Warsaw of Condra and Reed (1943).

Distribution and Thickness. The upper Keokuk-Burlington is present in northeastern, eastern, south-central and southwestern Nebraska (Plate III). It reaches its maximum development in south-central and northeastern Nebraska where thicknesses of 60 to 65 feet have been recorded. Over much of these areas this unit is the youngest Mississippian present and post-Mississippian erosion has resulted in a great

range in thickness. In southeastern Nebraska, thicknesses range from 30 feet in central Richardson and Nemaha counties up to 40 feet along the eastern margins of the state.

Lithology. In both south-central and northeastern Nebraska, the upper Keokuk-Burlington is a white to light gray, mottled, dense to medium crystalline and pseudoolitic limestone with a trace of glauconite. A sublithographic zone is often present near the base. In northeastern Nebraska the limestone contains white, blocky to dead-gray chert while in south-central Nebraska the chert content increases and consists of gray, mottled, blocky chert.

The lithology in southeastern Nebraska is quite similar to the preceding areas and consists of a light gray, dense to medium crystalline, pseudoolitic limestone with a trace of glauconite. Some mottling of the limestone is present in the lower portion. Chert is quite common and is gray, tan and black speckled and blocky.

Stratigraphic Relations. The upper Keokuk-Burlington is underlain by the lower Keokuk-Burlington and overlain by the Warsaw and in other areas by beds of Pennsylvanian age. This limestone is equivalent in Kansas and northwestern Missouri to the upper part of the Keokuk and Burlington. In Iowa it is equivalent to the upper Burlington of Harris (1947).

Meramecian Series

Warsaw Formation (Unit 6)

The Warsaw of this report is the limestone, limestone and dolomite and dolomite overlying the limestones of the upper Keokuk-Burlington and underlying the Spergen and younger rocks.

Distribution and Thickness. The Warsaw probably had much the same original distribution as the underlying Osagean units but it has been greatly restricted in distribution by post-Mississippian erosion (Plate III). The Warsaw in Nebraska is more closely related physically to the underlying Osagean than to the more restricted overlying Meramecian. The Warsaw was observed in extreme south-central Nebraska in only one well. Here, 15 feet of limestone overlies an apparently complete thickness of the upper Keokuk-Burlington. Similar thin occurrences were noted in extreme northeastern Nebraska. In both instances, equivalent rocks are developed in the immediately adjacent areas of Kansas and Iowa. There is 50 feet of Warsaw present in the southeastern corner of Richardson County, thinning northward to 30 feet in Nemaha County with a facies change.

Lithology. The Warsaw is typically a tan-gray, dense to finely crystalline limestone, in part dolomitic with tan-gray, mottled, fossiliferous chert, in south-central Nebraska and southward into Kansas. A similar limestone lithology is present in northwestern Missouri. The upper

portion of the Warsaw in extreme southeastern Nebraska is limestone, as described above. However, the lower portion is a tan to brown, dense to sucrosic dolomite with tan-gray, mottled chert. To the north in Nemaha County, the Warsaw becomes entirely a dolomite due probably to a thinning and facies change of the upper limestone. Similar dolomites are present in northeastern Nebraska and eastward into Iowa.

The limestone phase of the Warsaw is distinguished from the limestones of the upper Keokuk-Burlington by the tan-gray rather than gray color of both the limestone and chert of the Warsaw and by the tan mottling of this chert rather than the speckled nature of the cherts of the upper Keokuk-Burlington.

Stratigraphic Relations. The Warsaw overlies the upper Keokuk-Burlington. It underlies the Spergen, St. Louis and rocks of Pennsylvanian age. The Warsaw is equivalent to what has been called Warsaw in Kansas by Lee, although changed editorially to "Warsaw" by Moore who judged these rocks to be wholly younger than the type Warsaw (Lee, 1956). The Warsaw is equivalent to the Warsaw and lower Warsaw of northwestern Missouri. Eastward into Iowa, it is at least in part equivalent to the Keokuk of Harris (1947) and Rasmussen (1957). Here again as with the Osagean units, Nebraska terminology must await definite subsurface correlation in surrounding areas. It is considered preferable to use the term Warsaw at the present time.

Spergen Formation (Unit 7)

The Spergen of this report is the dolomite present in southeastern Nebraska between the dolomite and limestone of the Warsaw and the limestone of the St. Louis.

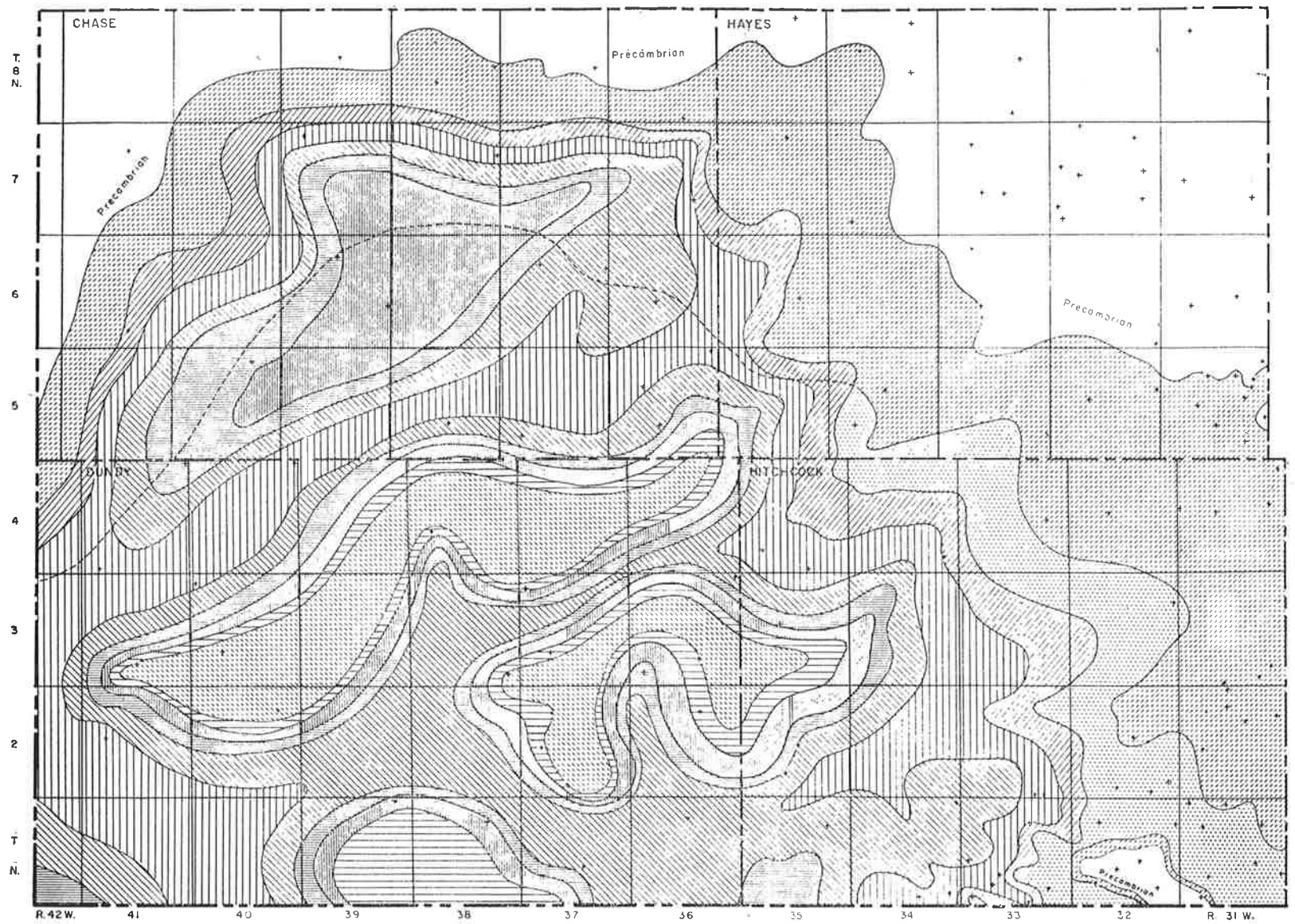
Distribution and Thickness. The Spergen is present only in eastern Richardson and southeastern Nemaha counties (Figure 3). It thins rapidly to the north in this area and pinches out under the St. Louis. Thicknesses decrease northward from 35 feet in southern Richardson to 20 feet in southern Nemaha and to zero in central Nemaha County.

Lithology. The Spergen in Nebraska is a light tan-gray, very finely crystalline dolomite with varying amounts of orange and gray, chalcidonic to conchoidal chert. The Spergen's lighter color and distinctive chert content distinguish it from the dolomite phase of the underlying Warsaw.

Stratigraphic Relations. The Spergen is underlain by dolomites and limestones of the Warsaw and overlain by the St. Louis limestone. The Spergen is equivalent to the Spergen of Kansas and Iowa and the Salem (Spergen) and upper Warsaw of northwestern Missouri.

St. Louis Formation (Unit 8)

The St. Louis is the dominantly limestone unit overlying the



EXPLANATION

Control Point

Bonneterre Zero Line

MISSISSIPPIAN

- Osagean
 - Upper Keokuk-Burlington
 - Lower Keokuk-Burlington
 - Upper
 - Upper Middle
 - Lower Middle
 - Lower
- Kinderhookian
 - Gilmora City
 - Chouteau - Hampton

CAMBRIAN

- Bonneterre
- LaMotte (Reagan)

PRECAMBRIAN

FIGURE 10

DISTRIBUTION OF THE PRE-PENNSYLVANIAN IN SOUTHWESTERN NEBRASKA



Spergen and Warsaw in southeastern Nebraska. Over most of the eastern portion of this area it is the youngest Mississippian preserved.

Distribution and Thickness. The St. Louis is present only in southeastern Nebraska (Figure 3). It is extensively developed in surrounding states. Thicknesses vary due to its eroded upper surface with a maximum of 30 feet noted in east-central Nemaha County.

Lithology. The St. Louis is a gray to tan-gray, sublithographic to lithographic limestone with occasional finely crystalline zones. It often contains oolitic zones and usually a trace of very fine grained sand. A trace of pink, chalcedonic chert was present in several wells.

Stratigraphic Relations. The St. Louis overlies Spergen and Warsaw and underlies the Ste. Genevieve and Pennsylvanian beds. It is widely recognized in Iowa, Missouri and northeastern Kansas.

Ste. Genevieve Formation (Unit 9)

The Ste. Genevieve in this report is the sandy limestone overlying the St. Louis in southeastern Nebraska.

Distribution and Thickness. The Ste. Genevieve is present only along the eastern margin of Nemaha and Richardson counties (Figure 3). It is extensively developed in northwestern Missouri. A maximum thickness of 25 feet was observed in southeastern Nebraska.

Lithology. The Ste. Genevieve in Nebraska is a light gray, dense granular to very finely crystalline limestone with much very fine to fine grained sand. In northwestern Missouri where this unit becomes extremely sandy it is often difficult to distinguish the Ste. Genevieve from the overlying Pennsylvanian sands.

Stratigraphic Relations. The Ste. Genevieve is the youngest Mississippian present in Nebraska and overlies the St. Louis. It is stratigraphically equivalent to the Ste. Genevieve of Iowa, Missouri and Kansas.

MISSISSIPPICAN ROCKS IN SOUTHWESTERN NEBRASKA

The term southwestern Nebraska of this report includes the four counties of Dundy, Hitchcock, Chase, and Hayes (Figure 1). Because of the comparatively large number of wells drilled in these counties, southwestern Nebraska is one of the two areas in the state in which a relatively detailed stratigraphic succession of the Mississippian can be delineated. It has the further advantage of being a recently explored area with better preservation of samples and some type of electrical survey available for almost all the wells. This greatly facilitates lithologic subdivision of some of the larger units within the Mississippian.

The Cambridge arch separates southwestern Nebraska from the Central Nebraska (Salina) basin to the east (Figure 1). Pre-Pennsylvanian sediments are absent from the crest of this arch in Nebraska

(Plate III). On the eastern flank of the Cambridge arch the Mississippian overlaps from east to west, the Devonian, Silurian and Ordovician (Maquoketa) before being truncated by the basal Pennsylvanian unconformity. West of the arch in southwestern Nebraska, the Mississippian rests on Cambrian rocks. In the northern and northwestern portion of southwestern Nebraska, the Mississippian overlaps the depositional edge of the Bonneterre and rests on the LaMotte (Reagan) Sandstone (Figure 10). Thinning and facies changes in both the Mississippian and Cambrian show that, environmentally, deposition took place along a basin margin reflecting a high to the north and northwest.

Structurally, southwestern Nebraska lies in what has been called the northern extension of the Hugoton embayment. The structural pattern within southwestern Nebraska is complicated by the presence during the pre-Pennsylvanian of Precambrian "islands." The most notable of these Precambrian highs so far discovered lies in southern Hitchcock County as shown by the absence there of all pre-Pennsylvanian sediments. Similar basement highs have been discussed by Walters (1946) in Kansas. The present configuration of the top of the pre-Pennsylvanian is shown on Figure 11.

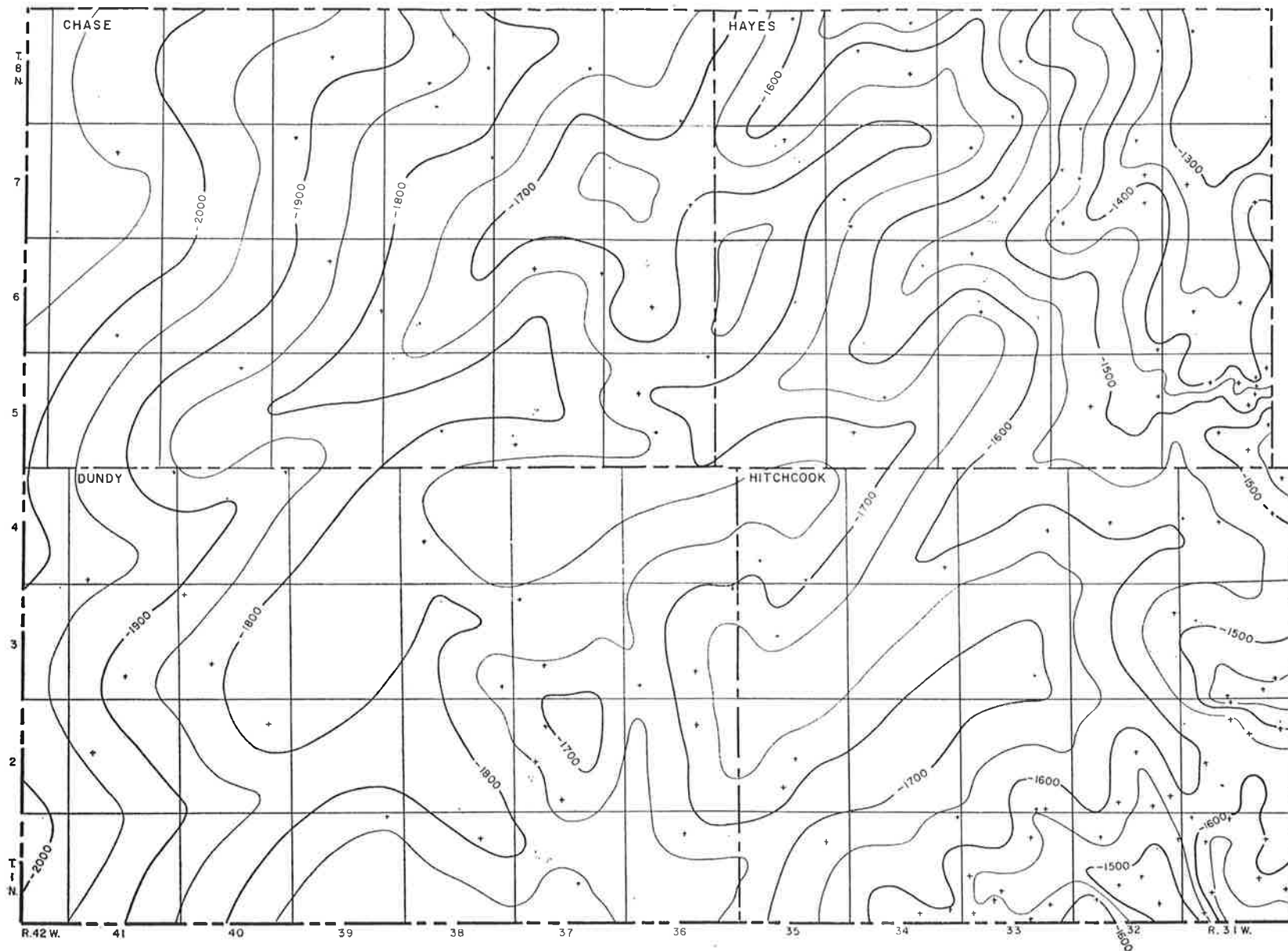
Southwestern Nebraska includes the northward termination of the Mississippian and Cambrian of the Hugoton embayment. The various lithologic subdivisions of the Mississippian in southwestern Nebraska can be correlated with the units present in the eastern portion of the state. The Hampton (Chouteau), Gilmore City and lower and upper Keokuk-Burlington are present. Because of the amount of control available, a fourfold division of the lower Keokuk-Burlington was possible. The electrical characteristics of the various units are shown in Figure 12.

Hampton (Chouteau) Group (Unit 2)

This unit does not have a specific lithologic correlation with beds in eastern Nebraska. However, because of its stratigraphic position under the distinct lithology of the Gilmore City and no demonstrable unconformity between the two, it is assigned to Hampton (Chouteau). The unconformity at its base in this area represents all of the Ordovician, the Silurian, the Devonian and probably the lowermost Mississippian.

Distribution and Thickness. The Hampton (Chouteau) is the most widely distributed Mississippian in this area (Figure 10). The thickness of the Hampton (Chouteau) ranges from 10 to 50 feet with a general thinning northward. Several seemingly anomalous thicknesses are present, possibly reflecting sinkholes in the underlying Bonneterre dolomites.

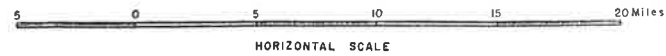
Lithology. In most of southwestern Nebraska, the Hampton (Chou-



EXPLANATION:
 + Control Point
 Contour Interval 50 Feet
 Datum Mean Sea Level

FIGURE II

CONFIGURATION OF THE BASE OF THE PENNSYLVANIAN IN SOUTHWESTERN NEBRASKA



ELECTRIC LOG FROM OHIO OIL CO. NO.1 CANNON C SW
NE SECTION 33 T.2 N., R.37W., DUNDY COUNTY

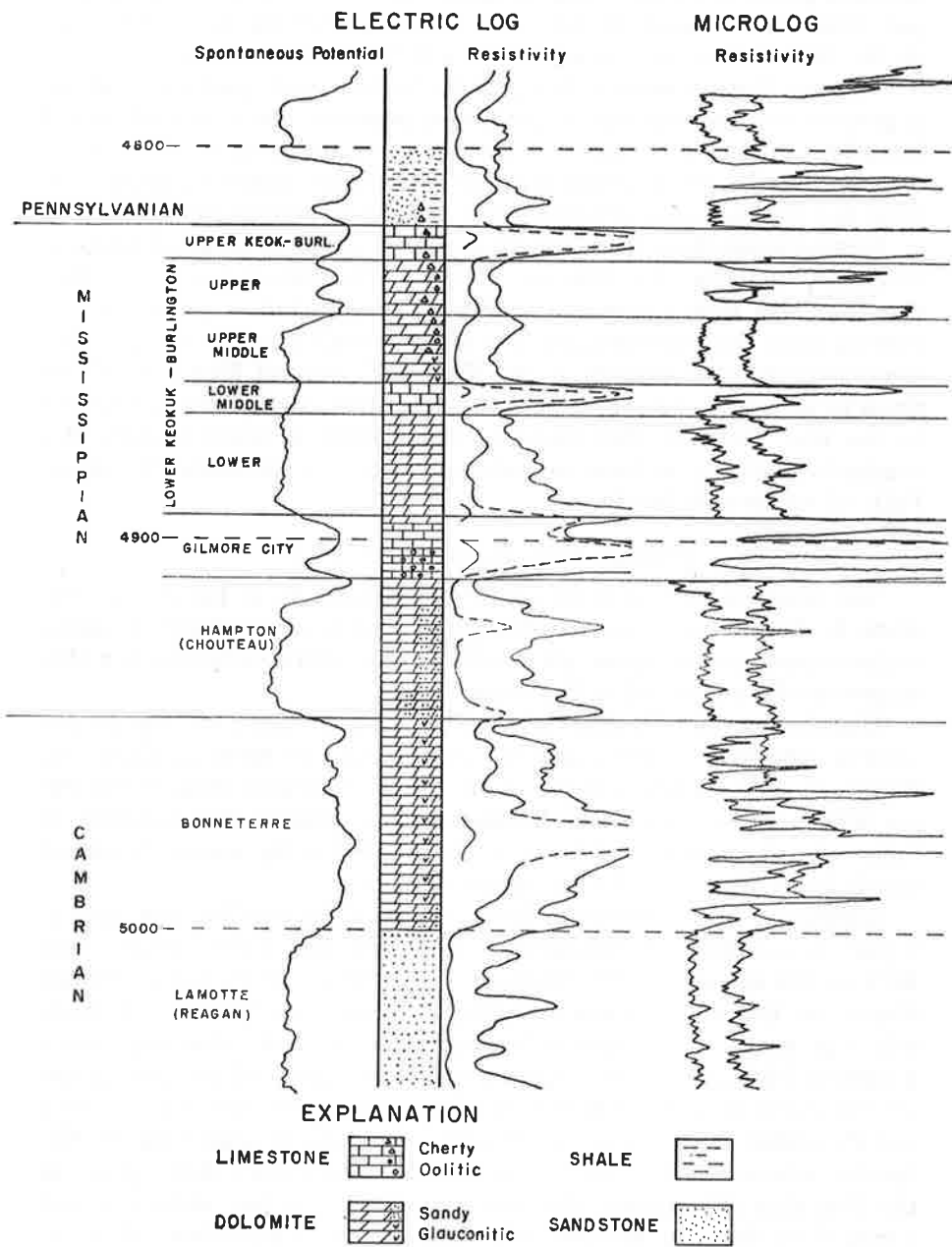


Figure 12. Electrical Characteristics of the Pre-Pennsylvanian Formations in Southwestern Nebraska.

teau) overlies a normal thickness of Bonneterre and is a gray to tan-gray, granoblastic dolomite with varying amounts of very fine to medium grained, rounded quartz sand. Occasionally there is a trace of pale green, waxy shale in the lower portion. Near the truncated edge of the Bonneterre and in areas of local thickening of the Hampton (Chouteau), the dolomite is tan-gray to brown; more green-gray shale is present and the unit has a speckled appearance due to disseminated inclusions of dark gray shale. In areas where the Hampton (Chouteau) directly overlies the LaMotte (Reagan) Sandstone, there is a gradation from the typical sandy dolomite into a lower dolomitic sandstone.

Stratigraphic Relations. The Hampton (Chouteau) in southwestern Nebraska underlies the Gilmore City and Pennsylvanian. It overlies the Cambrian Bonneterre and LaMotte (Reagan) but is not known to overlap onto the Precambrian. The Hampton (Chouteau) occupies the same stratigraphic position as the "Meisner" sand of Maher (1948) in areas to the south and southwest but is not stratigraphically equivalent to the true Meisner. The Hampton (Chouteau) in southwestern Nebraska is probably at least in part equivalent to the Eagle City-Iowa Falls of eastern Nebraska.

Gilmore City Formation (Unit 3)

The Gilmore City in southwestern Nebraska, as in the rest of the state, is distinctive in gross lithology. There is a possibility of some facies change in the upper portion in southwestern Nebraska but this cannot be demonstrated at this time.

Distribution and Thickness. The Gilmore City seems to form an extensive erosional surface under the Pennsylvanian rocks as shown on Figure 10. The thickness ranges from 8 to 30 feet with thinning to the northwest. Some anomalous thicknesses are present due possibly to facies changes causing difficulty in distinguishing the contact between the Gilmore City and the overlying Osagean.

Lithology. In southwestern Nebraska the Gilmore City is normally a gray to tan-gray, sublithographic limestone with occasionally some faint oolitic structure. This lithology is in contrast to that of beds both above and below which are primarily dolomites. In isolated, structurally high areas which seem to be associated with the aforementioned basement highs, the Gilmore City is a light to light medium gray, granular to finely crystalline limestone with zones of well developed oolites and dolomitic areas. In the northwestern portion of southwestern Nebraska, where the Gilmore City is thin and overlies the shaly phase of the Hampton (Chouteau), the limestone is gray to tan, dolomitic and varies from dense to crystalline as opposed to its sublithographic nature in most of southwestern Nebraska.

Stratigraphic Relations. The Gilmore City in southwestern Ne-

braska is overlain by the lower Keokuk-Burlington and Pennsylvanian beds. It overlies the Hampton (Chouteau). The Gilmore City is equivalent to the Gilmore City of both Lee (1940) and Maher (1948) in areas to the south and southwest.

Lower Keokuk-Burlington Formation (Unit 4)

Subdivision of the lower Keokuk-Burlington was possible in southwestern Nebraska due to the good quality of samples and the availability of electrical surveys on almost all the wells. Similar zones have been observed in other portions of the state but lack of precise data on many of the wells precluded subdividing the lower Keokuk-Burlington in those areas.

Distribution and Thickness. The lower Keokuk-Burlington seems to be confined to erosional remnants resulting from erosion prior to the deposition of the Pennsylvanian. At the present time these remnants are delineated by a thinning of the lower Pennsylvanian sediments and the presence of comparatively younger Mississippian units. A maximum thickness of 70 feet was observed with no general trend discernible.

Lithology. The lowermost subdivision of the lower Keokuk-Burlington is a tan to brown, dense granoblastic dolomite with zones of tan-gray, very finely crystalline dolomite. In some wells a small amount of light gray, mottled, fossiliferous, blocky chert was noted in the samples but may be due to sample "lag" from higher beds. Thickness of this lower member ranges from 15 to 25 feet. Some anomalous thicknesses may be the result of confusion with a minor dolomitic facies present in the upper portion of the Gilmore City.

The lower middle member consists of tan-gray to brown, sublithographic to lithographic limestone. This member is quite distinctive from the dolomites of the underlying and overlying subdivisions and has also been observed in wells in central and southeastern Nebraska. The lower middle member ranges from 8 to 12 feet in thickness.

The upper middle member is a white to light gray, sucrosic dolomite with varying amounts of glauconite. A small amount of dead gray chert is present in some wells. The thickness is apparently about 20 feet but because it is difficult to make a distinction between the upper two subdivisions of the lower Keokuk-Burlington on the electric log, the thickness is not precise.

The uppermost subdivision of the lower Keokuk-Burlington is a light to light medium gray, granular to very finely crystalline dolomite. It usually contains a large amount of gray, mottled and speckled, fossiliferous chert. This upper member has a maximum thickness of 15 feet with possibly some thinning to the northwest.

Stratigraphic Relations. The lower Keokuk-Burlington is underlain by the Gilmore City and overlain by the upper Keokuk-Burlington

and Pennsylvanian. This unit is equivalent to the lower portion of Maher's (1948) "Keokuk and Burlington limestones, undifferentiated." In his report Maher includes the lower two subdivisions as facies variations of the upper Gilmore City. However, since a brown lithographic limestone similar to the upper middle member has been observed in the lower Keokuk-Burlington in the eastern portion of Nebraska, these two subdivisions are considered to be Osagean in this report.

Upper Keokuk-Burlington Formation (Unit 5)

The upper Keokuk-Burlington is the youngest Mississippian present in southwestern Nebraska.

Distribution and Thickness. The upper Keokuk-Burlington is present only as erosional remnants on the crests of pre-Pennsylvanian topographic highs. There is a maximum of 15 feet present.

Lithology. The upper Keokuk-Burlington is a light medium gray, dense to finely crystalline limestone. It contains light gray, mottled, fossiliferous, blocky chert.

Stratigraphic Relations. The upper Keokuk-Burlington is underlain by the lower Keokuk-Burlington and unconformably overlain by beds of Pennsylvanian age. In southwestern Nebraska it is the equivalent of at least a portion of the upper part of Maher's (1948) "Keokuk and Burlington limestones, undifferentiated."

MISSISSIPPIAN ROCKS IN NORTHWESTERN NEBRASKA

The term northwestern Nebraska in this report includes the two counties of Sioux and Dawes in the extreme northwestern portion of the state (Figure 1). The Mississippian rocks of northwestern Nebraska mark the present-day southeastern limit of the northern (Madison) phase of the Mississippian. Regional distribution and lithologic variation for this northern area have been presented by Andrichuk (1955). It was his conclusion that only the oldest of a threefold subdivision of the Mississippian transgressed from the north into Nebraska. An opposing view was presented by Strickland (1957) who concluded that the upper portion of the Mississippian was the most widespread and overlapped the lower in southeastern Wyoming. In view of the Kinderhookian-Osagean relationships in the eastern and southern portions of Nebraska, Andrichuk's conclusions seem more valid in northwestern Nebraska.

Mississippian terminology in this northern area is varied. The term "Madison" with no specific connotation as to age or lithology is in general usage throughout the area for rocks of Mississippian age. The terms Guernsey of the Hartville uplift and Pahasapa-Englewood of the Black Hills seem to be confined to surface outcrop studies.

Problems encountered in studying northwestern Nebraska included

comparatively poor sample quality due mainly to the thinness of the Mississippian interval and the depth at which it is present as well as the presence of salt in the Permian section which often contaminates the drilling fluid and results in poor quality electrical surveys. Several wells cored the Mississippian and were quite important in determining specific lithologic relationships.

Structurally, northwestern Nebraska lies in the northern end of the Denver-Julesburg basin (Figure 1). This basin is bounded on the north by the Black Hills, on the east by the Chadron arch and is separated from the Powder River basin to the northwest by the Lance Creek anticline of Wyoming. The major amount of structural relief present is due to post-Cretaceous folding as shown by the similarity of contour maps on the Cretaceous and the Precambrian.

Deposition was continuous from northwestern Nebraska northward into Montana during at least a portion of the Mississippian (Andrichuk, 1955). To the south and southeast from northwestern Nebraska, however, some type of barrier or "land bridge" seems to have been present (Reed, 1948). The presence of this barrier is evidenced by the transgressive relationships within the Mississippian sequence in northwestern Nebraska as discussed later. Lithologic similarities of the Mississippian in northwestern Nebraska to the Hampton (Chouteau) and Gilmore City in the southern and eastern portions of the state and the distribution of the Gilmore City in north-central Nebraska (Plate III) suggest a connection across this barrier in at least the upper portion of the Kinderhookian. A similar seaway connection in north-central Nebraska in the Ordovician is discussed later.

The most complete pre-Pennsylvanian sequence in northwestern Nebraska contains the following: an upper limestone equivalent to the Gilmore City, a middle dolomite at least in part equivalent to the Hampton (Chouteau) and a basal sand of Cambrian (?) age resting on Precambrian. The upper two units are lithologic and probably age equivalents of the Gilmore City and Hampton (Chouteau). However, it is not recommended that this terminology be formally applied since the Mississippian in northwestern Nebraska is usually considered to lie in a different stratigraphic province from the type localities of these formations (Weller et al, 1948). The basal sand in this area is considered to have the same general relationships as the LaMotte (Reagan) in southwestern Nebraska where a Mississippian overlap of a Cambrian sand can be demonstrated.

Hampton (Chouteau) Equivalent (Unit 2)

All of the interval between the top of the basal sand and the base of the upper limestone is included in the Hampton (Chouteau) equivalent. This unit in northeastern Nebraska includes an upper sandy zone

which is anomalous when compared to the Hampton (Chouteau) in other portions of the state. However, due to inadequate control, a more precise differentiation is not possible at this time. Alternative correlations for the lower portions of this unit, as defined above, are presented later.

Distribution and Thickness. It was not considered practical to construct separate isopachous maps for the two units within the Mississippian in this area because of inadequate control. However, an approximate zero line denoting the edge of the Hampton (Chouteau) equivalent is shown on Plate III. The Hampton (Chouteau) equivalent has a maximum observed thickness of 103 feet and decreases to zero where overlapped by the Gilmore City equivalent and truncated by the Pennsylvanian. The upper sandy zone, where differentiated, ranges from 10 to 15 feet in thickness.

Lithology. The Hampton (Chouteau) equivalent, at its maximum development in northwestern Nebraska, consists of three general lithologic zones with the lower two possibly being pre-Mississippian in age. The upper subdivision is a light gray, dense to granoblastic dolomite with much very fine to fine grained sand. Locally this subdivision grades to a dolomitic sandstone. The middle subdivision is a medium gray to tan-gray, crypto-crystalline to very finely crystalline dolomite with zones of dolomitic limestone occasionally present. The lowermost subdivision is a light-medium to medium gray, dense to finely crystalline dolomite. In one well a small amount of tan-gray, conchoidal chert was noted near the base of the Hampton (Chouteau) equivalent. This lower portion contains sand due to the proximity of the previously mentioned, underlying Cambrian (?) sand.

Stratigraphic Relations. In northwestern Nebraska the Hampton (Chouteau) equivalent is overlain by limestones of the Gilmore City equivalent in some areas and by rocks of Pennsylvanian age elsewhere (Figure 13A). It is more extensive than the underlying basal sand as shown by well 3 (Figure 13B) where the Hampton (Chouteau) equivalent rests directly on Precambrian. The Hampton (Chouteau) equivalent is in turn overlapped by the Gilmore City equivalent (Figure 13B).

Although the term "Hampton (Chouteau) equivalent" has been used to include all of the middle dolomitic portion of the pre-Pennsylvanian, several alternative correlations are possible. The upper portion of this dolomite is characterized by the presence of sand which may suggest a disconformable relationship within this dolomite sequence. Since the Hampton (Chouteau) in other portions of Nebraska becomes quite sandy where thin, perhaps only the upper sandy portion of the dolomite sequence in northwestern Nebraska should be termed the Hampton (Chouteau) equivalent. This would then make the Hampton (Chouteau) both lithologically and stratigraphically equivalent throughout

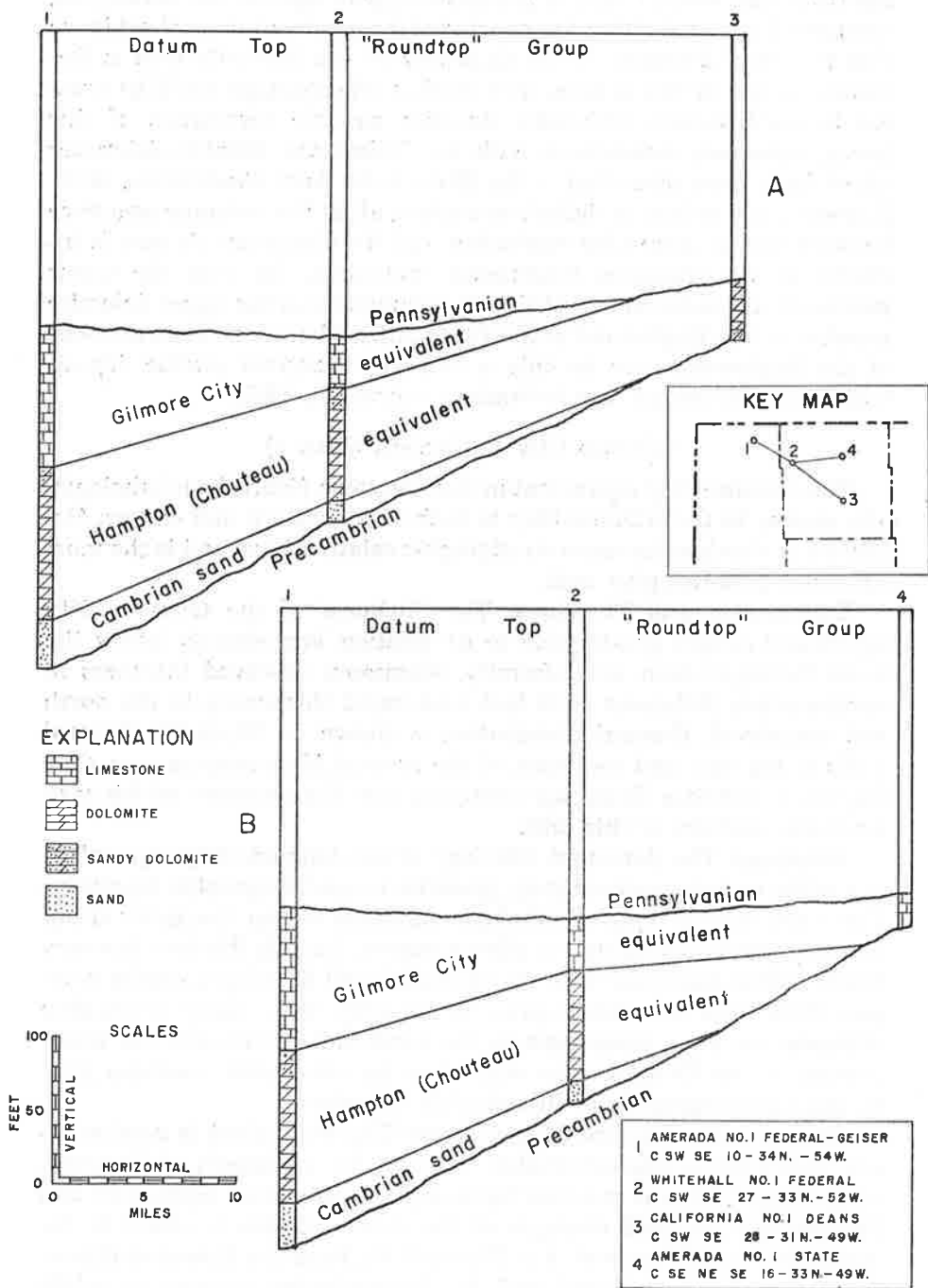


Figure 13. West to East Stratigraphic Cross Sections Showing Transgressive Relationships in Northwestern Nebraska.

Nebraska and would imply a pre-Mississippian age for the underlying dolomite. Love et al (1953) has concluded from paleontological evidence that the basal dolomite of the Guernsey in the Hartville area is Devonian in age. If this is true, then similar relationships could be present in northwestern Nebraska. Another possible correlation of this lower, non-sandy dolomite is with the Ordovician Trenton dolomites which have been identified in the Black Hills Area (Andrichuk, 1955). However, due to lack of definitive control, all of the dolomite sequence between the Gilmore City equivalent and the Cambrian (?) sand is included in the Hampton (Chouteau) equivalent. At least the upper portion of this interval is probably the equivalent of the upper dolomite member of the Englewood in the Black Hills. The lower shale member of the Englewood may be only a localized marginal marine deposit which did not extend into Nebraska (Andrichuk, 1955).

Gilmore City Equivalent (Unit 3)

The Gilmore City equivalent in northwestern Nebraska is lithologically similar to the Gilmore City in both southwestern and eastern Nebraska. It also has the same stratigraphic relationships, and is the most extensive Mississippian unit.

Distribution and Thickness. The thickness of the Gilmore City equivalent ranges greatly due to its position immediately below the basal Pennsylvanian unconformity. Maximum observed thickness in northwestern Nebraska is 96 feet with rapid thickening to the north and northwest. General distribution is shown on Plate III. Several wells to the east and southeast of the present Mississippian zero edge contain a siliceous limestone overlying the Precambrian which may represent outliers of this unit.

Lithology. The dominant lithology of the Gilmore City equivalent is a white to light medium gray, granular to sublithographic limestone. There are several types of lithologic variation within this interval but none are persistent enough to allow zonation. Locally this unit is a very finely oolitic limestone with inclusions of well developed calcite crystals. Thin beds of medium-gray to tan-gray, very finely crystalline dolomite are more prominent to the north and northwest. The lower portion of the Gilmore City equivalent in some areas includes gray to tan, sublithographic to lithographic limestone.

Stratigraphic Relations. The Gilmore City equivalent in northwestern Nebraska is unconformably overlain by sediments of Pennsylvanian age. The unit overlies the Hampton (Chouteau) equivalent and Precambrian. A good example of the latter relation is found in the Amerada No. 1 State (well 4 of Figure 13B). Here the Hampton (Chouteau) equivalent is absent and the Mississippian consists of oolitic limestones of the Gilmore City equivalent. The lower portion of this

limestone interval contains a increasing amount of angular quartz sand and biotite fragments. This limestone is transitional downward into several feet of a calcareous, micaceous, angular quartz sand which in turn grades into fresh biotite granite.

The limestone interval is probably equivalent to some portion of the lower Guernsey, above the basal dolomite, in the Hartville area and also to the lower limestone member of the Pahasapa of the Black Hills. As previously mentioned, the Gilmore City equivalent is the lithologic and stratigraphic equivalent of the Gilmore City in other portions of the state.

GEOLOGIC HISTORY

In order to apply current terminology to the Mississippian units recognized in Nebraska, it has been necessary to compare the sequential relationships noted in Nebraska with those reported in the outcrop areas of Iowa, Missouri, and Kansas. No field investigations were made by the writer in these adjoining states. Instead, the various publications cited herein were relied upon to determine the lithology, thickness and sequential relationships of the Mississippian units in these states. By comparing the described characteristics of those units with the trends of the Mississippian units observed in Nebraska, it has been possible to construct logical patterns of deposition during the Mississippian. The conclusions drawn from these paleogeographic studies do not necessarily imply agreement in correlation and terminology with the authors of the references cited.

Pre-Mississippian Paleogeography

Reed (1954) discussed the geologic history of the Central Nebraska (Salina) basin. This discussion indicated the presence of a high area, the Siouxana arch, serving as a land barrier across Nebraska during much of pre-Pennsylvanian time (Figure 14). As additional well control has become available, more detailed work has been done by the Nebraska Geological Survey on the geologic history of this arch.

Figure 14 is a form line map showing the general land-sea relationships from the beginning of Middle Ordovician time. (St. Peter Sandstone) through deposition of the Silurian. The Siouxana arch was apparently present as a positive area during this time. The distribution of the middle and upper Ordovician sediments (Plate III) however, demonstrates deposition through a sag or saddle on the Siouxana arch in north-central Nebraska, into South Dakota (Figure 14). A similar extension to the southeast in south-central South Dakota for equivalent Ordovician beds (Red River) has been suggested by Agnew and Gries (1960). Throughout this time interval (Middle Ordovician to Silurian), the main area of deposition was the North Kansas basin in southeastern Nebraska and northeastern Kansas (Figure 14).

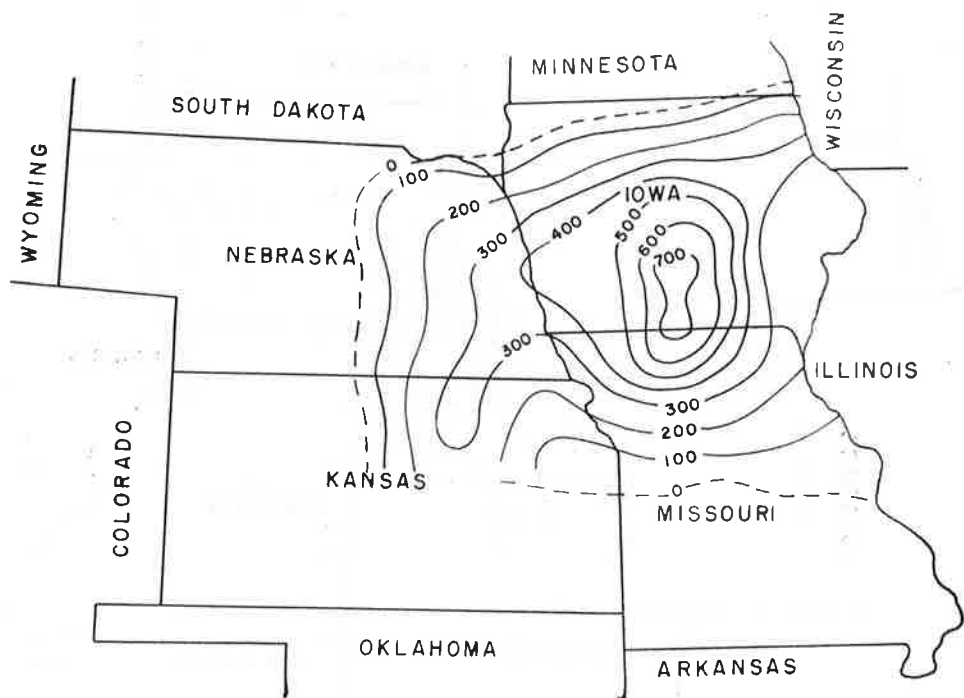


Figure 15. Regional Isopachous Map of Devonian Limestones.

During early Devonian time the main axis of deposition shifted to the northeast from the North Kansas basin as shown by thickness studies (Reed, 1954). It is not known whether this basin shift is due to some initial movement of the Nemaha arch as suggested by Lee (1956) or, more probably, a basin adjustment related to post-Silurian uplift in the Ozark region. An isopachous map of the total Devonian limestones and dolomites was compiled from the records of the Nebraska Geological Survey and the literature (Lee, 1956 and Lee et al, 1946). This map (Figure 15) shows a basinal development in south-central Iowa. However, an isopachous map of the overlying "Chattanooga" Shale, Figure 16, shows two separate basinal developments. This shift in sedimentational patterns during the Upper Devonian or Mississippian is anomalous in view of the general stability of this area during the early Paleozoic. It is suggested that these two maps show the thickness of a limestone-dolomite and a shale facies of the Late Devonian and not the thicknesses of two different age sediments. An isopachous map of the two intervals combined was constructed, Figure 17, showing apparent basinal development in southern Iowa and eastern Nebraska. A series of diagrammatic cross sections from eastern Nebraska to southeastern Kansas were constructed to show the suggested sequential development during the Late Devonian.

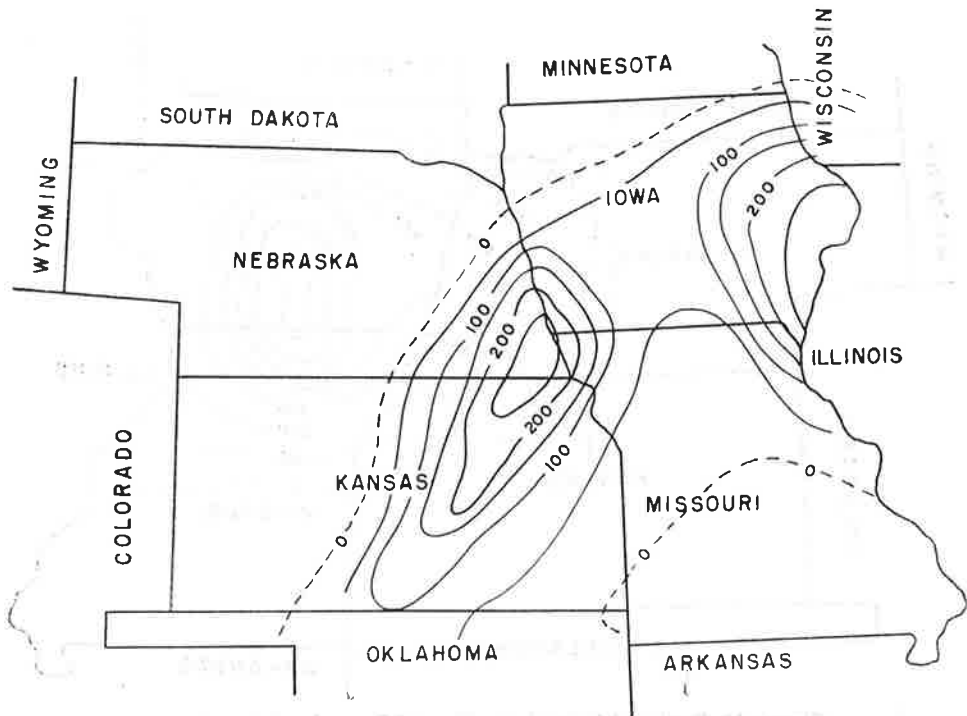


Figure 16. Regional Isopachous Map of "Chattanooga."

Limestone and dolomite deposition, prominent in the Silurian, continued through Middle Devonian time as shown on Figure 18A. At some time during Late Middle or Early Late Devonian time, uplift must have occurred in the Ozark-Chautauqua complex in southern Missouri and southeastern Kansas. Erosion commenced and removed sediments down to the Arbuckle in southeastern Kansas (Lee, 1956). It is suggested that deposition of the "Chattanooga shale" began in Late Devonian time in areas peripheral to the Ozark high while limestone and dolomite deposition continued in outlying areas such as east-central Nebraska and central Iowa (Figure 18B). Toward the end of Late Devonian time the "Chattanooga shale" facies transgressed southward over the truncated older Paleozoics in southeastern Kansas and extended northward into northern Nebraska and Iowa (Figure 18C). A similar history for Late Devonian time seems apparent in Oklahoma in the Hunton-Woodford sequence and may be present in other areas flanking the Ozark high.

At the close of Devonian time most of this area (Figure 17) became emergent with restricted limestone and dolomite deposition marking the end of the Devonian. It is suggested that this restricted depositional environment is evidenced by the Louisiana Limestone in northeastern

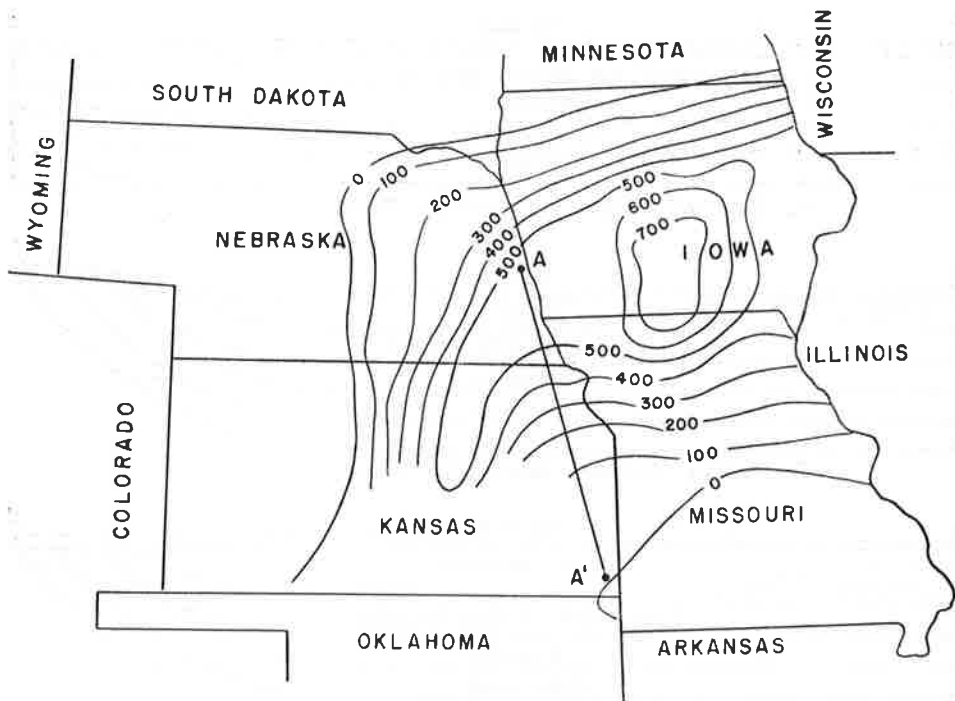


Figure 17. Regional Isopachous Map of "Chattanooga" and Devonian Limestones.

Missouri and western Illinois and the unnamed dolomitic zone overlying the main shale body of the "Chattanooga" in southeastern Nebraska and adjoining areas.

Thus in Nebraska and adjoining areas it is proposed that the top of the Devonian be placed at the top of the "Chattanooga shale." In much of this area this horizon is marked by an overlying red shale zone included in the Boice (Mississippian). The top of the "Chattanooga" is the stratigraphic equivalent of the top of the top of the Devonian in western Illinois as determined from conodont studies by Collinson (1961).

Correlation of the Kinderhookian Series

Sediments of Kinderhookian age are exposed in a northwest-southeast belt across central Iowa extending southward along the Mississippi River border of Missouri and Illinois and then westward across central Missouri on the north flank of the Ozark uplift. These outcrops were extensively studied and described by Moore (1928) and Laudon (1931, 1933) and have been restudied and revised by many others resulting in a varied and complex terminology.

The most complete development of the Kinderhookian limestones

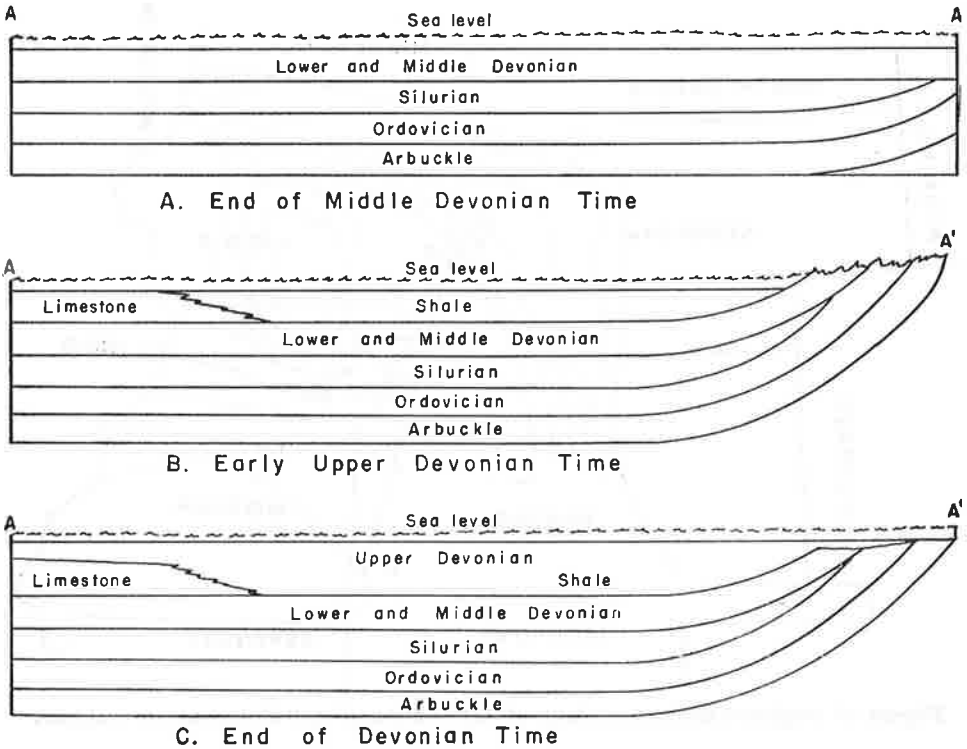


Figure 18. Diagrammatic Cross Sections, Eastern Nebraska to Southeastern Kansas.

and dolomites occurs in the subsurface of western Iowa and eastern Nebraska. Laudon (1931) described the outcrops in central Iowa nearest this area and defined the Hampton "formation" to include as members in ascending order Van Tuij's (1922) Chapin, Maynes Creek, Eagle City and Iowa Falls formations. Equivalents of the lower two members were described in southeastern Iowa; the North Hill (Chapin) and the Wassonville (Maynes Creek) members. Laudon in 1935 proposed to exclude the North Hill-Chapin from the Hampton to conform with Moore's (1928) restriction on the term Chouteau to include only the Compton (Figure 19). This influenced Workman and Gillette (1956) and Collinson (1961) to elevate the North Hill to group status to include, possibly, the Wassonville.

Since the terminology applied in the type localities in Iowa is extended into the subsurface of Nebraska, a classification should be utilized which best fits the regional relationships of the various units. Due to stratigraphic evidence which will be developed later, the following classification is suggested for the outcrops of Kinderhookian age in Iowa and western Illinois. Laudon's term "Hampton" is retained in this report on a group level to include the section overlain by Gil-

more City and underlain by English River and Hannibal. From the base upward the Hampton Group would include the Chapin (North Hill) Formation, the Maynes Creek (Wassonville) Formation, the Eagle City Formation, and the Iowa Falls Formation. Subdivision of the Chapin (North Hill) Formation as designated in southeastern Iowa and western Illinois could be retained on a member basis.

The outcrops of Kinderhookian rocks in central Missouri were described by Swallow in 1855 as the Chouteau. Moore (1938) restricted the term Chouteau to the lower portion of the original sequence and classified the upper portion as Sedalia and Osagean in age. Several further revisions were suggested in later years but the prevalent and most logical from later subsurface work was proposed by Beveridge and Clark (1952). From their studies the Chouteau Group in Missouri now includes from the base upward the Compton Formation and the Sedalia-Northview Formation (Figure 19). As thus defined, the Chouteau Group is the stratigraphic equivalent of the lower two members of the Hampton Group as defined in this report (Figure 19). Formational relationships of the Chouteau and Hampton groups are suggested as a result of subsurface studies in intervening areas.

The beginning of Mississippian time in this area was a period of restricted deposition. A shallow basin was present in southeastern Nebraska, northeastern Kansas and adjoining areas in which the Boice Shale was deposited. Apparently a similar basin was present at the same time in northeastern Missouri and western Illinois. Here the Hannibal Shale was deposited with at least the upper portion of the English River accumulating in southeastern Iowa. Apparently most of central Iowa was exposed at this time as evidenced by the red soil zone noted by Harris (1947) at the top of the Maple Mill. In north central Missouri the absence of sediments of Boice (Hannibal) age and the thinning of the Maple Mill-Grassy Creek-Saverton (Koenig, 1961) implies that this area was undergoing active erosion during earliest Mississippian time and served as a barrier between the two basins.

The main Kinderhookian marine invasion followed the restricted deposition of the Boice (Hannibal) sequence. This invasion is marked by an initial deposit of a basal dolomitic siltstone-sandstone. This unit underlies successively younger Kinderhookian beds toward the basin flanks.

Overlying this basal clastic zone is a widespread, dense to oolitic limestone. This unit, Chapin (Compton), is confined to the eastern edge of Nebraska and is equivalent to the Chapin (North Hill) Formation of Iowa and the Compton Formation or Chouteau restricted of Kansas and Missouri. It maintains its lithologic character throughout this area. The overlying unit, Maynes Creek (Wassonville), is present in

SYSTEM SERIES	UNITS THIS REPORT	NEBRASKA THIS REPORT	KANSAS LEE (1956,1943)	MISSOURI KOENIG & SPRENG '61	IOWA LAUDEN '31 - HARRIS '47
MERRAM	9	STE. GENEVIEVE	STE. GENEVIEVE	STE. GENEVIEVE	STE. GENEVIEVE
	8	ST. LOUIS	ST. LOUIS	ST. LOUIS	ST. LOUIS
	7	SPERGEN	SPERGEN	SALEM (SPERGEN)(UPPER WARSAW)	SPERGEN
	6	WARSAW	"WARSAW"	WARSAW	KEOKUK
	5	UPPER KEOK. - BURL.	UPPER KEOK. - BURL.	UPPER KEOK. - BURL.	UPPER BURLINGTON
	4	LOWER KEOK. - BURL.	LOWER KEOK. - BURL.	LOWER KEOK. - BURL.	LOWER BURLINGTON
PINKINDE RHOO K I A N	3	GILMORE CITY	GILMORE CITY	GILMORE CITY (RARE)	GILMORE CITY
	2	(CHOUTEAU) UNNAMED SILTSTONE	UPPER SEDALIA	SEDALIA - NORTHVIEW	HAMPTON EAGLE CITY - IOWA FALLS MAYNES CREEK - WASSONVILLE CHAPIN (COMPTON) UNRECOGNIZED
			LOWER SEDALIA - NORTHVIEW	CHOUTEAU RESTRICTED	
			CHOUTEAU	COMPTON	
			UNRECOGNIZED	"SYLAMORE - WEISNER"	
1	BOICE	BOICE	N W BOICE NE HANNIBAL	UNRECOGNIZED ENGLISH RIVER (PART)	
DEVONIAN	0	"CHATTANOOGA"	CHATTANOOGA	KINDERHOOK SAVERTON GRASSY CREEK	MAPLE MILL LATE DEVONIAN ROCKS
			D E V O N I A N C A R B O N A T E S O R		OLDER ROCKS

Figure 19. Regional Correlation Chart.

the eastern portion of Nebraska, usually as a dolomite, although a limestone phase is present in the southern portion of extreme eastern Nebraska. Both phases are identifiable by their distinctive chert content. This unit is equivalent to the Maynes Creek (Wassonville) Formation of Iowa, the lower Sedalia of Kansas and the Sedalia of the outcrop area of central Missouri. In the latter area the Sedalia grades into the Northview Shale Formation as the Ozark positive area is approached. This facies change may mark a minor reactivation of the Ozark area since the upper portion of the Hampton Group and the overlying Gilmore City are restricted in their southward distribution as compared with the lower Hampton and the Chouteau Group.

Overlying the Maynes Creek (Wassonville) cherty dolomite in Nebraska and western Iowa is an essentially non-cherty dolomite and dolomitic limestone equivalent to the undifferentiated Eagle City-Iowa Falls formations. This unit appears to be the equivalent of the widespread "upper Sedalia" of Lee (1956). A lithologic and stratigraphic equivalent of this upper portion of the Hampton Group is present in both southwestern and northwestern Nebraska and is probably equivalent to at least a portion of the Englewood of the Black Hills area.

Overlying the Hampton (Chouteau) group in Iowa, Nebraska and Kansas is a distinctive oolitic limestone, the Gilmore City. It is similar in distribution to the underlying upper Hampton formations in that it is restricted to the south in Missouri and Kansas. However, it is more extensive than the Hampton in the north-central portion of Nebraska (Plate III) and apparently was deposited over a saddle in the Siouxana Arch into South Dakota. This northwestward connection into South Dakota during Upper Kinderhookian time was first suggested by Sardeson (1902) in a study of the fauna of the Humboldt oolite (Gilmore City). Similar faunal affinities of the upper Kinderhook of this area with that of the northern phase of the Mississippian (Madison) were noted by both Moore (1935) and Laudon (1935). Additional subsurface information in northern Nebraska and southern South Dakota should further substantiate this connection.

The Kinderhookian, when viewed on a regional basis, is a widespread stratigraphic unit. Deposition began with the restricted Boice-Hannibal sequence followed by widespread transgression and deposition of the Chapin-North Hill-Compton and the more extensive Maynes Creek-Wassonville-Sedalia. Some slight movement of the Ozark region probably occurred at this time causing the Sedalia Dolomite-Northview Shale transition and later southward restriction of the Eagle City, Iowa Falls and Gilmore City. Apparently the dominating marine influence during late Kinderhookian time was from the northwest through South Dakota and from the southeast through Illinois. This

is in contrast to the overlying Osagean with its dominant transgression from the south and east and apparent isolation from the northern (Madison) phase.

Correlation of the Osagean and Meramecian Series

Classification of the Osagean and Meramecian Series in the area of this report is dependent upon terminology applied to outcrops in southeastern Iowa, southward along the Mississippi River and around the flanks of the Ozark uplift. In the eastern portion of this area the Osagean and early Meramecian outcrops occur in an area where, apparently, environmental conditions during deposition were unstable (Spreng, 1961). As a result, facies and thickness variations are common so that formational contacts are not always certain in the outcrops. In the western portion of the outcrop area, the Osagean and the early Meramecian consist of greater thicknesses of similar lithology with few good formation "breaks" available (Lee, 1940).

In contrast to both phases of the outcrops, the deposition of the Osagean and Meramecian in the subsurface of the report area took place under more stable shelf conditions. Thus, in Nebraska definite lithologic units are present but do not correspond in thickness and lithology with the units as described in the outcrop area. Until definite formational boundaries of the Osagean and early Meramecian are established in the outcrop areas and correlated in the subsurface, only tentative correlations can be made for the units of this general age in Nebraska.

By the time of the initial Osagean transgression, regional "tilting" to the south had become prominent (Lee, 1956). This tilting may have begun in Kinderhookian time as shown by the overlap of Late Kinderhookian sediments to the south. This southward extension was retarded in Missouri by the presence of the Ozark high. Tilting of regional magnitude is demonstrated by the transgressive overlap to the north of not only the major subdivisions of the Osagean but by overlap of faunal zones within these units (Laudon, 1937, Kaiser, 1950).

The Burlington-Keokuk units must have been extensively deposited over most of southern and eastern Nebraska as concluded in an earlier section. The Warsaw, although classified as Meramecian, is more closely related physically to the underlying Osagean rocks as demonstrated by its distributional pattern. Some restriction of deposition of the post-Warsaw Meramecian is evidenced by the overlap of the Spergen by the St. Louis in southeastern Nebraska.

In Nebraska, Iowa, Missouri and eastern Kansas the Osagean and Meramecian rocks are predominantly cherty limestones and dolomites representing a shelf facies. The true basin facies of these sediments lay to the south in Oklahoma and northern Texas (Huffman, 1959).

These limestones and dolomites grade eastward into the clastic sediments of the Appalachian province. A basinal development was present in southwestern Kansas and adjoining areas during this time (Maher and Collins, 1949). In this area rapid facies changes and thinning to the north and northwest demonstrate the presence of a positive area serving as a barrier to the northern (Madison) phase. Erosion has removed Osagean sediments in central Nebraska which may have included similar facies changes.

SUMMARY

Rocks of Mississippian age are present in the eastern, southwestern and northwestern portions of Nebraska. These rocks can be subdivided on a lithologic basis into eight major units. These units can be correlated with similar lithologic subdivisions in surrounding areas and by general paleogeographic reconstruction with the units recognized in the outcrop areas (Figure 19).

Conclusions pertaining to the correlation of the units recognized in this report are derived from lithology, distribution and sequential relationships. Thus from compilation of published material in Nebraska and adjoining states and the observations made in the subsurface of Nebraska, a logical sequence of deposition can be reconstructed for this general area.

Following deposition of the Middle Devonian, uplift occurred in the Ozark region causing peripheral deposition of a shale facies. This shale facies ("Chattanooga") expanded through Late Devonian time, overlapping the limestone and dolomite phase to the north until withdrawal of the Devonian seas. The Devonian-Mississippian boundary is evidenced by a break in sedimentation with the development of a red shale-oolitic hematite zone in the base of the Boice. The post-Boice, Kinderhookian transgression, except for a basal clastic interval, is primarily a limestone and dolomite sequence with at least the upper portion strongly influenced by the northern (Madison) phase of the Mississippian. Minor uplift of the Ozark area in the upper portion of the Kinderhookian is evidenced by the Sedalia Dolomite-Northview Shale transition in southern Missouri and southeastern Kansas (Spreng, 1961) and restriction of the later Kinderhookian into these areas from the north. The Osagean and Meramecian transgressions were from the south as evidenced by overlap of the younger Osagean in southern Missouri and Kansas (Lee, 1956 and Spreng, 1961). These two series were apparently isolated from the northern (Madison) phase. No evidence of Chesterian age sediments has been found in Nebraska.

Proposed terminology for the subdivisions recognized in this report for the Mississippian in Nebraska is shown in both Figures 2 and 19. This terminology is subject to revision since problems still exist in

the standard classification of the outcrop areas. However, since this study was conducted on a lithostratigraphic basis, it is believed that the boundaries of the recognized units should remain constant. Thus, application of more precise terminology as it becomes available should be accomplished with little difficulty, since it will necessitate only a change in terminology rather than a complete reinvestigation of the area.

The detailed correlations of all Nebraska wells utilized in the preparation of this report are included in the appendix of this bulletin in order that interested geologists may have access to the basic data of this report. The location, name of well and operator, elevation of Kelly bushing or derrick floor (starred elevations are ground elevations) and depths to top of Mississippian subdivisions are given in tabular form. In addition, the depth to and identification of the underlying strata are given. Abbreviations used in the appendix tables are as follows: Ste. Gen. is Ste. Genevieve; Sperg. is Spergen; Up. K.-B. is Upper Keokuk-Burlington; Lo. K.-B. is Lower Keokuk-Burlington; Gil. City is Gilmore City; Hamp. is Hampton (Chouteau); "Chatt." is "Chattanooga"; D. is Devonian; S. is Silurian; Om. is Maquoketa (Ordovician); Ov is Viola (Ordovician); Cb is Bonnetterre (Cambrian); Cl is LaMotte or Reagan (Cambrian); Pc is Precambrian; and TD is total depth of the drilling in cases where older formations were not reached.

SELECTED BIBLIOGRAPHY

- Agnew, A. F., and Gries, J. P., 1960, Dig deep for South Dakota pays: Oil and Gas Jour., v. 58, no. 12, p. 160-172.
- Andrichuk, J. M., 1955, Mississippian Madison Group stratigraphy and sedimentation in Wyoming and southern Montana: Am. Assoc. Petroleum Geologists Bull., v. 39, no. 11, p. 2170-2210.
- Beveridge, T. R., and Clark, E. L., 1952, A revision of the early Mississippian nomenclature in western Missouri: Kansas Geol. Soc. Guidebook 16th Ann. Field Conf.; Missouri Geol. Survey and Water Resources, Rept. Inv. 13, p. 71-80.
- Collinson, C. W., 1961, The Kinderhook Series in the Mississippi Valley: Kansas Geol. Soc. Guidebook 26th Ann. Field Conf., p. 100-109.
- Condra, G. E., and Reed, E. C., 1959, The Geologic section of Nebraska: Nebraska Geol. Survey Bull. 14A.
- , Reed, E. C., and Scherer, O. J., 1950, Correlation of the Laramie Range, Hartville Uplift, Black Hills and western Nebraska: Nebraska Geol. Survey Bull. 13A.
- , Schramm, E. F., and Lugn, A. L., 1931, Deep wells of Nebraska: Nebraska Geol. Survey Bull. 4.
- Fenneman, N. M., 1930, (Map showing) Physical divisions of the United States: U. S. Geol. Survey, 1930.
- Friedman, C. M., 1959, Identification of carbonate minerals by staining methods: Jour. Sed. Petrology, v. 29, no. 1, p. 87-97.
- Greene, F. C., 1945, Recent drilling in Northwest Missouri: Missouri Geol. Survey and Water Resources, Rept. Inv. 1.
- Grohskopf, J. G., Hinchey, N. S., and Greene, F. C., 1939, Subsurface geology of

- northwestern Missouri: Missouri Geol. Survey and Water Resources, Bienn. Rept. of the State Geol. to the 60th General Assembly, App. 1.
- _____, and McCracken, Earl, 1949, Insoluble residues of some Paleozoic formations of Missouri; their preparation, characteristics, and application: Missouri Geol. Survey and Water Resources, Rept. Inv. 10.
- Harris, S. E. Jr., 1947, Subsurface stratigraphy of the Kinderhook and Osage series in southeastern Iowa: Unpublished Doctoral Diss., Univ. of Iowa, Iowa City, Iowa.
- Hedberg, H. D., 1961, The stratigraphic panorama: Geol. Soc. America Bull., v. 72, p. 499-518.
- Huffman, G. G., 1959, Pre-Des Moinesian isopachous and paleogeographic studies in central Mid-Continent region: Am. Assoc. Petroleum Geologists Bull., v. 43, no. 11, p. 2541-2574.
- Jenkins, M. A., and McCoy, M. R., 1958, Cambro-Mississippian correlations in the eastern Powder River Basin, Wyoming and Montana: Wyoming Geol. Assoc. Guidebook 13th Ann. Field Conf., p. 31-35.
- Kaiser, C. P., 1950, Stratigraphy of the lower Mississippian rocks in southwestern Missouri: Am. Assoc. Petroleum Geologists, v. 34, no. 11, p. 2133-2175.
- Koenig, J. W., 1961, Unassigned Devonian or Mississippian formations: in The stratigraphic succession in Missouri, Missouri Geol. Survey and Water Resources, v. XL, 2nd ser. p. 41-49.
- Laudon, L. R., 1931, The stratigraphy of the Kinderhook Series of Iowa: Iowa Geol. Survey, v. 35, p. 333-451.
- _____, 1933, The stratigraphy and paleontology of the Gilmore City Formation of Iowa: Iowa Univ. Studies in Nat. History, v. 15, no. 2, p. 1-74.
- _____, 1937, Stratigraphy of the northward extension of the Burlington Limestone in Missouri and Iowa: Am. Assoc. Petroleum Geologists, v. 21, no. 9, p. 1158-1167.
- Lee, Wallace, 1939, Relation of thickness of the Mississippian limestones in central and eastern Kansas to oil and gas deposits: Kansas Geol. Survey Bull. 26, p. 1-42.
- _____, 1940, Subsurface Mississippian rocks of Kansas: Kansas Geol. Survey Bull. 33.
- _____, 1943, The stratigraphy and structural development of the Forest City basin in Kansas: Kansas Geol. Survey Bull. 51.
- _____, 1956, The stratigraphy and structural development of the Salina basin area: Kansas Geol. Survey Bull. 121.
- _____, Grohskopf, J. G., Reed, E. C., and Hershey, H. G., 1946, The structural development of the Forest City basin in Missouri, Kansas, Iowa, and Nebraska: U. S. Geol. Survey, Oil and Gas Inv., Prelim. Map 48, 7 sheets.
- Love, J. D., Henbest, L. G., and Denson, N. M., 1953, Stratigraphy and paleontology of Paleozoic rocks, Hartville area, eastern Wyoming: U. S. Geol. Survey Oil and Gas Inv. Chart OC 44, 2 sheets.
- Lugn, A. L., 1934, Pre-Pennsylvanian stratigraphy of Nebraska: Am. Assoc. Petroleum Geologists Bull. v. 18, no. 12, p. 1597-1631.
- Maher, J. C., 1948, Subsurface geologic cross section from Baca County to Yuma County, Colorado: Kansas Geol. Survey Oil and Gas Inv., Prelim. Cross Section No. 6.
- _____, and Collins, J. B., 1949, Pre-Pennsylvanian geology of southeastern Colorado, southwestern Kansas, and the Oklahoma Panhandle: U. S. Geol. Survey Oil and Gas Inv. Map 101.
- McQueen, H. S., and Greene, F. C., 1938, The geology of Northwest Missouri: Missouri Geol. Survey and Water Resources, 2nd ser., v. 25.
- Meek, F. B., and Worthen, A. H., 1861, Note in Am. Jour. Sci., 2nd ser., v. 32, p. 288.
- Moore, R. C., 1928, Early Mississippian formations in Missouri: Missouri Bur. Geol. and Mines, 2nd ser., v. 12.
- _____, 1935, The Mississippian System in the upper Mississippi Valley re-

- gion: Kansas Geol. Soc. Guidebook 9th Ann. Field Conf. p. 239-243.
- Rasmussen, N. F., 1957, The Mississippian, Devonian, and Silurian systems in the subsurface of Dallas County, Iowa: Unpublished Master's thesis, Univ. of Nebraska, Lincoln, Nebraska.
- Reed, E. C., 1946, Boice Shale, new Mississippian subsurface formation in Southeast Nebraska: Am. Assoc. Petroleum Geologists Bull. v. 30, no. 3, p. 348-349.
- , 1948, The possibility of a land bridge across Nebraska in Mississippian time: Jour. Geology, v. 56, no. 4, p. 308-312.
- , 1954, Central Nebraska has possibilities: World Oil, v. 139, no. 6, p. 113-116.
- Sardeson, F. W., 1902, The Carboniferous formations of Humboldt, Iowa: Am. Geol., v. 30, p. 300.
- Spreng, A. C., 1952, The lower Pierson fauna of west-central, Missouri: Kansas Geol. Soc. Guidebook 16th Ann. Field Conf.; Missouri Geol. Survey and Water Resources, Rept. Inv. 13, p. 81-86.
- , 1961, Mississippian System: in The stratigraphic succession in Missouri, Missouri Geol. Survey and Water Resources, v. XL, 2nd ser., p. 49-78.
- Strickland, J. W., 1957, Summary of Mississippian and Devonian stratigraphy, Wind River basin, Wyoming: Wyoming Geol. Assoc. Guidebook 12th Ann. Field Conf., p. 20-28.
- Ulrich, E. O., 1904, Preliminary notes on classification and nomenclature of certain Paleozoic rock units in eastern Missouri: Missouri Bur. Geology and Mines, 2nd ser., v. 2, p. 109-111.
- Van Tuyl, F. M., 1922, The stratigraphy of the Mississippian formations of Iowa: Iowa Geol. Survey, v. 30, p. 33-349.
- Walters, R. F., 1946, Buried Precambrian hills in northeastern Barton County, central Kansas: Am. Assoc. Petroleum Geologists Bull., v. 30, no. 5, p. 660-710.
- Weller, J. M., and Sutton, A. H., 1940, Mississippian border of Eastern Interior basin: Illinois State Geol. Survey, Rept. Inv. 62, p. 765-858.
- , et al, 1948, Correlation of Mississippian formations of North America: Geol. Soc. America Bull., v. 59, no. 2, p. 91-196.
- Wells, Jack, 1960, Typical well log, northwestern Missouri: in Kansas oil and gas fields, v. III, Kansas Geol. Soc.
- Williams, H. S., 1891, Correlation papers; Devonian and Carboniferous: U. S. Geol. Survey Bull. 80.
- Workman, L. E., and Gillette, Tracey, 1956, Subsurface stratigraphy of the Kinderhook Series in Illinois: Illinois Geol. Survey Rept. Inv. 189.

APPENDIX

APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN									UP. DEV. "Chatt." (10)	Under- lying Strata	
			Meramecian			Osagean			Kinderhookian					
			St. Gen. (6)	St. Louis (8)	Sperg. (7)	Warsaw (6)	Up. K.-B. (5)	Lo. K.-H. (4)	Ch. City (3)	Hamp. (2)	Boks. (1)			
ARAD														
C SE SW 35-5-9W	No. 1 Bauder Ohio Oil Co.	1848	-	-	-	-	-	3190	3216	3262	-	-	-	3300, D
C NE NE NE 28-5-10W	No. 1 Kort Graff & Kleinholz	1913	-	-	-	-	-	-	3401	3435	-	-	-	3458, D
C SE SW SW 33-5-10W	No. 1 Meyer G. F. Atkinson	1948	-	-	-	-	-	-	3437	3484	-	-	-	3508, D
C NW NW 8-6-10W	No. 1 Blumenkamp Bedrock Oil Co.	1885	-	-	-	-	-	-	3260	3284	-	-	-	3324, D
C SW 26-7-10W	No. 1 Katsberg Prumty Prod. Co.	1945	-	-	-	-	-	-	-	-	3362	-	-	3406, D
C NE NE SE 6-7-12W	No. 1 Claassen Texas Crude & J. Farmer	2047	-	-	-	-	-	-	-	-	-	-	-	3568, Om
ANTHONY														
NW NE SW 31-25-6N	No. 2 Taylor F. Cave & Baxter Drig.	1816	-	-	-	-	-	-	2013	-	-	-	-	2098, D
BOONE														
NE NE NE 23-22-7W	No. 7 Strat. Carter Oil Co.	1902	-	-	-	-	-	-	2284	-	-	-	-	2357, D
BUFFALO														
NE SE NE 27-9-13W	No. 9 Strat. Carter Oil Co.	2023	-	-	-	-	-	-	-	-	-	-	-	3514, Om
BURT														
NW NW NW 13-21-9E	No. 1 Ericksen L. D. Burt	1267	-	-	-	-	675	710	740	770	-	-	-	960, D
NW NW NW 25-21-9E	No. 1 Ericksen Omaha Drig. Co.	1373	-	-	-	-	770	834	864	892	-	-	-	1085, D
BUTLER														
SE SE NW 29-16-2E	No. 1 Nichols Bellwood Syndicate	1453	-	-	-	-	-	1350	1380	1430	-	-	-	1450, D
CASS														
C NW NW 21-10-14E	No. 1 Larsh Baker & Pollock	945	-	-	-	-	-	528	550	598	608	697	725	850, D.
NE NW NW 5-11-13E	No. 1 Ruffner Cass Oil Research	1185	-	-	-	-	-	-	-	-	-	-	448	467, D
CHASE														
C NW NE 1-5-36W	No. 1 Resler F. B. Jackson Jr.	3115	-	-	-	-	-	-	4855	4863	-	-	-	4874, Cb
NE NE NE 17-5-36W	No. 1 Dudek Nebr. Drillers Inc.	3271	-	-	-	-	-	-	4982	4988	-	-	-	5029, Cb
C NE NE 26-5-36W	No. 1 Nordhausen Davis Oil Co.	3201	-	-	-	-	-	4950	4953	4963	-	-	-	4997, Cb
C SW SW 29-5-37W	No. 1 Pribbend W. F. Newton	3386	-	-	-	-	-	5158	5169	5176	-	-	-	5198, Cb
NW NW NW 27-5-38W	No. 1 Bailey Stanolind Oil & Gas	3392	-	-	-	-	-	5193	5205	5225	-	-	-	5255, Cb
SW SE SW 2-5-40W	No. 1 Browning General Resources	3424	-	-	-	-	-	5290	5332	5344	-	-	-	5356, Cb
NW NW SE 21-6-36W	No. 1 Kanost Jones, Shelb. & Farmer	3267	-	-	-	-	-	4941	4948	4956	-	-	-	4972, Cb
C NW SW 9-6-37W	No. 1 Smith Carter Oil Co.	3278	-	-	-	-	-	5022	5030	5046	-	-	-	5087, Cb
C SE SE 12-6-37W	No. 1 Fanning Brinkerhoff Drig.	3303	-	-	-	-	-	5041	5050	5058	-	-	-	5076, C1
C NW NW 10-6-39W	No. 1 Mattheus W. F. Newton	3360	-	-	-	-	-	5226	5244	5251	-	-	-	5261, Cb

APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN									UP. DEV. "Chatt." (6)	Under- lying Strata
			Meramecian				Osagean			Kinderhookian			
			Ste. Gen. (8)	Rt. Louis (8)	Sperg. (7)	Warsaw (6)	Up. K.-B. (5)	Lo. K.-B. (4)	Gil. City (3)	Hamp. (2)	Baldc. (1)		
CHASS--Continued.													
C SE SE 24-6-39W	No. 1 Topley W. F. Newton	3297	-	-	-	-	-	5092	5116	-	-	-	5126, Td
NW NW NE 34-6-41W	No. 1 Schultz Carl Westland	3487	-	-	-	-	-	-	-	5470	-	-	5484, C1
C NE NE 26-7-36W	No. 1 Fanning Prize-Kee Petr.	3055	-	-	-	-	-	-	-	4758	-	-	4765, C1
C SE SE 12-7-39W	No. 1 Baker W. F. Newton	3251	-	-	-	-	-	-	5040	5062	-	-	5072, Td
C NW SW 5-7-39W	No. 1 Bremer Ohio Oil Co.	3396	-	-	-	-	-	-	-	5322	5328	-	5338, C1
C NW SE 10-7-41W	No. 1 Colson J. M. Huber Corp.	3507	-	-	-	-	-	-	-	-	-	-	5542, Pe
C SW SW 35-8-36W	No. 1 O'Neal Donnell Drig. Co.	3185	-	-	-	-	-	-	-	-	-	-	4890, C1
NW NW NW 24-8-37W	No. 1 Robertson Jones, Sheld. & Farmer	3247	-	-	-	-	-	-	-	-	-	-	5000, Pe
C SE SW 21-8-38W	No. 1 Eberhardt W. F. Newton	3287	-	-	-	-	-	-	-	-	-	-	5148, C1
NW NW NE 24-8-39W	No. 1 Baldwin Northern Nat. Gas	3278	-	-	-	-	-	-	-	-	-	-	5108, C1
NW NW SW 15-8-39W	No. 1 Kilpatrick Skelly Oil Co.	3375	-	-	-	-	-	-	-	-	-	-	5286, Pe
CLAY													
C SE NW 28-5-7W	No. 1 Shalka Wesley Hanceck	1764	-	-	-	-	-	-	-	3010	3047	-	3088, D
COLFAX													
C NW NW 7-17-3E	No. 1 Lauvets Superior Oil Co.	1411	-	-	-	-	-	-	-	1287	1385	-	1465, D
CUMING													
E4 SE SW 11-21-6E	No. 1 Daberkow Watkins Oil Co.	1343	-	-	-	-	-	-	840	885	930	-	1045, D
C SE SE 11-21-6E	No. 1 Rief Watkins Oil Co.	1358	-	-	-	-	-	838	852	902	950	-	1060, D
DAKOTA													
C NW NE 33-28-8E	No. 1 Armour Peter Skriver	1255	-	-	-	-	-	-	-	-	544	-	604, D
DAWES													
C SE SE 16-29-49W	No. 1 State Cree Drig. Co.	4147	-	-	-	-	-	-	-	-	-	-	4964, Pe
C NW NE 23-30-47W	No. 1 Kudrna Blair, B44ber & Barr	4081	-	-	-	-	-	-	-	-	-	-	3582, Pe
C NE SE 14-30-50W	No. 1 Hulseman Potter Drig. Co.	4386	-	-	-	-	-	-	-	-	5328	-	5346, C1
C SE SE 2-30-51W	No. 1 Soester Potter Drig. Co.	4519	-	-	-	-	-	-	-	-	-	-	5736, Pe
C NW NE 22-31-49W	No. 1 Federal Potter Drig. Co.	4105	-	-	-	-	-	-	-	-	4946	-	4964, C1
C SW SE 28-31-49W	No. 1 Demas California Oil Co.	4416	-	-	-	-	-	-	-	-	5169	-	5212, Pe
C NW SE 11-31-51W	No. 1 Richardson Fred Morgan	3785	-	-	-	-	-	-	-	-	5032	-	5042, C1
SW NE SW 10-32-52W	No. 1 Ostermayer Aserada Petr. Corp.	3649	-	-	-	-	-	-	-	-	5050	-	5080, C1
SE NE SE 16-33-49W	No. 1 State Aserada Petr. Corp.	3290	-	-	-	-	-	-	-	4465	-	-	4488, Pe

APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN										UPP. DEV. "Chalk" (9)	Under- lying Strata	
			Meramecian				Osagean			Kinderhookian					
			St. Gen. (4)	St. Louis (8)	Sperg. (7)	Warsaw (6)	Up. K.-H. (3)	Lo. K.-H. (4)	Gl. City (3)	Hamp. (2)	Boone (1)				
DAWES--Continued															
	NW NW NW 12-33-52W	No. 1 Metz Wondra & California Co.	3542	-	-	-	-	-	-	-	5008	5060	-	-	5113, TD
	C SW SE 27-33-52W	No. 1 Federal Whitehall Oil Co.	3625	-	-	-	-	-	-	-	5056	5090	-	-	5165, TD
	C NE NE 4-34-47W	No. 1 Christensen William Glary	3236	-	-	-	-	-	-	-	-	-	-	-	2740, Pc
DODGE															
	NW NE SW 34-19-8E	No. 1 Havekost Bedrock Oil & Gas	1112	-	-	-	-	760	790	840	865	-	-	-	930, D
DOUGLAS															
	NE NE NE 10-14-13E	No. 3 Water Well Union Stockyards	*974	-	-	-	-	-	548	570	610	620	-	725	785, D
	C SE 21-15-13E	No. 1 Water Well Alamto Dairy	*1160	-	-	-	-	650	685	720	730	-	-	830	870, D
	W 1/2 NE SE 22-15-13E	No. 3 Water Well Fairmont Creamery	*1030	-	-	-	7	550	570	600	610	-	-	710	750, D
	NW SE SE 25-16-9E	No. 1 Smith Great Western Oil	1150	-	-	-	-	-	-	-	610	-	-	-	655, D
DUNDY															
	C NW NW 10-1-36W	No. 1 Gottschalk E. A. Obering	3042	-	-	-	-	-	7	4762	4792	-	-	-	4839, Cb
	C SE SW 22-1-37W	No. 1 Richard J. M. Cline	3022	-	-	-	-	-	4768	4778	-	-	-	-	4781, TD
	C SW NW 11-1-38W	No. 1 Schrader Tippe Drlg. Co.	3170	-	-	-	-	-	4986	5019	5036	-	-	-	5076, Cb
	C NW NW 1-1-39W	No. 1 Hansen Dow & McHugh	3244	-	-	-	-	-	5000	-	-	-	-	-	5019, TD
	C SE NE 10-2-36W	No. 1 Vonderfecht E. A. Obering	3101	-	-	-	-	-	4775	4832	4856	-	-	-	4892, Cb
	C SW NE 8-2-37W	No. 1-A Stroup Sunray Mid-Continent	3159	-	-	-	-	-	4862	4940	4954	-	-	-	4970, Cb
	SW SW NW 20-2-37W	No. 1 Reining Deep Rock Oil Corp.	3167	-	-	-	-	-	4920	4961	5002	-	-	-	5028, Cb
	C SW NE 33-2-37W	No. 1 Cannon Ohio Oil Co.	3093	-	-	-	-	4820	4830	4894	4910	-	-	-	4946, Cb
	C SE NE 11-2-40W	No. 1 Peck J. K. Wadley	3415	-	-	-	-	5185	5200	-	-	-	-	-	5244, TD
	C SE SW 17-2-41W	No. 1 Rusey Woody, Keil & Burns	3473	-	-	-	-	-	-	5414	5425	-	-	-	5450, Cb
	C NE NE 1-3-36W	No. 1 Keiser Donnell Drlg.	3189	-	-	-	-	-	4883	4893	4918	-	-	-	4944, Cb
	C NE SE 27-3-36W	No. 1 Foster E. A. Obering	3062	-	-	-	-	-	4736	4793	4818	-	-	-	4848, Cb
	C SE NE 31-3-36W	No. 1 Dunn Sterling Drlg. Co.	3189	-	-	-	-	-	4924	4960	4976	-	-	-	5010, Cb
	SE SE SW 6-3-37W	No. 1 Boney Deep Rock Oil Corp.	3240	-	-	-	-	4996	5072	5080	-	-	-	-	5090, Cb
	C NW SE 29-3-37W	No. 1 Ham Sunray Mid-Continent	3181	-	-	-	-	-	4925	4984	5002	-	-	-	5016, Cb
	C SE NW 36-3-38W	No. 1-B State Sunray Mid-Continent	3210	-	-	-	-	4946	4956	5038	5054	-	-	-	5067, TD
	NE NE SW 6-3-40W	No. 1-A Nichols Deep Rock Oil Corp.	3470	-	-	-	-	-	-	5359	5370	-	-	-	5387, Cb
	C NE NE 29-3-40W	No. 1 Clegg J. K. Wadley	3458	-	-	-	-	5276	5290	5340	5351	-	-	-	5376, Cb

APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN								UP. DEV. "Chatt." (6)	Under- lying Strata	
			Meramecian				Osagean		Kinderhookian				
			Ste. Gen. (9)	St. Louis (8)	Sperg. (7)	Warraw (6)	Up. K.-H. (5)	Lo. K.-H. (4)	Gl. City (3)	Horns. (2)			Baird (1)
DUNDY--Continued													
C SW SW 27-3-41W	No. 1 Daniels Donnell Drig. Co.	3528	-	-	-	-	5405	5414	5460	5472	-	-	5488, Cb
SW SW 20-4-38W	No. 1 Frazier W. F. Newton	3358	-	-	-	-	-	5115	-	-	-	-	5146, TD
C NE NE 1-4-40W	No. 1 Watts W. F. Newton	3410	-	-	-	-	-	-	5284	5300	-	-	5306, TD
C NE NE 1-4-41W	No. 1 Earl Lion Oil Co.	3500	-	-	-	-	-	5352	5374	5382	-	-	5400, Cb
C SW SW 32-4-41W	No. 1-A Nichols Tenn. Gas Transmission	3545	-	-	-	-	-	-	5507	5514	-	-	5532, Cb
FILLMORE													
NE NE NE 22-5-1W	No. 1 Mathies William Ebke	1573	-	-	-	-	-	-	-	-	-	-	2248, D
SE SW NW 3-5-2W	No. 1 Vermont Fillmore Develop. Co.	1614	-	-	-	-	-	-	2430	2445	-	-	2465, D
FRANKLIN													
C NW SE 22-1-13W	No. 1 Kugler Sun Oil Co.	1879	-	-	-	-	-	3716	3768	3825	-	-	3842, Om
SE NE SE 30-1-13W	No. 1 Avery Ohio Oil Co.	1930	-	-	-	-	-	-	3535	3555	-	-	3575, Om
NE NE NE 17-1-15W	No. 1 Malick Bay Petroleum Co.	1967	-	-	-	-	-	3814	3839	3875	-	-	3884, Om
NE NE SE 6-1-16W	No. 1 Bauerle American Plains Oil Co.	1954	-	-	-	-	-	-	-	-	-	-	3775, Ov
C SE NE 23-1-16W	No. 1 Hauserman F. O. Hawn	1981	-	-	-	-	-	-	3842	3872	-	-	3882, Om
NW NW NE 32-1-16W	No. 1 Seigel G. F. Atkinson Co.	2080	-	-	-	-	-	-	-	-	-	-	3810, Ov
SW SW SE 8-3-14W	No. 1 Johnson Shaffer Drig. Co.	2116	-	-	-	-	-	3895	3910	3965	-	-	3975, Ov
C NW NW 13-3-16W	No. 1 Edens Foree & Fields	2150	-	-	-	-	-	-	4047	4085	-	-	4095, Ov
C SE NE 17-3-16W	No. 1 Flessner R. M. Hart et al	2229	-	-	-	-	-	-	4166	4210	-	-	4220, Ov
SE NE NW 24-4-15W	No. 1 Pollman R. G. Cramer	2136	-	-	-	-	-	-	3861	3890	-	-	3901, Ov
GRESHLEY													
C NW SE 24-17-12W	No. 1 Zulkoski Wed Biffle	1951	-	-	-	-	-	-	-	-	-	-	2848, Ov
C SW NE 28-17-12W	No. 1 Bredthauer Henry Bredthauer	2049	-	-	-	-	-	-	-	-	-	-	3025, D
SE SE SE 26-16-10W	No. 5 Strat Carter Oil Co.	1924	-	-	-	-	-	-	2848	2892	-	-	2902, D
C NE NE 33-19-11W	No. 41 Barnes Superior Oil Co.	2081	-	-	-	-	-	-	2958	2988	-	-	2994, D
HALL													
SW SW NW 32-9-11W	No. 1 Ditfield Al Ward	2026	-	-	-	-	-	-	-	3505	-	-	3530, D
SE SE NE 36-9-12W	No. 1 State Al Ward	1984	-	-	-	-	-	-	-	3510	-	-	3520, D
C SE SW 20-10-12W	No. 1 Lewis Superior Oil Co.	2009	-	-	-	-	-	-	-	-	-	-	3500, Om
SW SW SW 11-12-11W	No. 1 Dennison Nebr.-Wyo. Oil Co.	1922	-	-	-	-	-	-	-	3081	-	-	3100, Om

APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN									UP. DEV. "Chalk" (4)	Under- lying Strata
			Meramecian			Osagean		Kinderhookian					
			Ste. Gen. (8)	St. Louis (8)	Sperg. (7)	Warsaw (6)	Up. K.-B. (5)	Lo. K.-B. (4)	Gil. City (3)	Hamp. (2)	Balce (1)		
BARLAN													
C SW NE 17-2-17W	No. 1 Dixon Superior Oil Co.	2141	-	-	-	-	-	-	-	-	-	-	3982, Ov
SE NE NW 5-3-17W	No. 1 Hoffman Inter-Cont. Oil Co.	2216	-	-	-	-	-	-	-	4060	4090	-	4095, Ov
C E $\frac{1}{2}$ SW 7-3-17W	No. 1 Smith Inter-Cont. Oil Co.	2205	-	-	-	-	-	-	-	4019	4045	-	4055, Ov
C NE NW 9-3-17W	No. 1 Schluntz F. O. Havn	2232	-	-	-	-	-	-	-	4100	4118	-	4124, Ov
NE NE SE 27-3-17W	No. 1 Asche United Prod. Co.	2111	-	-	-	-	-	-	-	3920	3958	-	3967, Ov
SE SW SE 35-4-17W	No. 1 Arehart United Prod. Co.	2256	-	-	-	-	-	-	-	4042	4089	-	4098, Ov
HAYES													
C SW NW 15-5-34W	No. 1 Malone Jones, Shelb. & Farmer	2800	-	-	-	-	-	-	-	-	-	-	4442, C1
C NE NW 29-5-34W	No. 1 Harris Jones, Shelb. & Farmer	2814	-	-	-	-	-	-	-	-	-	-	4524, Cb
E $\frac{1}{2}$ SW NE 23-6-35W	No. 1 Irvine Bedrock Oil & Gas	3114	-	-	-	-	-	-	-	-	-	-	4812, C1
C SE SW 32-7-34W	No. 1 Cochran Plains Expl. Co.	3075	-	-	-	-	-	-	-	-	-	-	4730, C1
C SE SE 3-7-35W	No. 1 Voda Poole et al	3110	-	-	-	-	-	-	-	-	-	-	4726, C1
HITCHCOCK													
C SW NE 8-1-32W	No. 1 Pikan Skelly Oil Co.	2883	-	-	-	-	-	-	-	-	-	-	4462, Cb
C NE SW 29-1-32W	No. 1 Roose D. R. Claussen	2875	-	-	-	-	-	-	-	-	-	-	4496, C1
C SE NE 10-1-33W	No. 1 Sydos Burch Drilg. Co.	2959	-	-	-	-	-	-	-	-	4532	-	4548, Cb
C SE NW 19-1-33W	No. 1 Kelly Franco Cent. Oil	2943	-	-	-	-	-	-	4500	-	-	-	4502, TD
C SE SE 26-1-33W	No. 1 Solko Brack Drilg. Co.	2936	-	-	-	-	-	-	-	-	-	-	4502, Cb
C NW NW 28-1-33W	No. 1 Steinke Burch Drilg. Co.	2933	-	-	-	-	-	-	-	4469	4492	-	4516, Cb
C NE SE 29-1-33W	No. 1 Wagner D. R. Claussen	2976	-	-	-	-	-	-	-	4532	4550	-	4576, Cb
C SW NE 31-1-33W	No. 1 Hedke Texaco Inc.	3050	-	-	-	-	-	-	-	-	-	-	4606, Cb
C SE SE 34-1-33W	No. 1 Solko British American Oil Co.	2972	-	-	-	-	-	-	-	4525	-	-	4526, TD
C NE NE 1-1-34W	No. 1 Hudson Brack Drilg. Co.	2940	-	-	-	-	-	-	4580	4590	4632	-	4644, Cb
C SE NE 34-1-34W	No. 1 Bose British American Oil Co.	3053	-	-	-	-	-	-	-	4650	4672	-	4691, Cb
C NE SE 11-1-35W	No. 1 Bedford Franco Central Oil	3010	-	-	-	-	-	-	4685	4702	4729	-	4750, Cb
C SW SE 15-2-32W	No. 1 French Burch Drilg. Co.	2828	-	-	-	-	-	-	-	-	-	-	4390, C1
C SW NE 33-2-32W	No. 1 Brown Skelly Oil Co.	2890	-	-	-	-	-	-	-	-	-	-	4475, Cb
SW SW SE 35-2-33W	No. 1 Redmer Texaco Co.	2925	-	-	-	-	-	-	-	4494	4518	-	4530, Cb

APPENDIX, NEP. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Elevation (Feet)	MISSISSIPPIAN									UP. DEV. "Chatt." (10)	Under- lying Strata		
			Nemacolin				Osagean			Kinderhookian					
			St. Gen. (9)	St. Louis (8)	Sparg. (7)	Warren (6)	Up. K.-H. (5)	Lo. K.-H. (4)	Gl. City (3)	Hamp. (2)	Baize (1)				
HITCHCOCK--continued															
C SW SW 35-2-33W	No. 1 Reutzel Diamond Oil Co.	2909	-	-	-	-	-	-	-	-	4469	4492	-	-	4505, Cb
SE NW NW 22-2-35W	No. 1 Taunton Texas Co.	2823	-	-	-	-	-	-	-	4500	4512	4530	-	-	4560, Cb
C NW SE 28-2-35W	No. 1 Burks E. F. Blair & Assoc.	2840	-	-	-	-	-	-	-	4519	4540	4555	-	-	4580, Cb
C SE SE 12-3-32W	No. 1 Perkins Citizens Oil	2595	-	-	-	-	-	-	-	-	-	-	-	-	4120, C1
C SW SW 16-3-35W	No. 1 State J. K. Wadley	3039	-	-	-	-	-	-	-	4717	4745	4768	-	-	4793, Cb
C NE NE 23-4-33W	No. 1 Carter Jonas, Shelb. & Farmer	2700	-	-	-	-	-	-	-	-	-	-	-	-	4330, C1
C NW NW 36-4-34W	No. 1 State Jonas, Shelb. & Farmer	2986	-	-	-	-	-	-	-	-	-	4613	-	-	4633, Cb
SE SE SW 29-4-35W	No. 1 Egle Texas Co.	3190	-	-	-	-	-	-	-	-	4898	4918	-	-	4931, Cb
C SE SE 34-4-35W	No. 1 Harrison F. B. Jackson, Jr.	3119	-	-	-	-	-	-	-	-	4832	4848	-	-	4862, TD
HOLT															
C SE SE 9-25-16W	No. 1 Beck H. L. Hunt	2391	-	-	-	-	-	-	-	-	-	-	-	-	3070, Ov
C NE SE 15-27-16W	No. 1 Vrooman H. L. Hunt	2318	-	-	-	-	-	-	-	-	-	-	-	-	2884, Ov
SW SE NE 9-28-9W	No. 1 Asher L. J. Twibell	1917	-	-	-	-	-	-	-	-	1985	-	-	-	2056, D
C SE SE 34-28-13W	No. 1 Schaeffer Time Petr. Co.	2100	-	-	-	-	-	-	-	-	2390	-	-	-	2405, D
C SW NE 23-28-15W	No. 1 Dobrovolny H. L. Hunt	2225	-	-	-	-	-	-	-	-	-	2684	-	-	2733, Ov
C SE SE 13-29-13W	No. 1 Froelich Time Petr. Co.	2054	-	-	-	-	-	-	-	-	2241	-	-	-	2295, D
HOWARD															
C NE NW 25-13-11W	No. 1 Kroeger Superior Oil Co.	1879	-	-	-	-	-	-	-	-	-	?	-	-	2966, D
C SE NW 26-15-10W	No. 1 Weber Superior Oil Co.	1780	-	-	-	-	-	-	-	-	2706	2740	-	-	2750, D
SE SE NE 10-16-12W	No. 1 Kment W. F. Prochaska	2025	-	-	-	-	-	-	-	-	-	3092	-	-	3099, D
JEFFERSON															
C SE SE 31-1-1E	No. 1 Bonham Page et al	1610	-	-	-	-	-	-	-	-	-	-	-	-	2545, D
NW NW NW 20-2-2E	No. 1 Covlman Wm. Ebke	*1455	-	-	-	-	-	-	-	-	-	-	-	-	2047, D
KEARNEY															
C NE SE 28-8-13W	No. 1 Jackson Superior Oil Co.	2062	-	-	-	-	-	-	-	-	3706	3733	-	-	3753, Om
NE NE NE 32-8-16W	No. 1 Swanson K & F Drilg. Co.	2176	-	-	-	-	-	-	-	-	-	-	-	-	3878, Ov
MERRICK															
C NW SW 11-15-6W	No. 1 Pullen J. E. Palensky	1690	-	-	-	-	-	-	-	-	2308	2330	-	-	2385, D

APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN										UP. DEV. "Chatt." (0)	Under- lying Strata			
			Meramecian				Osagean		Kinderhookian								
			St. Gen. (9)	St. Louis (8)	Sperg. (7)	Warraw (6)	Up. K.-B. (5)	Lo. K.-B. (4)	Gil. City (3)	Hamp. (2)	Boice (1)						
NEBAMA																	
SE NE NW 6-4-14E	No. 1 Friedrichs Ohio Oil Co.	1110	-	-	-	-	-	2050	2095	2108	2180	2230	2400	D			
NE NE NE 9-4-14E	No. 1 Wheeler Frank Engles <u>et al</u>	1066	-	-	-	2214	2245	2268	2314	2328	2395	2465	2658	D			
SE SW NE 20-4-14E	No. 1 Hopkins O. A. Burton	1113	-	-	-	?	2162	2205	2252	2265	2330	2375	2541	D			
C SW NE 24-4-14E	No. 1 Hiel Phillips Petr. Co.	1110	-	-	-	2295	2310	2350	2400	2410	2470	2540	2722	D			
C SE SW 16-4-15E	No. 1 Allen Black Gold	1066	-	2200	2220	2232	2270	2310	2370	2380	2435	2485	2688	D			
NE NE SW 26-4-15E	No. 1 Lambert Richards <u>et al</u>	1061	-	-	2175	2185	2225	2260	2305	2310	2375	2420	2637	D			
NE NW SE 36-4-15E	No. 1 Lewis Palensky & Sams	1012	-	2109	2131	2149	2184	2218	-	2270	2335	2380	2557	D			
C SE SE 19-4-16E	No. 1 Shaffer Jackson & Rust	997	-	2090	2115	2130	2170	2200	?	2245	2310	2370	2550	D			
C SW NW 32-4-16E	No. 1 Kniesely Black Gold	1047	2120	2145	2165	2185	2220	2255	-	2300	2365	2415	2587	D			
NE SE NE 35-4-16E	No. 1 Morehead Skelly Oil Co.	1130	-	-	-	2215	2245	2285	?	2335	2400	2425	2610	D			
SW SW SE 36-4-16E	No. 194 Strat Skelly Oil Co.	1157	-	2200	2210	2225	2265	2300	-	2345	2398	?	2615	D			
C SE SW 1-5-13E	No. 1 Adcock Jones, Shalb., & Farmer	1165	-	-	-	1942	1954	1972	2006	2022	2091	2160	2366	D			
SE SE SE 4-5-13E	No. 1 Keichel Kees & Laker	1190	-	-	-	-	?	1870	1910	1925	1995	2055	2240	D			
C NW NE 7-5-13E	No. 1 Casey J. E. Palensky	1165	-	-	-	-	1650	1670	-	1712	1790	1860	2023	D			
SW SW SW 9-5-13E	No. 1 Lunsman C. B. Wakefield	1209	-	-	-	1883	1890	1912	1955	1960	2035	2090	2258	D			
NW NW NW 17-5-13E	No. 1 Rogge Thiesman & Schrock	1218	-	-	-	-	-	1947	1985	1998	2063	2110	2300	D			
C NW SW 32-5-13E	No. 1 Rohrs Jones, Shalb., & Farmer	1197	-	-	-	2025	2037	2056	2104	2120	2184	2250	2445	D			
SW NW NW 8-5-14E	No. 1 Ord Sonken-Galamba Co.	961	-	-	-	1800	1815	1850	1890	1907	1970	2030	2251	D			
W ¹ / ₂ NE SW 20-5-14E	No. 1 Schraifer Bow & Arrow	971	-	-	-	1975	1995	2030	2070	2085	2145	2205	2398	D			
C NE NE 15-5-15E	No. 1 Magor J. O. Isaacks	1108	-	2200	-	2235	2270	2305	2360	2370	2420	2475	2666	D			
C NW NE 32-5-15E	No. 1 Evans Nemha Development Co.	903	-	1766	-	1790	1815	1855	-	1905	1965	2020	2219	D			
SE SE SE 34-5-15E	No. 1 Lawrence Pulliam & Gall	921	-	2010	-	2040	2060	2100	2150	2160	2220	2275	2502	D			
SW SW SW 19-6-13E	No. 1 Boellstorff Cities Service	1052	-	-	-	1400	1405	-	-	-	-	-	1423	TD			
E ¹ / ₂ SE SW 21-6-13E	No. 1 Beason M. J. Sullivan	1058	-	-	-	?	1415	1435	-	1470	1543	1565	1730	D			
W ¹ / ₂ NW NW 23-6-13E	No. 1 Gauchot Dan Short <u>et al</u>	*952	-	-	-	-	1555	1580	-	1625	1705	1740	1922	D			
SW NW NE 26-6-13E	No. 1 Gauchot Continental Petr.	955	-	-	-	-	1628	1650	-	1695	1755	1800	2000	D			
C SE NW 28-6-13E	No. 1 Lintz Jones, Shalb., & Farmer	1096	-	-	-	-	1456	1465	-	1507	1586	1630	1781	D			

APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN									UP. DEV. "Chatt." (6)	Under- lying Strata	
			Meramecian			Osagean			Kinderhookian					
			St. Gen. (9)	St. Louis (8)	Sparg. (7)	Warsaw (6)	Up. K.-H. (5)	Lo. K.-H. (4)	Ch. Chy (3)	Hamp (2)	Boice (1)			
JEMAH--Continued														
	W $\frac{1}{2}$ SW NW 36-6-14E	No. 1 Wrightman Bow & Arrow	1112	-	-	-	2010	2040	2080	2130	2145	2205	2265	2496, D
	SE NE NE 34-6-15E	No. 1 Snyder Gulf Oil Corp.	942	-	1670	-	1700	1730	1770	1815	1835	1888	1950	2165, D
OTOE														
	NE SW NW 25-7-12E	No. 1 Ritter J. H. O'Connor	987	-	-	-	-	-	-	-	992	?	1016	1162, D
	C NW SW 10-8-14E	No. 1 Brick Plant Ingersoll Bros.	932	-	-	-	1051	?	1106	1156	?	?	1240	1460, D
	E $\frac{1}{2}$ SE SW 31-9-14E	No. 1 Roddy Estate Phelps Oil Co.	1065	-	-	-	-	-	-	-	-	-	970	1050, D
POLK														
	C SE NW 9-13-3W	No. 1 Sundberg Superior Oil Co.	1670	-	-	-	-	-	-	2116	2152	-	-	2192, D
	C SW SW 36-16-1W	No. 1 Brigham W & M Oil Co.	1506	-	-	-	-	-	-	1598	1639	-	-	1660, D
RICHARDSON														
	C NW SE 14-1-13E	No. 1 Stalder Ferguson Oil Co.	1163	-	-	-	-	-	-	-	2094	2114	2170	2400, D
	SW SW NE 22-1-13E	No. 1 Stauffer Stevens & Urhl	1044	-	-	-	-	-	-	-	-	1740	1760	1965, D
	C NW SW 22-1-13E	No. 1-A Stauffer Mitchell & Levine	1065	-	-	-	-	-	-	-	-	-	-	1788, B
	C SE NE 32-1-13E	No. 1 Harlow Stevens & Urhl	1112	-	-	-	-	-	-	-	-	-	-	750, Pc
	SW SW SE 2-1-14E	No. 1 Keras Palensky & Sons	941	-	-	-	-	-	-	-	-	-	2040	2231, D
	NE NW SW 3-1-14E	No. 1 Beachy Palensky et al	944	-	-	-	-	-	-	-	-	-	1990	2180, D
	E $\frac{1}{2}$ SE SE 3-1-14E	No. 1 Smith Skelly Oil Co.	941	-	-	-	-	-	-	-	-	-	1970	2170, D
	E $\frac{1}{2}$ SW SW 3-1-14E	No. 1 Wilkinson Web. Prod. & Ref.	951	-	-	-	-	-	-	-	-	-	1995	2162, D
	E $\frac{1}{2}$ SE SW 4-1-14E	No. 1 Auxier E. S. Towle	953	-	-	-	-	-	-	-	-	2055	2075	2255, D
	E $\frac{1}{2}$ SE NE 4-1-14E	No. 1 Cornelius Weeks et al	956	-	-	-	-	-	-	-	-	1974	1995	2176, D
	SW SW NW 6-1-14E	No. 1 Ast Eckert & Longmore	961	-	-	-	-	-	-	-	2045	2065	2095	2301, D
	E $\frac{1}{2}$ SE NE 9-1-14E	No. 1 Nofsger Urhl & Higgins	1000	-	-	-	-	-	-	-	-	2010	2030	2216, D
	SE SE SE 9-1-14E	No. 1 Ogle Arab-Kerlyn Oil Co.	1071	-	-	-	-	-	-	-	2073	2088	2110	2288, D
	SE NE SE 9-1-14E	No. 1 Ogle Krusger & Son	1034	-	-	-	-	-	-	-	2030	2040	2060	2245, D
	SW NW SW 10-1-14E	No. 1 Albin Eckhart & Powers	1009	-	-	-	-	-	-	-	-	2019	2050	2220, D
	SE NE NW 10-1-14E	No. 1 Bohrer Empire Drilg. Co.	945	-	-	-	-	-	-	-	-	-	1942	2142, D
	E $\frac{1}{2}$ SW SW 11-1-14E	No. 1 Redwood Urhl & Higgins	1012	-	-	-	-	-	-	-	-	-	2071	2276, D
	NE SE SW 11-1-14E	No. 1 Sandrock Forrest et al	998	-	-	-	-	-	-	-	-	-	2080	2289, D
	SW SW SW 12-1-14E	No. 1 Peterson Westgate Oil Co.	959	-	-	-	-	-	-	-	2115	2125	2145	2348, D

APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN										UP. DEV. "Chatt." (6)	Under- lying Strata	
			Meramecian				Osagean			Kinderhookian					
			Sta. (9)	Gen. (8)	St. Louis (8)	Sperg. (7)	Warraw (6)	Up. K.-H. (5)	Lo. K.-H. (4)	Gil. City (3)	Hamp. (2)	Boice (1)			
RICHARDSON--Continued															
NE SW 13-1-14E	No. 1 Phillips Kirby Oil Co.	1024	-	-	-	-	-	-	-	-	-	-	-	2144	2331, D
NW NW SE 14-1-14E	No. 1 Edelman A. H. Thege	1007	-	-	-	-	-	-	-	-	-	-	-	2130	2334, D
SW SE NW 15-1-14E	No. 1 Messinger Palensky & Sons	1035	-	-	-	-	-	-	-	-	-	-	-	2070	2283, D
NE NE SE 15-1-14E	No. 1 Sandrock Stout Drig. Co.	1076	-	-	-	-	-	-	-	-	-	-	-	2150	2355, D
NE NW NE 16-1-14E	No. 1 Lee Powers & Shalder	1073	-	-	-	-	-	-	-	-	2104	2112	2125	2322, D	
NW NW NE 22-1-14E	No. 1 Wittwer M. J. Lewis et al	1096	-	-	-	-	-	-	-	-	-	-	-	2170	2352, D
C SW NW 23-1-14E	No. 1 Shellenbarger Humble Oil	1153	-	-	-	-	-	-	-	-	-	-	-	2250	2423, D
C SE SW 24-1-14E	No. 1 Stevens Stout Drig. Co.	1125	-	-	-	-	-	-	-	-	2214	2230	2260	2448, D	
C NW NE 24-1-14E	No. 1 Whitney Kirby Oil Ind.	1049	-	-	-	-	-	-	-	-	-	-	-	2161	2341, D
NE SE NE 26-1-14E	No. 1 Albin B. F. Morgan	1036	-	-	-	-	-	-	-	-	-	-	-	2230	2430, D
NW NE NW 33-1-14E	No. 1 Feldman Al. Landon	1220	-	-	-	-	-	-	2445	2470	2475	2523	2560	2753, D	
C NE SE 3-1-15E	No. 1 Windle Forest City Basin Syn.	914	-	-	?	2145	2160	2190	-	2230	2295	2355	2564, D		
C NE NW 5-1-15E	No. 1 Horton Sparks & Campbell	973	-	-	-	?	2265	2295	-	2335	2400	2455	2655, D		
E $\frac{1}{2}$ SW NW 16-1-15E	No. 1 Tishen Palensky & Sons	982	-	-	-	-	2246	2268	-	2316	2374	2425	2655, D		
C NW NW 24-1-15E	No. 1 Meyers Pawnee Royalty Co.	945	-	-	-	2082	2098	2120	-	2160	2225	2281	2500, D		
NE NE SE 35-1-15E	No. 1 Miles Smith & Tomer	1082	-	-	-	-	2272	2296	-	2336	2398	2460	2645, D		
C SE SW 6-1-16E	No. 1 Hough Hill R. L. McIntyre	1009	-	-	-	-	2120	2155	2200	2205	2280	2315	2506, D		
C NE SW 7-1-16E	No. 4 Bahr Ohio Oil Co.	904	-	-	-	-	-	1920	1965	1970	2040	2080	2280, D		
C NW SE 7-1-16E	No. 5 Bahr Ohio Oil Co.	912	-	-	-	-	-	1915	1945	1990	2000	2065	2100	2295, D	
NW NE NE 8-1-16E	No. 1 Meyers Palensky & Sons	959	-	-	-	-	2015	2037	-	2084	2164	2200	2394, D		
C SW NW 8-1-16E	No. 1 Walmsley H. S. Campbell	961	-	-	-	-	2010	2015	2055	2070	2140	2170	2372, D		
C NE SE 8-1-16E	No. 1 Zentner Pawnee Royalty Co.	966	-	-	-	2015	2025	2050	2095	2100	2180	2200	2396, D		
SE NW NW 9-1-16E	No. 2 Meyers Palensky & Sons	1022	-	-	-	2085	2090	2111	2162	2170	2251	2272	2486, D		
NW NW NE 13-1-16E	No. 1 Deckenger Bart Aldrige	955	-	-	-	-	2127	2140	-	2185	2247	2300	2485, D		
C NE NW 16-1-16E	No. 2 Boose Shaffer & Rust	903	-	-	-	1980	2000	2030	-	2075	2150	2175	2365, D		
C NW NW 17-1-16E	No. 2 Bucholz Pawnee Royalty Co.	900	-	-	-	-	-	1970	-	2010	2090	2125	2300, D		
C SW NW 17-1-16E	No. 4 Bucholz Ohio Oil Co.	898	-	-	-	-	1945	1950	-	2000	2065	2100	2300, D		

APPENDIX, NEB. GEOL. SURV. BULL. 31

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN									UP. DEV. "Chatt." (0)	Under- lying Strata	
			Meramecian			Osagean			Kinderhookian					
			St. Gen (8)	St. Louis (8)	Spring (7)	Warsaw (8)	Up. K.-R. (5)	Lo. K.-R. (4)	Gr. City (3)	Hamp (2)	Boice (1)			
RICHARDSON-- Continued														
NW NE SW 17-1-16E	No. 10 Buchholz Ohio Oil Co.	894	-	-	-	-	-	1946	-	1976	2043	2080	2266, D	
W 1/2 SE SE 17-1-16E	No. 1 Sibbersen Towle & Isaacks	896	-	-	-	-	-	1914	1935	-	1972	2041	2075	2270, D
SW SW SW 17-1-16E	No. 2 Sibbersen Ohio Oil Co.	898	-	-	-	-	-	1910	1920	-	1960	2030	2070	2255, D
C NE NE 18-1-16E	No. 1 Boice Fawnee Royalty Co.	900	-	-	-	-	-	?	1925	-	1970	2040	2076	2276, D
NW NW NE 18-1-16E	No. 2 Boice O. C. Winter	900	-	-	-	-	-	1910	1920	1960	1970	2040	2075	2273, D
C NE SE 18-1-16E	No. 1 Keim-Workman Fawnee Royalty Co.	896	-	-	-	-	1945	1952	1972	2015	2020	2080	2100	2260, D
C SW SW 19-1-16E	No. 1 Towle Realty Isaacks & Towle	968	-	-	-	-	-	2135	2165	2200	2215	2285	2350	2549, D
NW NW NE 20-1-16E	No. 4 Davison Skelly Oil Co.	899	-	-	-	-	-	-	1915	-	1945	2010	2060	2244, D
C SE SE 20-1-16E	No. 1 Pritchard Kirk & Ross	898	-	-	-	-	-	-	1945	-	1970	2045	2080	2258, D
SE SE NW 20-1-16E	No. 2 Sandrock E. J. Schaffer	899	-	-	-	-	-	-	1905	-	1955	2035	2060	2250, D
SW SE NE 20-1-16E	No. 1 Schrock R. L. Campbell	897	-	-	-	-	-	-	1920	-	1960	2040	2065	2240, D
C SE NE 25-1-16E	No. 1 Towle O. F. Prah	884	-	-	-	-	-	2085	2100	-	2135	2200	2250	2445, D
NE NW NW 29-1-16E	No. 1 Pritchard Palensky & Sons	948	-	-	-	-	-	-	2016	-	2060	2132	2170	2370, D
C SE NE 29-1-16E	No. 1 Pritchard Skelly Oil Co.	964	-	-	-	-	-	-	2025	-	2070	2140	2180	2365, D
S 1/2 NW NW 29-1-16E	No. 2-B Schock R. L. Campbell	998	-	-	-	-	-	-	2018	-	2055	2120	2165	2347, D
C NE NE 30-1-16E	No. 1 Conklin Black Gold	1024	-	-	-	-	2175	2195	2225	-	2265	2335	2380	2583, D
SW SW SW 30-1-16E	No. 1 Langfitt O. A. Sutton	1087	-	-	-	-	2260	2265	2295	-	2344	2405	2472	2670, D
NE NW NE 33-1-16E	No. 1 Jenkins Ross Oil Co.	909	-	-	-	-	-	2170	2175	-	2220	2290	2330	2500, D
C SW NW 5-1-17E	No. 1 Zimmerman Ohio Oil Co.	947	-	-	-	2115	2120	2165	2200	-	-	-	-	2210, TD
NW NE NE 16-1-17E	No. 202 Strat Skelly Oil Co.	882	-	-	-	1988	2000	2045	2080	2122	2135	2195	2255	2442, D
C NE NW 24-1-17E	No. 1 Tiehen Ferguson & Towle	881	-	-	-	-	1980	2030	2065	2100	2115	2175	2235	2381, D
SE SW SW 5-1-18E	No. 1 Pecton Empire Drlg. Co.	957	-	2020	2030	2050	2100	2140	2180	2195	2245	2300	2431, D	
NE SE SW 28-1-18E	No. 1 Boose Citias Service	857	-	-	1876	1900	1950	1996	-	-	2022	2080	2140	2288, D
SE NE SE 28-1-18E	No. 1 Boose Palensky & Sons	858	-	1854	1885	1920	1965	2005	-	-	2045	2110	2165	2310, D
SW SE NE 30-1-18E	No. 1 Lewis C. M. Turner	870	-	-	1940	1972	2025	2065	2111	2116	2177	2240	2387, D	
C SW SW 5-2-13E	No. 1 Kalous Palensky & Sons	1008	-	-	-	-	-	-	-	-	-	-	-	980, D
SW NW SW 15-2-13E	No. 1 Cander McNulty & Bass	1101	-	-	-	-	-	-	-	-	-	-	-	1788, D

APPENDIX, NEIL GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN									UP DEV. "Chatt." (0)	Under- lying Strata		
			Meramecian				Osagean			Kinderhookian					
			Ste. Gen. (9)	St. Louis (8)	Sperg. (7)	Warsaw (6)	Up. K.-B. (5)	Lo. K.-R. (4)	Old City (3)	Hamp. (2)	Boice (1)				
RICHARDSON--Continued															
NW NW SE 24-2-13E	No. 1 Kotouc O. A. Sutton	1041	-	-	-	-	-	-	-	-	-	2195	2210	2227	2430, D
NE NE NE 29-2-13E	No. 1 Horalek Towle et al	1143	-	-	-	-	-	-	-	-	-	-	-	-	1025, B
NE NE NW 15-2-14E	No. 1 Heim O. A. Sutton	1098	-	-	-	-	-	2325	2350	-	-	2388	2455	2500	2675, D
C NW SW 15-2-14E	No. 1 Oswald National Petr. Co.	1013	-	-	-	-	-	?	2235	2275	2285	2345	2375	2552	2552, D
NW NW SE 27-2-14E	No. 1 Kean Phillips Petr. Co.	1043	-	-	-	-	-	-	2402	2446	2458	2512	2550	2742	2742, D
SW NW NW 29-2-14E	No. 1 Nofsger J. C. Higgins	1033	-	-	-	-	-	-	-	-	-	-	-	2215	2382, D
SW NW SW 29-2-14E	No. 2 Snetten J. C. Higgins	1071	-	-	-	-	-	-	-	-	-	-	-	2206	2367, D
SE NE NW 30-2-14E	No. 1 Stalder Palensky & Sons	1098	-	-	-	-	-	-	-	-	-	-	-	2295	2442, D
SE SE NE 30-2-14E	No. 1 Strawn Palensky & Sons	1056	-	-	-	-	-	-	-	-	-	-	-	2210	2349, D
NE NE NE 32-2-14E	No. 1 Funk Tomer Oper. Co.	1063	-	-	-	-	-	-	-	-	-	-	-	2210	2388, D
NE NE NE 1-2-15E	No. 1 Gephart Midland Oil Co.	1091	-	-	-	-	-	2225	2240	-	-	2285	2355	2400	2613, D
NW NW NE 2-2-15E	No. 1 Bauer Ferguson & Towle	981	-	-	-	-	-	2065	2075	-	-	2120	2178	2230	2413, D
N $\frac{1}{2}$ S $\frac{1}{2}$ SW 2-2-15E	No. 2 Fritz Palensky & Sons	1002	-	-	-	-	-	2122	2130	-	-	2180	2240	2295	2471, D
C SE SE 2-2-15E	No. 1 Rittamel' Palensky & Sons	1067	-	-	-	-	-	2205	2225	-	-	2275	2340	2395	2574, D
C NE SE 3-2-15E	No. 1 Bankers Life Indian Terr. Ill. Oil	978	-	-	-	-	-	2065	2090	-	-	2140	2200	2250	2418, D
NW NW NE 14-2-15E	No. 1 Heinemann Phillips Petr. Co.	1001	-	-	-	-	-	2153	2160	-	-	2210	2280	2338	2520, D
NE SE NE 23-2-15E	No. 1 Schafer Phillips Petr. Co.	929	-	-	-	-	-	2118	2122	2172	2177	2238	2300	2490, D	
W $\frac{1}{2}$ NW NE 31-2-15E	No. 1 Dowell O. C. Johnson	931	-	-	-	-	-	2275	2295	2335	2345	2405	2455	2648, D	
NW NE NW 1-2-16E	No. 2-A Schrang Monebia Development Co.	1080	-	-	-	2070	2080	2110	2150	2160	2210	2260	2432	2432, D	
SE NW NW 2-2-16E	No. 3 Henderson Meyers & Mulligan	1087	-	-	-	-	-	2085	2110	2150	2165	2208	2250	2426, D	
SW NW SW 2-2-16E	No. 1-A Rusted Capitol Petr. Corp.	1069	-	-	-	-	-	2084	2101	2140	2149	2204	2242	2410, D	
NE NE NE 2-2-16E	No. 1 Schilenberg Monebia Development Co.	1133	-	-	2130	2140	2160	2190	-	-	2230	2270	2300	2480, D	
C NW NW 4-2-16E	No. 2 Rickhoff J. & M. Oil Co.	1097	-	-	-	-	-	-	2200	2220	2230	2290	2330	2526, D	
C NW SW 8-2-16E	No. 1 Hebenstrett Transcontinental Petr.	980	-	-	-	2110	2120	2145	-	-	2190	2255	2295	2498, D	
NE SE SW 10-2-16E	No. 1 Goodman Palensky & Kucera	1016	-	-	-	-	2080	2090	2130	2140	2200	2235	2408, D		
NE NE SE 10-2-16E	No. 1 Watton Vice, Thompson & Harris	1023	-	-	-	-	-	2065	2090	2120	2130	2190	2230	2425, D	
NW SE NW 11-2-16E	No. 1 Watton Thompson Drig. Co.	1028	-	-	-	-	-	2035	2060	2100	2110	2160	2210	2385, D	

APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rg. E	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN										UP. DEV. "Chatt." (10)	Under- lying Strata		
			Meramecian					Osagean			Kinderhookian					
			St. Gen. (9)	St. Louis (8)	Sperg. (7)	Warsaw (6)	Up. K. D. (5)	La. K. R. (4)	Ill. City (3)	Hamp. (2)	Boice (1)					
RICHARDSON--Continued																
SW SW NW 14-2-16E	No. 1 Schulenberg Pressman & Payne	1070	-	-	-	-	2170	2179	2216	2256	2272	2321	2375	2574	D	
SE NE NW 15-2-16E	No. 1 Fritchard Thompson Drlg. Co.	963	-	-	-	-	-	?	2040	-	2080	2155	2180	2367	D	
C NE NE 15-2-16E	No. 1 Schulenberg Palensky & Sons	1032	-	-	-	-	-	2072	2105	2130	2140	2200	2245	2426	D	
NE NE SE 16-2-16E	No. 1 Bangert Capitol Petr. Corp.	1001	-	-	-	-	-	2064	2097	2138	2155	2208	2255	2429	D	
SW SW NW 21-2-16E	No. 1 Cullley Brown & Tomer	918	-	-	-	-	-	2050	2070	-	2110	2170	2220	2413	D	
NE SE NW 24-2-16E	No. 1 Peck Stout Drlg. Co.	1061	-	-	-	-	2240	2265	2300	2340	2360	2415	2460	2640	D	
SW NW NE 27-2-16E	No. 1 Maddox Skelly Oil Co.	937	-	-	-	-	-	?	2060	2090	-	2130	2200	2250	2420	D
C SW SE 29-2-16E	No. 1 Fleskoski Brown & Tomer	1004	-	-	-	-	2155	2175	2200	2250	2255	2330	2360	2555	D	
C SE SE 29-2-16E	No. 1 Fleskoski W. E. Kitrell	992	-	-	-	-	2130	2145	2170	-	2218	2296	2332	2519	D	
C NW SE 31-2-16E	No. 1 Fehr Liberty Development Co.	1005	-	-	-	-	2175	2185	2215	2260	2265	2340	2380	2575	D	
C SW SW 35-2-16E	No. 1 Holt Jackson & Carlock	939	-	-	-	-	-	-	2135	-	2175	2250	2300	2480	D	
W 1/2 NW NW 6-2-17E	No. 1 Bucholz Neb. Prod. & Ref. Co.	1064	-	-	-	-	2098	2120	2145	-	2195	2252	2280	2475	D	
C NW SW 31-2-17E	No. 1 Crook Ohio Oil Co.	940	-	-	-	-	2105	2125	2155	2200	2215	2280	2330	2490	D	
NE NE SE 28-3-14E	No. 1 Boomgarn O. A. Sutton	1127	-	-	-	-	-	-	-	-	-	-	-	1138	D	
SW SW SW 11-3-14E	No. 1 Schmidt O. A. Sutton	1059	-	-	-	-	-	2235	2245	2292	2302	2358	2415	2605	D	
SW SW SE 16-3-14E	No. 1 Cornelius Palensky & Sons	1045	-	-	-	-	-	2285	2295	2340	2350	2413	2430	2623	D	
SW SW NE 11-3-15E	No. 1 Evans Phillips Petr. Co.	1113	-	-	-	-	2306	2342	2371	2414	2424	2474	2580	2736	D	
C SE SE 25-3-15E	No. 1 Parsons Black Gold	1091	-	-	-	-	-	2170	2190	2235	2240	2295	2340	2535	D	
SE SE SE 34-3-15E	No. 1 Fritz John Peters	1019	-	-	-	-	-	-	2132	-	2180	2242	2308	2494	D	
C SW SW 1-3-16E	No. 1 George W. H. Pine	1083	-	2144	2155	2175	2207	2238	-	2286	2342	2418	2576	D		
SE SE NE 4-3-16E	No. 1 Lewis Phillips Petroleum Co.	1099	-	-	2192	2218	2252	2284	-	2336	2392	2422	2620	D		
NW NW NW 8-3-16E	No. 1 Berg Phillips Petroleum Co.	1061	-	2188	2200	2210	2237	2270	2318	2326	2378	2450	2596	D		
SE SE NE 13-3-16E	No. 1 Caverzogie L. M. Bates	1185	-	2215	2230	2240	2273	2303	?	2353	2422	2450	2632	D		
C SW NE 16-3-16E	No. 1 Moorehead Cities Service Oil	1101	-	2160	2185	2200	2240	2270	2315	2320	2370	2395	2595	D		
C NE SE 19-3-16E	No. 1 Ege Indian Terr. Ill. Oil	1038	-	2170	2190	2215	2255	2285	-	2340	2400	2430	2615	D		
SW SW SW 22-3-16E	No. 1 Lundy O. A. Sutton	1098	-	-	-	2210	2215	2250	-	2290	2350	2420	2550	D		
NE NW SW 25-3-16E	No. 1 Mangold A. W. Brown	1136	-	-	-	2130	2160	2200	-	2240	2300	2350	2532	D		

APPENDIX, NEB. GEOL. SURV. BULL. 21

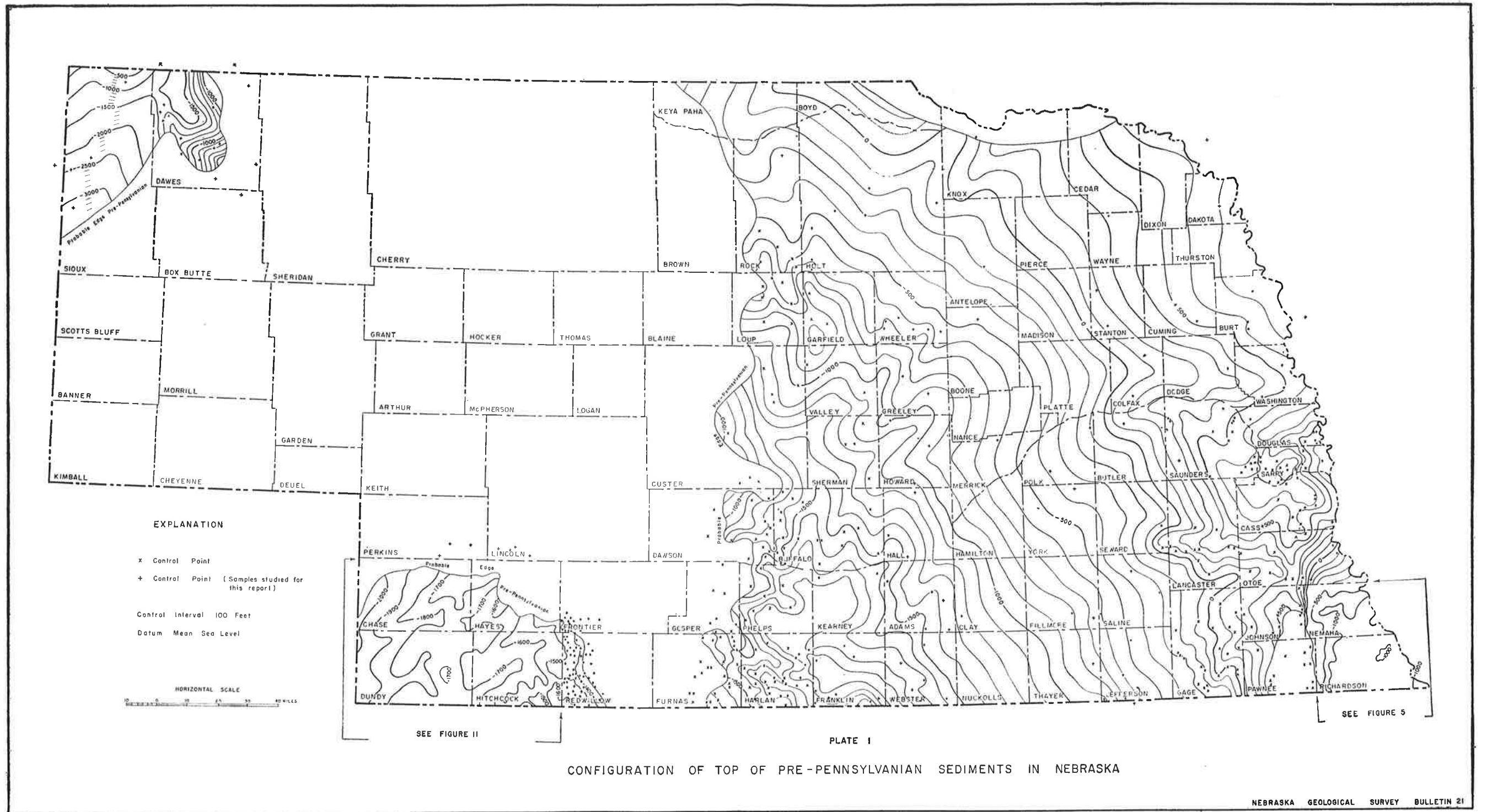
County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN									UP. DEV. "Chatt." (9)	Under- lyins Strata
			Meramecian				Osagean			Kinderhookian			
			Ste. Gen. (8)	St. Louis (8)	Sperg. (7)	Warsaw (8)	Up. K.-B. (5)	Lo. K.-B. (4)	Old City (3)	Hamp. (2)	Bajoc. (1)		
RICHARDSON--Continued													
B $\frac{1}{2}$ SE SE 26-3-16E	No. 2 Arnold J. E. Palensky	1113	-	-	-	2095	2105	2145	-	2190	2240	2295	2458, D
B $\frac{1}{2}$ NE SW 26-3-16E	No. 1 Horn O. C. Johnson	1134	-	-	-	2195	2210	2240	2280	2285	2345	2380	2560, D
C SE NW 29-3-16E	No. 1 Koepke E. J. Shaffer	998	-	-	-	2090	2130	2155	2200	2210	2265	2285	2486, D
C NE SW 29-3-16E	No. 1 Schabile-Kuttler Indian Terr. Ill. Oil	997	-	-	-	-	2090	2105	2147	2152	2205	2240	2433, D
C SW SW 30-3-16E	No. 1 Bankers Life Garretson & Knisley	1089	-	-	-	-	2160	2190	-	2240	2300	2340	2515, D
C NW SW 30-3-16E	No. 2 Bankers Life Black Gold	1116	-	-	-	2190	2230	2260	2305	2310	2370	2400	2600, D
C SE NE 31-3-16E	No. 1 Schabile Black Gold	1062	-	-	-	2137	2150	2180	2215	2220	2285	2315	2515, D
B $\frac{1}{2}$ NW NW 31-3-16E	No. 1 Smith Martigan et al	1067	-	-	-	-	2145	2170	?	2210	2270	2325	2513, D
C NW NW 32-3-16E	No. 1 Lang Black Gold	994	-	-	-	-	2094	2106	-	2150	2211	2236	2437, D
SE SE SE 34-3-16E	No. 1 Bucholtz Frank Manquist	1100	-	-	-	2102	2116	2144	-	2178	2237	2340	2470, D
C W $\frac{1}{2}$ NW 36-3-16E	No. 1 Roesch Skelly Oil Co.	1097	-	-	-	2035	2075	2115	-	2158	2224	2260	2433, D
W $\frac{1}{2}$ NE SW 36-3-16E	No. 4 Roesch Skelly Oil Co.	1103	-	-	-	2005	2025	2055	-	2100	2160	2185	2374, D
E $\frac{1}{2}$ W $\frac{1}{2}$ NW 36-3-16E	No. 8 Roesch Skelly Oil Co.	1056	-	-	-	1960	1978	2018	2060	2070	2125	2180	2338, D
W $\frac{1}{2}$ SW NE 36-3-16E	No. 1 Schwabg Skelly Oil Co.	1112	-	-	-	2055	2075	2110	-	2155	2220	2265	2436, D
SE SW SW 36-3-16E	No. 2 Zimmerman Skelly Oil Co.	1117	-	-	-	2110	2130	2162	2200	2210	2260	2320	2485, D
SW SE SW 17-3-17E	No. 1 Witte Horton & Peters	1075	-	-	-	2146	2180	2224	-	2270	2322	2390	2556, D
NW SW SW 19-3-17E	No. 1 Watton Peters Oil Co.	1136	-	-	2168	2190	2225	2265	2310	2320	2370	2440	2610, D
SW NW NE 19-3-17E	No. 1 Witte Skelly Oil Co.	1089	-	-	-	2130	2140	2174	-	2214	2273	2330	2503, D
NE NE SE 20-3-17E	No. 1 Bierman Tom Palmer, Inc.	1048	-	-	-	2086	2116	2158	-	2198	2260	2336	2504, D
SW SW NW 31-3-17E	No. 1 Duerfeldt Wm. Kitrell	1024	-	-	2024	2038	2060	2100	-	2138	2190	2240	2412, D
SE SE SE 31-3-17E	No. 1 Schwabg Ahsa Oil Co.	1079	-	-	2127	2140	2170	2210	-	2250	2313	2350	2555, D
ROCK													
C NE NE 24-31-16W	No. 1 Copple Serl Hutton	2249	-	-	-	-	-	-	2585	-	-	-	2625, Or
SALINE													
SW SW SE 35-8-2E	No. 1 Arnold T. G. Kleinholz	1442	-	-	-	-	-	-	-	-	-	-	1780, D
SARPY													
SW SW 23-13-12E	No. 1 Urhammer K. C. Schuyler	1053	-	-	-	-	-	-	-	-	-	-	220, D
NW SW NE 11-13-13E	No. 1 Water Well Offutt Air Base	965	-	-	-	-	550	565	610	630	-	745	845, D
NW SE 23-14-12E	No. 1 Palm Victor Jeep	1114	-	-	-	-	-	-	-	-	-	-	495, D

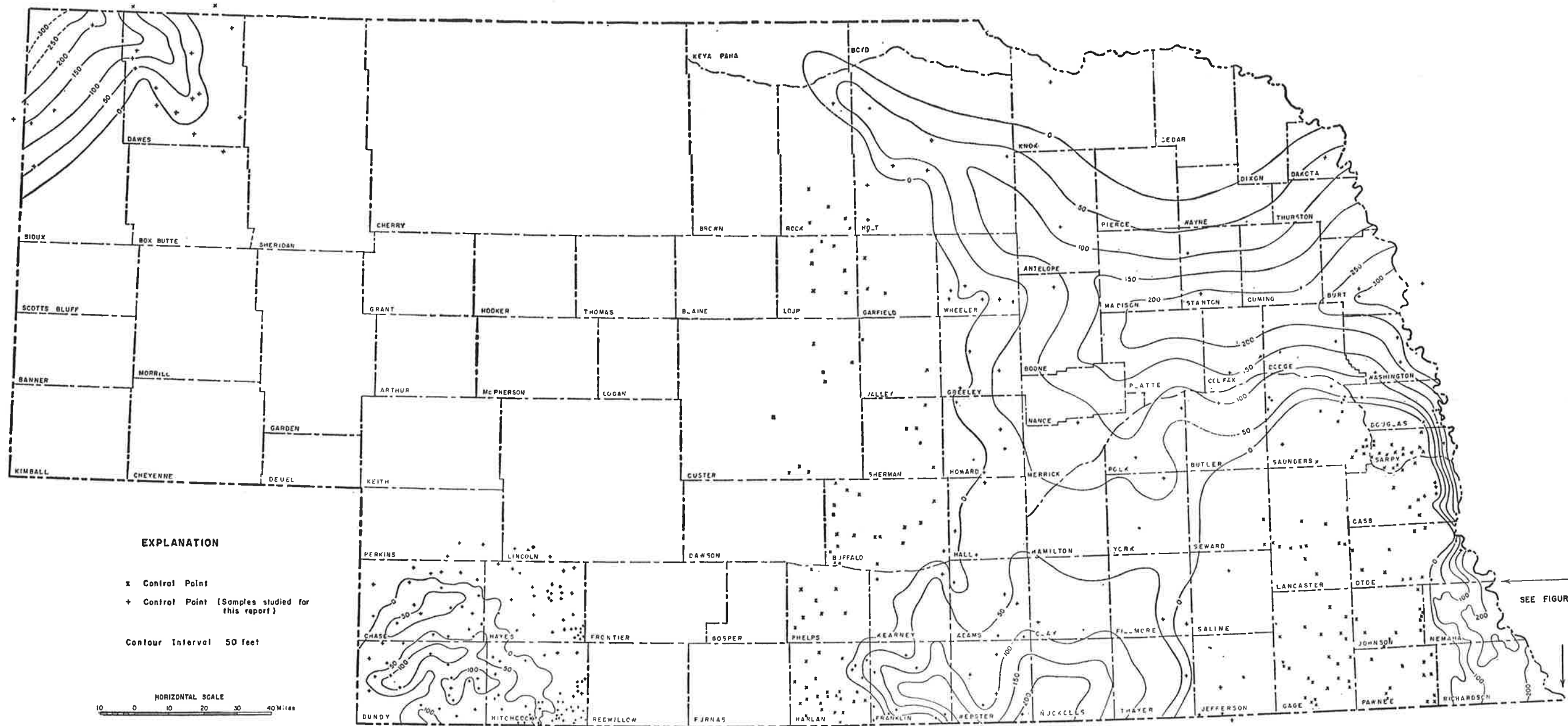
APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN										UP. DEV. "Chatt." (0)	Unde- lying Strata			
			Meramecian				Osagean		Kinderhookian								
			Ste. Gen. (9)	St. Louis (8)	Sparg. (7)	Warraw (6)	Up. K.-B. (5)	Lo. K.-B. (4)	Oil City (3)	Hamp. (2)	Bulwer (1)						
BAUDERS																	
SE SW 34-14-5E	No. 1 Ohnoutka Pelenky & Thege	*1493	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1258, D
NW NW NW 6-15-5E	No. 1 Krael L. J. Staska	1557	-	-	-	-	-	-	-	1280	1330	-	-	-	-	-	1349, D
SW SE SW 20-16-5E	No. 1 Kasper L. J. Staska	1506	-	-	-	-	-	-	-	1282	1335	-	-	-	-	-	1352, D
SE NE NE 29-16-5E	No. 1 Prochaska L. J. Staska	1556	-	-	-	-	-	-	-	1280	1320	-	-	-	-	-	1340, D
SE NE 5-16-8E	No. 1 Forester Midland Oil Co.	1373	-	-	-	-	-	-	-	935	960	-	-	-	-	-	1005, D
C SW SW 25-16-8E	No. 1 Hannon W. & M. Oil Co.	1250	-	-	-	-	-	-	750	760	785	-	-	-	-	-	800, D
C NE NE 35-16-8E	No. 1 Nelson W. & M. Oil Co.	1238	-	-	-	-	-	-	-	744	768	-	-	-	-	-	780, D
C SE NE 35-16-8E	No. 1 Roberts W. & M. Oil Co.	*1275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	790, D
SIoux																	
NW NW SE 17-27-57W	No. 1 Newell Magnolia Petr. Co.	4630	-	-	-	-	-	-	-	7956	-	-	-	-	-	-	8010, C1
NW NW NW 10-29-57W	No. 1 Wear Continental	4790	-	-	-	-	-	-	-	7306	7416	-	-	-	-	-	7448, C1
SW NE NW 27-30-56W	No. 1 Mann California Oil Co.	4769	-	-	-	-	-	-	-	7093	7178	-	-	-	-	-	7220, C1
C SW SE 10-34-54W	No. 1 Federal-Geiser Amerada Petr. Corp.	3667	-	-	-	-	-	-	-	4318	4415	-	-	-	-	-	4518, C1
STAMFON																	
SW SW SE 12-21-1E	No. 1 Hunt W. & M. Oil Co.	1831	-	-	-	-	-	-	1557	1610	1650	-	-	-	-	-	1766, D
NW SW SW 9-23-1E	No. 1 Collins Trans-Era Petr.	1491	-	-	-	-	-	-	-	-	1296	-	-	-	-	-	1382, D
THAYER																	
S $\frac{1}{2}$ SE SW 33-3-1W	No. 1 Williams Carter & Baumen	1525	-	-	-	-	-	-	-	2288	2292	-	-	-	-	-	2336, D
WASHINGTON																	
C SE SW 22-17-10E	No. 1 Marshall W. & M. Oil Co.	1285	-	-	-	-	-	-	790	815	830	-	-	-	900	930	D
SE SE SE 1-17-11E	No. 1 Wilkinson Blair Oil Co.	1305	-	-	-	-	-	-	808	852	878	890	-	-	1054	1090	D
NW NE SE 35-19-11E	No. 1 Brooks Paul Newell	1009	-	-	-	-	-	-	480	520	555	575	-	-	715	765	D
WEBSTER																	
NE NE NE 28-1-9W	No. 1 Taylor M. P. Gilbert	1765	-	-	-	-	3350	3370	3429	3476	3548	-	-	-	-	-	3554, D
NE NE NW 25-1-11W	No. 1 Merrill Jones, Shalb. & Farmer	1883	-	-	-	-	-	-	3627	3656	3724	-	-	-	-	-	3734, D
NE NW NW 30-2-10W	No. 1 Barta Bros. A. H. Kottmeyer	1865	-	-	-	-	-	-	3585	3615	3675	-	-	-	-	-	3683, D
C SW SW 25-3-12W	No. 1 Lambrecht C. E. McCaughey	1998	-	-	-	-	-	-	3712	3724	3784	-	-	-	-	-	3793, D
C NE NE 20-4-10W	No. 1 Schmidt G. P. Atkinson	1982	-	-	-	-	-	-	3460	3469	3537	-	-	-	-	-	3546, D
WHEELER																	
C NE NE 15-21-9W	No. 1 Justus Ned Biffle	2140	-	-	-	-	-	-	-	2690	-	-	-	-	-	-	2702, D

APPENDIX, NEB. GEOL. SURV. BULL. 21

County, Sec. Location, Twp. (N) & Rge.	Well Designation & Operator	Eleva- tion (Feet)	MISSISSIPPIAN									UP. DEV. "Chatt." (6)	Under- lying Strata	
			Meramecian				Osagean		Kinderhookian					
			Ste. Gen. (9)	St. Louis (8)	Sperg. (7)	Waraw (6)	Up. K. II. (5)	Lo. K. II. (4)	Gil. City (3)	Hamp. (2)	Baird (1)			
WHEELER--Continued														
	C NE NW 7-21-10W	No. 1 Benn J. E. Jones	2176	-	-	-	-	-	-	-	-	-	-	2806, D
	C SW SW 12-21-10W	No. 1 Swiatek Red Biffle	2173	-	-	-	-	-	-	2844	-	-	-	2864, D
	SE NE NE 3-21-12W	No. 1 Gibbs Kay Oil Co.	1235	-	-	-	-	-	-	-	-	-	-	2855, D
	NE NE SE 20-22-11W	No. 1 Pflugge Wheeler Development Co.	2110	-	-	-	-	-	-	2740	-	-	-	2765, D
	SW NE SW 26-22-12W	No. 1 Parks Central Nebr. Oil Syn.	2195	-	-	-	-	-	-	-	-	-	-	2924, D
YORK														
	SW SW NW 11-12-2W	No. 1 Roehr York Development Co.	*1650	-	-	-	-	-	-	1995	2020	-	-	2060, D





EXPLANATION

- x Control Point
- + Control Point (Samples studied for this report)

Contour Interval 50 feet

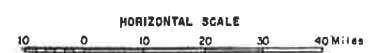


PLATE II

ISOPACHOUS MAP OF THE MISSISSIPPIAN IN NEBRASKA

