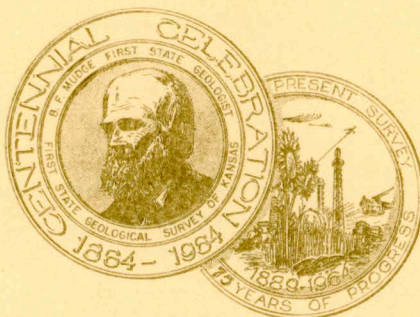


Activities of the Kansas Basement Rocks Committee in 1963 and Additional Precambrian Wells

By Virgil B. Cole, Daniel F. Merriam,
and William W. Hambleton

STATE
GEOLOGICAL
SURVEY
OF
KANSAS

BULLETIN 170, PART 4



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Activities of the Kansas Basement Rocks Committee in 1963 and Additional Precambrian Wells

ABSTRACT

A total of 63 wells drilled in Kansas during 1963 encountered buried Precambrian rock. Information on these wells, a list of completed projects, and the status of current projects of the Kansas Geological Society's Basement Rocks Committee are included in this report. The total number of wells known to have been drilled into Precambrian rocks in Kansas at the end of 1963 is approximately 2,400.

Zusammenfassung

Von allen Bohrungen, die im Laufe des Jahres 1963 in Kansas vorgenommen wurden, stiessen dreiundsechzig auf verdecktes Gestein aus dem Präkambrium. Der vorliegende Bericht gibt Auskunft über diese Bohrungen, enthält ein Verzeichnis durchgeführter Projekte und zeichnet den Stand gegenwärtiger Projekte des Kansas Geological Society's Basement Rocks Committee. Die Gesamtzahl aller Bohrungen, die bis Ende 1963 in Kansas in präkambrisches Gestein getrieben wurden, beträgt ungefähr zweitausendvierhundert.

INTRODUCTION

The Kansas Basement Rocks Committee was organized in 1958 in order to promote interest in Precambrian studies and to collect and preserve data on Precambrian rocks in Kansas. It functions under the auspices of the Kansas Geological Society in cooperation with the Kansas Geological Survey, with Virgil B. Cole as chairman. Much effort has been put forth to catalog all wells in the State that reached the Precambrian basement and to locate the well cuttings or cores taken from these wells. The task has been great, because to date almost 2,400 wells

Resumen

Un total de 63 pozos perforados en Kansas durante 1963 encontraron roca precámbrica escondida. Se incluyen en este informe datos sobre estos pozos, una lista de proyectos finalizados, y la condición de proyectos actuales del Kansas Basement Rocks Committee de la Kansas Geological Society. El número total de pozos que se conocen que han sido perforados dentro de las rocas precámbricas en Kansas hasta fines de 1963 es aproximadamente de 2400.

Résumé

Un total de 63 puits forés dans le Kansas pendant 1963 a rencontré des roches précambriennes enterrées. Compris dans ce rapport sont des renseignements sur ces puits, une liste de projets achevés, et l'état de projets actuels du Basement Rocks Committee de la Kansas Geological Society. On sait que le nombre total de puits forés dans les roches précambriennes dans le Kansas à la fin de 1963 est approximativement 2,400.

have encountered basement rock. This function of the Committee is nearly complete and the second phase—that of interpretation of the accumulated data—is underway.

This report is the third in a series of publications listing additions to the original list of wells, issued in 1961 as Bulletin 150 of the Kansas Geological Survey.

The Precambrian basement is of interest and importance for several reasons: (1) An understanding of the cause of geologic and tectonic developments now observable in the sedimen-

tary rocks may be enhanced by more complete knowledge of the basement rocks. (2) Ore deposits of commercial value are known to occur in Precambrian rocks in areas surrounding Kansas, and there is no reason to doubt that similar ore deposits underlie Kansas. The search for buried ore deposits is extremely difficult, and it is best undertaken by geophysical investigations. The presence of the important iron ore deposits now being developed at Pea Ridge, Missouri, was indicated by geophysical tests. Petroleum is known to occur in weathered and fractured Precambrian rocks, especially along the Central Kansas Uplift. (3) Seismic investigations, involving the study of frequency dispersion of surface waves from quarry blasts and earthquakes, and gravity investigations, involving the measurement of very small changes in the earth's gravity field, have yielded significant information about basement rocks and depth to the Moho discontinuity.

The object of the basement investigations is twofold: to aid in the interpretation of the complex history of these rocks and the unraveling of subsequent geologic history, and to aid in the exploration for hidden mineral wealth. It is hoped that the dissemination of the collected data will benefit all serious students of Precambrian geology.

ACKNOWLEDGMENTS

We would like to thank all companies and individuals who have supplied and checked information. Other members of the Committee, L. H. Cornell, P. C. Franks, P. L. Hilpman, and R. P. Lehman, have helped in various ways. A list of Precambrian wells maintained by the Kansas Survey's Oil and Gas Division, from information supplied by Data, Incorporated, and other sources, was helpful in preparing this report.

We would especially like to thank J. L. Kulp, of the Lamont Geological Observatory of Columbia University, and S. S. Goldich, of the U. S. Geological Survey, for age determinations performed on some Kansas core samples. E. G. Lidiak and R. E. Denison have coordinated with our work that of the Basement Rocks Project, directed by W. R. Muehlberger and supported by the Advanced Research Projects Agency. The U. S. Geological Survey, through the courtesy of H. C. Wagner, furnished the physical property analyses of Kansas rock samples. R. W. Scott, of The University of Kansas, has contributed information and graciously checked data on individual wells.

PROJECTS OF THE COMMITTEE

Several projects under the sponsorship of the Committee have been completed. The following reports have been published and are available:

Wells Drilled Into Precambrian Rock in Kansas, by V. B. Cole, D. F. Merriam, P. C. Franks, W. W. Hambleton, and P. L. Hilpman: Kansas Geol. Survey Bull. 150, p. 1-169, 1961.

Distribution of Precambrian Basement Rock Types in Kansas, by D. F. Merriam, V. B. Cole, and W. W. Hambleton: Am. Assoc. Petroleum Geologists Bull., v. 45, no. 12, p. 2018-2024, 1961.

Configuration of Precambrian Basement Rocks in Kansas, by V. B. Cole: Kansas Geol. Survey Oil and Gas Inv. 26, map, 1962.

Progress Report of the Kansas Basement Rocks Committee and Additional Precambrian Wells, by V. B. Cole and D. F. Merriam: Kansas Geol. Survey Bull. 157, pt. 2, p. 1-11, 1962.

History of Precambrian Studies in Kansas, by D. F. Merriam: Kansas Acad. Sci. Trans., v. 65, no. 4, p. 433-447, 1962.

Kansas Basement Rocks Committee Report for 1962 and Additional Precambrian Wells, by V. B. Cole, D. F. Merriam, and W. W. Hambleton: Kansas Geol. Survey Bull. 165, pt. 4, p. 1-10, 1963.

These publications, for the most part, report only interim progress, and many aspects of the basement rocks need to be studied in greater detail.

Presently, several projects of the Committee are being completed. A list of wells producing from Precambrian rock has been compiled. The petrology of the basement rocks, as well as the overlying rocks, is being investigated in detail. The contact between the basement and the overlying Paleozoic rocks was cored in two wells in northwestern Kansas, and a study of this contact is the subject of a report soon to be published in a Kansas Geological Survey Bulletin.

For ease in updating data, the Precambrian well information will be transferred to punch cards as soon as possible. Keeping the list of wells current will be facilitated by data storage and retrieval methods utilizing high-speed electronic computers.

It is difficult to collect information and would be impossible without the cooperation of the petroleum industry in Kansas. Donations of Precambrian well cores or samples to the Committee are welcomed. Information on the Precambrian in Kansas is on file in the offices of the State Geological Survey of Kansas at The University of Kansas, Lawrence, and is available to anyone upon request.

HISTORY OF PRECAMBRIAN TESTS

Few wells were drilled to the Precambrian before 1935, but since that time information has accumulated rapidly (Fig. 1). Since 1940, more than 50 wells to basement rock have been reported every year, and more than 100 wells were drilled to the basement in two of those years. This increase in basement wells, in spite of a decrease in explorational drilling, reflects the use of Precambrian and lower Paleozoic rocks for the permanent disposal of produced brines (E. D. Goebel, personal communication). Until the organization of this Committee in 1958 by the Kansas Geological Society, no serious attempt was made to assemble and preserve the information systematically.

As more information accumulated, maps showing configuration of the basement surface improved in quality and included more of the State. Several maps showing configuration of the Precambrian surface have been published, and each map is an improvement over the preceding publication. The latest map, utilizing 2,200 wells, was prepared by V. B. Cole in 1962. All major late Paleozoic structural features in Kansas are recognizable on a map showing the surface configuration of the Precambrian basement (Fig. 2).

AGE DATES, MAGNETIC PROPERTIES, AND DENSITIES

Several cores of Precambrian rock from Kansas have been dated by radioactivity methods,

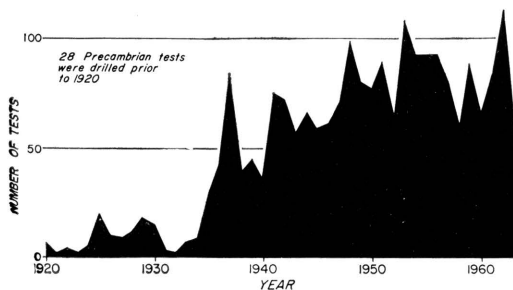


FIGURE 1.—Number of tests recorded as encountering Precambrian rocks in Kansas, by year.

and the results are shown in Figure 3 at the well locations. These so-called “absolute” dates include those made by the potassium-argon and rubidium-strontium methods. Five of the dates (two in Rush County, two in Barton County, and one in Morris County) were reported by Cole, Merriam, and Hambleton in 1962. The results of six more age determinations are recorded here (Table 1).

Of special interest is a well (Skelly No. 1 “A” Miles) in Kingman County, from which two age dates were obtained by different methods, one of 1,110 million years by the potassium-argon method on biotite, and one of 1,350 million years by the rubidium-strontium method on feldspar. The age date in Ellis County is probably erroneous because the sample was extensively weathered, altering the minerals used for dating (R. W. Scott, personal communication).

TABLE 1.—Potassium-argon (K/A) and rubidium-strontium (R/S) dates of samples of Precambrian rocks from Kansas.

Well name	Location	County	Rock type	Age, millions of years
Derby No. 4 Schoen	sec. 35, T 3 S, R 24 W	Norton	altered metamorphic pegmatite	1,100 (K/A)
			quartz-feldspar schist	1,240 (K/A)
Sinclair Prairie No. 2 Wallace	sec. 28, T 11 S, R 39 W	Wallace	hematitic biotite schist	1,080 (K/A)
Stanolind No. 1 Wann	sec. 12, T 15 S, R 20 W	Ellis	altered granite gneiss	900? (K/A)
Shell No. 4 Ehrlich	sec. 18, T 16 S, R 13 W	Barton	biotitic quartzite	1,350 (R/S)
Skelly No. 1 “A” Miles	sec. 30, T 27 S, R 10 W	Kingman	chloritized granite	1,100 (K/A)
				1,350 (R/S)
Rose Dome (surface)	sec. 13, T 26 S, R 15 E	Woodson	granite	1,220 (R/S)

An age determination made on the granite exposed at Rose Dome, in Woodson County, yielded a Precambrian date, raising speculation on the age of the intrusive and the relationship of the intrusive and granite. The granite previously had been thought to be Tertiary in age, or no older than late Cretaceous.

Table 2 reports magnetic properties and densities determined by the United States Geological Survey for Precambrian rock samples from several Kansas wells.

LIST OF PRECAMBRIAN WELLS

Table 3 lists for each well the county, company and farm name, location, surface elevation,

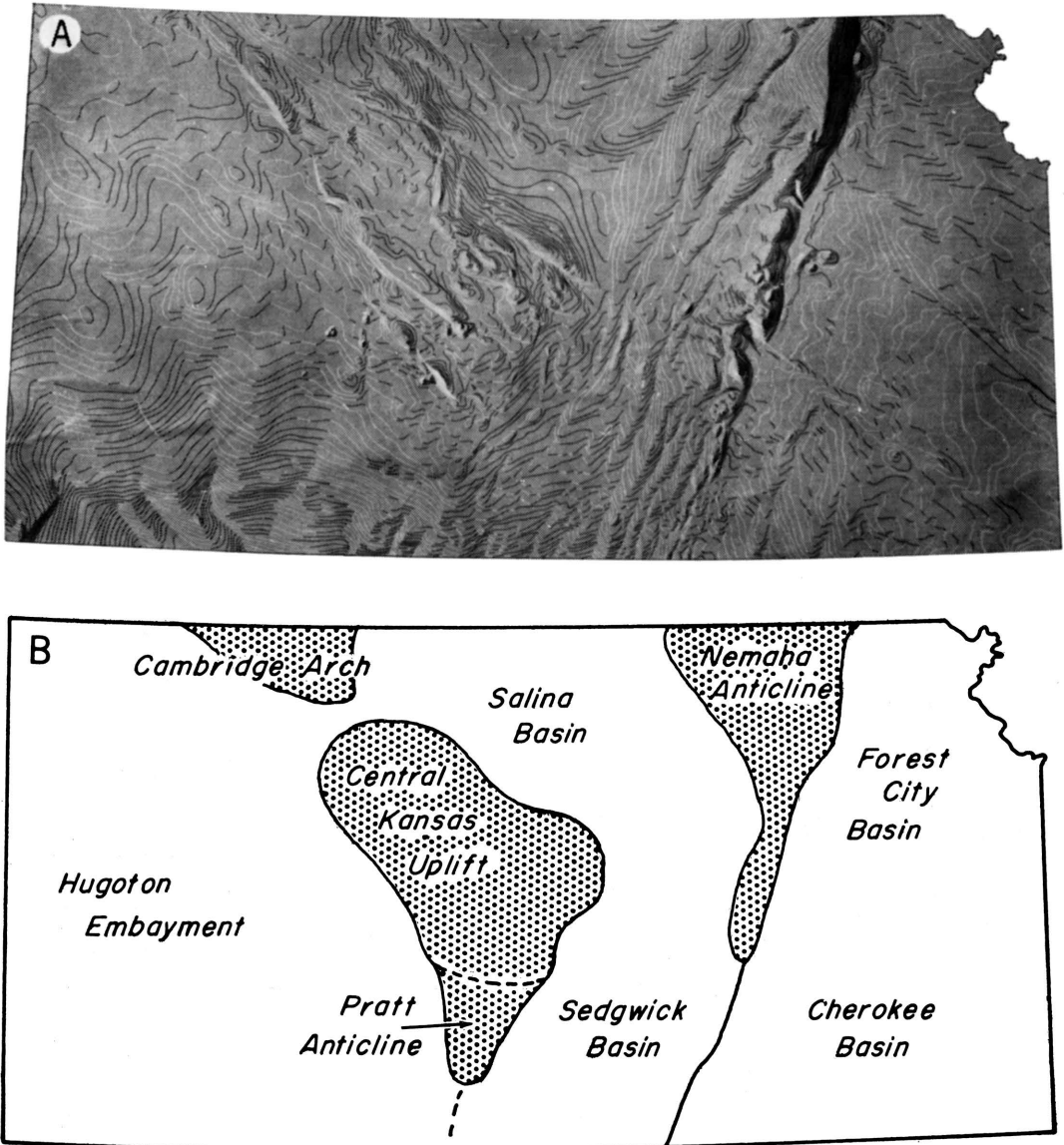


FIGURE 2.—Maps showing: *A*, Configuration of buried Precambrian surface in Kansas (based on V. B. Cole, 1962, *Configuration of top of Precambrian basement rocks in Kansas*: Kansas Geol. Survey Oil and Gas Inv. 26, map). The three-dimensional effect of the map is achieved by dark and light lines; positive structural features, such as the Nemaha Anticline, and negative features, such as the Salina Basin, seem to stand out in relief. The faults trending northeast and northwest, are accented. The cartographic work was done under the direction of George F. Jenks, Department of Geography, The University of Kansas; *B*, Major late Paleozoic structural features.

TABLE 2.—Magnetic properties and densities of Precambrian rock samples from Kansas.

Sample number*	Intensity, emu/cc	Susceptibility†	Density, g/cc	Rock type
1	1.35×10^{-5}	$.015 \times 10^{-3}$	2.68	muscovite quartzite
2	too weak to measure	$.015 \times 10^{-3}$	2.60	biotite granite
3	too weak to measure	$.012 \times 10^{-3}$	2.35	rhyolite
4	1.35×10^{-4}	$.030 \times 10^{-3}$	2.37	altered diabase
5	too weak to measure	$.016 \times 10^{-3}$	2.83	andalusite schist
6	too weak to measure	$.012 \times 10^{-3}$	2.39	altered granite gneiss
7	too weak to measure	$.012 \times 10^{-3}$	2.65	quartz-feldspathic schist
8	too weak to measure	$.014 \times 10^{-3}$	2.70	quartz-feldspathic schist
9	3.61×10^{-6}	$.015 \times 10^{-3}$	2.58	gneissic biotite granite

Data, courtesy H. C. Wagner, Fuels Branch, U.S. Geol. Survey, Menlo Park, California.

* All samples are not oriented; sources of the samples are:

1. Skelly No. 6 "B" Buehler, sec. 33, T 18 S, R 10 W.
2. Skelly No. 1 "A" Miles, sec. 30, T 27 S, R 10 W.
3. Skelly No. 3 Miller, sec. 21, T 18 S, R 16 W.
4. Northern Natural No. 65 Otis, sec. 10, T 18 S, R 16 W.
5. Atlantic No. 10 "A" Patzner, sec. 36, T 17 S, R 11 W.

6. Stanolind No. 1 Wann, sec. 12, T 15 S, R 20 W.

7. Derby No. 4 Schoen, sec. 35, T 3 S, R 24 W.

8. Derby No. 4 Schoen, sec. 35, T 3 S, R 24 W.

9. Texa Trading No. 1 Probst, sec. 18, T 6 S, R 19 W.

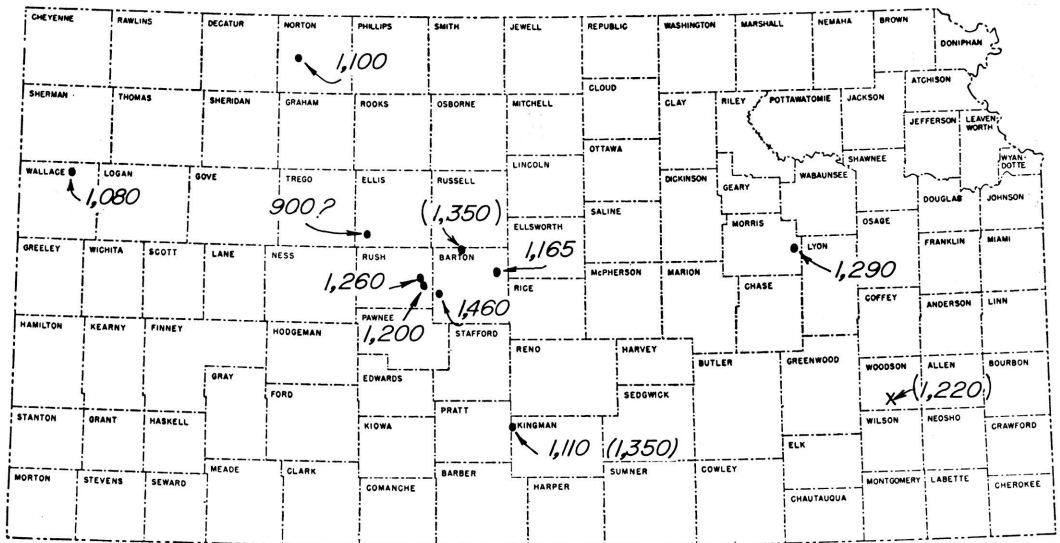
† Susceptibilities are directional.

depth to Precambrian, Precambrian elevation and rock type, rock unit on basement, and total depth. The wells are arranged by township and range; west ranges are listed first. Information is presented in the same format as that used in earlier published lists.

These data have been collected from a variety of sources including electric and radioactivity logs, top cards, drillers logs, sample logs, and logs of the Kansas Sample Log Service. For verification, information was compared from at least two sources wherever possible. The list

includes not only boreholes completed in 1963, but also some older wells inadvertently omitted from the previous lists. Additions to this list and corrections or omissions noted should be addressed to the State Geological Survey of Kansas.

All information has been forwarded to the American Association of Petroleum Geologists Basement Rocks Project Committee and to the Basement Rocks Project of the Advanced Research Projects Agency.



• Location of subsurface sample

x Location of surface sample

FIGURE 3.—Location of wells from which samples were obtained for dating by potassium-argon and rubidium-strontium methods. The age date in Woodson County is from granite exposed on Rose Dome. (Age of sample given in millions of years; age dates by rubidium-strontium in pars.)

TABLE 3.—Additional boreholes drilled to Precambrian rocks in Kansas.

County	Company, well number, and farm	Location	Surface elevation, feet	Depth to Precambrian, feet	Elevation of Precambrian, feet	Precambrian rock type	Rock unit on basement	Total depth, feet
Norton	Pentagon No. 1 Applegate	29-1S-24W C SE SE	2429	3654	-1225	8 ft. granite wash on granite	Pennsylvanian	3670
Decatur	Walker No. 1 Knutson	11-1S-26W E2 SW NW	2488	3605	-1117	granite	Reagan	3606
Do	Gulf No. 1 Huff	16-1S-26W C SW NW	2417	3516	-1099	granite	Pennsylvanian	3527
Do	Pubco No. 1-8 Ackman-Green	8-1S-27W C NE SE	2606	3657	-1051	17 ft. granite wash on granite	Reagan	3680
Do	Burch No. 1 Corcoran	28-1S-27W C SE NE	2452	3550	-1098	31 ft. granite wash on granite	Pennsylvanian	3600
Norton	D & D No. 1 Brown	5-2S-23W SW SW SW	2442	3722	-1280	granite	Reagan	3766
Do	Pentagon No. 1 Miller	30-2S-24W C NE SE	2471	3750	-1279	granite wash	Reagan	3787
Do	McLish & Petan No. 1 Miller	31-2S-24W C SE NW	2472	3745	-1273	63 ft. granite wash on granite	Pennsylvanian	3809
Do	Sauvage No. 1 Preston	23-2S-25W NW NW NW	2507	3786	-1279	7 ft. granite wash on granite	Reagan	3825
Decatur	Waggoner Est. No. 1 Helmkamp	6-2S-29W C SW NE	2761	4411	-1650	14 ft. granite wash on granite	Reagan	4445
Rawlins	Pan American No. 1 Prochazka	2-2S-35W C NW NE	3227	5082	-1855	weathered granite	Arbuckle	5104
Norton	Pentagon No. 1 "B", Henderson	3-3S-23W SW NW SW	2249	3550	-1301	granite wash	Reagan	3578
Do	Pentagon No. 1 Derks	4-3S-23W C NW SE	2276	3576	-1300	granite	Reagan	3578
Do	Martin & Keller No. 1 Sleafel	7-4S-22W C NE NE	2380	3846	-1466	granite	Reagan	3851
Do	Hansen No. 2 Dedrick	26-5S-21W SE NE SW	2268	3768	-1500	22 ft. granite wash on granite	Reagan	3793
Do	Chief No. 1 Armstrong	25-5S-22W C NW NE	2264	3704	-1440	6 ft. granite wash on granite	Pennsylvanian	3722

TABLE 3.—Additional boreholes drilled to Precambrian rocks in Kansas (continued).

County	Company, well number, and farm	Location	Surface elevation, feet	Depth to Precambrian, feet	Elevation of Precambrian, feet	Precambrian rock type	Rock unit on basement	Total depth, feet
Rooks	Pratt & Leben No. 1 Simons	14-6S-20W SW SW NW	2174	3630	-1456	7 ft. granite wash on granite	Pennsylvanian	3640
Graham	Continental No. 14 Trexler (twin)	15-9S-21W SE NE NW	2221	4096	-1875	granite wash	Arbuckle	4100
Russell	Sohio No. 4 Cook	9-11S-15W NE SW NW	1963	3471	-1508	granite wash	Pennsylvanian	3480
Ellis	Sinclair No. 8 Slimmer (OWWO)	19-11S-16W NW NE SW	1924	3947	-2023	granite wash	Arbuckle	3950
Russell	Home-Stake No. 0-4 "B" Baxter	32-13S-15W C SW SE	1907	3305	-1398	granite wash	Pennsylvanian	3324
Do	Home-Stake No. 0-17 "C" Mermis	32-13S-15W C NW SE	1909	3353	-1444	granite wash	Reagan	3355
Do	Meltzer No. 2 "B" Mermis	32-13S-15W S2 SE NW	1901	3309	-1408	granite wash	Pennsylvanian	3346
Do	Home-Stake No. 0-27 "G" Carter	33-13S-15W C SE SW	1887	3291	-1404	granite wash	Pennsylvanian	3313
Do	Leben No. 1 Krug	9-14S-14W S2 SW SE	1863	3282	-1419	granite wash	Pennsylvanian	3285
Do	Leben No. 3 Rusch	16-14S-14W NW NE NW	1881	3298	-1417	granite wash	Pennsylvanian	3303
Do	Home-Stake No. 0-34 "E" Witt	3-14S-15W C SE SW	1881	3314	-1433	granite wash	Pennsylvanian	3329
Do	Home-Stake No. 0-18 Dortland	4-14S-15W C NW NW	1895	3292	-1397	granite wash	Pennsylvanian	3340
Do	Home-Stake No. 0-31 "F" Witt	4-14S-15W C SE SW	1878	3267	-1389	granite wash	Pennsylvanian	3290
Do	Home-Stake No. 0-33 "D" Witt	4-14S-15W C NE SE	1885	3279	-1394	granite wash	Pennsylvanian	3290
Do	Home-Stake No. 0-6 "B" Mermis	5-14S-15W C NW NE	1905	3301	-1396	granite wash	Pennsylvanian	3316
Do	Home-Stake No. 0-21 Dortland	5-14S-15W C NW SE	1895	3278	-1383	granite wash	Pennsylvanian	3287

TABLE 3.—Additional boreholes drilled to Precambrian rocks in Kansas (continued).

County	Company, well number, and farm	Location	Surface elevation, feet	Depth to Precambrian, feet	Elevation of Precambrian, feet	Precambrian rock type	Rock unit on basement	Total depth, feet
Russell	Home-Stake No. 0-22 Dortland	5-14S-15W C SE NW	1886	3274	-1388	granite wash	Pennsylvanian	3281
Do	Home-Stake No. 0-25 "C" Baxter	5-14S-15W C NW NW	1895	3290	-1395	granite wash	Pennsylvanian	3302
Do	Home-Stake No. 0-26 "B" Mermis	5-14S-15W C SW NE	1901	3283	-1382	granite wash	Pennsylvanian	3294
Do	Meltzer No. 2 Dortland	5-14S-15W C SE SE	1885	3267	-1382	granite wash	Pennsylvanian	3276
Ellis	Petroleum Operating No. 1 Younker (OWWO)	35-14S-19W SW SW NE	2125	3990	-1865	granite	Reagan	3991
Barton	H-30 No. 4 "B" Schauf	1-16S-12W SE SW SW	1900	3437	-1537	granite?	Arbuckle	3451
Do	NCRA No. 4 "A" Hofmeister (twin)	5-16S-12W SW SW NW	1823	3218	-1395	quartzite	Pennsylvanian	3224
Rush	Frontier No. 2 Lippert (twin)	19-16S-17W SE NE SE	2025	3480	-1455	quartzite	Pennsylvanian	3518
Do	Frontier No. 1 Stramel	29-16S-17W C SW NE	2033	3668	-1635	quartzite	Arbuckle	3676
Do	Continental No. 1 Suppes	19-16S-18W C NE SW	2052	3642	-1590	20 ft. granite wash on granite	Reagan	3668
Barton	El Dorado No. 5 Ehler	11-17S-11W NE SE SE	1903	3544	-1641	quartzite	Arbuckle	3575
Do	Raymond No. 2 Evenson	33-17S-11W NE SW NE	1803	3678	-1875	granite	Arbuckle	3714
Rush	Frontier No. 1 Brack	5-17S-17W C NE	2048	3580	-1532	granite wash	Pennsylvanian	3617
Do	Frontier No. 1 "A" Kleweno	16-17S-17W C SW NE	2089	3576	-1487	granite wash	Pennsylvanian	3599
Do	Continental No. 1 Scheurman	1-17S-18W SE NW SE	2093	3643	-1550	21 ft. granite wash on granite	Pennsylvanian	3668

TABLE 3.—Additional boreholes drilled to Precambrian rocks in Kansas (concluded).

County	Company, well number, and farm	Location	Surface elevation, feet	Depth to Precambrian, feet	Elevation of Precambrian, feet	Precambrian rock type	Rock unit on basement	Total depth, feet
Rice	Glickman No. 1 Dohrman	22-18S-10W NW SE NE	1751	3252	-1501	granite wash	Pennsylvanian	3275
Do	Chief No. 1 Sittner	28-18S-10W N2 NE SW	1744	3238	-1494	quartzite	Pennsylvanian	3240
Rush	Morrison No. 1 Weigt	17-18S-16W NE SW NE	1944	3457	-1513	28 ft. granite wash on quartzite	Pennsylvanian	3489
Do	Morrison No. 2 Schneider	17-18S-16W NE NE SW	1950	3505	-1555	granite wash	Pennsylvanian	3511
Do	Morrison No. 2 Pechanec	18-18S-16W SE NE NW	1952	3522	-1570	granite	Pennsylvanian	3529
Do	Petroleum, Inc. No. 1 Crotinger	12-18S-17W NE SW SE	1959	3554	-1595	6 ft. granite wash on granite	Reagan	3564
Stafford	Virginia No. 2 Mueller (OWWO)	29-21S-12W S2 NW SE	1862	4220±	-2358±	granite	Arbuckle	4230
Pawnee	Alpine No. 2 Blasi	2-21S-16W NW SE SE	1983	4370	-2387	granite wash	Arbuckle	4378
Hodgeman	Pickrell No. 1 Hollenbeck	13-21S-24W C NW SE	2372	4777	-2405	rhyolite	Simpson	4804
Do	Texas No. 1 Lippoldt	14-23S-23W C SE NW	2294	5230	-2936	rhyolite	Arbuckle	5232
Marshall	Nelson No. 1 Brown	29-1S-10E S2 SE SE	1410	987	+423	9 ft. granite wash on granite?	Lansing-Kansas City	1003
Do	Continental No. 1 Neal	5-4S-8E SW SE NE	1443	1624	-181	granite wash	Simpson	1715
Pottawatomie	Ransopher No. 1 Washington Estate	7-9S-8E Lot #13 NE cor.	1315	2337	-1022	granite	Simpson	2339
Marion	CRA No. 33 Reamey	17-21S-4E S2 NE SE	1373	3070	-1697	granite	Lamotte	3071
Do	Watchorn No. 26 Townsend	5-22S-4E E2 NE SE	1426	3200?	-1774?	granite	Lamotte	3315

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- Part 1. **Archaeolithophyllum, an Abundant Calcareous Alga in Limestones of the Lansing Group (Pennsylvanian), Southeastern Kansas**, by John L. Wray, p. 1-13, pl. 1-2, fig. 1-4, June, 1964.
- Part 2. **Precambrian-Paleozoic Contact in Two Wells in Northwestern Kansas**, by Robert W. Scott and Marcus N. McElroy, p. 1-15, fig. 1-7, July, 1964.
- Part 3. **Mathematical Conversion of Section, Township, and Range Notation to Cartesian Coordinates**, by Donald I. Good, p. 1-30, fig. 1-8, June, 1964.
- Part 4. **Activities of the Kansas Basement Rocks Committee in 1963 and Additional Precambrian Wells**, by Virgil B. Cole, Daniel F. Merriam, and William W. Hambleton, p. 1-11, fig. 1-3, July, 1964.