DEPARTMENT OF THE INTERIOR
Ray Lyman Wilbur, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

Bulletin 812—B

THE KEVIN-SUNBURST OIL FIELD AND OTHER POSSIBILITIES OF OIL AND GAS IN THE SWEETGRASS ARCH, MONTANA

BY

ARTHUR J. COLLIER

Contributions to economic geology, 1929, Part II
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THE KEVIN-SUNBURST OIL FIELD AND OTHER POSSIBILITIES OF OIL AND GAS IN THE SWEETGRASS ARCH, MONTANA

By Arthur J. Collier

INTRODUCTION

The discovery of oil near Kevin, Mont., in March, 1922, gave prominence to the Sweetgrass arch, which is a large structural uplift somewhat similar in size and degree of folding to the Cincinnati arch. Most of the development so far attempted on this fold has been on the Kevin-Sunburst dome, a bulge upon the crest of the arch just south of the Canadian boundary. The dome covers about 16 townships, is nearly circular in outline, and has very low dips away from its highest point in all directions. Within the last five years (1923–1927) about 1,500 wells have been drilled upon it, over 880 of which are rated as productive. Since May, 1925, the field has stood second in production in the Rocky Mountain States being exceeded only by Salt Creek.

The Sweetgrass arch was described and named by Stebinger.[1] The position of its crest is marked by an area of nearly flat-lying Colorado shale extending a distance of about 100 miles northward from Great Falls to the Canadian boundary and averaging about 40 miles in width from east to west. The Great Northern, Chicago, Milwaukee, St. Paul & Pacific, and Canadian Pacific railways traverse this area, and it is consequently well supplied with transportation facilities.

After the discovery well was drilled in March, 1922, the Kevin-Sunburst field was surveyed in some detail by the United States Geological Survey,[2] and in 1923 the investigation was extended over the southern part of the arch. Several adjoining and related areas, such as the Sweetgrass Hills region, the Crown Butte and Willow Creek domes, and the north front of the Little Belt Mountains, were included in the study. In May, 1925, the field was again visited and the development since 1922 was reviewed.[3]

The record of developments made in 1927 and 1928 has been compiled from current newspapers and oil journals, the monthly reports of the conservation branch of the United States Geological Survey, and the weekly reports of the Northern Oil Information Bureau of Shelby, Mont.

[1] Stebinger, Eugene, U. S. Geol. Survey Bull. 641, pp. 64-65, pl. 4, 1916.
[2] Kevin-Sunburst dome: U. S. Geol. Survey Press Bull., September, 1922.
[3] U. S. Geol. Survey Press Bull., January, 1926.

IMPORTANT EARLIER INVESTIGATIONS

In 1897 Weed [4] completed an examination of the Little Belt Mountains, which lie south of Great Falls and in which the rocks underlying the Sweetgrass arch are exposed.

In 1906 Fisher [5] examined and described an area around Great Falls in which rocks from the Madison limestone to the Colorado shale are exposed.

In 1914 Stebinger [6] described the Two Medicine formation in the neighborhood of the Sweetgrass arch and its relation to the Claggett and Judith River formations farther east. In 1916,[7] in a report on the coal resources of northern Teton County (now called Glacier County), he described the formations above the Virgelle sandstone more fully than in his previous paper; and in "Possibilities of oil and gas in north-central Montana" he first mentioned the Sweetgrass arch. In 1917 he described the anticlines in the Blackfeet Indian Reservation,[8] and in 1919 the oil and gas geology of the Birch Creek-Sun River area,[9] which lies southwest of the Sweetgrass arch.

In 1921 Kemp and Billingsley [10] described the structural, stratigraphic, and petrographic relations of the igneous rocks involved in the Sweetgrass Hills, which are shown to be of laccolithic origin. In other words, they were formed by large masses of igneous rock that were forced upward through fissures until they were able to spread horizontally between the sedimentary beds, thus doming the strata above them. A part of the paper is devoted to a discussion of the sedimentary rocks surrounding the hills.

Two papers by Reeves [11] on the peculiar structure in the region surrounding the Bearpaw Mountains, which lie to the east of the Sweetgrass arch, should also be mentioned.

In 1915 Clapp [12] described the oil and gas fields of southern Alberta.

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[4] Weed, W. H., Geology of the Little Belt Mountains, Mont.: U. S. Geol. Survey Twentieth Ann. Rept., pt. 3, pp. 257–581, 1899; U. S. Geol. Survey Geol. Atlas, Fort Benton folio (No. 55), 1899; Little Belt Mountains folio (No. 56), 1899.

[5] Fisher, C. A., Geology of the Great Falls coal field: U. S. Geol. Survey Bull. 356, 1909.

[6] Stebinger, Eugene, The Montana group of northwestern Montana: U. S. Geol. Survey Prof. Paper 90, pp. 61–68, 1914.

[7] Stebinger, Eugene, Geology and coal resources of northern Teton County: U. S. Geol. Survey Bull. 621, pp. 117–156, 1916; Possibilities of oil and gas in north-central Montana: U. S. Geol. Survey Bull. 641, pp. 49–91, 1916.

[8] Stebinger, Eugene, Anticlines in the Blackfeet Indian Reservation, Mont.: U. S. Geol. Survey Bull. 641, pp. 281–305, 1917.

[9] Stebinger, Eugene, Oil and gas geology of the Birch Creek-Sun River area, northwestern Montana: U. S. Geol. Survey Bull. 691, pp. 149–184, 1919.

[10] Kemp, J. F., and Billingsley, Paul, Sweetgrass Hills, Mont.: Geol. Soc. America Bull., vol. 32, pp. 437–478, 1921.

[11] Reeves, Frank, Geology and possible oil and gas resources of the faulted area south of the Bearpaw Mountains, Mont.: U. S. Geol. Survey Bull. 751, pp. 71–114, 1924; Structure of the Bearpaw Mountains (in preparation).

[12] Clapp, F. G., Petroleum and natural gas resources of Canada: Canada Dept. Mines, Mines Branch, Pub. 291, vol. 2, pp. 265–340, 1915.

In 1917 Dowling [13] presented evidence of the northward extension of the Sweetgrass arch, and in 1919 [14] he reported on the gas and oil fields of Alberta, Saskatchewan, and Manitoba.

FIELD WORK AND ACKNOWLEDGMENTS

The field work on which this report is based was done by the writer, assisted by W. W. Boyer in 1922, by Ralph G. Lusk in 1923, and by J. M. Dunning in 1925. Many of the well locations and descriptions are taken from the weekly reports of the Northern Oil Information Bureau, published at Shelby, Mont., by F. C. Platt. Acknowledgments for data are due to many geologists in the field, including Frank R. Clark and J. B. Headley, of the Western Petroleum Exploration Co.; C. J. Hares and W. B. Emery, of the Ohio Co.; Dorsey Hager, of the Sunburst Producing Co.; F. A. Davies, of the California Co.; J. P. Gerlough, of the Inland Empire Oil & Gas Syndicate; R. D. Ferguson, of the Geological Survey's supervisory field forces; Charles Emmons, Gordon Campbell, and many others. The writer wishes also to express his appreciation of the unfailing courtesy of the many oil operators and residents he met in the field.

TOPOGRAPHY

The Sweetgrass arch is in the western part of the Great Plains. Its generally level surface is interrupted by many minor escarpments and low mesas caused by the outcrops of hard sandstone and by gravel beds that protect small areas from erosion. The laccolithic buttes of the Sweetgrass Hills rise to considerable heights, and the Marias, Teton, and Missouri Rivers and their tributaries have cut trenches or canyons across the plains which reach a maximum depth of 300 feet. The surface generally is covered with glacial débris, and the underlying bedded rocks are concealed except in local areas. A few small lakes and abandoned stream channels, exemplified by the Shelby trench, are also evidence of the great ice sheet that once covered this country. The altitude ranges from about 2,600 feet in the Missouri River Canyon to about 6,400 feet at the summit of the Sweetgrass Hills, but the surface generally is about 3,500 feet above the sea and slopes eastward at about 8 feet to the mile.

CLIMATE AND CULTURE

The climate of the Sweetgrass area is such as to make "dry-land farming" a precarious undertaking. About 1916 a succession of wet summers and successful crops induced settlement, and nearly every

[13] Dowling, D. B,, The southern plains of Alberta: Canada Geol. Survey Mem. 93, pp. 1-67, map, 1917.
[14] Dowling, D. B., Slipper, S. E., and McLearn, F. H., Investigations in the gas and oil fields of Alberta, Saskatchewan, and Manitoba: Canada Geol. Survey Mem. 116, pp. 1-9, maps, 1919.

available farm site was taken up. Towns were established, and the country was prosperous. Then came a series of dry years, and many of the farms were abandoned. In 1922 and 1923 small crops were again harvested and some of the farmers returned, but the discovery of oil in the Kevin-Sunburst field diverted attention from agriculture and increased prices of land to a point generally much above any possible agricultural value. Around the Sweetgrass Hills and the Little Belt Mountains climatic conditions are a little more favorable for agriculture, the oil excitement has been less disturbing, and there farming has been practiced with little interruption. Much land on the southwest side of the Sweetgrass arch, nearer to the Rocky Mountains, in Pondera, Teton, and Cascade Counties has been irrigated with water taken in ditches from the Marias, Teton, and Sun Rivers. Great Falls, the principal city in the area of the Sweetgrass arch, owes its name to a series of waterfalls along the Missouri River which furnish the power for the copper smelters located there and for neighboring towns and the Chicago, Milwaukee, St. Paul & Pacific Railway. Shelby, Kevin, Sunburst, and Sweetgrass, towns at the north end of the arch, are important on account of the oil developments. Valier, Conrad, and Choteau are the largest towns in the irrigated areas of the arch, and Fort Benton, a delightful old place on the Missouri River about 80 miles below Great Falls, was for many years the head of steamboat navigation on the river and the principal trading post in northern Montana. The main line of the Great Northern Railway crosses the arch in an east-west direction about 66 miles north of Great Falls. A branch leaves the main line at Havre and goes southwestward to Great Falls by way of Fort Benton and continues southwestward to Helena. Another branch of the Great Northern extends from Sweetgrass, on the Canadian border, where it connects with a branch of the Canadian Pacific Railway, southward through the oil field, crossing the main line at Shelby, to Great Falls, and connects with stub roads to Valier, Choteau, and the Sun River Valley. From Great Falls it continues southeastward to connect with the Northern Pacific Railway at Billings. The Great Falls branch of the Chicago, Milwaukee, St. Paul & Pacific Railway extends from Agawam, in the irrigated section, southeastward to Great Falls and thence on to a connection with the main line at Harlowton. The region of the Sweetgrass arch is traversed by several State highways, some of which are hard-surfaced and may be traveled by automobile in any weather, while others are in process of improvement. The Park to Park Trail between Great Falls and Choteau and the Roosevelt Trail at Shelby are examples of what can be accomplished. Other roads are good in dry weather but become almost impassable in wet weather.

WATER SUPPLY

The large towns of the Sweetgrass arch and the irrigated lands on its west side are supplied with water from the Marias, Teton, Missouri, and Sun Rivers, and some of the smaller towns are supplied by wells that reach the Virgelle sandstone or by springs and short watercourses that rise in the Virgelle and other sandstones. Large areas covered by the Colorado shale have no potable water, and the residents of these areas depend on rain water collected in cisterns. Water for drinking is brought by rail to Sunburst and Kevin and hauled out to the wells. Water for drilling is obtained from small lakes and ponds or collected in artificial reservoirs made by damming shallow ravines and coulees. Many of the "unproductive" wells in the oil field yield either sulphur or salt water, and some of these are used as water wells. Although water for drilling is normally scanty, the supply is usually sufficient.

SEDIMENTARY ROCKS

STRATIGRAPHIC COLUMN

The sedimentary rocks present in the Sweetgrass arch range in age from Algonkian to Recent, and in the Sweetgrass Hills these rocks have been domed by the injection of masses of lava, now solidified and forming the granite porphyry cores of the hills.

The general character and thickness of the sedimentary formations of the Sweetgrass arch are shown in the following table:

Sedimentary formations of the Sweetgrass arch

Age	Formation		Thickness (feet)	Character
Quaternary.	Glacial drift.		0–300±	Thick surficial deposit of unstratified clay and sand containing erratic boulders. Stratified clay and sand.
Tertiary.	Flaxville (?) gravel.			Gravel capping large areas, especially in the southwestern part of the arch. Believed to represent the Flaxville gravel of Miocene or Pliocene age.
Upper Cretaceous.	Two Medicine formation.		710	Irregularly bedded sandy shale and sandstone showing brackish and fresh-water facies. At top heavy beds of sandstone containing Judith River oysters. Coal in the Sweetgrass Hills.
	Virgelle sandstone.		200	150 feet of hard cross-bedded sandstone overlying about 50 feet of sandstone and shale in alternating thin beds.
	Colorado shale.		1,000±	Dark-gray shale containing limestone concretions and a few beds of bentonite. About 300 feet above the base sandy shale containing one or more thin bands of small dark pebbles and fish scales. Lower part dark bluish-gray shale.
		Blackleaf sandy member.	700±	Sandstone and fissile shale, usually dark bluish and brownish gray; thin beds of bentonite. Fish scales abundant for about 200 feet near the top, which is in part equivalent to the Mowry shale. Alternating thick beds of shale and sandy shale containing some conglomerate bands to the base of the formation. The lowest 200 feet contains no marine fossils but quantities of fossil wood in places.

Sedimentary formations of the Sweetgrass arch—Continued

Age	Formation	Thickness (feet)	Character
Lower Cretaceous.	Kootenai formation.	350±	A thick stratum of maroon shale at top, below which are alternating thick layers of shale and sandstone. Colors of the shale variable.
Jurassic.	Ellis formation.	100–400	Blue-gray calcareous shale grading into light-brown limestone. At the base more or less "sandstone" reported by drillers.
Major unconformity.			
	Quadrant formation.	Absent.	South of Great Falls consists of shale, limestone, sandstone, and gypsum. Removed by pre-Ellis erosion from Sweetgrass arch area, so far as known.
Mississippian.	—Unconformity?—		
	Madison limestone.	783	Massive hard light-colored limestone. Exposed at Stockett, south of Great Falls, also in East Butte of Sweetgrass Hills.
	—Unconformity?—		
Devonian.		333	White to dark-brown and black limestone with a few beds of black and greenish shale containing small showings of oil and some gas. Exposed in Little Belt Mountains, south of this area.
	—Unconformity?—		
Silurian (?)		275	Anhydrite interbedded with shale. In well logs only. Equivalents undetermined.
Ordovician and Cambrian.		1,095	The upper part consists of 905 feet of dolomitic limestone and shale with interbedded anhydrite in the upper 505 feet. 70 feet of anhydrite at 360 feet from the top is the thickest bed. The lower part consists of 705 feet of greenish to blue-gray, reddish-purple streaked shale above at least 90 feet of quartzite. In part exposed in Little Belt Mountains.
Algonkian.	Belt series.		Shale or slate, limestone, and quartzite exposed in Glacier National Park and the Little Belt Mountains. Not yet reached in drill holes.

ALGONKIAN ROCKS

In the Little Belt Mountains, south of the Sweetgrass arch, and in Glacier National Park, about 75 miles to the west, there is a great thickness of Algonkian sediments called the Belt series, which presumably underlies the Sweetgrass arch but has not been reached by drillers.

CAMBRIAN TO SILURIAN (?) ROCKS

About 2,000 feet of unidentified rocks have been penetrated in the deep Potlatch well drilled near the crest of the Kevin-Sunburst dome in sec. 21, T. 34 N., R. 1 W. The following inferences as to the formations represented are made by comparing the log of this well with known outcrops in the Little Belt and Little Rocky Mountains. At a depth of 4,420 feet the well entered quartzite, which continued for 90 feet to the bottom of the hole. This quartzite is believed to be equivalent to the Cambrian Flathead quartzite of the Little Belt

Mountains[15] and possibly to the basal Cambrian conglomerate or quartzite of the Little Rocky Mountains.[16] Above the quartzite there is 705 feet of shale resembling in hardness the Colorado, Kootenai, and Ellis shales. It is described as greenish to blue-gray shale, streaked with reddish purple. This shale probably corresponds with the Cambrian shales and impure limestones in the Little Belt Mountains, where they are over 1,000 feet thick.[17] Above the shale is 200 feet of limestone and calcareous shale which is probably also Cambrian, corresponding with the Yogo limestone of the Little Belt Mountains. This underlies about 600 feet of dolomitic limestone interlayered with several beds of anhydrite from 10 to 70 feet thick. This may also be in part Cambrian, though its stratigraphic position suggests a correlation with the Ordovician Bighorn limestone exposed in the Little Rocky Mountains. Between this limestone and the Devonian Jefferson limestone there is 275 feet of nearly pure pearl-gray to brown anhydrite, which has been doubtfully assigned to the Silurian by Jean P. Gerlough, geologist of the Potlatch Co. Anhydrite is lacking in the Little Belt and Little Rocky Mountain sections. A thickness of about 900 feet intervenes between the base of the Devonian and the supposed Cambrian, whereas the Ordovician limestone in the Little Rocky Mountains is less than 300 feet thick. The nearest known Silurian is several hundred miles to the northwest, in the Rocky Mountains of British Columbia, where it consists of about 1,300 feet of dolomite and quartzite.[18]

At about the same horizon in the California well near Agawam, in sec. 25, T. 26 N., R. 5 W., was found 438 feet of interbedded shale and anhydrite with a small amount of dolomitic limestone. In the California well log a fragment of a trilobite is mentioned. According to the customary interpretations of geologists this anhydrite indicates a period when the climate was dry. It may be, however, that the anhydrite is an alteration product of limestone. If it is, it may include equivalents of Silurian, Ordovician, and Cambrian limestones.

DEVONIAN ROCKS

Devonian fossils taken from the drill core of the Troy-Sweetgrass well, in sec. 21, T. 34 N., R. 1 W., by J. P. Gerlough, company geologist, were examined and reported on by G. H. Girty, of the United States Geological Survey. The formation is believed by Gerlough to be 333 feet thick and may include representatives of

[15] Weed, W. H., Geology of the Little Belt Mountains, Mont.: U. S. Geol. Survey Twentieth Ann. Rept., pt. 3, p. 281, 1900.

[16] Collier, A. J., and Cathcart, S. H., Possibility of finding oil in laccolithic domes south of the Little Rocky Mountains, Mont.: U. S. Geol. Survey Bull. 736, p. 173, 1922.

[17] Weed, W. H., op. cit., pp. 285–286.

[18] McConnell, R. G., Geological structure of a portion of the Rocky Mountains: Canada Geol. Survey Ann. Rept., new ser., vol. 2, pp. 15D–22D, 1887.

both the Threeforks shale and the Jefferson limestone. In the California Co.'s well in sec. 25, T. 26 N., R. 5 W., the Devonian is reported by H. L. Burchfield, company geologist, to be only 215 feet thick. The top of the formation can not be definitely placed in either well, and if the anhydrite is a product of alteration of limestone its bottom can not be surely located. In the report on the Little Belt Mountains [19] the Threeforks shale is described as thin-bedded shaly limestone containing much clayey matter with thickness varying from 40 to 140 feet, and the Jefferson limestone is described as bluish-black or chocolate-brown limestone. In the report on the Little Rocky Mountains [20] the Jefferson limestone is described as a dark rock giving when struck with a hammer an odor suggestive of petroleum. It carries a small but distinctive fauna and is believed to be capable of producing oil in favorable localities. The formation beneath the Sweetgrass arch consists mainly of limestone, but as shown by well logs it carries some interbedded black and greenish shale.

MADISON LIMESTONE

The Madison limestone is reported from the diamond-drill core of the Troy-Sweetgrass well, in sec. 21, T. 34 N., R. 1 W., to be 783 feet thick and from the California Co.'s well in sec. 25, T. 26 N., R. 5 W., to be 866 feet thick. This difference is to be expected, for at the top of the formation there is an unconformity representing the whole of Pennsylvanian, Permian, and Triassic time, and part of the formation was surely eroded and washed away during that time. The surface of the Madison in the Triassic period was a great lowland extending for many miles north and south, to the north resting on Devonian rocks and to the south on Pennsylvanian and Permian rocks. The exact position of the base of the Madison can not be recognized with certainty from the drill cuttings. The whole formation is composed of light-colored limestone, as shown by the logs of the two wells cited above. As revealed by the drill core of the Troy-Sweetgrass well, the lower 127 feet is dark impure and more or less shaly limestone containing many chert layers. For 210 feet above this the limestone is described as tight and hard, with a tendency to run to chert. In both of these parts the Madison limestone contains small showings of oil in vertical fractures. Above this the rock is described as white to light brown and as soft and coarsely crystalline to hard and fine grained.

In the Little Belt Mountains, according to Weed,[21] the Madison limestone is composed of a lower shaly portion, to which he applied the

[19] Weed, W. H., op. cit., pp. 287–289.
[20] Collier, A. J., and Cathcart, S. H., op. cit., p. 173.
[21] Weed, W. H., op. cit., p. 290.

names Paine shale and Woodhurst limestone. The limestone beds are separated by thin argillaceous layers which on weathering often coat the whole surface with red. The upper portion, called the Castle limestone by Weed, is massive and shows no bedding. The thickness of the whole formation is 1,100 feet, of which about one-third is shaly. Probably the shaly lower part of the Madison reported at the Troy-Sweetgrass well corresponds with the Paine shale of Weed. In the Little Rocky Mountains [22] the Madison measures 1,300 feet, 800 feet of the lower part of which is thinly bedded with some intervening shale and is called the Lodgepole limestone; the massive upper portion is called the Mission Canyon limestone. Some of the shale probably has a red color, for on the walls of Mission Canyon it has washed out and coated the Lodgepole limestone with large splotches of red. In the Little Rocky Mountains the Madison yielded a fauna of about 65 species, most of which were collected in the lower shaly beds. If it were well exposed in the Sweetgrass arch it would probably be found as rich in fossils there as in the Little Rocky Mountains. The formation crops out around East Butte in the Sweetgrass Hills.

QUADRANT (?) FORMATION

Some time after the Madison limestone was deposited, probably in the Triassic period, this part of Montana emerged from the sea and was subjected to erosion, which removed the later sedimentary rocks and in the Sweetgrass arch cut into the Madison limestone itself. About 25 miles south of Great Falls a portion of these missing rocks is preserved in what is called the Quadrant formation, exposed along Ming Coulee and at Riceville.

A description of the Quadrant formation adapted from Fisher is given here, but no positive evidence is at hand to show that any Quadrant rocks are present beneath the Sweetgrass arch proper. Later developments, however, may show that the Quadrant is preserved in some part of the arch.

The Quadrant formation comprises a succession of beds of variable character, which overlie the Madison limestone in apparent conformity. The rocks, which are readily distinguished from those of the Madison limestone, consist of red and green shale, sandy in part, interbedded with limestone and gypsum. Most of the fossils are marine, but near Ming Coulee the writer found a bed about 20 feet thick of what appears to be oil shale containing fish scales and lepidodendrons, plants that grew during Carboniferous time. The Quadrant formation as exposed south of Great Falls is regarded by G. H. Girty as of Mississippian age.

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[22] Collier, A. J., and Cathcart, S. H., op. cit., p. 173.

MADISON-ELLIS UNCONFORMITY

The Ellis formation of the Sweetgrass arch was deposited upon the planed-off surface of the Madison limestone. A few miles south of the arch it rests on the Quadrant formation; farther south on the Pennsylvanian and Permian; and at the Wyoming line on the Triassic. In the Rocky Mountain front near the Teton River, about 25 miles west of Choteau, an unconformity separates the Ellis and an undifferentiated Mississippian formation that is probably equivalent to the Quadrant but is correlated by Stebinger [23] with the Brazer limestone of Utah and Idaho. North of Birch Creek in Montana it is not exposed along the Rocky Mountain front. Kindle,[24] of the Canada Geological Survey, has recently reported the identification of a Triassic formation west of the Rocky Mountain front, near Banff, about 250 miles northwest of the international boundary at Sweetgrass. About 140 miles east of the arch, in the Little Rocky Mountains, the Ellis formation can be seen resting upon the Madison limestone, and a similar relation is believed to exist in a deep well drilled in the Bowdoin dome, 60 miles farther east. In the Big Snowy Mountains, about 70 miles south of the Little Rocky Mountains, the Quadrant formation is present between the Madison and the Ellis, as it is south of Great Falls. North of the international boundary for about 400 miles there are no outcrops that reveal the pre-Ellis surface, and it is so deeply covered with Upper Cretaceous and Tertiary sediments that it has been penetrated by the drill in only a few localities. About 450 miles due north of the international boundary at Sweetgrass an unconformity between the Devonian and what is probably the Dakota formation is exposed for many miles along the Athabaska River and is believed by the writer to be a northern extension of the pre-Ellis unconformity. If so it is necessary to assume that erosion has proceeded farther there than beneath the Sweetgrass arch and has removed the whole of the Madison limestone, and that the land surface was exposed to erosion for a longer period of time, extending through the Jurassic.

This unconformity therefore represents a great Triassic or possibly early Jurassic peneplain extending at least 800 miles from north to south and 300 miles from east to west, the surface of which was cut on Triassic, Permian, Pennsylvanian, Mississippian, and Devonian rocks. It may be of great economic importance in Canada, for the Athabaska tar sands are just above it and are thought to have derived their petroleum from the Devonian rocks and the lowest production of the Turner Valley field northwest of the Sweetgrass arch is reported

[23] Stebinger, Eugene, Oil and gas geology of the Birch Creek-Sun River area, northwestern Montana: U. S. Geol. Survey Bull. 691, p. 155, 1919.

[24] Kindle, E. M., Standard Paleozoic section of the Rocky Mountains near Banff, Alberta: Pan-Am. Geologist, vol. 42, pp. 113–124, 1924.

to be obtained just below the unconformable contact of a late Paleozoic dolomite with the Jurassic.[25] It is of great economic importance in Montana, for the principal oil sand of the Kevin-Sunburst oil field lies just above it.

Plate 11, a general view taken near Stockett, Mont., by Fisher, shows this unconformity, and Plate 12, *A*, shows the detail of the weathering and channeling of the Madison surface and the gravel and other material left upon it before it was submerged. Plate 11 shows that the bedding of the Madison formation makes a definite angle with that of the Ellis, and a similar discordance is to be expected wherever these formations are in contact. Wells drilled through the Ellis into the Madison can not be expected to strike the same bed of the Madison everywhere, and if oil were struck in the Madison it could not be expected at a uniform depth below the Ellis-Madison contact.

Although there is no conclusive evidence that any remnants of the Quadrant formation exist in depressions in the Madison limestone beneath the Sweetgrass arch, it is possible that some of the wells, whose logs show an unusually thick interval between the top of the Ellis and the characteristic Madison limestone, may pass through a part of the Quadrant. The logs of the California well in sec. 25, T. 26 N., R. 5 W., near Agawam, and the Transcontinental well in sec. 8, T. 23 N., R. 9 E., near Fort Benton, are more easily accounted for if it is assumed that at these places and perhaps extending across the arch between them remnants of the Quadrant are present.

ELLIS FORMATION

The Ellis formation, which overlies the Madison limestone of the Sweetgrass arch, is from 100 to 400 feet thick. In the oil field on the north side of the Kevin-Sunburst dome the thickness shown by well logs ranges from 200 to 260 feet and averages about 238 feet. As exposed around East Butte, in the Sweetgrass Hills, the formation consists of three or four alternating beds of light-colored shale and limestone. Its fossils are characteristic *Belemnites* and *Gryphaea*. A small collection made in sec. 15, T. 36 N., R. 5 E., was examined by J. B. Reeside, jr., who reports that it contained *Gryphaea nebraskensis* Meek and Hayden, *Kepplerites* sp. undet., and *Belemnites densus* Meek and Hayden. Mr. Gerlough, who had charge of the Troy-Sweetgrass well while it was being drilled, reported that fragments of *Belemnites* and *Gryphaea* were found in the Ellis formation, but no specimens were seen by the writer. Fragments of small crinoid stems were also found in drill cuttings from the Ellis formation, collected by Ivan Delashmutt from the Big West Oil Co.'s wells

[25] McLearn, F. H., and Hume, G. S., Stratigraphy and oil prospects of Alberta, Canada: Am. Assoc. Petroleum Geologists Bull., vol. 11, pp. 239-240, 250-259, 1927.

Nos. 2 and 8. These fragments might have been originally deposited in the Ellis, the Quadrant, or the Madison formation. If in the Madison, they have probably been eroded from it and redeposited in the basal "sand" of the Ellis formation. The gravel from the basal "sand" of the Ellis in the Big West Steele No. 2 well contained several large Madison fossils which had been redeposited in the Ellis. The exposures of the Ellis formation south of Great Falls differ greatly from those in the Sweetgrass Hills. A section measured near the head of Ming Coulee by Fisher [26] is as follows:

Section of the Ellis formation at head of Ming Coulee

	Feet
Sandstone, gray, weathering to brown, thin bedded	60
Sandstone, gray, conglomeratic, fossiliferous	29
Limestone, dove-colored, massive; basal member brecciated, fossiliferous	60
	149

The fossils present are chiefly *Camptonectes* and *Ostrea*. The Ellis formation in the Great Falls region does not contain many fossils, and the characteristic *Belemnites* and *Gryphaea* have not been reported. As exposed along Sand Coulee, about 8 miles above Stockett, it comprises a considerable bed of yellowish-gray sandy limestone containing *Dosinia* cf. *D. jurassica* Whitfield, as determined by Reeside, and two species of gastropods indicated by natural cross sections. This is overlain by a rather thick bed of conglomerate weathering red. At Stockett the Madison is overlain by a reddish-brown calcareous sandstone which is believed to belong to the Ellis formation, though no fossils were found in it. The coal bed in the Kootenai formation is only 130 feet above the Madison formation as determined by barometer readings at this point.

The well drillers in many places in the Sweetgrass arch can not tell the exact upper limit of the Ellis formation. In many wells it is put at the top of a thin yellow bed of shale or sandstone, but this bed is not recognized in all the well logs, or if recognized it is not reported. It underlies the Sunburst sand at the base of the Kootenai formation. The bottom of the Ellis is usually distinguished without difficulty, for the massive Madison limestone is encountered just below it. Above this contact there is a bed, from a few inches to 20 feet or more thick, which is described in well logs as "sand," "broken limestone," or "shale" and which is called the "Ellis sand" by the well drillers. In nearly every well in the Kevin-Sunburst dome of the Sweetgrass arch this "sand" carries oil, gas, or sulphur water, in some wells all three.

[26] Fisher, C. A., The geology of the Great Falls coal field, Mont.: U. S. Geol. Survey Bull. 356, p. 28, 1909.

UNCONFORMITY BETWEEN THE MADISON AND ELLIS FORMATIONS AS EXPOSED NEAR STOCKETT, MONT.

Photograph by C. A. Fisher

A. THE WEATHERED AND CHANNELED SURFACE OF THE MADISON LIMESTONE AS EXPOSED ABOUT 1 MILE NORTH OF STOCKETT, MONT.

a, Ellis formation; b, basal "sand" of Ellis formation; c, Madison limestone

B. BLACKLEAF SANDY MEMBER OF THE COLORADO SHALE ON SOUTH SIDE OF MISSOURI RIVER NEAR CARTER FERRY, MONT., IN T. 23 N., R. 6 E.

A. CLAY OF A GLACIAL LAKE BED LOCALLY DISTORTED BY A LATER GLACIAL OVERTHRUST, NORTH SIDE OF TETON RIVER NEAR SHANNON BRIDGE, MONT.

B. VIRGELLE SANDSTONE EXPOSED ABOUT 11 MILES WEST OF SUNBURST, MONT., IN SEC. 13, T. 36 N., R. 1 W.

West Butte in background

A. FOUR "DISCOVERY" PITS DUG NEAR A SECTION CORNER, IN ACCORDANCE WITH THE PROVISIONS FOR LAND LOCATION UNDER THE PLACER-MINING LAW

View taken near the Miller well

B. MINIATURE ANTICLINE IN THE BLACKLEAF SANDY MEMBER OF THE COLORADO SHALE, PROBABLY DUE TO GLACIAL THRUSTING

The contact of the Ellis and Madison formations is well exposed in the railroad cut a short distance north of Stockett, as shown in Plate 12, *A*. Here the surface of the Madison limestone is irregular and contains many channels and cavities due to pre-Ellis erosion. Resting upon it and filling the cavities and channels is a few feet of material consisting of iron-stained soil, rounded pebbles, small boulders, and secondary silica, forming what is called the basal "sand" of the Ellis formation, above which lie the regularly bedded strata of the Ellis. This "sand" is probably not wholly of Ellis age but consists, at least in part, of residual materials accumulated during the erosional period which was ended by its submergence beneath the Ellis sea.

KOOTENAI FORMATION

The exact points at which the top and bottom of the Kootenai formation should be placed can not be determined in many well logs, and its thickness of 350 feet is an average based on well logs and estimates. In the Sweetgrass Hills the bottom of the formation is well marked by a change in lithology and color, the Kootenai being dark reddish-brown sandy shale and the Ellis light-gray calcareous shale. The diamond-drill core of the Troy-Sweetgrass well shows the Ellis as a blue-gray calcareous shale grading to light brown and the Kootenai as a hard black shale. On Ming Coulee south of Great Falls the Ellis at its upper contact is a massive sandstone and the Kootenai is reported as a green sandy shale.

The top of the formation is very uncertain. Drillers usually call the first occurrence of red strata the top of the Kootenai. The position of the first red bed noted, however, may be about 200 feet above or below the average, and in some holes no red rocks at all have been noted by the drillers. Fisher puts the top of the Kootenai at the top of a 21-foot bed of reddish sandy shale, and in his map of the Great Falls coal field its outcrop is shown a little north of the smelter stack at Great Falls. The Kootenai is made up of variously colored shale and sandstone of fresh-water origin. At Great Falls it has yielded many fossil plants and a few fossil fish, some of which are on display at the Great Falls Public Library. The coal mined south of Great Falls is obtained from a bed near the bottom of the formation, which does not extend far north. Near Great Falls the sandstones are hard and thick, and their outcrops account for the falls. From place to place the succession of sandstone and shale varies, and perhaps in some places the red beds may lens out, though more probably they lose their color locally. The Sunburst sand, which yields some oil and is the chief gas producer in the Kevin-Sunburst field, is at the base of the formation. This sand is 29 feet thick at the original Sunburst well, but in a well a short distance farther south it is thinner and hardly recognizable.

33492°—29——2

COLORADO SHALE

The Colorado shale, about 1,700 feet thick, consists of an upper part of about 1,000 feet of normal dark-gray shale containing very little sand and a lower part of about 700 feet of sandstone, shale, and conglomerate, which has been named the Blackleaf sandy member of the Colorado by Stebinger. These divisions will be described separately.

BLACKLEAF SANDY MEMBER

The succession of sandstone, shale, and conglomerate making up the Blackleaf member of the Colorado shale is about 700 feet in thickness and is variable from place to place, as shown by the well logs. Near its top in the Kevin-Sunburst dome are some thin-bedded sandstone and shale carrying fish scales and other fossils. This part of the section in places contains thin hard fissile shale resembling the Mowry shale as exposed around the Little Rocky and Bearpaw Mountains. There is, however, no well-defined formation with Mowry characteristics, and the fossil fish scales occur for at least 300 feet in ordinary dark-gray shale. This phase is also present on Belt Butte, southeast of Great Falls, and at several places along the line of escarpments extending eastward from Gordon, near the north line of T. 21 N., to the vicinity of Great Falls. A section of the rocks exposed north of Vaughn, which is constructed from partial measurements at several localities along this line of escarpments, is about as given below, but the figures are all approximate only.

Section north of Vaughn

	Feet
Shaly sandstone containing fish scales and other fossils, among them *Ostrea congesta*	50
Hard ripple-marked sandstone	25
Sandy shale carrying fish scales, in part resembling Mowry shale	70
Hard conglomerate and sandstone carrying fish skeletons and ammonites	20
Sandy shale, shale, and thin beds of bentonite, not well exposed	190
Hard sandy shale	50
Gumbo shale, white to black, in thick lenses	50
Soft sandstone resembling white beach sand carrying fossil wood. A white escarpment north of Great Falls	30
Sandstone containing large isolated rusty lenses of coarse conglomerate and an abundance of fossil wood resembling Kootenai formation	30
Dark shale and sandstone, not well exposed	140
	655

No marine fossils were found in the lower 400 feet of the section given above, and the great abundance of fossil wood present in places in it led the writer to the belief that either the upper boundary of the

Kootenai should be placed much higher in the stratigraphic column or the lower 400 feet of the Colorado shale is equivalent to the Dakota sandstone. Should determinable fossil plants or other fossils be found in this part of the section the problem might be solved. The plants might be expected to belong to the Lower Cretaceous flora of the Kootenai or the Upper Cretaceous flora of the Dakota.

A diamond-drill log of the Big West Oil Co.'s first well, in sec. 6, T. 34 N., R. 1 W., prepared by Ivan Delashmutt, geologist of the company, shows 500 feet of the upper part of the Blackleaf member graphically. (See pl. 17.) A log of the California Co.'s well, in sec. 25, T. 26 N., R. 5 W., made by H. L. Burchfield, geologist, shows the whole of this member in detail. (See fig. 2.) A view taken across the Missouri River near Carter Ferry, in T. 23 N., R. 6 W. (pl. 12, *B*), shows the upper part of the member. Well-preserved fish scales were found within a few feet above the shale exposed. In many of the wells of the Kevin-Sunburst dome large flows of gas and showings of oil have been encountered in the Blackleaf member of the Kootenai formation.

UPPER PART OF COLORADO SHALE

Above the Blackleaf sandy member the Colorado shale is rather dark gray with the exception of some thin beds of light-colored bentonite, and it contains many limestone concretions.

About 300 feet above the Blackleaf member, or 700 feet below the top of the formation, there is a slightly sandy phase in which there is a layer from a quarter of an inch to 2 inches thick, sprinkled with small rounded black quartzite pebbles about one-tenth of an inch in diameter. This pebble band was the only definite layer available for mapping the structure in the summer of 1922, and it was found in nine or ten localities surrounding the dome. The assumption in the map presented in the press bulletin of September 7, 1922, that the band is continuous from place to place has proved to be correct. This sandy shale is often referred to as the Wall Creek sand by geologists who are familiar with Wyoming fields. Some light-yellow limestone concretions near the pebble band aided in the search for it.

Fossils collected at 18 localities furnish evidence that at least 40 species lived in the sea during Colorado time, but it should not be assumed that all the forms of life present in the sea at that time are represented by these collections. The invertebrate fossils have been determined by J. B. Reeside, jr., and the vertebrates by C. W. Gilmore, and the results of these determinations are presented in the table following.

Fossils of the Colorado shale in the Kevin-Sunburst field, Montana

U. S. Geological Survey Mesozoic locality No.	11995	11989	11984	11990	11976	12000	11971	11988	11986	11974	11987	11979	11993	11981	11982	11983	11980	11997
Distance below top of Colorado shale (feet)	20	50–100	200–300	200–300	300–400	400–500	400–500	450–550	500–600	600–700	600–700	600–700	650–750	1,000–1,100	1,000–1,100	1,000–1,100	1,100–1,200	1,100–1,200
Globigerina sp.															X	X		
Serpula sp.			X															
Uintacrinus socialis Grinnell	X					X												
Inoceramus labiatus Schlotheim							?							X	X	X		
Inoceramus fragilis Hall and Meek											X		?					
Inoceramus deformis Meek							X	X		X								
Inoceramus umbonatus Meek and Hayden				X														
Inoceramus exogyroides Meek and Hayden													X					
Inoceramus sp., thick-shelled	X		X			X			X									
Inoceramus sp.		X		X	X													
Ostrea congesta Conrad	X	X	X	X	X	X	X		X						X	X		
Ostrea sp. undescribed										X								
Ostrea sp.											X							
Camptonectes platessa										X								
Anomia sp.	X																	
Veniella mortoni Meek and Hayden					X													
Veniella goniophora Meek							X											
Lucina subundata Hall and Meek			X															
Lucina sp.	X																	
Cardium cf. C. pauperculum Meek	X																	
Panope? sp. undescribed											X							
Martesia n. sp. aff. M. cuneata Meek and Hayden	X																	
Anchura ruida White										X	?							
Fusus sp. undescribed							X											
Nautilus (Eutrephoceras?) sp. undescribed				X														
Baculites gracilis Shumard			?				?		?	X								
Baculites asper Morton							X											
Baculites aff. B. anceps Lamarck	X																	
Baculites thomi Reeside	X																	
Baculites sp.		X			X			X				X						
Puzosia (Schlueteria) sp. undescribed	X																	
Scaphites larvaeformis? Meek and Hayden										X								
Scaphites warreni Meek and Hayden										X								
Scaphites ventricosus Meek and Hayden	X	X					X		X		X	X	X					
Scaphites n. sp. aff. S. warreni and S. ventricosus										X	X							
Scaphites sp. undescribed																		
Scaphites sp.			X															X
Scaphites? sp.	X																	
Belemnitella sp.																		
Hypsodon audax (Leidy)								X										
Hypsodon lowi? Stewart			X															
Hypsodon? sp.														X				
Fish scales and bones, undetermined																	X	
Reptilian bones		X																

11995. Near spring west of Campbell well, sec. 17, T. 35 N., R. 3 W.
11989. North side of Marias River southwest of Etheridge, sec. 3, T. 31 N., R. 4 W.
11984. South line sec. 20, T. 24 N., R. 4 W., 1 mile east of Choteau.
11990. South of Twenty Dollar Bill well, sec. 9, T. 25 N., R. 9 E.
11976. Bluff south side of Missouri River, opposite Fort Benton, sec. 25, T. 24 N., R. 8 E.
12000. Teton River near bridge north of Carter, sec. 9, T. 24 N., R. 6 E.
11971. Teton River near Dent Bridge, north of Great Falls, sec. 34, T. 25 N., R. 4 W.
11988. 5 miles west of Shelby, south of Shelby-Etheridge road.
11986. 5 miles west of Shelby, north of Shelby-Etheridge road, sec. 14 (?), T. 30 N., R. 3 W.
11974. Half a mile east of Campbell well, sec. 15, T. 35 N., R. 3 W.
11987. Northwest of Shelby, sec. 8, T. 32 N., R. 2 W.
11979. Marias River 1 mile below railroad bridge, sec. 4, T. 30 N., R. 1 W.
11993. Marias River 2 miles above Naismith, sec. 3, T. 31 N., R. 4 W.
11981. Raglan Butte near Mowry horizon, sec. 13, T. 34 N., R. 2 W.
11982. Muddy Creek, 1½ miles above Gordon, sec. 19, T. 22 N., R. 1 E.
11983. 2 miles southeast of Power, sec. 6, T. 22 N., R. 1 E.
11997. 7 miles northwest of Great Falls, sec. 4, T. 21 N., R. 1 E.
11980. 5 miles north of Vaughn, sec. 1, T. 21 N., R. 1 E.

The upper 500 feet of the Colorado of the Sweetgrass arch can be definitely correlated with the Niobrara formation by the contained fossils, though the distinctive light-yellow color characteristic of the

Niobrara of Wyoming and southeastern Montana is lacking here. Probably the next lower 400 feet can be correlated with the Carlile and Frontier formations, and the underlying 350 feet, containing many fish remains, a few invertebrates, and some shale resembling Mowry shale, can be correlated with the Mowry and Thermopolis shales of Wyoming. The lower part of the beds here included in the Colorado shale, in which no fossils other than wood have been found, may possibly be the equivalent of the Dakota sandstone.

The correlations show that *Ostrea congesta*,[27] heretofore thought to be confined to the Niobrara formation, and *Inoceramus labiatus*, once believed to be diagnostic of the Greenhorn, occur throughout the Colorado shale above the Mowry. Two collections, lots 11974 and 11971, noted as containing Niobrara and Carlile types, are perhaps transitional between these formations. Smaller collections at about the same horizon do not show this phase.

A rather small cigar-shaped fossil, *Belemnitella*, which has been collected near Fort Benton, is also to be found in localities 11971 and 11974, and several specimens were collected by the writer but lost before they reached Washington.

VIRGELLE SANDSTONE

The Virgelle sandstone where well exposed is an outcropping ledge of rather light-colored, more or less massive rock about 200 feet thick. As measured in the escarpment northwest of Kevin, it consists of about 98 feet of hard sandstone overlying 134 feet of softer rock consisting in the main of sandstone but having some interbedded shale. Southwest of Sweetgrass it consists of 89 feet of massive sandstone and 92 feet of thin-bedded sandstone and shale. Sections of the Virgelle are given in the logs of the Griffith well in sec. 29, T. 37 N., R. 3 W., and the Mid-Northern well in sec. 7, T. 28 N., R. 4 E. In places on the east side of the arch the Virgelle is eroded and covered with glacial drift. In the writer's opinion the massive upper member of the Virgelle may not be as thoroughly cemented on the east side. It is well exposed in T. 29 N., R. 6 E., along the Marias River, and in the high hills called The Knees, in T. 26 N., R. 3 E. Plate 13, *B*, shows an exposure of the Virgelle sandstone.

The Virgelle sandstone in the region around Havre is the basal, more massive member of the Eagle sandstone, but in this vicinity it is the only recognizable representative of the Eagle. No fossils were found in the Virgelle sandstone in the northern part of the arch, but a coal mined in sec. 20, T. 19 N., R. 2 W., near Crown Butte, has been tentatively assigned to this formation.

[27] Darton, N. H., U. S. Geol. Survey Geol. Atlas, Newcastle folio (No. 107), p. 5, 1904.

TWO MEDICINE FORMATION

The Two Medicine formation is the group of fresh and brackish water sedimentary rocks that in the Sweetgrass arch occupies the part of the section which, farther east, is held by the upper part of the Eagle sandstone, the marine Claggett shale, and the chiefly brackish and fresh water Judith River formation. A section measured on Goose Bill Butte, in T. 27 N., R. 7 E., is about as follows:

Section on Goose Bill Butte

	Feet
Sandstone, hard	50
Sandstone and shale	50
Concealed by glacial drift	475
Sandstone	35
Sandy shale and sandstone	100
	710
Typical Virgelle sandstone	200±

The Two Medicine formation is exposed at several places around the Sweetgrass Hills and yields coal at the McDermott mine. From a rather casual inspection the writer believes that the formation does not contain a clearly marine fauna at any place within the area described though brackish-water forms are abundant. Evidently the Two Medicine formation was deposited near the western edge of the Cretaceous sea. The following fossils collected in the summer of 1923 have been identified by Mr. Reeside:

11975. Southeast of Chester, sec. 3, T. 30 N., R. 7 E.:
Ostrea glabra Meek and Hayden.
This brackish-water species ranges from Judith River to Lance, inclusive.

11977. Near top of Goose Bill Butte, sec. 35, T. 27 N., R. 7 E.:
Ostrea glabra Meek and Hayden.
Corbula perundata Meek and Hayden.
Anomia cf. A. gryphorhynchus Meek.
Goniobasis? subtortuosa Meek and Hayden.
Goniobasis invenusta Meek and Hayden.
Rhytophorus glaber Whiteaves.
Brackish-water fauna. The species all occur in the Judith River formation, though it is possible that the brackish-water beds here include more than Judith River.

11978. Goose Bill Butte, about 100 feet lower stratigraphically than 11977, sec. 35, T. 27 N., R. 7 E.:
Ostrea glabra Meek and Hayden.
Tancredia americana Meek and Hayden.
Possibly Claggett, though the Ostrea indicates brackish-water conditions.

11985. Two miles northeast of Bear's Den well, above a small coal bed in T. 36 N., R. 5 E.:
Ostrea glabra Meek and Hayden.

11996. Northwest side of Haystack Butte, 100 feet above base, sec. 16, T. 35 N., R. 4 W.:
Membranipora sp.
Ostrea glabra Meek and Hayden.
Corbula perundata Meek.
Corbula subtrigonalis Meek and Hayden.
Goniobasis? subtortuosa Meek and Hayden.
Same fauna as lot 11977.

11992. McDermott coal mine, sec. 31, T. 37 N., R. 2 E.:
Unio priscus Meek and Hayden.
Corbula perundata Meek and Hayden.
Corbula subtrigonalis Meek and Hayden.
Same fauna as lot 11977.

In the writer's opinion the McDermott mine is near the bottom of the formation, and Kemp and Billingsley[28] report it as belonging to the Virgelle.

FLAXVILLE (?) GRAVEL

The road between Pendroy and Conrad lies for about 10 miles upon a high gravel terrace, and about 5 miles from Conrad, near the point where the road comes down from the terrace, there is a strong spring of good water which comes from the base of the gravel and is used by the farmers as far away as Conrad. In the same general neighborhood there are several small flowing wells, the water of which comes from a sandstone. As there is no sandstone in the underlying shale, the water-bearing sand is probably in the lower part of this gravel. At several places northeast of Pendroy the gravel is capped by a layer of marly limestone similar to that noted in the Scobey region. Because of this similarity the gravel is thought by the writer to be the Flaxville gravel, of Miocene or Pliocene age. Between Fairfield and Sun River there is another wide exposure of gravel which may also be of Flaxville age, though it is at a lower altitude. These gravel deposits conceal the country rock.

Along the Teton River from Choteau to Shannon Bridge there is just above the shale from 4 to 20 feet or more of stratified clay resembling the shale in its bedding but readily distinguishable on close examination. About 8 miles east of Choteau this clay is exposed over a considerable area on the south side of the Teton River. At several localities farther east the clay can be seen between the shale and the glacial drift near the top of the river bluffs. Just above Shannon Bridge, in T. 25 N., R. 3 E., the clay layer is distorted locally by glacial thrusting into a rather sharp anticline shown in Plate 13, *B*. On the Fulton place, about 3 miles above Shannon Bridge, the clay layer is underlain by 6 to 10 feet of fine horizontally stratified gravel. The Miller well, in sec. 25, T. 34 N., R. 4 W., had caved when

[28] Kemp, J. F., and Billingsley, Paul, Sweetgrass Hills, Mont.: Geol. Soc. America Bull., vol. 32, p. 463, 1921.

examined, leaving a hole about 5 feet deep, the vertical sides of which showed horizontally bedded clay which may be of the same origin as that noted along the Teton. The position of the stratified clay along the Teton River shows that it was deposited before the last advance of the ice.

GLACIAL DRIFT

The glacial drift as exposed in the bluffs along the Marias River and the eastern parts of the Teton and Missouri Rivers in this area ranges in thickness from a few feet at the top of the canyon walls to the full depth of the canyons, or a maximum of about 300 feet. In these exposures it consists mainly of clay, but it carries boulders of granite and limestone which have been brought by the glacier from regions to the north or northeast, perhaps from around Hudson Bay and Lake Winnipeg. Around the Sweetgrass Hills the boulders are much more abundant and lie in irregular heaps and ridges. The southwestern part of the area discussed, south of a line extending from the neighborhood of Conrad to the Missouri River a little below Great Falls, was probably not covered by the glacier.[29]

DISTURBANCE OF THE UNDERLYING SHALE BY GLACIAL OVERTHRUST

On the Kevin-Sunburst dome several places were noted where the surface of the underlying bedrock is much disturbed, probably by the thrusting and squeezing of the ice during the glacial epoch. The most pronounced disturbance of this kind was found on Raglan Butte, in sec. 13, T. 34 N., R. 2 W., where the glacial action is almost certainly indicated, although the distorted croppings of thin beds of sandstone and shale near the top of the Blackleaf member of the Colorado shale were once thought to indicate the presence of a fault, shown on one of the early maps of the oil field as the Emmons fault.

In a small exposure in sec. 8, T. 35 N., R. 2 W., the bedding of the shale has a strong northward dip, and here the Kevin fault was inferred and appears on the same old map. This dip is probably also due to glacial action, but the evidence so far discovered is not conclusive. If the disturbance is either a fault or a deep-seated flexure of the rock evidence of it will no doubt be found by the drilling, for it is in the neighborhood of some of the richest strikes yet made in the field. Plate 14, *B*, shows a small local anticline in the Colorado shale that may be due to glacial overthrusting or perhaps to the swelling of the weathered shale.

ALLUVIUM AND SOIL

Deposits of soil and alluvium in this area are thin, and as they do not affect the occurrence of oil, they are of only incidental and negative interest to the oil prospector.

[29] Fisher, C. A., Geology of the Great Falls coal field, Mont.: U. S. Geol. Survey Bull. 356, pl. 1, 1909.

FORMATION BOUNDARIES

The outcrop of the Virgelle sandstone was mapped by Stebinger as the boundary of the Sweetgrass arch, but the continuation northward into Canada of the arch is shown by the croppings of higher formations, and the low dips on the east and west sides of the arch continue for many miles beyond the outcrop of the Virgelle sandstone and indicate its great width. On the west side of the arch the outcrop of the Virgelle sandstone is easily traceable, for it forms many high escarpments, but on the east side the croppings of the Virgelle are obscured by glacial drift and are to be seen only in a few places. On the first published map of the Sweetgrass arch, in Geological Survey Bulletin 641 (1916), and in the preliminary geologic map of central and eastern Montana published by the State School of Mines, University of Montana, in 1921, the east outcrop of the Virgelle sandstone is shown about 40 miles too far east. Its true position is indicated on Plate 15, where definite positions of outcrop are shown by solid lines and inferred positions by broken lines, for the upper boundary of that member is somewhat indefinite at best, and its outcrops are in many places covered by glacial drift. It is placed on the accompanying map, however, to emphasize the geologic structure known to exist in this region.

STRUCTURE

The Sweetgrass arch is a large structural uplift extending from the neighborhood of Great Falls, Mont., northward for more than 100 miles, to and beyond the Canadian boundary. Its crest is marked by an exposure of nearly flat-lying Colorado shale flanked on its east and west sides by slightly tilted Virgelle sandstone. Near its north end the uplift plunges northward beneath younger rocks at the Canadian line; south of Great Falls, in the Little Belt Mountains, the arch rises, exposing the whole succession of older sedimentary rocks down to the Algonkian. The regional structural features of the Sweetgrass arch, so far as they are known, are presented on Plate 15, and the structure of the Kevin-Sunburst dome is shown in greater detail on a larger scale on Plate 16. The position of the wells in the Kevin-Sunburst oil field, on the northern flank of the dome, is also shown on Plate 16.

TYPES OF STRUCTURE SURROUNDING THE ARCH

On the west side of the arch the Colorado shale is overlain progressively by the Virgelle, Two Medicine, Bearpaw, Horsethief, and St. Mary River formations, dipping gently to the west, beyond which lies the intensely folded and faulted belt of Cretaceous and Tertiary

rocks described by Stebinger.[30] The nature and distribution of the rocks exposed along the plunging northern extension of the arch are shown on map 1779 and in the frontispiece of Canada Geological Survey Memoir 116. Near the Canadian boundary the gentle northeastward dip of the formations on the east side of the arch is interrupted by a group of laccolithic domes that form the Sweetgrass Hills. South of these hills the slight eastward dip from the arch extends for many miles to the neighborhood of Virgelle and Kremlin. It is interrupted at intervals by narrow, sharply upturned and in places faulted anticlines, which are characteristic of the Bearpaw Mountain structure described by Reeves.[31]

At the south end of the arch the rocks rise toward the pre-Cambrian core of the Little Belt Mountains. The Kootenai formation below the Colorado shale comes to the surface 1 mile north of Great Falls, and the Madison limestone, a still lower formation, is exposed about 10 miles southeast of Great Falls, near Stockett.

USE AND INTERPRETATION OF WELL LOGS IN DETERMINING THE STRUCTURE

As the rocks exposed in the Sweetgrass arch are for the most part shales, in which few definite and persistent beds can be recognized, and as such horizon markers as may be found are extensively covered and concealed by glacial débris, the determination of the structure from surface examinations alone is unusually difficult. The difficulty is in part overcome, however, by the use of well logs. More than 1,500 wells in the Kevin-Sunburst dome (see pp. 94–168) and about 100 wells scattered over the rest of the Sweetgrass arch have been drilled since 1922, and many of the logs are available for study. The deep wells outside of the Kevin-Sunburst dome that have been used in the preparation of the general structure map of the Sweetgrass arch (pl. 15) are as follows:

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[30] Stebinger, Eugene, Anticlines in the Blackfeet Indian Reservation, Mont.: U. S. Geol. Survey Bull. 641, p. 292, 1917.

[31] Reeves, Frank, Geology and possible oil and gas resources of the faulted area south of the Bearpaw Mountains, Mont.: U. S. Geol. Survey Bull. 751, pp. 97–103, 1925; Structure of the Bearpaw Mountains (in preparation).

Deep wells on Sweetgrass arch outside of Kevin-Sunburst dome

Drilling company	Location	Lowest formation reached	Total depth (feet)	Date of completion	Remarks [M signifies 1,000,000 cubic feet]
	LIBERTY COUNTY				
Bears Den	Sec. 31, T. 37 N., R. 6 E.	Ellis	3,485	1928	Drilling.
Sunburst	Sec. 7, T. 36 N., R. 6 E.	Madison	2,400	1927	14 M gas at 1,010 and 3,062 feet.
Frazer	Sec. 12, T. 36 N., R. 5 E.	Ordovician	3,290	1924	5 M gas at 2,090 feet; show of oil.
Sunburst	Sec. 10, T. 37 N., R. 5 E.	Madison	2,970	1928	Gas at 2,878 feet; oil at 2,606 feet.
Gladys Belle	Sec. 19, T. 37 N., R. 4 E.	do	2,560	1924	15 M gas at 1,598 feet; show of oil
Western Natural Gas	Sec. 19, T. 37 N., R. 4 E.	Colorado	1,658	1927	13 M gas at 1,562–1,593 feet.
Do	Sec. 29, T. 37 N., R. 4 E.	do	2,005	1927	Dry.
Do	Sec. 19, T. 37 N., R. 4 E.	do	1,778	1927	6 M gas at 1,535 feet.
Do	Sec. 17, T. 37 N., R. 4 E.	Kootenai	2,365	1927	15 M gas at 1,200 feet.
Beck Petroleum	Sec. 18, T. 32 N., R. 4 E.	Madison	2,600	1923	Dry; showing of oil and gas.
Kalispell Petroleum	Sec. 21, T. 35 N., R. 7 E.	Colorado	2,600	1927	5 M gas at 2,110 feet.
Mid-Rocky Development	Sec. 7, T. 33 N., R. 7 E.	do	1,475		Top of Colorado at 800 feet.
	TOOLE COUNTY				
Bell	Sec. 1, T. 35 N., R. 3 E.	Colorado	1,950	1926	Dry.
Montana Oil	Sec. 3, T. 37 N., R. 3 E.	Madison	2,608	1926	Do.
Hi-line-66 Oil	Sec. 27, T. 36 N., R. 1 E.	Ellis	2,510	1928	Do.
Lone Eagle Oil	Sec. 20, T. 36 N., R. 2 E.	Colorado	2,100	1926	Gas at 1,425 feet.
Montana Canadian Oil	Sec. 4, T. 27 N., R. 2 E.	Kootenai	1,837	1925	4 M gas at 1,775 feet.
Do	Sec. 36, T. 37 N., R. 2 E.	do	2,116	1928	Dry.
Do	Sec. 24, T. 37 N., R. 3 E.	do	2,085	1925	2 M gas at 1,887 feet.
Red Top Oil	Sec. 26, T. 36 N., R. 3 E.	Colorado	1,300		
Montana Pacific Oil	Sec. 20, T. 37 N., R. 1 E.	Madison	2,110	1927	Dry.
Prairie Oil & Gas	Sec. 13, T. 33 N., R. 2 E.	do	2,190	1927	Do.
Dunkirk Oil	Sec. 17, T. 31 N., R. 1 E.	do	2,136	1926	Show of oil at 1,775 feet.
Zenith Oil	Sec. 21, T. 35 N., R. 1 E.	do	7,080	1927	Show of oil at 1,510 feet.
Commonwealth Petroleum	Sec. 22, T. 31 N., R. 2 E.	do	2,390	1927	Show of oil at 1,985 feet.
Adams	Sec. 18, T. 30 N., R. 3 E.	do	2,140	1925	Show of oil at 1,940 feet.
Do	Sec. 17, T. 29 N., R. 2 E.	do	2,345	1927	Show of oil at 850 feet.
Carter Oil	Sec. 29, T. 31 N., R. 2 E.	do	1,865	1926	Dry.
S-Hart Green	Sec. 11, T. 37 N., R. 2 E.	do	2,321	1927	Do.
Zenith-McDonald	Sec. 35, T. 36 N., R. 1 E.	do	2,180	1928	Show of oil at 1,555 and 2,177 feet.
Kiopp Oil	Sec. 28, T. 36 N., R. 3 W.	do	2,068	1927	Dry.
Madeline Oil	Sec. 33, T. 35 N., R. 4 W.		1,785	1928	Drilling.
	GLACIER COUNTY				
Sand Point Oil	Sec. 1, T. 35 N., R. 5 W.	Madison	2,978	1928	8 M gas at 2,745 feet.

Deep wells on Sweetgrass arch outside of Kevin-Sunburst dome—Continued

Drilling company	Location	Lowest formation reached	Total depth (feet)	Date of completion	Remarks [M signifies 1,000,000 cubic feet]
	PONDERA COUNTY				
Fowler Oil & Gas	Sec. 20, T. 30 N., R. 1 W.	Madison	2,210	1923	Show of oil at 1,543 feet.
Hiland-Van Dale	Sec. 35, T. 30 N., R. 3 W.	Devonian	3,620		Shut down.
Ute-Moe Oil	Sec. 32, T. 30 N., R. 2 W.	Madison	3,230		Do.
Big Eleven	Sec. 2, T. 29 N., R. 1 W.	do	2,396	1927	Show of oil at 2,258 feet.
Montana Pacific Oil	Sec. 32, T. 28 N., R. 2 W.	do	2,015	1927	Dry.
Montana Exploration	Sec. 2, T. 28 N., R. 2 W.	do	2,950	1924	Show of oil (?).
Mid-Northern Oil	Sec. 7, T. 28 N., R. 4 W.	do	3,042	1923	Dry.
Embar Drilling	Sec. 5, T. 27 N., R. 3 W.	do	1,919	1927	Show of oil at 1,860 feet.
Montana Pacific Oil	Sec. 17, T. 27 N., R. 4 W.	do	2,076	1927	3½ M gas at 2,065 feet; 3 barrels oil at 2,072 feet.
Fulton Petroleum	Sec. 16, T. 27 N., R. 4 W.	do	2,031	1928	1 M gas at 2,018 feet; 100 barrels oil at 2,025 feet.
California Petroleum	Sec. 13, T. 26 N., R. 2 W.	do	1,830	1927	Show of oil at 1,810 feet.
Do	Sec. 20, T. 26 N., R. 1 E.	do	1,800	1927	Dry.
	TETON COUNTY				
Continental Development	Sec. 8, T. 27 N., R. 5 W.		2,360		Drilling.
Utah-Western	Sec. 22, T. 27 N., R. 5 W.	Madison	2,432	1926	Show of oil at 2,393 feet.
O'Neil Bros	Sec. 32, T. 27 N., R. 6 W.	do	2,650	1926	Show of oil at 2,604 feet.
McCue	Sec. 32, T. 26 N., R. 2 W.	do	2,210	1925	Show of oil at 1,786 feet.
Golfers Syndicate	Sec. 34, T. 26 N., R. 1 W.	do	1,680	1927	Dry.
California Petroleum	Sec. 36, T. 26 N., R. 2 W.	do	1,720	1927	Do.
California	Sec. 25, T. 26 N., R. 5 W.	Devonian	3,673	1925	Do.
Bannatine	Sec. 29, T. 26 N., R. 1 E.	Ellis	1,635	1927	Show of oil at 1,480 and 1,586 feet.
Genon Oil	Sec. 8, T. 25 N., R. 1 E.	Madison	1,580	1927	30 barrels of oil at 1,445 feet.
Do	Sec. 8, T. 25 N., R. 1 E.	Ellis	1,505	1927	60 barrels of oil at 1,471 feet.
Do	Sec. 5, T. 25 N., R. 1 E.	do	1,485	1928	105 barrels of oil at 1,422 feet.
Hard Rock Oil	Sec. 5, T. 25 N., R. 1 E.		1,507	1928	Oil at 1,436 feet.
Fulton Petroleum	Sec. 8, T. 25 N., R. 1 E.		1,300		Drilling.
Fidelity Oil	Sec. 15, T. 25 N., R. 1 E.	Kootenai	1,340	1927	Dry.[1]
Elliot, Miller-Conklin	Sec. 19, T. 25 N., R. 1 E.	Madison	1,700	1927	Do.
Kalispell-Craig	Sec. 17, T. 25 N., R. 1 E.	Ellis	1,480	1927	Do.
S. C. Ferdig	Sec. 12, T. 25 N., R. 1 W.	do	1,625	1927	Show of oil at 1,585 feet.
W. J. Elliot	Sec. 1, T. 25 N., R. 1 W.	Madison	1,710	1927	Dry.
Homestake Exploration	Sec. 29, T. 25 N., R. 1 W.	do	1,607	1927	Show of oil at about 1,644 feet.
Gypsy Oil	Sec. 14, T. 25 N., R. 3 W.	do	2,032	1923	Dry.
Campbell	Sec. 32, T. 25 N., R. 4 W.	do	2,315	1923	Do.
Edwards	Sec. 2, T. 26 N., R. 6 W.	Colorado	435	1925	¼ M gas.
Bannatine No. 1	Sec. 3, T. 24 N., R. 1 E.	Kootenai	1,160		Dry.
Dutton Creek Oil & Gas	Sec. 28, T. 24 N., R. 1 W.	Madison	2,393		Show of oil at 1,715 feet.
Teton Petroleum	Sec. 26, T. 24 N., R. 1 W.	do	1,949	1924	Show of oil at about 1,676 feet.
Midwest Refining	Sec. 19, T. 24 N., R. 2 W.	do	2,166	1923	Dry.
Choteau Oil & Gas	Sec. 19, T. 24 N., R. 6 W.	Two Medicine	1,164	1921	Do.
Western Petroleum Exploration	Sec. 12, T. 24 N., R. 7 W.	Colorado	1,810	1922	Do.
Do	Sec. 24, T. 24 N., R. 7 W.	do	3,519	1921	Do.
Allen Oil	Sec. 34, T. 23 N., R. 2 E.	Ellis	3,200		Do.
Montana Giant Oil	Sec. 23, T. 23 N., R. 4 W.	Madison	2,232	1923	Do.
Carter Oil	Sec. 18, T. 23 N., R. 4 W.	do	2,700	1923	Do.
	CHOUTEAU COUNTY				
Northfield Reliance Oil	Sec. 20, T. 26 N., R. 4 E.	Madison	2,750	1923	Show of oil at 1,985 and 2,300 feet.
Twenty Dollar Bill Oil	Sec. 29, T. 25 N., R. 9 E.	Kootenai	2,378	1923	Show of oil at 1,717 feet.
Hagen-Stevenson Oil	Sec. 16, T. 25 N., R. 9 E.	do	2,300	1922	Dry.
McPherson	Sec. 19, T. 25 N., R. 7 E.		2,160	1924	Do.
Transcontinental Oil	Sec. 8, T. 23 N., R. 9 E.	Madison	2,979	1922	Do.
Montana Giant Oil	Sec. 18, T. 23 N., R. 4 E.	do	1,850	1923	Show of oil at 1,553 feet.
	CASCADE COUNTY				
Elkhorn Oil & Gas	Sec. 18, T. 22 N., R. 23 E.	Madison	1,596	1926	Dry.
Greater Great Falls Oil	Sec. 32, T. 22 N., R. 3 E.	do	1,368	1923	Trace of oil at 1,303 feet.
Allen Oil	Sec. 12, T. 22 N., R. 2 E.	Cambrian (?)	3,420		Drilling.
Great Falls Mutual Oil	Sec. 34, T. 32 N., R. 1 E.	Madison	1,837		Dry.
Cascade Oil & Gas	Sec. 18, T. 21 N., R. 3 E.	Cambrian (?)	3,710	1924	Do.
Keystone Oil	Sec. 3, T. 21 N., R. 1 E.	Kootenai	1,490	1923	Do.
Do	Sec. 10, T. 21 N., R. 1 E.	Madison	1,400	1922	Do.
Power City Oil & Gas	Sec. 10, T. 20 N., R. 3 E.	Cambrian (?)	3,595	1912	Show of oil at [illegible]30 and 2,015 feet.
Western Petroleum Exploration	Sec. 30, T. 20 N., R. 3 W.	Kootenai	2,184	1921	Dry.
Do	Sec. 36, T. 20 N., R. 3 W.	Colorado	1,910	1922	Do.

The whole stratigraphic section from the base of the Two Medicine formation to the basal sand of the Cambrian has been penetrated by wells, the logs of many of which are available. These logs show that the total thickness of sediments from the top of the Virgelle sandstone to the base of the Cambrian is about 5,600 feet. Four of the wells, three of which are on the west side of the arch and one on the east side, near the contact of the Colorado shale and Virgelle sandstone, show that although there is considerable variation in the thickness of the individual formations the total thickness of the sediments between the top of the Colorado shale and the oil horizon at the contact of the Ellis and Madison is fairly uniform, ranging from 2,410 to 2,545 feet with an average of 2,488 feet. Apparently the thickness is less on the northwest side of the arch than it is on the south and east sides. In the logs of these wells the exact position of the base of the Virgelle sandstone can not always be determined, but if several beds are reported as sandy shale the base of the lowest is taken for that horizon. The position of the Madison contact is believed to be definitely known in the three wells west of the arch, but in the Beck well, east of the arch, it may not have been reached.

In the wells that produce oil in the oil field and the wells drilled for oil on the south side of the Kevin-Sunburst dome drilling began somewhere in the Colorado shale. The logs of these wells report shale with little if any sand in the upper part of the Colorado. Different drillers use slightly different terms in describing the shale, but that seen on the surface is generally gray, varying somewhat from light to dark. In the Blackleaf sandy member there are some sandy layers of shale and some beds of sand or even conglomerate. The sediments vary more in color than those higher in the Colorado, and beds of bentonite are more frequently encountered. A few of the logs show brown, reddish, or pinkish beds of shale in the Blackleaf sandy member, and samples of shale from this member are likely to give a reddish streak when scratched across a rough white surface.

The Kootenai formation is not readily distinguishable in the well logs from the Blackleaf sandy member of the Colorado, though sand is more common in it. A distinctly red or maroon bed from 3 or 4 to 50 feet or more thick is reported from some of the wells. The average position of the highest red bed is 350 feet above the base of the Kootenai, but it is reported at intervals ranging from 150 to 450 feet. This bed where present and recognized is the first important horizon marker shown by the well logs. The second important horizon marker is a bed of yellow shale or sandy shale from a few to 40 or 50 feet thick mapped as the top of the Ellis formation, which is reported in some of the well logs. It probably belongs to the Ellis formation, but without fossil determinations its exact position can not be known. The Sunburst sand lies above this marker and is

highly variable in thickness. The base of the Ellis formation is so well marked by the change from shaly to massive light-colored limestone as to be recognized in most of the well logs that have penetrated it. In some of the wells, however, where the Ellis is more calcareous and where there is no basal "sand" in the Ellis the exact place of this horizon can not be determined. The logs of 15 wells scattered over the field are shown graphically in Plate 17. These logs show the variations in the altitude of the surface due to erosion and glaciation and in the altitude of the principal oil horizon at the base of the Ellis formation due mainly to the folding of the strata but also to the unequal erosion of the surface of the Madison limestone. The top of the Ellis formation, with the Sunburst sand above and the yellow shale below, and the top of the Kootenai formation, marked by the red beds, are shown wherever noted. The top of the Blackleaf sandy member of the Colorado is usually not noted by the drillers, but its position and that of the highest sandstone or sandy shale noted by the drillers are indicated. The horizons in the logs where oil or gas were noted and the logs in which the top of the Ellis formation is marked by a yellow bed and the top of the Kootenai formation by a red bed are indicated by the respective initial letters O, G, Y, and R.

The log of the California well in T. 26 N., R. 5 W., shown graphically in Figure 2, indicates either that the Ellis formation is abnormally thick or that there is a depression in the top of the Madison limestone containing some basal remnant of the Quadrant formation below the unconformity.

The lower part of the log of the California Co.'s well near Agawam, in sec. 25, T. 26 N., R. 5 W. (fig. 2), shows the Paleozoic formations of the field.

STRUCTURE CONTOURS SHOWING GENERAL CONFIGURATION OF THE ARCH

Plate 15 portrays the configuration of the Sweetgrass arch by means of structure contours drawn on the top of the Madison limestone, which lies at or just below the principal oil horizon of the Kevin-Sunburst field. Except in T. 35 N., R. 2 W., and parts of surrounding townships, these contours, though believed to be approximately in their correct position, are somewhat generalized, as will be seen by the lack of small irregularities such as are present in T. 35 N., R. 2 W., where drilling is more complete and where more details are therefore available. The contours are shown by broken lines, for the altitude of the basal "sand" of the Ellis formation or top of the Madison limestone is known at comparatively few localities. It can be determined approximately by subtracting about 2,500 feet from the altitude of the base of the Virgelle sandstone and

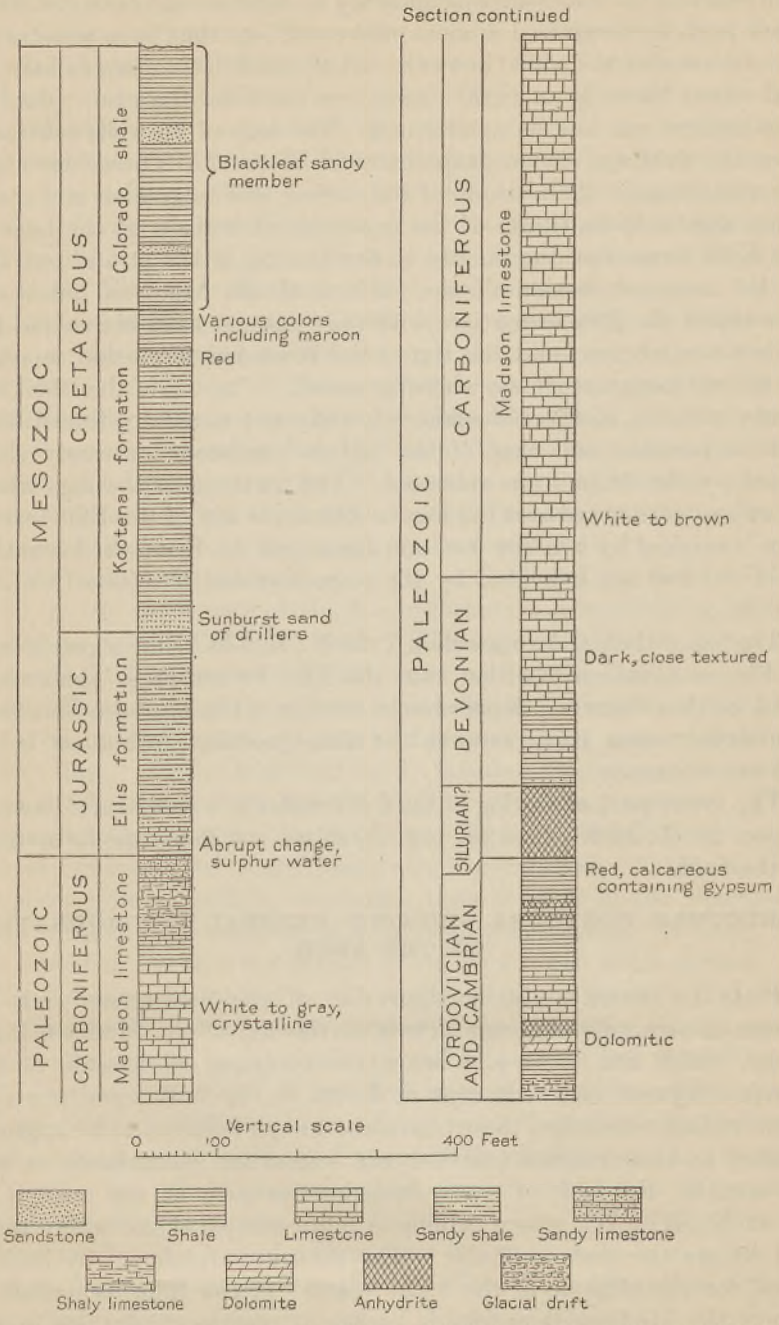


FIGURE 2.—Log of the California Co.'s well in sec. 25, T. 26 N., R. 5 W., near Agawam, Mont.

STRUCTURE MAP OF SWEETGRASS ARCH, MONTANA

Base from U. S. G. S 1:500,000 scale map

Geology by A. J. Collier

0 10 20 30

1929

EXPLANATION

Porphyry

Structure contours on top of Madison limestone
(Contour interval 100 feet; datum is sea level)

Boundary between formations
(Dashed line represents probable location)

Oil well

Uncompleted well

Dry hole

Dry hole with show of oil

Gas well

Gas well with show of oil

STRUCTURE MAP OF THE KEVIN-SUNBURST OIL FIELD, TOOLE COUNTY, MONTANA

Scale 1/62500
0 1 2 Miles

1929

EXPLANATION

- Uncompleted well
- Dry hole
- Dry hole with show of oil in Sunburst sand
- Dry hole with show of oil in basal "sand" of Ellis formation
- Show of oil in Sunburst sand
- Show of oil in basal "sand" of Ellis formation
- Show of oil in Sunburst sand and basal "sand" of Ellis formation
- Oil production in Sunburst sand
- Oil production in basal "sand" of Ellis formation
- Oil production in Sunburst sand and basal "sand" of Ellis formation
- Oil production in basal "sand" of Ellis formation with show of oil in Sunburst sand
- Gas well in Sunburst sand
- Gas well in Sunburst sand with show of oil in basal "sand" of Ellis formation
- Gas well in Sunburst sand with oil production in basal "sand" of Ellis formation

Structure contours on top of Madison limestone
(*Contour interval 50 feet; datum is sea level*)

Boundary between Virgelle sandstone and Colorado shale; dashed line represents probable location

CANADA

R.3W. R.2W. R.1W.

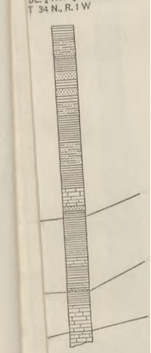
T.37N. T.36N. T.35N. T.34N. T.33N. T.32N.

PRINCIPAL MERIDIAN

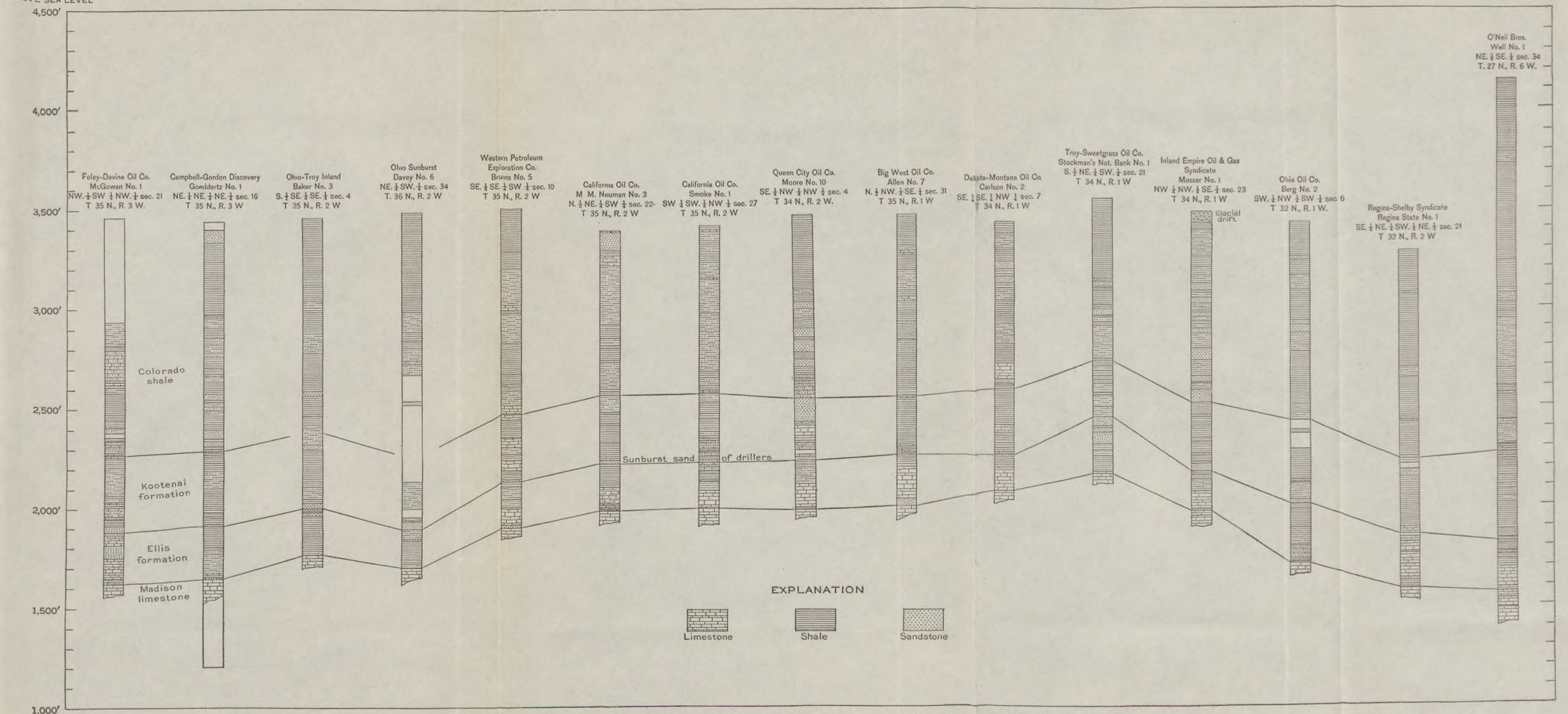
Sweetgrass, Sunburst, Van, Kevin, Oilmont, Aloe, Simla, Virden, SHELBY, Farrell

NORTHERN, GREAT

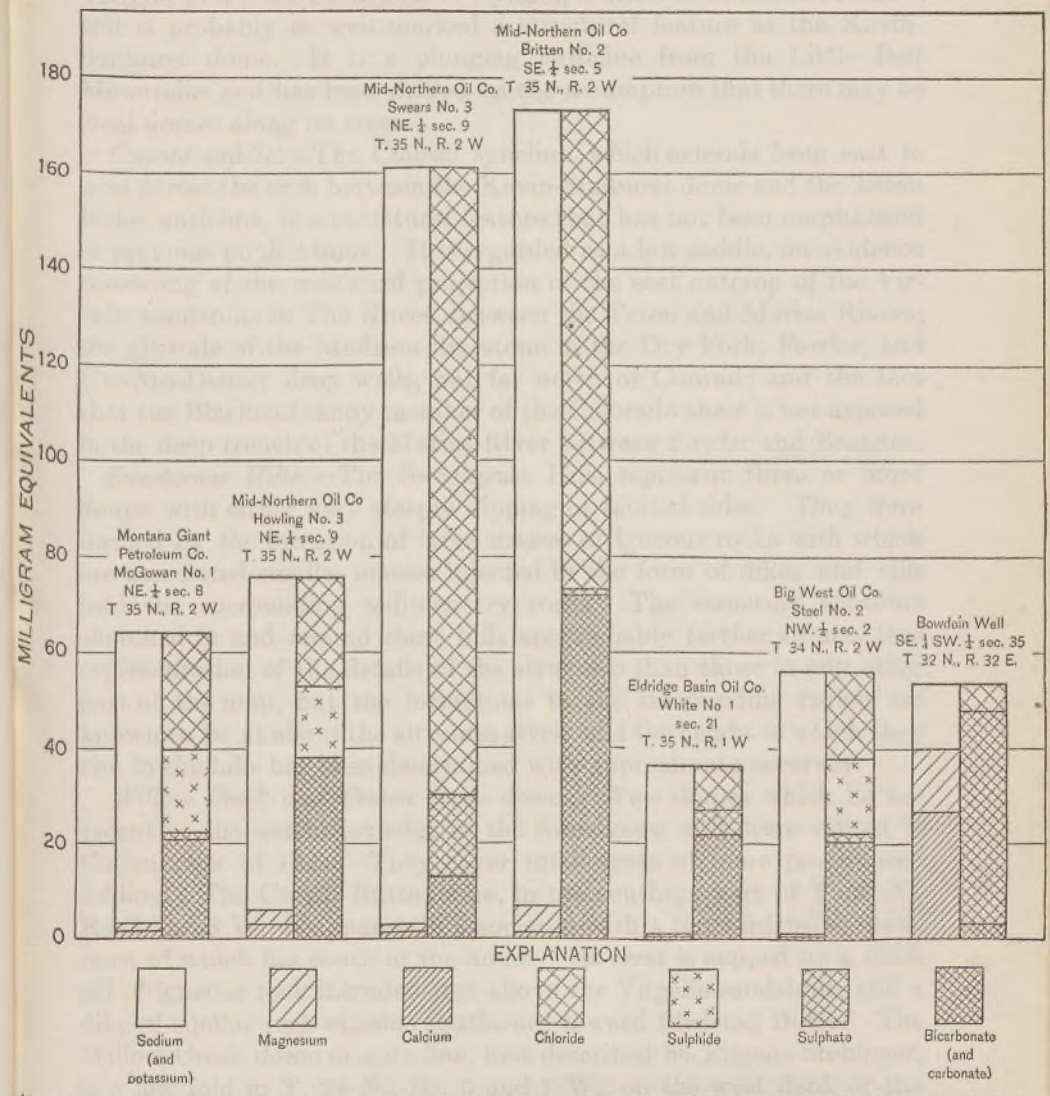
Virgelle sandstone
Colorado shale



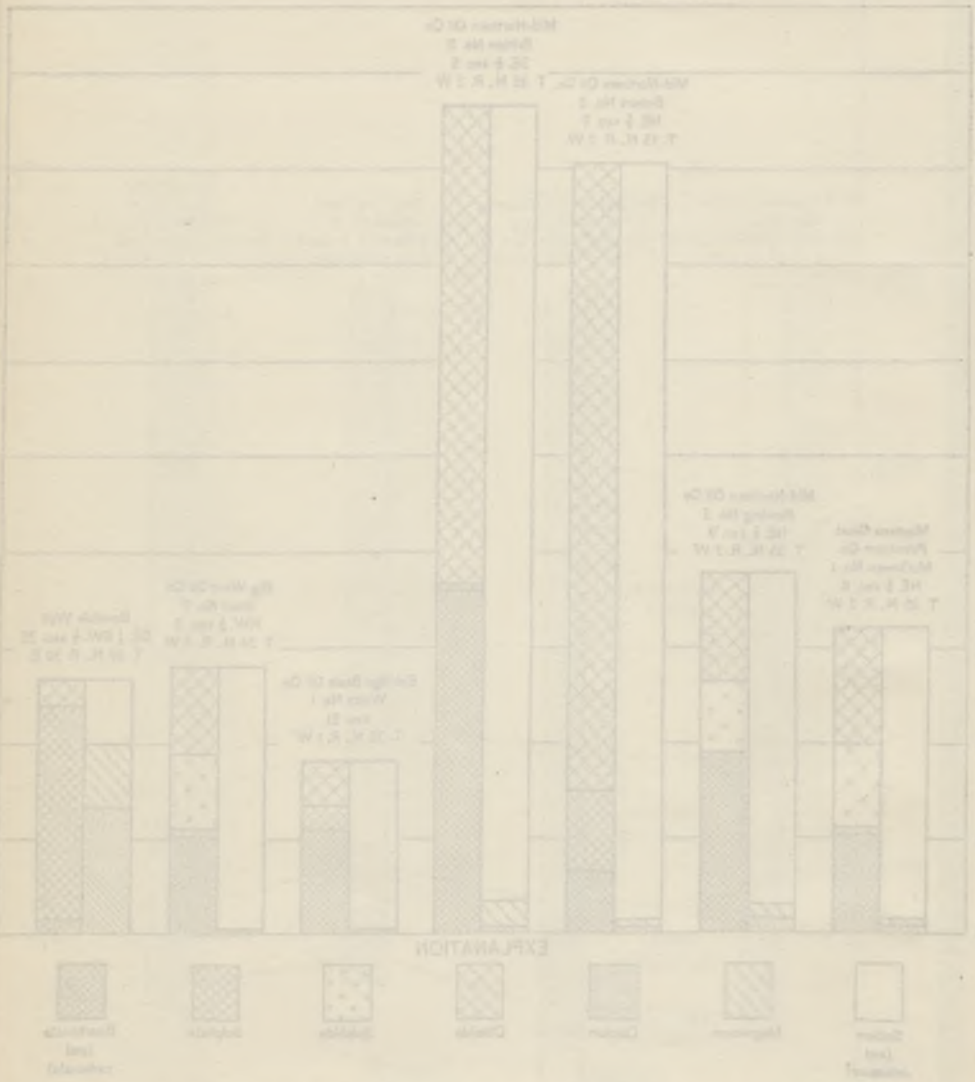
REGION SO



LOGS OF 15 WELLS IN THE KEVIN-SUNBURST OIL FIELD, MONTANA, AND THE REGION SOUTH OF IT



ANALYSES OF WATERS ASSOCIATED WITH THE OIL IN THE KEVIN-SUNBURST OIL FIELD, MONTANA



at a few scattered wells by subtracting the depth of the Madison from the surface altitude.

REGIONAL STRUCTURAL FEATURES OF THE ARCH

Teton Ridge anticline.—The Teton Ridge anticline extends from Vaughn to a point northwest of Bynum, a distance of about 50 miles, and is probably as well marked a structural feature as the Kevin-Sunburst dome. It is a plunging anticline from the Little Belt Mountains and has been drilled on the assumption that there may be local domes along its crest.

Conrad saddle.—The Conrad syncline, which extends from east to west across the arch between the Kevin-Sunburst dome and the Teton Ridge anticline, is a structural feature that has not been emphasized in previous publications. It is regarded as a low saddle, on evidence consisting of the westward projection of the east outcrop of the Virgelle sandstone in The Knees, between the Teton and Marias Rivers; the altitude of the Madison limestone in the Dry Fork, Fowler, and Ute-Mo-Denzer deep wells, not far north of Conrad; and the fact that the Blackleaf sandy member of the Colorado shale is not exposed in the deep trench of the Marias River between Fowler and Beatrice.

Sweetgrass Hills.—The Sweetgrass Hills represent three or more domes with either very steeply dipping or faulted sides. They were formed by the intrusion of large masses of igneous rocks with which are associated smaller masses injected in the form of dikes and sills into the surrounding sedimentary rocks. The structure contours sketched in and around these hills are probably farther from a true representation of the details of the structure than those in any other part of the map, but the formations in the surrounding region are known to be at about the altitudes given, and the height to which they rise in the hills has been determined with approximate accuracy.

Willow Creek and Crown Butte domes.—Two domes which lie adjacent to the southwest edge of the Sweetgrass arch were visited in the summer of 1923. They cover small areas of more pronounced folding. The Crown Butte dome, in the southern part of T. 20 N., Rs. 2 and 3 W., is apparently associated with a large intrusive mass, most of which lies south of the dome. Its crest is capped by a thick sill of igneous rock intruded just above the Virgelle sandstone, and a dike of similar rock extends southward toward Birdstail Butte. The Willow Creek dome or anticline, first described by Eugene Stebinger, is a low fold in T. 24 N., Rs. 6 and 7 W., on the west flank of the Sweetgrass arch which trends northwestward and is about 6 miles long. The Two Medicine is the oldest formation exposed in this fold, and the depth of the Virgelle sandstone is estimated at 2,000 feet. This and several other folds of similar nature found north and south of it on the west side of the Sweetgrass arch are not easily

recognized or mapped because of the lenticular character of the beds forming the Two Medicine formation. Such folds have not yet been found to be oil bearing in this region.

Kevin-Sunburst dome.—The Kevin-Sunburst dome, near Shelby, is a nearly circular uplift covering about 16 townships, the apex of which is only 700 feet above the marginal points, 12 miles away. The dips away from its summit are in few places as much as 1°. Its regularity and its outline suggest that it may be the surface expression of a large deep-seated laccolith, but of this there is no other evidence. The wells in the Kevin-Sunburst dome show a low increase in temperature with depth, approximately 1° F. to 100 feet, as compared with those in other oil fields, in some of which it is as high as 1° to 30 feet.[32]

SUBSURFACE STRUCTURAL FEATURES

Structure map of the Kevin-Sunburst dome.—On the structure map of the Kevin-Sunburst dome (pl. 16) the contours are drawn with a 50-foot interval to show the varying altitude of the top of the Madison and the base of the Ellis formation. In the proved oil field, where many wells have penetrated to the base of the Ellis formation and the altitudes are therefore known in some detail, the contours are shown by solid lines; in other parts of the area they are more generalized and are shown by broken lines.

Possible minor structural features on the dome.—The structure map based on the logs of the wells shows some minor irregularities such as local steepening of dips and a few local depressions and domes. These may be merely the result of variations in the oil sand due to unequal porosity, unequal weathering and erosion of the top of the Madison, or they may represent errors in the logs. They may, however, be the result of small folds or faults in the Madison limestone. The irregularities all represent departures of less than 100 feet from the normal folding of the beds, and without more thorough drilling at close intervals and reliable logs their nature can not be determined. The presence of vertical fissures in the limestone suggests faulting, which, if it could be demonstrated, would go far toward proving that the source of the oil is in the underlying rocks.

The imperfect logs of two wells in sec. 34, T. 35 N., R. 1 E., present one of these irregularities. In these wells the depth of the Madison is believed to be about 1,500 feet, from the occurrence of sulphur water at that depth, but drilling continued to a depth of about 1,700 feet, and in one of the wells a showing of oil is reported at 1,607 feet. The oil may be a local accumulation in the Madison, but on the other hand the Madison limestone may be faulted or folded downward at that place. A somewhat similar discrepancy is noted in

[32] Van Orstrand, C. E., personal communication.

the well logs in the neighborhood of sec. 18, T. 34 N., R. 1 W., and sec. 13, T. 34 N., R. 2 W. The Ohio Oil Co.'s Johnson No. 1 well, completed in July, 1926, in sec. 18, T. 34 N., R. 1 W., found a small quantity of oil in the Madison limestone 17 feet below the base of the Ellis. In the O'Neil-Lashbaugh No. 5 well, in sec. 27, T. 35 N., R. 2 W., a flow of 3,000 barrels of oil a day is believed to have been struck about 80 feet below the Ellis-Madison contact.

OIL AND GAS IN THE KEVIN-SUNBURST FIELD

DISCOVERY OF THE FIELD

The first attempt to develop oil in the Kevin-Sunburst dome was made on the James Miller ranch, in sec. 25, T. 34 N., R. 4 W., in 1912. Mr. Miller in drilling a water well obtained a small amount of high-grade oil from the Colorado shale and using this as a sample induced a drilling company to make a test. The well reached a depth of 1,755 feet and stopped in the Ellis formation some distance above its base. There was some excitement over this test, and placer locations were made on many of the surrounding sections under the old law, to hold the land for drilling. Plate 14, *A*, shows four of the so-called discovery pits surrounding a section corner not far from the site of the Miller well.

In 1921 Gordon Campbell and associates started drilling a well northwest of Kevin, in sec. 16, T. 35 N., R. 3 W., and in March, 1922, they announced the first discovery of oil in paying quantities, but the well was not tested with a pump until the later part of May. They had obtained gas from a higher sand and were using it to heat the office and other buildings around the well and had probably found traces of oil in the Sunburst sand. After the test Mr. Campbell decided to drill deeper in search of a better sand but in doing so struck sulphur water and lost the well. The attention of many oil men was attracted to the Sweetgrass arch by these activities, and in the spring of 1922 the Sunburst Oil Co. and the Troy-Sweetgrass Co. started operations. The Sunburst Oil Co. struck oil in the Sunburst sand, which is about 200 feet above the basal "sand" of the Ellis formation, and brought in a successful well in sec. 3, T. 16 N., R. 36 W., early in June, 1922. The Troy-Sweetgrass Co., working with a diamond drill in sec. 21, T. 34 N., R. 1 W., reached the Madison limestone at about the same time, and, though unsuccessful in striking oil in commercial quantities, the well, which has since been drilled through the Devonian, has furnished a reliable record of the formations underlying the field. Two other wells drilled in 1922 with core-cutting machinery—the Big West well, in sec. 6, T. 34 N., R. 1 W., and the Three-in-One well, in sec. 8, T. 35 N., R. 1 W.—have contributed detailed information regarding the Colorado and Kootenai formations of the field.

DEVELOPMENT, EXTENT OF FIELD, AND PRODUCING "SANDS"

About 1,000 wells had been drilled on the Kevin-Sunburst dome prior to January 1, 1927. Oil had been produced from wells within an area of about 75 square miles in T. 36 N., R. 2 W.; T. 35 N., Rs. 1, 2, and 3 W.; and T. 34 N., Rs. 1 and 2 W., on the north side of the Kevin-Sunburst dome; but on the south side only gas had been found in commercial quantities. Most of the wells are in T. 35 N., R. 2 W., but secs. 29 to 32, T. 35 N., R. 1 W., and sec. 4, T. 34 N., R. 2 W. are probably the most productive areas discovered.

The so-called basal "sand" of the Ellis at the unconformable contact of the Jurassic Ellis formation and the Carboniferous Madison formation yields most of the oil and a small part of the gas produced in the Kevin-Sunburst field, stray "sands" above the basal "sand" of the Ellis and the upper 80 feet of the Madison are productive in some of the wells, and the Sunburst sand in the Kootenai formation, 200 to 300 feet above the basal "sand" of the Ellis, yields a small part of the oil and most of the gas. Stray sands in the Kootenai and Colorado formations have also yielded part of the gas.

T. 37 N., Rs. 1–3 W., and T. 36 N., R. 1 W.—T. 37 N., R. 1 W., has been tested by only one well, in sec. 31. Fresh water was found at a depth of 1,945 feet, and sulphur water was struck in the basal "sand" of the Ellis at 2,186 feet.

No well has been drilled deep enough to test the basal "sand" of the Ellis formation in T. 37 N., R. 2 W.

T. 37 N., R. 3 W., has been tested by two wells, in secs. 28 and 29, which struck sulphur water, probably in the basal "sand" of the Ellis formation, at a depth of about 2,600 feet. A show of gas is reported from the Sunburst sand in one of these wells.

The only test well in T. 36 N., R. 1 W., is in sec. 31, where water was struck in the basal "sand" of the Ellis formation at a depth of 1,840 feet. A showing of gas was reported in the Blackleaf sandy member of the Colorado shale.

T. 36 N., R. 2 W.—The northern limit of the productive oil field on January 1, 1926, was somewhat less than 2 miles north of the south line of T. 36 N., R. 2 W., for wells in secs. 26, 27, and 29 had yielded small quantities of oil. The well in sec. 29 reported only 2 barrels a day from the basal "sand" of the Ellis and is abandoned, that in sec. 27 found a showing of oil in the Sunburst sand, and for that in sec. 26 an initial production of 12 barrels a day from the basal "sand" of the Ellis is reported. In sec. 31 shows of oil are reported from both the Sunburst sand and the basal "sand" of the Ellis. Of the 16 wells drilled in secs. 33, 34, and 35, 13 report an initial production from the Sunburst sand of 5 to 155 barrels a day; four wells report oil from both the Sunburst sand and the basal "sand" of the Ellis; three

wells report the Sunburst dry and the Ellis productive, one well was a dry hole; and one reported 2,000,000 feet of gas a day from a sand above the Sunburst. Four of these wells have been abandoned.

The discovery well of the Sunburst Co., in the SE. ¼ SE. ¼ SW. ¼ sec. 34, Ohio-Sunburst-Davey No. 1, which had an initial daily production of 150 barrels, was still being pumped when the field was revisited in 1925.

T. 36 N., R. 3 W.—Three wells had been drilled in T. 36 N., R. 3 W., prior to January 1, 1926, one of which, in sec. 21, had an initial daily production of 2 to 3 barrels in the Sunburst sand and has been abandoned.

T. 35 N., R. 1 W.—About 10 sections in the southwestern part of T. 35 N., R. 1 W., were within the producing oil field as defined on January 1, 1926. The easternmost point at which production was noted is in the SW. ¼ sec. 16, where there are two wells in the Sunburst sand. Three wells drilled in sec. 17, one in sec. 18, and one in sec. 7 report only showings of oil either in the Sunburst sand or the basal "sand" of the Ellis formation. The Frazier well in sec. 17 has been drilled through the Devonian and reports showings of oil and gas from that formation also. Southward from sec. 16 the outside boundary of the productive field runs southeastward to a well of small initial production in sec. 11, T. 34 N., R. 1 W. Thirteen wells drilled in the unproductive portion of the township report either showings or dry holes.

Of 10 wells drilled in secs. 19, 20, and 21 prior to January, 1926, four report production from the basal "sand" of the Ellis, one reports 500,000 cubic feet of gas a day from the Sunburst sand, and six report either showings of oil from the basal "sand" of the Ellis or dry holes.

In the southern and western part of sec. 29, 45 wells had been drilled by January 1, 1926, 44 of which reported an initial production of 8 to 145 barrels a day from the basal "sand" and stray higher sands of the Ellis and 3 reported from 1,000,000 to 4,000,000 cubic feet of gas a day from the Sunburst sand.

In sec. 30, 48 wells were listed January 1, 1926, 36 of which are productive, yielding from 10 to 3,000 barrels daily initial production from the basal "sand" and higher stray sands of the Ellis formation; 5 of these wells yielded from 1,000,000 to 3,000,000 cubic feet of gas daily from the Sunburst sand; 7 wells were either dry or reported only showings of oil.

Forty wells in the NE. ¼ sec. 31 had an initial production of 15 to 2,000 barrels a day. In this section only one dry hole is reported, and two wells report 1,000,000 and 3,000,000 cubic feet of gas.

In sec. 32, 28 wells were listed as having an initial production of 5 to 600 barrels a day from the basal "sand" and higher sands of the

Ellis on January 1, 1926. Most of the wells drilled are in the west half of the section.

These four sections—29, 30, 31, and 32—include the most productive part of the oil field yet discovered. The first oil in many of the wells is struck in "sands" above the base of the Ellis formation, and the drilling in some of these wells has been stopped there. Other wells have continued through barren strata, usually limestone, not readily distinguished from the Madison limestone and have struck oil at one or more underlying horizons before the Madison limestone was reached. As water is usually encountered in the basal "sand" of the Ellis or in the Madison it is probably good policy to stop drilling when a producing sand is reached and to resume the drilling only after the production of the upper sands has commenced to decline. Probably the well of largest production in the whole field prior to January 1, 1926, is the Rice-Stannard No. 1, in the SE. ¼ SE. ¼ SW. ¼ sec. 30. This well was begun at an altitude of 3,517 feet. It struck the first showing of oil in the Sunburst sand between 1,190 and 1,217 feet and the first commercial quantity in a stray sand at 1,255 feet. At a depth of 1,276 feet the well commenced to flow, making about 500 barrels of oil in 24 hours. In one month the production declined to about 60 barrels a day, and drilling was resumed; more oil was found at a depth of about 1,286 feet, but the well did not flow again until it had reached a depth of 1,442 feet, where it began flowing at a rate estimated at 3,000 barrels a day.

In secs. 33 and 34 three wells giving shows of oil in the basal "sand" of the Ellis formation have been drilled.

T. 35 N., R. 2 W.—In T. 35 N., R. 2 W., secs. 6 and 7 have not been tested; in sec. 29 only one well, a dry hole, has been drilled; and in secs. 1 and 32 gas but no commercial oil had been found on January 1, 1926. In these five sections only five wells have been drilled. Some 350 wells are scattered over the remaining 31 square miles of the township, and a few more than half of them are rated as productive, the output ranging from 10 to 3,000 barrels a day when first tested.

The productive areas in which wells produced over 1,000 barrels a day initially are in secs. 4 and 9, where three large wells drilled in 1923 produced over 500,000 barrels of oil in 1923 and 1924; and in the SW. ¼ sec. 33, the SE. ¼ sec. 27, and the E. ½ sec. 36, where 11 such wells were brought in during 1925 and 1926.

Most of the wells scattered between these two areas of high initial production are rated as producing initially from 10 to 500 barrels a day. Much undrilled territory remains in the township, on parts of which large producers may be located before the field is exhausted. In the two western tiers of sections only about one-third of the wells are reported as having an initial production of 10 to 275 barrels a day, and northeast of a line drawn from the northwest corner of sec. 4 to

the southwest corner of sec. 13 about one-half the wells have a small initial production, the largest being only 130 barrels.

In the northern area of large initial production all the oil comes from the basal "sand" of the Ellis but in the southern area stray "sands" of the Ellis above the basal "sand" produce a commercial quantity of the oil. In secs. 3, 4, 5, 8, 22, and 23 some of the wells produce oil from the Sunburst sand.

About one-tenth of the wells scattered over the township produce over 1,000,000 cubic feet of gas per well daily from the Sunburst sand.

T. 35 N., R. 3 W.—Although the first discovery of oil in the Kevin-Sunburst dome was made in T. 35 N., R. 3 W., in 1922, only 43 wells had been drilled within this township up to January 1, 1926. Of these wells 23 reported either oil or gas in commercial quantities. The position of the producing wells indicates that the productive territory lies southeast of a line drawn from the northeast corner of sec. 13 to the eastern part of sec. 9 and thence southwestward to the south line of sec. 31, including 17 or 18 square miles. No wells of large production have been found, and a comparatively small quantity of oil has been produced. Most of the oil is found near the contact of the Madison and the Ellis formations, though a considerable quantity comes from the Sunburst sand. Probably seven or eight wells have produced over 1,000,000 cubic feet of gas a day each and can be rated as gas wells. The large flows of gas come from the Sunburst sand. The Campbell discovery well, in sec. 16, struck oil in the basal "sand" of the Ellis formation at a depth of 1,770 feet in March, 1922, and, after standing idle for about three months, was tested and yielded about 100 barrels; subsequent pumping showed a production between 5 and 10 barrels a day. This well has been abandoned. The Majestic Oil & Gas Co.'s Davis No. 1 well in sec. 27, brought in on January 6, 1928, with an initial production of 800 barrels daily from the Madison limestone, a short distance below the Ellis-Madison contact, is probably the best well in the township.

T. 34 N., R. 1 W.—About 20 wells had been drilled to the basal "sand" of the Ellis in T. 34 N., R. 1 W., by July 1, 1926. Four of these wells, in secs. 5, 7, 11, and 17, which are reported as small producers, made it seem probable that some oil, and possibly some good wells, might be found in about one-third of the township.

Early in 1928 the number of wells drilled had increased to about 75, most of which were located in about five sections in the northwestern part. About one-tenth of the wells produced both oil and gas, three-tenths are oil wells, two-tenths gas wells, and four-tenths dry holes. Two of the wells in sec. 7 had an initial production of more than 1,000 barrels. One well in sec. 9 was first reported as a gas well, but it was drilled for a short distance into the Madison lime-

stone and struck a large flow of water, which later changed to oil. It is one of the most spectacular and productive wells of the Kevin-Sunburst field. A well in sec. 34 is reported to have had an initial production of 15,000,000 cubic feet of gas a day.

T. 34 N., R. 2 W.—The southern limit of oil production of the Kevin-Sunburst oil field on January, 1926, is marked by two small wells in the SE. ¼ sec. 13 and the NW. ¼ sec. 17, T. 34 N., R. 2 W. In sec. 4 and the E. ½ sec. 5 there is an area of large production which was developed in 1924 and yielded about half the oil produced in the whole field during that year. Developments in 1925 show that this area extends northward into sec. 33, T. 35 N., R. 2 W. Several of the wells yielded from 1,000 to 8,000 barrels a day when first tested. In one of these wells a small production was found in the Sunburst sand, and in several wells stray oil sands in the Ellis were found, but most of the oil came from the basal "sand" of the Ellis. The wells appear to be shorter lived than those in secs. 4 and 9, T. 35 N., R. 2 W., but this may be due to the fact that they have not been handled in the same way. About 67 wells had been drilled in secs. 4 and 5 by January 1, 1926.

In secs. 1, 2, and 3, more than half the wells are dry holes, and west of sec. 5 no well has been successful in finding oil. In secs. 8, 9, and 17 only small quantities of oil have been found, and most of the wells are either dry holes or have yielded only showings of oil in the basal "sand" of the Ellis formation. Two wells yielding small quantities of oil were drilled late in 1922, in the NW. ¼ and SE. ¼ sec. 13, but at present these wells are abandoned. In the two northern tiers of sections of the township large flows of gas from the Sunburst sand have been found in about one-tenth of the wells.

T. 34 N., Rs. 3 and 4 W.—In T. 34 N., R. 3 W., four wells had been drilled prior to January 1, 1926, from one of which in sec. 25 a showing of oil in the basal "sand" of the Ellis is reported. In T. 34 N., R. 4 W., 2 wells had been drilled, one of which is the Miller well, completed in 1912 and yielding gas in the Blackleaf member of the Colorado shale and in the Kootenai formation.

Tps. 32 and 33 N., Rs. 1 and 2 W.—On the south half of the dome there is evidently a field which will yield gas from the Sunburst and perhaps other sands. Three wells drilled prior to 1927 in T. 33 N., R. 1 W., yielded from 1,500,000 to 10,000,000 cubic feet of gas daily from the Sunburst sand; another well is a dry hole.

In T. 33 N., R. 2 W., three wells yield from 2,000,000 to 14,500,000 cubic feet of gas daily from the Sunburst sand or the basal "sand" of the Ellis, and one other well is a dry hole.

Two wells in sec. 6, T. 32 N., R. 1 W., yielded 4,000,000 and 7,500,000 cubic feet of gas daily, probably from the Sunburst sand, but a well in sec. 1 of the same township is a dry hole. The two

gas wells are equipped with a pipe line and supply domestic fuel to the town of Shelby.

A well in sec. 13, T. 32 N., R. 2 W., is reported as capable of yielding 10,000,000 cubic feet of gas daily from the Sunburst sand. This well, which had not reached the Madison in January, 1927, is said to have found between 50 and 150 feet of heavy black oil in a stray sand in the Ellis. It is the first well south of the dome to yield more than a trace of oil.

SHOOTING THE WELLS

Many of the wells when first drilled to the productive horizon yield very small quantities of oil, and the absence of water indicates that the rocks are not porous enough to allow the oil to flow. Under such conditions the practice is to "shoot" the well to open fissures through which the oil may move, using from 5 to 100 quarts of nitroglycerine. Possibly a third of the wells have been treated in this way, and the results commonly show enough improvement in the yield to justify the expense.

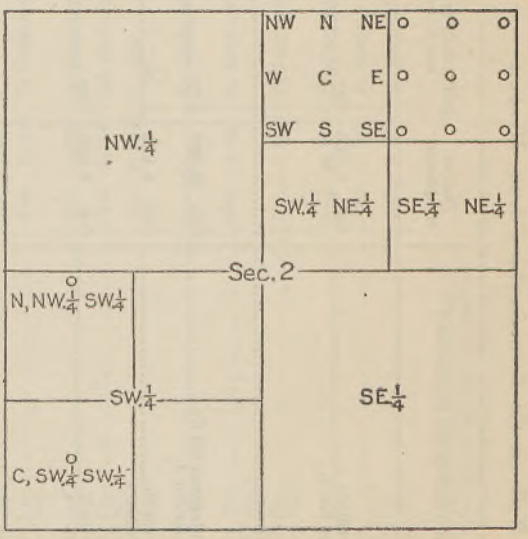


FIGURE 3.—Arrangement of wells in a section and letters used in table to indicate their location, Kevin-Sunburst field, Montana

WELL MAP

The location and character of the wells drilled in the part of the dome in which commercial oil or gas has been produced are shown on Plate 16, and the following table furnishes a key to the map by giving descriptions of the location with regard to land lines, name of operator and lessee, date of completion, depth of well, depth to basal "sand" of the Ellis, base of the Sunburst sand, and top of the Kootenai formation, and altitude of the surface and of the basal "sand" of the Ellis. The table has been made by rearranging the information given in the bulletins of the Northern Oil Information Bureau, published weekly by Fred C. Platt at Shelby, Mont., and for ready reference the numbers of the wells used in those bulletins are also given. As a general rule nine wells 400 feet apart are drilled on each 40-acre tract, or one well to each 4.44 acres. The arrangement of the wells within a section is shown in Figure 3. In a few tracts additional wells have been drilled.

Wells on the Kevin-Sunburst dome, Montana

Location (see fig. 3)	Well No.[a]	Oil company and name of well	Date of completion	Initial daily production and source [b]	Formation reached	Depth (feet) [c]	Altitude of surface (feet)
T. 37 N., R. 1 W.							
N., NE. ¼ SE. ¼ sec. 31	18	Beaupre Oil Co. Beaupre No. 1.	Apr. 7, 1925	Dry	Ellis	T 2,186 E 2,186	3,550?
T. 37 N., R. 2 W.							
SW., SW. ¼ SW. ¼ sec. 11		S. Hart Green Lemon.				T 2,050 K 1,860	
T. 37 N., R. 3. W.							
SW., SW. ¼ NE. ¼ sec. 28	335	Spartan-Montana Oil Co. McAlpine No. 1.	Oct. 10, 1923	Dry	Ellis	T 2,640 E 2,560 S 2,380?	3,793
C., NE. ¼ sec. 29	119	Griffiths Oil Co. Cornett No. 1.	Oct. 9, 1923	do	do	T 2,635 E 2,635?	3,799
T. 36 N., R. 1 W.							
C., SW. ¼ SE. ¼ sec. 31	266	Ohio Oil Co. Maley No. 1.	Oct. 7, 1922	Dry	Ellis	T 1,845 E 1,845 1,608?	3,570
T. 36 N., R. 2 W.							
S., SW. ¼ NW. ¼ sec. 4	80	W. C. Coe Oil Co. Hoffman No. 1.	Nov. 10, 1922		Colorado	T 1,300	3,350
SE., SE. ¼ SW. ¼ sec. 16	31	Bitter Creek Co. Cutler No. 1.	Apr. 26, 1923	Dry	Madison	T 1,955 E 1,840? K 1,312	3,399
W., NW. ¼ NE. ¼ sec. 18	354	Sunburst Pool O'Haire No. 1.	June 14, 1923	do	do	T 2,035 E 1,930?	3,396
C., SW. ¼ SW. ¼ sec. 23	346	Sunburst Oil & Refining Co. Boyce No. 1.	Aug. 21, 1922		do	T 1,896 E 1,876	3,455
SW., SE. ¼ SW. ¼ sec. 26	261	Ohio Oil Co. Hannon No. 1.	Aug. 10, 1922	12, Ellis	do	T 1,885 E 1,845	3,530
SE., SW. ¼ SW. ¼ sec. 27	678	Ohio Oil Co. Phillips No. 1.	Oct. 20, 1925	Show, Sunburst	Madison(?)	T 1,865 E 1,860 S 1,600 K 1,225	3,495
NE., SW. ¼ NE. ¼ sec. 29	221	National Exploration Co. Malcolm No. 1.	July 12, 1923	2, Ellis	do	T 1,690 E 1,690	3,371

NE., SE. ¼ SE. ¼ sec. 29	1,434	Overseas Petroleum Co. (Ltd.) Ferring No. 1.	Oct. 17, 1927	Dry	Ellis	T 1,950 E 1,950	3,489
SE., SE. ¼ SE. ¼ sec. 31	2	Adams Land Co. Seiver No. 1.	Nov. 30, 1922	Show, Sunburst Show, Ellis.	do	T 1,670 E 1,670 S 1,475 K 1,070	3,355
SE., SE. ¼ SW. ¼ sec. 33	484	Ohio Oil Co. Anderson No. 1.	July 12, 1925	Show, Ellis	do	T 1,763 E 1,763	3,444?
NE., NE. ¼ SE. ¼ sec. 33	314	C. B. Schaffer Thompson No. 1.	Oct. 16, 1922	5, Ellis [d] 2 M.	Madison	T 1,825 E 1,816	3,483
NE., SW. ¼ SE. ¼ sec. 33	607	Ohio Oil Co. Roundsley No. 3.	Aug. 26, 1925	Dry	do	T 1,829 E 1,807 S 1,525 K 1,435	3,487
SW., SW. ¼ SE. ¼ sec. 33	431	Ohio Oil Co. Roundsley No. 2.	Apr. 29, 1925	50, Sunburst	Kootenai	T 1,580 S 1,527	3,453
SE., SW. ¼ SE. ¼ sec. 33	272	Ohio Oil Co. Roundsley No. 1.	July 4, 1924	155, Sunburst	Ellis	T 1,776 E 1,776 S 1,525	3,455
SW., SW. ¼ NE. ¼ sec. 34	260	Ohio Oil Co. Holloway No. 1.	June 27, 1923	154, Sunburst, Ellis	Madison	T 1,777 E 1,765 S 1,765	3,492
SE., SE. ¼ NW. ¼ sec. 34	252	Ohio Oil Co. Davey No. 9.	Aug. 7, 1924	75, Sunburst, Ellis	Ellis	T 1,787 E 1,785 S 1,548	3,479
C., NE. ¼ SW. ¼ sec. 34	249	Ohio Oil Co. Davey No. 6.	Nov. 9, 1922	52, Sunburst, Ellis	Madison	T 1,794 E 1,782	3,481
SE., SE. ¼ SW. ¼ sec. 34	244	Ohio Oil Co. Davey No. 1.	June 5, 1922	150, Sunburst	Kootenai	T 1,564 S 1,564	3,502
C., SE. ¼ SW. ¼ sec. 34	247	Ohio Oil Co. Davey No. 4.	Oct. 20, 1922	15, Ellis	Madison	T 1,781 E 1,775 S 1,554	3,500
C., NE. ¼ SE. ¼ sec. 34	281	Ohio Oil Co. Swazey No. 2.	do	35, Sunburst	do	T 1,825 E 1,822 S 1,590	3,535
C., NW. ¼ SE. ¼ sec. 34	248	Ohio Oil Co. Davey No. 5.	Nov. 3, 1922	65, Sunburst, Ellis	Ellis	T 1,802 E 1,797 S 1,565	3,505
C., SW. ¼ SE. ¼ sec. 34	246	Ohio Oil Co. Davey No. 3.	Nov. 5, 1922	35, Sunburst, Ellis	Madison	T 1,783 E 1,777 S 1,552	3,501
C., SE. ¼ SE. ¼ sec. 34	280	Ohio Oil Co. Swazey No. 1.	Aug. 16, 1922	112, Sunburst	Kootenai	T 1,564 S 1,564	3,494
C., SE. ¼ SW. ¼ sec. 35	274	Ohio Oil Co. Shaw No. 1.	June 2, 1923	40, Sunburst	Madison	T 1,761 S 1,580	3,522
SW., SE. ¼ SE. ¼ sec. 35	270	Ohio Oil Co. O'Haire No. 1.	Sept. 5, 1923	15, Sunburst (?)	Ellis	T 1,685 E 1,685 S 1,500	3,451

[a] Number of well as published by the Northern Oil Information Bureau, Shelby, Mont.
[b] Figures with "M" indicate million cubic feet of gas; other figures indicate barrels of oil.
[c] T, Total depth; E, depth to base of Ellis; S, depth to top of Sunburst; K, depth to top of Kootenai.
[d] Gas in sandy shale at 1,205 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 36 N., R. 3 W.							
W., SW. ¼ NW. ¼ sec. 21	157	Kevin Oil & Gas Co. Archambault-Herman No. 1.			Colorado	T 526	3,450
W., SW. ¼ NW. ¼ sec. 21	158	Kevin Oil & Gas Co. Herman No. 2.	Feb. 16, 1925	Show, Sunburst	Madison	T 2,105 E 2,080 S 1,825	3,491
E., SE. ¼ NW. ¼ sec. 21	543	Kevin Oil & Gas Co. Prindle No. 1.	July 20, 1926	Dry	Ellis	T 1,975 E 1,975?	3,566
SE., SE. ¼ NE. ¼ sec. 35	470	Homestake Exploration Corp. Andersch No. 1.	June 22, 1925	do	Madison	T 2,000 E 1,930 S ?	3,487
SE., SW. ¼ SW. ¼ sec. 35	54	Campbell Gordon Syndicate McGowan No. 1.	May 31, 1923	do	Ellis (?)	T 1,940	3,543
T. 35 N., R. 1 E.							
C., SE. ¼ NW. ¼ sec. 30	338	Spokane-Wyoming Oil Co. Sundy No. 1.	Aug. 21, 1923	Dry	Madison	T 1,718 E 1,575? K 1,165	3,461
T. 35 N., R. 1 W.							
SE., NE. ¼ NW. ¼ sec. 2	359	Sweetgrass Arch Consolidated Skilton No. 1.	Sept. 11, 1923	Dry	Kootenai	T 1,820 S 1,820	3,691
W., NW. ¼ NW. ¼ sec. 2	360	Sweetgrass Arch Consolidated Skilton No. 2.	Feb. 24, 1925	do	Ellis	T 2,173 E 2,173	3,771?
SW., SW. ¼ SW. ¼ sec. 6	125	Hecla Oil Co. Sweetgrass No. 1.	May 31, 1923	do	Madison	T 1,705	3,567
C., SE. ¼ NE. ¼ sec. 7	160	Kevin-Roberts Klawitter No. 1.	July 22, 1923	Show, Ellis	Ellis	T 1,746 E 1,746	3,583
SE., NE. ¼ SE. ¼ sec. 8	375	Three-in-One Oil Co. Kundert No. 1.	Apr. 7, 1923	Dry	do	T 1,745 E 1,745	3,570
C., SW. ¼ NE. ¼ sec. 14	109	Folmsbee et al. Houliston No. 6.	Nov. 14, 1923	do	do	[f] T 1,830 E 1,830	3,542
SW., SE. ¼ SE. ¼ sec. 15	889	Montana Eagle Oil Co. Miller No. 1.	July 1, 1926	do	do	T 1,720 E 1,715 S 1,555	3,502
SW., SW. ¼ SW. ¼ sec. 16	290	Potlatch Oil & Gas Co. Potlatch No. 1.	Mar. 4, 1923	42, Sunburst-Ellis	Madison	T 1,636 E 1,618	3,520
SW., SE. ¼ SW. ¼ sec. 16	291	Potlatch Oil & Gas Co. State No. 2.	Oct. 15, 1925	15, Ellis	Ellis	T 1,642 E 1,642 S 1,425	3,522
SE., NE. ¼ NW. ¼ sec. 17	114	Texas Pacific Coal & Oil Co. Rice No. 1.	Sept. 17, 1924	Show, Ellis. Show, Devonian.	Devonian	[g] T 3,390 E 1,696	3,584

SW., SW. ¼ NW. ¼ sec. 17	1446	Texas Pacific Coal & Oil Co. Rice No. 2.	Sept. 19, 1927	Dry	Madison	T 1,707 E 1,670	3,576
SE., SE. ¼ SE. ¼ sec. 17	289	Freeman & Marble Grass No. 2.	May 16, 1925	Show, Sunburst	do	T 1,650 E 1,625? S 1,490	3,520
E., SE. ¼ SE. ¼ sec. 17	288	Potlatch Oil & Gas Co. Grass No. 1.	Aug. 2, 1923	Show, Ellis	do	T 1,660 E 1,631	3,529
NW., NW. ¼ NE. ¼ sec. 18	113	Frazer-Inland Gause No. 1.	May 9, 1923	do	do	T 1,672 E 1,650? S 1,470?	3,574
NE., SW. ¼ SE. ¼ sec. 18	1272	Waceka Oils (Ltd.) Gause No. 1.	June 18, 1927	Ellis	do	T 1,660 E 1,606	3,577
SE., NW. ¼ NE. ¼ sec. 19	509	Fonk et al. Bluhm No. 1.	July 20, 1925	Oil, Ellis	Ellis(?)	T 1,582? E 1,570 S 1,331	3,545
SW., SW. ¼ NE. ¼ sec. 19	228	Noyes et al. Bluhm No. 1.	Aug. 21, 1924	½ M	Madison	[h] T 1,572 E 1,540 S 1,290	3,516
SW., SE. ¼ NW. ¼ sec. 19	1305	California Petroleum Corporation Kalispell-Kevin No. 1.	July 2, 1927	30, Ellis	do	T 1,550 E 1,515	3,509
C., SE. ¼ NW. ¼ sec. 19	1381	California Petroleum Corporation Kalispell-Kevin No. 2.	Aug. 2, 1927	10, Ellis	do	T 1,575 E 1,537	3,517
W., SW. ¼ SW. ¼ sec. 19	1212	Arcus Oil Co. Kalispell-Kevin No. 4.	Apr. 8, 1927	25, Ellis	Ellis	T 1,499 E 1,499	3,506
C., SW. ¼ SW. ¼ sec. 19	1492	Arcus Oil Co. Kalispell-Kevin No. 5.	Oct. 10, 1927	35, Ellis	do	T 1,511 E 1,511	3,511
SW., SE. ¼ SW. ¼ sec. 19	807	Arcus Oil Co. Kalispell-Kevin No. 1.	May 5, 1926	30, Ellis	do	T 1,501 E 1,501	3,506
SE., SE. ¼ SW. ¼ sec. 19	875	Arcus Oil Co. Kalispell-Kevin No. 2.	May 31, 1926	Oil, Ellis	do	T 1,545 E 1,545 S 1,295	3,524
S. NE. ¼ SE. ¼ sec. 19	1566	P. M. K. Oil Co. Kalispell-Kevin No. 9.	Apr. 19, 1928	40, Ellis	Madison(?)	T 1,546 E 1,542	----------
E., SW. ¼ SE. ¼ sec. 19	1135	P. M. K. Oil Co. Kalispell-Kevin No. 6.	Jan. 7, 1927	2 M, Sunburst 100, Ellis.	Ellis(?)	T 1,495 E 1,491 S 1,250	3,521
NE., SW. ¼ SE. ¼ sec. 19	1500	P. M. K. Oil Co. Kalispell-Kevin No. 8.	Oct. 25, 1927	25, Ellis	Ellis	T 1,525 E 1,525	3,523
SW., SW. ¼ SE. ¼ sec. 19	844	P. M. K. Oil Co. Kalispell-Kevin No. 1.	May 9, 1926	30, Ellis	do	T 1,513 E 1,513 S 1,285	3,523
Do	1009	Arcus Oil Co. Kalispell-Kevin No. 3.	Aug. 28, 1926	50, Ellis	do	T 1,501 E 1,501 S 1,255	----------
SE., SW. ¼ SE. ¼ sec. 19	890	P. M. K. Oil Co. Kalispell-Kevin No. 2.	May 30, 1926	Oil, Ellis	do	T 1,505 E 1,505 S 1,270	3.523
NE., SE. ¼ SE. ¼ sec. 19	1464	P. M. K. Oil Co. Kalispell-Kevin No. 7.	Sept. 29, 1927	30, Ellis	do	T 1,522 E 1,522	3,520

[e] Abandoned in sulphur water.
[f] Sulphur water at 1,830 feet.
[g] Show of oil in Devonian.
[h] Gas at 1,365 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
SW., SE. ¼ SE. ¼ sec. 19	907	P. M. K. Oil Co. Kalispell-Kevin No. 3.	June 22, 1926	75, Ellis	Ellis	T 1,514 E 1,514 S 1,260	3,541
S., SE. ¼ SE. ¼ sec. 19	938	P. M. K. Oil Co. Kalispell-Kevin No. 4.	July 10, 1926	do	do	T 1,525 E 1,525 S 1,265	3,542
SW., NW. ¼ SW. ¼ sec. 20	1221	Ogden-Kevin Oil Co. Zachor No. 1.	Apr. 12, 1927	1 M, Stray 40, Ellis.	do	T 1,503 E 1,503	3,539
S., NW. ¼ SW. ¼ sec. 20	1276	Ogden-Kevin Oil Co. Zachor No. 2.	June 26, 1927	50, Ellis	do	T 1,543 E 1,543	3,539
SE., NW. ¼ SW. ¼ sec. 20	1574	Ogden-Kevin Oil Co. Zachor No. 3.	Apr. 23, 1928	40, Ellis	do	T 1,545 E 1,545	
N., SW. ¼ SW. ¼ sec. 20	1420	Adams Co. Zachor No. 2.	Aug. 28, 1927	50, Ellis	Madison	T 1,514 E 1,508	3,525
NW., SW. ¼ SW. ¼ sec. 20	1335	Adams Co. Zachor No. 2.	July 11, 1927	40, Ellis	do	T 1,532 E 1,525	3,523
SE., SW. ¼ SW. ¼ sec. 20	461	Big Four Oil Co. Zachor No. 1.	July 10, 1925	8, Ellis	Ellis	T 1,580 E 1,536 S 1,315	3,543
C., NE. ¼ NW. ¼ sec. 21	934	Ohio Oil Co. White No. 2.	Aug. 23, 1926	11, Ellis	do	T 1,619 E 1,619 S 1,416	3,507
NE., NW. ¼ NW. ¼ sec. 21	459	Crescent Oil & Gas Co. Danielson No. 1.	May 24, 1925	Show, Ellis	Madison	T 1,640 E 1,630 S 1,422	3,527
S., NW. ¼ NW. ¼ sec. 21	597	Crescent Oil & Gas Co. Danielson No. 2.	Aug. 21, 1925	Dry	do	T 1,625 E 1,594 S 1,375 K 1,055	3,509
SE., NW. ¼ NW. ¼ sec. 21	1120	Crescent Oil & Gas Co. Danielson No. 3.	Apr. 5, 1927	do	do	T 1,650 E 1,606	3,523
NE., SW. ¼ NW. ¼ sec. 21	421	Big Three Oil Co. Danielson No. 1.	June 28, 1925	30, Ellis	Ellis	T 1,600 E 1,600 S 1,396	3,509
NW., SE. ¼ NW. ¼ sec. 21	165	Jones Oil Co. White No. 1.	Sept. 2, 1924	25, Sunburst	Kootenai	T 1,420 S 1,400	3,518
NW., NE. ¼ SW. ¼ sec. 21	492	Western Drilling Co. White No. 1.	June 16, 1925	Show, Ellis	Madison	T 1,618 E 1,580 S 1,370	3,495
NW., NW. ¼ SE. ¼ sec. 21	436	Etheridge Basin Oil Co. White No. 1.	May 24, 1925	Dry	do	T 1,600 E 1,575 S 1,375	3,498

SW., SE. ¼ SE. ¼ sec. 21	1210	California Petroleum Corporation. White No. 1.	May 11, 1927	do	do	T 1,588 E 1,538	3,475
SE., SE. ¼ SE. ¼ sec. 22	1173	Kalispell-Coleman Oil Co. Cleveland No. 3.	Mar. 11, 1927	do	Ellis	T 1,630 E 1,630	3,501
SW., SW. ¼ SW. ¼ sec. 23	1191	Kalispell-Coleman Oil Co. Ferring No. 1.	May 2, 1927	do	do	T 1,647 E 1,647	3,510
SW., SW. ¼ SE. ¼ sec. 25	1291	Kelly-Ehr. Lough No. 1.	July 1, 1927	do	Madison	T 1,683 E 1,670	3,476
NW., NE. ¼ NE. ¼ sec. 27	1229	Adams Co. Merz No. 1.	May 10, 1927	do	do	T 1,620 E 1,615	3,487
SE., NE. ¼ NE. ¼ sec. 27	625	Charles Merz. Merz No. 1.	July 25, 1925	Oil, stray [e]	do	T 1,588 E 1,538	3,475
SE., SW. ¼ NW. ¼ sec. 27	868	Model Oils. Levnick No. 1.	June 9, 1926	10, Ellis	do	T 1,545 E 1,530 S 1,330	3,469
SW., NE. ¼ SE. ¼ sec. 27	1247	General Oil Co. Kasten No. 1.	June 7, 1927	Dry	do	T 1,670 E 1,542	3,353
NW., SW. ¼ SE. ¼ sec. 27	818	Great Spirit Oil & Gas Co. Kasten No. 2.	May 18, 1927	10, stray	do	T 1,540 E 1,515	3,454
SE., NE. ¼ NE. ¼ sec. 28	857	Deloraine Oil Syndicate. Levnick No. 1.	May 13, 1926	30, stray and Ellis [e]	do	T 1,566 E 1,541 S 1,360	3,470
SE., SW. ¼ NE. ¼ sec. 28	1304	"44" Petroleum Corporation. Miller No. 2.	June 13, 1927	10, stray	Ellis	T 1,520 E 1,520	3,462
NE., SE. ¼ NE. ¼ sec. 28	893	Deloraine Oil Syndicate. Levnick No. 2.	June 12, 1926	30, stray and Ellis [f]	do	T 1,566 E 1,566	3,477
E., SE. ¼ NE. ¼ sec. 28	935	Deloraine Oil Syndicate. Levnick No. 3.	July 20, 1926	35, stray [h]	do	T 1,500	3,478
NW., NE. ¼ SW. ¼ sec. 28	202	Mountain States Petroleum Co. Dipple No. 1.	July 10, 1923	Show, Ellis	do	T 1,498 E 1,480 S 1,298	3,468
SW., NE. ¼ SW. ¼ sec. 28	1181	Ferdig Oil Co. Dipple No. 2.	Feb. 10, 1927	Dry	Madison	T 1,590 E 1,508	3,482
SW., NW. ¼ SE. ¼ sec. 28	536	Rupp-Carlson. Miller No. 2.	July 12, 1925	Show, Ellis	Ellis	T 1,487 E 1,487	3,467
C., SE. ¼ SE. ¼ sec. 28	1194	West Hope Oil Co. Levnick No. 1.	Mar. 27, 1927	Dry	do	T 1,515 E 1,515	3,472
SW., NE. ¼ NE. ¼ sec. 29	626	Arronow F. & G. Bluhm No. 1.	Aug. 23, 1925	8, Ellis	do	T 1,560 E 1,560? S 1,295 K 940	3,491
NW., NW. ¼ NE. ¼ sec. 29	1405	Big Six Oil Co. (Ltd.) Zachor No. 2.	Aug. 28, 1927	20, Ellis	do	T 1,548 E 1,548	3,518
W., SW. ¼ NE. ¼ sec. 29	101	Sturdevant Oil Co. Bluhm No. 2.	Oct. 16, 1924	Show, Ellis	Madison	T 1,555 E 1,535 S 1,295	3,521
SW., SW. ¼ NE. ¼ sec. 29	100	Sturdevant Oil Co. Bluhm No. 1.	May 22, 1924	100, Ellis	Ellis	T 1,528 E 1,528 S 1,310	3,519

[e] Stray oil sand at 1,440 to 1,448 feet.

[f] Stray oil sands at 1,393 and 1,430 feet.

[h] Stray oil sand at 1,405 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
SW., NE. ¼ NW. ¼ sec. 29	601	Bitter Creek Oil Co. Maughans No. 5.	Aug. 25, 1925	15, Ellis	Ellis	T 1,560 E 1,560 S 1,295 K 957	3,533
NE., SW. ¼ NW. ¼ sec. 29	357	Sweeney Oil Co. Maughans No. 1.	Nov. 1, 1923	2 M, Sunburst 75, Ellis.	do	T 1,522 E 1,522 S 1,280	3,527
SW., SW. ¼ NW. ¼ sec. 29	553	Sweeney Oil Co. Maughans No. 3.	July 14, 1925	25, Ellis	do	T 1,530 S 1,290	3,537
S., SW. ¼ NW. ¼ sec. 29	645	Sweeney Oil Co. Maughans No. 4.	Sept. 3, 1925	do	do	T 1,525 E 1,525 S 1,292	3,529
SE., SW. ¼ NW. ¼ sec. 29	358	Sweeney Oil Co. Maughans No. 2.	Nov. 4, 1924	40, Ellis	do	K 900 T 1,510 E 1,510	3,524
NW., SE. ¼ NW. ¼ sec. 29	552	Bitter Creek Oil Co. Maughans No. 4.	July 18, 1925	25, Ellis	do	T 1,565 E 1,565	3,534
SW., SE. ¼ NW. ¼ sec. 29	35	Bitter Creek Oil Co. Maughans No. 3.	June 5, 1925	10, Ellis	do	T 1,587 E 1,587 S 1,300	3,530
SE., SE. ¼ NW. ¼ sec. 29	33	Bitter Creek Oil Co. Maughans No. 1.	Oct. 12, 1923	100, Ellis	do	T 1,529 E 1,529 S 1,265 K 975	3,519
E., SE. ¼ NW. ¼ sec. 29	34	Bitter Creek Oil Co. Maughans No. 2.	Nov. 16, 1923	120, Ellis	Madison (?)	T 1,569 E 1,558	3,524
NE., NE. ¼ SW. ¼ sec. 29	367	Ferdig Oil Co. Anderson No. 3.	Oct. 8, 1924	60, Ellis	Ellis	T 1,537 E 1,537	3,515
N., NE. ¼ SW. ¼ sec. 29	464	Ferdig Oil Co. Anderson No. 7.	May 8, 1925	75, Ellis	do	T 1,530 E 1,530	3,525
SW., NE. ¼ SW. ¼ sec. 29	366	Ferdig Oil Co. Anderson No. 2.	May 20, 1924	1 M, Sunburst 50, Ellis.	Madison	T 1,540 E 1,499 S 1,265	3,520
S., NE. ¼ SW. ¼ sec. 29	365	Ferdig Oil Co. Anderson No. 1.	Apr. 5, 1924	100, Ellis	do	T 1,534 E 1,492 S 1,270	3,515
NE., NW. ¼ SW. ¼ sec. 29	479	Red Deer Oil Co. Anderson No. 4.	May 28, 1925	50, Ellis	Ellis	T 1,524 E 1,524 S 1,280	3,520
NW. NW. ¼ SW. ¼ sec. 29	303	Red Deer Oil Co. Anderson No. 3	Oct. 19, 1924	40, Ellis	do	T 1,532 E 1,532 S 1,275	3,541

N., NW. ¼ SW. ¼ sec. 29	516	Red Deer Oil Co. Anderson No. 5.	June 21, 1925	80, Ellis	do	T 1,526 E 1,526 S 1,285	3,524
W., NW. ¼ SW. ¼ sec. 29	985	Red Deer Oil Co. Anderson No. 7.	Aug. 18, 1926	20, Ellis	Madison (?)	T 1,590 E 1,525 S 1,275	3,531
S., NW. ¼ SW. ¼ sec. 29	302	Red Deer Oil Co. Anderson No. 2.	Aug. 21, 1924	15, Ellis	Madison	T 1,596 E 1,485? S 1,258	3,527
SW., NW. ¼ SW. ¼ sec. 29	587	Red Deer Oil Co. Anderson No. 6.	Aug. 6, 1925	40, Ellis	Ellis	T 1,505 E 1,505 S 1,255	3,524
SE., NW. ¼ SW. ¼ sec. 29	301	Red Deer Oil Co. Anderson No. 1.	July 27, 1924	65, Ellis	Madison	T 1,544 E 1,522	3,523
N., SW. ¼ SW. ¼ sec. 29	189	Ferdig-Hughes-Brecken. Anderson No. 1.	June 15, 1924	40, Ellis	Ellis	T 1,524 E 1,524	3,525
W., SW. ¼ SW. ¼ sec. 29	666	Ferdig-Hughes. Anderson No. 12.	Oct. 11, 1925	20, Ellis	do	T 1,495 E 1,495 S 1,240	3,525
S., SW. ¼ SW. ¼ sec. 29	435	Ferdig-Hughes-Brecken. Anderson No. 4.	Apr. 21, 1925	100, Ellis	do	T 1,490 E 1,490 S 1,228	3,519
SW., SW. ¼ SW. ¼ sec. 29	463	Ferdig-Hughes-Brecken. Anderson No. 5.	May 15, 1925	100, Ellis	do	T 1,494 E 1,494 S 1,240	3,526
SE., SW. ¼ SW. ¼ sec. 29	191	Ferdig-Hughes-Brecken. Anderson No. 3.	Mar. 8, 1925	Oil, Ellis	do	T 1,503 E 1,503 S 1,250	3,517
NE., SE. ¼ SW. ¼ sec. 29	483	Ferdig Oil Co. Anderson No. 8.	May 30, 1925	1 M, Sunburst 40, Ellis.	Madison	T 1,514 E 1,508 S 1,270	3,509
N., SE. ¼ SW. ¼ sec. 29	368	Ferdig Oil Co. Anderson No. 4.	Nov. 7, 1924	100, Ellis	Ellis	T 1,530 E 1,530 S 1,260	3,512
NW., SE. ¼ SW. ¼ sec. 29	427	Ferdig Oil Co. Anderson No. 6.	Apr. 14, 1925	20, Ellis	Madison	T 1,560 E 1,540 S 1,275	3,526
W., SE. ¼ SW. ¼ sec. 29	515	Ferdig Oil Co. Anderson No. 9.	June 22, 1925	Show, Ellis	Ellis	T 1,500 E 1,500 S 1,240	3,575
SW., SE. ¼ SW. ¼ sec. 29	546	Ferdig Oil Co. Anderson No. 10.	July 14, 1925	30, Ellis	do	T 1,515 E 1,515 S 1,240	3,510
S., SE. ¼ SW. ¼ sec. 29	422	Ferdig Oil Co. Anderson No. 5.	Mar. 23, 1925	50, Ellis	do	T 1,520 E 1,520 S 1,250	3,514
SW., NE. ¼ SE. ¼ sec. 29	1257	W. E. Rice. Bluhm No. 9.	May 13, 1927	20, Ellis	do	T 1,513 E 1,513	3,506
S., NE. ¼ SE. ¼ sec. 29	1282	W. E. Rice. Bluhm No. 10.	June 4, 1927	15, Ellis	do	T 1,499 E 1,499	3,497
C., NE. ¼ SE. ¼ sec. 29	1313	W. E. Rice. Bluhm No. 11.	June 23, 1927	15, Ellis	do	T 1,497 E 1,495	3,494

33492°—29——4

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
NE., NW. ¼ SE. ¼ sec. 29	665	W. E. Rice, Bluhm No. 6.	Sept. 17, 1925	120, Ellis	Ellis	T 1,520 E 1,520 S 1,280 K 893	3,509
N., NW. ¼ SE. ¼ sec. 29	568	W. E. Rice, Bluhm No. 4.	July 19, 1925	25, Ellis	do	T 1,535 E 1,535 S 1,289	3,520
NW., NW. ¼ SE. ¼ sec. 29	475	W. E. Rice, Bluhm No. 2.	June 10, 1925	40, Ellis	do	T 1,538 E 1,538 S 1,285	3,519
W., NW. ¼ SE. ¼ sec. 29	535	W. E. Rice, Bluhm No. 3.	June 28, 1925	25, Ellis	do	T 1,520 E 1,520 S 1,280	3,514
SW., NW. ¼ SE. ¼ sec. 29	374	W. E. Rice, Bluhm No. 1.	July 6, 1923	50, Ellis	Madison	T 1,514 E 1,478 S 1,285 K 880	3,506
SE., NW. ¼ SE. ¼ sec. 29	697	W. E. Rice, Bluhm No. 7.	Oct. 5, 1925	25, Ellis	Ellis	T 1,532 E 1,532 S 1,275	3,514
C., NW. ¼ SE. ¼ sec. 29	588	W. E. Rice, Bluhm No. 5.	Aug. 6, 1925	25, Ellis	do	T 1,540 E 1,540 S 1,290 K 920	3,524
NW., SW. ¼ SE. ¼ sec. 29	369	Ferdig Oil Co, Anderson No. 11.	Sept. 13, 1924	50, Ellis	do	T 1,523 E 1,523 S 1,255	3,502
W., SW. ¼ SE. ¼ sec. 29	370	Ferdig Oil Co, Anderson No. 12.	Jan. 10, 1925	145, Ellis	do	T 1,503 E 1,496 S 1,255	3,507
SW., SW. ¼ SE. ¼ sec. 29	371	Ferdig Oil Co, Anderson No. 13.	Feb. 20, 1925	1 M, Sunburst 50, Ellis.	do	T 1,503 E 1,503 S 1,250	3,503
S., SW. ¼ SE. ¼ sec. 29	426	Ferdig Oil Co, Anderson No. 14.	Apr. 25, 1925	60, Ellis	do	T 1,505 E 1,505 S 1,245	3,501
C., SW. ¼ SE. ¼ sec. 29	465	Ferdig Oil Co, Anderson No. 15.	May 14, 1925	40, Ellis	do	T 1,504 E 1,504 S 1,255	3,498
W., SE. ¼ SE. ¼ sec. 29	751	W. E. Rice, Bluhm No. 8.	Dec. 6, 1925	50, Ellis	do	T 1,525 E 1,525 S 1,276	3,504

NE., NE. ¼ NE. ¼ sec. 30	*1048*	*Ohio Oil Co, Maughans No. 14.*	*Sept. 6, 1927*	*11, Ellis*	*Madison*	*T 1,548* *E 1,509*	*3,524*
NE., NW. ¼ NE. ¼ sec. 30	924	Ohio Oil Co, Maughans No. 11.	July 26, 1926	23, Ellis	do	T 1,517 E 1,503 S 1,250	3,521
N., NW. ¼ NE. ¼ sec. 30	85	Ohio Oil Co, Maughans No. 12.	Aug. 25, 1926	18, Ellis	Ellis	T 1,502 E 1,502 S 1,295	3,527
NW., NW. ¼ NE. ¼ sec. 30	858	Ohio Oil Co, Maughans No. 10.	June 30, 1926	15, Ellis	Madison	T 1,507 E 1,500 S 1,323	3,512
W., NW. ¼ NE. ¼ sec. 30	799	Ohio Oil Co, Maughans No. 9.	May 25, 1926	Oil, Ellis	do	T 1,550 E 1,495 S 1,255	3,510
SW., NW. ¼ NE. ¼ sec. 30	769	Ohio Oil Co, Maughans No. 8.	Feb. 27, 1926	46, Ellis	Ellis	T 1,492 E 1,492 S 1,270	3,514
NW., SW. ¼ NE. ¼ sec. 30	677	Ohio Oil Co, Maughans No. 5.	Oct. 10, 1925	50, Ellis	do	T 1,536 E 1,536 S 1,290	3,522
W., SE. ¼ NE. ¼ sec. 30	768	Ohio Oil Co, Maughans No. 7.	Jan. 16, 1926	200, Ellis	Ellis(?)	T 1,487 E 1,486 S 1,284	3,519
SW., SW. ¼ NE. ¼ sec. 30	523	Ohio Oil Co, Maughans No. 2.	July 21, 1925	500, Ellis	Ellis	T 1,476 E 1,476 S 1,230	3,516
SE., SW. ¼ NE. ¼ sec. 30	613	Ohio Oil Co, Maughans No. 3.	Sept. 1, 1925	Dry	Madison	T 1,579 E 1,540 S 1,210	3,523
C., SW. ¼ NE. ¼ sec. 30	721	Ohio Oil Co, Maughans No. 6.	Nov. 23, 1925	do	do	T 1,565 E 1,545 S 1,290 K 900	3,515
SW., SE. ¼ NE. ¼ sec. 30	630	Ohio Oil Co, Maughans No. 4.	Apr. 6, 1926	40, Ellis	do	T 1,510 E 1,499 S 1,280	3,532
SE., SE. ¼ NE. ¼ sec. 30	267	Ohio Oil Co, Maughans No. 1.	July 12, 1924	3 M, Sunburst 40, Ellis.	do	T 1,514 E 1,509± S 1,280	3,536
SW., NE. ¼ NW. ¼ sec. 30	95	Dakota-Montana Oil Co, Emmons No. 1.	Nov. 15, 1923	50, Ellis	do	T 1,483 E 1,460 S 1,245	3,513
S., NE. ¼ NW. ¼ sec. 30	559	Dakota-Montana Oil Co, Emmons No. 2.	Aug. 11, 1925	2 M, Sunburst 40, Ellis.	Ellis	T 1,510 E 1,510 S 1,250	3,511
SE., NE. ¼ NW. ¼ sec. 30	784	Dakota-Montana Oil Co, Emmons No. 7.	Mar. 19, 1926	1 M, Sunburst 60, Ellis.	Madison	T 1,527 E 1,485 S 1,260	3,514
NE., NW. ¼ NW. ¼ sec. 30	1346	Barmac Oil Co, Stannard No. 6.	June 28, 1927	22, Ellis	Ellis	T 1,497 E 1,497	3,507
N., NW. ¼ NW. ¼ sec. 30	1352	Barmac Oil Co, Stannard No. 7.	July 20, 1927	25, Ellis	do	T 1,500 E 1,500	3,511

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
SE., NW. ¼ NW. ¼ sec. 30	386	Barmac Oil Co. Stannard No. 1.	May 3, 1924	50, Ellis	Ellis	T 1,475 E 1,475 S 1,245	3,509
E., NW. ¼ NW. ¼ sec. 30	734	Barmac Oil Co. Stannard No. 3.	Dec. 9, 1925	240, Ellis	do	T 1,504 E 1,504 S 1,285 K 925	3,513
SW., NW. ¼ NW. ¼ sec. 30	387	Barmac Oil Co. Stannard No. 2.	Sept. 11, 1925	30, Ellis	do	T 1,518 E 1,516 S 1,220	3,493
NE., SW. ¼ NW. ¼ sec. 30	318	Security Oils (Inc.) Stannard No. 2.	June 2, 1924	50, Ellis	do	T 1,480 E 1,480 S 1,264	3,505
SW., SW. ¼ NW. ¼ sec. 30	321	Security Oils (Inc.) Stannard No. 5.	Feb. 21, 1925	½ M 110.	do	T 1,481 E 1,481 S 1,281	3,494
S., SW. ¼ NW. ¼ sec. 30	319	Security Oils (Inc.) Stannard No. 3.	Sept. 7, 1924	120, Ellis	do	T 1,497 E 1,497 S 1,248	3,499
E., SW. ¼ NW. ¼ sec. 30	696	Security Oils (Inc.) Stannard No. 6.	Oct. 18, 1924	Show, Ellis	do	T 1,495 E 1,495 S 1,225	3,501
NE., SE. ¼ NW. ¼ sec. 30	702	Tri-State Oil Co. Stannard No. 6.	Nov. 5, 1925	75, Ellis	Madison	T 1,500 E 1,490 S 1,253 K 901	3,509
N., SE. ¼ NW. ¼ sec. 30	455	Tri-State Oil Co. Stannard No. 2.	May 25, 1925	1½ M, Sunburst. 60, Ellis.	do	T 1,550 E 1,520 S 1,245	3,517
NW., SE. ¼ NW. ¼ sec. 30	373	Tri-State Oil Co. Stannard No. 1.	Nov. 3, 1924	75, Ellis	Ellis	T 1,480 E 1,480	3,506
SE., SE. ¼ NW. ¼ sec. 30	623	Tri-State Oil Co. Stannard No. 4.	Aug. 25, 1925	50, Ellis	Madison	T 1,495 E 1,490 K 875	3,518
E., SE. ¼ NW. ¼ sec. 30	738	Tri-State Oil Co. Stannard No. 7.	Apr. 18, 1926	200, Ellis	Ellis	T 1,462 E 1,462 S 1,247	3,511
NE., NE. ¼ SW. ¼ sec. 30	687	Tri-State Oil Co. Stannard No. 5.	Oct. 9, 1925	75, Ellis	do	T 1,505 E 1,505 K 850	3,514
SE., NE. ¼ SW. ¼ sec. 30	1462	Tri-State Oil Co. Stannard No. 14.	Sept. 27, 1927	Dry	Madison(?)	T 1,480 E 1,460	3,509

Do	*462*	*Tri-State Oil Co. Stannard No. 3.*	*July 6, 1925*	*40, Ellis*	*Madison*	T 1,500 E 1,475 S 1,240	3,517
NE., NW. ¼ SW. ¼ sec. 30	320	Security Oils (Inc.) Stannard No. 4.	Oct. 10, 1924	50, Ellis	do	T 1,518 E 1,505 S 1,240	3,499
NW., NW. ¼ SW. ¼ sec. 30	317	Security Oils (Inc.) Stannard No. 1.	Mar. 8, 1924	25, Sunburst	Ellis	T 1,468 E 1,460 S 1,240	3,487
W., NW. ¼ SW. ¼ sec. 30	1012	Security Oils (Inc.) Stannard No. 10.	Sept. 1, 1926	Dry	do	T 1,465 E 1,464 S 1,237	3,486
SW., NW. ¼ SW. ¼ sec. 30	727	Security Oils (Inc.) Stannard No. 7.	Nov. 29, 1925	85, Ellis	do	T 1,475 E 1,475 S 1,228	3,491
S., NW. ¼ SW. ¼ sec. 30	981	Security Oils (Inc.) Stannard No. 8.	Aug. 9, 1926	Dry	Madison	T 1,495 E 1,438? S 1,202	3,487
SE., NW. ¼ SW. ¼ sec. 30	760	Security Oils (Inc.) Stannard No. 9.	do	Show, Ellis	do	T 1,500 E 1,475 S 1,228	3,491
E., NW. ¼ SW. ¼ sec. 30	1014	Security Oils (Inc.) Stannard No. 12.	Aug. 31, 1926	do	do	T 1,485 E 1,462 S 1,262	3,493
C., NW. ¼ SW. ¼ sec. 30	1013	Security Oils (Inc.) Stannard No. 11.	Aug. 30, 1926	do	Ellis	T 1,456 E 1,456 S 1,235	3,488
NE., SW. ¼ SW. ¼ sec. 30	910	Rice Oil Co. Stannard No. 12.	July 15, 1926	3,600, stray [l] and Ellis.	Madison	T 1,443 E 1,430 S 1,225	3,488
N., SW. ¼ SW. ¼ sec. 30	909	Rice Oil Co. Stannard No. 14.	June 28, 1926	25, stray [m] and Ellis	do	T 1,459 E 1,430 S 1,225	3,492
NW., SW. ¼ SW. ¼ sec. 30	744	Rice Oil Co. Stannard No. 5.	Mar. 24, 1926	Oil, Ellis	do	T 1,452 E 1,442 S 1,218 K 975	3,501
W., SW. ¼ SW. ¼ sec. 30	796	Rice Oil Co. Stannard No. 7.	Apr. 30, 1926	130, Ellis	Ellis	T 1,461 E 1,461 S 1,230	3,506
SW., SW. ¼ SW. ¼ sec. 30	737	Rice Oil Co. Stannard No. 4.	Jan. 25, 1926	7,000, Ellis	do	T 1,457 E 1,457 S 1,250	3,507
E., SW. ¼ SW. ¼ sec. 30	948	Rice Oil Co. Stannard No. 16.	July 25, 1926	2,400, stray [n] and Ellis.	do	T 1,424 E 1,424 S 1,200	3,492
C., SW. ¼ SW. ¼ sec. 30	871	Rice Oil Co. Stannard No. 9.	May 25, 1926	200, Sunburst and stray.[o]	do	T 1,243 S 1,195	3,506
NE., SE. ¼ SW. ¼ sec. 30	911	Rice Oil Co. Stannard No. 13.	June 25, 1926	Dry	Madison	T 1,485 E 1,465 S 1,230	3,505

[l] Stray oil sand at 1,355 feet.

[m] Stray oil sand at 1,250 feet.

[n] Stray oil sand at 1,287 feet.

[o] Stray oil sand at 1,220 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
N., SE. ¼ SW. ¼ sec. 30	886	Rice Oil Co. Stannard No. 11.	May 28, 1926	Show, Ellis	Madison	T 1,500 E 1,460 S 1,225	3,499
NW., SE. ¼ SW. ¼ sec. 30	876	Rice Oil Co. Stannard No. 10.	June 1, 1926	2,500, Ellis	Ellis	T 1,445 E 1,445 S 1,215	3,499
W., SE. ¼ SW. ¼ sec. 30	821	Rice Oil Co. Stannard No. 6.	Apr. 14, 1926	200, Ellis	do	T 1,458 E 1,458 S 1,200	3,492
SW., SE. ¼ SW. ¼ sec. 30	674	Rice Oil Co. Stannard No. 3.		300, stray [p]	do	T 1,360 S 1,215	3,988
S., SE. ½ SW. ¼ sec. 30	659	Rice Oil Co. Stannard No. 2.	Sept. 13, 1925	300, Ellis	do	T 1,449 E 1,449 S 1,200 K 990	3,495
SE., SE. ¼ SW. ¼ sec. 30	622	Rice Oil Co. Stannard No. 1.	Aug. 25, 1925	3,000, Ellis	do	T 1,442 E 1,442 [q] S 1,276	3,495
E., SE. ¼ SW. ¼ sec. 30	845	Rice Oil Co. Stannard No. 8.	May 13, 1926	50, Ellis	Madison	T 1,470 E 1,455 S 1,230	3,500
C., SE. ¼ SW. ¼ sec. 30	947	Rice Oil Co. Stannard No. 15.	July 20, 1926	10, Ellis	Ellis	T 1,468 E 1,468 S 1,220	3,498
C., SE. ¼ SW. ¼ sec. 30	338	Spokane-Wyoming Oil Co. Sundby No. 1.	Aug. 21, 1923	Dry	Madison	T. 1,718 E 1,560 S 1,265	3,461
NE., NE. ¼ SE. ¼ sec. 30	333	Western Drilling Co. Anderson No. 1.	Sept. 3, 1924	3 M, Sunburst 20.	Ellis	T 1,545 E 1,545 [r] S 1,285	3,539
NW., NE. ¼ SE. ¼ sec. 30	660	Western Drilling Co. Anderson No. 4.	Sept. 22, 1925	50, Ellis	do	T 1,506 E 1,502 S 1,255	3,527
SW., NE. ¼ SE. ¼ sec. 30	600	Western Drilling Co. Anderson No. 3.	Aug. 19, 1925	30, Ellis	do	T 1,435 E 1,485	3,521
S., NE. ¼ SE. ¼ sec. 30	1467	Western Drilling Co. Anderson No. 6.	Sept. 24, 1927	25, Ellis	Madison	T 1,502 E 1,475	3,523
SE., NE. ¼ SE. ¼ sec. 30	558	Western Drilling Co. Anderson No. 2.	July 19, 1925	45, Ellis	do	T 1,505 E 1,480 S 1,241	3,522

NE., NW. ¼ SE. ¼ sec. 30	644	Rice Oil Co. Byrne No. 8.	Sept. 13, 1925	Dry	Ellis	T 1,540 E 1,540 S 1,297	3,520
NW., NW. ¼ SE. ¼ sec. 30	580	Rice Oil Co. Byrne No. 6.	Aug. 7, 1925	60, Ellis	do	T 1,493 E 1,493 S 1,270	3,518
W., NW. ¼ SE. ¼ sec. 30	528	Rice Oil Co. Byrne No. 4.	July 10, 1925	35, Ellis	do	T 1,495 E 1,495 S 1,255	3,512
SW., NW. ¼ SE. ¼ sec. 30	476	Rice Oil Co. Byrne No. 2.	June 3, 1925	30, Ellis	do	T 1,506 E 1,506 S 1,255	3,517
NE., SW. ¼ SE. ¼ sec. 30	424	Rice Oil Co. Byrne No. 1.	May 23, 1925	do	do	T 1,473 E 1,473 S 1,258	3,516
N., SW. ¼ SE. ¼ sec. 30	1256	Rice Oil Co. Byrne No. 10.	May 12, 1927	Dry	do	T 1,488 E 1,488	3,513
SW., SW. ¼ SE. ¼ sec. 30	668	Rice Oil Co. Byrne No. 9.	Sept. 19, 1925	30, Ellis	Madison	T 1,490 E 1,475 S 1,210	3,500
S., SW. ¼ SE. ¼ sec. 30	579	Rice Oil Co. Byrne No. 7.	Aug. 14, 1925	25, Ellis	Ellis	T 1,473 E 1,473 S 1,250	3,498
SE., SW. ¼ SE. ¼ sec. 30	551	Rice Oil Co. Byrne No. 5.	July 14, 1925	30, Ellis	do	T 1,480 E 1,480 S 1,235	3,503
E., SW. ¼ SE. ¼ sec. 30	500	Rice Oil Co. Byrne No. 3.	June 5, 1925	10, Ellis	do	T 1,510 E 1,510 S 1,235	3,505
NW., SE. ¼ SE. ¼ sec. 30	190	Ferdig-Hughes-Brecken Anderson No. 2.	Sept. 21, 1924	15, Ellis	do	T 1,510 E 1,510 S 1,215	3,515
SW., SE. ¼ SE. ¼ sec. 30	550	Ferdig-Hughes Anderson No. 9.	July 12, 1925	50, Ellis	do	T 1,495 E 1,495 S 1,255	3,512
S., SE. ¼ SE. ¼ sec. 30	529	Ferdig-Hughes-Brecken Anderson No. 7.	June 21, 1925	2,500, Ellis	Madison	T 1,478 E 1,443 S 1,219	3,515
S., SE. ¼ SE. ¼ sec. 30	590	Ferdig-Hughes Anderson No. 11.	Aug. 4, 1925	Show, Ellis	do	T 2,060 E 1,457 S 1,225	3,517
SE., SE. ¼ SE. ¼ sec. 30	491	Ferdig-Hughes-Brecken Anderson No. 6.	June 7, 1925	2,000, Ellis	do	T 1,488 E 1,466 S 1,227	3,519
E., SE. ¼ SE. ¼ sec. 30	540	Ferdig-Hughes Anderson No. 8.	July 18, 1925	Dry	do	T 1,510 E 1,463 S 1,225	3,525
C., SE. ¼ SE. ¼ sec. 30	591	Ferdig-Hughes Anderson No. 10.	July 22, 1925	10, Ellis	do	T 1,495 E 1,475	3,512

[p] Stray oil sands at 1,339 and 1,360 feet.

[q] Oil in Sunburst sand; stray oil sand at 1,255 feet.

[r] Oil at 1,362 feet

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
C., NE. ¼ NE. ¼ sec. 31	538	Rose Oil Co. Byrne No. 4.	July 7, 1925	40, Ellis	Ellis	T 1,470 E 1,470 S 1,255	3,505
SE., NE. ¼ NE. ¼ sec. 31	456	Rose Oil Co. Byrne No. 1.	May 18, 1925	60, Ellis	do	T 1,482 E 1,482 S 1,258	3,513
S., NE. ¼ NE. ¼ sec. 31	577	Rose Oil Co. Byrne No. 5.	July 2, 1925	2,500, Ellis	do	T 1,436 E 1,436 S 1,285	3,498
SW., NE. ¼ NE. ¼ sec. 31	578	Rose Oil Co. Byrne No. 6.	Aug. 2, 1925	Dry	Madison	T 1,520 E 1,500 S 1,260	3,504
NW., NE. ¼ NE. ¼ sec. 31	958	Rose Oil Co. Byrne No. 14.	July 30, 1926	do	do	T 1,481 S 1,218	3,507
N., NE. ¼ NE. ¼ sec. 31	537	Rose Oil Co. Byrne No. 3.	July 7, 1925	15, Ellis	Ellis	T 1,472 E 1,472 S 1,235	3,522
NE., NE. ¼ NE. ¼ sec. 31	504	Rose Oil Co. Byrne No. 2.	June 12, 1925	800, Ellis	do	T 1,450 E 1,450 S 1,255	3,510
E., NE. ¼ NE. ¼ sec. 31	882	Rose Oil Co. Byrne No. 13.	June 18, 1926	40, Ellis	do	T 1,466 E 1,466 S 1,215	3,507
N., NW. ¼ NE. ¼ sec. 31	713	Rose Oil Co. Byrne No. 11.	Nov. 11, 1925	50, Ellis	do	T 1,480 E 1,480 S 1,204	3,499
SW., NW. ¼ NE. ¼ sec. 31	636	Rose Oil Co. Byrne No. 7.	Nov. 4, 1925	1,000, Ellis	do	T 1,432 E 1,432 S 1,240	3,485
S., NW. ¼ NE. ¼ sec. 31	714	Rose Oil Co. Byrne No. 10.	Nov. 9, 1925	50, Ellis	do	T 1,455 E 1,445 S 1,200	3,490
W., NW. ¼ NE. ¼ sec. 31	672	Rose Oil Co. Byrne No. 9.	Oct. 6, 1925	25, Ellis	do	K 980 T 1,460 E 1,460 S 1,200	3,491
SE., NW. ¼ NE. ¼ sec. 31	736	Rose Oil Co. Byrne No. 12.	Oct. 29, 1925	530, Ellis	do	T 1,439 E 1,439	3,492

NW., NW. ¼ NE. ¼ sec. 31	*667*	*Rose Oil Co. Byrne No. 8.*	*Oct. 7, 1925*	*40, Ellis*	*do*	*T 1,470 E 1,470 S 1,205*	*3,496*
NE., SW. ¼ NE. ¼ sec. 31	719	Big West Oil Co. Allen No. 16.	Dec. 16, 1925	300, Ellis	do	K 825 T 1,472 E 1,472 S 1,198	3,491
N., SW. ¼ NE. ¼ sec. 31	656	Big West Oil Co. Allen No. 14.	Oct. 12, 1925	80, Ellis	do	K 885 T 1,449 E 1,449 S 1,215	3,482
NW., SW. ¼ NE. ¼ sec. 31	576	Big West Oil Co. Allen No. 12.	Aug. 18, 1925	800, Ellis	do	T 1,443 E 1,443 S 1,184	3,478
W., SW. ¼ NE. ¼ sec. 31	805	Big West Oil Co. Allen No. 17.	May 13, 1926	80, Ellis	Madison	T 1,461 E 1,436 S 1,170	3,474
SW., SW. ¼ NE. ¼ sec. 31	883	Big West Oil Co. Allen No. 18.	June 5, 1926	125, Ellis	Ellis	T 1,468 E 1,468 S 1,210	3,474
SE., SW. ¼ NE. ¼ sec. 31	24	Big West Oil Co. Allen No. 4.	Dec. 8, 1924	200, Ellis	do	K 835 T 1,432 E 1,432	3,475
E., SW. ¼ NE. ¼ sec. 31	1070	Big West Oil Co. Allen No. 25.	Sept. 13, 1927	Dry	Madison	T 1,538 E 1,430	3,481
C., SW. ¼ NE. ¼ sec. 31	957	Big West Oil Co. Allen No. 23.	Aug. 13, 1926	25, Ellis	do	T 1,489 E 1,426 S 1,195	3,475
NE., SE. ¼ NE. ¼ sec. 31	467	Big West Oil Co. Allen No. 9.	June 19, 1925	1,400, Ellis	Ellis	T 1,461 E 1,461 S 1,230	3,508
N., SE. ¼ NE. ¼ sec. 31	549	Big West Oil Co. Allen No. 11.	July 30, 1925	2,000, Ellis	do	T 1,443 E 1,443 S 1,203	3,500
NW., SE. ¼ NE. ¼ sec. 31	619	Big West Oil Co. Allen No. 13.	Sept. 23, 1925	50, Ellis	Madison	T 1,458 E 1,433 S 1,205	3,490
SW., SE. ¼ NE. ¼ sec. 31	22	Big West Oil Co. Allen No. 2.	Sept. 21, 1924	100, Ellis	Ellis	K 1,100 T 1,422 E 1,422 S 1,205	3,481
SE., SE. ¼ NE. ¼ sec. 31	23	Big West Oil Co. Allen No. 3.	Oct. 26, 1924	do	do	K 830 T 1,448 E 1,448 S 1,220	3,492
E., SE. ¼ NE. ¼ sec. 31	680	Big West Oil Co. Allen No. 15.	Nov. 9, 1925	800, Ellis	do	K 830 T 1,456 E 1,456 S 1,234	3,503
C., SE. ¼ NE. ¼ sec. 31	923	Big West Oil Co. Allen No. 21.	July 17, 1926	125, Ellis	Madison	T 1,477 E 1,445 S 1,215	3,493

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
NE., NE. ¼ NW. ¼ sec. 31	615	Fulton Oil Co. Byrne No. 3.	Aug. 30, 1925	1,120, Ellis [a]	Ellis	T 1,450 E 1,450 S 1,180 K 850	3,492
N., NE. ¼ NW. ¼ sec. 31	671	Fulton Oil Co. Byrne No. 5.	Oct. 9, 1925	1 M, Sunburst 45, Ellis.	do	T 1,456 E 1,456 S 1,180	3,495
SW., NE. ¼ NW. ¼ sec. 31	682	Fulton Oil Co. Byrne No. 6.	Nov. 28, 1925	50, Ellis	do	T 1,468 S 1,182	3,494
S., NE. ¼ NW. ¼ sec. 31	616	Fulton Oil Co. Byrne No. 4.	Sept. 21, 1925	1,500, Ellis [b]	do	T 1,457 E 1,457 S 1,178	3,481
SE. NE. ¼ NW. ¼ sec. 31	498	Fulton Oil Co. Byrne No. 1.	July 3, 1925	110, Ellis	do	T 1,440 E 1,440 S 1,183	3,479
E., NE. ¼ NW. ¼ sec. 31	569	Fulton Oil Co. Byrne No. 2.	July 31, 1925	1,600, Ellis	do	T 1,417 E 1,417 S 1,190	3,484
NW., NW. ¼ NW. ¼ sec. 31	753	Fulton Oil Co. Byrne No. 8.	Jan. 13, 1926	4,800, Ellis [c]	do	T 1,450 E 1,450 S 1,180	3,511
W., NW. ¼ NW. ¼ sec. 31	793	Fulton Oil Co. Byrne No. 9.	Apr. 3, 1926	60, Ellis	do	T 1,460 E 1,460 S 1,163	3,502
SW., NW. ¼ NW. ¼ sec. 31	786	Fulton Oil Co. Byrne No. 10.	Apr. 2, 1926	1 M, Sunburst 3,000, stray in Ellis. [d]	do	T 1,440 E 1,440 S 1,210	3,498
S., NW. ¼ NW. ¼ sec. 31	1213	Fulton Oil Co. Byrne No. 22.	Mar. 29, 1927	Show, Ellis	Madison	T 1,445 E 1,422	3,494
Do	1214	Fulton Oil Co. Byrne No. 23.	Apr. 3, 1927	15, Ellis	Ellis	T 1,423 E 1,423	3,496
SE., NW. ¼ NW. ¼ sec. 31	1215	Fulton Oil Co. Byrne No. 24.	Apr. 13, 1927	Ellis	Madison	T 1,443 E 1,422	3,494
E., NW. ¼ NW. ¼ sec. 31	1230	Fulton Oil Co. Byrne No. 25.	Apr. 21, 1927	20, Ellis	do	T 1,442 E 1,438	3,491
C., NW. ¼ NW. ¼ sec. 31	1163	Fulton Oil Co. Byrne No. 21.	Mar. 12, 1927	150, Ellis	Ellis	T 1,447 E 1,447	3,494
NE., SW. ¼ NW. ¼ sec. 31	761	Fulton Oil Co. Byrne No. 7.	May 9, 1926	1 M, Sunburst 500, stray. [e] 1,200, stray.	do	T 1,383 S 1,163	
N., SW. ¼ NW. ¼ sec. 31	1231	Fulton Oil Co. Byrne No. 26.	Apr. 25, 1927	100, Ellis	do	T 1,424 E 1,424	3,492

NW., SW. ¼ NW. ¼ sec. 31	826	Fulton Oil Co. Byrne No. 12.	Apr. 28, 1926	5,000, Ellis	do	T 1,410 E 1,410 S 1,190	3,496
W., SW. ¼ NW. ¼ sec. 31	827	Fulton Oil Co. Byrne No. 13.	Apr. 30, 1926	3,000, Ellis	do	T 1,415 E 1,415 S 1,200	3,495
SW., SW. ¼ NW. ¼ sec. 31	854	Fulton Oil Co. Byrne No. 16.	June 12, 1926	300, Ellis	do	T 1,450 E 1,450 S 1,185	3,491
SE., SW. ¼ NW. ¼ sec. 31	841	Fulton Oil Co. Byrne No. 14.	May 20, 1926	500, Ellis [f]	do	T 1,455 E 1,455 S 1,200	3,483
E., SW. ¼ NW. ¼ sec. 31	785	Fulton Oil Co. Byrne No. 11.	Apr. 18, 1926	40, Ellis	Madison	T 1,465 E 1,455 S 1,185	3,489
NE., SE. ¼ NW. ¼ sec. 31	634	Dakota-Montana Oil Co. Emmons No. 3.	Sept. 6, 1925	150, Ellis	Ellis	T 1,480 E 1,480 S 1,185	3,474
N., SE. ¼ NW. ¼ sec. 31	681	Dakota-Montana Oil Co. Emmons No. 4.	Oct. 11, 1925	3 M, Sunburst 200, Ellis.	do	T 1,453 E 1,453 S 1,200	3,479
NW., SE. ¼ NW. ¼ sec. 31	701	Dakota-Montana Oil Co. Emmons No. 5.	Nov. 17, 1925	2,000, Ellis. [g]	do	T 1,440 E 1,440 S 1,230 K 830	3,489
W., SE. ¼ NW. ¼ sec. 31	754	Dakota-Montana Oil Co. Emmons No. 6.	Feb. 8, 1926	4,100 Ellis	Madison(?)	T 1,448 E 1,423 S 1,223	3,484
SW., SE. ¼ NW. ¼ sec. 31	788	Dakota-Montana Oil Co. Emmons No. 8.	Apr. 9, 1926	1 M, Sunburst 250, Ellis.	Ellis	T 1,470 E 1,470 S 1,237	3,486
S., SE. ¼ NW. ¼ sec. 31	836	Dakota-Montana Oil Co. Emmons No. 10.	May 22, 1926	70, Ellis	do	T 1,494 E 1,494 S 1,250	3,488
SE., SE. ¼ NW. ¼ sec. 31	906	Dakota-Montana Oil Co. Emmons No. 13.	July 10, 1926	125, Ellis	do	T 1,458 E 1,458 S 1,205 K 845	3,477
E., SE. ¼ NW. ¼ sec. 31	877	Dakota-Montana Oil Co. Emmons No. 12.	June 14, 1926	25, Ellis	Madison	T 1,490 E 1,445 S 1,204	3,476
NW., NE. ¼ SW. ¼ sec. 31	828	Big West Syndicate. Allen No. 1.	Apr. 30, 1926	Show, Ellis	do	T 1,490 E 1,420 S 1,210	3,485
NW., NW. ¼ SW. ¼ sec. 31	867	Fulton Oil Co. Byrne No. 15.	May 22, 1926	160, Ellis	Ellis	T 1,451 E 1,451 S 1,185	3,476

[a] Oil from stray sand at 1,230 feet and the base of the Ellis.
[b] Oil from stray sand at 1,368 feet and the base of the Ellis.
[c] Stray oil sand at 1,230 feet; oil in Ellis at 1,404 feet.
[d] Stray in Ellis at 1,305 to 1,320 feet.
[e] Stray oil sands at 1,251 and 1,365 to 1,383 feet.
[f] Stray oil sand at 1,240 feet.
[g] Stray oil sands at 1,310 and 1,380 feet; at Ellis 1,410 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
W., NW. ¼ SW. ¼ sec. 31	901	Fulton Oil Co. Byrne No. 17.	June 20, 1926	20, Ellis	Madison	T 1,530 E 1,440 S 1,200 K 880	3,465
NW., SW. ¼ SW. ¼ sec. 31	866	Dakota-Montana Oil Co. Emmons No. 11.	June 7, 1926	50, Ellis	do	T 1,488 E 1,431 S 1,185	3,452
W., SW. ¼ SW. ¼ sec. 31	927	Dakota-Montana Oil Co. Emmons No. 15.	July 27, 1926	2 M, Sunburst Show, Ellis.	do	T 1,480 E 1,430 S 1,200 K 810	3,449
SW., SW. ¼ SW. ¼ sec. 31	945	Dakota-Montana Oil Co. Emmons No. 16.	Aug. 7, 1926	3 M, Sunburst	do	T 1,453 E 1,435 S 1,205	3,451
C., SE. ¼ SW. ¼ sec. 31	1231	Petroleum Corporation. Allen No. 7.	Mar. 19, 1927	70, Ellis	do	T 1,443 E 1,425	3,463
NE., NE. ¼ SE. ¼ sec. 31	466	Big West Oil Co. Allen No. 8.	May 24, 1925	140, Ellis	Ellis	T 1,462 E 1,462	3,493
N., NE. ¼ SE. ¼ sec. 31	1478	Big West Oil Co. Allen No. 26.	Oct. 8, 1927	30, Ellis	Madison	T 1,484 E 1,450	3,482
NW., NE. ¼ SE. ¼ sec. 31	423	Big West Oil Co. Allen No. 6.	Mar. 28, 1925	40, Ellis	Ellis	T 1,446 E 1,446 S 1,210 K 900	3,475
S., NE. ¼ SE. ¼ sec. 31	956	Big West Oil Co. Allen No. 22.	Aug. 1, 1926	140, Ellis	do	T 1,467 E 1,467	3,489
SE., NE. ¼ SE. ¼ sec. 31	503	Big West Oil Co. Allen No. 10.	July 6, 1925	75, Ellis	do	T 1,461 E 1,461	3,485
E., NE. ¼ SE. ¼ sec. 31	922	Big West Oil Co. Allen No. 20.	July 5, 1926	do	Madison	T 1,464 E 1,445 S 1,275 850	3,493
C., NE. ¼ SE. ¼ sec. 31	979	Big West Oil Co. Allen No. 24.	July 25, 1927	800, Ellis	do	T 1,465 E 1,455	3,486
NE., NW. ¼ SE. ¼ sec. 31	25	Big West Oil Co. Allen No. 5.	Feb. 27, 1925	140, Ellis	Ellis	T 1,444 E 1,444 S 1,205 K 870	3,471
NW., NW. ¼ SE. ¼ sec. 31	887	Big West Oil Co. Allen No. 19.	June 25, 1926	20, Ellis	Madison	T 1,489 E 1,470 S 1,214	3,472

N., NW. ¼ SE. ¼ sec. 31	437	Big West Oil Co. Allen No. 7.	Apr. 28, 1925	125, Ellis	Ellis	T 1,453 E 1,463 K 870	3,467
NW., SW. ¼ SE. ¼ sec. 31	655	Corey Oil Co. Kaiser No. 1.	Oct. 11, 1925	30, Ellis	do	T 1,452 E 1,445 S 1,185 K 865	3,463
NE., SE. ¼ SE. ¼ sec. 31	586	Adams-Caine. Adams No. 1.	Aug. 13, 1925	50, Ellis	do	T 1,460 E 1,460 S 1,250	3,479
N., SE. ¼ SE. ¼ sec. 31	663	Chisholm Oil Syndicate. Adams No. 3.	Sept. 18, 1925	do	do	T 1,461 E 1,461 S 1,205	3,485
NW., SE. ¼ SE. ¼ sec. 31	76	Chisholm Oil Syndicate. Adams No. 1.	Mar. 30, 1925	40, Ellis	do	T 1,448 E 1,448 S 1,210	3,466
W., SE. ¼ SE. ¼ sec. 31	501	Chisholm Oil Syndicate. Adams No. 2.	June 11, 1925	30, Ellis	do	T 1,454 E 1,440 S 1,205	3,462
NW., NE. ¼ NE. ¼ sec. 32	1452	"56" Petroleum Corp. Caine No. 33.	Sept. 15, 1927	20, Ellis	do	T 1,495 E 1,495	3,502
W., NE. ¼ NE. ¼ sec. 32	1418	"56" Petroleum Corp. Caine No. 31.	Aug. 18, 1927	100, Ellis	do	T 1,490 E 1,490	3,498
SW., NE. ¼ NE. ¼ sec. 32	1331	"56" Petroleum Corp. Caine No. 28.	July 6, 1927	do	do	T 1,470 E 1,470	3,498
S., NE. ¼ NE. ¼ sec. 32	1380	"56" Petroleum Corp. Caine No. 30.	Aug. 5, 1927	25, Ellis	Madison	T 1,494 E 1,484	3,499
E., NE. ¼ NE. ¼ sec. 32	1238	"56" Petroleum Corp. Caine No. 26.	June 4, 1927	Dry	do	T 1,520 E 1,490	3,488
N., NW. ¼ NE. ¼ sec. 32	685	"56" Petroleum Corp. Caine No. 7.	Oct. 2, 1925	20, Ellis	Ellis	T 1,493 E 1,493 S 1,240 K 960	3,501
NW., NE. ¼ NE. ¼ sec. 32	643	"56" Petroleum Corp. Caine No. 5.	Sept. 9, 1925	30, Ellis	Madison	T 1,510 E 1,484 S 1,250	3,510
W., NW. ¼ NE. ¼ sec. 32	1497	"56" Petroleum Corp. Caine No. 38.	Mar. 29, 1928	10, Ellis	do	T 1,497 E 1,475	3,514
SW., NW. ¼ NE. ¼ sec. 32	1508	"56" Petroleum Corp. Caine No. 37.	Nov. 11, 1927	25, Ellis	Ellis	T 1,495 E 1,495	3,517
S., NW. ¼ NE. ¼ sec. 32	1562	"56" Petroleum Corp. Caine No. 40.	Apr. 25, 1928	30, Ellis	do	T 1,496 E 1,496	3,505
SE., NW. ¼ NE. ¼ sec. 32	1441	"56" Petroleum Corp. Caine No. 32.	Sept. 3, 1927	100, Ellis	do	T 1,467 E 1,467	3,499
E., NW. ¼ NE. ¼ sec. 32	1451	"56" Petroleum Corp. Caine No. 34.	Sept. 29, 1927	10, Ellis	Madison	T 1,500 E 1,481	3,501
C., NW. ¼ NE. ¼ sec. 32	1496	"56" Petroleum Corp. Caine No. 36.	Oct. 27, 1927	20, Ellis	Ellis	T 1,488 E 1,488	3,504
NE., SW. ¼ NE. ¼ sec. 32	1487	"56" Petroleum Corp. Caine No. 35.	Oct. 13, 1927	do	Madison	T 1,498 E 1,483	3,496
N., SW. ¼ NE. ¼ sec. 32	1166	"56" Petroleum Corp. Caine No. 23.	Jan. 7, 1927	do	do	T 1,484 E 1,474	3,503

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
NE., SE. ¼ NE. ¼ sec. 32	1156	"56" Petroleum Corp. Caine No. 22.	Mar. 26, 1927	20, Ellis	Madison	T 1,490 E 1,485	3,495
N., SE. ¼ NE. ¼ sec. 32	1365	"56" Petroleum Corp. Caine No. 29.	July 20, 1927	Dry	do	T 1,533 E 1,510	3,496
SE., SE. ¼ NE. ¼ sec. 32	1196	"56" Petroleum Corp. Caine No. 24.	Apr. 21, 1927	Oil, Ellis	do	T 1,490 E 1,490	3,493
E., SE. ¼ NE. ¼ sec. 32	1237	"56" Petroleum Corp. Caine No. 25.	May 16, 1927	100, Ellis	Ellis	T 1,475 E 1,475	3,499
N., NE. ¼ NW. ¼ sec. 32	563	"56" Petroleum Corp. Caine No. 3.	July 26, 1925	600, Ellis	do	T 1,478 E 1,478 S 1,243	3,513
NW., NE. ¼ NW. ¼ sec. 32	495	"56" Petroleum Corp. Caine No. 1.	June 15, 1925	350, Ellis	do	T 1,500 E 1,500 S 1,235	3,511
W., NE. ¼ NW. ¼ sec. 32	539	"56" Petroleum Corp. Caine No. 2.	July 5, 1925	40, Ellis	do	T 1,505 E 1,505 S 1,230	3,514
SW., NE. ¼ NW. ¼ sec. 32	598	"56" Petroleum Corp. Caine No. 4.	Aug. 18, 1925	60, Ellis	do	T 1,495 E 1,495 S 1,240	3,517
SE., NE. ¼ NW. ¼ sec. 32	1561	"56" Petroleum Corp. Caine No. 39.	Apr. 10, 1928	20, Ellis	do	T 1,516 E 1,516	3,509
C., NE. ¼ NW. ¼ sec. 32	749	"56" Petroleum Corp. Caine No. 9.	Dec. 29, 1925	do	do	T 1,484 E 1,484 S 1,240	3,510
N., NW. ¼ NW. ¼ sec. 32	620	Hibbing-Sunburst Oil Co. Warner No. 6.	Aug. 27, 1925	40, Ellis	do	T 1,503 E 1,503 S 1,240	3,524
NE., NW. ¼ NW. ¼ sec. 32	575	Hibbing-Sunburst Oil Co. Warner No. 5.	July 30, 1925	50, Ellis	Madison	K 860 T 1,505 E 1,500 S 1,245	3,523
E., NW. ¼ NW. ¼ sec. 32	621	Hibbing-Sunburst Oil Co. Warner No. 7.	Aug. 25, 1925	do	Ellis	T 1,500 E 1,500 S 1,227	3,515
NW., NW. ¼ NW. ¼ sec. 32	527	Hibbing-Sunburst Oil Co. Warner No. 2.	July 1, 1925	28, Ellis	Madison	K 850 T 1,492 E 1,470 S 1,215	3,519
SW., NW. ¼ NW. ¼ sec. 32	450	Hibbing-Sunburst Oil Co. Warner No. 1.	May 15, 1925	18, Ellis	do	T 1,524 E 1,506 S 1,270	3,513
W., NW. ¼ NW. ¼ sec. 32	547	Hibbing-Sunburst Oil Co. Warner No. 3.	July 30, 1925	100, Ellis	do	T 1,498 E 1,489 S 1,235	3,515
S., NW. ¼ NW. ¼ sec. 32	664	Hibbing-Sunburst Oil Co. Warner No. 8.	Sept. 14, 1925	35, Ellis	Ellis	T 1,497 E 1,497 S 1,250	3,514
SE., NW. ¼ NW. ¼ sec. 32	564	Hibbing-Sunburst Oil Co. Warner No. 4.	Aug. 1, 1925	200, Ellis	Madison	K 920 T 1,515 E 1,495 S 1,250	3,515
NE., SW. ¼ NW. ¼ sec. 32	642	Duluth-Hibbing Oil Co. Warner No. 3.	Aug. 9, 1925	80, Ellis	do	T 1,500 E 1,494 S 1,230	3,512
N., SW. ¼ NW. ¼ sec. 32	1330	Duluth-Hibbing Oil Co. Warner No. 7.	July 5, 1927	25, Ellis	do	T 1,500 E 1,482	3,512
NW., SW. ¼ NW. ¼ sec. 32	3	Duluth-Hibbing Oil Co. Warner No. 1.	Oct. 22, 1924	50, Ellis	do	T 1,477 E 1,451 S 1,245	3,513
W., SW. ¼ NW. ¼ sec. 32	683	Duluth-Hibbing Oil Co. Warner No. 4.	Nov. 13, 1925	60, Ellis	do	T 3,487 E 1,467 S 1,250	3,510
SW., SW. ¼ NW. ¼ sec. 32	4	Duluth-Hibbing Oil Co. Warner No. 2.	Feb. 26, 1925	50, Ellis	Ellis	T 1,473 E 1,473 S 1,245	3,512
E., SW. ¼ NW. ¼ sec. 32	1377	Duluth-Hibbing Oil Co. Warner No. 8.	July 30, 1925	22, Ellis	Madison	K 1,150 T 1,500 E 1,490	3,512
NW., SE. ¼ NW. ¼ sec. 32	684	"56" Petroleum Corp. Caine No. 6.	Oct. 15, 1925	40, Ellis	Ellis	T 1,491 E 1,491 S 1,252	3,518
SW., SE. ¼ NW. ¼ sec. 32	748	"56" Petroleum Corp. Caine No. 8.	Dec. 9, 1925	15, Ellis	do	K 920 T 1,490 E 1,490 S 1,250	3,502
N., SE. ¼ NW. ¼ sec. 32	772	"56" Petroleum Corp. Caine No. 11.	May 15, 1925	Show, Ellis	Madison	T 1,502 E 1,484 S 1,235	3,513
NE., NE. ¼ SW. ¼ sec. 32	837	Kewanee Oil Co. Putnam No. 7.	May 21, 1926	do	do	T 1,547 E 1,490 S 1,290	3,505
SE., NE. ¼ SW. ¼ sec. 32	1240	Kewanee Oil Co. Putnam No. 8.	May 12, 1927	300, Ellis	Ellis	T 1,498 E 1,498	3,493
NE., NW. ¼ SW. ¼ sec. 32	731	Kewanee Oil Co. Putnam No. 6.	Nov. 27, 1925	15, Ellis	do	T 1,490 E 1,490 S 1,235	3,499
NW., NW. ¼ SW. ¼ sec. 32	162	Kewanee Oil Co. Putnam No. 2.	Nov. 1, 1924	100, Ellis	do	T 1,452 E 1,452 S 1,230	3,501
W., NW. ¼ SW. ¼ sec. 32	705	Kewanee Oil Co. Putnam No. 5.	Oct. 12, 1925	Oil, Ellis	do	T 1,485 E 1,485 S 1,233	3,491

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
SW., NW. ¼ SW. ¼ sec. 32	673	Kewanee Oil Co. Putnam No. 4.	Sept. 28, 1925	75, Ellis	Ellis	T 1,465 E 1,465 S 1,235 K 980	3,486
SE., NW. ¼ SW. ¼ sec. 32	161	Kewanee Oil Co. Putnam No. 1.	Sept. 28, 1924	20, Ellis	Madison	T 1,500 E 1,481 S 1,270	3,491
C., NW. ¼ SW. ¼ sec. 32	531	Kewanee Oil Co. Putnam No. 3.	Sept. 24, 1925	5, Ellis	Ellis	T 1,479 E 1,479 K 860	3,497
NW., SW. ¼ SW. ¼ sec. 32	448	Tecumseh Oil Co. Putnam No. 1.	May 10, 1925	40, Ellis	do	T 1,451 E 1,451 S 1,230	3,481
NW., SE. ¼ SW. ¼ sec. 32	372	Ferdig Oil Co. Putnam No. 1.	July 31, 1924	100, Ellis	Madison	T 1,496 E 1,474 S 1,275	3,478
Do	694	Pan-Canadian Oil Co. Putnam No. 1.	Oct. 12, 1925	Dry	do	T 1,510 E 1,486 S 1,235	3,474
W., SE. ¼ SW. ¼ sec. 32	955	Pan-Canadian Oil Co. Putnam No. 2.	Aug. 30, 1926	do	do	T 1,482 E 1,468	3,475
NE., NE. ¼ SE. ¼ sec. 32	1162	Ohio Oil Co. Putnam No. 4.	June 9, 1927	5, Ellis	do	T 1,506 E 1,479	3,492
N., NE. ¼ SE. ¼ sec. 32	1172	Ohio Oil Co. Putnam No. 5.	Mar. 1, 1927	30, Ellis	do	T 1,470 E 1,465	3,490
SW., NE. ¼ SE. ¼ sec. 32	1348	Ohio Oil Co. Putnam No. 10.	July 11, 1927	15, Ellis	do	T 1,505 E 1,473	3,491
SE., NE. ¼ SE. ¼ sec. 32	1250	Ohio Oil Co. Putnam No. 9.	June 17, 1927	70, Ellis	Ellis	T 1,482 E 1,482	3,498
C., NE. ¼ SE. ¼ sec. 32	1197	Ohio Oil Co. Putnam No. 6.	Apr. 1, 1927	10, Ellis	Madison	T 1,475 E 1,474	3,487
NE., NW. ¼ SE. ¼ sec. 32	1193	Ohio Oil Co. Putnam No. 3, well 2.	Mar. 27, 1927	4, Ellis	do	T 1,498 E 1,475	3,493
NW., NW. ¼ SE. ¼ sec. 32	762	Ohio Oil Co. Putnam No. 1.	Apr. 4, 1926	350, Ellis	Ellis	T 1,468 E 1,468 S 1,260	3,493
SW., NW. ¼ SE. ¼ sec. 32	1198	Ohio Oil Co. Putnam No. 7.	Apr. 10, 1927	400, Ellis	do	T 1,491 E 1,491	3,492
SE., NW. ¼ SE. ¼ sec. 32	1249	Ohio Oil Co. Putnam No. 8.	May 20, 1927	8, Ellis	Madison	T 1,469 E 1,465	3,485

C., NW. ¼ SE. ¼ sec. 32	1388	Ohio Oil Co. Putnam No. 11.	Aug. 6, 1927	185, Ellis	Ellis	T 1,482 E 1,482	3,490
NW., NW. ¼ NW. ¼ sec. 33	1509	Adams Co. Haskins No. 16.	Nov. 16, 1927	do	do	T 1,550 E 1,485	3,471
NW., SW. ¼ NE. ¼ sec. 33	1175	Adams Co. Haskins No. 5.	Jan. 25, 1927	do	do	T 1,504 E 1,465	3,455
NE., NE. ¼ NW. ¼ sec. 33	1488	Ohio Oil Co. Schacht No. 4.	Oct. 15, 1927	220, Ellis	do	T 1,470 E 1,470	3,471
NW., NE. ¼ NW. ¼ sec. 33	1460	Ohio Oil Co. Schacht No. 3.	Sept. 16, 1927	27, Ellis	Madison	T 1,502 E 1,477	3,477
SW., NE. ¼ NW. ¼ sec. 33	1349	Ohio Oil Co. Schacht No. 1.	July 23, 1927	55, Ellis	do	T 1,483 E 1,469	3,470
S., NE. ¼ NW. ¼ sec. 33	1390	Ohio Oil Co. Schacht No. 2.	Aug. 17, 1927	13, Ellis	Ellis	T 1,481 E 1,481	3,472
NE., NW. ¼ NW. ¼ sec. 33	1476	Flickertail Oil Co. Schacht No. 5.	Oct. 3, 1927	100, Ellis	do	T 1,480 E 1,480	4,381
NW., NW. ¼ NW. ¼ sec. 33	61	Calimont Oil Co. Thelen No. 1.	June 29, 1924	Show, Ellis	Madison	T 1,542 E 1,496 S 1,270	3,484
SW., NW. ¼ NW. ¼ sec. 33	1049	Bowbells Oil Co. Schacht No. 1.	Oct. 13, 1926	Gas and oil	Ellis	T 1,460 E 1,460	3,491
SE., NW. ¼ NW. ¼ sec. 33	1432	Flickertail Oil Co. Schacht No. 4.	Aug. 31, 1927	100, Ellis	do	T 1,474 E 1,474	3,483
NE., SW. ¼ NW. ¼ sec. 33	1419	Adams Co. Haskins No. 13.	Aug. 19, 1927	150, Ellis	do	T 1,480 E 1,480	3,488
N., SW. ¼ NW. ¼ sec. 33	1284	Adams Co. Haskins No. 10.	June 17, 1927	200, Ellis	do	T 1,476 E 1,476	3,488
W., SW. ¼ NW. ¼ sec. 33	1450	Adams Co. Haskins No. 14.	Sept. 4, 1927	20, Ellis	do	T 1,490 E 1,490	3,494
SW., SW. ¼ NW. ¼ sec. 33	1469	Adams Co. Haskins No. 15.	Sept. 24, 1927	25, Ellis	do	T 1,481 E 1,480	3,488
Do	1547	Adams Co. Haskins No. 17.	Mar. 23, 1928	15, Ellis	do	T 1,483 E 1,483	----------
S., SW. ¼ NW. ¼ sec. 33	1208	Adams Co. Haskins No. 7.	Mar. 29, 1927	100, Ellis	do	T 1,479 E 1,478	3,488
Do	1239	Adams Co. Haskins No. 9.	May 4, 1927	25, Ellis	do	T 1,483 E 1,483	3,472
SE., SW. ¼ NW. ¼ sec. 33	1180	Adams Co. Haskins No. 6.	Mar. 5, 1927	40, Ellis	do	T 1,481 E 1,481	3,483
N., SE. ¼ NW. ¼ sec. 33	1157	Adams Co. Haskins No. 4.	Jan. 4, 1927	150, Ellis	do	T 1,475 E 1,475	3,465
NW., SE. ¼ NW. ¼ sec. 33	1209	Adams Co. Haskins No. 8.	Apr. 2, 1927	200, Ellis	do	T 1,465 E 1,465	3,482
SW., SE. ¼ NW. ¼ sec. 33	1285	Adams Co. Haskins No. 11.	June 5, 1927	250, Ellis	do	T 1,466 E 1,466	3,478
SE., SE. ¼ NW. ¼ sec. 33	1363	Adams Co. Haskins No. 12.	July 22, 1927	Dry	Madison	T 1,580 E 1,471	3,464
NE., NW. ¼ SW. ¼ sec. 33	1158	Bottineau-Minot Oil Co. Develin No. 4.	Jan. 18, 1927	75, Ellis	do	T 1,490 E 1,477	3,486
NW., NW. ¼ SW. ¼ sec. 33	773	Bottineau-Minot Oil Co. Develin No. 1.	Apr. 9, 1926	112, Ellis	Ellis	T 1,480 E 1,480 S 1,250	3,492

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Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 1 W.—Continued							
SW., NW. ¼ SW. ¼ sec. 33	1382	Bottineau-Minot Oil Co. Develin No. 5.	Aug. 8, 1927	Dry	Madison	T 1,501 E 1,497	3,495
C., NW. ¼ SW. ¼ sec. 33	1060	Bottineau-Minot Oil Co. Develin No. 2.	Oct. 17, 1926	100, Ellis	Ellis	T 1,491 E 1,491	3,491
NW., NE. ¼ SE. ¼ sec. 33	1179	Caine. Haskins No. 1.	Mar. 12, 1927	Dry	Madison	T 1,488 E 1,486	3,445
NE., NW. ¼ NW. ¼ sec. 34	669	McDermid et al. Traver No. 1.	Oct. 23, 1925	Show, Ellis	do	T 1,745 E 1,525 S 1,261 K 980	3,461
NW., NE. ¼ NW. ¼ sec. 34	1259	Abell Oil Co. Travis No. 1.	May 28, 1927	Dry	do	T 1,703 E 1,519	3,459
C., SW. ¼ NW. ¼ sec. 34	106	First International Syndicate. Ferring No. 1.	Feb. 21, 1925	do	do	T 1,710 E 1,480	3,436
T. 35 N., R. 2 W.							
SW., SW. ¼ NW. ¼ sec. 1	276	Ohio-Troy-Potlatch. Sindon No. 1.	Sept. 18, 1922	1½ M, Sunburst	Kootenai	T 1,449 S 1,442	3,495
C., N. ½ SW. ¼ sec. 1	880	Ohio Oil Co. Baptiste-Sindon No. 2.	July 6, 1926	1 M, Sunburst	Ellis	T 1,644 E 1,644 S 1,440	3,511
SW., SW. ¼ SW. ¼ sec. 1	275	Ohio-Troy-Potlatch. Baptiste-Sindon No. 1.	June 16, 1923	4 M, Sunburst	do	T 1,595 E 1,458 S 1,458	3,481
SW., SW. ¼ NW. ¼ sec. 2	631	Ohio-Sunburst. Barr No. 3.	Nov. 1, 1925	1 M, Sunburst	Madison	T 1,724 E 1,715 S 1,520 K 1,395	3,498
SE., SE. ¼ NW. ¼ sec. 2	240	Ohio Sunburst. Barr No. 2.	July 25, 1923	do	Ellis	T 1,754 E 1,754 S 1,552	3,544
C., NW. ¼ NW. ¼ sec. 2	239	Ohio-Sunburst. Barr No. 1.	Aug. 7, 1922	2¼ M, Sunburst Oil, Ellis.	do	T 1,775 E 1,770 S 1,553	3,528
SE., SE. ¼ SW. ¼ sec. 2	75	Carter Oil Co. Lind No. 2.	Sept. 5, 1924	2 M. 12, Ellis.	Madison	T 1,685 E 1,671 S 1,465	3,528
SW., SW. ¼ SE. ¼ sec. 2	150	Homestake Exploration Co. Whitman No. 1.	June 16, 1924	140, Ellis	Ellis	T 1,647 E 1,647	3,513
C., NE. ¼ NW. ¼ sec. 3	819	Ohio Oil Co. Davey No. 10.	May 10, 1926	75, Sunburst	do	T 1,751 E 1,751 S 1,537	3,493

NW., NW. ¼ NE. ¼ sec. 3	245	Ohio-Sunburst. Davey No. 2.	Aug. 6, 1922	28, Sunburst	Kootenai	T 1,560 S 1,560	3,487
NE., SW. ¼ NE. ¼ sec. 3	250	Ohio-Sunburst. Davey No. 7.	Sept. 27, 1923	70, Sunburst. Ellis.	Ellis	T 1,783 E 1,781 S 1,555	3,492
NE., NE. ¼ NW. ¼ sec. 3	147	Texas Pacific Coal & Oil Co. Reibe No. 1.	Nov. 1, 1922	1 M, Stray *. 15, Sunburst.	Kootenai	T 1,582 S 1,550	3,502
SE., NE. ¼ NW. ¼ sec. 3	277	Ohio Oil Co. (Reibe). Claire Stevenson No. 1.	July 22, 1922	½ M ** Show of oil, Ellis.	Madison	T 1,820 E 1,742	3,471
SW., NW. ¼ NW. ¼ sec. 3	1429	Texas Pacific Coal & Oil Co. Reibe No. 11.	Aug. 31, 1927	Dry	Ellis	T 1,750 E 1,750	3,472
SE., SW. ¼ NW. ¼ sec. 3	608	Ohio Oil Co. Claire Stevenson No. 2.	Sept. 14, 1925	do	do	T 1,728 E 1,726 S 1,505	3,452
NW., NE. ¼ SW. ¼ sec. 3	1391	Ohio Oil Co. Baker No. 11.	Aug. 23, 1927	8, Ellis	Madison	T 1,748 E 1,709	3,465
N., SW. ¼ SW. ¼ sec. 3	236	Ohio Oil Co. (Troy Inland). Baker No. 7.	Aug. 14, 1923	15 Ellis	do	T 1,687 E 1,677 S 1,445	3,460
SW., SW. ¼ SW. ¼ sec. 3	234	Ohio Oil Co. Baker No. 5.	May 20, 1923	do	do	T 1,682 E 1,660 S 1,470	3,450
SW., SW. ¼ SE. ¼ sec. 3	251	Ohio Oil Co. Davey No. 8.	Sept. 2, 1923	10, Ellis	Ellis	T 1,675 E 1,675 S 1,490	3,507
NE., NE. ¼ NE. ¼ sec. 4	603	Texas Pacific Coal & Oil Co. Reibe No. 7.	Sept. 21, 1925	Oil, Sunburst	Madison	T 1,825 E 1,777 S 1,560 K 1,500	3,495
NW., NE. ¼ NE. ¼ sec. 4	440	Texas Pacific Coal & Oil Co. Reibe No. 4.	May 8, 1925	80, Sunburst	Kootenai	T 1,550 S 1,523	3,456
W., NE. ¼ NE. ¼ sec. 4	1226	Texas Pacific Coal & Oil Co. Reibe No. 8.	June 5, 1927	40, Sunburst	do	T 1,545 S 1,518	3,463
SW., NE. ¼ NE. ¼ sec. 4	485	Texas Pacific Coal & Oil Co. Reibe No. 5.	June 4, 1925	do	do	T 1,540 S 1,523	3,973
SE., NE. ¼ NE. ¼ sec. 4	1326	Texas Pacific Coal & Oil Co. Reibe No. 9.	June 28, 1927	100, Sunburst	do	T 1,545 S 1,505	3,476
Do	1378	Texas Pacific Coal & Oil Co. Reibe No. 10.	Aug. 10, 1927	15, Sunburst	do	T 1,566 S 1,540	3,492
NE., NW. ¼ NE. ¼ sec. 4	148	Texas Pacific Coal & Oil Co. Reibe No. 2.	Aug. 26, 1924	75, Sunburst	do	T 1,535 S 1,508	3,456
NW., NW. ¼ NE. ¼ sec. 4	149	Texas Pacific Coal & Oil Co. Reibe No. 3.	Oct. 8, 1924	40, Ellis	do	T 1,545 S 1,521	3,445
C., NW. ¼ NE. ¼ sec. 4	545	Texas Pacific Coal & Oil Co. Reibe No. 6.	July 16, 1925	50, Ellis	Ellis	T 1,757 E 1,757	3,452
NE., SE. ¼ NW. ¼ sec. 4	548	O'Neil Bros. Swears No. 2.	July 23, 1925	10, Ellis	do	T 1,733 E 1,733 S 1,500	3,422
E., NE. ¼ SW. ¼ sec. 4	460	O'Neil Bros. Swears No. 1.	June 12, 1925	Show, Ellis	Madison	T 1,755 E 1,727 S 1,490	3,449

* Gas at 1,000 feet.

** Gas at 1,036 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
NE., NW. ¼ SW. ¼ sec. 4	1482	Ohio Oil Co. Baker No. 12.	Oct. 11, 1927	60, Ellis	Ellis	T 1,724 E 1,724	3,454
NW., SW. ¼ SW. ¼ sec. 4	452	Western Petroleum Exploration Co. H. Swears No. 4.	June 10, 1925	Dry	Madison	T 1,775 E 1,770 S 1,550	3,436
SW., SW. ¼ SW. ¼ sec. 4	406	Western Petroleum Exploration Co. H. Swears No. 3.	Oct. 3, 1923	Show, Sunburst	do	T 1,725 E 1,716 S 1,496	3,430
NE., SE. ¼ SW. ¼ sec. 4	405	Western Petroleum Exploration Co. H. Swears No. 2.	Oct. 2, 1923	60, Ellis	Ellis	T 1,701 E 1,701 S 1,440	3,431
SE., SE. ¼ SW. ¼ sec. 4	404	Western Petroleum Exploration Co. H. Swears No. 1.	Sept. 2, 1923	15, Ellis	do	T 1,687 E 1,687 S 1,455	3,435
SE., NW. ¼ SE. ¼ sec. 4	1549	Ohio Oil Co. Baker No. 14.	Mar. 27, 1928	45, Sunburst Ellis.	Madison	T 1,711 E 1,709 S 1,480	
NE., SW. ¼ SE. ¼ sec. 4	238	Ohio Oil Co. Baker No. 9.	July 1, 1924	22, Ellis	Ellis	T 1,710 E 1,710 T 1,673	3,462
SW., SW. ¼ SE. ¼ sec. 4	230	Ohio Oil Co. Baker No. 2.	Mar. 9, 1923	330, Ellis	do	E 1,673 T 1,703	3,441
W., SW. ¼ SE. ¼ sec. 4	235	Ohio Oil Co. Baker No. 6.	Apr. 26, 1923	50, Ellis	do	E 1,703 S 1,453	3,435
SE., SW. ¼ SE. ¼ sec. 4	231	Ohio Oil Co. Baker No. 1.	Jan. 27, 1923	150, Ellis	Madison	T 1,698 E 1,698 S 1,460	3,455
NE., SE. ¼ SE. ¼ sec. 4	959	Ohio Oil Co. Baker No. 10.	Aug. 6, 1926	1½ M, Sunburst 15, Ellis.	do	T 1,688 E 1,671 S 1,345	
N., SE. ¼ SE. ¼ sec. 4	237	Ohio Oil Co. Baker No. 8.	Aug. 15, 1923	58, Ellis	do	T 1,700 E 1,690	3,450
S., SE. ¼ SE. ¼ sec. 4	232	Ohio Oil Co. Baker No. 3.	Mar. 19, 1923	1545, Ellis	do	T 1,682 E 1,674 S 1,495	3,458
SE., SE. ¼ SE. ¼ sec. 4	233	Ohio Oil Co. Baker No. 4.	June 19, 1923	60, Ellis	do	T 1,662 E 1,650	3,453
NE., SE. ¼ SE. ¼ sec. 5	177	Mid-Northern Oil Co. Britton No. 2.	July 20, 1924	90, Ellis	Kootenai	T 1,518 S 1,492	3,422
SE., SE. ¼ SE. ¼ sec. 5	176	Mid-Northern Oil Co. Britton No. 1.	May 4, 1923	131, Sunburst Ellis.	Madison	T 1,715 E 1,705 S 1,492	3,419

NE., NE. ¼ NE. ¼ sec. 8	196	Montana-Giant Petroleum Co. McGowan No. 1.	Nov. 18, 1923	50, Ellis	Ellis	T 1,703 E 1,703 S 1,465	3,405
E., NE. ¼ NE. ¼ sec. 8	197	Montana-Giant Petroleum Co. McGowan No. 2.	Oct. 24, 1924	204, Sunburst	Kootenai	T 1,488 S 1,488	3,418
NE., NE. ¼ NW. ¼ sec. 8	307	Rice Oil Co. Gillis No. 1.	Oct. 25, 1922	Dry	do	T 1,340 S 1,340	3,338
NE., NE. ¼ NW. ¼ sec. 8	308	Rice Oil Co. Gillis No. 2.	July 13, 1923	do	Madison	T 1,665 S 1,422	3,348
NW., SW. ¼ NW. ¼ sec. 8	126	Sunburst Oil Co. Beaupre No. 1.	July 31, 1923	30, Sunburst and Ellis	do	T 1,651 E 1,646 S 1,435	3,352
NE., NE. ¼ NE. ¼ sec. 9	145	Texas Pacific Coal & Oil Co. Howling No. 3	Sept. 1, 1923	2,400, Ellis	do	T 1,676 E 1,654 S 1,414	3,451
NW., NE. ¼ NE. ¼ sec. 9	143	Texas Pacific Coal & Oil Co. Howling No. 1.	Mar. 9, 1923	40, Ellis	do	T 1,704 E 1,695 S 1,447	3,455
N., NE. ¼ NE. ¼ sec. 9	144	Texas Pacific Coal & Oil Co. Howling No. 2.	June 29, 1923	160, Ellis	do	T 1,704 E 1,654 S 1,440	3,456
SW., NE. ¼ NE. ¼ sec. 9	1474	Texas Pacific Coal & Oil Co. Howling No. 7.	Oct. 8, 1927	125, Ellis	do	T 1,697 E 1,664	3,446
SE., NE. ¼ NE. ¼ sec. 9	1227	Texas Pacific Coal & Oil Co. Howling No. 5.	July 20, 1927	50, Ellis	do	T 1,709 E 1,654	3,464
SE., NE. ¼ NE. ¼ sec. 9	186	Mid-Northern Oil Co. Swears No. 2.	Nov. 29, 1922	35, Ellis	Ellis	T 1,672 E 1,672 S 1,430	3,430
E., NE. ¼ NE. ¼ sec. 9	146	Texas Pacific Coal & Oil Co. Howling No. 4.	Oct. 2, 1924	130, Ellis	Madison	T 1,675 E 1,670	3,461
NE., NW. ¼ NE. ¼ sec. 9	178	Mid-Northern Oil Co. Howling No. 1.	Oct. 21, 1922	225, Ellis	do	T 1,711 E 1,666 S 1,456	3,455
NW., NW. ¼ NE. ¼ sec. 9	179	Mid-Northern Oil Co. Howling No. 2.	Apr. 5, 1923	75, Ellis	do	T 1,692 E 1,673 S 1,430	3,438
W., NW. ¼ NE. ¼ sec. 9	180	Mid-Northern Oil Co. Howling No. 3.	May 28, 1923	2,000, Ellis	do	T 1,662 E 1,658 S 1,430	3,426
E., NW. ¼ NE. ¼ sec. 9	183	Mid-Northern Oil Co. Howling No. 6.	Oct. 18, 1924	25, Ellis	do	T 1,686 E 1,673 S 1,470	3,436
C., NW. ¼ NE. ¼ sec. 9	782	Mid-Northern Oil Co. Howling No. 8.	Mar. 14, 1926	15, Sunburst Show, Ellis.	do	T 1,705 E 1,673 S 1,465	3,432
NE., SW. ¼ NE. ¼ sec. 9	764	Mid-Northern Oil Co. Howling No. 7.	Jan. 23, 1926	108, Ellis	Ellis	T 1,670 E 1,670 S 1,445	3,439
NE., SE. ¼ NE. ¼ sec. 9	1430	Texas Pacific Coal & Oil Co. Howling No. 6.	Aug. 31, 1927	50, Ellis	do	T 1,664 E 1,664	3,417

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
NW., SW. ¼ NE. ¼ sec. 9	181	Mid-Northern Oil Co. Howling No. 4.	Aug. 31, 1923	83, Ellis	Ellis	T 1,630 E 1,630 S 1,434	3,431
SW., SW. ¼ NE. ¼ sec. 9	182	Mid-Northern Oil Co. Howling No. 5.	July 12, 1923	40, Ellis	Madison	T 1,648 E 1,627 S 1,407	3,436
SE., SW. ¼ NE. ¼ sec. 9	864	Mid-Northern Oil Co. Howling No. 10.	May 7, 1926	Show, Ellis	do	T 1,688 E 1,658 S 1,428	----------
C., SW. ¼ NE. ¼ sec. 9	820	Mid-Northern Oil Co. Howling No. 9.	Apr. 22, 1926	32, Ellis	Ellis	T 1,662 E 1,662	3,433
NE., NE. ¼ NW. ¼ sec. 9	185	Mid-Northern Oil Co. Swears No. 1.	Feb. 11, 1923	300, Ellis	do	T 1,672 E 1,672	3,434
NW., NW. ¼ NW. ¼ sec. 9	187	Mid-Northern Oil Co. Swears No. 3.	May 18, 1924	Dry	Madison	T 1,718 E 1,683 S 1,460	3,414
SW., NW. ¼ NW. ¼ sec. 9	447	Mid-Northern Oil Co. Swears No. 4.	June 15, 1925	Show, Ellis	do	T 1,785 E 1,756 S 1,456	3,416
NE., SE. ¼ NW. ¼ sec. 9	15	Beardsley Swears No. 1.	July 26, 1923	40, Ellis	do	T 1,702 E 1,667 S 1,435 K 1,077	3,434
SE., SE. ¼ NW. ¼ sec. 9	16	Beardsley Swears No. 2.	May 22, 1924	100, Ellis	do	T 1,655 E 1,650 K 1,040 or 1,240	3,431
NE., NE. ¼ SW. ¼ sec. 9	402	Western Petroleum Exploration Co. Swears No. 1.	May 1, 1923	166, Ellis	do	T 1,642 E 1,629 S 1,390	3,420
SE., SE. ¼ SW. ¼ sec. 9	403	Western Petroleum Exploration Co. Swears No. 2.	July 23, 1923	40, Ellis	do	T 1,622 E 1,619 S 1,384	3,448
N., NW. ¼ SE. ¼ sec. 9	397	Western Petroleum Exploration Co. Bruins No. 4.	Feb. 2, 1924	Show, Ellis	do	T 1,666 E 1,650	3,429
NW., NW. ¼ SE. ¼ sec. 9	394	Western Petroleum Exploration Co. Bruins No. 2.	June 13, 1923	175, Ellis	do	T 1,641 E 1,637 S 1,405	3,417
W., NW. ¼ SE. ¼ sec. 9	1205	California Petroleum Corp. Bruins No. 7.	Apr. 12, 1927	20, Ellis	do	T 1,978 E 1,625	3,433

SW., SW. ¼ SE. ¼ sec. 9	396	Western Petroleum Exploration Co. Bruins No. 3.	July 12, 1923	25, Ellis	do	T 1,625 E 1,619 S 1,380	3,456
NE., NE. ¼ NE. ¼ sec. 10	1164	Ohio Oil Co. Bruins No. 5.	Apr. 3, 1927	20, Ellis	do	T 1,655 E 1,645	3,512
SW., NE. ¼ NE. ¼ sec. 10	1302	Ohio Oil Co. Bruins No. 6.	June 23, 1927	15, Ellis	Ellis	T 1,663 E 1,663	3,529
SW., NW. ¼ NE. ¼ sec. 10	609	Ohio Oil Co. Bruins No. 2.	Sept. 24, 1925	33, Ellis	do	T 1,636 E 1,636 S 1,435	3,497
C., SE. ¼ NE. ¼ sec. 10	859	Ohio Oil Co. Bruins No. 3.	June 2, 1926	Show, Ellis	Madison	T 1,760 E 1,645 S 1,442 K 1,085	3,528
NW., NW. ¼ NW. ¼ sec. 10	12	Beardsley Bruins No. 1.	May 16, 1923	165, Ellis	do	T 1,669 E 1,666 S 1,466	3,456
SE., NE. ¼ NW. ¼ sec. 10	1431	Tom Davis Syndicate Corp. Bruins No. 5.	Oct. 16, 1927	30, Ellis	Ellis	T 1,660 E 1,660	3,492
W., NW. ¼ NW. ¼ sec. 10	13	Beardsley Bruins No. 2.	Aug. 11, 1924	10, Ellis	Madison	T 1,666 E 1,647	3,466
Do	1199	Tom Davis Syndicate Corp. Bruins No. 2-A.	May 1, 1927	62, Ellis	do	T 1,685 E 1,652	3,465
SW., NW. ¼ NW. ¼ sec. 10	1263	Tom Davis Syndicate Corp. Bruins No. 3.	June 16, 1927	40, Ellis	do	T 2,035 E 1,680	3,469
SE., NW. ¼ NW. ¼ sec. 10	1320	Tom Davis Syndicate Corp. Bruins No. 4.	Aug. 5, 1927	100, Ellis	Ellis	T 1,684 E 1,684	3,494
NE., SW. ¼ NW. ¼ sec. 10	1456	Carter Oil Co. Howling No. 4.	Oct. 19, 1927	30, Ellis	Madison	T 1,710 E 1,648	3,486
NW., SW. ¼ NW. ¼ sec. 10	73	Carter Oil Co. Howling No. 1.	July 15, 1923	2 M, Sunburst 6, Ellis.	do	T 1,693 E 1,661 S 1,455	3,483
SW., SW. ¼ SW. ¼ sec. 10	395	Western Petroleum Exploration Co. Bruins No. 1.	June 13, 1923	10, Ellis	Ellis	T 1,596 E 1,596 S 1,365	3,469
SW., SE. ¼ SW. ¼ sec. 10	1138	Carter Oil Co. Howling No. 3.	May 5, 1927	Dry	Madison	T 1,750 E 1,650	3,502
S., SE. ¼ SW. ¼ sec. 10	1211	California Petroleum Corp. Bruins No. 8.	Apr. 25, 1927	Show, Ellis	do	T 1,660 E 1,610	3,493
SE., SE. ¼ SW. ¼ sec. 10	398	Western Petroleum Exploration Co. Bruins No. 5.	Aug. 10, 1923	200, Ellis	Ellis	T 1,602 E 1,602 S 1,370	3,503
SW., NW. ¼ SE. ¼ sec. 10	243	Ohio Oil Co. Bruins No. 1.	May 30, 1923	Dry	Madison	T 1,650 E 1,616 S 1,420	3,491
SW., SW. ¼ SE. ¼ sec. 10	530	Western Petroleum Exploration Co. Bruins No. 6.	July 20, 1925	Show	do	T 1,635 E 1,607 S 1,405	3,502
C., SW. ¼ NE. ¼ sec. 11	279	Ohio-Sunburst Stockman's National Bank No. 2.	Mar. 6, 1926	5, Ellis	Ellis	T 1,583 E 1,578 S 1,445	3,506

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
SE., SE. ¼ NE. ¼ sec. 11	278	Ohio-Sunburst Stockman's National Bank No. 1.	Apr. 5, 1923	115, Ellis	Ellis	T 1,562 E 1,562 S 1,390	3,482
NW., NW. ¼ NW. ¼ sec. 11	1124	Carter Oil Co. Lind No. 4.	Mar. 26, 1927	Dry	Madison	T 1,750 E 1,650	3,515
NE., SW. ¼ NW. ¼ sec. 11	211	Continental Oil Co. Higgins No. 1.	June 13, 1923	10, Ellis	do	T 1,571 E 1,534	3,467
NW., SW. ¼ NW. ¼ sec. 11	74	Carter Oil Co. Lind No. 1.	June 12, 1923	30, Ellis	Ellis	T 1,635 E 1,630 S 1,420	3,520
NW., SW. ¼ NW. ¼ sec. 11	393	Western Petroleum Exploration Co. Berglin No. 2.	June 11, 1923	Dry	Madison	T 1,585 E 1,570 S 1,355	3,489
SW., SW. ¼ NW. ¼ sec. 11	392	Western Petroleum Exploration Co. Berglin No. 1.	Jan. 10, 1923	230, Ellis	Ellis	T 1,560 E 1,560 S 1,370	3,490
S., SW. ¼ NW. ¼ sec. 11	451	Western Petroleum Exploration Co. Berglin No. 3.	May 20, 1925	60, Ellis	do	T 1,586 E 1,586 S 1,371	3,496
C., SW. ¼ NW. ¼ sec. 11	589	Western Petroleum Exploration Co. Berglin No. 4.	Sept. 12, 1925	30, Ellis	do	T 1,578 E 1,578 S 1,360	3,503
C., NE. ¼ SW. ¼ sec. 11	340	Stapleton Oil Co. Engemoen No. 1.	May 18, 1923	10, Ellis	Madison	K 1,000 T 1,640 E 1,626 S 1,410	3,551
C., NW. ¼ SW. ¼ sec. 11	341	Stapleton Oil Co. Engemoen No. 2.	Nov. 24, 1923	20, Ellis	do	T 1,650 E 1,633 S 1,400	3,553
W., NE. ¼ SE. ¼ sec. 11	1438	California Oil Co. Shaver No. 1.	Sept. 1, 1927	Show, Ellis	do	T 1,551 E 1,449	3,471
NW., SE. ¼ SE. ¼ sec. 11	345	Diamond Petroleum Co. Stockman's National Bank No. 1.	Aug. 6, 1923	10, Ellis	do	T 1,539 E 1,520	3,468
NW., SW. ¼ NE. ¼ sec. 12	1035	California Petroleum Corp. Berglin No. 5.	Apr. 17, 1927	Dry	do	T 1,615 E 1,610	3,499
NW., NW. ¼ SW. ¼ sec. 12	123	Hager-Stevenson Barth No. 1.	Apr. 7, 1923	do	do	T 1,592 E 1,557 S 1,340	3,487
C., SE. ¼ SW. ¼ sec. 12	124	Hager-Stevenson Barth No. 2.	July 28, 1924	do	do	T 1,676 E 1,610 S 1,418	3,530

SW., SW. ¼ NW. ¼ sec. 13	347	Sunburst Oil & Refining Co. Hagerty No. 1.	Apr. 27, 1923	do	Ellis	T 1,520 E 1,516 S 1,380	3,492
N., NE. ¼ SW. ¼ sec. 13	688	American Production Co. Waite No. 3.	Oct. 9, 1925	5, Ellis	Madison	T 1,564 E 1,524 S 1,275	3,518
SE., NE. ¼ SW. ¼ sec. 13	652	American Production Co. Waite No. 2.	Sept. 12, 1925	Dry	do	T 1,560 E 1,535 S 1,361	3,523
C., NE. ¼ SW. ¼ sec. 13	112	American Production Co. Waite No. 1.	Sept. 3, 1924	35, Ellis	Ellis	K 970 T 1,537 E 1,537	3,525
E., NW. ¼ SW. ¼ sec. 13	1338	General Oil Co. Hagerty No. 1.	July 15, 1927	1 M, Sunburst 10, Ellis.	Madison	T 1,640 E 1,520 S 1,330	3,530
SW., NW. ¼ SW. ¼ sec. 13	1436	General Oil Co. Hagerty No. 2.	Sept. 5, 1927	21, Ellis	do	T 1,608 E 1,536	3,497
SW., SE. ¼ SE. ¼ sec. 13	222	Nelson Sunburst Oil Co. Kalispell-Kevin No. 1.	Oct. 22, 1923	Dry	Ellis	T 1,587 E 1,587 S 1,360	3,547
N., SW. ¼ NE. ¼ sec. 14	229	O'Haire Oil Co. O'Haire No. 1.	Aug. 27, 1924	5, Ellis	do	T 1,505 E 1,505	3,502
C., NE. ¼ NW. ¼ sec. 14	860	Ohio Oil Co. Engemoen No. 2.	May 29, 1926	Oil, Ellis	Madison	T 1,704 E 1,587 S 1,345	3,545
NW., NW. ¼ NW. ¼ sec. 14	259	Ohio Oil Co. Engemoen No. 1.	May 30, 1923	30, Ellis	Ellis	T 1,616 E 1,616 S 1,416	3,547
NE., NW. ¼ SW. ¼ sec. 14	611	Ohio Oil Co. Reeg No. 2.	Sept. 9, 1925	109, Ellis	Madison	T 1,537 E 1,521 S 1,360	3,512
SW., SW. ¼ SW. ¼ sec. 14	271	Ohio Oil Co. Reeg No. 1.	Apr. 27, 1923	37, Ellis	do	T 1,485 E 1,480 S 1,270	3,480
NE., NW. ¼ SE. ¼ sec. 14	163	Sunburst Oil Co. Reeg No. 1.	Aug. 25, 1923	Dry	Ellis	T 1,515 E 1,515	3,480
SW., SW. ¼ SE. ¼ sec. 14	164	Sunburst Oil Co. Reeg No. 2.	Oct. 13, 1923	1 M, Sunburst 25, Ellis.	Madison	T 1,466 E 1,461 S 1,210	3,438
SW., SE. ¼ SE. ¼ sec. 14	348	Sunburst Oil Co. Hagerty No. 2.	Oct. 5, 1924	40, Ellis	do	T 1,469 E 1,466 S 1,988	3,454
C., SE. ¼ SE. ¼ sec. 14	573	Sunburst Oil Co. Hagerty No. 3.	Aug. 9, 1925	Show, Ellis	do	T 1,475 E 1,455 S 1,240	3,457
NW., NW. ¼ NE. ¼ sec. 15	400	Western Petroleum Exploration Co. Kenny No. 1.	Aug. 1, 1923	250, Ellis	do	T 1,598 E 1,594 S 1,355	3,486
W., NW. ¼ NE. ¼ sec. 15	401	Western Petroleum Exploration Co. Kenny No. 2.	Sept. 5, 1923	25, Ellis	Ellis	T 1,600 E 1,600 S 1,365	3,486

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
SE., NW. ¼ NE. ¼ sec. 15	1371	California Petroleum Corp. Kenney No. 5.	Aug. 1, 1927	Dry, Ellis	Madison	T 1,654 E 1,565	3,496
SE., SW. ¼ NE. ¼ sec. 15	1253	California Petroleum Corp. Kenney No. 3.	May 25, 1927	45, Ellis	Ellis	T 1,537 E 1,537	3,480
SE., SE. ¼ NE. ¼ sec. 15	1296	California Petroleum Corp. Kenney No. 4.	June 26, 1927	11, Ellis	Madison	T 1,559 E 1,550	3,500
NE., NE. ¼ NW. ¼ sec. 15	257	Ohio Oil Co. Emmert No. 3, A–C No. 2.	June 28, 1923	200, Ellis	Ellis	T 1,590 E 1,590 S 1,395	3,476
SE., NE. ¼ NW. ¼ sec. 15	258	Ohio Oil Co. Emmert No. 4, A–C No. 2.	Aug. 12, 1923	50, Ellis	Madison	T 1,564 E 1,556	3,457
NW., NW. ¼ NW. ¼ sec. 15	254	Ohio Oil Co. Emmert No. 1, A–C No. 2.	Apr. 24, 1923	70, Ellis	do	T 1,596 E 1,594 S 1,345	3,472
C., NW. ¼ sec. 15	1506	Ohio-Sunburst. Emmert No. 5, A–C No. 2.	Nov. 14, 1927	8, Ellis	do	T 1,584 E 1,548	3,449
NW., NW. ¼ SW. ¼ sec. 15	255	Ohio Oil Co. Emmert No. 2, A–C No. 2.	July 9, 1923	30, Ellis	Ellis	T 1,550 E 1,550 S 1,360	3,450
SW., SW. ¼ SW. ¼ sec. 15	253	Ohio Oil Co. Emmert No. 1, A–C No. 1.	Jan. 23, 1923	100, Ellis	do	T 1,485 E 1,485 S 1,280	3,417
SE., SW. ¼ SW. ¼ sec. 15	256	Ohio Oil Co. Emmert No. 2, A–C No. 1.	June 20, 1923	70, Ellis	Madison	T 1,462 E 1,452	3,407
NE., NE. ¼ SE. ¼ sec. 15	1354	Ohio Oil Co. Kenny No. 4.	July 22, 1927	8, Ellis	do	T 1,546 E 1,540	3,506
NE., NW. ¼ SE. ¼ sec. 15	610	Ohio Oil Co. A. E. Kenny No. 1.	Aug. 16, 1925	30, Ellis	Ellis	T 1,533 E 1,533 S 1,240	3,474
NW., SW. ¼ SE. ¼ sec. 15	811	Sunburst Oil & Refining Co. Reeg No. 3.	May 13, 1926	15, Ellis	Madison	T 1,515 E 1,481 S 1,237	----------
SW., SW. ¼ SE. ¼ sec. 15	771	Ohio Oil Co. Kenny No. 3.	Jan. 27, 1926	Show, Ellis	Ellis	T 1,495 E 1,495 S 1,265	3,455
NW., SE. ¼ SE. ¼ sec. 15	715	Ohio Oil Co. Kenny No. 2.	Nov. 27, 1925	40, Ellis	Madison	T 1,522 E 1,517 S 1,320	3,478
NE., NE. ¼ NE. ¼ sec. 16	218	Continental Oil Co. State No. 3.	July 8, 1923	10, Ellis	do	T 1,601 E 1,578	3,461

NW., NW. ¼ NE. ¼ sec. 16	216	Continental Oil Co. State No. 1.	May 13, 1923	150, Ellis	do	T 1,629 E 1,627 S 1,380	3,470
NE., NE. ¼ NW. ¼ sec. 16	14	Beardsley State No. 1.	Apr. 12, 1924	2, Ellis	do	T 1,660 E 1,652 S 1,405 K 1,080	3,464
NE., NE. ¼ SE. ¼ sec. 16	219	Continental Oil Co. State No. 4.	July 27, 1923	96, Ellis	do	T 1,544 E 1,542	3,439
NE., SE. ¼ SE. ¼ sec. 16	730	Continental Oil Co. State No. 6.	Oct. 23, 1925	Show	do	T 1,580 E 1,528 K 910	3,437
SE., SE. ¼ SE. ¼ sec. 16	217	Continental Oil Co. State No. 2.	July 16, 1923	121, Ellis	do	T 1,524 E 1,520 S 1,297	3,430
C., SE. ¼ sec. 16	510	Continental Oil Co. State No. 5.	July 4, 1925	Show	do	T 1,573 E 1,522	3,440
SW., SW. ¼ NE. ¼ sec. 17	215	Continental Oil Co. O'Haire No. 1.	Apr. 25, 1924	do	do	T 1,634 E 1,628	3,372
SW., SW. ¼ NW. ¼ sec. 17	284	Ohio-Sunburst. Thornton No. 2.	Nov. 28, 1922	20	do	T 1,686 E 1,655	3,380
NW., NW. ¼ SW. ¼ sec. 17	263	Ohio-Sunburst. Larson No. 1.	Dec. 10, 1922	250	Ellis	T 1,648 E 1,648	3,390
W., NW. ¼ SW. ¼ sec. 17	264	Ohio-Sunburst. Larson No. 2.	Apr. 18, 1923	40	do	T 1,638 E 1,638	3,393
SE., NW. ¼ SW. ¼ sec. 17	265	Ohio-Sunburst. Larson No. 3.	Sept. 19, 1923	Show, Ellis	Madison	T 1,581 E 1,577	3,343
SW., SE. ¼ SW. ¼ sec. 17	195	Montana-Giant Petroleum Co. Larson No. 1.	July 25, 1923	do	do	T 1,593 E 1,566	3,339
NE., SW. ¼ SE. ¼ sec. 17	544	Continental Oil Co. O'Haire No. 2.	July 28, 1925	Dry	do	T 1,690 E 1,643 K 1,150	3,418
SE., SE. ¼ NE. ¼ sec. 18	282	Ohio Oil Co. Thornton No. 1.	Mar. 7, 1923	do	Ellis	T 1,636 E 1,636	3,378
SW., NE. ¼ NW. ¼ sec. 18	494	McDonald et al. Singer No. 1.	June 20, 1925	Show, Ellis	Madison	T 1,745 E 1,670 S 1,435	3,442
NE., NE. ¼ SE. ¼ sec. 18	285	Oil Producers' Syndicate. Larson No. 1.	Aug. 24, 1922	276, Ellis	Ellis	T 1,645 E 1,641	3,387
E., NE. ¼ SE. ¼ sec. 18	443	Oil Producers' Syndicate. Larson No. 2.	June 10, 1925	60, Ellis	do	T 1,638 E 1,638	3,394
C., NE. ¼ NW. ¼ sec. 19	116	Fulton Oil Co. Gunderson No. 1.	Mar. 7, 1923	Dry	Madison	T. 1,632 E. 1,625 S 1,358	3,374
SW.,SW. ¼ SW. ¼ sec. 19	175	Metzembaum Syndicate. Seabrook No. 1.	May 16, 1924	40, Ellis	do	T 1,595 E 1,551	3,357
NE., NE. ¼ SE. ¼ sec. 19	1,336	Dakota-Dubuque Oil Co. Nelson No. 1.	Aug. 14, 1927	Dry	do	T 1,612 E 1,535	3,340
SE., SE. ¼ SE. ¼ sec. 19	350	Sunburst Oil Co. Pike No. 1.	June 21, 1923	do	Ellis	T 1,528 E 1,528 S 1,280	3,348

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
C., NE. ¼ NE. ¼ sec. 20	159	Kevin-Roberts Halter No. 1.	Aug. 6, 1923	Show, Ellis	Madison	T 1,570 E 1,490? S 1,400?	3,392
NE., NW. ¼ NW. ¼ sec. 20	198	Montana-Sweetgrass McDonald No. 1.	Apr. 7, 1923	35, Ellis	Ellis	T 1,607 E 1,607	3,350
NE., SW. ¼ NW. ¼ sec. 20	214	Continental Nelson No. 2.	June 25, 1924	Show	Madison	T 1,610 E 1,575	3,349
SW., NE. ¼ SW. ¼ sec. 20	343	Sunburst Halter No. 2.	July 2, 1923	Dry	do	T 1,577 E 1,547 S 1,400?	3,338
SE., NW. ¼ SW. ¼ sec. 20	213	Continental Oil Co Nelson No. 1.	June 29, 1923	Show	do	T 1,534 E 1,527	3,336
NE., SW. ¼ SW. ¼ sec. 20	70	Canadian-American Oil Co McBride No. 1.	May 1, 1923	75, Ellis	do	T 1,524 E 1,519 K 1,040	3,337
W., SW. ¼ SW. ¼ sec. 20	71	Canadian-American Oil Co McBride No. 2.	Oct. 15, 1923	170, Ellis	Ellis	T 1,511 E 1,511 S 1,325	3,358
NW., SE. ¼ SW. ¼ sec. 20	342	Sunburst Halter No. 1.	June 9, 1923	Dry	Madison	T 1,555 E 1,520	3,337
NE., NE. ¼ NE. ¼ sec. 21	453	Texas-Pacific Coal & Oil Co Pewters No. 5.	May 26, 1925	20, Ellis	Ellis	T 1,516 E 1,516	3,423
SE., NE. ¼ NE. ¼ sec. 21	517	Texas Pacific Coal & Oil Co Pewters No. 6.	July 11, 1925	1 M., Sunburst Show, Ellis.	Madison	T 1,500 E 1,470 S 1,245	3,402
SW., NW. ¼ NE. ¼ sec. 21	152	International Halter No. 1.	Aug. 1, 1923	205, Ellis	Ellis	T 1,512 E 1,512 S 1,280?	3,376
SE., NW. ¼ NE. ¼ sec. 21	361	Sweetgrass Halter No. 1.	June 6, 1923	Dry	Madison	T 1,527 E 1,504	3,394
NW., SW. ¼ NE. ¼ sec. 21	139	Homestake Pewters No. 3.	Sept. 10, 1923	Show, Sunburst	do	T 1,530 E 1,500? S 1,270	3,359
SW., SW. ¼ NE. ¼ sec. 21	1,303	Texas Pacific Coal & Oil Co Pewters No. 8.	June 28, 1927	100, Ellis	Ellis	T 1,490 E 1,490	3,382
S., SW. ¼ NE. ¼ sec. 21	1,379	Texas Pacific Coal & Oil Co Pewters No. 9.	Aug. 3, 1927	Dry	Madison	T 1,547 E 1,494	3,393
NE., SE. ¼ NE. ¼ sec. 21	206	Continental Oil Co Helmerichs No. 3.	June 22, 1923	38, Ellis	do	T 1,449 E 1,438 S 1,185	3,376
SE., NE. ¼ NW. ¼ sec. 21	203	Continental Oil Co Halter No. 1.	Sept. 8, 1923	Show, Ellis	do	T 1,544 E 1,535 S 1,265	3,366

NE., SE. ¼ NW. ¼ sec. 21	131	L. W. Hill Halter No. 1.	Aug. 1, 1923	25, Ellis	Ellis	T 1,492 E 1,492 S 1,230	3,355
SE., SE. ¼ NW. ¼ sec. 21	649	L. W. Hill Halter No. 2.	Sept. 3, 1925	20, Ellis	Madison	T 1,490 E 1,480 S 1,255 K 930	3,379
E., SE. ¼ NW. ¼ sec. 21	676	L. W. Hill Halter No. 3.	Oct. 8, 1925	Show gas, Ellis	do	T 1,490 E 1,470 S 1,250 K 930	3,356
S., SE. ¼ NW. ¼ sec. 21	1375	L. W. Hill Halter No. 6.	Aug. 4, 1927	Dry	do	T 1,570 E 1,480	3,383
S., NE. ¼ SW. ¼ sec. 21	831	L. W. Hill McManus No. 5.	May 11, 1927	53, Ellis	do	T 1,510 E 1,484	3,394
SE., SE. ¼ SW. ¼ sec. 21	1306	L. W. Hill McManus No. 6.	June 23, 1927	25, Ellis	do	T 1,555 E 1,452	3,403
S., NE. ¼ SE. ¼ sec. 21	703	L. W. Hill McManus No. 2.	Nov. 20, 1925	Show, Ellis	do	T 1,475 E 1,455 S 1,250	3,421
NE., NW. ¼ SE. ¼ sec. 21	133	L. W. Hill McManus No. 1.	Aug. 11, 1923	Dry	do	T 1,520 E 1,495 S 1,275	3,402
NW., NW. ¼ SE. ¼ sec. 21	1207	L. W. Hill McManus No. 4.	Apr. 4, 1927	do	do	T 1,543 E 1,502	3,393
NE., SW. ¼ SE. ¼ sec. 21	1413	Hesla-Sunburst Oil Co McManus No. 4.	Sept. 6, 1927	do	do	T 1,610 E 1,465	3,421
SW., SW. ¼ SE. ¼ sec. 21	1485	Hesla-Sunburst Oil Co McManus No. 5.	Oct. 4, 1927	do	do	T 1,515 E 1,485	3,403
S., SE. ¼ SE. ¼ sec. 21	130	Hesla-Sunburst Oil Co McManus No. 3.	June 20, 1925	Show, Ellis	do	T 1,473 E 1,455 S 1,205	3,438
SE., SE. ¼ SE. ¼ sec. 21	128	Hesla-Sunburst Oil Co McManus No. 1.	July 10, 1923	135, Ellis	Ellis	T 1,450 E 1,450 S 1,220	3,435
E., SE. ¼ SE. ¼ sec. 21	129	Hesla-Sunburst Oil Co McManus No. 2.	Apr. 26, 1924	60, Ellis	do	T 1,452 E 1,452 S 1,228	3,435
SW., NW. ¼ NE. ¼ sec. 22	57	California Oil Co M. M. Neuman No. 2.	July 3, 1923	125, Sunburst Ellis	Madison	T 1,484 E 1,475 S 1,270 K 910	3,461
C., SE. ¼ NE. ¼ sec. 22	628	California Oil Co M. M. Neuman No. 4.	Oct. 11, 1925	20, Ellis	do	T 1,461 E 1,430 S 1,210	3,454
SE., NE. ¼ NW. ¼ sec. 22	140	Texas Pacific Coal & Oil Co Pewters No. 4.	Oct. 1, 1923	31, Ellis	Ellis	T 1,464 E 1,462 S 1,240	3,421
NW., NW. ¼ NW. ¼ sec. 22	602	Texas Pacific Coal & Oil Co Pewters No. 7.	Aug. 18, 1925	20, Ellis	do	T 1,470 E 1,470 S 1,230	3,387

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
N., NW. ¼ NW. ¼ sec. 22	138	Texas Pacific Coal & Oil Co. Pewters No. 2.	Aug. 20, 1923	2, Ellis	Madison	T 1,492 E 1,481 S 1,265	3,431
SE., NW. ¼ NW. ¼ sec. 22	137	Texas Pacific Coal & Oil Co. Pewters No. 1.	Mar. 15, 1923	35, Ellis	do	T 1,496 E 1,478	3,410
NE., SW. ¼ NW. ¼ sec. 22	204	Continental Oil Co. Helmerichs No. 1.	Oct. 25, 1922	500, Ellis	Ellis	T 1,440 E 1,440 S 1,160	3,398
N., SW. ¼ NW. ¼ sec. 22	825	Continental Oil Co. Helmerichs No. 8.	May 9, 1926	Dry	Madison	T 1,470 E 1,433 S 1,225	3,379
SE., SW. ¼ NW. ¼ sec. 22	207	Continental Oil Co. Helmerichs No. 4.	Aug. 17, 1923	96, Ellis	Ellis	T 1,408 E 1,404 S 1,140	3,378
NE., SE. ¼ NW. ¼ sec. 22	208	Continental Oil Co. Helmerichs No. 5.	Aug. 4, 1923	15, Ellis	Madison	T 1,455 E 1,449 S 1,230	3,434
NW., SE. ¼ NW. ¼ sec. 22	209	Continental Oil Co. Helmerichs No. 6.	Sept. 2, 1923	10, Ellis	do	T 1,452 E 1,447 S 1,220	3,407
SW., SE. ¼ NW. ¼ sec. 22	205	Continental Oil Co. Helmerichs No. 2.	Mar. 26, 1923	75, Ellis	Ellis	T 1,410 E 1,408	3,381
S., SE. ¼ NW. ¼ sec. 22	210	Continental Oil Co. Helmerichs No. 7.	June 19, 1924	25, Ellis	do	T 1,392 E 1,392 S 1,150	3,381
N., NE. ¼ SW. ¼ sec. 22	58	California Oil Co. M. M. Neuman No. 3.	May 25, 1924	do	Madison	T 1,417 E 1,406 S 1,170	3,391
NW., NE. ¼ SW. ¼ sec. 22	56	California Oil Co. M. M. Neuman No. 1.	Apr. 1, 1923	100, Ellis	Ellis	T 1,409 E 1,409 S 1,120 K 814	3,390
NE., NW. ¼ SW. ¼ sec. 22	132	L. W. Hill Lorenson No. 1.	June 19, 1923	40, Ellis	do	T 1,390 E 1,390 S 1,210	3,393
W., SW. ¼ SW. ¼ sec. 22	473	L. W. Hill Lorenson No. 3.	May 19, 1925	15, Ellis	Madison	T 1,466 E 1,448	3,434
SW., SW. ¼ SW. ¼ sec. 22	442	L. W. Hill Lorenson No. 2.	Apr. 26, 1925	125, Ellis	Ellis	T 1,451 E 1,451 S 1,205	3,438

S., SW. ¼ SW. ¼ sec. 22	698	L. W. Hill Lorenson No. 5.	Oct. 14, 1925	250, Ellis	do	T 1,477 E 1,477 S 1,220	3,443
SE., SW. ¼ SW. ¼ sec. 22	592	L. W. Hill Lorenson No. 4.	Sept. 20, 1925	20, Ellis	do	T 1,457 E 1,445 S 1,203	3,441
SW., SE. ¼ SW. ¼ sec. 22	718	L. W. Hill Lorenson No. 6.	Nov. 7, 1925	68, Ellis	do	T 1,466 E 1,460 S 1,225	3,450
SE., SE. ¼ SW. ¼ sec. 22	726	L. W. Hill Lorenson No. 7.	Nov. 13, 1925	Dry	Madison	T 1,457 E 1,442 S 1,210 K 975	3,450
SW., SW. ¼ SE. ¼ sec. 22	481	Hill & O'Neil Lorenson No. 1.	Aug. 7, 1925	1 M, Sunburst 98, Ellis.	Ellis	T 1,468 E 1,468 S 1,238	3,430
W., SE. ¼ SE. ¼ sec. 22	1433	California Oil Co. Neuman No. 8.	Sept. 11, 1927	13, Madison	Madison	T 1,600 E 1,423	3,464
NW., NE. ¼ NE. ¼ sec. 23	353	Sunburst Oil Co. Zimmerman No. 2.	May 17, 1923	15, Ellis	do	T 1,560 E 1,492	3,475
C., NE. ¼ NE. ¼ sec. 23	352	Sunburst Oil Co. Zimmerman No. 1.	Sept. 30, 1922	30, Ellis	Ellis	T 1,538 E 1,538 S 1,305	3,496
C., SE. ¼ NE. ¼ sec. 23	390	Wells-Sunburst Zimmerman No. 1.	May 26, 1923	1½ M, Ellis	Madison	T 1,560 E 1,492 S 1,250	3,491
SE., NE. ¼ NW. ¼ sec. 23	1165	Ohio Sunburst Reeg No. 6.	May 15, 1927	Dry	do	T 1,464 E 1,393	3,450
SW., NW. ¼ NW. ¼ sec. 23	895	Ohio Oil Co. Reeg No. 3.	July 6, 1926	40, Ellis	Ellis	T 1,464 E 1,464 S 1,250	3,475
NW., SE. ¼ NW. ¼ sec. 23	1228	Texas Pacific Coal & Oil Co. Pewters Permit "B" No. 3.	May 24, 1927	1½ M, Ellis	Madison	T 1,382 E 1,379	3,431
C., NE. ¼ SW. ¼ sec. 23	629	California Oil Co. J. J. Neuman No. 2.	Sept. 1, 1925	1 M, Sunburst Show, Ellis.	do	T 1,502 E 1,460 S 1,213 K 842	3,461
C., NE. ¼ SE. ¼ sec. 23	39	Buffalo-Sunburst Oil Co. Zimmerman No. 2.	July 5, 1923	15, Ellis	Ellis	T 1,458 E 1,458	3,481
SW., SW. ¼ SE. ¼ sec. 23	55	California Oil Co. J. J. Neuman No. 1.	Nov. 16, 1922	25, Sunburst	Madison	T 1,521 E 1,517 S 1,225 K 900	3,451
NE., SW. ¼ NE. ¼ sec. 24	899	Clara Oil Co. Wait No. 4.	June —, 1926	10, Ellis	do	T 1,602 E 1,506 S 1,300	3,498
NW., SW. ¼ NE. ¼ sec. 24	384	Clara Oil Co. Wait No. 2.	July 6, 1923	40, Ellis	Ellis	T 1,506 E 1,502 S 1,290	3,496
W., SW. ¼ NE. ¼ sec. 24	939	Clara Oil Co. Wait No. 5.	July 20, 1926	20, Ellis	do	T 1,513 E 1,513 S 1,265	3,493

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
SW., SW. ¼ NE. ¼ sec. 24	383	Clara Oil Co. Wait No. 1.	Nov. 17, 1922	52, Ellis	Madison	T 1,513 E 1,495 S 1,275	3,494
S., SW. ¼ NE. ¼ sec. 24	843	Clara Oil Co. Wait No. 3.	May 18, 1926	Show, Ellis	do	T 1,527 E 1,505 S 1,250	3,498
NW., NE. ¼ NW. ¼ sec. 24	334	Spartan-Montana Oil Co. Zimmerman No. 1.	June 9, 1923	3, Ellis	do	T 1,524 E 1,509	3,516
NE., SW. ¼ NW. ¼ sec. 24	391	Wells-Sunburst Oil Co. Zimmerman No. 2.	June 30, 1924	20, Ellis	Ellis	T 1,518 E 1,510	3,503
NW., SE. ¼ NW. ¼ sec. 24	82	Coeur d'Alene Oil Syndicate Hagerty No. 2.	Apr. 27, 1925	Show, Ellis	Madison	T 1,553 E 1,509 S 1,302	3,506
SE., SE. ¼ NW. ¼ sec. 24	37	Bradley and Bradley Hagerty No. 1.	June 20, 1923	15, Ellis	Ellis	T 1,512 E 1,507	3,499
SE., NE. ¼ SW. ¼ sec. 24	81	Coeur d'Alene Oil Syndicate Hagerty No. 1.	Oct. 29, 1923	35, Ellis	do	T 1,514 E 1,514 S 1,250	3,498
NE., NW. ¼ SW. ¼ sec. 24	38	Buffalo Sunburst Oil Co. Zimmerman No. 1.	May 1, 1923	25, Ellis	do	T 1,499 E 1,499	3,485
NE., SE. ¼ SW. ¼ sec. 24	283	Ellis Oil Co. Byrne No. 1.	Dec. 11, 1924	50, Ellis	do	T 1,503 E 1,496 S 1,300	3,492
NW., SE. ¼ SW. ¼ sec. 24	1244	Hardrock Oil Co. Byrne No. 4.	May 10, 1927	Dry	Madison	T 1,710 E 1,530	3,497
S., SE. ¼ SW. ¼ sec. 24	745	Ellis Oil Co. Byrne No. 2.	Dec. 18, 1925	100, Ellis	Ellis	T 1,517 E 1,517 S 1,304 K 1,080	3,502
SE., SE. ¼ SW. ¼ sec. 24	814	Ellis Oil Co. Byrne No. 3.	May 6, 1926	Show, Ellis	Madison	T 1,520 E 1,510 S 1,300	3,505
SE., SE. ¼ SW. ¼ sec. 24	1312	Hardrock Oil Co. Byrne No. 3A.	June 6, 1927	45, Ellis	do	T 1,519 E 1,517	3,503
NW., NW. ¼ SE. ¼ sec. 24	48	California Co. McKee No. 1.	Apr. 6, 1923	100, Ellis	do	T 1,530 E 1,526 S 1,300 K 980	3,495
SW., SW. ¼ SE. ¼ sec. 24	1501	California Co. McKee No. 9.	Nov. 5, 1927	34, Ellis	do	T 1,582 E 1,522	3,506
SE., SE. ¼ SE. ¼ sec. 24	1297	California Petroleum Corporation McKee No. 3.	June 9, 1927	11, Ellis	do	T 1,585 E 1,490	2,498

E., SE. ¼ SE. ¼ sec. 24	1268	California Petroleum Corporation McKee No. 2.	May 25, 1927	Dry	do	T 1,528 E 1,498	3,498
SE., NE. ¼ NE. ¼ sec. 25	1491	California Petroleum Corporation McKee No. 5.	Oct. 8, 1927	Dry, Ellis	do	T 1,576 E 1,497	3,497
E., NE. ¼ NE. ¼ sec. 25	1401	California Petroleum Corporation McKee No. 4.	Aug. 8, 1927	Dry	do	T 1,570 E 1,490	3,493
NE., SW. ¼ NE. ¼ sec. 25	1347	California Co. McKee No. 8.	July 12, 1927	15	do	T 1,642 E 1,495	3,501
S., SW. ¼ NE. ¼ sec. 25	50	California Co. McKee No. 3.	June 27, 1924	1½ M, Sunburst 180, Ellis.	Ellis	T 1,501 E 1,501 S 1,260 K 900	3,500
SE., SW. ¼ NE. ¼ sec. 25	49	California Co. McKee No. 2.	Oct. 1, 1923	60, Ellis	do	T 1,518 E 1,518 S 1,270 K 890	3,512
E., SW. ¼ NE. ¼ sec. 25	51	California Co. McKee No. 4.	Aug. 23, 1924	50, Ellis	do	T 1,514 E 1,514 S 1,273 K 930	3,505
C., SW. ¼ NE. ¼ sec. 25	541	California Co. McKee No. 5.	Aug. 10, 1925	do	do	T 1,502 E 1,502 S 1,260	3,501
W., SE. ¼ NE. ¼ sec. 25	11	B. C. Montana Oil Co. Stannard No. 3.	June 22, 1924	60, Ellis	do	T 1,475 E 1,475 S 1,280	3,499
SW., SE. ¼ NE. ¼ sec. 25	10	B. C. Montana Oil Co. Stannard No. 2.	July 17, 1923	1 M, Sunburst 50, Ellis.	do	T 1,490 E 1,490	3,507
SE., SE. ¼ NE. ¼ sec. 25	9	B. C. Montana Oil Co. Stannard No. 1.	June 6, 1923	40, Ellis	do	T 1,475 E 1,475 S 1,250 K 935	3,498
NE., NE. ¼ NW. ¼ sec. 25	787	Ferdig Oil Co. Byrne No. 4.	Mar. 6, 1926	100, Ellis	do	T 1,514 E 1,514 S 1,270	3,497
N., NE. ¼ NW. ¼ sec. 25	777	Ferdig Oil Co. Byrne No. 3.	Feb. 3, 1926	10, Ellis	Madison	T 1,504 E 1,491 S 1,260	3,504
SW., SW. ¼ NW. ¼ sec. 25	861	Dominion Oil Co. Byrne No. 2.	May 21, 1926	Dry	do	T 1,515 E 1,485 S 1,275	
NE., SE. ¼ NW. ¼ sec. 25	767	Ferdig Oil Co. Byrne No. 2.	Jan. 14, 1926	Show	Ellis	T 1,525 E 1,525 S 1,287	3,491
E., SE. ¼ NW. ¼ sec. 25	725	Ferdig Oil Co. Byrne No. 1.	Nov. 20, 1925	70 Ellis	do	T 1,512 E 1,512	3,483
NW. NE. ¼ SW. ¼ sec. 25	8	Wilson et al. Byrne No. 1.	Oct. 7, 1923	1 M, Sunburst	do	T 1,483 E 1,483 S 1,280 K 925	3,480

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Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
E., NE. ¼ SW. ¼ sec. 25	728	Wilson et al. Byrne No. 2.	Dec. 29, 1925	75, Ellis	Madison(?)	T 1,502 E 1,474 S 1,258	3,491
E., NW. ¼ SW. ¼ sec. 25	1176	Kobes-Howe-McCormick Byrne No. 2.	May 5, 1927	10, Sunburst	Ellis	T 1,542 E 1,538 S 1,295	3,481
SW., SW. ¼ SW. ¼ sec. 25	313	Rochester-Anoka Abell No. 3.	Aug. 6, 1924	2 M, Sunburst 56, Ellis.	do	T 1,448 E 1,448 S 1,225	3,455
S., SW. ¼ SW. ¼ sec. 25	567	Rochester-Anoka Abell No. 4.	July 30, 1925	Show, Ellis	Madison	T 1,492 E 1,448 S 1,210 K 985	3,455
NE., SE. ¼ SW. ¼ sec. 25	309	Rochester-Anoka Abell No. 1.	Oct. 23, 1923	25, Ellis	Ellis	T 1,459 E 1,459 S 1,240	3,489
E., SE. ¼ SW. ¼ sec. 25	310	Rochester-Anoka Abell No. 2.	Mar. 14, 1924	Dry	Madison	T 1,502 E 1,495 S 1,275	3,489
NE., NE. ¼ SE. ¼ sec. 25	1248	California Petroleum Corporation McKee No. 1.	May 26, 1927	15, Ellis	do	T 1,526 E 1,496	3,493
NW., NE. ¼ SE. ¼ sec. 25	19	B. C. Montana-Beaver Stannard No. 1.	Sept. 5, 1923	30, Ellis	Ellis	T 1,515 E 1,474 S 1,257	3,495
NE., NW. ¼ SE. ¼ sec. 25	411	Wyomont Oil Co Stannard No. 1.	Aug. 13, 1923	85, Ellis	do	T 1,470 E 1,470 S 1,258	3,501
N., NW. ¼ SE. ¼ sec. 25	413	Wyomont Oil Co Stannard No. 3.	May 18, 1924	60, Ellis	Madison	T 1,500 E 1,474 S 1,240	3,495
SW., NW. ¼ SE. ¼ sec. 25	617	Wyomont Oil Co Stannard No. 6.	Sept. 6, 1925	25, Ellis	Ellis	T 1,472 E 1,462 S 1,235 K 920	3,489
E., NW. ¼ SE. ¼ sec. 25	412	Wyomont Oil Co Stannard No. 2.	Oct. 18, 1923	90, Ellis	Madison	T 1,455 E 1,450 S 1,273	3,497
C., NW. ¼ SE. ¼ sec. 25	414	Wyomont Oil Co Stannard No. 4.	Aug. 21, 1924	40, Ellis	Ellis	T 1,498 E 1,498	3,499
NW., SW. ¼ SE. ¼ sec. 25	833	Wyomont Oil Co Stannard No. 8.	June 5, 1926	25, Ellis	Madison	T 1,495 E 1,465 S 1,230	3,496

SE., SW. ¼ SE. ¼ sec. 25	468	Wyomont Oil Co Stannard No. 5.	June 16, 1925	2 M, Sunburst 25, Ellis.	Ellis	T 1,500 E 1,500 S 1,210	3,499
S., SE. ¼ SE. ¼ sec. 25	759	B. C. Montana Oil Co Stannard No. 5.	Dec. 27, 1925	20, Ellis	do	T 1,490 E 1,490 S 1,230	3,500
SE., SE. ¼ SE. ¼ sec. 25	711	B. C. Montana Oil Co Stannard No. 4.	Dec. 11, 1925	80, Ellis	Madison	T 1,750 E 1,453 S 1,230 K 885	3,504
SW., SW. ¼ NE. ¼ sec. 26	584	Hardrock Oil Co Abell No. 1.	Aug. 22, 1925	½ M, Sunburst 10, Ellis.	Ellis	T 1,478 E 1,478 S 1,240 K 905	3,446
C., NW. ¼ NE. ¼ sec. 26	1189	Hardrock Oil Co Abell No. 5.	Apr. 5, 1927	120, Sunburst	Kootenai	T 1,320 S 1,307	3,441
NE., NE. ¼ NW. ¼ sec. 26	1204	California Co Abell No. 10.	Apr. 30, 1927	Dry	Madison	T 1,598 E 1,422	3,445
NE., NW. ¼ NW. ¼ sec. 26	41	California Co Abell No. 2.	June 14, 1923	8½ M, Ellis	do	T 1,685 E 1,453 S 1,288	3,460
S., SE. ¼ NW. ¼ sec. 26	627	California Co Abell No. 5.	Nov. 8, 1925	Show, Ellis	do	T 1,515 E 1,450 S 1,243	3,462
N., NE. ¼ SW. ¼ sec. 26	518	California Co Abell No. 3.	July 7, 1925	350, Ellis	Ellis	T 1,458 E 1,458 S 1,238	3,456
NW., NE. ¼ SW. ¼ sec. 26	604	California Co Abell No. 4.	Sept. 15, 1925	¼ M, Sunburst 5, Ellis.	Madison	T 1,481 E 1,449 S 1,248 K 920	3,463
E., NE. ¼ SW. ¼ sec. 26	40	California Co Abell No. 1.	Aug. 16, 1922	50, Ellis	Ellis	T 1,489 E 1,489 S 1,270	3,467
SW., SW. ¼ SW. ¼ sec. 26	852	California Co Abell No. 6.	May 25, 1926	Oil, Ellis	Madison	T 1,565 E 1,520 S 1,265	3,453
SE., SE. ¼ SW. ¼ sec. 26	1278	California Co Abell No. 11.	June 5, 1927	Dry	do	T 1,600 E 1,483	3,461
W., SW. ¼ SE. ¼ sec. 26	135	Texas Pacific Coal & Oil Co Abell No. 1.	July 7, 1923	2 M, Sunburst [bb]	do	T 1,517 E 1,514	3,480
SE., SE. ¼ SE. ¼ sec. 26	136	Texas Pacific Coal & Oil Co Abell No. 2.	May 17, 1924	do 25, Ellis.	Ellis	T 1,478 E 1,478 S 1,242	3,463
NE., NW. ¼ NE. ¼ sec. 27	1454	Bi-State Oil Co Lorenson No. 1.	Sept. 11, 1927	½ M, Sunburst 20, Ellis.	Madison	T 1,571 E 1,435	3,462
NW., NW. ¼ NE. ¼ sec. 27	381	Waconia-Sunburst Oil Co Lorenson No. 1.	July 23, 1923	100, Ellis	Ellis	T 1,490 E 1,490 S 1,270	3,445

[bb] Gas at 1,250 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
W., NW. ¼ NE. ¼ sec. 27	765	Sunburst Oil Co. Lorenson No. 4.	Jan. 21, 1926	70, Ellis	Ellis	T 1,509 E 1,503 S 1,268	3,460
SW., NW. ¼ NE. ¼ sec. 27	789	Sunburst Oil & Refining Co. Lorenson No. 6.	Apr. 2, 1926	1 M, Sunburst	Madison	T 1,515 E 1,482 S 1,259	3,459
SE., SW. ¼ NE. ¼ sec. 27	1417	California Co. Smoke No. 8.	Aug. 21, 1927	Dry, Ellis	do	T 1,610 E 1,477	3,467
NE., NE. ¼ NW. ¼ sec. 27	382	Waconia-Sunburst Oil Co. Lorenson No. 2.	June 2, 1924	Show, Ellis	do	T 1,515 E 1,448 S 1,240	3,452
NW., NE. ¼ NW. ¼ sec. 27	733	Sunburst Oil Co. Lorenson No. 3.	Dec. 5, 1925	40, Ellis	Ellis	T 1,478 E 1,461 S 1,227 K 990	3,451
SE., NE. ¼ NW. ¼ sec. 27	778	Sunburst Oil Co. Lorenson No. 5.	Feb. 22, 1926	1 M, Sunburst 40, Ellis.	Madison	T 1,590 E 1,459 S 1,230	3,462
NE., NW. ¼ NW. ¼ sec. 27	593	California Co. Smoke No. 3.	Aug. 12, 1925	100, Ellis	Ellis	T 1,461 E 1,461 S 1,220	3,447
N., NW. ¼ NW. ¼ sec. 27	740	California Co. Smoke No. 4.	Dec. 22, 1925	125, Ellis	Madison	T 1,481 E 1,442 S 1,214	3,442
NW., NW. ¼ NW. ¼ sec. 27	486	California Co. Smoke No. 2.	June 12, 1925	40, Ellis	do	T 1,471 E 1,461 S 1,245	3,438
SW., SW. ¼ NW. ¼ sec. 27	59	California Co. Smoke No. 1.	Nov. 20, 1922	25, Ellis	Ellis	T 1,450 E 1,405 K 840	3,424
E., NE. ¼ SE. ¼ sec. 27	1173	California Petroleum Corporation Lashbaugh No. 12.	Feb. 15, 1927	Dry	Madison	T 1,480 E 1,460	3,469
C., NE. ¼ SE. ¼ sec. 27	1299	California Petroleum Corporation Lashbaugh No. 16.	June 21, 1927	do	do	T 1,664 E 1,485	3,468
SE., NW. ¼ SE. ¼ sec. 27	582	Wilson & West Lashbaugh No. 1.	Aug. 15, 1925	do	Ellis	T 1,475 E 1,475 S 1,224	3,467
SE., SW. ¼ SE. ¼ sec. 27	813	Swift Current Oil Co. Lashbaugh No. 1.	Apr. 10, 1926	½ M, Sunburst 35, Ellis.	Madison	T 1,496 E 1,458 S 1,237	3,469
NW., SE. ¼ SE. ¼ sec. 27	1178	California Petroleum Corporation Lashbaugh No. 14.	Feb. 6, 1927	Dry	do	T 1,616 E 1,427	3,449

W., SE. ¼ SE. ¼ sec. 27	1028	California Petroleum Corporation Lashbaugh No. 5.	Sept. 13, 1926	Show, Ellis [ee] 3,000, Madison.	do	T 1,517 E 1,434 S 1,220 K 1,130	3,454
SW., SE. ¼ SE. ¼ sec. 27	849	California Petroleum Corporation Lashbaugh No. 1.	May 15, 1926	1 M, Sunburst 2,000, Ellis.	Ellis	T 1,491 E 1,450 S 1,190	3,466
S., SE. ¼ SE. ¼ sec. 27	896	California Petroleum Corporation Lashbaugh No. 2.	July 9, 1926	240, Ellis	Madison	T 1,488 E 1,444 S 1,225	3,461
SE., SE. ¼ SE. ¼ sec. 27	897	California Petroleum Corporation Lashbaugh No. 3.	June 17, 1926	200, Ellis	do	T 1,500 E 1,465 S 1,249	3,451
E., SE. ¼ SE. ¼ sec. 27	908	Swift Current Oil Co. Lashbaugh No. 2.	Aug. 9, 1926	325, Ellis	Ellis	T 1,447 E 1,447 S 1,220	3,463?
E., SE. ¼ SE. ¼ sec. 27	1174	California Petroleum Corporation Lashbaugh No. 13.	Feb. 1, 1927	Dry	Madison	T 1,510 E 1,475	3,451
NE., NE. ¼ NE. ¼ sec. 28	46	California Co. Lorenson No. 1.	Apr. 21, 1923	30, Ellis	do	T 1,473 E 1,435 S 1,220 K 960	3,438
N., NE. ¼ NE. ¼ sec. 28	441	California Co. Lorenson No. 2.	May 20, 1925	15, Ellis	Ellis	T 1,463 E 1,463 S 1,217	3,439
SW., NW. ¼ NE. ¼ sec. 28	1203	California Co. Lorenson No. 6.	Apr. 4, 1927	25, Ellis	Madison	T 1,600 E 1,457	3,419
S., NW. ¼ NE. ¼ sec. 28	1219	California Co. Lorenson No. 7.	Apr. 23, 1927	150, Ellis	Ellis	T 1,435 E 1,435	3,415
SE., NW. ¼ NE. ¼ sec. 28	1225	California Co. Lorenson No. 9.	Apr. 16, 1927	5, Madison	Madison	T 1,600 E 1,439	3,420
NE., SW. ¼ NE. ¼ sec. 28	1223	California Petroleum Corporation Moe No. 6.	Apr. 28, 1927	Dry	do	T 1,477 E 1,416	3,413
N., SW. ¼ NE. ¼ sec. 28	1195	California Petroleum Corporation Moe No. 4.	Mar. 22, 1927	400, Ellis	do	T 1,429 E 1,425	3,415
NW., SW. ¼ NE. ¼ sec. 28	1187	California Petroleum Corporation Moe No. 3.	Feb. 24, 1927	237, Ellis	Ellis	T 1,456 E 1,456	3,417
W., SW. ¼ NE. ¼ sec. 28	1113	California Petroleum Corporation Moe No. 5.	Apr. 4, 1927	Dry	Madison	T 1,530 E 1,470	3,416
S., SW. ¼ NE. ¼ sec. 28	1295	California Petroleum Corporation Moe No. 12.	July 26, 1927	100, Ellis	do	T 1,455 E 1,450	3,420
SE., SW. ¼ NE. ¼ sec. 28	1264	California Petroleum Corporation Moe No. 8.	July 1, 1927	220, Ellis	do	T 1,440 E 1,434	3,418
C., SW. ¼ NE. ¼ sec. 28	1236	California Petroleum Corporation Moe No. 7.	Apr. 27, 1927	Dry	do	T 1,511 E 1,453	3,417
SW., SE. ¼ NE. ¼ sec. 28	1311	California Co. Lorenson No. 11.	June 26, 1927	do	do	T 1,604 E 1,421	3,414
NE., NE. ¼ NW. ¼ sec. 28	1372	California Petroleum Corporation Moe No. 13.	July 27, 1927	do	do	T 1,550 E 1,443	3,411
NW., NW. ¼ NW. ¼ sec. 28	1266	California Petroleum Corporation Moe No. 10.	May 20, 1927	do	do	T 1,567 E 1,516	3,420

[ee] Madison oil at 1,517 feet, 83 feet below top of Madison limestone.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
NE., SE. ¼ NW. ¼ sec. 28	1265	California Petroleum Corporation Moe No. 9.	May 12, 1927	Dry	Madison	T 1,592 E 1,472	3,419
SE., NE. ¼ SW. ¼ sec. 28	1084	California Petroleum Corporation Moe No. 2.	Jan. 12, 1927	115, Ellis	do	T 1,515 E 1,462	3,418
E., NE. ¼ SW. ¼ sec. 28	1294	California Petroleum Corporation Moe No. 11.	July 6, 1927	Dry	do	T 1,600 E 1,470	3,419
SE., NW. ¼ SW. ¼ sec. 28	1415	California Petroleum Corporation Moe No. 14.	Aug. 20, 1927	416, Ellis	Ellis	T 1,475 E 1,475	3,417
SE., SW. ¼ SW. ¼ sec. 28	526	Western Petroleum Exploration Co Moe No. 1.	Sept. 20, 1925	Show, Ellis	do	T 1,501 E 1,476 S 1,230 K 895	3,434
NE., SE. ¼ SW. ¼ sec. 28	1234	Hill-O'Neil Co Lorenson No. 7.	Apr. 30, 1927	Dry	Madison	T 1,487 E 1,459	3,422
NW., SE. ¼ SW. ¼ sec. 28	1532	Hill-O'Neil Co Lorenson No. 18.	Jan. 11, 1928	do	do	T 1,533 E 1,485	----------
SE., SE. ¼ SW. ¼ sec. 28	1416	Hill-O'Neil Co Lorenson No. 16.	Aug. 20, 1927	½ M, Sunburst 35, Ellis.	do	T 1,487 E 1,476	3,445
NW., NE. ¼ SE. ¼ sec. 28	1340	California Co Lorenson No. 14.	July 14, 1927	Dry	do	T 1,747 E 1,440	3,427
W., NE. ¼ SE. ¼ sec. 28	1360	California Co Lorenson No. 15.	July 28, 1927	do	do	T 1,645 E 1,445	3,433
SW., NE. ¼ SE. ¼ sec. 28	1316	California Co Lorenson No. 12.	July 21, 1927	80, Ellis	do	T 1,665 E 1,457	3,440
SE., NE. ¼ SE. ¼ sec. 28	1475	California Co Lorenson No. 16.	Oct. 12, 1927	1,500, Ellis	do	T 1,490 E 1,458	3,449
NE., NW. ¼ SE. ¼ sec. 28	1300	Hill-O'Neil Co Lorenson No. 10.	June 14, 1927	1,000, Ellis	Ellis	T 1,454 E 1,454	3,432
SW., NW. ¼ SE. ¼ sec. 28	1202	Hill-O'Neil Co Lorenson No. 5.	Apr. 5, 1927	200, Ellis	do	T 1,459 E 1,459	3,428
S., NW. ¼ SE. ¼ sec. 28	1359	Hill-O'Neil Co Lorenson No. 15.	July 22, 1927	Dry	Madison	T 1,590 E 1,476	3,435
SE., NW. ¼ SE. ¼ sec. 28	1301	Hill-O'Neil Co Lorenson No. 11.	July 2, 1927	100, Ellis	Ellis	T 1,487 E 1,487	3,449
E., NW. ¼ SE. ¼ sec. 28	1327	Hill-O'Neil Co Lorenson No. 12.	June 30, 1927	150, Ellis	Madison	T 1,486 E 1,481	3,471
C., NW. ¼ SE. ¼ sec. 28(?)	1358	Hill-O'Neil Co Lorenson No. 14.	July 21, 1927	Dry	do	T 1,592 E 1,467	3,437
NE., SW. ¼ SE. ¼ sec. 28	1224	Hill-O'Neil Co Lorenson No. 6.	Apr. 21, 1927	76, Ellis	do	T 1,527 E 1,469	3,445
Do	1513	Hill-O'Neil Co Lorenson No. 17.	Nov. 7, 1927	Dry	do	T 1,600 E 1,470	3,438

N., SW. ¼ SE. ¼ sec. 28	1261	Hill-O'Neil Co Lorenson No. 9.	June 27, 1927	175, Ellis	Ellis	T 1,469 E 1,469	3,433
NW., SW. ¼ SE. ¼ sec. 28	1357	Hill-O'Neil Co Lorenson No. 13.	July 22, 1927	Dry	Madison	T 1,590 E 1,454	3,425
SW., SW. ¼ SE. ¼ sec. 28	481	Hill-O'Neil Co Lorenson No. 1.	Aug. 7, 1925	1 M, Sunburst 98, Ellis.	Ellis	T 1,468 E 1,468 S 1,238	3,430
E., SW. ¼ SE. ¼ sec. 28	127	Hill-O'Neil Co Lorenson No. 4.	Mar. 28, 1927	950, Madison	Madison	T 1,477 E 1,460	3,439
C., SW. ¼ SE. ¼ sec. 28	1260	Hill-O'Neil Co Lorenson No. 8.	May 15, 1927	560, Ellis	Ellis	T 1,475 E 1,475	3,434
NE., SE. ¼ SE. ¼ sec. 28	583	California Oil Co Lorenson No. 3.	Sept. 15, 1925	Show, Ellis	Madison	T 1,501 E 1,448 S 1,231 K 875	3,464
NW., SE. ¼ SE. ¼ sec. 28	1,220	California Co Lorenson No. 8.	May 14, 1927	1,350, Madison and Ellis.	do	T 1,539 E 1,445	3,441
W., SE. ¼ SE. ¼ sec. 28	1143	California Co Lorenson No. 5.	Mar. 1, 1927	150, Ellis	do	T 1,466 E 1,459	3,439
S., SE. ¼ SE. ¼ sec. 28	1277	California Co Lorenson No. 10.	June 4, 1927	Dry	do	T 1,637 E 1,447	3,446
C., SE. ¼ SE. ¼ sec. 28	1339	California Co Lorenson No. 13.	Aug. 21, 1927	5 barrels	do	T 1,608 E 1,460	3,448
SE., SE. ¼ NE. ¼ sec. 29	1502	A. E. Crumley Jarrett No. 1.	Apr. 6, 1928	50, Ellis	do	T 1,487 E 1,480	3,390
NE., NW. ¼ NW. ¼ sec. 29	69	Canadian-American Moore No. 2.	Sept. 2, 1923	Dry	Ellis	T 1,530 E 1,530 S 1,305	3,334
SW., SW. ¼ NW. ¼ sec. 29	1262	Taylor Zimmerman No. 1.	June 7, 1927	1 M	Madison	T 1,591 E 1,503 S 1,253	3,352
SE., SE. ¼ NW. ¼ sec. 29	1572	Dakota-Dubuque Oil Co Zimmerman No. 2.	Apr. 29, 1928	¼ M, Sunburst	do	T 1,518 E 1,509	3,389
E., NE. ¼ SW. ¼ sec. 29	1555	Minnesota Petroleum Co Zimmerman No. 1.	Apr. 5, 1928	do 20, Ellis	do	T 1,555 E 1,520 S 1,235	3,407
SE., NE. ¼ SW. ¼ sec. 29	1583	Minnesota Petroleum Co Zimmerman No. 2.	May 2, 1928	1¼ M, Sunburst	Ellis	T 1,505 E 1,505 S 1,240	3,394
NW., SW. ¼ NE. ¼ sec. 30	192	Montana-Giant Petroleum Co Helmerichs No. 1.	June 18, 1923	20, Ellis	do	T 1,504 E 1,489 S 1,267	3,339
SE., SW. ¼ NE. ¼ sec. 30	193	Montana-Giant Petroleum Co Helmerichs No. 2.	Aug. 6, 1923	1 M, Sunburst 15, Ellis.	do	T 1,490 E 1,487	3,338
NW., NW. ¼ NW. ¼ sec. 30	79	Cobb & Rutherford Broadwell No. 1.	Sept. 23, 1924	Show oil, Ellis	Madison	T 1,560 E 1,511	3,345
SE., NW. ¼ NW. ¼ sec. 30	7	Baker-Summerville Broadwell No. 1.	June 16, 1923	Dry	Ellis	T 1,570 E 1,570	3,361
NW., SW. ¼ NW. ¼ sec. 30	78	Cobb & Radigan Broadwell No. 1.	Mar. 26, 1925	50, Ellis	Madison	T 1,552 E 1,538	3,344
E., NW. ¼ SE. ¼ sec. 30	194	Montana-Giant Petroleum Co Helmerichs No. 3.	Aug. 24, 1923	3, Ellis	Ellis	T 1,530 E 1,523	3,390

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
NE., NE. ¼ NE. ¼ sec. 31	293	Queen City Oil Co. Moore No. 2.	Aug. 6, 1923	10, Ellis	Madison	T 1,486 E 1,486 S 1,258	3,372
NE., NE. ¼ NW. ¼ sec. 31	420	Whitefish Syndicate Tibbets No. 1.	May 7, 1925	Show, Ellis	do	T 1,603 E 1,490 S 1,245	3,355
SE., SE. ¼ SW. ¼ sec. 31	86	Craig et al Tibbets No. 1.	June 29, 1924	Dry	do	T 1,560 E 1,545? S 1,295	3,401
NW., NW. ¼ SW. ¼ sec. 32	735	Butte Kevin Oil Co. Veitch No. 1.	Dec. 8, 1925	1 M, Sunburst Show, Ellis.	do	T 1,476 E 1,470 S 1,245	3,373-
NE., SE. ¼ SE. ¼ sec. 32	292	Queen City Oil Co. Moore No. 1.	June 22, 1923	Dry	Ellis	K 990 T 1,537 E 1,537 S 1,240	3,434
NW., NW. ¼ NE. ¼ sec. 33	648	Diamond Oil Co. McCormick No. 4.	Sept. 9, 1925	15, Ellis	do	T 1,469 E 1,469 S 1,245	3,435
W., SW. ¼ NE. ¼ sec. 33	1188	Diamond Oil Co. McCormick No. 10.	Mar. 20, 1927	Dry	Madison	K 895 T 1,510 E 1,493	3,456
SW., SW. ¼ NE. ¼ sec. 33	419	Diamond Oil Co. McCormick No. 1.	Apr. 13, 1925	2 M, Sunburst 90, Ellis.	Ellis	T 1,510 E 1,510 S 1,280	3,486
C., SW. ¼ NE. ¼ sec. 33	512	Diamond Oil Co. McCormick No. 3.	June 2, 1925	2 M, Sunburst 80, Ellis.	do	T 1,486 E 1,486 S 1,255	3,465
SE., SE. ¼ NW. ¼ sec. 33	457	Diamond Oil Co. McCormick No 2.	May 1, 1925	35, Ellis	do	T 1,515 E 1,515 S 1,263	3,477
C., SE. ¼ NW. ¼ sec. 33	1171	Diamond Oil Co. McCormick No. 11.	Mar. 19, 1927	do	Madison	T 1,518 E 1,512	3,464
NE., NE. ¼ SW. ¼ sec. 33	493	Texas Pacific Coal & Oil Co. Halloran No. 2.	June 27, 1925	1 M, Sunburst 20, Ellis.	Ellis	T 1,490 E 1,490 S 1,225	3,452
SW., NE. ¼ SW. ¼ sec. 33	633	Texas Pacific Coal & Oil Co. Halloran No. 5.	Sept. 9, 1925	½ M, Sunburst	do	T 1,475 E 1,475 S 1,230 K 925	3,431

SE., NE. ¼ SW. ¼ sec. 33	566	Texas Pacific Coal & Oil Co. Halloran No. 3.	July 28, 1925	Dry	do	T 1,480 E 1,480 S 1,235	3,437
SE., SW. ¼ SW. ¼ sec. 33	141	Texas Pacific Coal & Oil Co. Halloran No. 1.	July 24, 1924	50, Sunburst	do	T 1,466 E 1,466 S 1,240	3,447
NE., SE. ¼ SW. ¼ sec. 33	533	Ohio Oil Co. Norem No. 5, A-C No. 2.	July 23, 1925	1 M, Sunburst	do	T 1,483 E 1,465	3,447
NW., SE. ¼ SW. ¼ sec. 33	507	Ohio Oil Co. Norem No. 4, A-C No. 2.	June 27, 1925	do 150, Ellis.	do	T 1,465 E 1,465 S 1,250	3,436
SW., SE. ¼ SW. ¼ sec. 33	269	Ohio Oil Co. Norem No. 1, A-C No. 2.	Nov. 1, 1924	1,000, Ellis	do	T 1,473 E 1,473 S 1,215	3,447
S., SE. ¼ SW. ¼ sec. 33	691	Ohio Oil Co. Norem No. 8, A-C No. 2.	Oct. 12, 1925	800, Ellis	do	T 1,466 E 1,466 S 1,255	3,445
SE., SE. ¼ SW. ¼ sec. 33	478	Ohio Oil Co. Norem No. 3, A-C No. 2.	June 4, 1925	2,000, Ellis	do	T 1,473 E 1,473 S 1,250	3,455
C., SE. ¼ SW. ¼ sec. 33	432	Ohio Oil Co. Norem No. 2, A-C No. 2.	May 18, 1925	366, Ellis	do	T 1,472 E 1,472 S 1,255	3,441
N., NW. ¼ SE. ¼ sec. 33	800	Regina-Kevin Oil Co. Halloran No. 4.	Apr. 26, 1926	21, Ellis	do	T 1,506 E 1,506 S 1,250	3,472
NW., NW. ¼ SE. ¼ sec. 33	454	Regina-Kevin Oil Co. Halloran No. 1.	May 26, 1925	3 M, Sunburst 35, Ellis.	do	T 1,516 E 1,508 S 1,262	3,474
SW., NW. ¼ SE. ¼ sec. 33	519	Regina Oil Co. Halloran No. 2.	June 26, 1925	225, Ellis	do	T 1,478 E 1,478 S 1,246	3,446
SE., NW. ¼ SE. ¼ sec. 33	1465	Regina-Kevin Oil Co. Halloran No. 5.	Oct. 19, 1927	Dry	Madison	T 1,493 E 1,481	3,446
C., NW. ¼ SE. ¼ sec. 33	572	Regina Oil Co. Halloran No. 3.	July 26, 1925	75, Ellis	Ellis	T 1,494 E 1,494 S 1,246 K 912	3,459
NE., SW. ¼ SE. ¼ sec. 33	1389	Ohio Oil Co. Norem No. 10, A-C No. 2.	Aug. 11, 1927	250, Ellis	do	T 1,495 E 1,495	3,456
NW., SW. ¼ SE. ¼ sec. 33	534	Ohio Oil Co. Norem No. 6, A-C No. 2.	June 28, 1925	1 M, Sunburst	Madison	T 1,490 E 1,477 S 1,250	3,443
SW., SW. ¼ SE. ¼ sec. 33	612	Ohio Oil Co. Norem No. 7, A-C No. 2.	Aug. 23, 1925	100, Ellis	do	T 1,473 E 1,469 S 1,250 K 895	3,449
SE., SW. ¼ SE. ¼ sec. 33	1483	Ohio Oil Co. Norem No. 11, A-C No. 2.	Oct. 1, 1927	Dry	do	T 1,786 E 1,492	3,468
C., SW. ¼ SE. ¼ sec. 33	720	Ohio Oil Co. Norem No. 9, A-C No. 2.	----------	do	Ellis	T 1,485 E 1,482 S 1,240 K 1,175	3,452

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
NE., SE. ¼ SE. ¼ sec. 33	1310	Ohio Oil Co. Norem No. 2, A-C No. 1.	June 28, 1927	5, Ellis	Madison	T 1,535 E 1,476	3,456
NW., SE. ¼ SE. ¼ sec. 33	1443	Ohio Oil Co. Norem No. 3, A-C No. 1.	Sept. 5, 1927	Dry	do	T 1,503 E 1,485	3,448
N., NE. ¼ NE. ¼ sec. 34	892	Ferdig-Sunburst Oil Co. Lashbaugh No. 14.	June 14, 1926	Show, Ellis	do	T 1,544 E 1,495 S 1,260	3,469
NW., NE. ¼ NE. ¼ sec. 34	823	Ferdig Oil Co. Lashbaugh No. 12.	Apr. 11, 1926	1,200, stray [dd]	Ellis	T 1,474 E 1,474 S 1,235	3,477
Do	1190	Ferdig Oil Co. Lashbaugh No. 12 A.	May 3, 1927	500, stray	do	T 1,469 E 1,469	3,464
SW., NE. ¼ NE. ¼ sec. 34	658	Ferdig Oil Co. Lashbaugh No. 3.	Sept. 4, 1925	Dry	do	T 1,510 E 1,510 S 1,259 K 924	3,474
S., NE. ¼ NE. ¼ sec. 34	724	Ferdig Oil Co. Lashbaugh No. 7.	Nov. 15, 1925	140, Ellis	do	T 1,492 E 1,492 S 1,240	3,470
SE., NE. ¼ NE. ¼ sec. 34	651	Ferdig Oil Co. Lashbaugh No. 4.	Nov. 10, 1925	600, Ellis	do	T 1,485 E 1,485 S 1,235	3,475
E., NE. ¼ NE. ¼ sec. 34	707	Ferdig Oil Co. Lashbaugh No. 6.	Oct. 21, 1925	Show	do	T 1,500 E 1,500 S 1,260	3,466
C., NE. ¼ NE. ¼ sec. 34	675	Ferdig Oil Co. Lashbaugh No. 5.	Aug. 26, 1925	130, Ellis	do	T 1,481 E 1,481 S 1,248 K 908	3,474
Do	742	Ferdig-Sunburst Oil Co. Lashbaugh No. 8.	Nov. 29, 1925	5, Ellis	Madison	T 1,496 E 1,473 S 1,260	3,485
Do	743	Ferdig-Sunburst Oil Co. Lashbaugh No. 9.	Dec. 6, 1925	Dry	do	T 1,530 E 1,495 S 1,265 K 935	3,481
Do	757	Ferdig-Sunburst Oil Co. Lashbaugh No. 10.	Dec. 11, 1925	50, Ellis	do	T 1,472 E 1,465 S 1,240 K 1,185	3,476

W., SW. ¼ NE. ¼ sec. 34	606	Ferdig Oil Co. Lashbaugh No. 1.	Aug. 16, 1925	75, Ellis	Ellis	T 1,550 E 1,550 S 1,310	3,511
W., SE. ¼ NE. ¼ sec. 34	614	Ferdig Oil Co. Lashbaugh No. 2.	Aug. 19, 1925	30, Ellis	do	T 1,510 E 1,510 S 1,265	3,469
NW., NW. ¼ NW. ¼ sec. 34	173	A. E. Crumley. Lashbaugh No. 1.	Mar. 31, 1924	5 M, Sunburst	Madison	T 1,502 E 1,455 S 1,229	3,472
SE., NW. ¼ NW. ¼ sec. 34	1233	A. E. Crumley. Lashbaugh No. 6.	May 8, 1927	¼ M, Sunburst	do	T 1,531 E 1,515 S 1,253	3,484
E., SW. ¼ NW. ¼ sec. 34	595	A. E. Crumley. Lashbaugh No. 3.	Aug. 11, 1925	10, Ellis	do	T 1,515 E 1,496 S 1,265	3,485
E., SE. ¼ NW. ¼ sec. 34	650	A. E. Crumley. Lashbaugh No. 4.	Sept. 17, 1925	15, Ellis	do	T 1,534 E 1,520 S 1,300 K 945	3,505
N., SE. ¼ NW. ¼ sec. 34	1453	A. E. Crumley. Lashbaugh No. 7.	Sept. 12, 1927	Dry	do	T 1,548 E 1,508	3,488
C., NW. ¼ sec. 34	477	A. E. Crumley. Lashbaugh No. 2.	June 8, 1925	1 M, Sunburst 16, Ellis.	Ellis	T 1,505 E 1,505 S 1,267	3,494
NW., NW. ¼ SW. ¼ sec. 34	657	California Co. Parker No. 2.	Oct. 2, 1925	Dry	Madison	T 1,514 E 1,491 S 1,275 K 940	3,481
SE., NW. ¼ SW. ¼ sec. 34	561	California Co. Parker No. 1.	Aug. 11, 1925	do	do	T 1,559 E 1,517 S 1,295	3,476
SW., SE. ¼ SE. ¼ sec. 34	1403	California Co. Parker No. 5.	Sept. 13, 1927	Dry, Ellis	do	T 1,646 E 1,534	3,501
NE., NE. ¼ NE. ¼ sec. 35	434	Munger-Barr. Byrne No. 1.	May 11, 1925	1 M, Sunburst	Ellis	T 1,465 E 1,464 S 1,230	3,464
SE., NE. ¼ NE. ¼ sec. 35	596	Munger-Barr. Byrne No. 2.	Aug. 8, 1925	25, Ellis	do	T 1,463 E 1,463 S 1,232	3,468
E., NE. ¼ NE. ¼ sec. 35	851	Munger-Barr. Byrne No. 4.	June 6, 1926	15, Ellis	do	T 1,481 E 1,481 S 1,245	3,473
NE., SE. ¼ NE. ¼ sec. 35	695	Munger-Barr. Byrne No. 3.	Oct. 19, 1925	30, Ellis	do	T 1,459 E 1,459 K 843	3,459
N., SE. ¼ NE. ¼ sec. 35	949	Munger-Barr. Byrne No. 5.	Aug. 1, 1926	25, Ellis	do	T 1,458 E 1,458 S 1,220	3,451
NE., NE. ¼ NW. ¼ sec. 35	873	Ferdig Oil Co. Abell No. 8.	May 28, 1926	2 M, Sunburst Show, Ellis.	Madison	T 1,625 E 1,480 S 1,262	

[dd] In Ellis at depth of 1,390 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
SW., NE. ¼ NW. ¼ sec. 35	1111	Abell Oil Co. Abell No. 2.	Apr. 22, 1927	35, Ellis	Ellis	T 1,487 E 1,487	3,448
NW., NW. ¼ NW. ¼ sec. 35	732	Ferdig-Sunburst Oil Co. Abell No. 4.	Feb. 7, 1926	2 M, Sunburst **	do	T 1,505 S 1,255	3,462
SW., NW. ¼ NW. ¼ sec. 35	686	Ferdig-Sunburst Oil Co. Abell No. 2.	Oct. 12, 1925	5 M, Sunburst	Madison	T 1,523 E 1,470 S 1,235	3,460
NW., SW. ¼ NW. ¼ sec. 35	722	Ferdig Oil Co. Abell No. 3.	Nov. 3, 1925	25, Ellis	do	T 1,500 E 1,490 S 1,260 K 985	3,469
SW., SW. ¼ SW. ¼ sec. 35	581	Ferdig-Sunburst Oil Co. Abell No. 1.	Aug. 9, 1925	do	Ellis	T 1,541 E 1,541 S 1,314	3,510
E, SE. ¼ SW. ¼ sec. 35	872	Ferdig Oil Co. Abell No. 7.	May 21, 1926	Show, Ellis	Madison	T 1,495 E 1,478 S 1,247	3,469
NW., NW. ¼ SE. ¼ sec. 35	1185	Delphia Oil Ltd. Byrne No. 1.	Mar. 11, 1927	¼ M	Ellis	T 1,493 E 1,493	3,450
NE., SW. ¼ SE. ¼ sec. 35	1437	Munger-O'Connell. E. Byrne No. 1.	Oct. 13, 1927	20, Ellis	Madison	T 1,500 E 1,454	3,461
NE., NE. ¼ NE. ¼ sec. 36	709	Texas Pacific Coal & Oil Co. State No. 2.	Oct. 18, 1925	2,000, Sunburst and Ellis.	Ellis	T 1,468 E 1,468 S 1,240	3,509
N., NE. ¼ NE. ¼ sec. 36	758	Texas Pacific Coal & Oil Co. State No. 4.	Mar. 12, 1926	50, Ellis	do	T 1,440 E 1,440 S 1,225 K 830	3,517
W., NE. ¼ NE. ¼ sec. 36	1317	Texas Pacific Coal & Oil Co. State No. 30.	July 3, 1927	Dry	Madison	T 1,600 E 1,455	3,511
SW., NE. ¼ NE. ¼ sec. 36	1242	Texas Pacific Coal & Oil Co. State No. 27.	June 7, 1927	1,000, Ellis 600, stray.	do	T 1,465 E 1,460	3,502
SE., NE. ¼ NE. ¼ sec. 36	770	Texas Pacific Coal & Oil Co. State No. 5.	Feb. 9, 1926	2,800, Ellis	Ellis	T 1,441 E 1,441 S 1,220 K 870	3,505
E., NE. ¼ NE. ¼ sec. 36	779	Texas Pacific Coal & Oil Co. State No. 6.	Mar. 7, 1926	1½ M, Sunburst // 835, stray and Ellis.	do	T 1,471 E 1,471 S 1,230 K 835	3,502
C., NE. ¼ NE. ¼ sec. 36	700	Texas Pacific Coal & Oil Co. State No. 23.	Jan. 8, 1927	200, Ellis	do	T 1,455 E 1,455	3,501

NE., NW. ¼ NE. ¼ sec. 36	632	Texas Pacific Coal & Oil Co. State No. 1.	Sept. 20, 1925	1 M, Sunburst	do	T 1,468 E 1,468 S 1,235 K 950	3,503
SE., NW. ¼ NE. ¼ sec. 36	1318	Texas Pacific Coal & Oil Co. State No. 31.	June 28, 1927	300, stray Ellis.	do	T 1,454 E 1,454	3,492
Do	1355	Texas Pacific Coal & Oil Co. State No. 33.	July 20, 1927	100, Ellis	Madison	T 1,550 E 1,460	3,499
NE., SW. ¼ NE. ¼ sec. 36	1243	Texas Pacific Coal & Oil Co. State No. 28.	May 28, 1927	200, stray	do	T 1,458 E 1,430	3,493
NW., SW. ¼ NE. ¼ sec. 36	1356	Texas Pacific Coal & Oil Co. State No. 34.	July 21, 1927	50, Ellis	Ellis	T 1,460 E 1,460	3,496
SW., SW. ¼ NE. ¼ sec. 36	1399	Texas Pacific Coal & Oil Co. State No. 37.	Aug. 18, 1927	do	do	T 1,472 E 1,472	3,478
Do	1440	Texas Pacific Coal & Oil Co. State No. 38.	Aug. 27, 1927	15, Ellis	Madison	T 1,465 E 1,458	3,476
S., SW. ¼ NE. ¼ sec. 36	1385	Texas Pacific Coal & Oil Co. State No. 35.	Aug. 2, 1927	35, stray	do	T 1,460	3,470
Do	1273	Texas Pacific Coal & Oil Co. State No. 29.	June 3, 1927	25, Ellis	do	T 1,420 E 1,405	3,470
SE., SW. ¼ NE. ¼ sec. 36	1151	Homestake Exploration Corp. State No. 22.	Jan. 8, 1927	1,500, stray and Ellis	do	T 1,434 E 1,400 S 1,203 K 795	3,476
Do	1151	Texas Pacific Coal & Oil Co. State No. 22.	do	3,000, Ellis and stray	do	T 1,434 E 1,430	3,476
C., SW. ¼ NE. ¼ sec. 36	1319	Texas Pacific Coal & Oil Co. State No. 32.	June 30, 1927	20, Ellis	do	T 1,458 E 1,450	3,476
SW., SE. ¼ NE. ¼ sec. 36	17	Texas Pacific Coal & Oil Co. State No. 26.	May 3, 1927	do	do	T 1,415 E 1,410	3,472
S., SE. ¼ NE. ¼ sec. 36	950	Texas Pacific Coal & Oil Co. State No. 14.	July 29, 1926	30, Ellis	do	T 1,445 E 1,425 S 1,185 K 870	3,471
Do	1026	Texas Pacific Coal & Oil Co. State No. 17.	Sept. 13, 1926	2 M, Sunburst †† 1,250, stray in Ellis.	Ellis	T 1,280 S 1,195 K 860	3,478
SE., SE. ¼ NE. ¼ sec. 36	842	Texas Pacific Coal & Oil Co. State No. 9.	May 21, 1926	2,000, stray and Ellis‡‡	do	T 1,425 E 1,425 S 1,185 K 910	3,481
E., SE. ¼ NE. ¼ sec. 36	802	Texas Pacific Coal & Oil Co. State No. 7.	Apr. 11, 1926	1 M, Sunburst 720, Ellis.	do	T 1,430 E 1,430 S 1,195 K 805	3,494
Do	803	Texas Pacific Coal & Oil Co. State No. 8.	May 6, 1926	720, Ellis	do	T 1,417 E 1,417 S 1,200 K 803	3,489

** Stray oil sand at 1,310 feet.
// Stray oil sand at 1,300 feet.
†† Stray oil sand in Ellis at 1,250 feet.
‡‡ Stray oil sand at 1,260 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 2 W.—Continued							
C., E. ½ NE. ¼ sec. 36	904	Texas Pacific Coal & Oil Co. State No. 12.	June 30, 1926	20, Sunburst and Ellis	Madison	T 1,465 E 1,460 S 1,225	3,505
SE., NE. ¼ NW. ¼ sec. 36	795	Adams Co. Homestake No. 4.	June 19, 1926	Dry	do	T 1,520 E 1,445 S 1,230	3,494
NW., NW. ¼ NW. ¼ sec. 36	417	Adams Co. Homestake No. 3.	Mar. 22, 1925	1 M, Sunburst	Ellis	T 1,448 E 1,448 S 1,235	3,458
W., NW. ¼ NW. ¼ sec. 36	929	Adams Co. Homestake No. 5.	July 17, 1926	25, Ellis	Madison	T 1,498 E 1,458 S 1,240	3,475
S., NW. ¼ NW. ¼ sec. 36	201	Adams Co. Homestake No. 2.	Dec. 6, 1923	5 M, Sunburst 60, Ellis.	Ellis	T 1,455 E 1,455 S 1,225	3,465
C., NW. ¼ NW. ¼ sec. 36	200	Adams Co. Homestake No. 1.	Aug. 20, 1923	75, Ellis	do	T 1,447 E 1,447 S 1,230	3,471
NW., SW. ¼ NW. ¼ sec. 36	708	Texas Pacific Coal & Oil Co. State No. 3.	Dec. 3, 1925	Show, Ellis	do	T 1,449 E 1,446 S 1,225	3,460
NE., NE., SW. ¼ sec. 36	1473	Texas Pacific Coal & Oil Co. State No. 44.	Nov. 7, 1927	Dry	Madison	T 1,470 E 1,457	3,472
N., NE. ¼ SW. ¼ sec. 36	1457	Texas Pacific Coal & Oil Co. State No. 41.	Sept. 18, 1927	45, stray and Madison.	do	T 1,480 E 1,445	3,462
E., NE. ¼ SW. ¼ sec. 36	1484	Texas Pacific Coal & Oil Co. State No. 43.	Oct. 13, 1927	75, stray and Ellis	do	T 1,470 E 1,460	3,467
NE., NE. ¼ SE. ¼ sec. 36	879	Texas Pacific Coal & Oil Co. State No. 10.	June 5, 1926	1,000, Ellis	do	T 1,445 E 1,440 S 1,185 K 800	3,473
SE., NE. ¼ SE. ¼ sec. 36	972	Texas Pacific Coal & Oil Co. State No. 15.	Aug. 13, 1926	2,600, stray and Ellis “	Ellis	T 1,405 E 1,405 S 1,205 K 810	3,455
E., NE. ¼ SE. ¼ sec. 36	888	Texas Pacific Coal & Oil Co. State No. 11.	June 24, 1926	10, Ellis	do	T 1,445 E 1,445 S 1,190 K 800	3,465
N., NW. ¼ SE. ¼ sec. 36	1398	Texas Pacific Coal & Oil Co. State No. 36.	Aug. 18, 1927	40, Ellis	do	T 1,430 E 1,430	3,473

NW., NW. ¼ SE. ¼ sec. 36	1449	Texas Pacific Coal & Oil Co. State No. 40.	Sept. 30, 1927	50, stray	Madison	T 1,500 E 1,450	3,473
S., NW. ¼ SE. ¼ sec. 36	1481	Texas Pacific Coal & Oil Co. State No. 42.	Oct. 11, 1927	5, Ellis	do	T 1,460 E 1,443	3,475
C., NW. ¼ SE. ¼ sec. 36	1448	Texas Pacific Coal & Oil Co. State No. 39.	Sept. 15, 1927	80, Ellis	Ellis	T 1,418 E 1,418	3,474
S., SW. ¼ SE. ¼ sec. 36	1008	Texas Pacific Coal & Oil Co. State No. 16.	Sept. 2, 1926	1 M, Sunburst 20, Ellis.	do	T 1,438 E 1,438 S 1,205 K 820	3,448
NE., SE. ¼ SE. ¼ sec. 36	921	Texas Pacific Coal & Oil Co. State No. 13.	July 11, 1926	2,000, stray and Ellis ‡‡	do	T 1,424 E 1,424 S 1,195	3,456
T. 35 N., R. 3 W.							
SE., SW. ¼ SE. ¼ sec. 3	166	Kolfax Petroleum Co. Baum No. 1.	Sept. 8, 1924	1 M **	Ellis	T 1,785 E 1,785	3,441
SE., NW. ¼ SE. ¼ sec. 9	300	Rainbow Oil Co. Lincoln No. 1.	Sept. 20, 1922	Dry	Madison(?)	T 1,875	3,489
SW., SW. ¼ SW. ¼ sec. 10	65	Campbell Syndicate Lincoln No. 1.	Nov. 10, 1922	35, Ellis	Ellis	T 1,767 E 1,767	3,437
SE., SE. ¼ SE. ¼ sec. 10	44	California Oil Co. Lincoln No. 1.	Dec. 8, 1922	7, Ellis	Madison	T 2,100 E 1,811 S 1,515 K 1,205	3,481
SE., SE. ¼ NW. ¼ sec. 13	5	Royal Canadian Oil Co. Campbell No. 1.	Sept. 23, 1924	20, Sunburst	Kootenai	T 1,433 S 1,433	3,353
SW., NE. ¼ SW. ¼ sec. 13	966	Royal Canadian Oil Co. Campbell No. 4.	Aug. 17, 1926	Dry	Madison	T 1,743 E 1,645 S 1,420	3,372
SE., NE. ¼ SE. ¼ sec. 14	508	Radigan-McDonald Louis No. 1.	July 25, 1925	15, Ellis	Ellis	T 1,691 E 1,688 S 1,412 K 1,190	3,379
NW., NW. ¼ SE. ¼ sec. 14	171	Louis Oil & Gas Co. Louis No. 1.	Aug. 19, 1922	1 M, Sunburst	Madison	T 2,048 S 1,434	3,432
SW., NE. ¼ NW. ¼ sec. 15	45	California Co. Lincoln No. 2.	July 13, 1923	Show, Ellis	do	T 1,912 E 1,732 K 1,115	3,412
NE., NE. ¼ NE. ¼ sec. 16	62	Campbell Goeddertz No. 1 (discovery well).	Mar. 14, 1922	20, Ellis	do	T 2,540 E 1,770 K 1,143	3,435
NE., SW. ¼ SE. ¼ sec. 16	36	Black Magic Oil Co. Goeddertz No. 1.	Nov. 10, 1922	35, Ellis	do	T 1,808 E 1,797 S 1,561 K 1,210	3,445
C., SW. ¼ SE. ¼ sec. 16	699	Arronow Goeddertz No. 1.	May 25, 1926	Show, Ellis	do	T 1,865 E 1,827 S 1,530	3,452

“ Stray oil sand in Ellis at 1,270 feet.

‡‡ Stray oil sand in Ellis at 1,345 feet.

** Gas at 1,042 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 35 N., R. 3 W.—Continued							
NW., SW. ¼ NW. ¼ sec. 21	108	Foley-Devine McGowan No. 1.	June 1, 1924	1½ M, Sunburst 40, Ellis.	Ellis	T 1,835 E 1,835 S 1,592	3,462
SE., SE. ¼ SW. ¼ sec. 22	511	O'Neil Bros. McKenzie.	June 29, 1925	1 M, Sunburst	do	T 1,736 E 1,736 S 1,470	3,390
SE., NE. ¼ SE. ¼ sec. 22	1412	Carney Carlson No. 1.	Aug. 26, 1927	do	Madison	T 1,723 E 1,710 S 1,430	3,413
SE., SW. ¼ SE. ¼ sec. 22	716	Maharg Co. Storme No. 1.	Nov. 9, 1925	Dry	Ellis	T 1,681 E 1,681 S 1,417	3,402
W., SW. ¼ SW. ¼ sec. 23	1383	Maharg Oil Co. Goeddertz No. 2.	Aug. 4, 1927	½ M, Sunburst	Madison	T 1,470 E 1,420	3,402
SW., SW. ¼ W. ¼ sec. 23	1321	Maharg Oil Co. Goeddertz No. 1.	June 22, 1927	100, Ellis	do	T 1,675 E 1,675	3,399
SE., SE. ¼ SE. ¼ sec. 23	430	Royal Canadian Oil Co. Sohn No. 1.	May 2, 1925	Show	do	T 1,590 E 1,590 S 1,355	3,335
S., SE. ¼ NE. ¼ sec. 24	118	Gladys-Belle-Fryberger Olson No. 1.	Nov. 26, 1922	15, Ellis	Ellis	T 1,658 E 1,657?	3,361
S., NE. ¼ SE. ¼ sec. 24	862	Maughans et al. Fryberger No. 1.	May 16, 1926	10, Ellis	Madison	T 1,660 E 1,579 S 1,345	3,351
SE., SE. ¼ SE. ¼ sec. 24	389	Western Drilling Co. Fryberger No. 1.	Mar. 15, 1925	Show	Ellis	T 1,595 E 1,536 S 1,325	3,358
SW., NE. ¼ NE. ¼ sec. 25	474	Royal Canadian Oil Co. Stewart No. 3.	July 2, 1925	40, Ellis	do	T 1,519 E 1,519	3,331
C., NE. ¼ NE. ¼ sec. 25	66	Royal Canadian Oil Co. Stewart No. 1.	Nov. 25, 1923	156, Ellis	do	T 1,535 E 1,535 S 1,280	3,335
N., SE. ¼ NE. ¼ sec. 25	425	Pemaco Oil Co. Stewart No. 1.	Apr. 30, 1925	Show, Ellis	Madison	T 1,599 E 1,535 S 1,306	3,340
NE., NW. ¼ NE. ¼ sec. 25	306	Royal Canadian Oil Co. Stewart No. 2.	Oct. 30, 1924	50, Ellis	Ellis	T 1,581 E 1,581	3,353
E., NE. ¼ NW. ¼ sec. 25	444	B. P. Radigan Campbell No. 1.	June 4, 1925	Show	Madison	T 1,618 E 1,609	3,376
NW., NW. ¼ NW. ¼ sec. 25	497	Royal-Canadian Oil Co. Campbell No. 3.	July 14, 1925	40, Ellis	Ellis	T 1,566 E 1,566	3,328

NE., NE. ¼ SW. ¼ sec. 25	378	Vanmeer Oil Syndicate Roseth No. 1.	Jan. 23, 1925	Dry	do	T 1,520 E 1,520 S 1,280	3,332
N., NW. ¼ SW. ¼ sec. 25	555	Vanmeer Oil Syndicate Roseth No. 2.	Aug. 10, 1925	do	do	T 1,550 E 1,550 S 1,320	3,341
NE., NE. ¼ NE. ¼ sec. 26	311	Royal Canadian Oil Co. Campbell No. 2.	Apr. 24, 1925	75, Ellis	do	T 1,573 E 1,573 S 1,340	3,330
W., NW. ¼ NW. ¼ sec. 26	1254	Maharg Oil Co. Rock No. 2.	May 18, 1927	45, Ellis	Madison	T 1,666 E 1,656	3,389
C., SW. ¼ NW. ¼ sec. 26	520	Rutherford et al. Rock No. 1.	July 18, 1925	5, Ellis	Ellis	T 1,660 E 1,660 S 1,475	3,387
NE., NE. ¼ SW. ¼ sec. 26	63	Campbell-Gordon Goeddertz No. 1.	Nov. 8, 1922	Dry	do	T 1,775 E 1,775	3,363
NE., NE. ¼ NE. ¼ sec. 27	1337	Colonel Kevin Oil Co. Rock No. 3.	July 27, 1927	20, Ellis	Madison	T 1,679 E 1,671	3,392
N., NE. ¼ NE. ¼ sec. 27	102	Colonel Kevin Oil Co. Rock No. 1.	May 4, 1925	154, Ellis	Ellis	T 1,682 E 1,682	3,391
C., NE. ¼ NE. ¼ sec. 27	706	Colonel Kevin Oil Co. Rock No. 2.	Nov. 29, 1925	10, Ellis	Madison	T 1,679 E 1,658 S 1,420	3,385
SE., SE. ¼ NE. ¼ sec. 31	755	Dupont Oil Co. Leach No. 1.	Mar. 24, 1926	50, Sunburst and Ellis	Ellis	T 1,468 E 1,760 S 1,542	3,401
NE., NE. ¼ SE. ¼ sec. 31	846	Workman Oil Co. Strange No. 2.	May 17, 1926	10, Ellis	Madison	T 1,757 E 1,757 S 1,150	----------
NW., NW. ¼ SE. ¼ sec. 31	717	Cardson Oil Co. Strange No. 1.	Oct. 6, 1925	Dry	do	T 1,885 E 1,803	3,418
SW., NE. ¼ SW. ¼ sec. 32	679	Treasure State Oil Co. Lillifore.	Oct. 30, 1925	1 M, Sunburst Show oil, Ellis.	Ellis	T 1,735 E 1,735	----------
SE., NW. ¼ SW. ¼ sec. 32	490	Madison Oil Co. Strange No. 1.	June 25, 1925	50, Ellis	do	T 1,860 E 1,764	3,391
C., SW. ¼ SW. ¼ sec. 33	653	H. F. Alexander Charles No. 1.	Sept. 21, 1925	Dry	Madison	T 1,728 E 1,718 S 1,418	3,383
NE., NE. ¼ NE. ¼ sec. 34	286	Phelps et al. Johnson No. 1.	July 10, 1924		Colorado	T 700	----------
C., SW. ¼ SE. ¼ sec. 34	410	Williams et al. Williams No. 1.	Mar. 27, 1925	Dry	Ellis	T 1,630 E 1,560 S 1,270	3,342
S., NE. ¼ NE. ¼ sec. 36	776	Kevin-Washington Oil & Gas Co. State No. 2.	Feb. 2, 1926	3 M, Sunburst	Kootenai	T 1,280 S 1,280	3,346
SE., NW. ¼ NE. ¼ sec. 36	225	Kevin-Washington Oil & Gas Co. State No. 1.	Sept. 29, 1923	do	do	T 1,260 S 1,260	3,344
E., NE. ¼ SE. ¼ sec. 36	332	G. W. Snyder Jensen No. 1.	June 6, 1923	2 M, Sunburst 10, Ellis.	Ellis	T 1,542 E 1,524 S 1,278	3,360
C., NE., ¼ SE. ¼ sec. 36	104	Featherstone et al. State No. 1.	Aug. 8, 1924	1 M, Sunburst	do	T 1,542 E 1,542 S 1,296	3,364

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Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 34 N., R. 1 E.							
SW., SW. ¼ NW. ¼ sec. 7	339	Spokane-Wyoming Oil Co. Taylor No. 1.	June 6, 1923	Dry	Madison	T 1,483 E 1,478	3,364
S., NW. ¼ SE. ¼ sec. 8	962	Mouse River Oil & Gas Co. Rooney No. 1.	Sept. 2, 1926	do	do	T 1,672 E 1,651 S 1,403	3,390
NE., NE. ¼ SW. ¼ sec. 24	690	Postewaite-Vanmeer Oil Co. DeMars No. 1.	June 30, 1926	do	do	T 1,720 E 1,710 S 1,465	3,229
T. 34 N., R. 1 W.							
NW., SW. ¼ NE. ¼ sec. 3	1351	New Day Oil Co. Little No. 1.	Aug. 2, 1927	Dry	Madison	T 1,950 E 1,515	3,432
SE., SE. ¼ SE. ¼ sec. 3	977	Bistate Oil Co. Heanel No. 1.	Aug. 19, 1926	do	do	T 1,532 E 1,500 S 1,287	3,425
NW., NW. ¼ NW. ¼ sec. 4	388	C. A. Weil Syndicate. Hocksprung No. 1.	Jan. 12, 1925	do	do	T 1,526 E 1,486 S 1,240	3,474
SE., SE. ¼ SE. ¼ sec. 4	987	O'Neil Bros. Hocksprung No. 1.	Aug. 17, 1926	do	do	T 1,550 E 1,475 S 1,245	3,466
W., NW. ¼ NW. ¼ sec. 5	489	Treasure State Oil Co. Putnam No. 2.	June 1, 1925	do	Ellis	T 1,466 E 1,466	3,468
SE., SE. ¼ SW. ¼ sec. 5	693	Green Bay Oil Co. Carrie.	Nov. 7, 1925	5 M, Sunburst	Kootenai	T 1,248 S 1,248	3,458
E., NE. ¼ SE. ¼ sec. 5	635	Pan-Canadian Oil Co. Maloney No. 2.	Sept. 11, 1925	Show, Ellis	Ellis	T 1,456 E 1,456 S 1,185 K 820	3,463
NW., NW. ¼ SE. ¼ sec. 5	480	Pan-Canadian Oil Co. Maloney No. 1.	June 3, 1925	10, Ellis	Madison	T 1,480 E 1,457 S 1,240	3,461
NE., NE. ¼ NE. ¼ sec. 6	968	Chisholm Oil Co. Adams No. 4.	Aug. 12, 1926	40, Ellis	do	T 1,467 E 1,465 S 1,250	3,473
NW., NW. ¼ NW. ¼ sec. 6	21	Big West Oil Co. Allen No. 1.	1922		Colorado	T 610	3,453
NE., NE. ¼ SW. ¼ sec. 6	960	Arcus Oil Co. Torbenson No. 1.	July 12, 1926	Dry	Madison	T 1,465 E 1,429 S 1,210	3,477

NE., NW. ¼ SW. ¼ sec. 6	816	Weiser-Crosby. Torbenson No. 1.	Apr. 14, 1926	Show, Ellis	do	T 1,460 E 1,428 S 1,200	3,478
SW., SE. ¼ SW. ¼ sec. 6	1333	Dakota Montana Oil Co. Emmons "B" No. 21.	July 14, 1927	Dry	do	T 1,552	3,462
S., SE. ¼ SW. ¼ sec. 6	1232	Dakota Montana Oil Co. Emmons "B" No. 20.	May 9, 1927	20, Madison	do	[u] T 1,535 E 1,500	3,464
NW., NE. ¼ NE. ¼ sec. 7	763	Keylone et al. Wilcox No. 1.	May 7, 1926	Show, Ellis	do	T 1,433 E 1,405 S 1,192	3,472
W., NW. ¼ NE. ¼ sec. 7	312	Russell et al. Harte No. 1.	Aug. 14, 1924	do	Ellis	T 1,435 E 1,435 S 1,180	3,471
SW., SW. ¼ NE. ¼ sec. 7	1461	Diamond-T-Rice Woods. Russell No. 18.	Oct. 6, 1927	Dry	Madison	T 1,380 E 1,350	3,449
S., SW. ¼ NE. ¼ sec. 7	1439	Diamond-T-Rice Woods. Russell No. 7.	Aug. 31, 1927	do	do	T 1,370 E 1,363	3,449
SE., SW. ¼ NE. ¼ sec. 7	1252	Reservation Oil Co. Russell No. 2.	May 16, 1927	do	do	T 1,450 E 1,351	3,443
W., SE. ¼ NE. ¼ sec. 7	1161	Dakota Montana Oil Co. Wilcox No. 1.	May 11, 1927	1,508, Ellis	do	T 1,508 E 1,365	3,452
SW., SE. ¼ NW. ¼ sec. 7	1168	Dakota Montana Oil Co. Wilcox No. 2.	Apr. 13, 1927	500, Ellis	Ellis	T 1,383 E 1,383	3,445
SE., SE. ¼ NE. ¼ sec. 7	1345	Dakota Montana Oil Co. Wilcox No. 3.	July 17, 1927	750, Madison [u]	Madison	T 1,425 E 1,375	3,452
NE., NE. ¼ NW. ¼ sec. 7	96	Dakota Montana Oil Co. Carlson No. 1 A.			Colorado	T 1,010	3,473
E., NE. ¼ NW. ¼ sec. 7	97	Dakota-Montana Oil Co. Carlson No. 1.	May 12, 1924	25, Ellis	Ellis(?)	T 1,455 E 1,371	3,452
NW., NW. ¼ NW. ¼ sec. 7	878	Reservation Oil Co. Russell No. 1.	June 5, 1926	Dry	Madison	T 1,411 E 1,399	3,477
SW., SW. ¼ NW. ¼ sec. 7	1406	Dakota-Montana Oil Co. Carlson No. 6.	Aug. 30, 1927	do	do	T 1,430 E 1,360	3,446
S., SE. ¼ NW. ¼ sec. 7	1447	Dakota-Montana Oil Co. Carlson No. 8.	Sept. 6, 1927	do	do	T 1,372 E 1,362	3,448
NE., NE. ¼ SW. ¼ sec. 7	1275	Radigan-Hungerford Corp. Harte No. 1.	June 21, 1927	30, Ellis	do	T 1,386 E 1,377	3,470
N., NW. ¼ SW. ¼ sec. 7	1421	Radigan-Hungerford Corp. Harte No. 4.	Nov. 18, 1927	Dry	do	T 1,400 E 1,356	3,440
NW., NW. ¼ SW. ¼ sec. 7	1400	Radigan-Hungerford Corp. Harte No. 3.	Aug. 17, 1927	do	do	T 1,523 E 1,360	3,444
NE., SW. ¼ SW. ¼ sec. 7	1493	Radigan-Hungerford Corp. Harte No. 5.	Oct. 25, 1927	do	do	T 1,400 E 1,368	3,444
E., SW. ¼ SW. ¼ sec. 7	1342	Radigan-Hungerford Corp. Harte No. 2.	July 20, 1927	2 M, Sunburst 10, Ellis.	do	T 1,410 E 1,361	3,449
NW., SE. ¼ SW. ¼ sec. 7	1504	Hannah-Porter Oil Co. Harte No. 3.	Nov. 9, 1927	2,000, Ellis	do	T 1,450 E 1,378	3,448
W., SE. ¼ SW. ¼ sec. 7	1410	Hannah-Porter Oil Co. Harte No. 2.	Sept. 23, 1927	2 M, Sunburst 800, Ellis.	Ellis	T 1,354 E 1,354 S 1,140	3,352

[u] Madison oil at 1,388 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 34 N., 1 W.—Continued							
SE., SE. ¼ SW. ¼ sec. 7	1281	Hannah-Porter Oil Co. Harte No. 1.	June 6, 1927	Dry	Madison	T 1,635 E 1,362	3,469
N., NE. ¼ SE. ¼ sec. 7	1471	Dakota-Montana Oil Co. Carlson No. 10.	Sept. 29, 1927	do	do	T 1,477 E 1,372	3,445
NW., NE. ¼ SE. ¼ sec. 7	1279	Dakota-Montana Oil Co. Carlson No. 3.	June 3, 1927	1 M, Sunburst 20, Ellis.	do	T 1,392 E 1,375	3,452
W., NE. ¼ SE. ¼ sec. 7	1280	Dakota-Montana Oil Co. Carlson No. 4.	June 7, 1927	Dry	do	T 1,605 E 1,365	3,453
NE., NW. ¼ SE. ¼ sec. 7	72	Diamond-T-Rice-Woods. Russell No. 1.	July 7, 1927	600, Ellis	Ellis	T 1,360 E 1,360	3,481
NW., NW. ¼ SE. ¼ sec. 7	1386	Diamond-T-Rice-Woods. Russell No. 13.	Aug. 5, 1927	Dry	Madison	T 1,399 E 1,365	3,455
SE., SW. ¼ SE. ¼ sec. 7	1350	Diamond-T-Rice-Woods. Russell No. 6.	July 13, 1927	½ M, Ellis. 10 M, Ellis.	do	T 1,490 E 1,372	3,467
W., SE. ¼ SE. ¼ sec. 7	1498	Dakota-Montana Oil Co. Carlson No. 11.	Oct. 29, 1927	2,000, Ellis	Ellis	T 1,363 E 1,363	3,456
SW., SE. ¼ SE. ¼ sec. 7	1315	Dakota-Montana Oil Co. Carlson No. 5.	June 20, 1927	275, Ellis	do	T 1,380 E 1,380	3,454
S., SE. ¼ SE. ¼ sec. 7	1470	Dakota-Montana Oil Co. Carlson No. 9.	Sept. 21, 1927	100, Ellis	Madison	T 1,380 E 1,375	3,452
SW., SW. ¼ NE. ¼ sec. 8	745	Adams-Radigan. Maloney No. 1.	Dec. 10, 1925	Dry, Ellis	do	T 1,550 E 1,430 S 1,215 K 803	3,458
W., SW. ¼ NW. ¼ sec. 8	1368	Dakota-Montana Oil Co. Wilcox No. 4.	July 23, 1927	1 M, Sunburst	do	T 1,410 E 1,394	3,446
SE., SE. ¼ NW. ¼ sec. 8	1490	General Oil Co. Wilcox No. 1.	Oct. 10, 1927	2½ M, stray	do	T 1,425 E 1,370	3,454
NW., NW. ¼ SW. ¼ sec. 8	1411	Dakota-Montana Oil Co. Carlson No. 7.	Aug. 11, 1927	3 M, stray		T 1,381 E 1,371	3,447
NW., NW. ¼ SE. ¼ sec. 8	1425	Blue Sage Oil Co. Wilcox No. 1.	Sept. 17, 1927	150, Ellis and Madison	Madison	T 1,377 E 1,365	3,449
C., SE. ¼ NW. ¼ sec. 9	1592	Baker-Barnhill-Corey. Barger No. 4.	Apr. 5, 1927	15, Ellis	Ellis	T 1,365 E 1,365	
SW., NW. ¼ SW. ¼ sec. 9	1366	Baker-Barnhill-Corey. Barger No. 2.	July 26, 1927	Dry	Madison	T 1,400 E 1,367	3,450
C., NW. ¼ SW. ¼ sec. 9	1288	Baker-Barnhill-Corey. Barger No. 1.	June 22, 1927	1 M, Sunburst Oil, Madison.	do	T 1,365 E 1,363	3,429
NE., NE. ¼ NE. ¼ sec. 11	925	Cascade Oil Co. Peterson No. 1.	Aug. 14, 1926	Dry	do	T 1,550 E 1,490 S 1,280	3,414

SW., NE. ¼ NW. ¼ sec. 11	856	Fitzpatrick-Winston. Peterson No. 1.	Aug. 4, 1926	13, stray[mm]	Ellis	T 1,495 E 1,495 S 1,260	3,403
NW., NW. ¼ NW. ¼ sec. 11	812	Sturdevant Oil Co. Peterson No. 1.	June 30, 1926	47, stray [nn] Oil, Ellis.	Madison	T 1,540 E 1,492 S 1,288	3,427
W., NW. ¼ NW. ¼ sec. 11	1323	Bi-State Oil Co. Peterson No. 2.	July 5, 1927	3 M, stray and Sunburst.	do	T 1,550 E 1,510	3,425
W., SW. ¼ NW. ¼ sec. 14	1283	California Petroleum Corp. Sauby No. 1.	June 16, 1927	Dry	Ellis	T 1,487 E 1,487	3,462
S., NW. ¼ SE. ¼ sec. 15	1343	Magic City Oil Co. Burwash No. 2.	July 3, 1927	do	Kootenai	T 1,150	3,498
N., SW. ¼ SE. ¼ sec. 15	1292	Magic City Oil Co. Burwash No. 1 A.	June 12, 1927	20, stray	do	T 1,120	3,502
NW., SW. ¼ SE. ¼ sec. 15	1370	Magic City Oil Co. Burwash No. 3.	July 21, 1927	22, stray	do	T 1,043	3,505
NW., NW. ¼ NE. ¼ sec. 16	514	Jones Oil Co. State No. 1.	Aug. 1, 1925	4, Ellis	Madison	T 1,430 E 1,398 S 1,185	3,451
SE., SW. ¼ NE. ¼ sec. 17	739	Jones Oil Co. Marrills No. 1.	May 28, 1926	1 M, Sunburst	do	T 1,458 E 1,366 S 1,142	3,484
N., SW. ¼ NW. ¼ sec. 17	1571	Dakota-Montana Oil Co. Peterson No. 1.	Apr. 22, 1928	1,000, Ellis	Ellis	T 1,391 E 1,391	3,503
E., NE. ¼ SW. ¼ sec. 17	894	Pondera Valley Oil Co. Larsen No. 1.	June 8, 1926	Oil, Ellis	do	T 1,420 E 1,420 S 1,180	3,541
NW., NE. ¼ NE. ¼ sec. 18	1279	Oil Producers Syndicate. Skinner No. 1.	May 28, 1927	3 M, stray 40, Ellis.	Madison	T 1,405 E 1,365	3,466
N., NW. ¼ NE. ¼ sec. 18	1293	Barnhill Oil Co. Skinner No. 3.	July 12, 1927	Dry	do	T 1,500 E 1,360	3,481
NE., NE. ¼ NW. ¼ sec. 18	1241	Hannah-Porter Oil Co. Hannah No. 2.	May 11, 1927	250, Ellis	do	T 1,381 E 1,371	3,483
NE., NW. ¼ NW. ¼ sec. 18	1255	Queen City Oil Co. Hannah No. 2.	June 1, 1927	Dry	do	T 1,480 E 1,377	3,472
SW., NW. ¼ NW. ¼ sec. 18	912	Barnhill Units. Skinner No. 1.	Aug. 30, 1926	4 M, stray in Ellis [oo]	Ellis	T 1,280 E 1,280 S 1,113	3,494
SE., SW. ¼ NW. ¼ sec. 18	963	Queen City Oil Co. Hanna No. 1.	Sept. 8, 1926	100, Madison [pp]	Madison	T 1,388 E 1,356 S 1,140	3,485
NE., NW. ¼ SW. ¼ sec. 18	902	Ohio Oil Co. Johnson No. 1.	July —, 1926	93, Madison [qq]	do	T 1,380 E 1,366 S 1,140	3,493
SW., SW. ¼ SW. ¼ sec. 18	42	California Oil Co. Johnson No. 1.	Dec. 14, 1922	Dry	Devonian	T 2,611 E 1,343 K 800	3,490
SE., NE. ¼ NW. ¼ sec. 19	43	California Oil Co. Johnson No. 2.	Apr. 30, 1924	do	Madison	T 1,426 E 1,350 S 1,135 K 740	3,522

[mm] Stray oil sand in Ellis at 1,452 feet. [nn] Stray oil sand at 1,383 feet. [oo] Stray gas sand in Ellis at 1,235–1,255 feet. [pp] Madison oil at 1,388 feet. [qq] Madison (?) oil at 1,380 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 34 N., R. 1 W.—Continued							
NE., NW. ¼ NW. ¼ sec. 19	1423	Chinook Syndicate Johnson No. 1.	Sept. 12, 1927	Dry	Madison	T 1,491 E 1,385	3,497
NW., NW. ¼ SW. ¼ sec. 20	1472	Reo Oil & Gas Co Schmedt No. 1.	Oct. 24, 1927	do	do	T 1,455 E 1,355	3,561
NE., SE. ¼ NW. ¼ sec. 21	287	Potlatch Oil Co Adams No. 1.	Apr. 11, 1924	3 M, Sunburst	Cambrian [r]	T 4,521 E 1,420 S 1,200	3,548
S., NE. ¼ SW. ¼ sec. 21	377	Troy-Sweetgrass Oil Co Stockman's National Bank No. 1.	Sept. 2, 1922	1½ M, Sunburst	Devonian [s]	T 2,608 E 1,377 S 1,143	3,549
SW., SW. ¼ NE. ¼ sec. 22	1112	California Petroleum Corp Dahl No. 1.	Jan. 8, 1927	Dry	Madison	T 1,527 E 1,409	3,513
NW., NW. ¼ SE. ¼ sec. 23	151	Inland Empire Oil Co Mosser No. 1.	Jan. 27, 1923	1½ M, Sunburst	do	T 1,605 E 1,517 S 1,310	3,503
C., NE. ¼ sec. 25	1139	Carter Oil Co Siegel No. 1.	Apr. 7, 1927	1 M, Sunburst	Ellis	T 1,519 E 1,519 S 1,202	3,481
NW., SW. ¼ NW. ¼ sec. 27	1384	California Petroleum Corp Barger No. 2.	Aug. 19, 1927	Dry	Madison	T 1,381 E 1,365	3,497
SW., NW. ¼ NW. ¼ sec. 28	931	O'Neil Bros Barger No. 1.	July 8, 1926	5 M, Sunburst		T 1,566 E 1,358 S 1,120	3,569
C., S. ½ sec. 28	1298	California Petroleum Corp T. Jones No. 1.	July 15, 1927	2½ M, Sunburst	Madison	T 1,371 E 1,368 S 1,131	3,534
NW., SW. ¼ NE. ¼ sec. 29	1267	California Petroleum Corp Stockman's National Bank No. 1.	June 24, 1927	2½ M, stray	do	T 1,315 E 1,300	3,553
N., SE. ¼ NW. ¼ sec. 30	790	W. T. Farrish Liebenau No. 1.	Mar. 31, 1926	Dry	do	T 2,230 E 1,280 S 1,090	3,532
SE., SE. ¼ SE. ¼ sec. 30	810	Hungerford Stevens No. 1.	Apr. 9, 1926	1½ M [t]	do	T 1,370 E 1,290	3,508
NW., SE. ¼ SW. ¼ sec. 33	1387	Jamestown Development Co Sauby No. 1.	Aug. 11, 1927	¼ M, Sunburst	do	T 1,882 E 1,377	3,480
NW., NW. ¼ NW. ¼ sec. 36	1762	Hannah-Porter Oil Co State No. 2.	Dec. 15, 1928	½ M, Sunburst(?) 15, stray at 1,390 feet.	Ellis(?)	T 1,426 S 1,225?	3,481
T. 34 N., R. 2 W.							
NE., SE. ¼ NE. ¼ sec. 1	884	Wismont Oil Co Lewis No. 2.	June 14, 1926	5 M, Sunburst	Madison	T 1,470 E 1,410 S 1,160	3,451

NW., SE. ¼ NE. ¼ sec. 1	83	Colonel-McGuire Lewis No. 1.	Aug. 14, 1924	3 M, Sunburst	do	T 1,472 E 1,435 S 1,200	3,459
SW., NW. ¼ NW. ¼ sec. 1	169	Lilly et al Lewis No. 1.	Nov. 15, 1924	Show Ellis	do	T 1,530 E 1,475 S 1,233	3,465
SE., NW. ¼ NW. ¼ sec. 1	832	Wismont Oil Co Lewis No. 1.	May 2, 1926	1 M, Sunburst	do	T 1,448 E 1,441 S 1,190	3,468
NW., NE. ¼ SW. ¼ sec. 1	794	Adams Co Faunce No. 1.	Mar. 23, 1926	2 M, Sunburst	do	T 1,505 E 1,405 S 1,185	3,442
NW., NW. ¼ SW. ¼ sec. 1	502	Hibbing-Sunburst Faunce No. 1.	June 29, 1925	½ M, Sunburst 135, Ellis.	Ellis	T 1,433 E 1,433 S 1,195	3,448
N., NW. ¼ SW. ¼ sec. 1	641	Hibbing-Sunburst Faunce No. 2.	Aug. 27, 1925	½ M, Sunburst 200, Ellis.	do	T 1,441 E 1,441 S 1,195	3,458
NW., NW. ¼ SW. ¼ sec. 1	1505	Hibbing-Sunburst Oil Co Faunce No. 3.	Oct. 28, 1927	¼ M, Sunburst	Madison	K 810 T 1,700 E 1,420	3,448
W., SE. ¼ SW. ¼ sec. 1	752	Sunburst Oil & Refining Co Steele No. 1.	May 14, 1926	Dry	do	S 1,182 T 1,447 E 1,444	3,459
W., NW. ¼ SE. ¼ sec. 1	848	Didbury Syndicate Steele No. 1.	May 22, 1926	do	do	S 1,208 T 1,473 E 1,420	3,474
SW., NW. ¼ SE. ¼ sec. 1	117	Fulton-McKnight (Gladys-Belle) Faunce No. 1.	Aug. 31, 1922	5, Ellis	do	S 1,180 T 1,455 E 1,437	3,443
SE., SE. ¼ NE. ¼ sec. 2	662	Morgan & Johnson Emmons No. 1.	Sept. 26, 1925	1 M, Sunburst	Ellis	T 1,528 E 1,528 S 1,235	3,462
W., NE. ¼ NW. ¼ sec. 2	27	Big West Oil Co Steele No. 2.	Nov. 26, 1924	10, Ellis	do	K 905 T 1,517 E 1,517 S 1,270	3,500
S., NE. ¼ NW. ¼ sec. 2	26	Big West Oil Co Steele No. 1.	Aug. 3, 1924	150, Ellis	do	K 895 T 1,508 E 1,508 S 1,264	3,498
SE., NE. ¼ NW. ¼ sec. 2	712	Big West Oil Co Steele No. 3.	Sept. 9, 1925	3 M, Sunburst 15, Ellis.	Madison	K 900 T 1,510 E 1,506 S 1,235	3,481
NW., NW. ¼ SW. ¼ sec. 2	170	Lilly et al Shoemaker No. 1.	Aug. 17, 1924	Dry	Ellis	K 950 T 1,523 E 1,523 S 1,290	3,514

[r] Deep test well to the base of the Cambrian. [s] Diamond drill hole through the Devonian. [t] Gas at 1,190 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 34 N., R. 2 W.—Continued							
NE., NE. ¼ SE. ¼ sec. 2	599	Barr Oil Co. Steele No. 1.	Oct. 16, 1925	150, Ellis	Ellis	T 1,419 E 1,419	3,449
NE., SW. ¼ SE. ¼ sec. 2	704	California Co. Shoemaker No. 1.	Nov. 29, 1927	Dry	Madison	T 1,480 E 1,466 S 1,252	3,458
NE., SE. ¼ SE. ¼ sec. 2	723	Bruceann et al. Steele No. 1.	Nov. 24, 1925	do	do	T 1,461 E 1,449 S 1,210 K 875	3,447
NE., NE. ¼ NE. ¼ sec. 3	115	Frazer et al. Tembroeck No. 1.	Feb. 9, 1925	25, Ellis	Ellis	T 1,531 E 1,531 S 1,300	3,497
N., NE. ¼ NE. ¼ sec. 3	428	Frazer et al. Tembroeck No. 2.	Apr. 21, 1925	30, Ellis	Madison	T 1,543 E 1,529 S 1,303	3,503
NW., NE. ¼ NE. ¼ sec. 3	1222	Frazer et al. Tembroeck No. 4.	May 10, 1927	30, Sunburst	Ellis	T 1,400 S 1,295	3,499
C., NE. ¼ NE. ¼ sec. 3	560	Frazer et al. Tembroeck No. 3.	Aug. 5, 1925	Dry	Madison	T 1,542 E 1,525 S 1,310	3,501
E., SW. ¼ NE. ¼ sec. 3	554	Ferdig-Sunburst. Tembroeck No. 1.	July 31, 1925	do	Ellis	T 1,535 E 1,535 S 1,310 K 1,070	3,504
SW., NW. ¼ SW. ¼ sec. 3	142	Homestake Oil Co. Helgard No. 1.	June 20, 1924	do	Madison	T 1,515 E 1,510 S 1,270	3,456
NW., SW. ¼ SW. ¼ sec. 3	336	Spartan Oil Co. Swift No. 1.	July 1, 1924	Dry; sulphur water	Ellis	T 1,518 E 1,518	3,462
SW., SW. ¼ SW. ¼ sec. 3	167	Last Chance Oil Co. Swift No. 1.	Nov. 4, 1923	do	do	T 1,551 E 1,551 S 1,276	3,481
W., NE. ¼ SE. ¼ sec. 3	574	Cooperative Oil Co. Shoemaker No. 1.	Aug. 5, 1925	Show, Ellis	Madison	T 1,530 E 1,525 S 1,310	3,503
SW., NE. ¼ NE. ¼ sec. 4	268	Ohio Oil Co. Norem No. 1, A–C No. 1.	June 22, 1924	Dry	do	T 1,493 E 1,487 S 1,265	3,466
NW., NW. ¼ NE. ¼ sec. 4	689	Glenrock Oil Co. Norem No. 4.	Nov. 25, 1925	do	do	T 1,515 E 1,472 S 1,260	3,450

W., SW. ¼ NE. ¼ sec. 4	487	Glenrock Oil Co. Norem No. 3.	July 2, 1925	1 M, Ellis	do	T 1,505 E 1,495 S 1,253	3,473
SW., SW. ¼ NE. ¼ sec. 4	20	Glenrock Oil Co. Norem No. 2.	Nov. 24, 1924	30, Ellis	Ellis	T 1,498 E 1,498 S 1,278	3,468
SE., SW. ¼ NE. ¼ sec. 4	168	Glenrock Oil Co. Norem No. 1.	Dec. 12, 1923	10, Ellis	do	T 1,498 E 1,498 S 1,260	3,471
E., SE. ¼ NE. ¼ sec. 4	853	Bistate Oil Co. Norem No. 1.	May 23, 1926	Oil, Ellis	Madison	T 1,562 E 1,497 S 1,270	3,471
NE., NE. ¼ NW. ¼ sec. 4	458	Queen City Oil Co. Moore No. 11.	May 20, 1925	2 M, Sunburst	Ellis	T 1,488 E 1,488 S 1,260	3,452
N., NE. ¼ NW. ¼ sec. 4	565	Queen City Oil Co. Moore No. 14.	July 20, 1925	250, Ellis	do	T 1,474 E 1,474 S 1,234	3,449
NW., NE. ¼ NW. ¼ sec. 4	298	Queen City Oil Co. Moore No. 7.	Dec. 7, 1924	50, Ellis	do	T 1,480 E 1,480 S 1,208	3,447
C., NE. ¼ NW. ¼ sec. 4	496	Queen City Oil Co. Moore No. 12.	June 12, 1925	2 M, Sunburst	do	T 1,497 E 1,493 S 1,255	3,471
NE., NW. ¼ NW. ¼ sec. 4	647	Queen City Oil Co. Moore No. 19.	Sept. 22, 1925	2,858, Ellis	do	T 1,472 E 1,472 S 1,245	3,457
SW., NW. ¼ NW. ¼ sec. 4	646	Queen City Oil Co. Moore No. 18.	Sept. 15, 1925	20, Ellis	do	T 1,477 E 1,477 S 1,230 K 885	3,459
S., NW. ¼ NW. ¼ sec. 4	524	Queen City Oil Co. Moore No. 15.	Sept. 19, 1925	400, Ellis	do	T 1,461 E 1,461 S 1,245	3,459
SE., NW. ¼ NW. ¼ sec. 4	429	Queen City Oil Co. Moore No. 10.	Apr. 29, 1925	¼ M, Sunburst 3,326, Ellis.	do	T 1,479 E 1,479 S 1,234	3,469
NE., SW. ¼ NW. ¼ sec. 4	418	Johnson Syndicate. Corey No. 4.	Mar. 28, 1925	½ M, Sunburst 50, Ellis.	do	T 1,477 E 1,477 S 1,238	3,459
N., SW. ¼ NW. ¼ sec. 4	472	Johnson Syndicate. Corey No. 6.	June 5, 1925	80, Ellis	do	T 1,488 E 1,488 S 1,239	3,461
NW., SW. ¼ NW. ¼ sec. 4	585	Johnson Syndicate. Corey No. 7.	Aug. 5, 1925	600, Ellis	do	T 1,497 E 1,497 S 1,255	3,468
W., SW. ¼ NW. ¼ sec. 4	865	Johnson Syndicate. Corey No. 9.	May 30, 1926	Dry	Madison	T 1,536 E 1,502 S 1,242	3,470
SW., SW. ¼ NW. ¼ sec. 4	532	Johnson Syndicate. Corey No 1.	July 4, 1925	550, Ellis	Ellis	T 1,508 E 1,508 S 1,275	3,475

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 34 N., R. 2 W.—Continued							
S., SW. ¼ NW. ¼ sec. 4	471	Johnson Syndicate Corey No. 5.	May 22, 1925	800, Ellis	Ellis	T 1,503 E 1,503 S 1,270	3,480
SE., SW. ¼ NW. ¼ sec. 4	153	Johnson Syndicate Corey No. 2.	July 21, 1924	350, Ellis	do	T 1,529 E 1,529 S 1,280	3,505
E., SW. ¼ NW. ¼ sec. 4	154	Johnson Syndicate Corey No. 3.	Dec. 12, 1924	4 M, Sunburst 5,000, Ellis.	do	T 1,487 E 1,487 S 1,255	3,474
C., SW. ¼ NW. ¼ sec. 4	815	Johnson Oil Syndicate Corey No. 8.	Apr. 19, 1926	140, Ellis	Madison	T 1,486 E 1,481 S 1,245	3,471
NW., SE. ¼ NW. ¼ sec. 4	416	Queen City Oil Co Moore No. 9.	Apr. 12, 1925	½ M, Sunburst 200, Ellis.	Ellis	T 1,474 E 1,474 S 1,233	3,459
W., SE. ¼ NW. ¼ sec. 4	299	Queen City Oil Co Moore No. 8.	Feb. 12, 1925	500, Ellis	do	T 1,982 E 1,982 S 1,260	3,468
SW., SE. ¼ NW. ¼ sec. 4	294	Queen City Oil Co Moore No. 3.	June 19, 1924	900, Ellis	do	T 1,501 E 1,501 S 1,298	3,485
S., SE. ¼ NW. ¼ sec. 4	296	Queen City Oil Co Moore No. 5.	Aug. 2, 1924	300, Ellis	Madison	T 1,501 E 1,490 S 1,242	3,472
SE., SE. ¼ NW. ¼ sec. 4	297	Queen City Oil Co Moore No. 6.	Aug. 19, 1924	36, Ellis	Ellis	T 1,486 E 1,486 S 1,231	3,469
NE., NE. ¼ SW. ¼ sec. 4	91	Crumley & McKnight Corey No. 5.	Sept. 10, 1924	75, Ellis	Madison	T 1,490 E 1,475 S 1,238	3,467
N., NE. ¼ SW. ¼ sec. 4	90	Crumley & McKnight Corey No. 4.	Aug. 18, 1924	1,000, Ellis	Ellis	T 1,475 E 1,475 S 1,250	3,470
NW., NE. ¼ SW. ¼ sec. 4	88	Crumley & McKnight Corey No. 2.	July 12, 1924	¾ M, Sunburst 250, Ellis.	do	T 1,509 E 1,509 S 1,290	3,493
W., NE. ¼ SW. ¼ sec. 4	92	Crumley & McKnight Corey No. 6.	Oct. 20, 1924	Dry	Madison	T 1,509 E 1,479 S 1,252	3,466
SE., NE. ¼ SW. ¼ sec. 4	87	Crumley & McKnight Corey No. 1.	June 15, 1924	5 M, Sunburst 400, Ellis.	Ellis	T 1,524 E 1,524 S 1,270	3,489

E., NE. ¼ SW. ¼ sec. 4	89	Crumley & McKnight Corey No. 3.	Aug. 5, 1924	2,000, Ellis	do	T 1,481 E 1,481	3,467
C., NE. ¼ SW. ¼ sec. 4	93	Crumley & McKnight Corey No. 7.	Dec. 2, 1924	30, Ellis	Madison	T 1,483 E 1,467 S 1,239	3,460
C., NE. ¼ SW. ¼ sec. 4	640	Crumley & McKnight Corey No. 8.	Sept. 10, 1925	Dry	do	T 1,511 E 1,475 S 1,243	3,471
NE., NW. ¼ SW. ¼ sec. 4	408	Whitman et al Corey No. 2.	Sept. 9, 1924	2,000, Ellis	Ellis	T 1,512 E 1,512	3,496
N., NW. ¼ SW. ¼ sec. 4	439	Whitman-Sunburst Corey No. 4.	May 13, 1925	1,500, Ellis	do	T 1,479 E 1,479 S 1,261	3,483
NW., NW. ¼ SW. ¼ sec. 4	488	Whitman-Sunburst Corey No. 5.	June 4, 1925	1,000, Ellis	do	T 1,467 E 1,467 S 1,241	3,465
SW., NW. ¼ SW. ¼ sec. 4	407	Whitman-Sunburst Corey No. 1.	June 21, 1924	3, Ellis	Madison	T 1,521 E 1,481	3,450
E., NW. ¼ SW. ¼ sec. 4	409	Whitman-Sunburst Corey No. 3.	Nov. 24, 1924	Show, Ellis	do	T 1,505 E 1,469	3,471
NE., SW. ¼ SW. ¼ sec. 4	624	Newton & McMurray Corey No. 3.	Sept. 16, 1925	Dry	do	T 1,484 E 1,465 S 1,240 K 870	3,456
NW., SW. ¼ SW. ¼ sec. 4	223	Newton & McMurray Corey No. 1.	June 24, 1924	do	do	T 1,478 E 1,454 S 1,220	3,445
NE., SE. ¼ SW. ¼ sec. 4	224	Newton & McMurray Corey No. 2.	July 19, 1924	200, Ellis	do	T 1,504 E 1,504 S 1,273	3,470
NW., NE. ¼ SE. ¼ sec. 4	499	Sunburst Oil Co Norem No. 4.	June 24, 1925	1 M, Sunburst	do	T 1,504 E 1,480 S 1,247	3,465
W., NE. ¼ SE. ¼ sec. 4	363	Sunburst Oil Co Norem No. 2.	Nov. 5, 1923	3 M, Sunburst 1,000 Ellis.	do	T 1,491 E 1,484	3,468
SW., NE. ¼ SE. ¼ sec. 4	362	Sunburst Oil Co Norem No. 1.	July 23, 1923	150, Ellis	Ellis	T 1,500 E 1,500 S 1,265	3,470
SW., NE. ¼ SE. ¼ sec. 4	1182	Sunburst Oil & Refining Co Norem No. 1 A.	Mar. 13, 1927	25, Ellis	do	T 1,498 E 1,498	3,470
C., NE. ¼ SE. ¼ sec. 4	364	Sunburst Oil Co Norem No. 3.	Apr. 23, 1924	Dry	do	T 1,502 E 1,502 S 1,260	3,460
N., NW. ¼ SE. ¼ sec. 4	562	Shoshone Oil Co Storme No. 9.	July 29, 1925	25, Ellis	Madison	T 1,480 E 1,475	3,463
NW., NW. ¼ SE. ¼ sec. 4	329	Shoshone Oil Co Storme No. 6.	Sept. 7, 1924	384, Ellis	Ellis	T 1,467 E 1,467 S 1,225	3,465
W., NW. ¼ SE. ¼ sec. 4	328	Shoshone Oil Co Storme No. 5.	Aug. 19, 1924	1½ M, Sunburst 1,400, Ellis.	do	T 1,478 E 1,478 S 1,225	3,466

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 34 N., R. 2 W.—Continued							
SW., NW. ¼ SE. ¼ sec. 4	327	Shoshone Oil Co. Storme No. 4.	July 15, 1924	3 M, Sunburst 2,500, Ellis.	Ellis	T 1,477 E 1,477 S 1,237	3,468
SE., NW. ¼ SE. ¼ sec. 4	326	Shoshone Oil Co. Storme No. 3.	June 15, 1924	Dry	Madison	T 1,513 E 1,485 S 1,262	3,476
E., NW. ¼ SE. ¼ sec. 4	325	Shoshone Oil Co. Storme No. 2.	Dec. 18, 1923	400, Ellis	do	T 1,520 E 1,515 S 1,265	3,464
C., NW. ¼ SE. ¼ sec. 4	513	Shoshone Oil Co. Storme No. 8.	June 25, 1925	190, Ellis	Ellis	T 1,469 E 1,469 S 1,245	3,463
NE., SW. ¼ SE. ¼ sec. 4	324	Shoshone Oil Co. Storme No. 1.	May 30, 1923	125, Ellis	do	T 1,527 E 1,527 S 1,275	3,496
NW., SW. ¼ SE. ¼ sec. 4	380	Shoshone Oil Co. Storme No. 7.	Nov. 24, 1924	1 M, Sunburst	Madison	T 1,500 E 1,471 S 1,238	3,466
NW., SE. ¼ SE. ¼ sec. 4	379	Vanmeer. Storme No. 1.	May 11, 1924	5,000, Ellis	do	T 1,520 E 1,514 S 1,270	3,489
W., SE. ¼ SE. ¼ sec. 4	380	Vanmeer. Storme No. 2.	July 15, 1924	Show, Ellis	Ellis	T 1,535 E 1,525	3,489
C., NW. ¼ NE. ¼ sec. 5	654	Hub City Oil Co. Moore No. 1.	Oct. 21, 1925	do	do	T 1,552 E 1,552 S 1,310 K 950	3,470
S., SE. ¼ NE. ¼ sec. 5	605	Queen City Oil Co. Moore No. 17.	Aug. 19, 1925	25, Ellis	do	T 1,494 E 1,494 S 1,241	3,465
SE., SE. ¼ NE. ¼ sec. 5	525	Queen City Oil Co. Moore No. 13.	July 3, 1925	1 M, Sunburst 623, Ellis.	do	T 1,496 E 1,496 S 1,272	3,482
NE., NW. ¼ NW. ¼ sec. 5	1269	Craigmile Oil Co. Putnam No. 1.	May 23, 1927	Dry	Madison	T 1,503 E 1,490	3,479
SE., SE. ¼ NW. ¼ sec. 5	295	Queen City Oil Co. Moore No. 4.	June 27, 1924	Show, Ellis	Ellis	T 1,512 E 1,512 S 1,252	3,454
E., SE. ¼ NW. ¼ sec. 5	571	Queen City Oil Co. Moore No. 16.	July 28, 1925	do	do	T 1,508 E 1,508 S 1,275	3,486

NE., SE. ¼ SW. ¼ sec. 5	60	California Oil Co. Sweeney No. 1.	Aug. 9, 1924	5, Ellis	do	T 1,472 E 1,472 K 880	3,437
NE., NE. ¼ SE. ¼ sec. 5	521	Regal Consolidated Oil Co. Sweeney No. 5.	July 10, 1925	100, Ellis	do	T 1,500 E 1,500 S 1,235	3,462
S., NE. ¼ SE. ¼ sec. 5	304	Regal Consolidated Oil Co. Sweeney No. 2.	Aug. 3, 1924	do	do	T 1,467 E 1,467	1,445
E., NE. ¼ SE. ¼ sec. 5	542	Regal Consolidated Oil Co. Sweeney No. 6.	July 21, 1925	do	Madison	T 1,498 E 1,477 S 1,210	3,452
NE., SE. ¼ SE. ¼ sec. 5	315	Regal Consolidated Oil Co. Sweeney No. 1.	May 9, 1924	1 M, Sunburst 256, Ellis.	Ellis	T 1,454 E 1,454 S 1,218	3,444
N., SE. ¼ SE. ¼ sec. 5	316	Regal Consolidated Oil Co. Sweeney No. 3.	Oct. 13, 1924	40, Ellis	do	T 1,476 E 1,476 S 1,246	3,459
S., SE. ¼ SE. ¼ sec. 5	469	Regal Consolidated Oil Co. Sweeney No. 4.	June 17, 1925	50, Ellis	do	T 1,474 E 1,474 S 1,220	3,452
SE., SE. ¼ NW. ¼ sec. 6	68	Canadian American Oil Co. Moore No. 1.	Apr. 8, 1923	Dry	Madison	T 1,590 E 1,555 S 1,280	3,397
S., SW. ¼ SE. ¼ sec. 6	783	California Syndicate. Moore No. 2.	Mar. 19, 1926	¼ M, Sunburst	do	T 1,530 E 1,495 S 1,250	3,389
E., SE. ¼ SE. ¼ sec. 6	741	California Syndicate. Moore No. 1.	Jan. 18, 1926	2 M, Sunburst	do	T 1,515 E 1,500 S 1,264	3,418
SE., NE. ¼ NW. ¼ sec. 7	594	Western States Oil Co. Crawford No. 1.	Aug. 25, 1925	3 M, Ellis	Ellis	T 1,506 E 1,506 S 1,234 K 848	3,387
SW., NW. ¼ NW. ¼ sec. 7	356	Swartz-Kevin Syndicate. Crawford No. 1.	Oct. 16, 1923	Show, Ellis	Madison	T 1,500 E 1,490	3,381
N., NE. ¼ NE. ¼ sec. 8	155	Regal Consolidated Oil Co. DeGroat No. 1.	Apr. 13, 1925	2 M 50.	Ellis	T 1,460 E 1,460 S 1,220 K 855	3,439
NE., NW. ¼ NE. ¼ sec. 8	446	Cleveland Syndicate. De Groat No. 1.	May 13, 1925	50	do	T 1,468 E 1,468	3,431
E., NW. ¼ NE. ¼ sec. 8	505	Cleveland Syndicate. DeGroat No. 2.	June 10, 1925	Show, Ellis	Madison	T 1,505 E 1,468 S 1,220	3,435
NE., SW. ¼ NE. ¼ sec. 8	433	Nanton Oil Co. DeGroat No. 1.	Apr. 20, 1925	½ M, Ellis	do	T 1,490 E 1,475 S 1,224	3,444
C., NE. ¼ NW. ¼ sec. 8	638	Mansfield Kevin Syndicate. Hurley No. 1.	Oct. 12, 1925	Show, Ellis	do	T 1,490 E 1,481 S 1,228	3,426

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 34 N., R. 2 W.—Continued							
SW., NW. ¼ NW. ¼ sec. 8	903	Johnson Oil Co. DeGroat No. 3.	Aug. 5, 1926	Show. Ellis	Madison	T 1,500 E 1,470 S 1,230	3,434
SE., NW. ¼ NW. ¼ sec. 8	77	Claresholm Oil Co. Hurley No. 1.	Nov. 25, 1924	30, Ellis	do	T 1,460 E 1,439 S 1,190	3,403
SE., SW. ¼ SW. ¼ sec. 8	30	Wenonah Oil Syndicate. Sorrell No. 1.	May 7, 1924	50, Ellis	Ellis	T 1,449 E 1,449 S 1,220	3,395
W., SE. ¼ SW. ¼ sec. 8	29	Wenonah-Sunburst Syndicate. Hurley No. 2.	Aug. 21, 1924	5 M, Sunburst-5, Ellis.	do	T 1,470 E 1,470 S 1,200	3,414
SW., SE. ¼ SW. ¼ sec. 8	355	Wenonah-Sunburst Syndicate. Hurley No. 1.	Mar. 23, 1923	15, Ellis	Madison	T 1,510 E 1,460	3,524
C., SE. ¼ SW. ¼ sec. 8	729	Wenonah Oil Syndicate. Hurley No. 3.	Apr. 14, 1926	Show, Ellis	do	T 1,508 E 1,484 S 1,240	3,449
NW., NE. ¼ SE. ¼ sec. 8	174	Metzembaum Syndicate. Falck No. 1.	June 30, 1924	Dry	do	T 1,474 E 1,464 S 1,203	3,427 427
SE., SW. ¼ SE. ¼ sec. 8	942	Wenonah-Sunburst Syndicate. Falck No. 1.	July 25, 1926	10, Ellis	do	T 1,475 E 1,446 S 1,197	3,420
NW., NE. ¼ NE. ¼ sec. 9	103	Eline-Sunburst Oil Co. Suhr No. 1.	Oct. 4, 1923	Show, Ellis	do	T 1,560 E 1,520 S 1,280	3,472
E., NW. ¼ NE. ¼ sec. 9	438	Sunburst Oil & Refining Co. Suhr No. 3.	May 7, 1925	do	do	T 1,532 E 1,490 S 1,265	3,494
SW., SW. ¼ NE. ¼ sec. 9	1569	Aetna Oil Co. Suhr No. 1.	Apr. 19, 1928	½ M, Sunburst	Ellis	T 1,494 E 1,494 S 1,225	
NE., NE. ¼ NW. ¼ sec. 9	385	Wallace Oil Co. DeGroat No. 1.	Nov. 5, 1923	Show, Ellis	Madison	T 1,599 E 1,466	3,455
NE., NW. ¼ NW. ¼ sec. 9	639	Johnson Oil Syndicate. DeGroat No. 2.	Sept. 2, 1925	do	do	T 1,486 E 1,448 S 1,230 K 865	3,446
NW., NW. ¼ NW. ¼ sec. 9	449	Johnson Oil Co. DeGroat No. 1.	June 16, 1925	30 Ellis	do	T 1,477 E 1,450 S 1,216	3,443

NE., NE. ¼ SW. ¼ sec. 9	506	Arro-McDonald. Falk No. 1.	July 29, 1925	Oil, Ellis	do	T 1,545 E 1,486 S 1,245 K 885	3,430
SW., NW. ¼ SW. ¼ sec. 9	331	Snow Cap Oil Co. Falk No. 1.	July 1, 1924		Colorado	T 150	3,429
C., NE. ¼ SW. ¼ sec. 10	351	Sunburst Oil Co. Suhr No. 1.	Sept. 9, 1922	Show, Colorado and Ellis.	Ellis	T 1,521 E 1,521	3,461
NW., NE. ¼ SE. ¼ sec. 10	710	Sunburst Oil Co. Krueger No. 2.					
NE., NW. ¼ SW. ¼ sec. 11	349	Sunburst Oil Co. Krueger No. 1.	Aug. 16, 1923	Dry	Madison	T 1,571 E 1,526 S 1,300	3,508
S., SE. ¼ NE. ¼ sec. 12	1422	Big West Oil Co. Steele No. 5.	Aug. 20, 1927	do	do	T 1,455 E 1,350	3,450
SE., SE. ¼ NE. ¼ sec. 12	1404	Big West Oil Co. Steele No. 4.	Aug. 15, 1927	do	do	T 1,443 E 1,351	3,445
NE., NE. ¼ SW. ¼ sec. 12	1397	Sunburst Oil Co. Adams No. 3.	do	do	do	T 1,461 E 1,450	3,484
S., SE. ¼ SW. ¼ sec. 12	1463	Meows Oil Co. Adams No. 1.	Sept. 27, 1927	3M, stray 500, Ellis	do	T 1,448 E 1,429	3,527
NE., NW. ¼ SE. ¼ sec. 12	1395	Sunburst Oil & Refining Co. Adams No. 1.	Aug. 21, 1927	Dry	do	T 1,390 E 1,380	3,450
SE., NW. ¼ SE. ¼ sec. 12	1396	Sunburst Oil & Refining Co. Adams No. 2.	Sept. 4, 1927	do	do	T 1,370 E 1,359	3,451
NE., SW. ¼ SE. ¼ sec. 12	1428	Cooperative Petroleum Co. Adams No. 2.	Sept. 3, 1927	do	do	T 1,394 E 1,355	3,454
SW., SW. ¼ SE. ¼ sec. 12	84	Cooperative Petroleum Co. Adams No. 1.	Feb. 4, 1925	Show, Ellis	do	T 1,440 E 1,400 S 1,240	3,507
NE., NE. ¼ NE. ¼ sec. 13	1414	Meows Oil Co. Harte No. 1.	Aug. 27, 1927	Dry	do	T 1,461 E 1,361	3,472
N., NE. ¼ NW. ¼ sec. 13	1507	Hardrock Oil Co. Craig-Permit No. 1.	Feb. 4, 1928	¼ M, stray-180, Ellis.	do	T 1,547 E 1,492	3,569
S., NE. ¼ NW. ¼ sec. 13	913	Minot Oil Co. Craig No. 1.	July 3, 1926	Dry	do	T 1,475 E 1,422 S 1,190	3,504
SW., SW. ¼ NW. ¼ sec. 13	273	Ohio Oil Co. Sauby No. 1.	Jan. 23, 1923	7	do	T 1,395 E 1,393	3,476
SW., SW. ¼ SW. ¼ sec. 13	1100	Trapp Oil Co. Morton No. 2.	July 28, 1927	Dry	do	T 1,435 E 1,369	3,455
S., SW. ¼ SE. ¼ sec. 13	1376	Rice Oil Co. Morton No. 6.	Aug. 5, 1927	do	do	T 1,395 E 1,380	3,484
S., SE. ¼ SE. ¼ sec. 13	53	California Oil Co. Morton No. 2.	Oct. 24, 1922	do	Ellis	T 1,396 E 1,396	3,494
SE., SE. ¼ SE. ¼ sec. 13	52	California Oil Co. Morton No. 1.	Sept. 9, 1922	30, Ellis	do	T 1,373 E 1,373 K 810	3,492
SE., SE. ¼ SE. ¼ sec. 13	804	Liberty, et al. Morton No. 1.	May 16, 1926	Oil, Ellis [uu]	Madison	T 1,380 E 1,354 S 1,180	

[uu] Oil found at 1,350 feet. Well is about 20 feet south of old California Morton No. 1 well, which produced 4,832 barrels before it was abandoned.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 34 N., R. 2 W.—Continued							
NE., NE. ¼ NE. ¼ sec. 14	262	Ohio Oil Co. Jenkins No. 1.	Sept. 2, 1923	1 M, Ellis	Ellis	T 1,441 E 1,441 S 1,260	3,483
SW., SW. ¼ NE. ¼ sec. 14	971	Cagney-Sunburst Jenkins No. 2.	May 31, 1927	Dry	Madison	T 1,486 E 1,452	3,459
SW., NE. ¼ NE. ¼ sec. 15	432	Wells Oil Co. State No. 1.	June 24, 1925	do	do	T 1,492 E 1,462 S 1,224	3,438
N., NE. ¼ NW. ¼ sec. 17	28	Bill Thomas DeGroat No. 1.	Jan. 28, 1924	50, Ellis	do	T 1,532 E 1,466	3,438
NW., NE. ¼ NW. ¼ sec. 17	835	Wenonah-Sunburst Syndicate De Groat No. 2.	June 12, 1926	10, Ellis	do	T 1,465 E 1,442 S 1,198	3,405
NW., SW. ¼ SW. ¼ sec. 17	556	Valier Drilling Co. McGleen No. 1.	Oct. 6, 1926	Show, Ellis	do	T 1,568 E 1,522 S 1,280	3,435
NW., NW. ¼ SE. ¼ sec. 17	184	Mid-Northern Oil Co. Huestis No. 1.	July 1, 1923	Dry	do	T 1,502 E 1,470?	3,418
NE., SW. ¼ SE. ¼ sec. 17	110	Fonk et al Huestis No. 1.	Feb. 22, 1925	do	do	T 1,510 E 1,508 S 1,308	3,411
NE., NE. ¼ NE. ¼ sec. 18	917	Byorum Oil Co. Jensen No. 1.	June 26, 1926	Show, Ellis	Ellis	T 1,500 E 1,500 S 1,215	3,415
NE., NW. ¼ SE. ¼ sec. 21	212	Continental Oil Co. Kester No. 1.	Sept. 1, 1923	Dry	Madison	T 1,435 E 1,430	3,395
SE., SE. ¼ NW. ¼ sec. 23	1402	California Petroleum Corp. Dackseiner No. 1.	Aug. 10, 1927	do	do	T 1,500 E 1,378	3,451
NW., NE. ¼ NE. ¼ sec. 24	1314	Medford Oil Co. Morton No. 4.	July 5, 1927	20, Ellis	Ellis	T 1,368 E 1,368	3,500
SW., NE. ¼ NE. ¼ sec. 24	1042	Medford Oil Co. Morton No. 3.	May 24, 1927	Dry	Madison	T 1,495 E 1,381	3,501
E., NW. ¼ NE. ¼ sec. 24	914	Medford Oil Co. Morton No. 2.	June 2, 1926	25, Ellis	Ellis	T 1,370 E 1,370 S 1,170	3,498
SW., SW. ¼ SW. ¼ sec. 24	54	California Oil Co. Morton No. 3.	May 10, 1923	Dry	Madison	T 1,470 E 1,349?	3,491
NW., NW. ¼ NW. ¼ sec. 25	1114	Mouse River Oil & Gas Co. Moffat No. 1.	May 11, 1927	do	do	T 1,365 E 1,340	3,486
E., SE. ¼ SW. ¼ sec. 31	781	Sunburst Oil Co. Overby No. 1.	Mar. 24, 1926	do	do	T 1,600 E 1,575 S 1,336	3,491

NW., NW. ¼ NW. ¼ sec. 32	105	"56" Petroleum Corp. Murrils No. 1.	Oct. 29, 1924	do	do	T 1,648 E 1,610	3,465
SW., SE. ¼ SE. ¼ sec. 34	134	Hollingsworth-Green Schildts Schildts No. 1.	Dec. 18, 1922	Dry	do	T 1,538 E 1,525	3,468
T. 34 N., R. 3 W.							
W., SW. ¼ NE. ¼ sec. 5	98	Eagle Oil Co. Mary No. 1.	May 4, 1925	¼ M	Madison	T 1,735 E 1,693 S 1,422	3,365
N., NW. ¼ NE. ¼ sec. 10	399	Western Petroleum Exploration Co. Brumbaugh No. 1.	Sept. 14, 1924	Dry	do	T 1,570 E 1,550	3,329
NE., NE. ¼ NE. ¼ sec. 11	834	D. A. S. Oils Freemke No. 1.	May 11, 1926	5 M, Sunburst and Ellis.	do	T 1,560 E 1,510 S 1,256	3,381
SW., NE. ¼ NE. ¼ sec. 11	961	D. A. S. Oils Freemke No. 3.	Aug. 13, 1926	Dry	do	T 1,545 E 1,525 S 1,270	3,380
E., NE. ¼ NE. ¼ sec. 11	891	D. A. S. Oils Freemke No. 2.	June 5, 1926	3 M, Sunburst Show, Ellis.	do	T 1,550 E 1,535 S 1,258	3,383
E., NE. ¼ NE. ¼ sec. 25	121	Guarantee Oil Co. Lewis No. 2.	Aug. 29, 1923	Show, Ellis	do	T 1,576 E 1,556?	3,449
NE., NW. ¼ SE. ¼ sec. 25	120	Guarantee Oil Co. Lewis No. 1.	July 26, 1923	Dry	do	T 1,595 E 1,585 S 1,400	3,477
T. 34 N., R. 4 W.							
SE., SE. ¼ SW. ¼ sec. 11	47	California Oil Co. McDonald No. 1.	Sept. 4, 1923	Dry	Madison	T 2,053 E 1,987?	3,480
NW., NW. ¼ NW. ¼ sec. 25	188	James Miller No. 1.	1912	do	Ellis	T 1,755	3,354
T. 33 N., R. 1 E.							
NW., NW. ¼ NE. ¼ sec. 16	220	Continental Oil Co. State No. 1.	Nov. 24, 1924	Show gas, Ellis	Madison	T 1,705 E 1,650 S 1,435	3,438
C., NW. ¼ NW. ¼ sec. 36	415	"56" Petroleum Corp. Girth No. 1.	June 29, 1923	Dry	Ellis	T 1,803 E 1,803?	3,270
T. 33 N., R. 1 W.							
SE., SE. ¼ NE. ¼ sec. 3	344	Sunburst Oil Co. Seward No. 1.	Jan. —, 1924	Gas	Kootenai	T 1,205	
SW., SW. ¼ SW. ¼ sec. 12	111	Foster & Hull Larson No. 1.	Sept. 7, 1924	Water, Sunburst	Madison	T 1,550 E 1,504 S 1,250	3,377
C., SE. ¼ NW. ¼ sec. 19	1445	Northern Natural Gas Development Co. Cobb No. 1.	Sept. 26, 1927	Dry	Kootenai	T 1,245	3,375
C., SE. ¼ SW. ¼ sec. 19	1528	Northern Natural Gas Development Co. Swan Vine No. 1.	Dec. 4, 1927	6 M, Sunburst	do	T 1,254 S 1,209	3,363
C., SE. ¼ NE. ¼ sec. 20	107	Flood Watson Solid No. 1.	Sept. 23, 1924	10 M, Sunburst	Devonian	T 2,500 E 1,478 S 1,205	3,338

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Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 33 N., R. 1 W.—Continued							
NE., NE. ¼ NW. ¼ sec. 23	323	Shelby Oil & Gas Syndicate Webb No. 1.	1924	4½ M	Ellis	T 1,320 S 1,280	3,425
SW., SW. ¼ NE. ¼ sec. 27	337	Spokane-Sweetgrass Oil Co McGuire No. 1.	Jan. 27, 1923	1½ M, Sunburst	Madison	T 1,450 E 1,438 S 1,150 K 645	3,313
C., NW. ¼ NW. ¼ sec. 28	1394	Northern Natural Gas Development Co Peterson Permit No. 1.	Aug. 12, 1927	2 M, Sunburst	Kootenai	T 1,207 S 1,160	3,338
C., NW. ¼ NE. ¼ sec. 30	1424	Northern Natural Gas Development Co Edwards Permit No. 1.	Aug. 28, 1927	19½ M, gas	do	T 1,253 S 1,210	3,365
S., SE. ¼ SE. ¼ sec. 31	1512	Northern Natural Gas Development Co Parker No. 1.	Nov. 6, 1927	6 M, gas	do	T 1,303 S 1,275	3,360
T. 33 N., R. 2 W.							
N., NE. ¼ NE. ¼ sec. 1	1246	New Day Oil Co Speer No. 1.	May 18, 1927	3 M, Stray	Madison	T 1,650 E 1,346	3,415
SW., SE. ¼ SW. ¼ sec. 10	637	O'Neil Bros Coonrod No. 1.	Sept. 12, 1925	2 M, Sunburst and Ellis.[**]	do	T 1,583 E 1,575 S 1,315	3,409
NE., NW. ¼ NW. ¼ sec. 12	692	Ohio Oil Co Geist No. 1.	Oct. 20, 1925	Dry	do	T 1,419 E 1,409 S 1,165	3,387
SW., SE. ¼ NE. ¼ sec. 14	1485	Northern Natural Gas Development Co Flesch No. 1.	Sept. 19, 1927	2 M, Sunburst	Kootenai	T 1,279 S 1,238	3,432
SE., SE. ¼ SE. ¼ sec. 22	122	Gypsy Oil Co Nesbo No. 1.	Oct. 8, 1923	do	Madison	T 1,685 E 1,632 S 1,300 K 1,050	3,485
C., SE. ¼ NE. ¼ sec. 26	1444	Northern Natural Gas Development Co Holmes No. 1.	Sept. 5, 1927	Dry	Kootenai	T 1,333 S 1,325	3,426
C., NW. ¼ NE. ¼ sec. 33	1435	Northern Natural Gas Development Co Lutz No. 1.	Aug. 29, 1927	4½ M	do	T 1,483 S 1,448	3,515
NE., NW. ¼ SW. ¼ sec. 34	661	St. Paul Montana Oil Co Cox No. 1.	Oct. 16, 1925	14½ M, Sunburst	Madison	T 1,357 E 1,330 S 1,573	3,550
C., W. ½ SW. ¼ sec. 35	1369	Northern Natural Gas Development Co Kreitzberg No. 1.	Aug. 2, 1927	2½ M, Sunburst	Kootenai	T 1,496 S 1,461	3,516
NE., NE. ¼ NE. ¼ sec. 36	1005	Sunburst-Hewson State No. 1.	Oct. 16, 1925	10 M, Sunburst	Madison	T 1,615 S 1,318	----------

T. 33 N., R. 3 W.							
SE., SW. ¼ NW. ¼ sec. 12	780	Ohio Oil Co Rittanhouse No. 1.	Mar. 21, 1926	Dry	Ellis	T 1,700 E 1,686 S 1,438	3,413
T. 33 N., R. 4 W							
SE., SE. ¼ NW. ¼ sec. 2	756	Medilia Oil Co Schuler No. 1.	----------	5 M, Sunburst[**]	Ellis	T 2,000 E 2,000? S 1,673	3,360?
T. 32 N., R. 1 W.							
NE., NE. ¼ SE. ¼ sec. 1	199	Montana-Sweetgrass Sonstrud No. 1.	Nov. 27, 1922	Dry	Madison	T 1,581 E 1,560	3,289
NE., NW. ¼ NE. ¼ sec. 6	1324	Northern Natural Gas Development Co McLean Permit No. 1.	July 23, 1927	4 M, Sunburst	Kootenai	T 1,316 S 1,286	4,464
C., NW. ¼ NW. ¼ sec. 6	241	Ohio Oil Co Berg No. 1.	Nov. 10, 1922	7½ M	do	T 1,308 S 1,368 K 1,040	3,416
SW., NW. ¼ SW. ¼ sec. 6	242	Ohio Oil Co Berg No. 2.	Jan. 27, 1923	4 M	Madison	T 1,730 E 1,719 S 1,420 K 1,000	3,437
C., SE. ¼ SW. ¼ sec. 6	1503	Peterson et al McLean Permit No. 1.	Oct. 3, 1927	Dry	do	T 1,720 E 1,654	3,423
NW., NW. ¼ NW. ¼ sec. 15	1127	Sunburst Oil & Refining Co Monson No. 1.	May 13, 1927	do	Ellis	T 1,490 E 1,490	3,328
C., SE. ¼ SW. ¼ sec. 19	1258	Latah-Idaho Oil Co Neuman No. 1.	Aug. 12, 1927	11½ M, Sunburst	Madison	T 1,913 E 1,867 S 1,562	3,468
C., SE. ¼ SE. ¼ sec. 19	1563	Latah-Idaho Oil Co Riddle No. 1.	Apr. 26, 1928	5 M, Sunburst	do	T 1,863 E 1,830	3,433
SW., SW. ¼ SW. ¼ sec. 13	1001	Peterson et al Broderick No. 1.	Dec. 22, 1926	10 M, Sunburst	Ellis(?)	T 1,853 E 1,833 S 1,542 K 1,192	3,470
T. 32 N., R. 2 W.							
C., SE. ¼ SW. ¼ sec. 1	1325	Northern Natural Gas Development Co O'Hearn No. 1.	Aug. 21, 1927	5 M, Sunburst	Kootenai	T 1,475 S 1,430	3,461
SE., NE. ¼ SE. ¼ sec. 1	1548	Ohio Oil Co Sunburst No. 1.	Apr. 10, 1928	4½ M, Sunburst	do	T 1,438 S 1,396	
C., NE. ¼ SE. ¼ sec. 3	1353	Northern Natural Gas Development Co Schanil No. 1.	July 22, 1927	1¾ M, Sunburst	do	T 1,531 S 1,511	3,520
C., NW. ¼ SE. ¼ sec. 11	1289	Northern Natural Gas Development Co N. Rice No. 1.	June 28, 1927	5¾ M, Sunburst	do	T 1,542 S 1,520	3,485
NW., NW. ¼ SW. ¼ sec. 13	1251	East Chicago Oil Co Hunter No. 1.	June 18, 1927	9 M, Sunburst	do	T 1,545 S 1,520	3,469
C., SE. ¼ SE. ¼ sec. 14	1341	Northern Natural Gas Development Co McAdoo No. 1.	July 22, 1927	7¾ M, Sunburst	do	T 1,590 S 1,564	3,493

[**] Gas at 1,295 and 1,360 feet.

[**] Salt water at 2,150 and 2,207 feet.

Wells on the Kevin-Sunburst dome, Montana—Continued

Location (see fig. 3)	Well No.	Oil company and name of well	Date of completion	Initial daily production and source	Formation reached	Depth (feet)	Altitude of surface (feet)
T. 32 N., R. 2 W.—Continued							
NE., SW. ¼ NE. ¼ sec. 21	305	Regina-Shelby Syndicate State No. 1.	Aug. 28, 1923	Dry	Madison	T 1,705 E 1,700 S 1,426 K 1,048	3,278
SW., SW. ¼ SW. ¼ sec. 31	991	Zenith Oil Co. Orcutt No. 1.	Sept. 9, 1926	Shows of gas [zz]	Madison(?)	T 2,217 E 2,202 S 1,900 K 1,505	
T. 32 N., R. 4 W.							
W., SW. ¼ SW. ¼ sec. 2	226	No Jack Oil Co. Buckner No. 1.	Dec. 2, 1923	Dry	Ellis	T 2,370 E 2,370 K 1,635	3,558
T. 32 N., R. 3 W.							
NE., NE. ¼ NW. ¼ sec. 4	940	Shields Valley Oil & Gas Co. Petters No. 1	Aug. 11, 1926	Dry	Madison	T 2,110 E 2,096 S 1,815	3,585

[zz] Show of gas at 1,305 and 1,370 feet.

PRODUCTION OF OIL

By January 1, 1926, the total gross pipe-line runs for the Kevin-Sunburst field, as given by the Illinois Pipe Line Co., amounted to 4,133,518 barrels. This is somewhat less than the total production of the field, for it does not take into consideration the oil handled by several smaller pipe lines and refineries and the oil consumed at the wells. The wells listed as producers number 444, which makes an average production of about 9,310 barrels to the well. If half the oil recoverable by present methods has been taken from the wells and if, as seems doubtful, the other half still left in the ground is to be pumped out in the next several years, the average total production for these wells would be about 18,000 barrels. As the total number of dry holes and producers on January 1, 1926, was 750, the average production per well for the field would be about 11,000 barrels. Wells drilled and equipped in the Kevin-Sunburst dome cost on an average a little less than $10,000 each, and the posted price of oil January 1, 1926, was $1.15 a barrel. What the future production of the Kevin-Sunburst dome may be can not be predicted, but to the writer it seems certain that within the next 10 years the field will be rather thoroughly drilled, especially if in that time the price of crude oil should rise to as much as double the present price.

The flowing wells of large initial production, yielding 1,000 barrels or more daily, commonly decline to about one-third of the initial production by the end of the first month and to about one-tenth of it by the end of the first year, after which the decline is more gradual, and the well may be pumped for several years before the production becomes too small to justify pumping. The wells of smaller production from the basal "sand" of the Ellis formation must be pumped from the start, and their decline curves are somewhat like those of the large wells after the flush production has been exhausted. The decline of the wells producing from the Sunburst sand is usually not so rapid as that of wells producing from the base of the Ellis.

The flush production of a well depends largely upon the gas pressure, and if this is released too suddenly the well will decline very rapidly. If the production is pinched down to about one-fourth of the normal, the decline curve will be greatly modified, and probably a much larger amount of oil may be produced before pumping is necessary. An estimate by R. D. Ferguson, of the Geological Survey's engineering staff, who was stationed at Shelby during the summer of 1925, puts the economic life of an average oil well in the Kevin-Sunburst field at 8 to 10 years.

Figure 4 shows the composite decline curves of three leases for which the production records are believed to be sufficiently accurate and complete to show the rate of decline with fair precision. In this

figure the space allotted for the number of barrels decreases progressively from the bottom to the top of the column, so that the space occupied by the first 1,000 barrels is equal to that occupied by 10,000 barrels higher in the column. A shows the production curve on

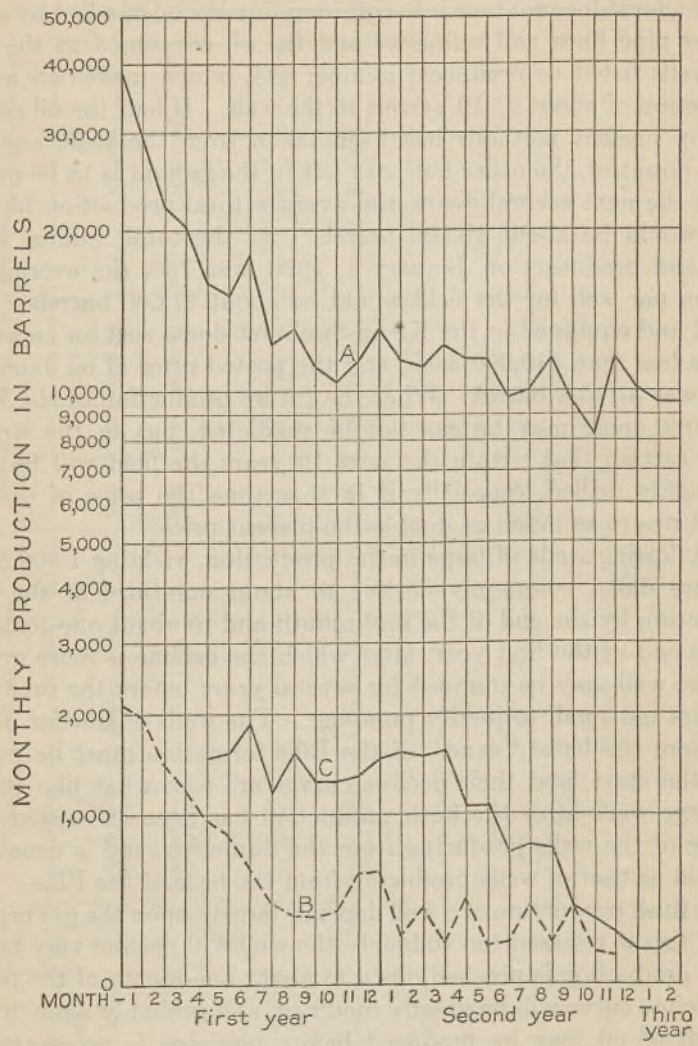

FIGURE 4.—Decline in production of three leases in the Kevin-Sunburst oil field, Montana

seven wells of one of the most productive leases of the oil field; B shows the decline curve of two average wells producing from the basal "sand" of the Ellis formation; and C gives the curve on a lease for two average wells drilled to the Sunburst sand.

PROBABLE RESULTS OF FUTURE DRILLING

Owing to the extremely variable nature of the oil "sands" of the Kevin-Sunburst field, it is probably impossible to estimate from the thickness of the oil sand the quantity of oil held in the ground. The estimates here given may prove to be much too small, but they are presented to afford a conservative guide to the probable total yield of the field. They were made by considering the production of the several townships and assuming that future production will be like that shown by the wells already drilled.

Developments indicate that about seven sections in T. 36 N., R. 2 W., will produce some oil. In these sections 21 wells had been drilled prior to January 1, 1926, 15 of which had been productive, yielding about 172,000 barrels of oil, or about 11,000 barrels to the well. The seven sections would, if fully drilled according to the spacing of the wells now prevailing in the field, accommodate 1,008 wells, about one-half of which could be expected to be productive, yielding an estimated average of at least 5,000 barrels, or a minimum total of 2,000,000 barrels.

Parts of about ten sections in T. 35 N., R. 1 W., have been found productive. Four of these sections have been very actively drilled on account of the large production obtained in them. About 170 wells in these four sections had produced over 1,200,000 barrels of oil on January 1, 1926, or about 7,000 barrels each, and it seems probable that if all the available locations in these sections were drilled the wells would average at least 7,000 barrels, or a total of 4,000,000 barrels or more. Half of the wells on the remaining six sections will probably produce a minimum average of 5,000 barrels, or a total of 2,000,000 barrels. The township can thus be expected to produce at least 6,000,000 barrels of oil.

Development has extended over pretty nearly the whole of T. 35 N., R. 2 W. On January 1, 1926, 310 wells had been drilled in the township, of which about 200 were rated as producers. The production to that date was nearly 2,000,000 barrels, or 10,000 barrels to the well. The present spacing of the wells allows 5,184 to the township. If half of these wells were dry and the other half were to make an average of only 5,000 barrels each, the township could be expected to produce at least 13,000,000 barrels of oil.

The productive part of T. 35 N., R. 3 W., consisting of about 20 sections, had been tested by only 34 wells on January 1, 1926, a little more than half of which are listed as productive, but no large wells are included. Probably not more than one-fourth of the 2,880 locations in this area will yield as much as 5,000 barrels of oil to the well. This would make a total of about 3,600,000 barrels, and the total production may actually prove to be less than that amount.

By the first of May, 1928, T. 34 N., R. 1 W., had been tested by about 75 wells, most of which were in the northwestern part. About four-tenths of these wells are rated as oil wells, including four which had an initial daily production of more than 1,000 barrels. The total production of the township will probably be at least 2,000,000 barrels.

T. 34 N., R. 2 W., includes an area of large initial production in secs. 4 and 5, which on January 1, 1926, had yielded a little over 1,000,000 barrels. Outside of these two sections the area of possible production comprises about ten sections, or 1,440 well locations, not more than one-fourth of which is expected to yield as much as 5,000 barrels to the well. The production of this township will probably be at least 3,000,000 barrels.

From the foregoing figures it seems evident that the field may safely be expected to produce a total of 25,000,000 to 30,000,000 barrels of oil. Should more areas of large initial production be struck, should deeper productive beds be found, or should the limits of the field as now known be enlarged the estimate given above may prove to be much too low. An inspection of the map showing the distribution of the wells indicates that other areas of large initial production may be found and that the drilling of wells outside of the limit given in this paper for the producing field on January 1, 1926, may possibly be successful.

An estimate based on the number of wells that had been drilled prior to January 1, 1926 (about 750), the quantity of oil obtained (4,133,518 barrels), and the assumption that the oil produced is one-half of the total production to be expected from these wells indicates that the wells drilled to that date will produce a rough average of 11,000 barrels to the well. With oil at the price prevailing on January 1, 1926, only the areas of high initial production can be worked at a profit, the larger low-grade areas being left until higher prices are obtainable.

PRODUCTION OF GAS

Up to January 1, 1926, oil and not gas had been the objective of the explorations, but even so a productive gas field has been found on the south side of the dome, and considerable quantities of gas are produced along with the oil on the north side. Probably very few of the wells drilled to the basal "sand" of the Ellis formation have failed to find some gas at one or more horizons.

In the oil field on the north side of the dome a great deal of the gas is wasted in drilling and extracting the oil, but the larger flows of 1,000,000 cubic feet or more are generally used for fuel in drilling. The largest initial flow of gas reported on the north side of the dome is 8,400,000 cubic feet. The towns of Kevin, Sunburst, and Sweetgrass, near the oil field, can consume a moderate quantity of gas for

domestic use, and west of the oil field the larger and possibly more permanent town of Cutbank can be supplied if a pipe about 18 miles in length is installed. A well near the town of Kevin, completed in January, 1926, was drilled solely for gas.

On January 1, 1927, gas had been found in 12 wells on the south side of the dome, the estimated initial daily production of which ranged from 1,500,000 to 14,500,000 cubic feet. These large wells are in T. 32 N., R. 1 W.; T. 33 N., Rs. 1, 2, and 3 W.; and the south half of T. 34 N., R. 1 W.; in these townships only 16 wells had been drilled deep enough to reach the basal "sand" of the Ellis formation prior to January 1, 1926. Most of the gas has been found at or near the horizon of the Sunburst sand, but in two of the wells large flows are also reported from the basal "sand" of the Ellis formation. Two of the wells completed in 1922 in sec. 6, T. 32 N., R. 1 W., were connected with the town of Shelby by a pipe line about 5 miles in length early in 1923 and furnish the greater part of the fuel supply of the town.

In 1927, 16 wells were drilled to the Kootenai formation in T. 32 N., R. 2 W., and T. 33 N., Rs. 1 and 2 W., to develop a gas field for Great Falls. These wells included only two dry holes. They ranged in initial daily production from 1,750,000 to 19,500,000 cubic feet and averaged about 5,000,000 cubic feet. These wells together with scattering gas wells north and east of the area have demonstrated that the gas supply is ample not only for the towns near at hand but also for Great Falls, though they have not fixed the limits of the field. A pipe line has been laid to Great Falls, and before this report goes to press that city probably will be supplied with gas for heating. It is estimated that 10,000,000 feet a day will be consumed.

CHARACTER OF THE OIL

The crude oil from the basal "sand" of the Ellis formation is dark green, almost black, and has a specific gravity of 27.3° to 34° Baumé. It has a strong sulphur odor and a sulphur content of 1.35 to 1.38 per cent. The analyses show that it will yield from 12 to 23 per cent of gasoline. That from the Sunburst sand is lighter in color and lacks the disagreeable odor of the Ellis oil. Its sulphur percentage is from 0.96 to 1.10, and its gasoline content is from 25 to 28 per cent.

Six samples of the Kevin-Sunburst oil collected by the writer in 1922 and 1923 were submitted to the Bureau of Mines for analyses. Three samples represent the oil from the basal "sand" of the Ellis, but one of them, No. 00136, taken from the oil tank at the Campbell well, is probably not truly representative, for the well stood idle for three months before it was pumped and the sample contained a small

percentage of water. The other two came from the two large producers—the Ohio Baker No. 3 and the Mid-Northern Howling No. 3, each of which had an initial daily production of more than 1,000 barrels. The other three samples represent the oil from the Sunburst sand. No. 00137 was taken in 1922 from the Ohio Sunburst-Davey well No. 1, the second discovery of the field; No. 24153 came from a well in which both the Ellis and Sunburst sands are productive, and it may be a mixture of the oil from the two sands; No. 24152 represents the Sunburst sand. The results of the analyses follow.

Analyses of oil from Kevin-Sunburst field, Montana

No. 00136.—Gordon Campbell well No. 1, "Discovery well," sec. 16, T. 35 N., R. 3 W.

[Oil from basal "sand" of Ellis formation; depth of sand, 1,770 to 1,780 feet. Initial daily production, about 20 barrels. Specific gravity at 15° C., 0.891 (27.3° A. P. I., modulus 141.5). Water, 0.7 per cent; carbon residue, 9.06 per cent. Distillation in Bureau of Mines Hempel flask: Amount distilled, 200 cubic centimeters; first drop, 128° C.]

Temperature (° C.)	Air distillation, with fractionating column (barometer, 760 mm.)			Vacuum distillation, without column (pressure, 40 mm.)		
	Fraction (per cent by volume)	Sum (per cent by volume)	Specific gravity	Fraction (per cent by volume)	Sum (per cent by volume)	Specific gravity
125 to 150	2.5	2.5	0.754			
150 to 175	4.2	6.7	.774			
175 to 200	4.9	11.6	.796	5.7	5.7	0.868
200 to 225	6.0	17.6	.816	8.9	14.6	.883
225 to 250	6.7	24.3	.833	9.3	23.9	.899
250 to 275	6.8	31.1	.850	8.1	32.0	.907
275 to 300				8.2	40.2	.912

No. 24154.—Mid-Northern Howling well No. 3, sec. 9, T. 35 N., R. 2 W.

[Oil from basal "sand" of Ellis formation; depth of sand, 1,650 feet. Initial daily production, 2,000 barrels. Specific gravity, 0.871 (31° A. P. I.). Sulphur, 1.35 per cent; water, none; carbon residue, 6.9 per cent. Saybolt Universal viscosity at 70° F., 64 sec.; at 100° F., 50 sec. Pour point, below 5° F. Distillation in Bureau of Mines Hempel flask: First drop, 25° C.]

Temperature (° C.)	Fraction (per cent)	Sum (per cent)	Gravity		Viscosity	Cloud test (° F.)
			Specific	A. P. I. (°)		
Air distillation; barometer, 748 mm.						
Up to 50	1.1	1.1	0.660	82.9		
50 to 75	2.1	3.2				
75 to 100	3.3	6.5	.698	71.2		
100 to 125	3.9	10.4	.726	63.4		
125 to 150	4.1	14.5	.754	56.2		
150 to 175	4.3	18.8	.775	51.1		
175 to 200	4.5	23.3	.800	45.4		
200 to 225	4.7	28.0	.820	41.1		
225 to 250	5.7	33.7	.836	37.8		
250 to 275	6.1	39.8	.854	34.2		
Vacuum distillation; pressure, 40 mm.						
Up to 200	3.9	3.9	.880	29.3	43	Below 5.
200 to 225	7.1	11.0	.890	27.5	49	Below 5.
225 to 250	6.0	17.0	.909	24.2	68	22
250 to 275	5.9	22.9	.919	22.5	106	42
275 to 300	8.0	30.9	.922	22.0	214	60

Analyses of oil from Kevin-Sunburst field, Montana—Continued

No. 24154.—Mid-Northern Howling well No. 3, sec. 9, T. 35 N., R. 2 W.—Continued

APPROXIMATE SUMMARY

	Per cent	Gravity		Viscosity
		Specific	A. P. I. (°)	
Gasoline and naphtha	23.3	0.739	60.0	----------
Kerosene distillate	4.7	.820	41.1	----------
Gas oil	19.6	.860	33.0	----------
Nonviscous lubricating distillate	11.2	0.891–.917	27.3–22.8	50–100
Medium lubricating distillate	7.0	.917–.921	22.8–22.1	100–200
Viscous lubricating distillate	4.7	.921–.924	22.1–21.6	Above 200.

No. 24155.—Ohio Baker well No. 3, sec. 4, T. 35 N., R. 2 W.

[Oil from basal "sand" of Ellis formation; depth to top of sand, 1,685 feet. Initial daily production, 1,545 barrels. Specific gravity, 0.872 (30.8° A. P. I.). Sulphur, 1.30 per cent; water, none; carbon residue, 7.5 per cent. Saybolt Universal viscosity at 70° F., 67 sec.; at 100° F., 47 sec. Pour point, below 5° F. Distillation in Bureau of Mines Hempel flask: First drop, 25° C.]

Temperature (° C.)	Fraction (per cent)	Sum (per cent)	Gravity		Viscosity	Cloud test (° F.)
			Specific	A. P. I. (°)		
Air distillation; barometer, 748 mm.						
Up to 50	0.9	0.9	0.678	77.2	----------	----------
50 to 75	2.2	3.1				
75 to 100	3.3	6.4	.701	70.4	----------	----------
100 to 125	4.1	10.5	.727	63.1	----------	----------
125 to 150	3.8	14.3	.754	56.2	----------	----------
150 to 175	4.7	19.0	.774	51.3	----------	----------
175 to 200	4.1	23.1	.799	45.6	----------	----------
200 to 225	4.9	28.0	.820	41.1	----------	----------
225 to 250	5.2	33.2	.836	37.8	----------	----------
250 to 275	7.0	40.2	.855	34.0	----------	----------
Vacuum distillation; pressure, 40 mm.						
Up to 200	2.4	2.4	.879	29.5	41	Below 5.
200 to 225	7.5	9.9	.887	28.0	47	Below 5.
225 to 250	5.9	15.8	.905	24.9	66	22
250 to 275	7.0	22.8	.918	22.6	104	44
275 to 300	7.7	30.5	.923	21.8	198	60

APPROXIMATE SUMMARY

	Per cent	Gravity		Viscosity
		Specific	A. P. I. (°)	
Gasoline and naphtha	23.1	0.743	58.9	----------
Kerosene distillate	4.9	.820	41.1	----------
Gas oil	19.6	.861	32.8	----------
Nonviscous lubricating distillate	11.3	0.890–.917	27.5–22.8	50–100
Medium lubricating distillate	8.1	.917–.923	22.8–21.8	100–200
Viscous lubricating distillate	3.7	.923–.925	21.8–21.5	Above 200.

Analyses of oil from Kevin-Sunburst field, Montana—Continued

No. 00137.—Ohio Sunburst Davey well No. 1, "discovery well," sec. 34, T. 36 N., R. 2 W.

[Oil from Sunburst sand; depth of sand, 1,535 feet. Initial daily production, 175 barrels. Specific gravity at 15° C., 0.844 (36.2° A. P. I., modulus 141.5). Water, none; carbon residue, 7.2 per cent. Distillation in Bureau of Mines Hempel flask: Amount distilled, 200 cubic centimeters; first drop, 32° C.; water, none]

Temperature (° C.)	Air distillation, with fractionating column (barometer, 760 mm.)			Vacuum distillation, without column (pressure, 40 mm.)		
	Fraction (per cent by volume)	Sum (per cent by volume)	Specific gravity	Fraction (per cent by volume)	Sum (per cent by volume)	Specific gravity
Up to 50	1.1	1.1	0.661			
50 to 75	3.0	4.1				
75 to 100	3.2	7.3	.700			
100 to 125	5.1	12.4	.725			
125 to 150	4.7	17.1	.748			
150 to 175	5.8	22.9	.772	1.2	1.2	0.857
175 to 200	5.3	28.2	.789	4.1	5.3	
200 to 225	6.1	34.3	.803	8.2	13.5	.886
225 to 250	5.9	40.2	.820	6.4	19.9	.884
250 to 275	6.4	46.6	.836	6.9	26.8	.898
275 to 300				5.9	32.7	.906

No. 24152.—California Oil Co., J. J. Newman well No. 1, sec. 23, T. 35 N., R. 2 W.

[Oil from Sunburst sand; depth of sand, 1,277 feet. Initial daily production, 25 barrels. Specific gravity, 0.855 (34° A. P. I.). Sulphur, 0.96 per cent, water, none; carbon residue, 6.4 per cent. Saybolt Universal viscosity at 70° F., 52 sec.; at 100° F., 43 sec. Pour point, below 5° F. Distillation in Bureau of Mines Hempel flask: First drop, 58° C.]

Temperature (° C.)	Fraction (per cent)	Sum (per cent)	Gravity		Viscosity	Cloud test (° F.)
			Specific	A. P. I. (°)		
Air distillation; barometer, 747 mm.						
50 to 75	0.9	0.9	0.703	69.8		
75 to 100	2.6	3.5				
100 to 125	4.5	8.0	.725	63.7		
125 to 150	6.3	14.3	.747	57.9		
150 to 175	5.1	19.4	.769	52.5		
175 to 200	5.6	25.0	.788	48.1		
200 to 225	6.5	31.5	.805	44.3		
225 to 250	6.6	38.1	.821	40.9		
250 to 275	7.7	45.8	.838	37.4		
Vacuum distillation; pressure, 40 mm.						
Up to 200	4.9	4.9	.863	32.5	41	8
200 to 225	7.4	12.3	.871	31.0	46	30
225 to 250	7.2	19.5	.888	27.9	60	50
250 to 275	6.6	26.1	.900	25.7	90	70
275 to 300	6.4	32.5	.907	24.5	159	90

APPROXIMATE SUMMARY

	Per cent	Gravity		Viscosity
		Specific	A. P. I. (°)	
Gasoline and naphtha	25.0	0.750	57.2	
Kerosene distillate	13.1	.813	42.6	
Gas oil	18.6	.855	34.0	
Nonviscous lubricating distillate	11.9	0.876–.901	30.0–25.6	50–100
Medium lubricating distillate	8.7	.901–.910	25.6–24.0	100–200

Analyses of oil from Kevin-Sunburst field, Montana—Continued

No. 24153.—California Oil Co. M. M. Newman well No. 2, sec. 22, T. 35 N., R. 2 W.

[Oil from basal "sand" of Ellis formation and Sunburst sand; depth of sands, 1,100–1,120 and 1,391–1,400 feet. Initial daily production, 100 barrels. Specific gravity, 0.854 (34.2° A. P. I.). Sulphur, 1.10 per cent; water, none; carbon residue, 6.6 per cent. Saybolt Universal viscosity at 70° F., 52 sec.; at 100° F., 44 sec. Pour point, below 5° F. Distillation in Bureau of Mines Hempel flask: First drop, 26° C.]

Temperature (° C.)	Fraction (per cent	Sum (per cent)	Gravity		Viscosity	Cloud test (° F.)
			Specific	A. P. I. (°)		
Air distillation; barometer, 748 mm.						
Up to 50	1.0	1.0	0.658	83.6	----------	----------
50 to 75	2.4	3.4			----------	----------
75 to 100	3.6	7.0	.696	71.8	----------	----------
100 to 125	4.8	11.8	.724	63.9	----------	----------
125 to 150	4.9	16.7	.748	57.7	----------	----------
150 to 175	4.3	21.0	.771	52.0	----------	----------
175 to 200	4.8	25.8	.792	47.2	----------	----------
200 to 225	4.9	30.7	.809	43.4	----------	----------
225 to 250	5.3	36.0	.825	40.0	----------	----------
250 to 275	7.1	43.1	.843	36.4	----------	----------
Vacuum distillation; pressure, 40 mm.						
Up to 200	4.7	4.7	.869	31.3	42	Below 5.
200 to 225	6.9	11.6	.877	29.9	48	28
225 to 250	6.3	17.9	.896	26.4	63	44
250 to 275	5.7	23.6	.907	24.5	95	64
275 to 300	7.3	30.9	.913	23.5	177	80

APPROXIMATE SUMMARY

	Per cent	Gravity		Viscosity
		Specific	A. P. I. (°)	
Gasoline and naphtha	25.8	0.736	60.8	----------
Kerosene distillate	10.2	.817	41.7	----------
Gas oil	16.2	.859	33.2	----------
Nonviscous lubricating distillate	12.1	0.879–.908	29.5–24.3	50–100
Medium lubricating distillate	9.7	.908–.916	24.3–23.0	100–200

The pipe lines pay a uniform rate for all the oil of the field regardless of its source, but if the higher-grade oil were more abundant a higher price would have to be paid for it. The posted price on January 1, 1926, was $1.15 a barrel, and on March 6, 1928, $1.50 a barrel. The oil from the field in general must be freed from sulphur in the refineries and on this account is not quite so valuable as that from many other fields. Much of the gasoline produced at local refineries in the field has contained much of the sulphur and in consequence has had a disagreeable odor.

CHARACTER OF THE GAS

The gas from the horizons above the Madison limestone is all, so far as known, of approximately the same character. An analysis of a sample of the gas from the Sunburst sand at a depth of 1,204–1,225 feet is given below through the courtesy of the Bureau of Mines:

Analysis of gas from a well in sec. 34, T. 35 N., R. 2 W.

[Analyst, H. S. Kennedy, Bureau of Mines]

	Per cent
CO_2	1. 91
O	. 37
CH_4	90. 32
C_2H_6	4. 60
N	2. 80

In one well, a flow of gas of a different character was struck at a depth of 3,250 feet in Ordovician or Upper Cambrian dolomitic limestone. Two samples of this gas were analyzed by Mr. Kennedy, with the results given below.

Analyses of gas from deep test well in sec. 21, T. 34 N., R. 1 W.

[Analyst, H. S. Kennedy, Bureau of Mines]

	Dec. 23, 1925	Nov. 3, 1924
CO_2	9. 48	[a]11. 12
O_2	0. 63	2. 61
CH_4	3. 23	7. 22
C_2H_6	6. 45	7. 48
N_2	80. 21	71. 57

[a] CO_2+H_2S.

The high percentage of nitrogen in this gas suggests that it may be derived from rocks associated with an igneous intrusion,[33] probably a laccolith situated somewhere below the basal sandstone or quartzite of the Cambrian, or more probably that it is a pocket of residual air trapped and buried, possibly in beds of nonmarine origin.

ERRATIC OCCURRENCE OF THE OIL

Oil in the basal "sand" of the Ellis is very irregularly distributed, without any system that can be detected from a study of the surface. Many of the large wells in the field, having initial yields above 100 barrels a day, are offset by wells 440 feet away, that are dry or have only a small production. For some of the wells this unfavorable result is known to be due to the release of the gas pressure in the first well drilled, but generally the wells appear to be wholly independent of each other. A group of wells drilled around a section corner may include one well yielding a small oil production, offset by three dry holes. Very little can be predicted from proximity to a producing well as to the probability of success in any particular area, and according to the popularly expressed opinion "all the wells are wildcats."

This uncertainty is probably due, in part at least, to the irregular surface of the Madison limestone and the uncertain character of the

[33] Clarke, F. W., The data of geochemistry, 5th ed.: U. S. Geol. Survey Bull. 770, pp. 262, 275, 1924.

soil or other material making up the basal "sand" of the Ellis at the contact of the Ellis and Madison formations. In some places the wells may strike buried channels in the limestone which are filled with porous material; in other places channels are absent, and the Ellis and Madison limestones are almost in contact, or, if they are separated, the soil and other material at the contact may not be porous. An example of a buried channel is probably presented by the Big West Steele No. 2 well, in sec. 2, T. 34 N., R. 1 W., in which a large quantity of more or less rounded gravel containing water and some oil was found. In the Hardrock Craig No. 2 well, in sec. 13, T. 34 N., R. 2 E., drilled in 1928, a similar occurrence is reported. In places where the Madison limestone was more resistant to erosion or was left at a slightly higher level for any cause the basal "sand" of the Ellis is likely to be thin, but such places can not be detected from the surface, and the graphic well logs given in Plate 17 do not indicate any large area of this kind. Such high places are presumably the results of unequal erosion on a nearly base-leveled surface. The thinness or thickness of the basal "sand" of the Ellis is only one of the factors controlling production. If the Ellis formation above the basal "sand" is, as it appears to be in the southwestern part of T. 35 N., R. 1 W., composed of very porous limestone, the high places in the Madison limestone may be the most productive. In a few wells the basal "sand" of the Ellis is nearly dry, but oil is found in the Madison limestone near its top, perhaps in cavernous places. Two wells in sec. 18, T. 34 N., R. 1 W., have a small production from a bed within 68 feet of the top of the Madison, and one well in sec. 17, T. 35 N., R. 2 W., had an initial daily production of 3,000 barrels from a bed about 86 feet below the top of the Madison limestone.

POSSIBLE EFFECT OF FAULTING ON THE DISTRIBUTION OF THE OIL

The distribution of the oil may be due in part to its source and method of migration. The small fissures noted in the Troy-Sweetgrass well may be parts of fracture zones or even faults which reach down into the Devonian formation and through which the oil reported in that formation may have collected at the base of the Ellis formation. If this could be definitely proved to be the source and method of migration of the oil, it would in part account for the unequal distribution of the oil, the larger wells being located near the more open fissures, the small wells being farther laterally from the fissures, and the barren areas representing places far removed from fissures or fractures.

WATERS ASSOCIATED WITH THE OIL

The waters associated with the oil in the Kevin-Sunburst field are believed to have been relatively stationary since the accumulation

of the oil, such lack of circulation being perhaps due to the great Lewis thrust fault along the Rocky Mountain front, about 75 miles to the west, or to the intermediate belt of highly folded and faulted rock, either of which may have sealed the strata of the Sweetgrass arch against the invasion of surface water from the west.

Some waters may have invaded the Kevin-Sunburst field from the Little Belt Mountains on the south, a part of this water perhaps flowing northwestward along the west side of the Teton Ridge anticline to the Conrad saddle and then eastward across the arch. Owing to the varying porosity of the basal "sand" of the Ellis formation it seems hardly possible that even where water flushing was active all parts of this "sand" could be swept clear of oil by circulating waters. In the writer's opinion, therefore, more or less oil may be irregularly distributed over considerable areas of the Sweetgrass arch outside of the present Kevin-Sunburst field.

The waters present in the Kevin-Sunburst field commonly contain more or less hydrogen sulphide gas, which gives them a characteristic disagreeable "sulphur" odor, and analyses of the water show that it is a somewhat modified sea water that was presumably buried with the sedimentary rocks in which it is now found.

Six analyses of the waters associated with the oil in the Kevin-Sunburst dome are given in Plate 18. Four of these samples were taken from the basal "sand" of the Ellis formation, one from the Sunburst sand, and one from the Colorado shale. The analyses show that among the salts contained sodium chloride, or common salt, predominates, though the waters from the basal "sand" of the Ellis formation are described by the drillers as sulphur water on account of the odor. An analysis of water from approximately the same horizon as the basal "sand" of the Ellis but in the Bowdoin dome is given for comparison with the Kevin-Sunburst analyses. The well from which the last-mentioned sample was taken had a much larger flow than the Kevin-Sunburst wells, and the water is essentially a sulphate water. Sulphate water entering the basal "sand" of the Ellis in the Little Rocky Mountains may have partly displaced the salt water.

POSSIBLE SOURCES OF THE OIL

The oil produced in the Kevin-Sunburst dome is found entrapped along the unconformity between the Madison and Ellis formations; at various horizons called "stray sands" in the Ellis formation above its base, in the Sunburst sand, averaging 238 feet above the base of the Ellis; and in the Madison limestone near its top. The oil from the base of the Ellis formation has a strong sulphur odor and contains about 1.3 per cent of sulphur. As a general rule the oil from the higher beds is free from the sulphur odor, has a lower specific

gravity, and is of better quality than that from the contact of the Madison and Ellis formations.

Disseminated oil and some showings of gas are found in the upper part of the Colorado shale, but owing to the compact, impervious nature of the shale and the absence of sands of more open texture, commercial pools of oil have not been found in the upper part of the Colorado and probably are not to be expected in it. Sandstone layers suitable for oil and gas pools are abundant in the Blackleaf sandy member of the Colorado shale and in the Kootenai formation, and showings of oil and gas from these layers are reported in many wells. These formations are made up largely of fresh-water sediments and probably do not contain as much disseminated oil as marine formations. Nevertheless, the Sunburst sand, at the base of the Kootenai formation, carries some productive pools of oil or gas on the Kevin-Sunburst dome, and large flows of gas have been found in both the Blackleaf member and the Kootenai formation.

The Ellis formation was laid down in a sea which advanced over the eroded surface of the Madison limestone and in the vicinity of the Kevin-Sunburst dome consists mainly of compact limy shale in which porous beds are rare. Porous beds, however, are commonly found at the contact of the Ellis and Madison, owing to the weathering of the Madison limestone and to the nature of the débris incorporated in the basal part of the Ellis. The beds at this very variable horizon constitute the basal "sand" of the Ellis formation, from which most of the Kevin-Sunburst oil is obtained. The Ellis formation contains fossil remains of marine animals and plants deposited in a rather shallow sea richly charged with lime. Samples of drill cuttings show that parts of the Ellis contain a considerable quantity of disseminated oil, and the formation might have been the source of the oil that is now being produced.

A part of the oil usually credited to the base of the Ellis formation is probably held in the cavernous weathered top of the Madison limestone. Such occurrences are probably only phases of the accumulation of the Ellis oil and may not be indicative of its source.

Showings of oil have been found in small vertical fissures in the normally compact Madison limestone, and parts of the Madison core of the Troy-Sweetgrass well had the pronounced disagreeable sulphur odor characteristic of much of the Kevin-Sunburst oil.

A considerable quantity of black, heavy, "dead" oil is reported to have been found near the base of the Madison limestone in the Dry Fork well, north of Conrad, in sec. 2, T. 28 N., R. 3 W. Showings of oil and hydrocarbon gas as well as disseminated oil are reported from the Devonian rocks penetrated by the Troy-Sweetgrass and Frazier wells, in the Kevin-Sunburst field, and the Bearsden well, northeast of

East Butte. The Athabaska tar sands, 400 miles north of the Kevin–Sunburst oil field, which lie just above the Devonian, the oil found at points farther north in Canada; and the oily odor found in the Devonian limestone of the Little Rocky Mountains all lead to the belief that the Devonian contains a considerable quantity of oil and may possibly be the source of the oil of the Kevin-Sunburst field.

Considering the great thickness of the Madison, the oil found in the Ellis formation, if derived from it, may have been greatly concentrated. If the oil was derived from the Devonian rocks it must have migrated upward at least 800 feet, presumably through fractures in the massive hard Madison limestone. It is possible that the Madison limestone does not extend far north, on account of erosion or nondeposition, and that the oil there migrated from the Devonian to the base of the Ellis formation and thence southward along the unconformity for many miles.

After deposition, pressure would drive the oil from the shale to the more open-textured rocks, where if water were absent it would sink down and accumulate in the lowest places available. If water were present under a hydrostatic head the oil would rise into the highest openings available, moving along bedding planes to the tops of domes or anticlines; or if the overlying impervious rocks were fissured or faulted it might cross the bedding planes to higher sands. The presence of artesian water in the Madison limestone in many of the wells of the Kevin-Sunburst field makes it seem improbable that oil from the Kootenai or Colorado formations could have migrated downward and accumulated in the Ellis shale. The oil therefore apparently originated in the Ellis formation or in the formations below it.

As disseminated oil is found in each of the formation of the field, the oil under discussion probably originated in the Ellis formation and was forced by pressure into the more open-textured rocks near at hand. The unconformity at the base of the Ellis offered the largest cavities; the Sunburst sand, at the base of the Kootenai was a thicker but less porous rock. Owing to the diverse nature of the Ellis formation from place to place and the varying porosity of the reservoir rocks, the quantities of oil held at these horizons would also vary. The two distinct grades of oil may be due to the fact that below the Ellis formation all the water contains some sulphur and has a sulphur odor, whereas above it most of the water is free from sulphur. The reaction of sulphur water and oil probably affected the character of the oil.

POSSIBLE OIL SANDS IN THE PALEOZOIC ROCKS

The drill core of the Troy-Sweetgrass well, in sec. 21, T. 34 N., R. 1 W., completed in 1922, indicated a possibility of finding oil either in the Madison limestone (Mississippian) or in the Devonian rocks, but it failed to show any sands in these formations which could be expected to serve as reservoirs. Attempts to find commercial quan-

tities of oil in lower formations than the Ellis were made in 1925 near the top of the Kevin-Sunburst dome, in sec. 21, T. 34 N., R. 1 W.; sec. 17, T. 35 N., R. 1 W.; and sec. 20, T. 33 N., R. 1 W. The Dry Fork well, in sec. 2, T. 28 N., R. 3 W., completed in 1923, which is reported to have found a small quantity of oil in the Devonian or perhaps in the Madison limestone, also suggests the possibility that oil may be found in one of these lower formations, though the wells so far drilled to those formations have failed to find more than traces of gas and oil.

Three wells drilled in 1925 and 1926 apparently found commercial quantities of oil in the Madison limestone less than 100 feet below the Ellis formation. These wells—the Ohio-Johnson No. 1 and Queen City-Hanna No. 1, in sec. 18, T. 23 N., R. 1 W., and the O'Neil-Lashbaugh No. 5, in sec. 27, T. 35 N., R. 2 W.—struck the oil at 14, 29, and 86 feet respectively below the Ellis, probably in parts of the limestone made porous by solution. Presumably the oil is similar in origin to that found in the Ellis. The discovery of a 3,000-barrel initial production at a depth of 86 feet below the top of the Madison will undoubtedly lead to considerable deeper drilling and may result in finding a lower oil horizon of commercial importance, but it would probably not be found at a uniform depth in that formation, for the bedding and structure of the Madison are probably not conformable with those of the Ellis. Five wells have been drilled through the Madison limestone on the Kevin-Sunburst dome, and these wells may have been placed in unfavorable positions with regard to the deeper structure. Not more than 30 wells have been drilled as far into the Madison as the O'Neil No. 5 well, which penetrated it for 86 feet.

POSSIBLE DISCOVERY OF OIL AND GAS OUTSIDE OF THE PRESENT PRODUCING AREA

SWEETGRASS HILLS

The Sweetgrass Hills are a group of three separate laccolithic centers in the northern part of Toole County, Mont., near the international boundary.[34] The summit of each hill consists of one or more large masses of porphyry from which the sedimentary rocks dip away fairly steeply in all directions. In the sedimentary rocks near the buttes there are many dikes and sills of igneous rock, some of which are porphyritic and others, called minettes, have a dark color and a texture somewhat resembling that of mica schist. These dikes and sills are regarded as offshoots from the large masses of igneous rock, formed at the time of their intrusion or soon afterward. A laccolith is a peculiar type of igneous intrusion in which the molten rock,

[34] Kemp, J. F., and Billingsley, Paul, Sweetgrass Hills, Mont.: Geol. Soc. America Bull., vol. 32, p. 478, 1921.

instead of flowing out on the surface through dikes, stopped rising at one or more horizons in the sedimentary rocks and spread out mushroom-like between sedimentary beds, raising the overlying strata in dome-shaped uplifts.[35] Before erosion the sedimentary rocks probably formed nearly circular domes above the igneous cores, very much like the laccolithic domes south of the Little Rocky Mountains. Erosion has advanced far enough in the Sweetgrass Hills, however, to expose the laccoliths and to leave the upturned sedimentary rocks with their truncated edges exposed around the buttes. The sediments are broken and in places penetrated by plugs, sills, and dikes which may not be impervious to oil and gas and which may have altered the sedimentary rocks and destroyed or driven out of them any oil or gas that they may have contained originally. The best-known occurrences of oil in close proximity to igneous intrusive masses are in Mexico, and brief summaries of the conditions in such occurrences can be found in several handbooks of petroleum geology.[36] The beds cut by plugs and dikes in Mexico are not uplifted so much as those in Sweetgrass Hills. In all the known occurrences the oil is found in the sedimentary rocks at or near their contact with the igneous rock and in small quantities in the igneous rock itself, where evidently it collected after the igneous rock had cooled.

That metamorphic action has not been so intense near the Sweetgrass Hills as to destroy all the oil once present there is perhaps indicated, as the coal at the Piedmont mine, on the south flank of West Butte, near one of the laccoliths, has a carbon ratio (the fixed carbon as computed for the coal free from water and ash [37]) of about 60 per cent, which is slightly lower than what is regarded as the prohibitive ratio above which rocks can not be expected to yield oil. The effect of the igneous intrusions has probably not been great enough to destroy the oil already in the sediments, and moreover the intrusions have domed the sedimentary rocks and may have prepared them for holding large subsequent accumulations of gas or oil from the surrounding country.

An oil seep on the north flank of West Butte which has been known for many years was visited by W. A. English, of the United States Geological Survey, who reported [38] that the oil comes from a sand in the Colorado shale, which in a well 3 miles northeast of the seep and at the general plain level is found at a depth of 1,640 feet. Several

[35] Collier, A. J., and Cathcart, S. H., Possibility of finding oil in laccolithic domes south of the Little Rocky Mountains, Mont.: U. S. Geol. Survey Bull. 736, pp. 171–178, 1922.

[36] Day, D. T., Handbook of the petroleum industry, vol. I, pp. 64–67, New York, John Wiley & Sons, 1922. Emmons, W. H., Geology of petroleum, pp. 151–152, 1921.

[37] White, David, Some relations in origin between coal and petroleum: Washington Acad. Sci. Jour., vol. 5, No. 6, pp. 189–212, 1915.

[38] Stebinger, Eugene, Oil and gas in north-central Montana: U. S. Geol. Survey Bull. 641, pp. 88–89, 1917. (See also p. 289.)

wells, none of which reached deep enough to test the basal "sand" of the Ellis formation, had been drilled north of the Sweetgrass Hills before oil was discovered on the Kevin-Sunburst dome. The region is covered with glacial drift, and probably the geology was not known and the wells were located without reference to the structure. In the summer of 1923 two new wells were drilled to the Madison—one about 3 miles north of Whitlash, in sec. 18, T. 37 N., R. 4 E., and the other in sec. 12, T. 36 N., R. 5 E., on what is known as the Bearsden dome. The surface at the well north of Whitlash is covered with glacial drift, and the formation exposed was not determined, though the well probably started a little above the Virgelle sandstone. After passing through three gas sands in the Blackleaf sandy member of the Colorado shale, estimated to contain over 15,000,000 cubic feet of gas, a showing of oil which possibly would have yielded a small production was struck, either in the Kootenai or in the lower part of the Colorado formation. The well was continued until the Madison limestone was reached at 2,712 feet, finding the basal "sand" of the Ellis formation dry.

The Bearsden well started about 400 feet below the top of the Colorado shale. The Virgelle sandstone is exposed on the east, south, and north sides of the Bearsden dome, but on the southwest side the Colorado shale probably rises about a mile to Mount Lebanon, one of the large masses of igneous rock of East Butte, which is about a mile away. Plate 16 shows the Bearsden well in close proximity to Mount Lebanon. The log of the well shows that gas was struck at several horizons in the Colorado, Kootenai, and Ellis formations. The largest flow, estimated at 4,000,000 cubic feet daily, was struck near the base of the Ellis formation. Traces of oil in the Blackleaf sandy member of the Colorado shale had been found at a depth of 1,019 feet. The Madison limestone was struck at a depth of about 2,114 feet. The well was later drilled through the Madison limestone to the Devonian rocks at a depth of 3,290 feet, where, it is reported, more gas and a show of oil were found. Gas at several horizons is entrapped at this place, apparently on the flank of a dome which has been broken and sealed by a large mass of intrusive rock, probably a laccolith. If the Sweetgrass Hills were carefully mapped in close detail other places where similar conditions prevail might be found where oil rather than gas would be the more abundant hydrocarbon. In June, 1928, about 20 deep wells had been drilled around the Sweetgrass Hills, 10 of which are reported to have produced initially from 2,000,000 to 15,000,000 cubic feet of gas each. One of these wells, drilled on the "Flat Coulee structure" in sec. 10, T. 37 N., R. 5 E., is reported to have found oil in commercial quantities in the Kootenai and a strong flow of gas estimated at 15,000,000 cubic feet in the Ellis.

The total depth of this well is 2,970 feet. The top of the Colorado formation was reported at 498 feet. The well is situated about 1 mile north of a minette outcrop described by Kemp and Billingsley.[39]

TETON RIDGE ANTICLINE

The Teton Ridge anticline plunges from the exposures of the Madison limestone and older rocks in the Little Belt Mountains northwestward to the neighborhood of Bynum and Agawam. It is a pronounced anticline, the details of which are not well known because of its heavy gravel cover. Between Vaughn and Bynum at least six wells had been drilled prior to 1927 through the Ellis formation in the hope of finding oil, but without success, though traces of oil are reported to have been found in the Collins well and in one or more of the wells near Vaughn. A well drilled northwest of Bynum, in sec. 34, T. 27 N., R. 6 W., and completed in January, 1926, had a reported initial production of 1 barrel of oil from the base of the Ellis formation. This well is near the site of some shallow wells drilled in 1923, in which gas was found at a depth of about 700 feet below the top of the Colorado shale, the initial flow of one of which was estimated at 250,000 cubic feet a day. On the south, west, and north sides of this well the dips of the rocks indicate a dome, but on the east side there are no exposures. These dips, together with the discovery of gas, justified the drilling of the well to test the basal sand of the Ellis.

Attention was again called to Teton Ridge on July 21, 1927, by the successful completion of the Genou Oil Co.'s Speer No. 1 well in sec. 8, T. 25 N., R. 1 E., with a reported initial production of 30 barrels daily. The productive sand, called the Emrick sand in honor of E. B. Emrick, locator of the well, is believed to be in the Ellis formation about 100 feet below the horizon of the Sunburst sand and is reported to be a porous sand 34 to 72 feet thick. By April 23, 1928, the productive field had been extended about half a mile to the northeast by the drilling of three new wells, one of which is believed to have an initial production of about 100 barrels. The field takes its name from the original Bannatine well, in sec. 3, T. 24 N., R. 1 E.

On June 16, 1927, a well in sec. 17, T. 27 N., R. 4 W., brought in 3,500,000 cubic feet of gas from the Ellis formation at a depth of 2,065 feet and about 2 barrels of black oil from the Ellis-Madison contact. On March 14, 1928, the Fulton Petroleum Corporation, drilling in sec. 16 of the same township, struck about 1,000,000 cubic feet of gas at the Ellis-Madison contact at a depth of 2,018 feet and oil in the Madison at a depth of 2,085 feet. The oil flows

[39] Kemp, J. F., and Billingsley, Paul, Sweetgrass Hills, Montana: Geol. Soc. America Bull., vol. 32, fig. 5, 1921.

20 to 35 feet a day. These wells are in what is called the Pondera field.

Development has not gone far enough in these fields to indicate whether the oil occurs in small subsidiary domes or whether its occurrence is erratic, as in the Kevin-Sunburst dome. In the table of deep wells in the Sweetgrass arch outside of the Kevin-Sunburst dome showings of oil are noted in so many of the wells as to suggest that isolated oil pools may be found over a considerable area.

AREA BETWEEN THE SWEETGRASS ARCH AND THE ROCKY MOUNTAINS

The area between the west side of the Sweetgrass arch and the Rocky Mountain front has been described by Stebinger [40] and most of the anticlines have been noted. This area includes a belt of highly folded and faulted rocks which extends northward along the Rocky Mountain front and which is about 8 miles wide near its south end, near the Sun River, and 20 miles wide near the international boundary. East of this belt there is an area of nearly horizontal rocks which are tilted westward at an average angle of 2° to 3°. Since 1918, the date of Stebinger's last report on this region, attempts to find oil in commercial quantities have been made in T. 36 N., R. 12 W., in the disturbed belt; in T. 24 N., Rs. 6 and 7 W., in the Willow Creek anticline, a low fold in the area of flat-lying rocks; and in T. 20 N., R. 3 W., in the Crown Butte dome where the flat-lying rocks have been intruded by igneous masses.

In sec. 27, T. 36 N., R. 12 W., a well was reported as being drilled at a depth of 3,000 feet on June 6, 1925, with an oil showing at 2,750 feet. About 6 miles north of this well, in sec. 6, a well reached a depth of more than 2,000 feet and was abandoned as a dry hole in 1922. The beds in each of these localities are so greatly folded and faulted that it is impossible to state what formations were penetrated.

On the Willow Creek anticline, in T. 24 N., Rs. 6 and 7 W., three wells have been drilled, the deepest of which started in the Two Medicine formation and reached the Blackleaf sandy member of the Colorado shale at 3,519 feet. It would probably have reached the basal "sand" of the Ellis if drilled about 900 feet deeper, but that horizon was not known to be productive when drilling was in progress. The anticline appears to be worthy of a test by a well deep enough to reach the Madison limestone. If oil were found there it would justify a thorough study of the local reversed dips which Stebinger noted in the area of flat-lying rocks west of the Sweetgrass arch. If any of these areas are found to be oil bearing the result may be

[40] Stebinger, Eugene, Anticlines in the Blackfeet Indian Reservation, Mont.: U. S. Geol. Survey Bull. 641, pp. 281–305, 1916; Oil and gas geology of the Birch Creek-Sun River area, northwestern Montana: U. S. Geol. Survey Bull. 691, pp. 149–184, 1918.

accepted as indicating that the circulation of the underground water is impeded by the belt of disturbed rocks on the west.

The Sand Point-Berger No. 1 well, in sec. 1, T. 35 N., R. 5 W., may be in one of these small anticlines due to a local reversal of the general westerly dip. This well is reported to have found an encouraging show of oil in the Kootenai formation at a depth of 2,445 feet, about 8,000,000 cubic feet of gas in the Sunburst sand at 2,745 to 2,820 feet, and sulphur water in the base of the Ellis formation at 2,975 feet. If the depths and formations reached are correctly reported the top of the Madison limestone is about 600 feet lower than in the Campbell discovery well, or at an altitude of about 1,000 feet.

The Crown Butte dome, in Tps. 19 and 20 N., Rs. 3 and 4 W., is also on the west side of the Sweetgrass arch, but it is in the north margin of a large area in which the Cretaceous sediments have been affected by intrusions and probably extrusions of igneous rocks. A small part of a large sill of igneous rock caps the dome just above the Virgelle sandstone, and there is a dike of similar rock leading south toward a large intrusive mass called Birdtail Butte. The dome has been tested by two wells, the deeper of which started near the top of the Colorado shale and reached a depth of 2,230 feet. It is reported that this well stopped in the Blackleaf sandy member of the Colorado. The depth is sufficient, provided the beds are not disturbed, to reach the Kootenai formation within a few feet.

POSSIBLE OIL AND GAS OCCURRENCES NOT DIRECTLY CONTROLLED BY GEOLOGIC STRUCTURE

The facts that the best production of oil on the Kevin-Sunburst dome has been obtained on its north side 4 to 10 miles from its crest and that the crest is apparently almost barren of oil lead to the conclusion that the structure is not pronounced enough to collect the oil, that the sands vary greatly either in thickness or porosity from place to place, trapping the oil locally regardless of the structure, or that the oil has come from a lower source by way of fissures and that the pools are related to these fissures rather than to any structure observable at the surface and hence can not be found except by the drill. Any one of these conditions may be responsible for the apparently erratic occurrence of the oil in the Kevin-Sunburst dome, and the drilling of many other wells where no structural disturbance is apparent, though highly hazardous, may lead to further discoveries.

The Beck well, in sec. 18, T. 32 N., R. 4 E., is so far down on the east flank of the Kevin-Sunburst dome that it could not have collected gas or oil on account of that dome, and yet the drill found a large but as yet undetermined quantity of gas, probably in the basal "sand" of the Ellis formation. No minor structural feature capable of holding gas or oil can be positively recognized at this well, for the surface is deeply covered by glacial drift.

At the Genou well, in sec. 21, T. 26 N., R. 4 E., a strong showing of oil is reported in the basal "sand" of the Ellis. This well is near the bottom of a long structural slope leading northward from Great Falls, and there is no evidence of a local fold to explain the presence of the oil.

The McQue well, in the NW. ¼ sec. 32, T. 26 N., R. 2 E., about 14 miles southwest of the Genou well, was completed in May, 1925. It ended at a depth of 1,985 feet, with limestone and shale at the bottom. It probably reached at least the basal "sand" of the Ellis formation. Water had been struck at two horizons in the Blackleaf sandy member of the Colorado, and at a depth of 1,770 feet water filled the hole. Coming with the water was a show of oil which rose in small globules and spread over the surface in thin, rainbow-like films.

The Montana Giant well, in sec. 30, T. 23 N., R. 4 E., about halfway between the Genou well and Great Falls, yielded much oil-bearing sand, but oil or gas in paying quantities was not found. The oil found in this sand may be a residue from migrating oil.

The Twenty Dollar Bill well, in sec. 9, and the Transcontinental well in sec. 8, T. 23 N., R. 9 E., each penetrated as far as the Madison limestone and in each some gas and showings of oil were reported, but both these wells are abandoned and are yielding large flows of sulphur water.

The Dry Fork well, in sec. 2, T. 28 N., R. 3 W., about 3 miles north of Conrad, is reported to have reached the Madison limestone at 2,140 feet, where sulphur water was struck. A strong flow of fresh water was reached at 2,620 feet, and a 27-foot sand was reported to have been reached at 2,620 feet, from which a small quantity of black sulphur-free oil was obtained. The oil rose from 40 to 60 feet in the hole during a night. The gravity of the oil is estimated at 20° to 25° Baumé. This oil must be either in a fissure in the Madison limestone or, as seems more likely, in a Devonian sandstone not found in the oil field. If it is in the Devonian the thickness of the Madison is not more than 600 feet at this place. The Dry Fork well is near a "low" area in the crest of the Sweetgrass arch, called by the writer the Conrad saddle. The top of the Madison limestone at the well is about 1,200 feet above the sea, whereas at the summit of the Kevin-Sunburst dome it is about 2,100 feet.

In the light of this evidence it will be necessary to drill many wildcat holes before many parts of the arch outside of the Kevin-Sunburst dome can be definitely declared to be barren. There are several entire townships in which no drilling has yet been done and in which some oil may possibly be found. Experience on the Kevin-Sunburst dome has shown that even should one well be barren, another well a short distance away may be productive, and also, unfortunately, that the contrary is equally true.