T. 26 N., R. 8 E.

By K. C. Heald and Kirtley F. Mather.

INTRODUCTION.

The greater part of the field work in T. 26 N., R. 8 E. (see fig. 1), was done by the writers during the months of June and July, 1917. D. E. Winchester and W. B. Emery collaborated in the mapping of the eastern part of the township. Plane-table and telescopic alidade were used throughout the area.

STRATIGRAPHY.

EXPOSED ROCKS.

GENERAL FEATURES.

The rocks exposed in this township are all of upper Pennsylvanian age and include sandstone, limestone, and shale. Sandstones and shales constitute the greater part of the exposed strata, but limestone beds occur at a number of horizons from the top nearly to the bottom of the section. Certain of these limestones are especially noteworthy for their conspicuous outcrops in many parts of the township. A generalized geologic section indicating the nature of the exposed rocks and the intervals between the successive beds of sandstone and limestone is presented in figure 39. The vertical intervals there recorded are approximate averages for the region under discussion; they vary somewhat from place to place throughout the township.

The geologic structure was determined from elevations taken on a great number of beds. Some of these have only a very local development, but others may be traced for long distances. The more persistent and helpful of these key beds are described briefly in the following paragraphs.

KEY BEDS.

Plummer limestone.—Throughout this township the Plummer limestone is an easily recognized and very persistent bed, 3 to 5 feet in thickness, occurring about midway between the Deer Creek and

Lecompton members of the Pawhuska limestone. It was named[1] from its occurrence near the Plummer ranch, in T. 26 N., R. 9 E., and has proved to be an excellent key bed throughout a considerable part of these two townships. Its top is about 20 feet below the top of the Deer Creek limestone, the most conspicuous member of the Pawhuska formation and the bed to which the name "Pawhuska lime" is ordinarily applied by commercial geologists working in this region. Good exposures may be observed almost anywhere in the southeastern part of T. 26 N., R. 8 E., a few feet below the rim of the inner valley of North Bird and Middle Bird creeks.

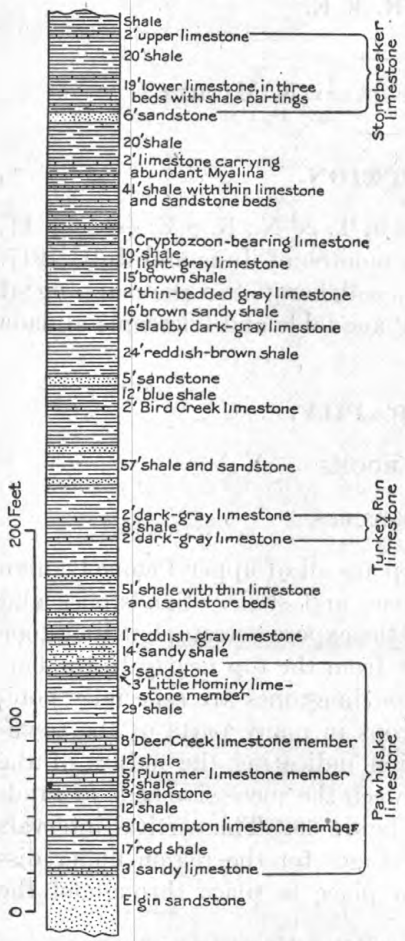

FIGURE 39.—Columnar section showing rocks exposed between the east and west margins of T. 26 N., R. 8 E.

This bed is at most localities a very hard, brittle fine-grained limestone, which weathers into large rectangular slabs 5 to 15 feet in length; these slabs sometimes slide unbroken down the slopes and may appear to be in place many feet below the actual cropping of the bed. The color of the weathered surface is dark brownish gray, spotted with limonitic stains; on freshly fractured surfaces the stone is lead-gray. The limestone is not conspicuously fossiliferous but in places contains brachiopod and other shells.

The Plummer limestone is readily identified because of its position, 10 to 18 feet below the ledge almost everywhere formed by the Deer Creek limestone. It was used as a key bed in preference to the higher and more conspicuous limestone because of the difficulty in ascertaining one's exact position with respect to any single horizon in the Deer Creek member. The top of that member is generally concealed somewhere along the gentle slopes on the surface of the intervalley table-lands that have resulted from the marked difference

[1] Clark, F. R., report on T. 26 N., Rs. 9, 10, and 11 E.: U. S. Geol. Survey Bull. 686–I, 1918.

in resistance to erosion offered by the limestone and the overlying shales. These upland flats are rimmed by conspicuous ledges of the Deer Creek limestone, but different beds within the member are the ledge makers at different places. The use of the Deer Creek ledge as a datum plane involves a possible vertical error of not less than 5 feet, whereas the upper surface of the Plummer limestone may be located quickly and accurately with a possible error of only a few inches.

Little Hominy limestone.—The Little Hominy limestone is a 3-foot bed, which in this township lies about 30 feet above the Deer Creek limestone. Typically it is light gray on weathered surfaces, somewhat darker where freshly broken, and very coarsely crystalline. In many places the uppermost 3 to 6 inches of this member consists of very impure conglomeratic limestone containing many shell fragments and worn pebbles of limy material. At certain localities *Fusulina*, brachiopods, gastropods, and other organisms are well preserved in this limestone, but at most places good fossils are lacking.

At some of its exposures the Little Hominy is unusually sandy, containing from 20 to 30 per cent of clear, glistening quartz grains. In places this proportion is greatly exceeded and it is impossible to separate the limestone from the overlying massive sandstone, a bed which in the absence of the Little Hominy limestone has proved very serviceable in detailed mapping. It is probable, too, that the abrupt disappearance of this limestone at many localities is due to its transition from a sandy lime into a calareous sandstone that is indistinguishable from the overlying sands. Good exposures may be observed on both sides of the north-south ridge in the middle of sec. 14, T. 26 N., R. 8 E., and on the hillside west of the road in the NW. ¼ sec. 35 and the SW. ¼ sec. 26.

Turkey Run limestone.—From 70 to 80 feet above the Little Hominy member of the Pawhuska limestone is a dark-gray limestone, 1 to 2 feet thick, to which the name Turkey Run limestone has been applied,[1] from its excellent exposures near the head of Turkey Run, in T. 24 N., R. 8 E. In the southern part of T. 26 N., R. 8 E., as well as in the townships farther south, this limestone is fine grained, thin bedded, hard, and brittle and weathers into smoothly rounded slabs a few inches in length. The weathered surface is generally light gray with many curving traceries and irregular patterns of darker gray or yellowish brown due to the fragments of brachiopod and gastropod shells, the margins of which are thus etched by weathering. On fresh fractures the color is a much darker blue-gray, at some localities almost black. Well-preserved fossils are extremely rare; in fact, this bed can most readily be distinguished from the

[1] Heald, K. C., and Mather, K. F., report on Tps. 24 and 25 N., R. 8 E.: U. S. Geol. Survey Bull. 686–M, 1919.

lithologically similar limestone 60 feet higher in the section by the absence of the brachiopod species commonly found in the higher bed.

In the central and northern parts of T. 26 N., R. 8 E., the Turkey Run limestone is split into two beds separated by 5 to 9 feet of limy shale. The lower bed is 2 or 3 feet thick and consists of rather soft oolitic limestone, which contains few fossils and weathers into thin slabby masses with a dark dirty-gray surface. On fresh fracture this limestone appears dark gray, with scattered blotches of limonitic material. The upper bed, the top of which is 81 feet above the top of the Little Hominy limestone, is hard, dense, and tough and weathers into solid chunks of irregular shape with sharp corners. Weathered surfaces are dirty gray with numerous irregular stains of yellow and brown limonite; freshly fractured surfaces are light gray with a lavender tinge. The bed is capped by about 2 feet of thin, slabby limestone or calcareous shale. Both beds are well exposed in the SW. ¼ sec. 22. Exposures in the NW. ¼ sec. 15, although more difficult of access, show the entire series of strata from the beds below the Little Hominy to the beds above the Bird Creek limestone.

Bird Creek limestone.—The next limestone above the Turkey Run bed, just referred to, has been named the Bird Creek limestone,[1] for there are many good outcrops along the headwaters of Bird Creek and its main branches in the township under consideration. Typical exposures occur along the south side of South Bird Creek in sec. 29 and on both sides of Middle Bird Creek in sec. 8. The interval between the Turkey Run and Bird Creek limestones varies between 55 and 65 feet within this township and is in general slightly greater in the northeastern part of the township than along the south margin, although it increases again in the townships farther south.

The Bird Creek limestone is in general appearance very similar to the Turkey Run limestone as it occurs in the vicinity of the southern boundary of T. 26 N., R. 8 E. The higher bed is only slightly darker than the lower and weathers into similar smoothly rounded slabs a few inches in diameter and with gray surfaces. On fresh fractures the stone appears dark blue-gray or almost black. It contains rather abundant remains of the brachiopod *Enteletes hemiplicata*, specimens of which may generally be found by breaking up the weathered fragments at any outcrop. In the region under discussion the presence of this fossil has proved to be diagnostic of this limestone.

The Bird Creek limestone is only a foot or two in thickness, and on many gentle hill slopes it remains entirely concealed beneath the grass-covered soil for long distances along its line of of outcrop.

[1] Heald, K. C., and Mather, K. F,. op. cit.

Under these conditions, where float from this limestone can be discovered by careful search only at intervals of a hundred yards or so, its position may frequently be traced by its effect upon vegetation. Brown patches of sun-burned grass in the midst of the green pastures of this township commonly indicate the presence of limestone immediately below the shallow surface soil, and in the region underlain by the Bird Creek limestone they lead unerringly to inconspicuous croppings of that bed.

Cryptozoon-bearing limestone.—Limestone beds occur at closely spaced intervals throughout the stratigraphic series above the Bird Creek limestone. Many of them are lenticular and of small extent, and few display lithologic or paleontologic features that readily distinguish individual beds from those higher or lower in the series. Fortunately, however, the most persistent and extensive of these many limestones is also one which may easily be recognized by its fossil content and general appearance. This is the *Cryptozoon*-bearing limestone, a bed 1 to 2 feet thick, about 90 feet above the Bird Creek limestone. Its characteristic features are well displayed in the outcrops near the base of the flat-topped hills west of the north-south road in secs. 7 and 18.

Typically this limestone is very hard and remarkably brittle and splits almost like glass under the blows of a hammer. The weathered surface is usually of a characteristic dark-gray color; the fresh surface a clean dark blue-gray. The feature which makes it easily recognized is the presence of Cryptozoa, irregular forms that are the fossil remains of organisms whose nature has not been precisely determined. In many of these forms it is possible to detect a bryozoan, a fragment of shell, or a segment of crinoid stem near the center. These fossil remains were apparently the nuclei around which the Cryptozoa formed. A rough sketch showing the general appearance of these fossils has been presented in an earlier paper[1] describing the geology of the region immediately north of this township.

UNEXPOSED ROCKS.

The lowest formation exposed at the surface within T. 26 N., R. 8 E., is the Elgin sandstone, into which the larger streams in the eastern part of the township have incised their valleys. Information concerning the strata below this sandstone depends on well records and is not nearly as complete as is desired. At the date of writing only three wells have been drilled to depths greater than 1,250 feet, and the log of only one of these is now available. The scanty data at hand must therefore be supplemented by information from the neighboring townships. (See fig. 40.)

[1] Heald, K. C., Geologic structure of the northwestern part of the Pawhuska quadrangle, Okla.: U. S. Geol. Survey Bull. 691, fig. 24, p. 65, 1918 (Bull. 691–C).

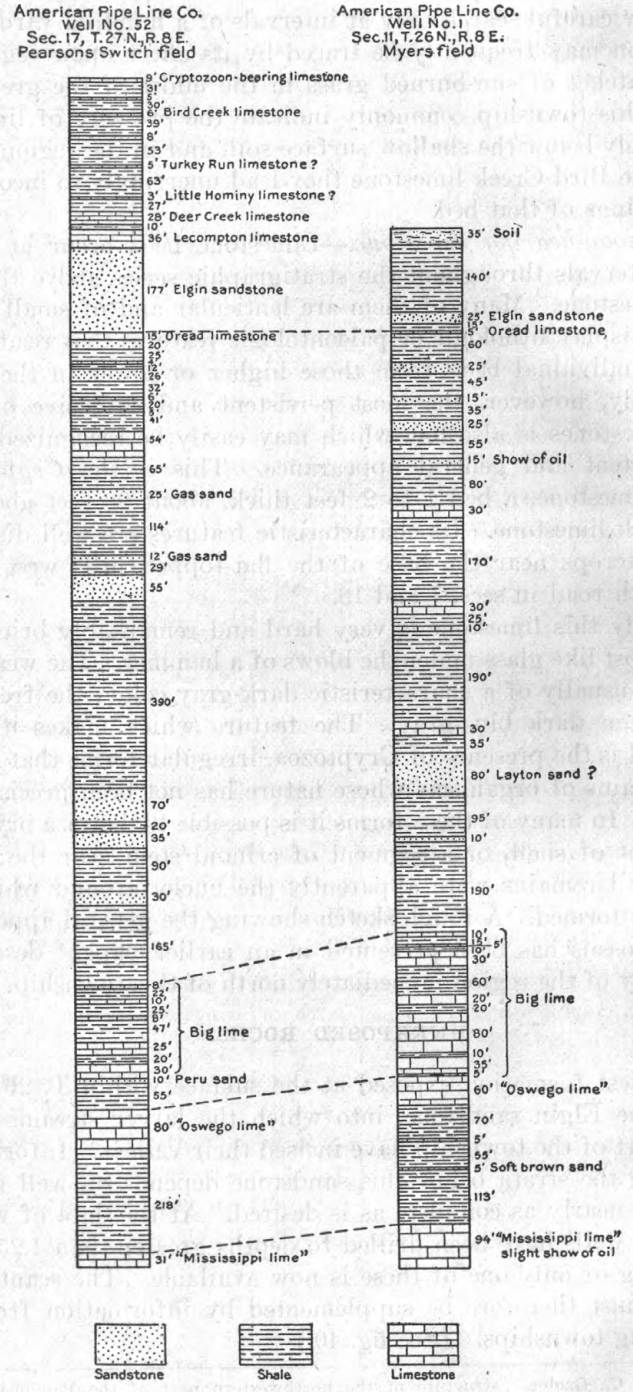

FIGURE 40.—Logs of selected wells in Tps. 26 and 27 N., R. 8 E.

The Pennsylvanian rocks below the Elgin sandstone are of the same general type as those which appear on the surface. Sandstone and shale make up about 80 per cent of the total thickness of beds above what is known to the drillers as the Big lime (probably the Pawnee limestone of the Kansas section). Below that horizon there is comparatively little sandstone, but there are massive beds of limestone and thick series of shale.

Most of the sandstones in the upper part of the stratigraphic section seem to be lenticular, varying greatly in thickness or pinching out entirely within short distances. Two beds, however, appear to be more persistent and will doubtless be encountered wherever wells are drilled in the northeast quarter of the township, if not throughout its extent. The upper of these two sandstones is reached at depths of 175 to 350 feet in the gas field near Myers, in sec. 12, and is between 250 and 300 feet below the Plummer limestone; it contains much water, which at most localities is fresh. The other persistent sandstone is 250 to 300 feet lower in the series and under favorable conditions yields large quantities of gas. It is one of the most productive of the sands in the Myers gas field and is probably at the same horizon as that occupied by the chief gas sand in the Pearson Switch field, 6 miles to the northwest. Below this gas sand are 500 feet of strata which consist largely of shale with a few thin beds of limestone or sandstone. Certain of these sandstones are said to contain gas or water, but none are of economic importance. Underlying this shale series, at a depth of approximately 1,100 feet below the Plummer limestone, there is a series, about 100 feet thick, which consists predominantly of sandstone and limestone with only minor amounts of shale. The deepest gas-bearing sands in the Myers gas field are included in this series, which is apparently the stratigraphic equivalent of the Layton sand of the oil field near the southeast corner of T. 24 N., R. 8 E. The next 350 feet of strata are almost entirely shales, but they are underlain by a thick mass of limestone, broken at frequent intervals by shale partings. This represents the Big lime of the drillers and probably includes also the "Oswego lime" or Fort Scott limestone, although an alternative interpretation might be to identify a 5-foot lime shell, 70 feet lower, as the "Oswego lime." The one record now available indicates that sands are absent at the horizons where the Peru and Wheeler sands occur in the oil fields to the east and south, although 6 miles to the northwest there is a 10-foot sand in the same stratigraphic position as that occupied by the Peru. A sandstone 5 feet thick, 130 feet below the bottom of these limestones, is the only sand reported between the Big lime and the "Mississippi lime" and may possibly represent the Bartlesville sand, although it is more probably a sandy lens of small extent occurring at a level slightly above that of the Bartlesville.

Nearly 2,200 feet below the top of the Deer Creek limestone is a hard oil-bearing limestone—the "Mississippi lime," as that term is applied throughout the Osage Reservation. It was penetrated for nearly 100 feet in the comparatively deep well on the margin of the Myers field, in sec. 11. The interval between the "Mississippi lime" and the formations that crop out at the surface in the western part of the Pawhuska quadrangle is about 250 feet less in T. 26 N., R. 8 E., than in the townships to the south and east. Presumably the absence of the Bartlesville sand is closely connected with this fact, for which a number of plausible explanations at once suggest themselves. If it is true, as seems likely, that this variation is due partly to the irregularities of surface of the Mississippian floor upon which the Pennsylvanian sediments were deposited, it follows that the petroliferous beds that lie 200 feet or more below the top of the "Mississippi lime" in the eastern part of the Osage Reservation may be expected at much greater depths below that horizon in this township. Many more data must be gathered before the exact relations can be known with certainty.

STRUCTURE.

SALIENT FEATURES.

The strata which appear at the surface in T. 26 N., R. 8 E., are in general tilted downward in a direction a little north of west, so that any individual bed is about 250 feet higher at the east margin of the township than at the west. This regional slope is very much modified by local warping, which has developed several anticlinal and synclinal folds, and by a number of faults, each with the northwest strike characteristic of faults throughout the Osage Reservation. The faults are of short extent and slight throw and are confined to the eastern half of the township, where deformation is much more intense than in the western half.

The structure is shown on the map (Pl. XXXVI) by 10-foot contours, based on surface data and drawn to represent the attitude of a hypothetical bed 548 feet below the top of the Plummer limestone. This datum plane coincides with that used to represent the structure of the townships on the north, east, and south. A different datum was used for the work in T. 26 N., R. 7 E., and because of divergences between certain beds the contour lines on the two datum planes do not coincide along the boundary between these two townships.

ANTICLINES AND DOMES.

MYERS DOME.

One of the most perfect domelike uplifts in the Osage Reservation is situated near Myers, in the northeast corner of this town-

ship. The fold is a symmetrical oval with its longer axis extending eastward from the NE. ¼ sec. 11, T. 26 N., R. 8 E., through the NW. ¼ sec. 7, T. 26 N., R. 9 E. The closure is about 80 feet. The lowest closed contour is the 420-foot line and incloses about 1½ square miles within these two townships, including nearly all of sec. 12 and adjacent parts of secs. 1 and 11 in T. 26 N., R. 8 E. The apex of the dome is in the SW. ¼ NE. ¼ sec. 12. Structurally the Myers dome is ideal for the localization of an oil pool of large volume.

Toward the west, the direction from which oil and gas migrating up the regional slope would come, this dome is hemmed in by a series of low anticlinal folds separated from it by a shallow synclinal trough. These folds must necessarily interfere with the free movement of oil and may possibly limit the gathering ground available as the source of an oil pool beneath the Myers dome to less than 4 square miles. Possibly, also, the three faults in secs. 2 and 11 may assist in cutting off the supply.

To date seven gas wells and five dry holes have been drilled on this dome. An additional dry hole has been sunk on the floor of the syncline north of the anticlinal fold in the NE. ¼ sec. 1. Drillers' logs for all but three of these holes are at hand. Only one was sunk below the horizon of the Layton sand. The first well drilled in sec. 12, located squarely on the crest of the dome, had an initial production of 15,000,000 cubic feet of gas from a sand 25 feet thick, which was reached at a depth of 535 feet; gas is also reported to have been present in two other sands at shallower depths in this well. Other wells, nearly as favorably located with respect to structure, failed to obtain gas in paying quantities from this sand at 500 to 600 feet. Some of these wells were continued or subsequently deepened to approximately 1,200 feet, where an alternating series of sandstones, limestones, and shales seems to represent the horizon of the Layton sand. Gas in paying quantities was obtained from the sands in this series in a few of these wells, but not in all. Apparently, these sands are "tight" in spots, so that they vary greatly in gas-yielding capacity. A "showing" of oil is reported from the "500-foot" sand in one well; in another there was a similar "showing" from a sand about 200 feet lower; and in still a third well there was a "light showing" of oil from the "1,200-foot" sand. The "500-foot" sand is apparently at the same stratigraphic horizon as that occupied by the best-paying gas sand in the Pearsons Switch field, 6 miles to the northwest.

The dry hole in the SE. ¼ sec. 11 is 2,172 feet deep; its log is graphically shown in figure 40. Several shallow sands yielded water or slight amounts of gas or oil; a sand 80 feet thick, presumably the Layton sand, reached at 1,095 feet, yielded salt water; no trace of oil or gas was reported from the Big lime or the "Oswego lime," nor

were there any sands reported associated with them; 5 feet of soft brown sand was penetrated 118 feet above the "Mississippi lime," but no oil or gas was reported to be present in it. The "Mississippi lime" was reached at 2,078 feet and penetrated to a depth of 94 feet; a "slight show" of oil was observed at a depth of 2,108 feet. On July 6, 1917, seven months after the well was completed, the sludge pit still showed a considerable quantity of oil, and gas was escaping from the plugged hole. The record does not state whether the hole was shot. This well is far down the western flank of the Myers dome, just below the lowest closed contour. Although this is not the most desirable location for a deep test, it is nevertheless true that if a large oil pool had been trapped by this structure in the strata penetrated by this well a good yield might have been expected there. The test, although not conclusive, is distinctly unfavorable to the prospects of this dome.

Apparently the only rocks present beneath the Myers dome which are likely to yield oil in commercial quantities are those of the "Mississippi lime." In many places throughout the Osage Reservation east and south of this township good yields have been obtained from "sands" in this limestone at different levels within 300 feet of its top. Some of the best-paying sands are as much as 200 feet below its surface, in a zone which has not been penetrated in the Myers field. A well 6 miles to the northwest, in the Pearsons Switch field, is reported to have had an initial daily production of 5,000 barrels or more from the upper 31 feet of this limestone. Adequate tests should therefore be made in this locality.

Although certain of the minor flexures present at the surface in the Osage region may not persist at depths of 2,000 or 3,000 feet, there can be no doubt that so prominent a fold as the Myers dome arches the Mississippian strata, nor can its competency to form a reservoir for oil and gas be doubted. The uncertain factors are the presence of suitable sands within those strata and a source from which the oil may be derived. In view of the general experience that production from limestones is apt to be "spotted," it is strongly recommended that at least two more tests be made of the deeper strata in the Myers dome. The holes should penetrate to a depth of at least 400 feet below the top of the "Mississippi lime" and should be located between the 440 and 470 foot contour lines. The location of well No. 9, the dry hole near the middle of the south line of the NW. ¼ sec. 12, is good; this well was abandoned at 1,147 feet, at the horizon of the Layton sand. If deepened, it should reach the "Mississippi lime" at about 2,000 feet and should be continued to 2,450 feet unless oil in paying quantities is found before that depth is reached. Another suggested location for a deep test is in the NW. ¼ NW. ¼ NE. ¼ sec.

12, where the depth to the "Mississippi lime" would be about the same as that estimated for well No. 9.

BENCHMARK ANTICLINE.

A small flexure extends north-northeastward, parallel to the regional strike of the rocks in this township, from the NE. ¼ sec. 10 to the NW. ¼ sec. 2. It is separated from the Myers dome by a syncline which abruptly terminates at either end against a fault. The closure of about 15 feet is sufficient to trap an oil pool that would supply wells of small production if other conditions are favorable. This fold is 1½ miles nearer the Pearsons Switch field than the Myers dome, and it is possible that the "Mississippi lime" might yield oil in commercial quantities in this smaller anticline, even though it failed to do so in the more prominent dome. The test should be made at the apex of the doubly plunging anticline, about 400 feet east and 1,600 feet north from the southwest corner of sec. 2. At that locality the top of the "Mississippi lime" is probably between 2,300 and 2,400 feet below the surface.

CAIRN TERRACE.

Extending southwestward from the Myers dome is a broad, flattened anticlinal nose which may be classified as a terrace in spite of the irregularities of its surface. It occupies much of the S. ½ sec. 11 and the N. ½ sec. 14 and extends into the NE. ¼ sec. 15. Its surface displays two small bulges, each of which causes a contour line to close. (See map, Pl. XXXVI.) Structurally this terrace is favorable for the accumulation of oil; its gathering ground is much more extensive than that contributory to the Myers dome. From present knowledge, however, nothing commendatory can be said with certainty concerning the oil-bearing possibilities of the formations beneath it. Should it prove advisable to test this terrace suitable locations will be found near the north quarter corner of sec. 14 and in the NE. ¼ NE. ¼ NE. ¼ sec. 15.

DISAPPOINTMENT DOME.

Parts of secs. 21, 22, 27, and 28 are included in a triangular anticlinal fold which has an easterly dip of about 50 feet and a closed area of more than a square mile. Structurally this fold ranks second only to the Myers dome in this part of the Osage Reservation, and in extent of gathering ground from which oil could migrate it is far superior to that dome. Since the completion of the field work on which this report is based two wells have been drilled on this fold. One, indicated on the map, is reported to be at the center of the SE. ¼ sec. 21 and was abandoned at a depth of 2,726 feet. This depth

would carry the drill about 400 feet into the "Mississippi lime." The location of this test, a short distance down the west flank of the dome, is excellent, and its failure indicates that there is grave doubt as to the presence of sands carrying commercial quantities of oil in the "Mississippi lime" beneath this part of the township. The second hole was drilled in sec. 22 and was abandoned at 2,420 feet, in the "Mississippi lime"; it is not shown on the map. On account of the irregular occurrence of oil in most limestones, it might be well to make still another test of this dome before definitely classifying the area as unproductive. It is suggested that such a test, if made, be located at a point about 800 feet south of the north line and 2,000 feet west of the east line of sec. 21. The hole should be drilled to a minimum depth of 2,700 feet.

BASELINE ANTICLINE.

Separated from the Disappointment dome toward the south by a low saddle athwart the course of South Bird Creek is a broad, flat-crested fold of slightly smaller dimensions, which occupies the S. ½ sec. 28 and nearly all of sec. 33. Only two contour lines on this fold are closed, but the easterly dip amounts to more than 40 feet. The beds rise steeply from the west toward its summit, flatten into a broad arch, and descend gently to the bottom of a fault-shattered syncline on the east. The structure seems admirably suited to bring about the accumulation of an oil pool, which might be expected to underlie all of the area inclosed by the 300-foot contour line south of South Bird Creek and to extend some distance down the steep slope toward the west. The failure of the tests made on the Disappointment dome, however, indicates the probability that suitable reservoir sands are absent here as well as there. In spite of this, the Baseline anticline is worthy of at least two test wells. Good locations for these are in the SW. ¼ SW. ¼ sec. 28 and the NW. ¼ SW. ¼ sec. 33. To be adequate they should be drilled to depths of 2,650 and 2,750 feet respectively.

COYOTE DOME.

The SW. ¼ sec. 24 and the NW. ¼ sec. 25 are underlain by a small domelike flexure with a closure of about 20 feet. Although of slight extent and not especially well located with respect to gathering ground, it is not unworthy of notice. The nearest well is a dry hole, less than a mile to the east, in the NW. ¼ NW. ¼ sec. 30, T. 26 N., R. 9 E., near the bottom of a syncline. This hole is reported to have had a "show of oil" from the "Oswego lime" and to have been abandoned in the "Mississippi lime" at 2,292 feet. This would mean that it penetrated the deeper lime for only a few feet and is

not an altogether adequate test. Moreover, it suggests the possible presence of oil in the "Oswego lime" in the Coyote dome. Test wells should be sunk to a depth of 400 feet below the top of the "Mississippi lime" and may be located at a point 600 feet north and 1,000 feet east from the southwest corner of sec. 24, or at a point in sec. 25 about 700 feet south and 1,000 feet east from the same corner.

RODEO ANTICLINE.

Sec. 36 is crossed diagonally from southwest to northeast by the axis of a long, low anticline extending from sec. 15, T. 25 N., R. 8 E., into sec. 31, T. 26 N., R. 9 E. Only the 420-foot contour line on this fold is closed, but the accumulation of oil would be influenced by the fold throughout a much larger area than that inclosed within it. The best places for testing the Rodeo anticline are in the township to the south.[1] If producing wells are brought in there, development would naturally extend northeastward and may cover the southeast corner of sec. 35 and nearly all of sec. 36.

PRAIRIE ANTICLINE.

The tilt of the strata in the western part of the township is much more gentle than in the central and eastern parts; in fact, from the middle of sec. 7 south to the middle of sec. 31 the beds are comparatively flat-lying. The surface of the terrace thus formed is crumpled slightly, and as a result two broad, flat anticlinal folds may be distinguished. The southern of the two may be known as the Prairie anticline. Its major axis, which is crescentic in plan, extends from the center of sec. 25, T. 26 N., R. 7 E., to the southeast corner of sec. 30, T. 26 N., R. 8 E. Its closure is about 20 feet, but only 40 or 50 acres is included within the lowest closed contour line. The oil prospects of this fold can not be forecast. If suitable sands and a source of oil are present, it ought to show a fairly good yield, for the structure is adequate to bring about accumulation, but the failure of the nearest wells, those on the Disappointment dome, does not encourage too great expectation that paying sands will be found here. A good location for a test well is about 2,400 feet north of the south line and 1,500 feet east of the west line of sec. 30. This well should reach the "Mississippi lime" at a depth of about 2,500 feet and ought to penetrate it for at least 400 feet to be an adequate test.

BROWN MESA ANTICLINE.

The northern of the two major wrinkles on the surface of the terrace above referred to extends from the northwest corner of sec. 18 to the middle of the east side of sec. 19. Only one contour line on this

[1] Heald, K. C., and Mather, K. F., op. cit.

fold is closed, and it embraces only a few acres. The prospects for finding oil in this field appear similar to those of the Prairie anticline. It may be tested by drilling within the area inclosed by the 210-foot contour line in the SW. ¼ sec. 18, or near the west quarter corner of the same section.

SYNCLINES.

Synclinal areas where the structure is decidedly unfavorable to the accumulation of oil and gas are of slight extent in this township. The synclines are few, short, and narrow. The east margin of sec. 33, the west margin of sec. 34, the SW. ¼ and NE. ¼ sec. 27, and the NE. ¼ sec. 22 are particularly unpromising areas.