UNIVERSITY OF KENTUCKY
COLLEGE OF ARTS AND SCIENCES

KENTUCKY GEOLOGICAL SURVEY
Lexington

ARTHUR C. McFARLAN, Director
DANIEL J. JONES, State Geologist

SERIES IX

BULLETIN – NO. 5

AREAS AND PRINCIPLES OF GROUND-WATER OCCURRENCE IN THE INNER BLUEGRASS REGION, KENTUCKY

By
Dan K. Hamilton

Prepared in cooperation with the
GEOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF THE INTERIOR

Printed by authority of the State of Kentucky

LEXINGTON, KENTUCKY
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Map of ground-water areas of Jessamine County, Kentucky

Map of ground-water areas of Scott County, Kentucky

Map of Bourbon County, Kentucky, showing location of wells

Map of Fayette County, Kentucky, showing location of wells

Map of Jessamine County, Kentucky, showing location of wells

Map of Scott County, Kentucky, showing location of wells

LETTER OF TRANSMITTAL

August 17, 1950

Dean M. M. White

College of Arts and Sciences

University of Kentucky

Dear Dean White:

I am submitting Dan K. Hamilton's report on the occurrence and availability of underground waters in Fayette, Bourbon, Scott and Jessamine Counties, Kentucky for publication as Bulletin No. 5 of the Kentucky Geological Survey. The importance of this work to the farmer and to industry is obvious in a region where successful drilling for water had been about one well in five. It is particularly important in that not only has the geologic pattern of ground water occurrence been determined, but principles are developed which are applicable to other counties of the central Kentucky limestone region. Geological and ground water maps accompanying the report were issued earlier, and have been used with much success.

The work was done by the United States Geological Survey in cooperation with the several counties and the Division of Geology of the State Department of Mines and Minerals. Field work was essentially complete prior to the transfer of the Division of Geology to the University of Kentucky as the Kentucky Geological Survey. Geological field mapping was carried on by L. F. Boland and E. M. O'Connell under the supervision of Dr. Hamilton, a member of the Department of Geology staff. The report has served as his doctor's thesis.

Sincerely yours,

Arthur C. McFarlan

Areas and Principles of Ground-Water Occurrence in the Inner Bluegrass Region, Kentucky

Dan K. Hamilton

ABSTRACT

This report presents the results of ground-water investigations carried on from 1945 to 1948 in Jessamine, Fayette, Bourbon, and Scott Counties in the inner Bluegrass region of Kentucky. That only about one well in five drilled in the past found water and that many wells failed in the summers of 1944 and 1945 made clear the necessity for investigating the principles controlling the distribution and quantity of ground water. Field work included new geologic mapping and inventory of all wells and springs in the area.

The bedrock of this area consists of the Highbridge, Lexington, Cynthiana, Eden, and Maysville strata of Lower to Upper Ordovician age. Limestone is dominant but shaly zones and betonite beds are important hydrologically. The rocks dip gently from the axis of the Cincinnati arch, which crosses the center of the area with a northeast trend, paralleled on the east by the Hickman zone of normal faults. A system of joints, best developed in the thicker and more brittle limestones, includes two sets, trending respectively north 60° west and north 30° east except in the vicinity of the faults.

The Kentucky River runs in a gorgelike valley 200 feet or more below a rolling upland pitted with sinkholes and little dissected by tributaries.

The ground mass of even the most coarsely granular limestones is almost impermeable, and subsurface water moves principally through irregular passages produced by solution along joints and to a lesser extent along bedding planes. The base of the zone of solution lies well below the water table and shows a configuration roughly similar to that of the land surface. Beneath valleys solution has been more active and reaches to greater depths than under the adjacent uplands, indicating greater circulation of water under topographic lows. Modifications of this picture are produced by the presence of less soluble beds.

Below the zone of active flow in enlarged joints, at depths greater than about 90 or 100 feet, such water as may be encountered is usually

salty and sulfurous. Highly mineralized waters are encountered in the few permeable zones below the Highbridge strata. Waters of this type, accompanied by gas, rise to the surface along the Hickman fault zone.

Interpretation, based on detailed geologic mapping of soluble and insoluble beds and on their relation to the local topography, permitted the drawing of maps delineating areas of good, fair, and poor possibilities of obtaining adequate amounts of usable water from wells. Records of wells obtained in the inventory were used as a final check on the accuracy of the maps.

PURPOSE OF THE INVESTIGATION

The investigation of the geology and ground-water resources of Fayette, Bourbon, Scott, and Jessamine Counties (figs. 1 and 4) of the Commonwealth of Kentucky, was carried on for 3 years after the establishment in July 1945 of a cooperative program between those counties and the Geological Survey, United States Department of the Interior. The County cooperation was administered through the Division of Geology of the Kentucky Department of Mines and Minerals.

Certain phases of these studies have been given special attention and the results have been published separately. It is the purpose of this report to present all the data of the investigation as a summary of the conditions and controls of ground-water occurrence in the above-mentioned counties.

The field work on this investigation was begun in September 1945 and was continued until July 1948. The investigation was carried out under the general supervision of A. N. Sayre, geologist in charge of the Ground Water Branch, United States Geological Survey, and D. J. Jones, State Geologist of Kentucky. M. I. Rorabaugh, engineer in charge of the Kentucky district, Ground Water Branch, United States Geological Survey, was assigned district director of the project. The author was responsible for the active direction of the project, and was aided in the geologic mapping by E. M. O'Connell (June 1946-January 1948) and L. F. Boland (June 1946-September 1947). The well inventory was by the author and E. M. O'Connell and L. F. Boland, and they were helped for a short period by K. A. Lentz, W. V. Naylor, and A. J. Napier, all of the United States Geological Survey.

The ground water stored in the openings of the limestones and shales underlying the area of this report constitutes a valuable natural resource, furnishing water to wells and springs for domestic, stock, municipal, and industrial supplies. Water from rainfall and snow melt, and in some places from streams, soaks into the soil and ultimately some of it percolates downward to the zone of saturation, where it

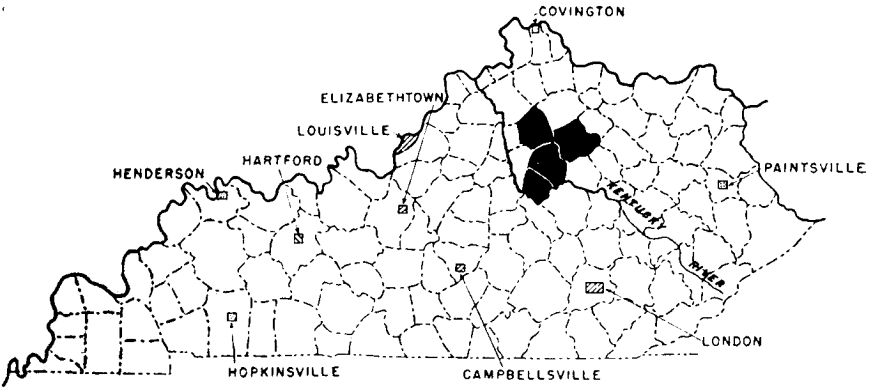


FIGURE 1

INDEX MAP

OF

KENTUCKY

SHOWING

AREA COVERED BY THIS REPORT

EXPLANATION

THIS REPORT

REPORTS PUBLISHED

REPORTS IN PREPARATION

FIELD WORK IN PROGRESS

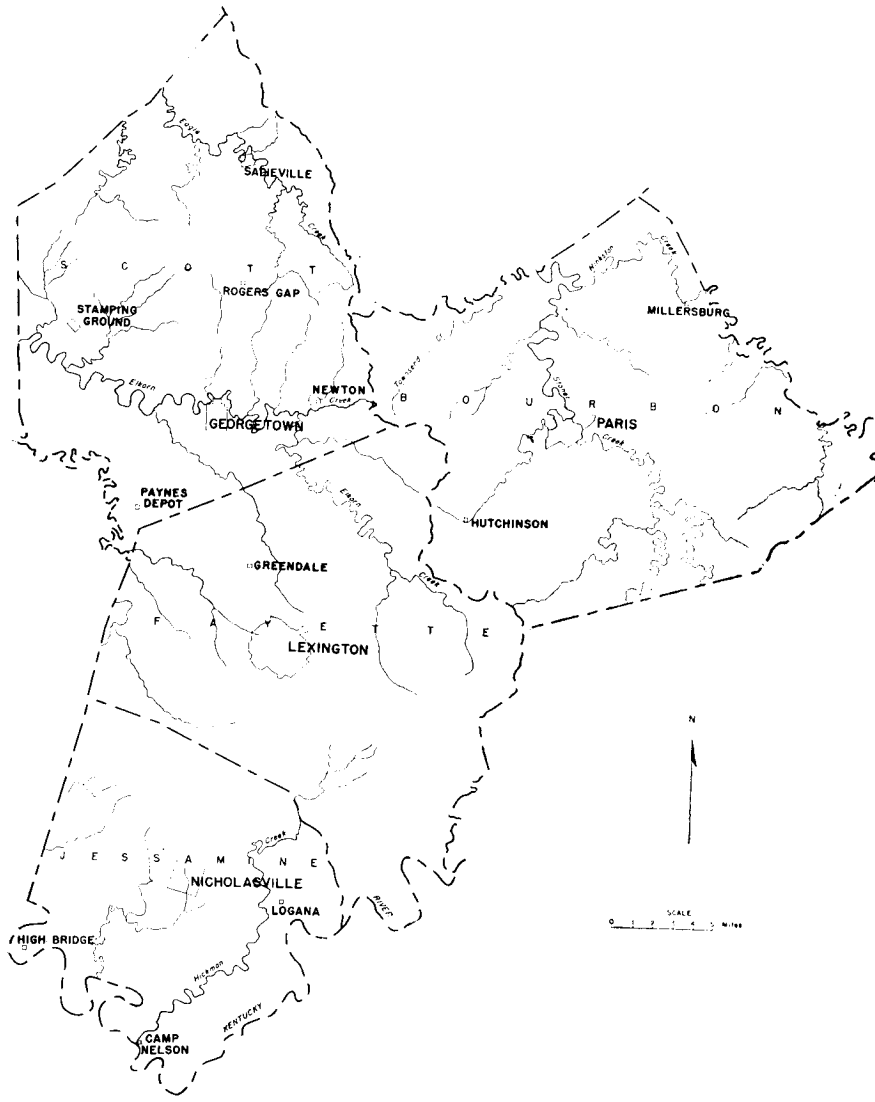


Figure 2.— Index map of the inner Bluegrass region.

replenishes the supply of ground water. The water, once it reaches the water table, moves under the influence of gravity to natural outlets, maintaining their flow in dry weather. Some of it is evaporated or is transpired by plants where the water table approaches the surface, also generally along streams.

It was the purpose of this investigation to discover as fully as possible the location and distribution of ground water, the availability to wells, the amount and rate at which it can be removed from the groundwater zone, the conditions of natural recharge and discharge, the depth to the water below the land surface, and other pertinent facts. The purpose is not only to answer questions of the moment, but also to accumulate data that will make possible the best development of this resource in the future.

The writer takes this opportunity to acknowledge his indebtedness to O. E. Meinzer (deceased) and A. N. Sayre for their advice and counsel in planning and carrying out this investigation and preparing this report. For specific aid in matters concerning the investigation, thanks are due V. T. Stringfield, United States Geological Survey; A. C. McFarlan, Head, Department of Geology, University of Kentucky; V. E. Nelson, W. C. MacQuown, W. R. Brown, L. B. Freeman, and J. A. Stokely, University of Kentucky; and E. G. Otton, United States Geological Survey. The drafting of the maps was by Edith S. Nichols. The writer also acknowledges his indebtedness to the well owners, county and city officials, owners and managers of industrial establishments, well drillers, and others who have furnished information concerning wells on their properties and who have aided in gathering the essential information on which this report is based.

STRATIGRAPHY

The exposed formations in this area constitute a sedimentary sequence composed chiefly of limestone but containing many interbedded shales and several bentonites. These formations include the oldest exposed rocks in the State and are of Lower, Middle, and Upper Ordovician age. They are represented in the stratigraphic section in figure 3. A description of the strata, with their associated faunas (paleontology after Bassler,[1] McFarlan,[2] and White,[3] Miller,[4] and

[1] Bassler, R. S., The stratigraphy of the Central Basin of Tennessee: Tennessee Div. Geology Bull. 38, 1932.

[2] McFarlan, A. C., Geology of Kentucky, University of Kentucky, 531 pp., 1943.

[3] McFarlan, A. C., and White, W. H., Trenton and pre-Trenton of Kentucky: Am. Assoc. Petroleum Geologists Bull., vol. 32, pp. 1627-1646, 1948.

[4] Miller, A. M., The geology of Kentucky: Kentucky Dept. Geology and Forestry, ser. 5, Bull. 2, vol. 29, 1919.

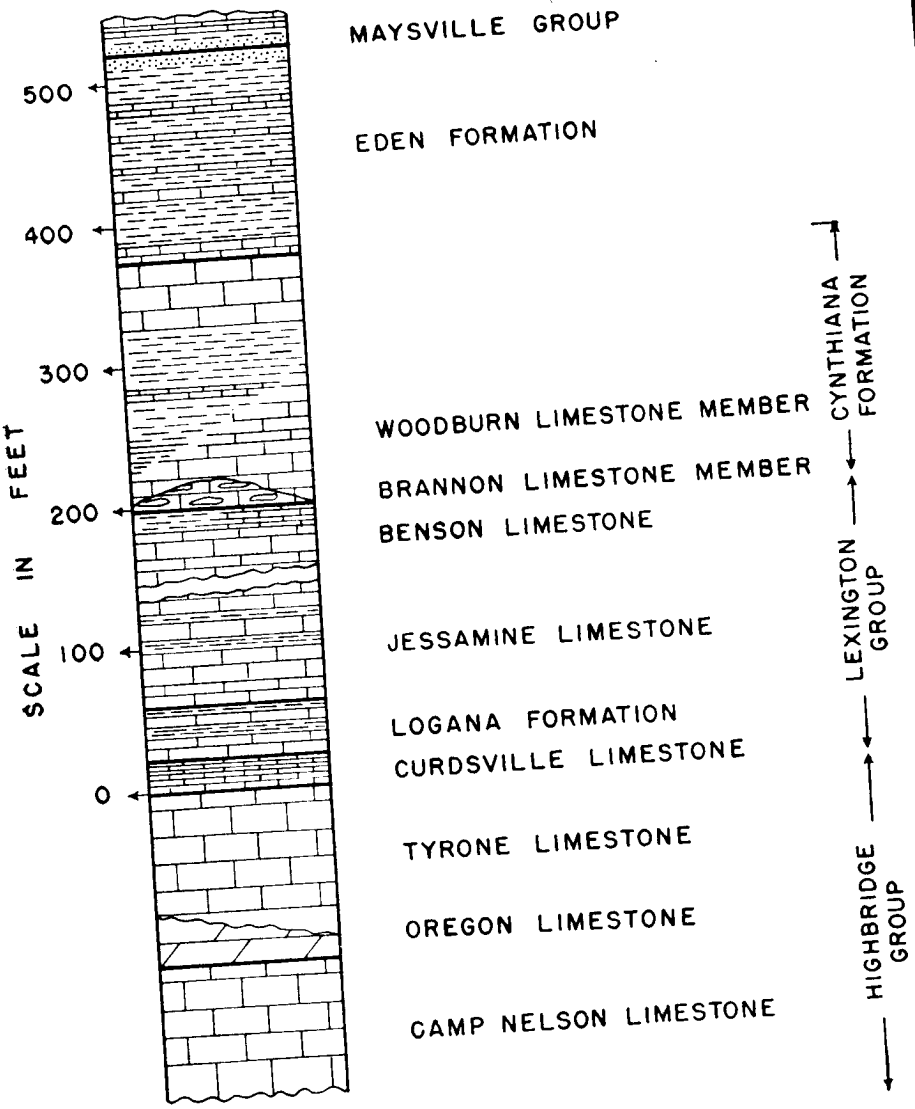


Figure 3.— Stratigraphic section of the inner Bluegrass region, Kentucky.

Wilson[5]) that crop out in the area follows. The strata are described in order from the oldest to the youngest.

Highbridge Group

The rocks of the Highbridge group are the oldest exposed in Kentucky. They have been variously correlated with the Chazy, Stones River, and Lowville of New York as well as the equivalents of those rocks in other areas. McFarlan and White consider the Highbridge to be of Lowville (Black River) and Trenton age.

Camp Nelson limestone.— The maximum exposed thickness recorded for the Camp Nelson limestone is at its type locality in Jessamine County, where the upper 310 feet of the formation is exposed along the walls of the Kentucky River and tributary valleys. From this point, approximately on the axis of the Cincinnati arch, the Camp Nelson dips to the east and west bringing the top of the formation closer to, and eventually below, the level of the Kentucky River as the unit is traced downstream. Upstream from the axis the area of outcrop is interrupted by faulting, and no exposure even closely approaches the maximum thickness. Records from wells drilled in this area indicate the presence of 200 to 300 feet of limestone between the lowest exposed Camp Nelson and the underlying Knox dolomite, of Lower Ordovician and Upper Cambrian age.

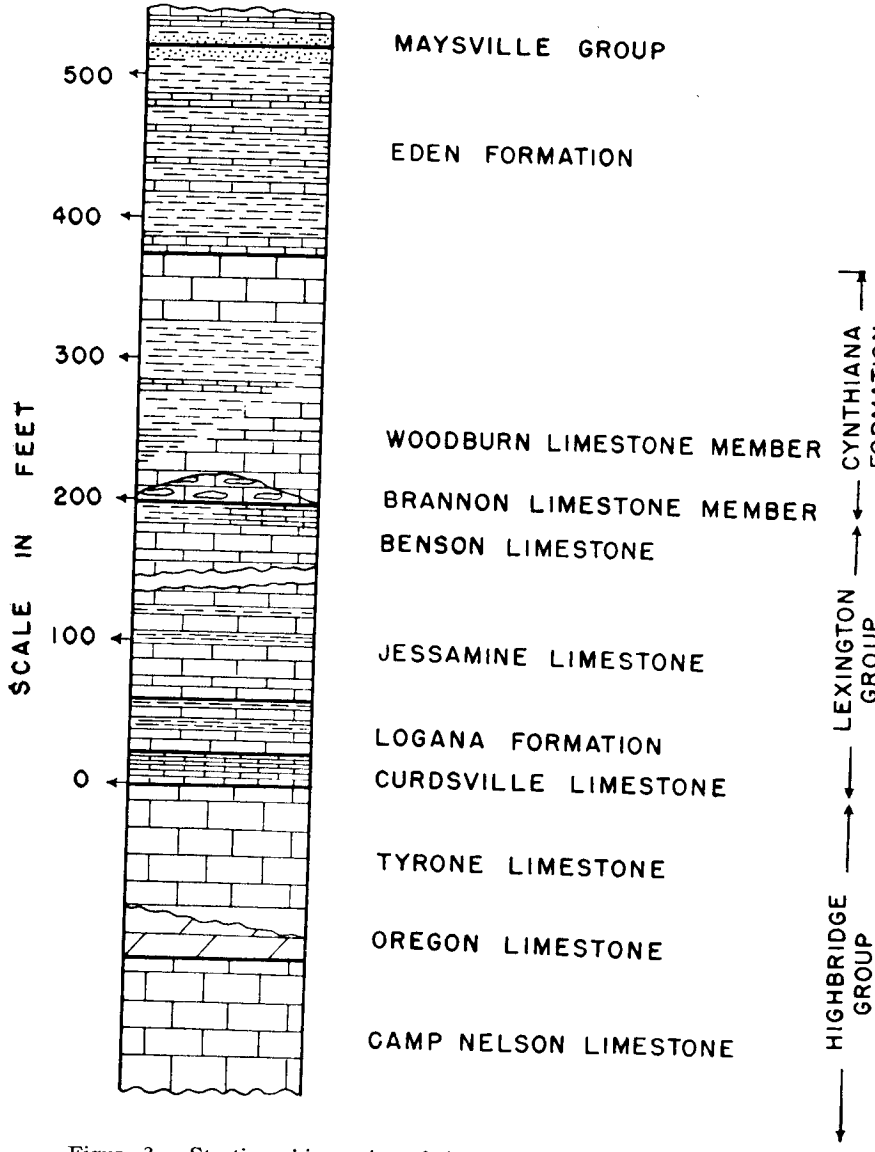
Throughout its area of outcrop the lithology of the Camp Nelson limestone is relatively uniform. It is essentially a lithographic limestone showing irregular dolomitic inclusions. The individual layers may range in thickness from a few inches to a few feet, most of them being measured at slightly more than a foot. The irregular masses of more dolomitic material show on weathering a most uneven surface and color. Miller[6] has suggested that these seaweedlike designs of more highly magnesian limestone are probably "more directly algal in origin than the material of the limestone itself, which may have been originally a secretion of marine algae."

As magnesian limestone is typical of the overlying Oregon limestone, and lithographic limestone is typical of the Tyrone limestone, the Camp Nelson might be described as a mixture of the types represented by the two overlying formations.

Few fossils are found in the Camp Nelson limestone. Most char-

[5] Wilson, C. W., Curdsville limestone zone of Hermitage formation (Trenton group) in central Tennessee (abstract): Geol. Soc. America Bull., vol. 49, pp. 1923-1924, 1938.

[6] Miller, A. M., op. cit.



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[6] Miller, A. M., op. cit.

Plate 1.— View of a quarry in the Tyrone limestone at Highbridge, Jessamine County, Ky.

acteristic fossils are casts of the gastropod *Maclurites bigsbyi* and various cephalopods, principally of the genus *Endoceras*.

Oregon limestone.— The Oregon limestone in the area ranges from about 15 to 35 feet in thickness. It is gray to buff in color and in many places shows gray or black banding parallel to the bedding. It is uniformly bedded in layers approximately 8 inches to a foot in thickness. This finely crystalline magnesian limestone is extensively quarried in the central Kentucky area for use as road metal and building stone. Chemical analyses from various sources show the magnesium-carbonate content in some areas to be in excess of 30 percent. The formation is essentially nonfossiliferous.

Tyrone limestone.— The Tyrone limestone is about 90 feet thick throughout the area of this study (pl. 1). It is a dense, very pure limestone of birdseye or, in some places, lithographic type. Individual beds are usually about 8 inches thick and break with conchoidal fracture, exposing a gray, buff, or cream-colored limestone on the fresh surface. With weathering, the exposed surface takes on a chalky white appearance bringing into relief the darker calcite facets from which it received the local name "Birdseye limestone."

Three bentonite beds are interlayered with the limestone. The lowest of these beds is about 1 foot thick and occurs about 10 feet

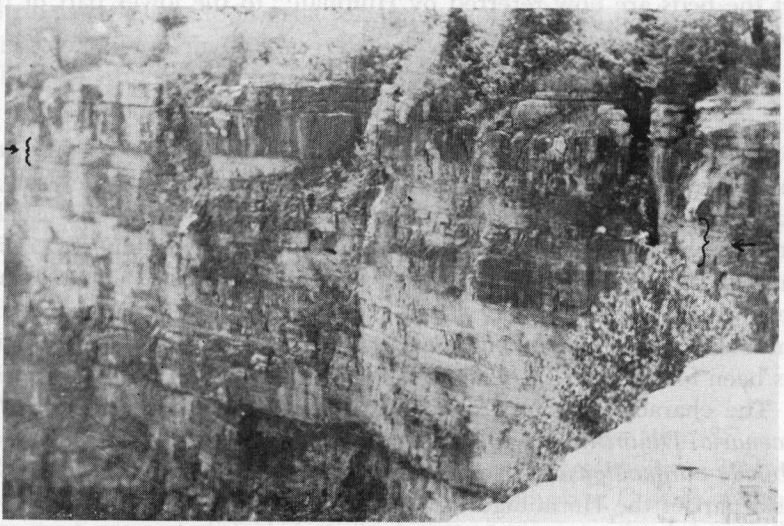

Plate 2.— A quarry at Highbridge, Ky., showing a layer of bentonite in the upper part of the Tyrone limestone.

above the Tyrone and Oregon contact. The second occurs about 10 to 22 feet below the Tyrone and Curdsville contact and ranges from a few inches to a few feet in thickness (pl. 2). The third horizon occurs at – and, where present, marks satisfactorily – the contact between the Tyrone and the Curdsville.

A few fossils reported from the Tyrone limestone include *Strophomena incurvata, Rafinesquina minnesotensis, Hesperorthis tricenaria, Helicotoma verticalis, Rhinidictya nicholsoni, Phyllodictya frondosa, Escharopora ramosa, Leperditis fabulites, Tetradium cellulosum,* and specimens from the cephalopod genera *Endoceras, Actinoceras,* and *Cameroceras.*[7]

The presence locally of an equivalent of the Leray limestone member of the Lowville of New York is indicated by the presence in the upper part of the Tyrone, of a mollusc assemblage that includes species of *Ctenodonta, Lophospira, Omospira, Oxydiscus,* and others.[8]

Miller[9] felt that a Black River age of the formation was indicated by the presence of *Rafinesquina minnesotensis and Helicotoma verticalis.* Various later authors assigned the formation to the Lowville,

[7] McFarlan, A. C., and White, W. H., op. cit.
[8] Bassler, R. S., op. cit.
[9] Miller, A. M., op. cit.

but the beds are now referred by Huffman[10] to the lower part of the Trenton group.

Lexington Group

Curdsville limestone.— This formation is a cherty, coarsely crystalline gray-blue limestone, about 20 feet thick. It is somewhat irregularly bedded and has a few shale partings between beds usually 6 to 8 inches thick. Locally, basal breccias have been reported, with fragments of the Tyrone in a matrix of the Curdsville. In areas adjacent to that of the present study, which show thicker sections of the Curdsville limestone, a bentonite bed known as the fourth bentonite has been found 25 to 27 feet above the Curdsville and Tyrone contact.

The characteristic fossils include *Streptelasma profundum, Orthis tricenaria, Dinorthis pectinella, Rhynchotrema subtrigonale,* and *Sowerbyella curdsvillensis.* The Curdsville fauna is now recognized in the basal part of the Hermitage formation of central Tennessee.[11]

Logana formation.— Formerly called the Hermitage formation, this unit was re-established as the Logana formation by McFarlan and White.[12] The formation is about 35 feet thick and consists of thin-bedded fine-grained gray-blue argillaceous limestone with a considerable amount of interbedded shale. Although the bottom of this formation is readily distinguishable from the cherty Curdsville limestone below, its upper limit is hardly discernible. Lithologically and faunally, the upper part of the Logana is quite similar to the overlying Jessamine limestone. However near the top of the Logana formation there is commonly a molluscan horizon that aids in marking the upper limit of the formation.

Many fossils have been recorded in this formation, *Dalmanella bassleri* and *Prasopora falesi* being most common. *Heterorthis clitie* is considered the best index to this formation but, unfortunately, is rarely seen.

Jessamine limestone.— This unit consists of a hard gray-blue thin- to medium-bedded limestone with thin layers of shale. In a very few places the entire thickness is a shaly, siliceous limestone. It varies little from 80 feet in thickness. Usually it is roughly divisible into three units, the shale occurring in definite layers rather than irregularly throughout the entire formation. In those areas there is a basal

[10] Huffman, G. G., Middle Ordovician limestones from Lee County, Virginia, to central Kentucky: Jour. Geology, vol. 53, pp. 135-174, 1945.
[11] Wilson, C. W., op. cit.
[12] McFarlan, A. C., and White, W. H., op. cit.

portion similar to the Logana formation, a middle unit only a few feet thick containing many clay shale layers, and an upper portion of rubbly limestone with some intercalated shale.

The fauna includes *Prasopora simulatrix, Dalmanella bassleri, Hebertella frankfortensis, Rafinesquina alternate, Rhyncotrema increbescens, Zygospira recurvostris, Liospira mundula,* and *Lophospira obess.* Characteristically the Jessamine is very fossiliferous, and the fauna may be used successfully for mapping purposes. The top normally is marked by a distinctive zone of abundant *Dalmanella bassleri* in a siliceous fine-grained limestone, usually found about 6 feet higher than a light-colored "semilithographic" siliceous limestone carrying abundant gastropods.

Benson limestone.— This unit ranges in thickness from 35 to 40 feet and consists of medium to coarsely crystalline limestone in beds several inches to more than a foot thick. In Bourbon County a rather persistent zone of distorted strata is found close to the base of the formation. This appears to be the effect of wave action on unconsolidated sediments. A similar feature is found 15 to 20 feet below the top of the formation in southern Fayette and Jessamine Counties. Throughout the rest of the area the lithology and fauna of the formation are uniform.

Characteristically, the fauna includes *Hebertella frankfortensis, Rhynchotrema increbescens, Strophomena vicins, Platystrophia colbiensis, Rafinesquina alternata,* and *Cyclora minuta.*

The Benson limestone includes the Perryville facies,[13] consisting of a gray crystalline limestone which ranges in thickness from a knife edge to 15 feet and which is thinnest or absent along the crest of the Cincinnati arch in Fayette County. Three subdivisions, the Faulconer, Salvisa, and Cornishville, have been described in and around central Kentucky.

Over much of the outcrop area of the Benson, the top 5 or 6 feet consists of a coarsely crystalline, somewhat cross-bedded pure limestone (pls. 3 and 4)containing, in all attitudes, shells and portions of shells of *Dinorthis ulrichi, Rhynchotrema increbescens, Hebertella frankfortensis* and the bryozoan *Cyphotrypa frankfortensis.* Near the top of the Benson is a zone of abundant *Stromatocerium pustulosum,* commonly used as the characteristic marker for the upper part of this formation.

[13] McFarlan, A. C., and White, W. H., op. cit.

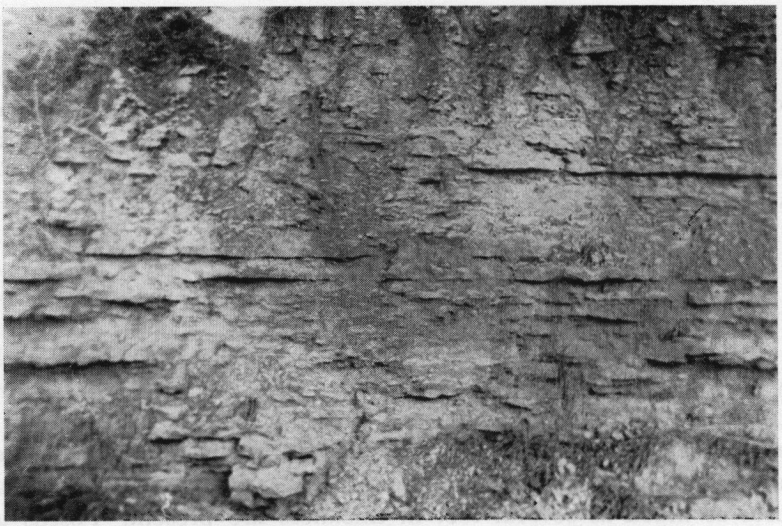

Plate 5.— Interbedded limestone and shale of the Cynthiana formation. Location about 8 miles north of Lexington, in railroad cut along the Georgetown Pike.

others; for further discussion see McFarlan,[14] and McFarlan and White.[15]

The formation is extremely fossiliferous over most of its outcrop, yielding characteristically *Arthropora cleavelandi, Batostoma minnesotense, Batostoma winchelli, Constellaria emaciata, Constellaria fisheri, Constellaria florida, Crepipora spatiosa, Cyphotrya spatiosa, Dekayella folicces, Eridotrypa aedilis, Eridotrypa briareus, Escharopora acuminata, Escharopora falciformis, Escharopora masculata, Peronopora milleri, Prasopora spatiosa, Rhynidictya parallela, Dalmanella emacerata, Dalmanella multisecta, Hebertella sinuata, Hebertella occidentalis, Hebertella subjugate, Orthorhynchula linneyi, Platstrophia colbiensis, Rafinesquina alternata, Rafinesquina winchesternsis, Sowerbyella rugosa, Bellerophon rogersensis, Cyclonema varicosum, Crytolites retrorsus, Fusispira sulcata, Lophospira bicincta, Allonychid flanaganensis, Whitesevia cincinnatienses, Whitesevia pulchella, Cryptolithus tessellatus, Bollia unguloidea, Ceratopsis chambersi, Lingulops norwoodi, Primitia centralis,* and *Ulrichia nodosa.*

[14] McFarlan, A. C., op. cit.; also Stratigraphic relationships of Lexington, Perryville, and Cynthiana (Trenton) rocks of central Kentucky: Geol. Soc. America Bull., vol. 49, pp. 989-996, 1938. .

[15] McFarlan, A. C., and White, W. H., op. cit.; also The Perryville formation of central Kentucky: Geol. Soc. America Proc., 1946.

Eden formation.— The Eden formation consists of 150 feet of blue clay shale with quite a few thin lenses of crystalline limestone. In the southern portion of Fayette and Jessamine Counties, a light-colored siltstone called the Garrard sandstone member is present in the upper part of the formation. The Garrard is of little consequence as an aquifer, being essentially impermeable and insoluble. It ranges from 0 up to 70 feet in thickness. Occasional lenses of limestone, with no apparent shale partings, may locally attain a thickness of 5 to 10 feet. Four units have been identified within the group at Cincinnati, Ohio, but these have not yet been accurately correlated with the section of central Kentucky. Characteristic fossils of the Eden of central Kentucky include *Merocrinus curtus*, *Sowerbyella rugosa*, *Dalmanella multisecta*, *Cryptolithus tessellatus*, and numerous bryozoa — of which the most common are *Hallopora oncalli*, *Eridotrypa sedilia*, and *Dekayella ulrichi*.

Maysville group.— Only the bottom of the Maysville group is exposed in the area covered by this report. It is present only as a thin capping on the tops of some of the higher hills in northern Scott County and extreme southeastern Bourbon County. Where present, it is of little consequence, being only a few feet of thin-beded fossiliferous limestone.

Proposed Change of Nomenclature

In the early stages of this ground-water investigation it was found that the rocks of the Highbridge group were easily mapped and their water-bearing characteristics remarkably uniform. The same was true of rocks of the Lexington group, except for the difficulty of locating the top of the Logana formation and establishing some of the lithologic changes of the Jessamine limestone. Above the Benson, however, many difficulties were encountered. The Brannon, Woodburn, and Cynthiana formations and their various subdivisions had previously been mapped on the basis of fossils or lithology. In some areas fossils alone were the medium of subdivision. In other areas lithology was the only basis. Rarely were both fossils and lithology dependable for mapping purposes. Inasmuch as the primary objective of this study was the delineation of water-bearing units, and not their paleontological aspect, much effort was made to map the lithologic units irrespective of their faunas. In some cases these lithologic units were found to cross previously described faunal units. In other areas similar lithologies carried nearly identical faunas. After 2 years of the investigation, an attempt was made to tie the various units of the post-

Lexington rocks to some readily identifiable horizon. The top of the Tyrone limestone, with its associated bentonites, was chosen as the most dependable marker, and the cuttings of several wells drilled to this horizon and drillers' records were used to determine the interval between the top of the Benson limestone and the top of the Tyrone. This interval was always close to 210 feet. The top of the Benson was therefore assumed to be approximately parallel to the top of the Tyrone, and measurements were made from the top of the Benson to the various units above. One fact asserted itself strongly. Throughout the area involved in the study, the interval between the top of the Benson limestone and the bottom of the Eden formation was a uniform 120 to 130 feet. Only in eastern Bourbon County was this not true. In that area the thickness of the interval increased gradually from the central part of the county toward the east, where, on the county line, as much as 150 feet separated the base of the Eden formation and the Benson limestone.

This interval, then, remained relatively uniform, regardless of the various mapped subdivisions. In other words, where the Brannon limestone attained a thickness of 15 feet and the Woodburn limestone a thickness of 40 feet, there the Cynthiana formation was 65 feet thick – thus making a total of 120 feet. Where neither the Brannon nor the Woodburn was identifiable, the Cynthiana attained the full thickness of 120 feet.

Because the Cynthiana formation is the only persistent unit in the entire above-mentioned interval, the author feels that only the Cynthiana should be accorded the status of a formation. All subdivisions, then, of the interval between the top of the Benson limestone and the bottom of the Eden formation should hereafter be referred to as members of the Cynthiana. This would include as members the lithologic and paleontologic units heretofore defined as the Brannon, Woodburn limestones, and the Greendale, Millersburg, Nicholas, Rogers Gap, Bromley, and Gratz.

STRUCTURE

The Cincinnati arch traverses Kentucky in a northeast direction, forming, throughout its extent in the State, a large anticline with gentle dips to the east and west (fig. 4). In the area of this study, the arch is gently rounded to produce the central Kentucky structure known as the Jessamine dome. Essentially, the rocks of these four counties dip gently east and west from the axis of the arch at about 40 feet per mile. The doming effect distorts this picture slightly, introducing in northern

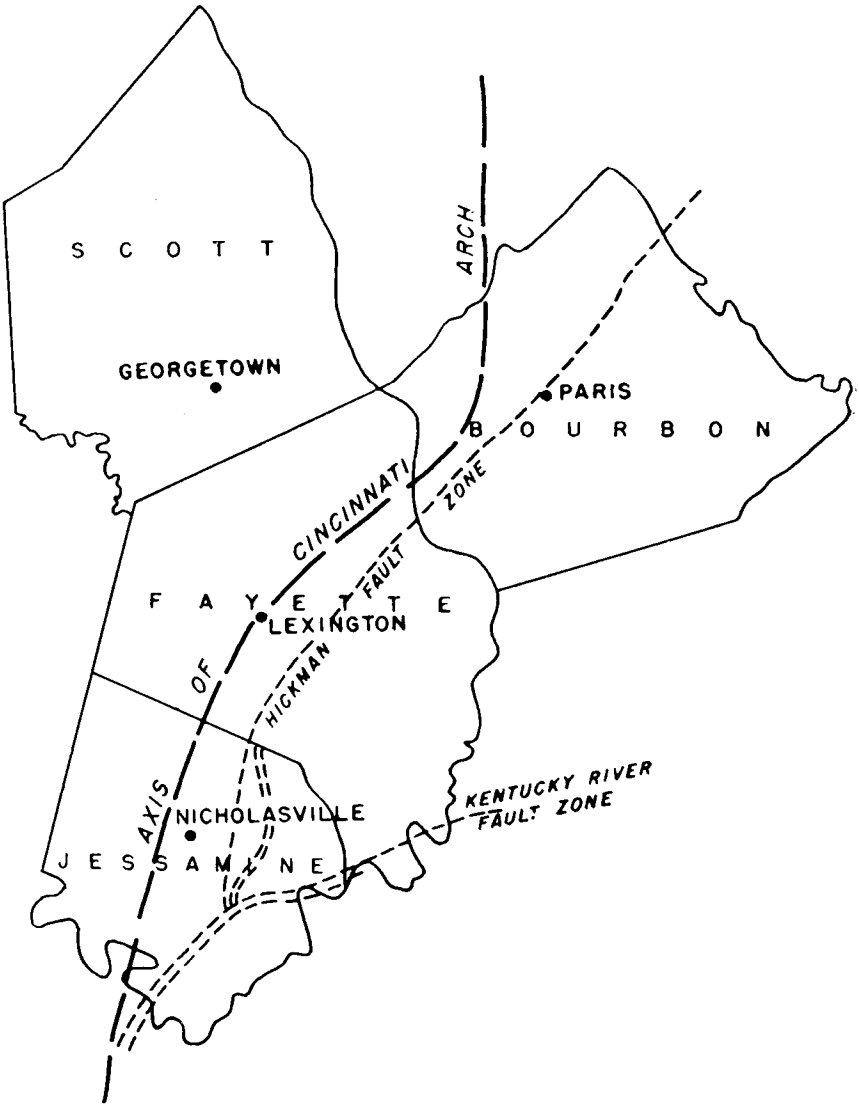

Figure 4.— Major structural features of the area.

Fayette and Scott Counties a gentle north dip of varying amount (see appended structure maps). No indication that this dome was present during Ordovician time is found in the Ordovician strata of the four counties, and stratigraphic relationships outside the immediate area seem to indicate that the first major movement along this structure occurred some time after middle Silurian and before middle Devonian time. Undoubtedly, it was still further defined by movements during the Appalachian revolution, and peraps still further accentuation of the structure was produced by mid-Tertiary uplift of the area. Superimposed on the regional pattern of the Jessamine dome are many small positive and negative closures which locally determine the direction and amount of dip (see appended structure maps).

Two large fault systems are recognized and many smaller displacements have been identified. Still other faults appear to be present, but the lack of outcrops at the critical points has to date made these structures impossible to map. The Hickman fault system consists, in most of its course, of two parallel faults bounding a graben, with numerous cross faults cutting the graben and in many cases small displacements leading away from the bounding faults. This system follows roughly the axis of the Cincinnati arch, trending approximately N. 40° E. and lying several miles southeast of the crest of the arch.

The Kentucky River fault system forms either a graben or a single fault with the downthrow away from the crest of the arch, and it passes across the southern portion of the area, extending beyond the area of the investigation, with a trend of about N. 80° E. The faults of these systems are of the normal type, usually close to vertical, and are characterized by many cross faults and local directional changes.

The two most prominent sets of joints trend approximately N. 60° W., and N. 30° E. (pl. 6). Although other sets may be present locally, this pattern is almost uniform throughout the area. The appearance of other sets, and deviations from this regional alinement, may be attributed to local changes along the major fault systems (where the jointing frequently is in three sets approximating N. 80° W., N. 10° E., and N. 80° E.) and around the more pronounced local closures (where it is not uncommon to see one set radiating out of the closure, and the other set roughly following the structure contours of the closure).

In the massive, brittle formations such as those of the Highbridge group the joints show more continuity, in both vertical and linear extent, than do those in the less massive and somewhat less brittle limestones of the Lexington group. The bentonites and clay shales, being the least brittle of all the stratigraphic units, show virtually no jointing. This difference is attributed to the difference in the plasticity of the

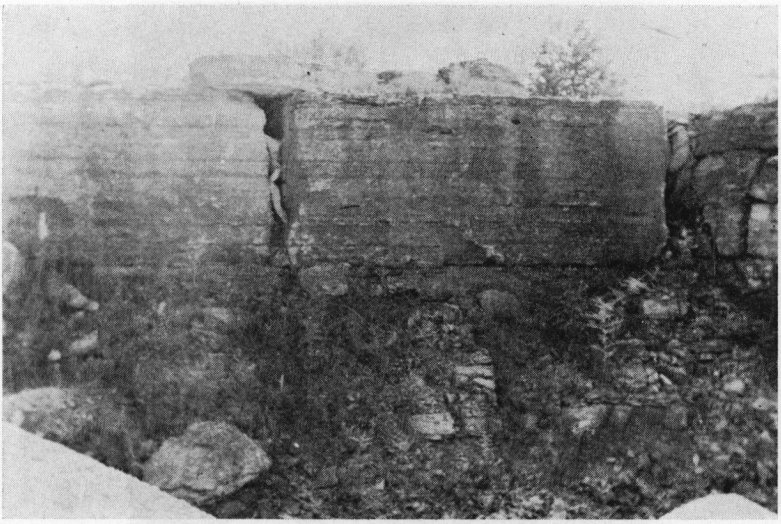

Plate 6.— Upper part of the Benson limestone in the Central Rock Co. quarry at Lexington, showing two directions of jointing, one paralleling the plane of the plate and the other perpendicular to the plane of the plate.

various units, as well as the lack of solutional activity in the clay shales and bentonites. The lack of solutional activity has in no way controlled the extent of jointing, but it has, by comparison with the surrounding carbonate strata, made existing joints less conspicuous.

The mineralized water and natural gas so characteristic of the rocks in close proximity to the faults of the area appear to have leaked up through the faults and associated joints from some depth below. If, as appears most probable, the water and gas are ascending from the Knox dolomite, then it appears that the fracturing along those faults must certainly extend down through the brittle Highbridge group to depths of many hundreds of feet.

CENOZOIC HISTORY

The major through-flowing stream of the area, the Kentucky River (see fig. 1), has its origin in the outcrop area of the Pennsylvanian formations of eastern Kentucky. In draining that area, the Kentucky River assumes a burden of sand, which when transported across the limestones and shales near Lexington, enables incisement of those formations.

Successive uplifts during late Tertiary time renewed degradational processes after earlier Tertiary peneplanation. These degradational

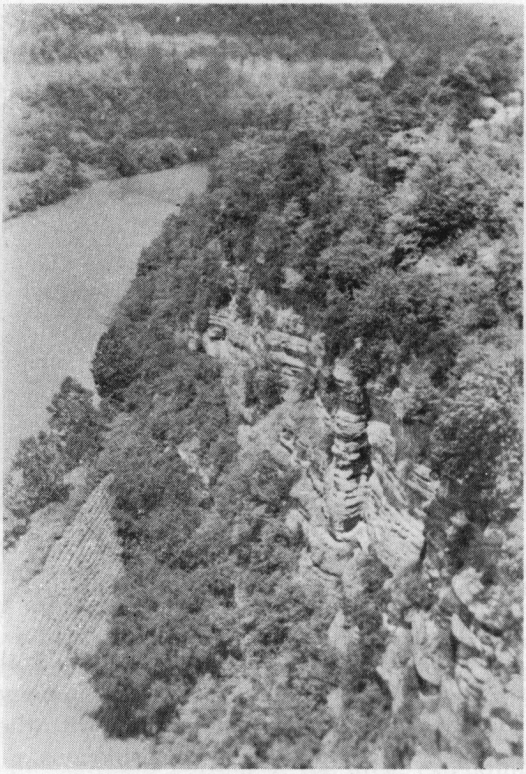

Plate 7.— View west along the Kentucky River from Highbridge, Kentucky, showing incisement by that stream.

processes were operative in the Lexington area in two ways. First, the Kentucky River rapidly cut to a depth of 300 to 400 feet below the upland level (pls. 7 and 8). As there are no sandstones in the central Kentucky area, degradational activity on the Lexington plain since the Kentucky River incisement has been essentially restricted to the processes of solution. The low spots in the present topography seem to have been localized by two controls. Some of them seem to have been produced entirely by solution, independent of pre-existing topography. The remainder, and majority, seem to have developed along pre-existing drainage lines inherited from the Lexington peneplain.

Adjustment of the smaller streams draining central Kentucky to the present local base level, the Kentucky River, has not been rapid, and adjustment to this level has taken place only near their mouths. Most of them are slightly incised for distances of 2 or 3 miles away from

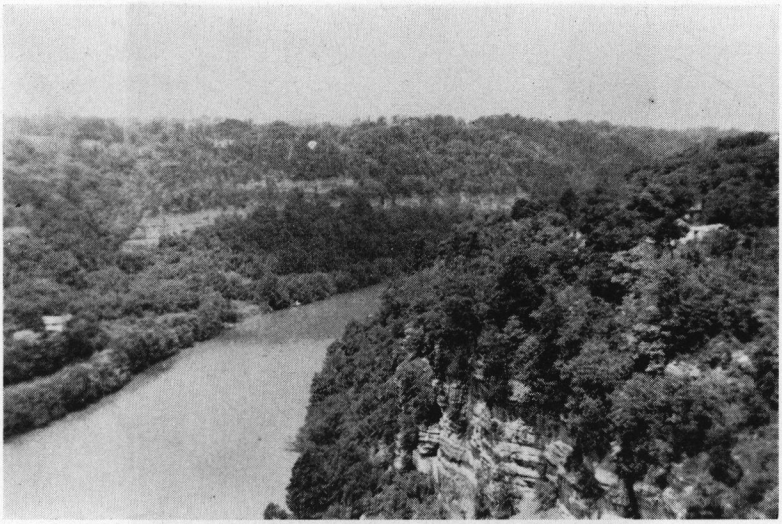

Plate 8.— View west along the Kentucky River from Highbridge, Kentucky, showing gorge cut down below the generally flat upland level.

the gorge of the Kentucky River, but for the rest of their course they flow only slightly below the general level of the Lexington plain.

SOLUTIONAL FEATURES

None of the outcropping formations considered in this paper has interstitial openings of sufficient size to permit the free movement of water. Some interstitial permeability seems to have been developed in the more coarsely crystalline limestones, where water in the intergranular openings has etched the crystal edges sufficiently to allow some fluid transmission. Such permeability, however, seems to be extremely rare, and if it has any bearing on the production of water from this area, it is in the capacity of the beds to store water and yield it slowly to joints and bedding-plane openings that cut across the interstices. Seepage in quarries, mines, and natural outcrops shows conclusively that the transmission of water in these formations is predominantly along solutionally enlarged joint planes (pls. 9 and 10). A minor amount of water is transmitted through solutionally developed bedding-plane and joint openings that have not been appreciably enlarged. Although of minor importance in the transmission of water prior to solutional development, the jointing is of paramount importance in providing the necessary initial openings along which solutional development can take place.

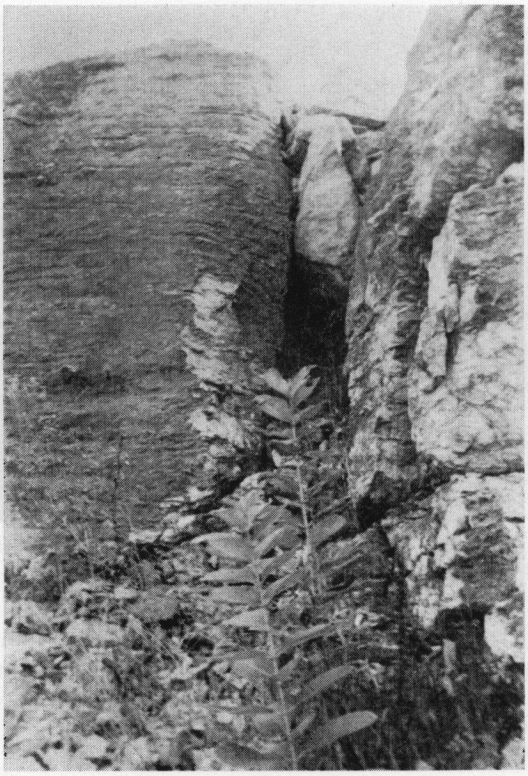

Plate 9.— View in the Central Rock Co. quarry showing solutionally developed joint in the upper part of the Benson limestone.

The classic paper by Davis[16] on the origin of limestone caverns called the attention of many geologists to the problems of limestone solution. Davis, essentially by deductive reasoning, put forth the "two-cycle" theory of cavern formation. Earlier papers had proceeded with the assumption that caverns were developed by vadose water, or water above the water table. They presented, as evidence for this assumption, the presence of dripstone within the caverns, and the presence of caves above the present water table. The dripstone, it was argued, could be deposited only above the water table, and inasmuch as it is the result of material deposited from solution, that solution must also have been above the water table.

Davis postulated two epochs in the development of most caverns — an early epoch of solutional excavation below the water table, followed

[16] Davis, W. M., Origin of limestone caverns: Geol. Soc. America Bull., vol. 41, pp. 475-628, 1930.

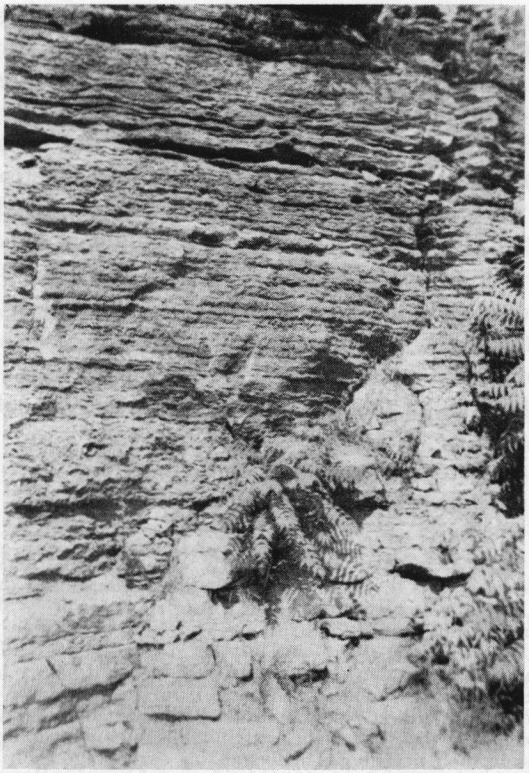

Plate 10.— View of solutionally developed joint in the Central Rock Co. quarry at Lexington. The joint plane parallels the plane of the plate, and rocks on the near side of the joint have been removed in quarrying operations.

by regional elevation and exposure of the caverns to the air, diminution of the solutional process, and the beginning of dripstone deposition.

The Davis paper exited much comment and started a controversy among those adhering to the two schools of thought. The controversy concerned itself chiefly with the question: "Does most solution take place above or below the water table?" Of those who upheld the view that solution was accomplished largely above the water table, Swinnerton[17] and Gardner[18] were most eloquent.

To some extent, this controversy has continued until the present time, although much of the argument was essentially silenced by the

[17] Swinnerton, A. C., Origin of limestone caverns: Geol. Soc. America Bull., vol. 43, pp. 663-694, 1932.

[18] Gardner, J. H., Origin and development of limestone caverns: Geol. Soc. America Bull., vol. 46, pp. 1255-1274, 1935.

quantitative paper of Bretz,[19] who found that observational data in more than 100 caves bore out the deductive reasoning of Davis. In the work of Bretz, an attempt was made to classify those features of caverns that could be attributed to vadose origin, and those that could be attributed to phreatic origin. Through this study, he found that nearly 50 percent of the caves examined showed the features of both epochs (the two epochs of Davis), very many showed evidence of only phreatic history, and very few were thought to be wholly vadose in origin.

In this paper, the author has concerned himself only so far as was necessary with the theoretical approach to the processes by which large cavern systems have formed in other areas. Rather, the problem has been the explanation of the occurrence of water in the solutional openings as they exist in the Lexington area today.

The actual water table in the Bluegrass area is a very difficult horizon to distinguish. The character of this surface is perhaps best described by Davis:[20]

> While the embryonic shafts on the nearly vertical joint intersections and the embryonic galleries along the nearly level bedding planes are minutely opened, the movement of the water through them must be so leisurely that its action is only by solution and not at all by corrasion. Moreover by reason of the very slow movement of the subsurface water and of the varying success of the water discharge from galleries into valleys, the shafts may be filled nearly to the surface of the ground. Yet as soon as some of the joints come to be a little more open than the others, there being still only an imperfect interconnection between the various underground passages, the subsurface water will sink to lower level in the more open shafts than in their neighbors; hence, at this early stage there will be no such thing as an evenly developed water table, but only a pseudo-water table very locally and unevenly developed. The relief of such a surface, passing through the tops of all the subsurface water filaments will be irregular and quite unlike, perhaps greater than, the surface relief. By reason of the very leisurely downward movement of the water filaments at this stage, the height of the water in the various embryonic shafts will vary greatly between heavy rains and long droughts.

Essentially then, the storage of the subsurface water in this embryonic stage of cavern development is in an irregularly connected series of solutionally enlarged joints and bedding-plane openings. As mentioned elsewhere in this paper, there is no interstitial transmission of water in these limestones, and mechanical openings not enlarged by solution are incapable of supplying appreciable quantities of water to wells.

Under the vadose theory, solution is concentrated in that zone above the water table. The zone closest to the land surface would have been exposed for the longest period, and therefore should have undergone the greatest amount of enlargement by solution. Were this true,

[19] Bretz, J. Harlen, Vadose and phreatic features of limestone caverns: Jour. Geology, vol. 50, pp. 675-811, 1942.

[20] Davis, W. M., op. cit.

then no cavern system would develop. Instead, the greatest amount of solution would be concentrated on the surface of the rocks, and they would be reduced more rapidly close to the surface than at some distance below the land surface. However, the very presence of caverns at some depth below the surface is at variance with these tenets. Even assuming the above to be the extreme view, the vadose theory is found wanting in that no consistent downward narrowing of the joints is found. Rather, the majority of them maintain a remarkable uniformity throughout their vertical extent above the water table except in the top few feet where they are in constant contact with the rock mantle. This feature may readily be explained under the phreatic theory. Under that theory, the water table would be lowered at a nearly uniform rate by the solutional enlargement of joints in the bottom of the saturated zone. Thus the various portions of the joint are below the water table for approximately equal lengths of time.

A further examination of the vadose portions of the solutionally enlarged joint planes reveals horizontal flutings on both walls of the joint opening. These flutings do not match across the opening, and therefore are not likely to be the result of the presence of alternating strata of different solubility. They do not appear to have been formed by vadose waters moving vertically. They are interpreted by this author as flutings developed by the lateral circulation of water beneath the water table, and their preservation today is considered a valid testimony to the ineffectiveness in this area of downward-moving vadose waters as agents of solution.

The role of phreatic water as an agent of solution is well illustrated in the over-all picture of ground-water circulation in the area. The solutionally enlarged zone in the area, and hence the saturated zone, is found as a continuous unit, usually 50 to 100 feet thick, having as its floor the lowest limit of solutional development. In following a typical karst valley showing no trace of a surface stream, we find that the surface elevation of the valley and water table slope generally toward the Kentucky River. The bottom of the solutionally developed zone slopes in the same direction, but with a slightly steeper gradient. It thus becomes clear that the circulation of subsurface water follows roughly the trend of the surface valleys but in a solutionally developed course, the lower surface of which had to be developed far beneath the water table.

To those persons ascribing a vadose origin to these features, two lines of reasoning seem adequate in rebuttal. First, with solution essentially restricted to the zone at and above the water table, no storage

area for water could be developed below the water table. Thus no well of high production and long-term sustained yield could be expected in such an area. Nevertheless, many such wells do exist. Second, the solutional process is the medium of land reduction today. If that process is carried on only at and above the water table, then no openings of any size can be developed below the water table to allow its lowering. Without lowering of the water table, further reduction of the land surface would be limited to a few feet – the vadose zone – leaving then a plateau rising several hundred feet above the local base level, the Kentucky River, a land area unique in that it would exist in the nearly complete absence of any effective erosional agent.

Along the walls of the Kentucky River gorge, many large solutional openings are seen. As these caves are entirely above the present water table and river level, and appear to have no conterpart below the water table in that area, they have not been given attention in this study.

The two most extensive cavern systems in the area have their mouths at Georgetown and provide the water supply for that town. As wells drilled close to the mouths of these springs show a water table much lower than the spring level, it appears that both these springs represent the "outcropping" of water tables perched above an insoluble stratum.

An examination of these caverns – though somewhat restricted by the presence of water – seems to indicate that they were developed on top of the afore-mentioned relatively insoluble stratum. After the initial localization of the caverns at this horizon, subsequent downcutting in the lower courses of the cavern systems succeeded in breaching the localizing horizon. In examining the mouths of these caverns, the bottom is found at a level below the relatively insoluble stratum. Thus it appears that within the cavern system the collection and storage of water takes place on top of the relatively insoluble horizon, whence the water flows through the cavern system to be discharged at a slightly lower stratigraphic horizon.

It is the author's interpretation, admittedly on little evidence, that the delay in solutional downcutting caused by this relatively insoluble horizon resulted in an unusually long exposure of the overlying zone to phreatic conditions, with the result that an unusually extensive solutional enlargement of that zone took place.

During the course of this investigation more than a thousand water wells were studied. Comparison of these well records seems to indicate a lack of solutional openings at depths exceeding 90 to 100 feet. In the 5-minute quadrangle just south of Lexington, between 37°55′ and

38°00′ north latitude and 84°25′ and 84°30′ west longitude, 41 water wells have been drilled. Of these, 30 have produced water. Only 5 of them exceeded 80 feet in depth, and even in them the driller reported water above 80 feet. Of the 11 wells that do not produce water, one is 125 feet deep and the remaining 10 are 150 feet or more deep. Because all the dry wells exceed 80 feet in depth, it may be stated that about three out of every four wells in this quadrangle reached water at depths of 80 feet or less. It is doubtful that an adequate supply of potable water has been produced in this quadrangle from strata lying more than 80 feet beneath the land surface.

As these wells have been drilled at locations representing a complete range of topographic conditions in an area of essentially flat lying beds, it may be assumed that in this quadrangle the zone of water production coincides more closely with topography than with the local stratigraphy or geologic structure though the latter are by no means unimportant. A statistical study, borne out by data in other portions of the four counties, would seem to indicate that there is little water below the depth of 80 feet. As the water occurs in solutionally developed joint and bedding-plane openings, this suggests a zone of solutional development to a depth of 80 feet or less, having as its lower limit an undulating surface approximately following the configuration of the land surface.

Information obtained through the examination of several limestone mines indicates that solutional cavities were not present below a depth of about 90 feet. At the Central Rock Co. Quarry in Lexington, Ky., a shaft was sunk to a depth of 265 feet. At that depth mining has been done, by the room and pillar method, over an area about 800 feet across in the Oregon limestone. In sinking the shaft, solutional openings in the limestone were encountered to a depth of 90 feet, but below this depth there were no openings. Other limestone mines show similar conditions.

Figure 5 shows a hypothetical cross section of the solutional zone near a valley, as interpreted from present data. A similar figure and descriptive text may be found in the work of W. M. Davis.[21] In his account, however, Davis did not take into consideration the increments of water from the surface as the underground water flowed toward the valley. In the area of the four counties considered in the present report, the topography is essentially the product of solutional activity. The valleys are present today because of the solution taking place below them, although their general pattern may have been inherited from

[21] Davis, W. M., Origin of limestone caverns: Geol. Soc. America Bull., vol. 41, pp. 475-628, 1930.

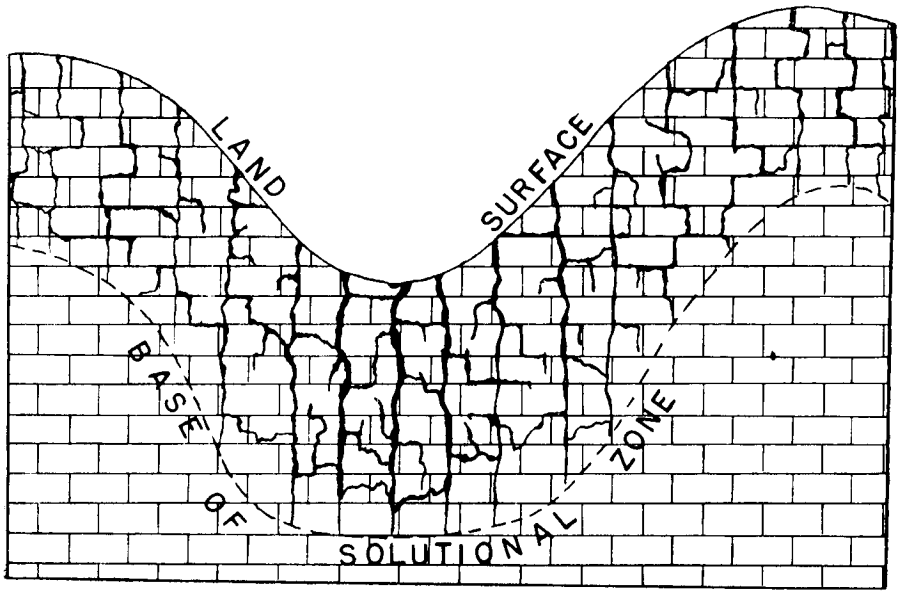

Figure 5.— The zone of solution in a valley.

an earlier topography. The presence of these valleys is, in itself, an evidence of a greater amount of solution under them than under the bordering topographic highs. This may be readily explained by the fact that most of the drainage below the ground is toward the topographic lows. Thus, all the water that moves below the surface on the hillsides eventually finds its way to the valleys. There it is joined by water moving down from the surface and water moving down the valley. Assuming all other factors to be equal, the extent and depth of solution would depend upon the quantity of water involved. It is therefore apparent that the depth and extent of solution would be greater beneath the topographic lows.

In those broad upland areas that are typified by many sinkholes and that show few real drainage trends at the surface, the change in surface topography apparently has not yet caught up with the process of solution (pls. 11, 12, 13, and 14). It is obvious that, to drain such a large upland area, some underground system of water collection and drainage must exist (pl. 15). Figure 6 shows the solutional zone under such an area. Abundant evidence for such solutional features is to be found in the large underground streams exposed in the bottoms of deep sinkholes in the plateau areas. In those areas, the development of large underground drainage systems has been controlled by the jointing of

Plate 11.— Sinkhole about 5 miles west of Lexington, on Calumet Farm.

Plate 12. — Small sinkhole in southwestern Jessamine County, about half a mile east of Highbridge.

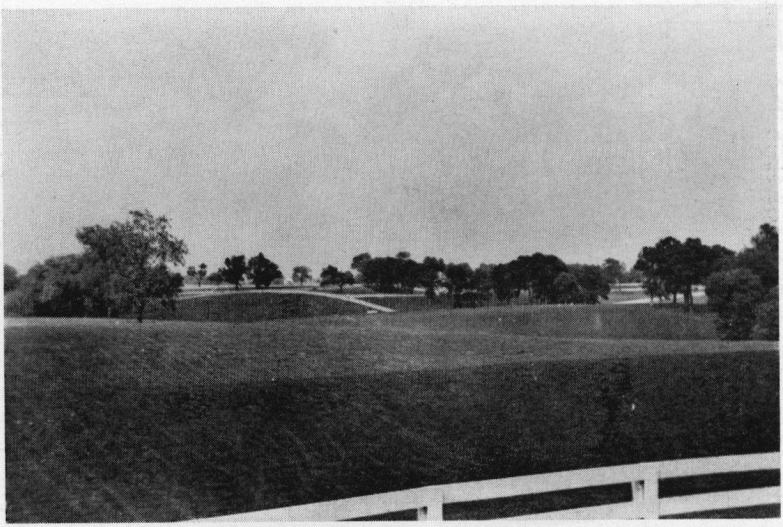

Plate 13.— Rolling karst topography about 5 miles west of Lexington, on Calumet Farm. Rounded topographic forms are often indicative of extensive solutional activity.

Plate 14. — Large irregular sinkhole about 5 miles west of Lexington, on Calumet Farm.

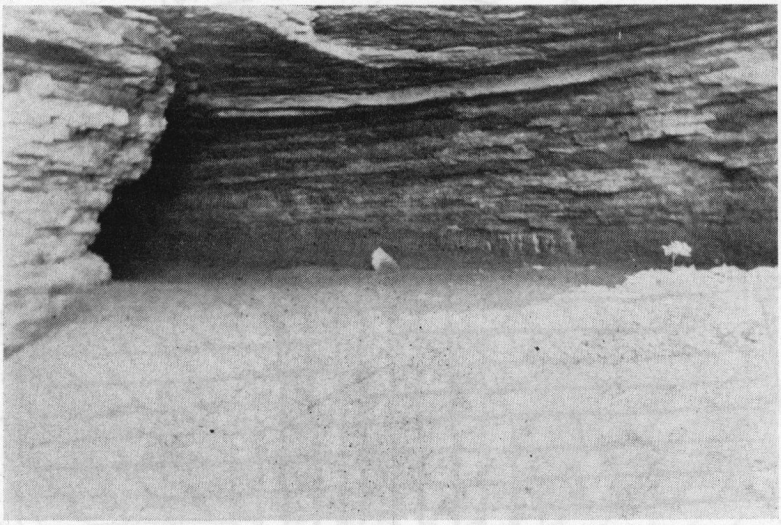

Plate 15.— Mouth of Russell Cave, about 6 miles northeast of Lexington on the Russell Cave Pike. This cave marks the point of emergence of a large underground drainage system.

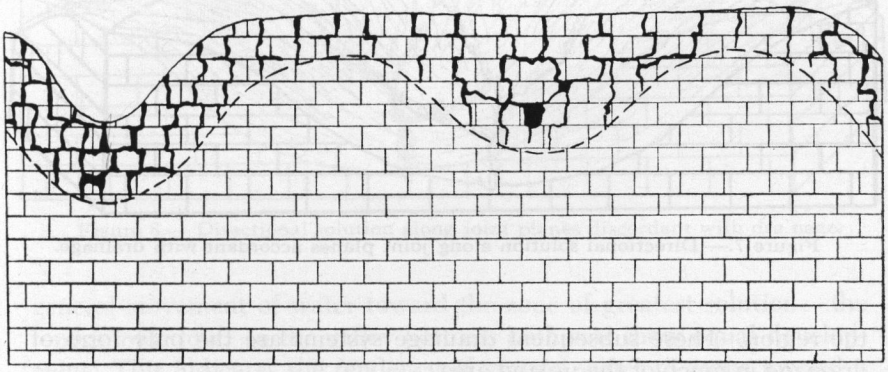

Figure 6.— The zone of solution in an upland area.

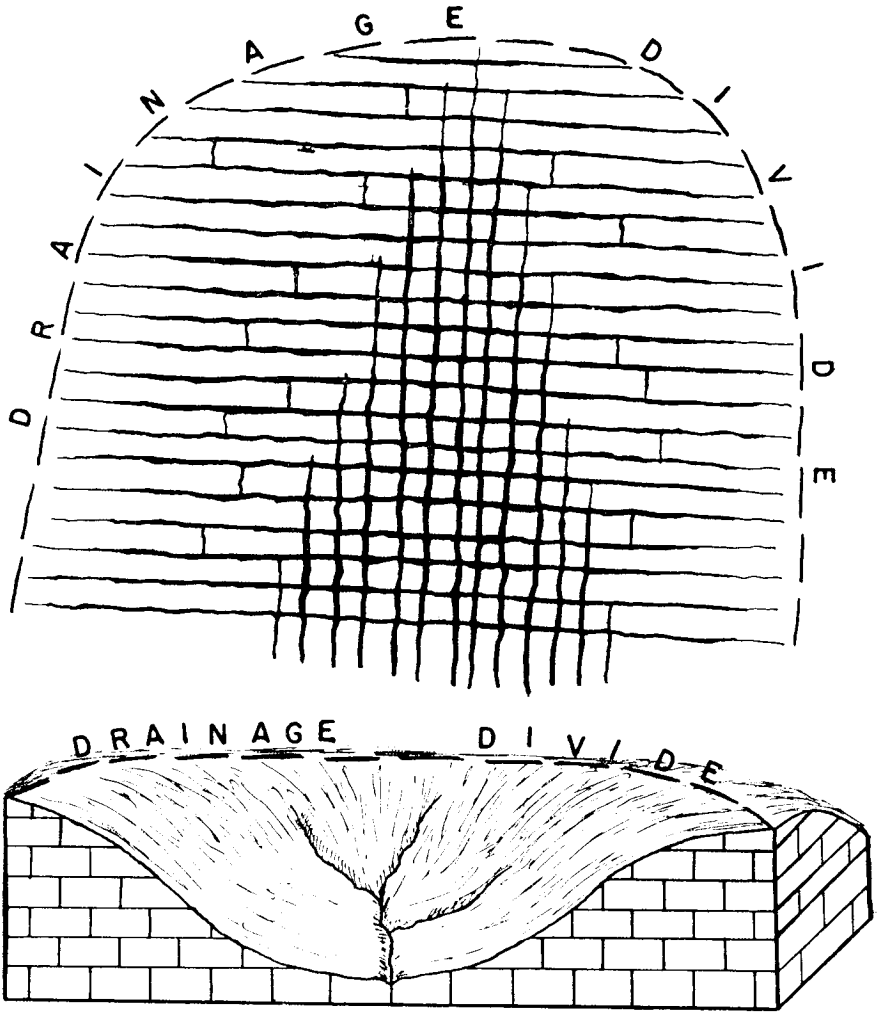

Figure 7.— Directional solution along joint planes accordant with drainage.

the region. These subsequent drainage systems are the only form of drainage in much of the upland area.

In considering the development of such drainage, it became apparent that some directional development of the jointing existed. Field work showed that where two sets of joints trend parallel and perpendicular, respectively, to a valley, the perpendicular set was greatly developed by solution along the slopes (fig. 7). This was due to the

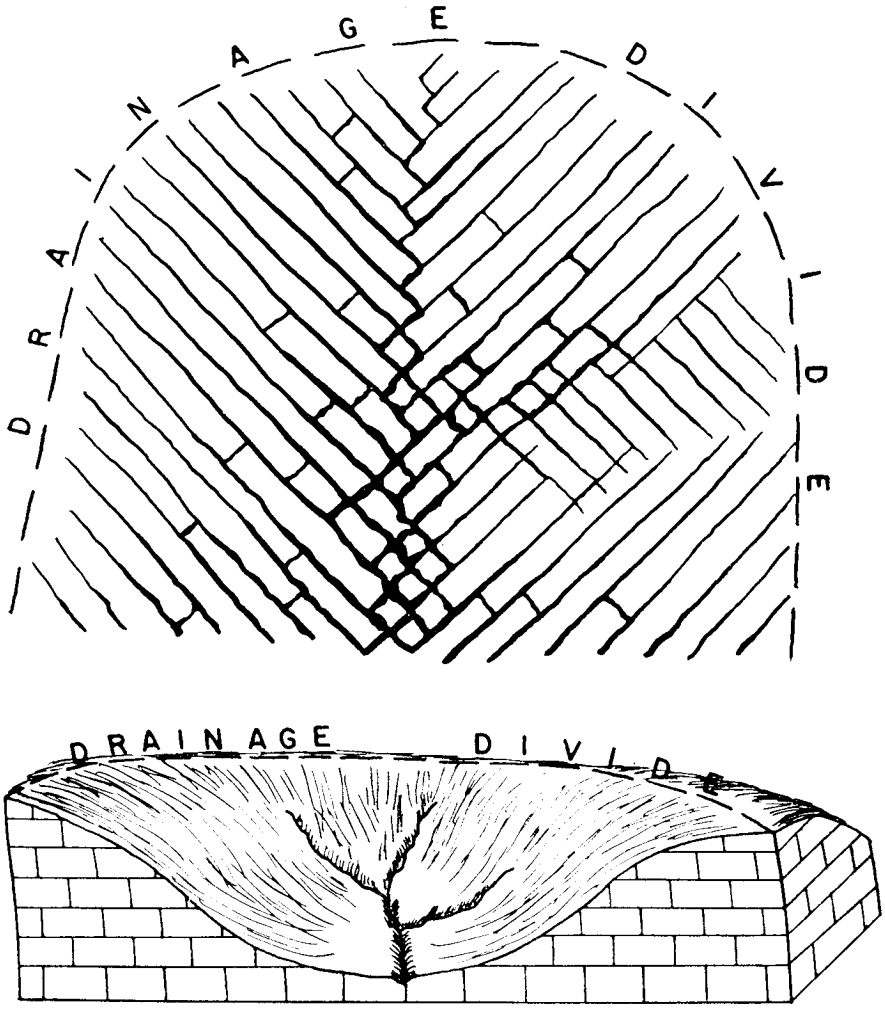

Figure 8.— Directional solution along joint planes discordant with drainage.

general movement of water toward the zone of greatest solution – the topographic low. In the valley bottoms both sets show equal development. This indicates the tendency of ground water to move toward a valley and thence down the valley to some lower point of discharge. Where two sets of joints intersect a valley in a diagonal pattern, the joints will be solutionally developed in a herringbone pattern pointing downstream (fig. 8). An example of this type of solutional development may be seen at the intersection of Ray's Fork and U. S. Highway

25. The joints of the herringbone pattern pointing downstream are developed to a width of several inches. The herringbone pattern pointing upstream shows practically no solutional development, and few of the joints exceed a quarter of an inch in width.

In the consideration of the development of the solutional features illustrated in figures 5 and 6, hypothetical sections are used, indicating the ideal profile that should be developed under conditions of uniform structure, homogeneous materials, and uniform infiltration of surface water. Unfortunately, such a condition is only the ideal, as yet undiscovered in nature. In the Bluegrass region the degree of mechanical opening due to jointing varies with the intensity and direction of the deformative forces, the competency of the individual strata, and many other variables. Over most of the area, however, it appears to be relatively uniform. Considering the area as a whole, the infiltration of surface water does not vary markedly from place to place. The stratigraphic section, however, shows marked differences of solubility in a vertical direction, and the individual strata show marked differences in solubility at various outcrops. The presence of thin layers of clay shale, bentonite, or limestone layers of low solubility prevents the vertical movement of water and produces an effective temporary base level for the process of solution. For convenience of discussion, in some parts of this paper the term "insoluble" has been used to describe these layers of low solubility.

Two factors predominate in causing the shales and bentonites to serve effectively as base levels for the process of solution: (1) the lack of jointing in these relatively incompetent strata and (2) the lack of solutional enlargement of any existing openings in these beds. Wherever these beds of low permeability and solubility intersect the land surface, contact springs are produced and all water that penetrates to the depth of these strata is discharged at the surface by springs and seeps. By thus preventing further downward percolation of the water, these beds prevent the formation of solutional openings below.

Where these strata of low solubility lie beneath the land surface, downward solution below their upper surface is prevented or delayed, and some lateral development is effected. Differences in the topographic, stratigraphic, and structural occurrence of these strata produce an infinite variety of solution patterns. These conditions are the actual field conditions of the Bluegrass and represent distorted versions of the hypothetical condition indicated in figure 5.

The intersection of an insoluble horizon with the bottom of a stream valley and the effect of that horizon on the development of the hypothetical zone of solution as depicted in figure 5 is illustrated in figure 9.

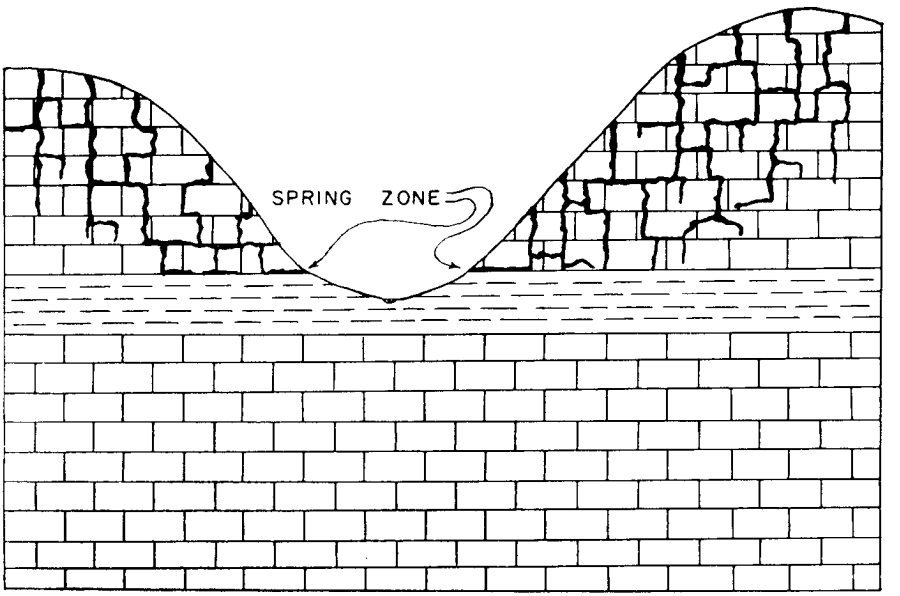

Figure 9.— Effect of insoluble stratum at stream level.

An example of this pattern occurs in Bourbon County, 1½ miles west of Paris on U. S. Highway 40. In this locality the hilltops are underlain by coarsely crystalline limestone of the Benson limestone. The upper few feet of the Jessamine limestone, which is found at and below creek level, is a dense, fine-grained siliceous and shaly limestone that resists solution. Two wells have been drilled on hilltops into the Benson limestone. Both these wells produce water. One well has been drilled into the Jessamine limestone in the valley bottom, and it failed to produce water from either the upper or the lower portion of the limestone.

Figure 10 illustrates the presence of two insoluble horizons, one of which is at creek level and is unbreached by the stream. An example of this pattern occurs near Shannondale in Fayette County. A well on the Mannelly farm was started on the hilltop, where it penetrated coarsely crystalline limestone of the lower part of the Cynthiana formation (heretofore mapped as the Woodburn limestone), then the insoluble argillaceous limestone of the basal part of the Cynthiana formation (heretofore mapped as the Brannon limestone). After passing through the base of the Cynthiana formation, the well passed through the coarsely crystalline Benson limestone, then through the insoluble upper portion of the Jessamine limestone, and finally ended in the

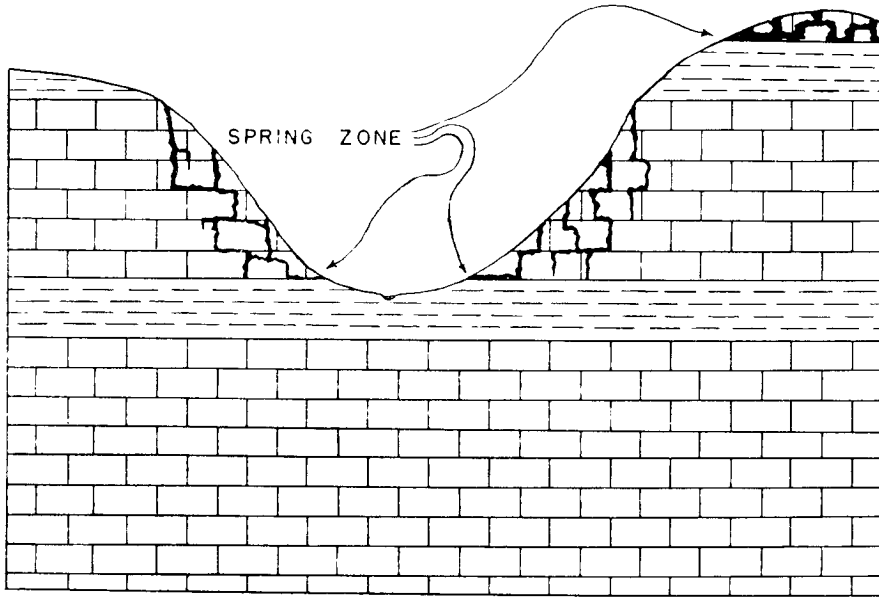

Figure 10.— Effect of insoluble strata at stream level and capping hill.

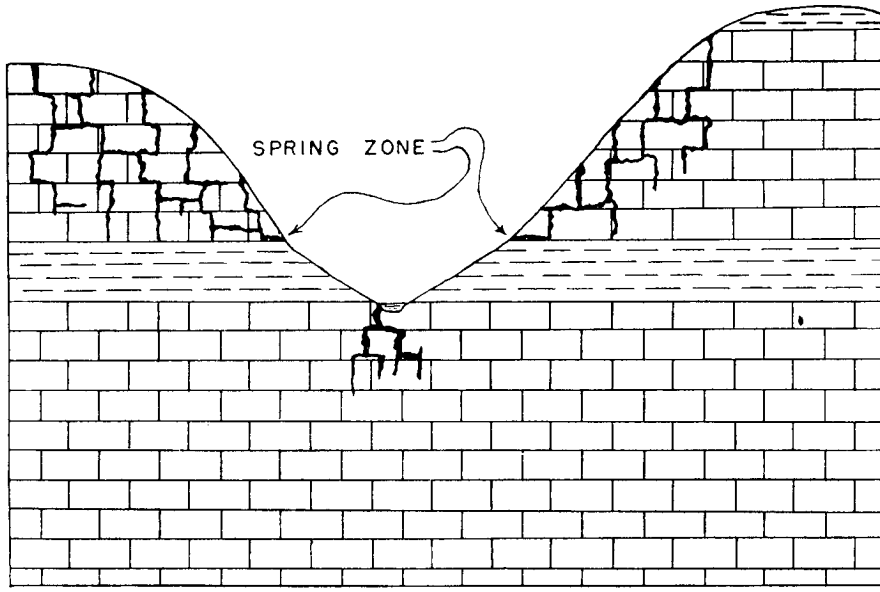

Figure 11.— Effect of insoluble stratum being breached by stream.

coarsely crystaline lower portion of the Jessamine limestone. No water was produced from the well. Wells were drilled on the Kirkland and Powers farms at points topographically and stratigraphically lower. These wells begin just below the base of the Cynthiana formation and do not enter the Jessamine limestone. Both wells produce water from the Benson limestone.

Figure 11 illustrates the beginning of substream solution as an insoluble horizon is breached by the stream valley.

Figure 12 illustrates a condition encountered about 3¼ miles north of Lexington, on the Newtown Pike. A well on the Moore farm starts on the side of a hill in the basal part of the Cynthiana (heretofore mapped as the Brannon limestone), and penetrates the Benson and Jessamine limestones without producing water. At the nearby Marks farm a successful well was drilled in the valley bottom, where the well starts and ends in the Benson limestone.

Figure 13 illustrates a similar condition but indicates an additional insoluble horizon at the top of a hill. An example of this feature occurs in Bourbon County in the vicinity of Hutchinson Station. A well drilled on the farm of I. S. Wilmott, three-quarters of a mile south of Hutchinson Station, started on the hilltop in the insoluble argillaceous limestone in the lower middle part of the Cynthiana formation, passed through this horizon into the coarsely crystalline limestone of the lower part of the Cynthiana formation (heretofore mapped as Woodburn), and thence through the insoluble and argillaceous basal part of the Cynthiana (heretofore called the Brannon limestone), and finally entered the crystalline Benson limestone below. The well failed to produce water. A well on the nearby farm of I. Varellis was drilled in the creek bottom, in which the Benson limestone is exposed, and obtained water from that limestone.

It should be emphasized that these illustrations are merely a few specific examples of the many intricate combinations of topography and stratigraphy that together produce the areal solutional pattern. The records of the wells used as illustrations are but a few of the hundreds shown in the well inventory that further corroborate the conclusions indicated in figures 9 through 13.

THE OCCURRENCE OF WATER

In the foregoing section it has been the author's intention to illustrate and describe the general solutional features that localize and determine the movement of underground water in the four-county area of this study. It was the fundamental aim of this investigation to pre-

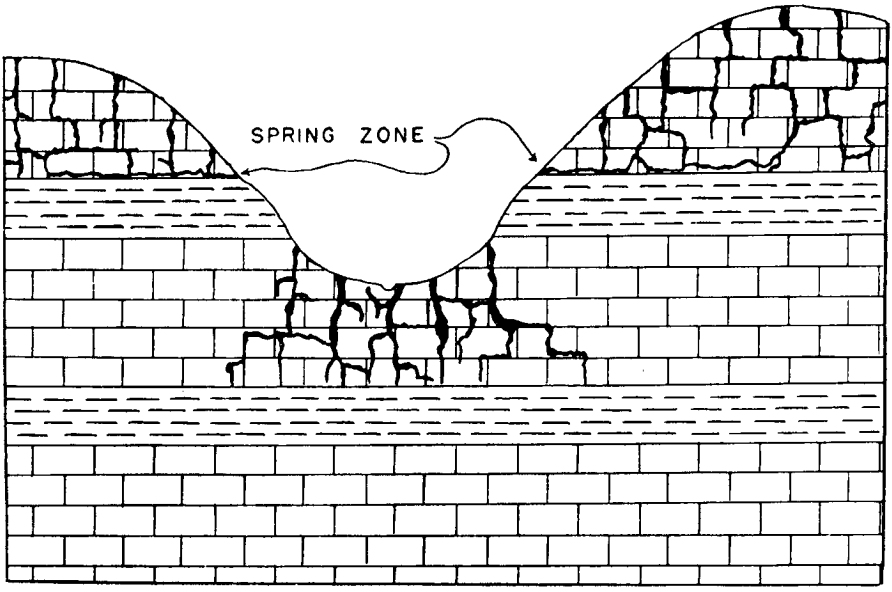

Figure 12.— Effect of insoluble stratum breached by stream.

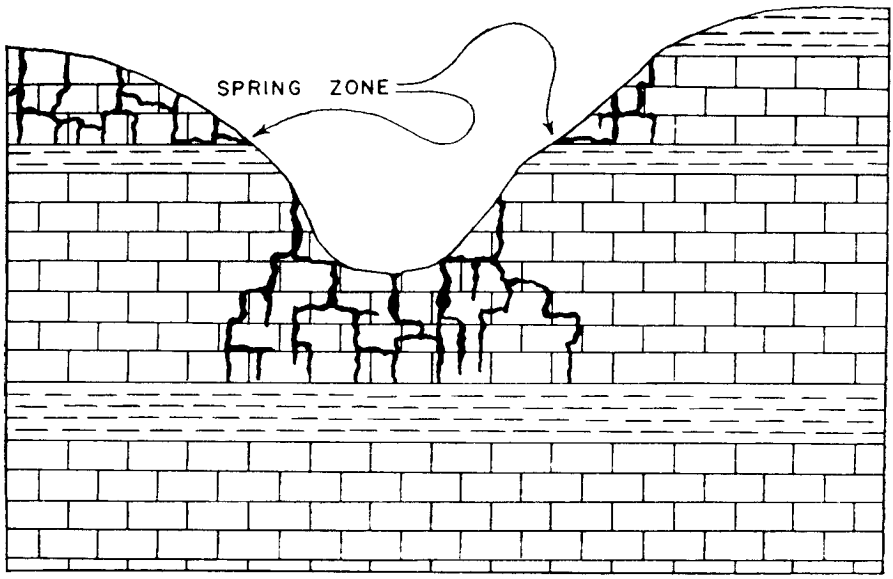

Figure 13.— Effect of insoluble strata below stream, breached, and capping hill.

pare maps of each county, indicating the areas in which wells drilled for water could be expected to produce, and those areas in which wells would be dry. For the areas of possible water production, some idea of the chances of encountering water, the possible amount of water, depth at which water should be encountered, and a suggestion as to quality of water were to be indicated. These maps were prepared, and small-scale reproductions of them are appended to this report.

Previous to this investigation, selection of a site for drilling for water in the Bluegrass region was entirely a matter of convenience, and little or no thought was given to conditions controlling occurrence of the water. This investigation, although essentially qualitative in nature, showed that, by considering the solubility of the strata in three dimensions and comparing that condition with the topography, the geologist was able to predict, with a fair degree of accuracy, the zones of maximum solution, and thus the zones of maximum water production. The existence of the zone of solution illustrated in figure 5 indicated that drilling in excess of 100 feet would produce either no water, or stagnant (perhaps connate) water of insufficient quantity and, usually, poor quality. This was borne out by the production of water from wells penetrating strata lying 100 feet or more below the land surface. Those wells, with only rare exceptions, produced water in very small quantity and high in sulfur and salt content. Thus all areas of possible production were mapped only for the first 100 feet, unless other factors made this figure smaller. In the producing zone, the quality of the water was uniformly hard, the more highly mineralized water being found along the faults of the area. This distribution necessitated the inclusion of a salt symbol on the maps of groundwater areas. This symbol follows the fault pattern of the area, extending out from each fault for about a mile. The localization of mineralized waters along these faults suggests that it is essentially water from deeper strata leaking upward along the shatter zone.

The amount of water produced by wells depends upon the size of the solutional openings encountered, and that, in turn, upon stratigraphic and topographic considerations. By mapping the geology of the four counties (maps appended), paying close regard to lithology and apparent solubility, and comparing that map with the topography, it was possible to prepare a map of ground-water distribution using three symbols. One symbol, hereafter referred to as zone A, represents areas in which soluble beds are so located topographically as to be greatly affected by solution. In this zone, most wells produce water in quantities of about 150 gallons an hour, with some larger and smaller production at unpredictable locations. The second symbol, hereafter

referred to as zone B, represents areas in which beds of lower apparent solubility are well located topographically, or beds of high apparent solubility are poorly located topographically. In this zone, about half the wells drilled produce water in quantities of approximately 100 gallons an hour. As in zone A, some larger or smaller production is encountered at unpredictable locations. The third symbol, hereafter referred to as zone C, represents areas in which the beds are practically insoluble or, if soluble, so poorly located topographically or stratigraphically as to yield water only in extremely rare instances, and then in quantities less than 50 gallons an hour.

Because the stratigraphic relationship of the various horizons controls, to a large degree, the occurrence of the ground water in these counties, some discussion, general though it may be, of the water-bearing characteristics of the various formations seems desirable.

Few wells have been drilled through the Highbridge group into the underlying formations. Most of those wells were drilled many years before this investigation, and little information regarding them is available. Consequently, only generalizations may be drawn concerning the water from these deeper strata. Apparently, lenticular sands receiving no permanent recharge are present at varying depths below the bottom of the Highbridge group. These sands have been variously referred to as the St. Peter sandstone and stray sands of the Knox dolomite. The author inclines toward the latter classification. Almost all the wells drilled to this horion produce water, in quantities ranging from 1 to 50 gallons a minute, that is too salty for human consumption. Occasional wells have been reported as producing fresh water from these beds, but some question exists as to whether the producing stratum does not lie much higher in the well, perhaps within the first 100 feet. The great depth to static water level in wells producing from these deeper sands, as well as the poor quality of the water in most wells, makes it inadvisable to drill to this depth in search of a potable water supply.

Strata of the Highbridge group yield water to wells only in the area where they are exposed to direct infiltration. In all the areas where these strata are not exposed at the surface, virtually no water is produced from them. This distribution of water production is readily understood from a consideration of the effect of the bentonite beds in the Tyrone limestone. These layers of bentonite are extremely effective in preventing the passage of water down through the upper portion of the Highbridge group. The occurrence of a rather persistent layer of bentonite in the upper part of the Tyrone limestone prevents the movement of water from the Lexington group to any depth in the

Highbridge group. Thus, wherever the Highbridge is found under cover of younger rocks, little or no water is found in it. Only in the outcrop area along the Kentucky River, where the bentonite layers have been removed by erosion, does this group produce water. In that area, owing to the irregular topography, recharge areas are limited in extent, and water traveling in the formations is usually discharged through large springs high along the walls of the Kentucky River Valley and its tributaries. These springs are produced by the intersection of a relatively insoluble bed with the surface. Water, working down through the strata of the Highbridge group, moves down along solutional openings to an insoluble bed, then moves laterally along the top of the insoluble bed to issue at the surface as a spring.

The combination of the small area of recharge and rapid discharge makes the Highbridge group generally unsatisfactory for well-water production. Some water may be produced, however, immediately adjacent to the Kentucky River and its tributaries, where it frequently infiltrates from these streams into the joints of the rocks underneath and along the stream course. Occasional wells produce water at higher points in the area where springs do not discharge the water too rapidly. The outcrop area of the Highbridge group has been indicated as being either in zone B, where conditions indicate that small amounts of water might be produced, or in zone C, where little or no water is likely to be produced.

Ground-water conditions in the Lexington group as a whole vary considerably in different areas. Locally, however, the zones of differing water production coincide closely with the areal distribution of the formations making up the Lexington group.

The Curdsville limestone crops out in only two of the four counties involved in this study. It may be seen as a persistent band crossing the southern portion of Jessamine and Fayette Counties with the dendritic pattern characteristic of nearly horizontal formations. Throughout this area of outcrop the formation is of nearly uniform lithology and solubility. The bentonite layers lying in or not far above the underlying Tyrone prevent the passage of ground water to any great depth below the base of the Curdsville limestone. The numerous springs at the contact of these two formations attest to the fact that the water of the Curdsville limestone is discharged rapidly after recharge takes place. Many of these springs, however, provide water during the whole year, showing that sufficient storage is available to provide discharge during the drier months. Where the lower part of the Curdsville limestone and its associated bentonite are exposed above the drainage level, little water can be produced by a well penetrating the

Curdsville. Some clue to the conditions existing here is shown by the fact that some water remains in storage during the drier months of the year. That in itself is suggestive of low permeability of the formation and poor yields to wells drilled in that zone; for, if the rock were more permeable it would tend to be drained completely in dry periods. In other words, where the permeable part of a formation lies above drainage level, if large openings are present that would yield water to a well, then most of the water is lost through springs. If, on the other hand, the openings are too small to discharge the water rapidly through springs, they are also too small to supply large quantities to wells.

Where the Curdsville limestone is sufficiently below drainage to provide storage within the limestone, wells having small but perennial yields may be expected. It is not uncommon to find wells in the outcrop area of the Curdsville producing water from the lower part of the limestone where it is no more than 10 to 15 feet below the land surface. Most of those wells were carried to greater depths in hopes of finding a larger supply, but deepening them below the base of the Curdsville limestone failed to increase their production.

The Logana formation throughout its extent is hydrologically quite similar to the previously described Curdsville limestone. The individual layers of limestone in the Logana formation appear to be of about the same solubility as those of the underlying Curdsville. The presence of more interbedded shale in the Logana formation, however, tends to slow up the process of solution, and, in most cases, to provide smaller yields of water to wells producing from this formation. As no appreciable difference exists in the solubility of the basal part of the Logana and the upper part of the Curdsville, there is no break in the pattern of water occurrence at that contact. In indicating the several zones of water production, these two formations were mapped as showing identical water-bearing characteristics. Actually, the production capacity of the Curdsville would seem to be the better of the two.

The siliceous and shaly nature of the Jessamine limestone over much of the area included in this investigation makes it a very poor producer of water. In Jessamine and southern Fayette Counties, the lower 15 to 25 feet grades rather imperceptibly into the top of the Logana formation. Thus, for water-bearing capacity, that portion of the Jessamine has been mapped in the same fashion as the underlying Logana formation and Curdsville limestone. About 20 to 30 feet above the bottom of the Jessamine, the formation in much of the southern part of the area appears to resist strongly the process of solution, and effectively serves as a base level of solution above this horizon. With the exception of the upper 5 or 10 feet of the formation, the remainder

of the Jessamine limestone is a rather soluble, shaly, and somewhat siliceous fine-grained limestone. Because this portion of the formation is both underlain and overlain by relatively insoluble strata, the potential producing one is so restricted in thickness and recharge as to make it almost impossible to obtain a well in the upper portion of the formation. The Jessamine limestone, therefore, has been mapped as an unsatisfactory producing one, except in the lower 15 to 25 feet mentioned above.

In Scott and much of Bourbon Counties, as well as the northern part of Fayette County, the outcrop of the Jessamine limestone is confined to the stream valleys, where the relatively insoluble upper portion of the formation acts as a barrier to the downward movement of ground water and forms a local base level of the process of solution, producing a spring zone at and below the top of the Jessamine limestone.

The fact that many of the larger springs of the area are actually within the relatively insoluble upper part of the Jessamine is not incompatible with the facts previously presented. These springs originally developed as contact springs on top of the Jessamine limestone. As their discharge increased it also increased the size of the conduit through which the water flowed to the surface. As most of the year water flows over only the bottom portion of the conduit, that is the portion most affected by solution. In those few times during the year when the flow is heavy and some clastic material is discharged in the spring water, limited abrasion and hydraulic action are active in lowering the point of discharge. It is notable that the larger the spring at this horizon, the farther is the bottom of the outlet below the top of the Jessamine limestone.

Throughout the four counties covered by this investigation, the most important producing formation is the Benson limestone. In those areas where the contact of the Benson with the underlying Jessamine limestone lies above the drainage level, it is rare to see wells that are capable of year-round production. This is attributed to the discharge of most of the water through springs, as mentioned in the preceding discussion of the Jessamine limestone. In many parts of the area, however, that contact lies at varying depths below the drainage level, and wells starting near the top of the Benson limestone produce water from within that formation. Throughout the area of this investigation, the Benson limestone presents the most uniform lithology, solubility, and water-bearing characteristics. This medium to coarsely crystalline limestone is easily dissolved and, wherever seen in outcrop, displays much solutional enlargement along joint and bedding planes. Where

the Benson limestone is covered by younger formations, it fails to serve as a satisfactory water-bearing bed. Those overlying less soluble layers prevent the infiltration of water down into the Benson, thereby preventing solutional enlargement and recharge of existing openings in the Benson. With only a few minor exceptions, the outcrop area of the Benson limestone has been indicated on the accompanying maps as most favorable for ground-water production.

In direct contrast with the Benson limestone, the Cynthiana formation is the most variable, lithologically and hydrologically, of all the formations in these counties. Various authors have given local names to the many minor facies of the Cynthiana and have proposed those names for the rank of formation. Those various facies have no great continuity either horizontally or vertically, and, although useful for local descriptive purposes, cannot be identified over the entire outcrop area of the Cynthiana formation. Two zones produce water in this formation, and neither one has identical characteristics over any great horizontal extent. Normally, lying immediately above the Benson limestone is the finely crystalline siliceous or shaly limestone heretofore called the Brannon. Where present, this relatively insoluble stratum serves as a base level of solution and is represented by a well-marked spring zone. This stratum is absent in southeastern Jessamine County and eastern Bourbon County, but it attains a maximum thickness of 15 feet at its type locality at Brannon Station in north-central Jessamine County.

Beginning immediately above this basal insoluble stratum is the first potential producing zone of the Cynthiana formation. This zone ranges in thickness from about 30 feet in eastern Bourbon County to about 40 feet in western Bourbon County and the remainder of the area. In Fayette, Jessamine, and Scott Counties this unit has been identified as the Woodburn limestone, which is typically a fine- to coarse-grained phosphatic limestone. In eastern Bourbon County the same interval is represented by a medium-grained crystalline, somewhat siliceous and rubbly limestone carrying typical fossils of the Cynthiana formation as heretofore described. As a water bearer that zone is continuous with the afore-mentioned unit known as the Woodburn of the other areas. In none of the counties does this zone compare with the Benson limestone in production capacity. Production from wells drilled in this stratum is somewhat unpredictable, and dry wells have been drilled with about the same frequency as producing wells.

Lying immediately above this limestone bed are a series of clay shales with interbedded limestones ranging in thickness from about 50

feet in Fayette and Scott Counties to about 30 feet in eastern Bourbon County. This zone, like those insoluble zones mentioned heretofore, is not capable of yielding water to wells, and serves only as a barrier to the downward movement of water and the further solutional development which that water might have effected. Above this insoluble zone, and found over the entire area of outcrop of the Cynthiana in these counties is the second zone of potential ground-water production. This zone ranges in thickness from about 30 feet in Fayette and Scott Counties to about 50 feet in eastern Bourbon County.

As from the lower producing zone in the Cynthiana formation, production from this horizon is somewhat unpredictable, and only about half the wells drilled in the past have yielded satisfactory water supplies. The most reliable production from this horizon has been in eastern Bourbon County, where, although few wells have been drilled into this zone, it has a large outcrop area and appears to hold the promise of much-needed water for that portion of Bourbon County.

The remaining few feet of the Cynthiana formation is composed of alternating shales and limestones that are incapable of yielding water because of the presence of the insoluble clay shales.

The remaining portion of the formations cropping out in these counties is a section of alternating limestones and shales, which afford no possibility of water production.

The summary and conclusions of this investigation are embodied in the maps of ground-water occurrence appended to this paper. It should be pointed out that the lack of topographic control in eastern Bourbon and southern Fayette Counties prevented the desired accuracy in mapping those areas.

WELL INVENTORY

In the early stages of the investigation, it was thought that the accumulation of data on existing wells would provide a means for the accurate evaluation of drilling conditions and water occurrence. Although this information was accumulated over the four-county area, and duly transcribed by men working in the field, the validity of the information is questionable in several respects.

As no person or agency has kept a record of the wells drilled during the past few decades, it is almost impossible now to get information on the many wells that were unsuccessful in yielding water. It is estimated that as many as two or three times the present recorded number have been drilled. Local drillers informed members of the survey party that the general average of producing wells was no more than one out of

every five wells drilled. The wells drilled while the survey was carried on would, in many places, seem to bear that out. The appended inventory indicates that somewhat more than half the wells that could be found in the field are producing water. Needless to say, those drilled in past years that were not producers are now lost and cannot be included in the inventory. Thus, the statistical nature of the inventory is misleading in regard to the over-all ratio of producing wells to dry wells. It is further misleading in that the information on existing wells comes from such a variety of sources, of differing interest and object, that it is difficult to evaluate it.

It was the objective of the inventory program to visit every existing well, determine its depth, diameter, owner, method of lift, use, depth to water, production, and chemical quality of the water. It was originally hoped to determine in the field the top and bottom formations penetrated by the well. Limitations imposed by a small budget necessitated a much more abbreviated inventory program than originally planned. In only the rarest cases was it possible to determine the depth to water and the production. Chemical analyses proved too expensive to be considered on the limited budget, and determination of top and bottom formations in the field proved impractical. The inventory was therefore restricted to information on the owner, depth, diameter, method of lift, use, and miscellaneous items. To attempt to classify the accuracy of the information collected is out of the question. Its value is well shown in general patterns of production and in some carefully observed areas and wells, but, as a whole, it must be used with great care.

The numbering system of the wells is based upon quadrangles of 5 minutes' latitude and longitude on each side. Thus the first four-digit number represents the degrees and minutes of the meridian of longitude forming the east boundary of the 5-minute quadrangle, and the second four-digit number represents the degrees and minutes of the parallel of latitude forming the south boundary of the 5-minute quadrangle. The third number is the number assigned that well in the 5-minute quadrangle. Thus well 8400-3805-1 is the first well numbered in the 5-minute quadrangle bounded on the east by the meridian 84°00′ west longitude and on the south by the parallel 38°05′ north latitude.

Appended to this paper are four tables of wells arranged according to county and number. A comparison of the location of the producing wells and the map of ground-water occurrence demonstrates clearly the validity of the map of ground-water occurrence insofar as the inventory can be trusted.

The inventory was not used in the preparation of the maps of ground-water occurrence but was prepared independent of that work, and used for the purpose of checking the accuracy of the maps. In this capacity, the inventory formed a most valuable adjunct to the program.

Table 1.— Records of wells in Bourbon County, Kentucky

Method of lift: C, cylinder; E, electric; G, gasoline, H, hand pump; P, power; W, windmill Use: D, domestic; S, stock

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8400-3805-1	R. H. Swope	50	6		D	Driller, J. Miller. Date drilled, June 1946. Depth to water, 25 feet. Fresh water.
8400-3805-2	R. H. Swope	22	6		D	Driller, J. Miller. Date drilled, June 1946. Fresh water with show of oil.
8400-3805-3	R. H. Swope	18	6		D	Driller, J. Miller. Date drilled, June 1946. Fresh water.
8400-3805-4	Lyle Brothers	25	6	H	D	Fresh water with show of oil.
8400-3805-5	Lyle Brothers	25	6	H	D	Fresh water.
8400-3810-1	R. H. Taul	77	6			Dry.
8400-3810-2	Tollie Young	60		H	D	Water contains some oil, "sulfur" (hydrogen sulfide)
8400-3810-3	Tollie Young	60		H	D	Water contains sulfur.
8400-3810-4	George Ballard	50		H	D	Water contains salt.
8400-3810-5	John O. Brennen	35		H	D	Water contains lime.
8400-3810-6	John O. Brennen	65		H	D	Water contains some sulfur.
8405-3805-1	Mrs. J. M. Mason	40		H	S	Water contains salt.
8405-3805-2	Mrs. J. M. Mason	40		H		Water contains sulfur.
8405-3805-3	Mrs. J. M. Mason	40		H	DS	Water contains sulfur.
8405-3805-4	Mary Dowel	40		H		Water contains lime.
8405-3805-5	Smith and Dickson	50		H	S	Water contains sulfur.
8405-3810-1	Reynolds Letton	15±	60?	CH	D	
8405-3810-2	Reynolds Letton	15±	60		D	
8405-3810-3	Maravan Farm	80-100		W	S	Water contains sulfur.
8405-3810-4	Maravan Farm	40		H	DS	Water contains lime.
8405-3810-5	C. C. Clarke, Sr.	80		H	D	Water contains sulfur.
8405-3810-6	C. C. Clarke, Sr.	80				Dry.
8405-3810-7	H. Rogers	20				Water contains lime.
8405-3815-1	Florence B. Jefferson	32	6	CH	D	
8410-3805-1	J. D. Crawford	90		H	DS	Water contains lime.
8410-3805-2	J. D. Crawford	90		E		Water contains lime.
8410-3805-3	Mrs. W. H. Whitley	100				Dry.
8410-3805-4	W. Fuback	20		H	S	Water contains lime.
8410-3805-5	Gilbert Webb	160		H		Water contains salt.
8410-3805-6	Gilbert Webb	200		H	D	Water contains sulfur.
8410-3805-7	Tom Henry Clay	60		H		Water contains sulfur.
8410-3805-8	Tom Henry Clay	35		E	D	Water contains sulfur.
8410-3805-9	Clay Gaitskill	22		H	D	Water contains lime.
8410-3805-10	H. B. Clay, Jr.	127		H	D	Mineral water.
8410-3805-11	Fred Batterton	80		H	D	Salt water, unfit for use.
8410-3805-12	O. L. Steele, Jr.	80		H	D	Mineral water.
8410-3805-13	O. L. Steele, Jr.	82				Yield 1,000 gallons per hour. Water contains lime.
8410-3805-14	O. L. Steele, Jr.	30		H	D	Water contains lime.
8410-3805-15	O. L. Steele, Jr.	30		H	D	Water contains a little sulfur.
8410-3805-16	Woodford Spears	80		H	D	Water contains sulfur.
8410-3805-17	Elmer Davis	50		H	D	Water contains lime.
8410-3805-18	Mrs. Forest Davis	60		H	D	Water contains lime.
8410-3810-1	F. F. Colcord	100	6		D	Water contains sulfur.
8410-3810-2	F. F. Colcord	200	6			Driller Garretson. Dry.
8410-3810-3	Stoner Creek Stud Farm	120		H	DS	Water contains lime.
8410-3810-4	Stoner Creek Stud Farm	50		H		Water contains salt.
8410-3810-5	Pridemore	30		H	D	Water contains lime.
8410-3810-6	Mrs. Otis Spencer	90±		H	D	Water contains sulfur in summer.
8410-3810-7	Jim Ford	75		None	DS	Water contains lime.
8410-3810-8	E. R. Earlywine	20		H		Water contains lime. Well not in use.
8410-3810-9	N. B. Hancock	125±		E		Water contains sulfur. Well not in use.
8410-3815-1	G. S. Carter			CH		Date drilled, 1915. Well has not been used for 20 years.
8410-3815-2	Ben Harrison	100±		H	D	Water contains sulfur.
8410-3820-1	Raymond Florence	30	100	H	D	15 feet to water, blasted 18 feet into rock.
8410-3820-2	Wood Monford	70	6	CE	D	Driller, Cox. Date drilled, 1900. Depth to water, 40 feet, October 1945. Sulfur water originally, but cleared later.
8415-3805-1	W. H. Forgy	30				

[1] For location of wells see map.

Table 1.— Records of wells in Bourbon County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8415-3805-2	W. H. Forgy	80				Well draws down very easily, slow recovery.
8415-3805-3	Meyer	40±				
8415-3805-4	N. E. Miller	50				Driller, Miller. Date drilled, December 1945.
8415-3805-5	Doug Guy	180		CG		Driller, Sparks.
8415-3805-6	A. S. Thompson	83		CE		
8415-3805-7	John Anderson	60		CE		Date drilled. 1925. Water contains sulfur.
8415-3805-8	Johnson	100				Date drilled, 1925. Dry.
8415-3805-9	Dewey Hayes	60±		CE		
8415-3805-10	Mrs. C. J. Redman	80		CH		Date drilled, August 1945.
8415-3805-11	Mrs. C. J. Redman	82		CE		Date drilled, 1936.
8415-3805-12	Mrs. House	60		CE		Date drilled, 1920. Good supply. Evidently taps spring.
8415-3805-13	Mrs. House	65		CH		Date drilled, 1920. Water contains sulfur.
8415-3805-14	Mrs. House	110		CH		Date drilled, 1930. Water contains sulfur.
8415-3805-15	Mrs. House	83		CH		Date drilled, 1920.
8415-3805-16	Mrs. Matear	100		CE		Date drilled, 1935.
8415-3805-17	John Wiggins	60		CH		
8415-3805-18	John Wiggins	65		CE		
8415-3805-19	S. Florence			CH		
8415-3805-20	Mr. Roach	300		CE		Water contains sulfur.
8415-3805-21	James Wilmott	80				Date drilled, 1935. Dry.
8415-3805-22	James Wilmott	90				Date drilled, 1935. Dry.
8415-3805-23	James Wilmott	85				Date drilled, 1935. Dry.
8415-3805-24	E. F. Pritchard	40?	6	None		
8415-3805-25	E. F. Pritchard	40?	6	None		
8415-3805-26	E. F. Pritchard	60	6		S	
8415-3805-27	J. B. Caywood	34	6	E	D	Driller, Wells. Water contains sulfur.
8415-3805-28	J. B. Caywood	31	6			Water contains sulfur. Well plugged.
8415-3805-29	I. M. Yates	30			D	Driller, Gagston. Pumps dry after 20 minutes.
8415-3805-30	I. M. Yates	140	6			Water contains some sulfur, some oil.
8415-3805-31	I. M. Yates	90				Water contains lime.
8415-3805-32	I. M. Yates	40		CH	D	Water contains iron. Well pumps dry if steadily pumped over 2 hours. Dry.
8415-3805-33	Mrs. George Jacoby					
8415-3805-34	R. E. Bell	72	6	H	D	Water contains lime.
8415-3805-35	R. M. Cable	80	6	H		Water cannot be used, contains sulfur.
8415-3805-36	Stonie Keller	125		None		Water contains salt. Well not in use.
8415-3805-37	Stonie Keller	200		None		Water contains gas. Well not in use.
8415-3805-38	Stonie Keller	46		H	D	Water contains sulfur.
8415-3805-39	Stonie Keller	180		H		Water contains salt.
8415-3805-40	E. F. Pritchard	60	6	None		
8415-3810-1	Elsie Sugg					Yellow sediment deposited by water.
8415-3810-2	D. C. Earlywine	28		CH		Date drilled, 1920.
8415-3810-3	D. C. Earlywine	20		CH		Date drilled, 1930.
8415-3810-5	R. B. Renfrew	150	6			Dry.
8415-3810-6	R. B. Renfrew	150	6			Dry.
8415-3810-7	R. B. Renfrew	150	6			Dry.
8415-3810-8	R. B. Renfrew	150	6			Dry.
8415-3810-9	R. B. Renfrew	150	6			Dry.
8415-3810-10	R. B. Renfrew	150	6			Dry.
8415-3810-11	R. B. Renfrew	150	6			Dry.
8415-3810-12	R. B. Renfrew	150	6			Dry.
8415-3810-13	W. S. Thomas	73	6		S	Water contains sulfur.
8415-3810-14	E. W. Fergeson	30	6	H		Water contains sulfur. Date drilled, 1935.
8415-3810-15	W. H. Fergeson	70	6	H	D	Driller, Jones. Fresh water.
8415-3810-16	Jacoby			CH	D	Hard water. Well never goes dry.
8415-3810-17	Ned Brent			CE		Hard water. Well pumps dry in 6 hours.
8415-3810-18	Davis	65	6			Hard water. Well will pump dry.
8415-3810-19	W. F. Clifford	69	6	CE	D	Hard water. Well never goes dry.
8415-3810-20	R. W. Ritter			CE		Water contains sulfur.
8415-3810-21	Wilson Wilson	120		CE		Water contains sulfur and salt. Well never goes dry.
8415-3810-22	T. Butler	60	6	CE		Water contains some sulfur.
8415-3810-23	W. C. Indecut	60	6			Went dry when well across road hit water.
8415-3810-24	Henry T. Bell	95±	6	CH		Water contains small amount of lime. Well never goes dry.

Table 1.— Records of wells in Bourbon County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8415-3810-25	Claud Ballard	100			S	Water contains sulfur.
8415-3810-26	Martin					Well not in use.
8415-3810-27	W. G. Sugg	100+		CE	D	Driller, John Steward. Well never goes dry.
8415-3810-28	August Lant	180±	6	CE		Water contains sulfur.
8415-3810-29	Roy Turner	80±	6	CE		Hard water. Well never goes dry.
8415-3810-30	T. B. Reynolds	25		H	S	Water contains lime.
8415-3815-1	B. C. Dykes	75±		CH		Date drilled, 1934.
8415-3815-2	W. B. Kiser	60		CH		Date drilled, 1890.
8415-3815-3	Logan English	225	8	None		Driller, W. N. Garretson. Dry.
8415-3815-4	J. H. Jackson			None		Water contains lime.
8415-3815-5	Theodore Kuster	125		H		Water contains salt.
8415-3815-6	Theodore Kuster	60		H		Well not in use.
8415-3815-7	Theodore Kuster	65		H	DS	Water contains salt.
8415-3815-8	Theodore Kuster	60		None		Water contains salt. Well not in use.
8415-3815-9	Theodore Kuster	40		H		Water contains lime.
8415-3815-10	Joseph H. Ewalt	22		H	S	Water contains lime.
8415-3815-11	Joseph H. Ewalt	15		H	S	Water contains lime.
8415-3815-12	Joseph H. Ewalt	35		H	D	Water contains lime.
8420-3805-19	I. M. Thompson					Dry.
8420-3805-20	Mrs. George Jacoby	150				Dry.
8420-3805-21	M. Mantle	55	6	CH	D	Water contains sulfur.
8420-3805-22	Hutson Methodist				D	Well pumps dry in dry weather.
8420-3805-23	Jacoby	125			D	
8420-3805-24	Jacoby	80			D	Water contains iron.
8420-3805-25	C. P. Rice	75		CE	D	
8420-3805-26	C. P. Rice	50		CH	D	
8420-3805-27	C. P. Rice	60		CH	D	
8420-3805-28	I. S. Wilmott	90				Dry.
8420-3805-33	I. S. Wilmott					Well pumps dry in 1 hour.
8420-3805-34	I. Wilkson					Well not in use.
8420-3805-35	H. H. Temple	52	6	CE		Water contains small amount of iron little salt when well not used for 2 weeks. Well pumps dry in dry weather.
8420-3805-36	H. H. Temple	52	6	DS		Water contains small amount of iron little salt when well not used for 2 weeks. Well pumps dry in dry weather.
8420-3805-38	Look	48	6	CE		Water contains sulfur.
8420-3805-40	Henry Hage	50	6	CH		Water contains small amount of sulfur.
8420-3805-41	S. W. Spears	190				Water contains sulfur and salt.
8420-3805-42	S. W. Spears	200	6			Dry.
8420-3805-43	Tom Hale	150	6	CH		Water contains sulfur and salt.
8420-3805-45	Arthur Downing		6	CH		Water contains lime.
8420-3805-46	I. C. Beatty	46	6	CH		Water contains sulfur. Well not in use.
8420-3805-47	I. C. Beatty	50	6			Water contains lime. Well goes dry after pumping 30 gallons.
8420-3805-49	I. W. Townson	180				Dry.
8420-3805-50	I. W. Townson	190				Dry.
8420-3810-1	Mrs. Neville Fisher	100±	6	E	D	Driller, Tadlock (?)
8420-3810-2	Mrs. Mary F. Taylor	100±	6	H		Driller, Tadlock (?)
8420-3810-3	Mrs. Mary F. Taylor	100±	6	H	D	
8420-3810-4	Mrs. Mary F. Taylor	100±	6			Well not in use.
8420-3810-5	Frank Nichols	100±	6	H		
8420-3810-6	R. W. Carpenter	100±	6	H	D	
8420-3810-7	Homer Brown	100±	6	H	D	Well goes dry in summer.
8420-3810-8	Frank Nichols	80±	6	H	D	
8420-3810-9	Clyde D. Burberry	33	6	H	D	Driller, E. C. Cox.
8420-3810-10	N. M. Witt	120	6	G	D	Driller, E. C. Cox.
8420-3810-11	N. M. Witt	150	6	G	D	Driller, Silas Wells.
8420-3810-12	H. S. May	28	6	H	D	Water contains sulfur.
8420-3810-13	Frank Nichols	100±	6		D	
8420-3810-14	B. F. Wright	100±	6	E	DS	
8420-3810-20	Royce G. Martin	828±	6	E	D	Dry to 806 feet.
8420-3810-21	Frank Nichols	100±	6		D	
8420-3810-22	Frank Nichols	100±	6			
8420-3810-23	Mrs. G. F. Leach	80	6	H	D	
8420-3810-24	G. M. Burberry, Jr.	80	6		D	

Table 1.— Records of wells in Bourbon County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8420-3810-25	T. B. Lloyd	60	6		D	
8420-3810-26	George McClead, Sr.	80	6	H		
8420-3810-27	Center Hill School	100±	6		D	Water contains salt. Well not in use.
8420-3810-28	Harry Ferguson	330±	6			Dry.
8420-3810-29	Harry Ferguson	330±	6			Dry.
8420-3810-30	Harry Ferguson	330±	6			Dry.
8420-3810-31	J. H. Bell	65	6	H	S	Water contains small amount of sulfur.
8420-3810-32	Mrs. Fredrikson	60	8	E	D	Fresh water. Water level: 15 feet below surface.
8420-3810-46	H. Weil	78	6	P	S	Drilled, 1944. Water contains sulfur.
8420-3810-47	H. Weil	150	6			Dry.
8420-3810-48	H. Weil	75	6		S	Drilled, 1944. Water contains sulfur.
8420-3810-49	H. Weil	75	6	H	D	Drilled, 1944. Water contains sulfur.
8420-3810-50	H. Weil	76	6	P	S	Drilled, 1944. Water contains sulfur.
8420-3815-1	W. A. Fitzgerald	10-15	36±		D	
8420-3815-2	C. J. Fitzgerald	30-40	6		D	
8420-3815-3	C. J. Fitzgerald	40?			D	
8420-3815-4	Mrs. I. B. Skillman	10-15	36±		D	
8420-3815-5	Clarence LeBus	15±	36±		D	
8420-3815-6	Robert Berry				D	
8420-3815-7	C. T. Morris					
8420-3815-8	C. T. Morris	65±	6			
8420-3815-9	Frank Nichols					
8420-3815-10	J. K. Housten	60±				
8420-3815-11	Frank Shropshire	70?				
8420-3815-12	Allison Barlow					
8420-3815-13	Ed Kelly					
8420-3815-14	Mrs. Angie Houston				D	
8420-3815-15	E. C. More	48			D	
8420-3815-16	E. K. Thomas	160	8	E	DS.	Water contains small amount of sulfur.
8420-3815-17	E. K. Thomas	60	8	H	D	Water contains small amount of sulfur.
8420-3815-18	E. K. Thomas	65	8	H	D	Driller H. M. Marcum. Water contains small amount of sulfur.
8420-3815-19	Frank Sogeser	35		H	D	Water contains lime.
8420-3815-20	Mary Thomas	35		H		Water contains lime.
8420-3815-21	Polly Wallace			H	D	Water contains lime.

Table 2.— Records of wells in Fayette County, Kentucky

Method of lift: B, bucket; C, cylinder; E, electric; G, gasoline; H, hand pump; W, windmill. Use: C, cooling; D, domestic; S, stock; P, public service.

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8415-3800-1	B. F. McKinney	27±		CE		Date drilled: 1930.
8415-3800-2	J. B. McKinney	30		CH		
8415-3800-3	Mrs. Cooper	50-60		CH		
8415-3800-4	C. A. Asbury			CH		
8415-3800-5	C. A. Asbury	40		CH		Water contains salt.
8415-3800-6	L. Simpson	85		CH		Water contains small amount of sulfur.
8415-3800-7	Eron Glass	60	6	H	D	Driller, Tadlock. Date drilled, 1915.
8420-3750-1	Clark Bentley	220	4	CE	D	Water contains sulfur. Yield, 50 gallons per day.
8420-3750-2	Tom Maybrier	145	6			Date drilled, July 1945.
8420-3750-3	Bob Hart	100±				Driller, Tadlock.
8420-3750-4	Mrs. Jeter	80				Dry.
8420-3750-5	Mrs. S. G. Blanding	100		H		
8420-3750-6	J. S. Kelly	80	6			
8420-3750-7	Cedar Hills Water Co.	80		CE	D	Yield, 3,000-5,000 gallons per day. Water supply for community of 40 camps.
8420-3750-8	Powl Lamb	100±		CH		Supplies water to Kiddville, Kentucky.
8420-3750-9	Ollie West	12		B		
8420-3750-10		100±		CH		
8420-3755-1	Pres Bentley	110	6		D	Date drilled, 1940. Goes dry every summer.
8420-3755-2	Athens School	237	6			Driller, Tadlock. Yield, 3 gallons per minute.
8420-3755-3	Mrs. Mary White	25			D	Water contains lime.
8420-3755-4	H. S. Ritchie	20		E	DS	Well will not pump dry. Water contains lime.
8420-3755-5	John Muth	100				Dry.
8420-3755-6	John Muth	150		H	D	Dry.
8420-3755-7	H. E. Ennis	40				Water contains sulfur.
8420-3755-8	C. M. Gentry	150				Dry.
8420-3755-9	Charles Baesler	150		H	D	Dry.
8420-3755-10	Gentry Brothers	100		H	D	Water contains sulfur.
8420-3755-11	William Guilfoil	72		H	D	Water contains sulfur and iron.
8420-3755-12	William Guilfoil	86		E	DS	Mineral water.
8420-3755-13	William Guilfoil	140		H	D	Mineral water.
8420-3755-14	Sam Houston	160		H	D	Water contains sulfur.
8420-3755-15	Owen White	20		None		Water contains lime.
8420-3755-16	Nanie Carroll	125	6	H	D	Water contains lime.
8420-3755-17	Bonnie Stone	62				Yield, 60 gallons per minute. Water contains sulfur.
8420-3755-18	Jenny Sharp	50	6	H	D	Water contains lime.
8420-3755-19	Roger Stone	65		H	D	Water contains sulfur.
8420-3755-20	John Moore	70	6	H	D	Water contains sulfur.
8420-3755-21	E. H. Barker	65	6	H	D	Water contains lime.
8420-3755-22	Noah Miller	25		None		Water contains lime.
8420-3755-23	Charlie Hall	35	6	None		Water contains sulfur.
8420-3755-24	Charlie Hall	30	6	H	D	Water contains sulfur.
8420-3755-25	J. G. Clark	35		H		Water contains small amount of sulfur.
8420-3755-26	Douglas Gay			None		Well not in use.
8420-3755-27	Mrs. Virginia Hindman	112			D	Water contains lime.
8420-3755-28	Mrs. Virginia Hindman	110		None		Water contains lime.
8420-3800-1	Bryan Station School	238	6			Driller, Tadlock. Dry.
8420-3800-2	Bryan Station School	275	6			Driller, Clay Moore. Dry.
8420-3800-3	Chesapeake and Ohio Depot	175	6			Driller, Clay Moore. Dry.
8420-3800-4	Chesapeake and Ohio Depot	175	6			Driller, Clay Moore. Water contains salt.
8420-3800-5	Adams	170	6			
8420-3800-6	J. D. Weil	65		CE		
8420-3800-7	J. D. Weil	135		CE		Dry.
8420-3800-8	J. D. Weil	200				
8420-3800-9	L. Simpson	85		CE		
8420-3800-10	L. Simpson	125		CE		

[1] For location of wells see map.

Table 2.— Records of wells in Fayette County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8420-3800-11	Graham Bronaugh	30		H	D	Water contains lime.
8420-3800-12	Luther Stevens	125		E	DS	Yield, 300 gallons per day. Water contains sulfur.
8420-3800-13	Luther Stevens	130		H	D	Water contains sulfur.
8420-3800-14	Miss Susie Darnaby	130				Dry.
8420-3800-15	Hedgewood Farm	40		E	D	Water contains lime.
8420-3800-16	Taylor Service Station	40	6	H	D	Water contains lime.
8420-3805-1	J. D. Weil	80		CE		Date drilled; 1930.
8420-3805-2	J. D. Weil	150				Date drilled, January 1946. Dry.
8420-3805-3	Collidner	28	6	CE	D	Dry.
8420-3805-4	I. M. Wallace	200			D	
8420-3805-5	I. I. Carr	40		CE		Water contains small amount of sulfur.
8420-3805-6	I. I. Carr	50			S	Water contains sulfur.
8420-3805-7	Collidner	65		CH		
8420-3805-8	Collidner	42	6			Dry.
8420-3805-9	Floyd Howard	191				Water contains sulfur. Well unfit for use.
8420-3805-10	E. S. Conolton	70				
8420-3805-11	E. S. Conolton	85		CH	S	
8420-3805-12	Charley Bodley	87±		CH	D	Mineral water.
8420-3805-13	Charley Bodley	60				Water contains sulffur.
8420-3805-14	A. F. Wall					Well not in use.
8420-3805-15	A. F. Wall			CH	D	
8420-3805-16	P. B. Sams	42		CH	D	Water contains lime.
8420-3805-17	Gragg	70		CC	S	Water contains lime.
8420-3805-18	C. D. Bell					Well not in use.
8420-3805-29	P. D. Foster	165	6		D	
8420-3805-30	P. D. Foster	182	6	CE	S	Water contains sulfur.
8420-3805-31	P. D. Foster	183		CE		Water contains sulfufr.
8420-3805-32	Greentree					Water contains sulfur.
8420-3805-37	Klemdorf Farm	100+	6			Water contains sulfur. Well not in use.
8420-3805-39	J. L. Butler		6		D	
8420-3805-44	F. M. Johnson			CH		Water contains some sulfur.
8420-3805-48	E. W. Townson	135		None		
8420-3805-51	Greentree Farm					Water contains sulfur.
8420-3810-15	B. F. Wright	100+	6	G	DS	
8420-3810-16	Joe Huffman	60±	6	H	DS	
8420-3810-17	Joe Huffman	60±	6	E	D	
8420-3810-18	Joe Huffman	60±	6	H	DS	
8420-3810-19	Hal Price Headly	100+	6	H	DS	
8420-3810-33	J. F. Shimfessel	108	6			Date drilled, 1930. Water contains salt and show of gas. Unfit for drinking purposes.
8420-3810-34	B. F. Buckley	80	6	H	D	Driller, T. K. Tadlock. Fresh water.
8420-3810-35	J. A. Whitsitt	50	6			Driller, Tadlock. Date drilled, 1902. Water contains some iron.
8420-3810-36	J. L. Huffman	67	6	H	D	Driller, Dave Tadlock. Fresh water.
8420-3810-37	J. L. Huffman	32	6	E	D	Driller, Tadlock. Date drilled, 1911. Fresh water.
8420-3810-38	J. L. Huffman	86	6	H	D	Driller, Tadlock. Date drilled, 1906. Water brackish in dry season.
8420-3810-39	J. L. Huffman	90	6	H	D	Driller, Tadlock. Date drilled, 1916. Fresh water.
8420-3810-40	Sears	50	6	H	D	Driller, Henry Van Hook. Date drilled, 1943. Water contains some sulfur.
8420-3810-41	H. Weil	78	6		DS	Water contains sulfur.
8420-3810-42	H. Weil	80	6			Dry.
8420-3810-43	H. Weil	78			S	Driller, Jones (?). Water contains sulfur.
8420-3810-44	H. Weil	80	6			Dry.
8420-3810-45	H. Weil	150	6			Dry.
8420-3810-51	Duke Jones	148	6	H	D	Driller, Tadlock. Date drilled, 1903. Fresh water.
8420-3810-52	Jones	100	6	H	D	Driller, Tadlock.
8420-3810-53	Cecil Corn	96	6	H	D	Water contains some sulfur.
8420-3810-54	E. K. Hipping.r	66	6	E	D	Fresh water.
8425-3750-1	Ballard	52	6			Driller, Clay Moore. Yield: ½ gallons per minute.
8425-3750-8	Marshall	100	6		D	Driller, L. G. Cook.
8425-3750-9	Hisel	135	6		D	
8425-3750-15	Horace Wilson					Water level goes very low sometime — presumably in dry seasons.
8425-3755-1	Charles Young	50	6	CH	D	Driller, Clay Moore.

Table 2.— Records of wells in Fayette County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8430-3755-26	William Dehl	100		H	D	Mineral water.
8430-3755-27	E. P. Southworth			H	DS	Water contains lime.
8430-3755-28	D. D. Whisman	122		H		Water contains sulfur. Gas encountered.
8430-3755-29	D. D. Whisman	100	6	H		Gas encountered.. Wall fell in.
8430-3755-30	Reed Lang	15	10	E	D	Water contains lime.
8430-3755-31	W. P. Margeson	150		E	DS	Yield, 8 gallons per minute. Water contains lime.
8430-3755-32	W. P. Margeson	80		H		Well not in use.
8430-3755-33	Ed Huffman	30		W	DS	Water contains lime.
8430-3800-1	J. S. Lonsill	120		E		Yield, 2½ gallons per minute. Water contains lime.
8430-3800-2	W. R. Brown	40		None		Water contains lime. Well not in use.
8430-3800-3	W. H. Smith	40		None		Water contains lime. Well not in use.
8430-3800-4	O. W. Cecil	65	6	E	DS	Water contains sulfur.
8430-3800-5	Ed Hoffman	40		H	D	Water contains lime.
8430-3800-6	Oliver	40		H	D	Water contains lime.
8430-3800-7	Victor Fister	75		H	D	Water contains sulfur.
8430-3800-8	Victor Fister	80		H	D	Water contains sulfur.
8430-3800-9	Victor Fister	80		H	DS	Water contains sulfur.
8430-3805-10	Crocker	75	6			Driller, Cook. Water contains salt.
8430-3805-11	Crocker	70	6			Water contains salt.
8430-3805-12	F. E. Moler		6			Driller, Cook.
8430-3805-13	S. W. Stroder	168		H		Water contains sulfur.
8430-3805-14	Mary Watson			H	D	Water contains some sulfur.
8430-3805-15		80		H	DS	
8430-3805-16	Anna Smith	70		H	D	Water contains some sulfur.
8430-3805-17	Jimmie Lewis	100		H	D	Water contains some sulfur.
8430-3805-18	Mrs. M. Long	50±		H	D	Water contains sulfur. Water level, 35 feet.
8430-3805-19	Walnut Hall Farm	1,100				Well plugged back to depth 90 feet and pumping fresh water.
8435-3755-24	Walters	135	6		D	Driller, Clay Moore.
8435-3755-25	George Beckwitt	90		None	D	Driller, Cooke. Date drilled, February 1947. Water contains some sulfur.
8435-3755-26	Joe Horn	100				Driller, Cooke. Date drilled, February 1947. Dry.
8435-3800-1	W. Payne				D	Well used by two families besides tenant.
8435-3800-2	Jesse Haynes, Jr.				S	Owner is digging cistern. Well contains sulfur.
8435-3800-3	George Allen	129	6	CH	D	Driller, Cooke. Date drilled, 1943. Water level: 60 feet above bottom, 1946.
8435-3800-4	L. M. Tucker	100+		CH	D	Driller, Cooke. Date drilled, 1942. Water contains sulfur. Well used mostly in summer, cistern used at other times.
8435-3800-5	Wells	90		CH	D	Water contains sulfur.
8435-3800-6	Wells	60	6	E	D	Owner building 30,000 gallon concrete tank to accomodate this well.
8435-3800-7						
8435-3800-8	N. B. Hamilton	30	6	CH	D	Driller, Payne. Water level, 15 feet above bottom, 1946.
8435-3800-9	Wells		6	CH	D	Water level, 10 feet, June 20, 1946. Water muddy.
8435-3800-10	Shouse	40	6	E	D	Well used by three houses and five troughs.
8435-3800-11	Clyde Allen	85	6	CH	D	
8435-3800-12	George Ritchey	78	6	CH	D	Water contains sulfur.
8435-3800-13	F. H. Stone	62	6	E	D	Well used by two families. Well will pump dry in summer. Water contains small amount of sulfur.
8435-3800-14	Fain					Water contains sulfur. Pumps some sand.
8435-3800-15	Lizzie Chiles	30	6	CH	D	Water level, 25 feet above bottom, 1939.
8435-3800-16	E. Davis	44+	6	CH	D	Driller, Smith. Date drilled, June 1936. Water level, 18 feet above bottom, May 1946. Yield: 5 gallons per minute.
8435-3800-17	E. Davis	75	6	CH	D	Driller, Smith. Date drilled, 1926.
8435-3800-18	Robert Field	80	6	CE	D	Driller, Smith. Date drilled, June 1946. Water level, 20 feet above bottom, June 1946.

Table 2.— Records of wells in Fayette County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8435-3800-19	E. B. Jenkins	90	6	CE	DS	Driller, Kearney. Date drilled, 1922. Water level, 50 feet above bottom, 1943. Yield, 250 gallons in 28 minutes. Water contains sulfur.
8435-3800-20	Spears					
8435-3800-21	Martha Hieatt	50	6	CH	S	Well periodically dry. Unfit for domestic use.
8435-3800-22	Martha Hieatt	65	6	CH	D	
8435-3800-23	William Keller	240	3	E	D	Date drilled, 1916. Water level, 100 feet above bottom, 1946. Water contains some sulfur.
8435-3800-24	I. J. Waits	120	6	E	D	Driller, Cooke. Date drilled, June 1944. Water level, 50-60 feet above bottom, June 1946. Water contains some sulfur. Yield, 35 gallons per day.
8435-3800-25	Gardner	120	6	E	D	Water contains sulfur.
8435-3800-26	Katie Higgins	135	6	CH	S	Driller, Cooke. Date drilled, June 1945. Water contains sulfur, unfit for human use. Water level, 60 feet, 1945. Analysis showed brine and contamination. Strong gas blow and oil show after well drilled.
8435-3800-27	Russell Michael	125	6	E	P	Driller, Cooke. Date drilled, January 1946. Yield, 10 gallons per minute. Water contains salt and sulfur.
8435-3800-28	Nora Green	65	6	E	D	Driller, Cooke. Date drilled, 1945. Gas encountered.
8435-3800-29	Iona Sleet	30+	6		D	Date drilled, 1920. Water level, 4 feet below surface, 1946. Water contains salt and sulfur.
8435-3800-30	William B. Gess	97				Driller, Moore. Date drilled, June 1946. Dry. Gas encountered.
8435-3800-31	William B. Gess	50				Driller, Moore. Date drilled, 1946. Dry. Gas encountered.
8435-3800-32	Sam Chasteen	37	6	CH	D	Driller, Kearney. Date drilled, 1942.
8435-3800-33	William B. Gess	80	6		D	Driller, Moore. Water level, 25 feet above bottom, 1946. Across creek from dry gas well. Yield: 15 gallons per minute.
8435-3800-34	Robert Kirkland	130	6	CH	D	Driller, Moore. Date drilled, May 1945. Water contains sulfur. Gas encountered. Well used by nine families.
8435-3800-35	N. H. McClelland	50	6	CH	D	Water level, 28 feet, 1946. Well not in use.
8435-3800-36	Richard Baitty	72	6	CH	D	Driller, Smith. Water contains some sulfur.
8435-3800-37	G. A. Jones	75	6	CH	D	Driller, John Carney. Water level, 61 feet, 1931. Water contains some iron.
8435-3800-38	Henry Thurman	65		CH	D	
8435-3800-39	Johnny King	65	6			Water contains some iron.
8435-3800-40	Rosevelt York	65	6	CH		Water contains some iron.
8435-3800-41	J. T. Harford	185	6			Dry. Encountered gas and some salt water when drilled.
8435-3800-42	Bowers	60	6		D	Water level, 50 feet.
8435-3800-43	Jessie Haymes	80	6			Driller, Carney. Water level, 60-65 feet. Water contains sulfur and salt. When drilling hit good water at 65 feet; hit black and white sulfur water at lower depth; unfit for use.
8435-3800-44	W. S. Paine	165	6			Eight wells, all dry except one; small amount of water at 45 feet.
8435-3800-45	Mannely Farmer	60+	6			Dry.
8435-3800-46	R. A. Scherer	85	6	CE	D	Water level, 65 feet above bottom, 1938. Well never goes dry.
8435-3805-23	Mrs. Lienchford	25		H	D	Water contains lime.
8435-3805-24	S. W. Stroder	204	8	None		Water contains large amount of sulfur. Well not in use.
8435-3805-25	W. P. Belt	60+		H	D	Water contains lime.
8435-3805-26	H. F. Beasley	105		H	D	Water contains black sulfur.
8435-3805-27	George Ried	45		H	D	Water contains sulfur.
8435-3805-28	T. Barns	102		H		Water contains some sulfur.
8435-3805-29	W. Curd	20		E	DS	Water contains lime.

Table 3.— Records of wells in Jessamine County, Kentucky

Method of lift: C, cylinder; E, electric; G, gasoline; H, hand pump; T, turbine. Use: D, domestic; I, industrial; S, stock.

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8425-3750-2	Lee	174	6			Driller, Clay Moore. Water contains salt. Unfit for domestic use.
8425-3750-3	Lee	130	6			Driller, Clay Moore.
8425-3750-4	Lee	130	6			Driller, Cook.
8425-3750-5	Lee	60	6			Driller, Cook.
8425-3750-6	Irene Strode					Driller, Clay Moore. Date drilled, 1931. Water contains salt.
8425-3750-7	S. D. House	100	6		D	Date drilled, 1923. Dry.
8425-3750-10	Circle Creek Farm		6	CE	DS	Driller, Cook.
8425-3750-11						Not in use.
8425-3750-12	A. W. Lee, Jr.					Date drilled, 1945. Dry.
8425-3750-13	A. W. Lee, Jr.	200	6			Date drilled, 1945. Dry.
8425-3750-14	J. N. Tutor	15		H	D	Water contains lime.
8425-3750-15	J. W. Rankin	15		H	D	Water contains lime.
8425-3750-16	C. T. Ashby	160	6	G	D	Water contains some sulfur.
8425-3750-17	Louis Stakelin	100	6	E	D	Water contains lime.
8425-3750-18	Clarence Allender	25		E		Dry.
8425-3750-19	Clarence Allender	25		E		Dry.
8425-3750-30	Mary Morgan	80		CH		Driller, Cook.
8425-3755-31	Hensley	65		CH		Date drilled, 1900.
8430-3745-1	Ambrose School	100	6			Water contains sulfur. Well abandoned.
8430-3745-2	John Warren	75	6	CH	DS	Yield, 1-2 barrels per day.
8430-3745-3	Clyde Teater	100±	6			Well abandoned because of gas.
8430-3745-4	L. E. Betis	80	6	CH	S	Water contains salt.
8430-3745-5	Lucian Peele		61	CH	D	Well goes dry during summer.
8430-3745-6	F. C. Watts	50	6		D	
8430-3745-7	Johnny Walker	60	6	CH	D	Well unused at present.
8430-3745-8	Howard Carter	80	72±		D	
8430-3745-9	Grover Warner	40	6	H	D	Driller, owner. Dry.
8430-3750-1	W. W. Conn	65	6	None		Water level, 35 feet.
8430-3750-2	R. L. Mullcaby	130				Well not in use. Water contains sulfur. Water level, 90 feet.
8430-3750-3	Elbert Jennings		6	E	D	Water contains lime.
8430-3750-4	Carry Teater	28		H	D	Water contains lime.
8430-3750-5	O. W. Stallsworth	25		H	DS	Water contains lime.
8430-3750-6	E. L. May	20			DS	Water contains lime.
8430-3750-7	A. C. Savage	55	6		D	Water contains lime.
8430-3750-8	John Kenny	14			D	Water contains lime.
8430-3750-9	Henry Tankersly	125	6		D	Water contains sulfur.
8430-3750-10	Clifford Laine	140	6	H	D	Water contains sulfur.
8430-3750-11	Morris Peel	18		None		Water contains lime.
8430-3750-12	Donald Macky	30		None		Well not in use.
8430-3750-13	Jim Echington	225	6	None		Well not in use. Water contains salt.
8430-3750-14	Harry Parks	133	6	H	D	Water contains lime.
8430-3750-15	Harry Parks	125				Dry.
8430-3755-1	Nancy L. Johnston	132	6-7	None		Driller, Cooke. Water level, 50 feet. Water contains salt. Well not in use.
8430-3755-2	F. M. Kaplin Estate	140	6	G	S	Driller, Cooke. Water level, 100 feet. Mineral water.
8430-3755-3	C. W. Simpson	110		H	D	Driller, Little. Water contains lime.
8430-3755-4	Clay Simpson	100		E	DS	Driller, Little. Mineral water, contains sulfur.
8430-3755-5	Millard Hatoa	60	6	H		Water contains sulfur and salt. Well not in use.
8430-3755-6	Elmo Combs	60	6	H		Dry.
8430-3755-7	C. S. McWilliams	40		G	D	Driller, Mahoney. Date drilled, 1944. Water contains sulfur.
8430-3755-8	C. S. McWilliams	60	6	None		Driller, Tadlock. Date drilled, 1931. Well not in use. Water level, 24 feet.
8430-3755-9	C. S. McWilliams	60	6	G	S	Driller, Tadlock. Date drilled, 1931. Water level, 40 feet. Water contains lime.
8430-3755-10	C. S. McWilliams	26	6	H	D	Driller, Tadlock. Date drilled, 1931. Water contains salt.
8430-3755-11	F. R. Cannon	14		E	D	Water contains lime.
8430-3755-12	William S. Dale	125	6	H	D	Driller, Moore. Water contains lime.
8430-3755-13	Railroad	28	6	H	D	Water level, 10 feet. Water contains lime.

[1] For location of wells see map.

Table 3.— Records of wells in Jessamine County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8430-3755-14	Railroad	32	6	H	D	Water contains lime.
8430-3755-15	William Dale	50	6	H	D	Driller, Glover Motor Co. Water contains lime.
8430-3755-16	Henry Baker	60	6		D	Water contains lime.
8430-3755-17	J. W. Robinson	120	6	None		Water level, within 6 inches of surface. Water contains lime.
8430-3755-18	J. W. Robinson	130	6	E	D	Water contains salt and sulfur.
8435-3745-1	Theodore Brunner	80				Driller, McCuddy. Water contains salt. Well not in use.
8435-3745-2	T. S. Ward	80	6			Driller, McCuddy. Well not in use.
8435-3745-3	T. S. Ward	75	6	CH	DS	Driller, Jones.
8435-3745-4	T. S. Ward	220	6	CH	DS	Driller, Jones.
8435-3745-5	T. S. Ward	100	6	CH	DS	
8435-3745-6	T. S. Ward	40	6			Driller, Jones. Dry.
8435-3745-7	Curtis East	80	6			Driller, McCuddy. Water contains salt. Well not in use.
8435-3745-8	Hanley School	80	6			Dry.
8435-3745-9	Robert H. Lands	60	60	CH	D	
8435-3745-10	Robert H. Lands	90	6	CH	S	Date drilled, about 1910. Yield, 2 barrels per day.
8435-3745-11	Robert H. Lands	90	6			Date drilled, about 1910. Dry. Well abandoned.
8435-3745-12	Robert H. Lands	90	6			Date drilled, about 1910. Dry. Well abandoned.
8435-3745-13	Robert H. Lands	90	6			Date drilled, about 1910. Dry. Well abandoned.
8435-3745-14	Robert H. Lands	90	6			Dry. Well abandoned.
8435-3745-15	Kentucky River Distillery	135	6	TE	I	Yield, 10 gallons per minute.
8435-3745-16	Kentucky River Distillery	120	6	TE	I	Yield, 150 gallons per minute. Water contains sulfur.
8435-3745-17	Kentucky River Distillery	120	6	TE	I	Yield, 150 gallons per minute. Water contains sulfur.
8435-3745-18	Kentucky River Distillery	200	6	E	I	Yield, 50 gallons per minute. Water contains sulfur. 135 feet of column.
8435-3745-19	Mrs. Coleman	60	6	CH	D	
8435-3745-20	Gulf Refining Co.	60	6	CH	D	
8435-3745-21	Daniel Boone Cave	88	6	CE	D	
8435-3745-22	Mr. Thomason	45	6	CH	DS	
8435-3745-23	Tom Barr	60	6	CH	D	
8435-3745-24	Tom Barr			CH	D	
8435-3745-25	Charity Fain	80	6	CH	D	
8435-3750-1	John Reister	150	6			Dry.
8435-3750-2	John Reister	100	6			Dry.
8435-3750-3	Mrs. J. C. Cobb	44	6	None		Well reported as a suitable supply when drilled; abandoned when gasoline leaked into well.
8435-3750-4	Mrs. J. C. Cobb	75	6	CH	D	
8435-3750-5	Mrs. J. C. Cobb		6			Well apparently abandoned for lack of production.
8435-3750-6	F. F. Zorniger			CH	D	
8435-3750-7	F. F. Zorniger					Dry.
8435-3750-8	F. F. Zorniger					Dry.
8435-3750-9	F. F. Zorniger				DS	
8435-3750-10	F. F. Zorniger					Dry.
8435-3750-11	F. F. Zorniger					Dry.
8435-3750-12	J. D. Weill	150?	6	E		Driller, Mohney.
8435-3750-13	J. D. Weill	953	6	E	S	Driller, Mohney. Yield, 5 gallons per minute.
8435-3750-14	J. D. Weill	170	6			Driller, Mohney. Water contains some sulfur. Well abandoned — practically dry.
8435-3750-15	J. D. Weill	170	6			Driller, Mohney. Water contains some sulfur. Well abandoned — practically dry.
8435-3750-16	J. D. Weill	200	6			Driller, Mohney. Water contains some sulfur. Well abandoned — practically dry.
8435-3750-17	J. D. Weill	125	6			Dry.
8435-3750-18	Franklin Carmon	60	6		D	Water contains lime.
8435-3750-19	Dr. Glenn Darrok	210	6	None		Dry.
8435-3750-20	Mrs. Elizabeth Neal	35	6	H	D	Water contains lime. Water level, 33 feet.
8435-3750-21	John N. Meeks	220	6-7		D	Water contains lime. Water level, 45 feet.

Table 3.— Records of wells in Jessamine County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8435-3750-22	Earnest Nichols	45			D	Water level, 30 feet.
8435-3750-23	J. W. Elliott	60	6		D	Water contains sulfur and iron.
8435-3750-24	C. T. Nash	102	6	H	D	Water contains sulfur.
8435-3750-25	Louis Cook	76	6	None		Driller, Diamond. Water contains sulfur. Water level, 35 feet.
8435-3750-26	George McMellian	120	6	G	DS	Water contains sulfur. Well not in use.
8435-3750-27	Carl Riester	80		H	D	Water contains lime.
8435-3750-28	Jack Hurst	40			D	Water contains lime.
8435-3750-29	John B. Carpenter	125	6	H	D	Mineral water.
8435-3750-30	Edward Johns	15		H	D	Water contains lime.
8435-3750-31	R. J. Dennie	16		H	D	Water contains lime.
8435-3750-32	J. M. Thornton	30			DS	Water contains lime.
8435-3750-33	J. M. Thornton	90	6		D	Water contains sulfur. Well not in use.
8435-3750-34	Mrs. Hattie Welch	30		H	D	Water contains lime.
8435-3750-35	Charles Freemon	50	6	H	D	Water contains lime.
8435-3750-36	Sherman Carman	50		H	D	Water contains lime.
8435-3750-37	Sherman Carman	75	6	None		Water contains salt and sulfur. Well not in use.
8435-3750-38	Frank Allender	150	6	H		Driller, Joe James. Mineral water. Unfit for use.
8435-3750-39	J. D. Weil	950	6	E	DS	Driller, Mahoney Brothers. Mineral water.
8435-3750-40	Mrs. Mary McDowell Young	135	6	H	D	Mineral water.
8435-3750-41	William Parks	125	6	None		Mineral water. Well not in use.
8435-3750-42	W. S. Lowry	150	6	H		Water contains salt. Well not in use.
8435-3750-43	Frank Carman	100	6	None		Mineral water. Well not in use.
8435-3755-1	Paul Simpson	75	6	H	D	Water contains lime.
8435-3755-2	School House Mount Pleasant	60	6	H		Water unfit for use.
8435-3755-3	Mrs. May Wilson	150	6	E	D	Water level, 120 feet. Water contains sulfur.
8435-3755-4	Burgess Woods	150				Water level, 100 feet. Well not in use.
8435-3755-5	Hugh Mahin	70	6	E	DS	Water contains lime.
8435-3755-6	Hugh Mahin	30			DS	Water contains lime.
8435-3755-7	Hugh Mahin	40			D	Water contains lime.
8435-3755-8	J. L. Reynolds	50	6	H		Water contains iron. Well seldom used.
8435-3755-9	Margaret Sandusky	14	6	H	D	Water contains lime.
8435-3755-10	L. P. Riley		6		D	Well not in use.
8435-3755-11	P. B. Blackford	60	6	None		Water contains lime.
8435-3755-12	Smith		6	H	D	
8435-3755-13	Mrs. Joseph Sharkey	158	6	E	D	
8435-3755-14	J. P. Powell	60	6	H	D	Water contains lime.
8435-3755-15	J. P. Powell	20			D	Water contains lime.
8435-3755-16	J. P. Powell	100±	6	H	S	Water contains salt.
8435-3755-17	Barkley and Burrier	15			S	Water contains lime.
8435-3755-18	J. R. Burrier	65	6	G	S	Driller, Smith or Harris. Water contains sulfur.
8435-3755-19	Barkley and Burrier	14	6	H	S	Water contains lime. Water level 40 feet.
8435-3755-20	Albert Buffens	100		None		Dry.
8435-3755-21	J. M. Lippert	100	6	H		Water contains lime. Well not in use.
8435-3755-22	Earl Parks	121	6	H	S	Water contains iron.
8435-3755-23	C. A. Belcher	80	6		D	Water contains lime.
8440-3750-1	Allen Wheeler	80	6	H	D	Water contains lime.
8440-3750-2	R. P. Baker	86		H	D	Water contains some sulfur.
8440-3750-3	S. T. Harrison	30	6		D	Water contains lime.
8440-3750-4	Mahan	75	6		D	Water contains lime.
8440-3750-5	Bill Grimes	68	6	H	D	Driller, Cooke. Water contains lime.
8440-3750-6	Duggins	75	6	None		Dry. Well contains much gas.
8440-3750-7	J. Chester Shackelford	65	6	H	D	Water contains lime.
8440-3750-8	Jack Elliott	45	6	H	D	Water contains some sulfur.
8440-3750-9	John Beckby	140	6		S	Water contains some sulfur.
8440-3750-10	Thomas	80	6	H	D	Water level, 75 feet. Mineral water.
8440-3750-11	Figgs	40	6		DS	Water level, 38 feet. Water contains lime.
8440-3750-12	O. C. McMillian	125	6	None		Well not in use.
8440-3755-1	Dr. W. C. McCluey	40	6	H	D	Water contains lime.
8440-3755-2	Joseph Baker	30		H	D	Water contains lime.
8440-3755-3	Amos Strange	65	6	H	D	Water contains lime.

Table 4.— Records of wells in Scott County, Kentucky

Method of lift: C, cylinder; E, electric; G, gasoline; H, hand pump; W, windmill. Use: D, domestic; S, stock.

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8425-3810-1	H. L. Smith	100	6	H	D	
8425-3810-2	LeRoy Smith	170	6	CE	DS	Driller, L. G. Cook. Water level, 48 feet below surface. Yield, 500 gallons per hour.
8425-3810-3	LeRoy Smith	80	6			Well abandoned.
8425-3810-4	J. S. Shighan					Well not in use.
8425-3810-8	C. R. Shephard	60	6	CH	D	
8425-3810-9	R. M. Marcum	75		CH	D	Water contains some sulfur.
8425-3810-10	R. M. Marcum	70				Well not in use.
8425-3810-11	R. M. Marcum	50	6	CH		Well never goes dry.
8425-3810-12	Stakely	70				
8425-3810-13	C. H. Fugerson	75	6	CE		
8425-3810-14	C. H. Fugerson			CE		Water contains sulfur.
8425-3810-15	C. H. Fugerson			CH		
8425-3810-16	Mrs. William Preston	65		CH		Water contains sulfur.
8425-3810-17	Mrs. William Preston	70		CH		Water contains sulfur.
8425-3810-18	H. O. Barns			CH		Water contains sulfur.
8425-3810-19	O. T. Flarnce	25		CH		
8425-3810-20	J. Varellas	80		CE		
8425-3810-21	J. Varellas	50+		CH		
8425-3810-22	W. I. Fresh	60		CE		Water contains sulfur.
8425-3810-23	J. C. Carrick	65	6	CH		
8425-3810-24	J. C. Carrick	45		CH		Water contains some sulfur.
8425-3810-25	J. E. Kregial	106	6	CG		
8425-3810-26	W. T. Haden	145	6	CH		
8425-3810-27	W. T. Haden	90		CE	DS	
8425-3810-28	W. T. Haden	60		CH		
8425-3810-32	Warick Bros.			CH		
8425-3810-33	D. M. Hollingsworth			CH		
8425-3810-34	D. M. Hollingsworth		6		D	
8425-3810-35	Gabber	45	6	CE		
8425-3810-36	Clarence Jewell	66		CH		Water contains sulfur.
8425-3810-37	Fred Smith	115+		CH		Water contains sulfur.
8425-3810-38	Willard Connor	100		CH		Water contains sulfur.
8425-3810-39	Rogers Park	90	6	CH		Water contains some sulfur.
8425-3810-40	Rogers Park	84	6	CH		Driller, Cook. Water contains some sulfur.
8425-3810-44	Cecil Bell	55				
8425-3810-45	J. L. Allen	78	6	CH	D	Water contains some sulfur.
8425-3810-46	J. W. Sidney	100+		CH	D	Water contains some sulfur.
8425-3810-47	Fred Johnsen	90-100		CH		Water contains iron.
8425-3810-48	J. H. Bell	75		CG	D	
8425-3810-49	J. H. Bell	80+		CG	D	
8425-3815-1	Hubert Hill	50		H	D	Water contains lime.
8425-3815-2	Lawrence Well	60		H	D	Water contains salt.
8425-3815-3	Robert Gravitt			H	D	Water contains sulfur.
8425-3815-4	A. McKenny	12		None	D	Water contains lime.
8425-3815-5	William Van Hook	65		H	D	Water contains lime.
8425-3820-1	Giles	100	6			Driller, Van Hooks. Date drilled, September, 1946. Water level, 88 feet above base, which is 12 feet below surface, September, 1946.
8425-3820-2	Mrs. Alice Davis	40	6		D	Driller, Van Hooks. Date drilled, September, 1946. Water level, 30 feet above base, which is 10 feet below surface, September, 1946. Water contains sulfur.
8425-3820-3	William T. Smith	48	6		D	Driller, Van Hooks. Date drilled, September, 1946. Water level, 20 feet above base, which is 28 feet below surface, September, 1946.
8425-3820-4	E. H. McKinney	64	6	H	S	Driller, Van Hooks. Date drilled, September, 1946. Water level, 10 feet below top, which is 10 feet below surface, September, 1946. Water contains large amount of salt.
8425-3820-5	S. J. Holland	30	6	H	D	Water contains lime.
8430-3805-1	J. T. Carpenter	20	4		D	Water level, 15 feet below surface, February 16, 1946. Water goes low in summer.

[1] For location of wells see map.

Table 4.— Records of wells in Scott County, Kentucky — Continued

Well number	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8430-3805-2	J. T. Carpenter	80	4			Driller, L. M. Cook. Date drilled, 1925. Well abandoned.
8430-3805-3	J. T. Carpenter	150	4			Driller, L. M. Cook. Date drilled, 1925. Well abandoned.
8430-3805-4	J. T. Carpenter	150	4			Driller, L. M. Cook. Date drilled, 1925. Well abandoned.
8430-3805-5	Hugh Hamilton	15			D	Water contains lime. Water level, 10 feet.
8430-3805-6	Winston Boyd	115		None		Well not in use. Water contains sulfur.
8430-3805-7	Alvin D. Wilson	130		H	D	Driller, Kerney. Water contains sulfur.
8430-3805-8	Martha Hubert	117	6	H	D	Water contains sulfur.
8430-3805-9	W. M. Nevins	60		H	D	Water contains sulfur.
8430-3810-1		80	5	H	D	Driller, Van Hook. Yield, 4 gallons per minute.
8430-3810-2		135				Date drilled, 1927. Water level, 20 feet below surface, February 17, 1945.
8430-3810-3	Blackburn					Date drilled, 1940-41.
8430-3810-4	J. W. Relford	60	6	CH	D	Driller, Marcum. Date drilled, September, 1945.
8430-3810-5	B. V. Blackburn					
8430-3810-6	Marshall	77		CE		
8430-3810-7	C. D. Marshall	104		CE		Date drilled, 1943.
8430-3810-8	George Tingle			CH		
8430-3810-9	Buford Penn	285		CE		Date drilled, 1915.
8430-3810-10	K. Ferguson			CH		
8430-3810-11	Finley	500?		CE		Date drilled, 1944.
8430-3810-12	J. B. Cannon	140		CE	D	Date drilled, 1940.
8430-3810-13	J. B. Bryan	160		CE		Date drilled, 1944. Yield, 15 gallons per day.
8430-3810-14	J. B. Bryan	160		CE		Date drilled, 1944. Dry.
8430-3810-15	J. B. Bryan	160		CE		Date drilled, 1944. Dry.
8430-3810-16	C. Morrison			CH	D	Driller, Coville. Water contains sulfur.
8430-3810-17	C. Morrison			CH	D	Driller, Coville. Well goes dry.
8430-3810-18	Earl Morrison			CH		
8430-3810-19	Earl Morrison				S	Water contains sulfur.
8430-3810-20	F. M. Glass	44			D	
8430-3810-21	W. L. Cannon	60-75		CE		
8430-3810-22	J. H. Ashpaw	41		CH		Water contains sulfur.
8430-3810-23	J. H. Ashpaw	25		CH	D	
8430-3810-24	G. G. Wilhoite	70		CH	D	
8430-3810-25	G. G. Wilhoite	65+		CE		
8430-3810-26	C. A. Thornton	100+		CE		Water contains some sulfur.
8430-3810-27	C. C. Flarnce	110		CE		Water contains some sulfur.
8430-3810-28	G. W. Metts	85+		CE	D	Water contains some sulfur.
8430-3810-29	Cardome School	120		CE	D	
8430-3810-30	Lora Hampton	90	6	CE	D	Water contains some sulfur.
8430-3810-31	Cardome School	135		CE		Water contains some sulfur.
8430-3810-32	Cardome School	130	6	CE	D	
8430-3810-33	J. T. Carpenter				S	Water contains some sulfur.
8430-3810-34	R. M. Libboncott			CE		
8430-3810-35	J. Glass	100+		CH	D	
8430-3810-36	J. Glass	90+		CE		
8430-3810-37	W. I. Asfue	160		CE	D	Water contains some sulfur.
8430-3810-38	C. O. Grayes	170		CH	D	
8430-3810-39	Osborne	150+		CE		Water contains some sulfur.
8430-3810-40	C. Graves	134		CE	DS	Water contains lime.
8430-3810-41	C. Graves	104		CH	D	
8430-3810-42	Horace Hunbrick	200	6	CE	D	Water contained sulfur for 3 years.
8430-3810-43	C. J. Tate	100+		CE		Water contains some sulfur.
8430-3810-44	J. C. Wise			CH		
8430-3810-45	John Engam	80	6	CH	D	Water contains some black sulfur.
8430-3810-46	Mrs. L. M. Smith	120	6	CE	D	
8430-3810-47	C. J. Tate	100+	6	CH		Water contains sulfur.
8430-3810-48	J. M. Donavon	82		CE		Water contained sulfur for 5 years; good now.
8430-3810-49	J. Marshall	80		CG		Water contains some sulfur.
8430-3810-50	Mrs. H. L. Smith					Water contains white sulfur. Well not in use.
8430-3810-51	J. K. Nichols	125		CH		
8430-3810-52	J. Franks	85		CE	D	
8430-3810-53	Willtrac	76		CH	D	

Table 4.— Records of wells in Scott County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8430-3815-1	James Fisher	24		H	D	Water level, 18 feet. Water contains lime.
8430-3815-2	James Fisher	40		H	D	Water level, 18 feet. Water contains lime.
8430-3815-3	White	50		H		Water contains salt. Well not in use.
8430-3815-4	Rollie Henton	51		H	D	Water level, 46 feet. Water contains some salt.
8430-3815-5	Lee Hiles	22				Water contains sulfur.
8430-3815-6	Mrs. Burtie White	15		H	D	Water contains lime.
8430-3820-1	Sadieville	200	6	H	D	Water contains some sulfur. Well abandoned.
8430-3820-2	Edward Marshall			H	D	Water contains sulfur and salt.
8430-3820-3	Fred Smith	110		H	D	Water contains sulfur.
8430-3820-4	M. A. Fergerson	45		H	D	Water contains sulfur.
8430-3820-5	Charles Towles	31		H	D	Water contains lime.
8430-3820-6	G. W. Giles	110		H	D	Water contains salt.
8430-3825-1	T. Fisher	65	6	CE	D	Water contains salt at 40 feet.
8430-3825-2	T. Fisher	65		CE	D	
8430-3825-3	T. Fisher	180	6	CE	D	
8430-3825-4	Pete Colston	50±	6	CE	D	Water contains salt.
8430-3825-5	Marcus Haydon	50±	6	H	DS	
8435-3805-1	Thomas Piatt	150	6			Driller, Cook. Date drilled, 1939. Dry.
8435-3805-2	Thomas Piatt	150	6			Driller, Cook. Date drilled, 1940. Water contains salt. Well abandoned.
8435-3805-3	Thomas Piatt	150	6		S	Driller, Cook. Date drilled, 1927. Yield, 5 gallons per minute.
8435-3805-4	Thomas Piatt	200	6			Driller, Cook. Date drilled, 1939. Dry. Well abandoned.
8435-3805-5	Thomas Piatt	150	6			Driller, Cook. Date drilled, 1925. Dry.
8435-3805-6	Thomas Piatt	150	6			Driller, Cook. Date drilled, 1925. Dry.
8435-3805-7	Lewis Tutt	135	4	G	D	Date drilled, 1944. Yield, 5 gallons per minute.
8435-3805-8	Thomas Piatt	150	6		S	Driller, Cook. Date drilled, 1925. Yield, 3 gallons per minute.
8435-3805-9	Jim Cleveland	50	4	H	D	Yield, 2 gallons per minute.
8435-3805-10	Thomas Piatt	150	6			Driller, Cook. Date drilled, 1927. Dry.
8435-3805-11	Jim Cleveland	80	4	H		
8435-3805-12	W. Lee Nutter	135	4	E	DS	Driller, Cook. Date drilled, 1937. Water level, 70 feet below ground level, February, 1945.
8435-3805-13	Robert Young	135	6		S	Driller, Cook. Date drilled, 1940. Yield, 3-5 gallons per minute.
8435-3805-14	W. Lee Nutter	75	4	H	D	Driller, Cook. Date drilled, 1925.
8435-3805-15	Robert Young	135	6		S	Driller, Cook. Date drilled, 1940. Yield, 3-5 gallons per minute.
8435-3805-16	Robert Young	135	6			Driller, Cook. Date drilled, 1928. Dry.
8435-3805-17	Robert Young	150	6			Driller, Cook. Date drilled, 1940. Dry.
8435-3805-18	Robert Young	135	6		S	Driller, Cook. Date drilled, 1940. Yield, 3-5 gallons per minute.
8435-3805-19	Robert Young	200	6			Driller, Cook. Date drilled, 1938. Dry. Well abandoned after drilling — produced gas.
8435-3805-20	Robert Young	135	6			Driller, Cook. Date drilled, 1928. Dry.
8435-3805-21	Robert Young	135	6			Driller, Cook. Date drilled, 1924. Dry.
8435-3805-22	Robert Young	145	6			Driller, Cook. Date drilled, 1938. Dry.
8435-3810-1	J. W. Singer	135	6	H	D	Driller, Cook.
8435-3810-2	J. W. Singer	60	6	E	DS	Driller, Van Hook. Yield, 2,000 gallons per day for couple of days, then dry.
8435-3810-3	J. W. Singer	190	6	H	DS	Water contains sulfur.
8435-3810-4	E. H. Brooking	100+	6		D	Water unfit for use.
8435-3810-5	E. H. Brooking	100+	6		D	
8435-3810-6	Homer Martin	100±	6	H	D	Driller, Cook.
8435-3810-7	Marcum	80	5			Driller, Marcum. Date drilled, 1940.
8435-3810-8	A. L. Jennings	40		H	D	Water contains lime.

Table 4.— Records of wells in Scott County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8435-3810-9	A. L. Jennings	40	6	E	D	Water contains lime.
8435-3810-10	R. H. Rogers	104		E	D	
8435-3810-11	Haskel Marshal	75	6	H	D	Water contains lime.
8435-3810-12	Leslie Collins		6	H	D	Water contains lime.
8435-3810-13	Charlie Kittenring	80	6	H	D	Water contains lime.
8435-3810-14	Claxon	125	6	E	DS	Water contains iron.
8435-3810-15	Alford Power	13		None		Dry.
8435-3810-16	Jane Smith	30			D	Water contains lime.
8435-3810-17	R. H. Anderson Estate	135	6	None		Dry.
8435-3810-18	W. O. Wilson	50		H	D	Water contains lime.
8435-3810-19	W. O. Wilson			None		Dry.
8435-3810-20	J. W. Hall	20		None		Water contains lime.
8435-3810-21	Miss Jan J. Woods		6	H		Water contains sulfur.
8435-3810-22	Felix Swope	80	6	H		Water contains sulfur. Well not in use.
8435-3810-23	O'Mullen		6	H	D	Water level, 30 feet. Water contains lime.
8435-3810-24	Howard Lur	40	6	H	D	Water contains salt.
8435-3810-25	John M. Jones	60	6	G	S	Mineral water.
8435-3810-26	John M. Jones	15		H	DS	Water contains lime.
8435-3810-27	Joe H. Gaines	45	6	None		Well not in use.
8435-3810-28	Lonnie McIntire	110	6	H	DS	Water contains lime.
8435-3810-29	Lonnie McIntire	135		H	D	Water contains sulfur.
8435-3810-30	H. G. Collins	95	6	H	D	Water level, 65 feet. Water contains some sulfur.
8435-3810-31	Lenard Shepard	90	6	H	D	Driller, Cooke. Date drilled, 1937. 1937. Water contains sulfur.
8435-3810-32	H. J. Honerkamp	65		H	D	Driller, Marcum. Date drilled, 1931. Water contains lime.
8435-3810-33	H. J. Honerkamp	91	6	H	S	Water contains sulfur and salt.
8435-3810-34	J. J. Barrett	125	6	H	D	Water contains some sulfur.
8435-3810-35	James R. Duncan	140	6	E	DS	Water contains lime.
8435-3810-36	Robert Rice	75		H	D	Water contains lime.
8435-3815-1	Joe H. Gaines	200	6	W	S	Water contains sulfur.
8435-3815-2	William Connely	60	6	H	D	Water contains lime.
8435-3815-3	Henry Pruitte	20		H	D	Water contains lime.
8435-3815-4	R. E. Lynn	20			S	Water contains lime.
8435-3815-5	Harsh Hambrick	80	6	W		Water contains sulfur.
8435-3815-6	W. T. Devers	80		H	DS	Water contains lime.
8435-3815-7	W. T. Devers	75		H		Water contains lime.
8435-3815-8	Dudley Glass	85		H	D	Water contains lime.
8435-3815-9	Loyd Covington	60	6	None		Well not in use. Water contains sulfur and salt.
8435-3815-10	Jake Bayers	60		H	D	Water contains lime.
8435-3815-11	Ace Perry	30	6	E	D	Water contains sulfur.
8435-3815-12	J. T. True	30				Well not in use.
8435-3815-13	Cleveland Poe	49		H	D	Water contains lime.
8435-3815-14	Cleveland Poe	22		None		Water contains lime.
8435-3815-15	Harold Roberts	86		E	D	Water level, 50 feet. Water contains lime.
8435-3815-16	W. S. Dixon	110		H	D	Water contains sulfur.
8435-3815-17	Frank Williamson	175		None		Water contains sulfur. Well not in use.
8435-3815-18	John Bridges	80		H	DS	Water contains lime.
8435-3815-19	John Bridges	80	6	H	D	Water contains lime.
8435-3815-20	J. W. Griggs	92		H	D	Water contains salt.
8435-3815-21	Virgil Waters	50		H	D	Water contains salt. Well not in use.
8435-3815-22	Virgil Waters	12		None		Water contains lime.
8435-3820-1	J. G. Rollison	12		None		Water contains lime.
8435-3820-2	Emery Burgess	86		H	D	Driller, Tom Elder. Water contains sulfur.
8440-3810-1	Robert Rice	143	6	W	DS	Driller, Tom Elder. Water contains sulfur.
8440-3810-2	Waldon and Parrish	45	6		S	Driller, Tom Elder. Water contains sulfur.
8440-3810-3	Kerny	142	6	G	S	Driller, Tom Elder. Water contains sulfur.
8440-3810-4	Mrs. K. C. Richardson	12			S	Water contains lime.
8440-3810-5	Joe Daugherty	150	6	E	D	Water contains sulfur.
8440-3810-6	John Buckley	75	6	H	DS	Water contains sulfur.
8440-3810-7	Walter Mullin	125		E	S	Driller, Tom Elder. Water contains some salt. Water level, 50 feet.
8440-3810-8	H. B. Morgan	60	6	H	D	Water contains sulfur.

Table 4.— Records of wells in Scott County, Kentucky — Continued

Well number[1]	Owner or tenant	Depth (feet)	Diameter (inches)	Method of lift	Use	Remarks
8440-3810-9	Mrs. Matt Pruitt	15		H	D	Water contains lime.
8440-3810-10	William Mitchell	45	6	H		Water contains lime.
8440-3810-11	J. B. Green	20		H		Water contains lime.
8440-3810-12	L. C. Glass	50	6	H	D	Water contains salt.
8440-3810-13	W. Gaines Leach	20		H	D	Water contains lime.
8440-3810-14	W. Gaines Leach	104		None		Water contains salt. Well not in use.
8440-3810-15	W. Gaines Leach	20		H	S	Water contains lime.
8440-3815-1	Jesse W. Scott	15		H		Water contains lime.
8440-3815-2	E. R. McConnell			H	D	Water contains lime.
8440-3815-3	Burgis Thomason	120	6	H	D	Water contains salt.
8440-3815-4	Bob Mason	75	6	H	D	Water contains lime.
8440-3815-5	Logan Sechret	20		H	S	Water contains lime.
8440-3815-6	Robert Baldwin	18		H	D	Water contains lime.
8440-3815-7	J. B. Carter	14			D	Water contains lime.
8440-3815-8	O. S. Night	40			D	Water contains lime.
8440-3815-9	J. H. Barker	25		None		Well not in use.
8440-3815-10	Sanford Wigginton	36			D	Water contains lime.
8440-3815-11	J. F. Kissler	196				Dry.
8440-3815-12	J. F. Kissler	68			S	Water contains large amount of salt.
8440-3815-13	Mrs. W. O. Wigginton	60			D	Water contains lime.
8440-3815-14	John Herdnel	115		H		Water contains lime.
8440-3815-15	R. M. Mitchell	24			D	Water contains lime.
8440-3815-16	Curtis Smith	90		None		Well not in use. Water contains much salt.
8440-3815-17	Mrs. Cordinewman	20			D	Water contains lime.
8440-3815-18	Hardin Fugett	40	6	H	D	Water contains lime.
8440-3815-19	Mrs. W. O. Wiggington	75				Driller, Selby. Mineral water.
8440-3815-20	Odis Wilson	60		None		Water contains salt.
8440-3815-21	Brodis Wiley	12		H	D	Water contains lime.
8440-3815-22	Robby Simms	60		H	D	Driller, Marcum. Date drilled, November 17, 1946.. Water level, 10 feet. Water contains lime.
8440-3815-23	J. R. Vance	21			DS	Water contains white sulfur.
8440-3815-24	Val Donovan	65	6	H	D	Water contains lime.
8440-3815-25	Mason Johnson	60	6	H	D	Driller, Marcum. Date drilled, October, 1946. Water contains lime.
8440-3815-26	Nony Perry	25			D	Water contains lime.
8440-3815-27	Charles Darasett	20		H	D	Water contains lime.
8440-3815-28	Lawrence Bromback	30		None		Water contains lime.
8440-3815-29	D. M. York	15			D	Water contains lime.
8440-3815-30	Smith Edwards	35		H	D	Water contains some sulfur and salt.
8440-3815-31	Lawrence Young	32			D	Water contains some sulfur.
8440-3815-32	J. J. Rogers	52		H	D	Water contains sulfur.
8440-3815-33	L. C. Perry	136		H		Mineral water. Unfit for use.
8440-3815-34	H. C. Vance	40		H	D	Water contains lime.
8440-3815-35	William Gardner	20		H	D	Water contains lime.
8440-3815-36	William Gardner	15			S	Water contains lime.
8440-3815-37	H. E. Leight				D	Water contains lime.

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