AGRIGULTURAL AND INDUSTRIAL DEVELOPMENT BOARD
OF KENTUCKY

MEMORANDUM ON THE GEOLOGY AND GROUND-WATER RESOURCES OF THE CALVERT CITY-GILBERTSVILLE AREA, MARSHALL COUNTY, KENTUCKY

By

Henry L. Pree, Jr., Geologist
and
William H. Walker, Hydraulic Engineer
U. S. Geological Survey

Prepared cooperatively by the

GEOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF THE INTERIOR

January 1952
52-115

CONTENTS

ILLUSTRATIONS

TABLES

MEMORANDUM ON THE GEOLOGY AND GROUND-WATER RESOURCES OF THE CALVERT CITY-GILBERTSVILLE AREA, MARSHALL COUNTY, KENTUCKY

By Henry L. Pree, Jr. and William H. Walker

INTRODUCTION

Purpose and Scope

A State-wide program of ground-water investigations is being conducted by the Ground Water Branch of the United States Geological Survey, in cooperation with the Kentucky Agricul tural and Industrial Development Board. As a part of this program, a complete inventory of wells was made in the area between Calvert City and Gilbertsville, in Marshall County, Ky., during the first week of August 1951. Calvert City and Gilbertsville are in the northern part of Marshall County. Calvert City is 15 miles east of Paducah, and Gilbertsville, 5 miles southeast of Calvert City, is on the west side of Kentucky Lake at Kentucky Dam.

The purpose of this report is to make available such data as could be assembled on the local ground-water conditions, relative to both quantity and quality of the water in this area. The work was done under the general supervision of A. N. Sayre, Chief of the Ground Water Branch of the U. S. Geological Survey.

Records

The field data upon which this memorandum is based are given in four tables, one map, and one geologic section. Table 1 is a resume of the water-bearing formations; table 2 summarizes the records of the 99 wells, 1 spring, and 14 test borings that were inventoried; table 3 contains records of geologic formations encountered in 4 water wells and 1 test boring; and table 4 presents chemical analyses of water from 6 wells in the area. The map, figure 1, shows the locations of all wells, springs, and test borings, and the geologic section, figure 2, shows the inferred geology across the area from south to north.

Well-Numbering System

The numbers of all wells, springs, and test borings used in this memorandum conform to the well-numbering system used by the Ground Water Branch throughout Kentucky. Under this system, the State has been subdivided into rectangles bounded by 5-minute meridians of longitude and 5-minute paralles of latitude. A well is designated by a composite of three numbers: the first indicates the degrees and minutes of longitude, the second indicates the degrees and minutes of latitude, the third, the number of the well in that quadrangle. Thus, well 8815-3700-3 is the third well inventoried in the 5-minute quadrangle west of longitude 88°15' W. and north of latitude 37°00' N.

Acknowledgments

Thanks and appreciation are expressed to the many residents of the Calvert City-Gilbertsville area who kindly supplied information and aided in the collection of field data. Special acknowledgment is due the officials of the town of Gilbertsville who furnished information about the public water supply. Acknowledgment is also made of the information received from J. McWhirter, Works Manager, Pennsylvania Salt Manufacturing Co.; from A. W. Toon, Plant Engineer, Pittsburgh Metallurgical Co., Inc.; and from F. E. Large, Project Engineer, and Harold Gray, Resident Engineer, Air Reduction Co., Inc., who furnished logs of wells and test borings and quality-of-water data. The valuable information furnished by H. Vernon Duckett, of Duckett and Arnold, is greatly appreciated. The hearty cooperation of well drillers, including R. B. Elrod, Future City, and Walter Bingham, Smithland, is acknowledged.

Physiography

The area covered by this memorandum lies in the northeastern part of the Jackson Purchase region, which is the northern tip of the Mississippi Embayment of the Gulf Coastal Plain. From south to north in this local area, the land surface declines from a low plateau having a maximum elevation of 460 feet to the level flood plain of the Tennessee River at about 320 feet. In general, a line drawn from Gilbertsville through a point on the south edge of Calvert City divides upland from flood plain, though there are low valleys south of such a line.

WATER-BEARING FORMATIONS

Geologic History

Table 1 and the geologic section (fig. 2) show the relative position of the several formations that underlie this area. The consolidated bedrock beneath the Calvert City-Gilbertsville area is the St. Louis limestone of Mississippian age, upon the eroded surface of which lie the younger, unconsolidated formations. During an invasion of the Upper Cretaceous sea, the gravels of the Tuscaloosa formation and, later, the sands and clays of the Ripley formation were laid down. After the disappearance of this sea, these sediments were somewhat eroded, then covered by a sheet of gravel and sand of Pliocene (?) age. Subsequently the Tennessee River, flowing in a northwesterly direction in this locality, cut a valley down to the limestone bedrock and later partially filled this valley with gravel, sand, and silt. A thick blanket of loess, wind-borne silt deposited during the Pleistocene age, overlies earlier deposits.

St. Louis Limestone

The St. Louis limestone, as seen in exposures not far from this area, is a fine-grained limestone, in places dolomitic, medium gray to nearly black in color. Chert nodules, mostly blue-gray but occasionally tan to ivory, are abundant.

Test borings a couple of miles up river from West Gilbertsville show that bedrock is at an elevation of 235 feet in the center of the valley and rises toward both sides of the valley. Logs are available for two of six water wells that penetrate bedrock. Well 8820-3700-64, drilled for the Calvert Heights housing development, encountered the limestone at a depth of 85 feet and an elevation of 313 feet. A well drilled for J. E. Griffith at "The Veep" restaurant on State Highway 282, number 8815-3700-3, struck bedrock at a depth of 83 feet, elevation 270.

Table 1.—Generalized section of the geologic formations exposed or penetrated in the Calvert City-Gilbertsville area, Marshall County, Kentucky

System	Series	Formation	Thickness (feet)	Lithology	Water-bearing characteristics
Quaternary	Pleistocene and Recent		0–120	Loess and alluvium. Principal body of alluvium is in Tennessee River valley and consists of sand and gravel overlain by silt and clay.	Alluvium of Tennessee Valley yields large amounts of water to wells. Water moderately hard and has high iron content.
Tertiary	Pliocene (?)		0–65	Gravel and sand, and small amounts of clay. Gravel is composed largely of chert. Sand is medium- to coarse-grained and occurs either as a matrix for the gravel or as a bedded deposit.	Furnishes small supplies to domestic wells. Well owners report large quantities of iron in water.
Cretaceous	Upper Cretaceous	Ripley formation	0–100	Sand and clay, varicolored, in some places indurated. Sand varies from fine to coarse.	Furnishes ample domestic supplies and is likely to have larger potentialities. Water is soft and generally of good quality.
		Tuscaloosa formation	0–50	Coarse cherty gravel, usually with dense and poorly permeable matrix of clay. Some beds of sand.	Not an important water-bearing formation. Only a few domestic wells obtain water from this formation.
Carboniferous	Mississippian	St. Louis limestone	350–400	Fine-grained limestone, grey to black in color, containing many chert nodules.	Water occurs in the occasional crevices and solution openings. Yields up to 125 gallons per minute reported; greater yields possibly available. Water moderately hard.

The well drilled for the Calvert Heights housing development passed through 85 feet of sand and gravel and continued 290 feet in limestone bedrock to a total depth of 375 feet. The well yielded 41 gallons per minute when completed, but 5 months later it yielded 120-125 gallons per minute during a 72-hour pumping test.

Table 4 shows that the water from this well, with a hardness of 188 parts per million and iron content of 0.35 part per million, is acceptable for domestic purposes. The water comes from crevices in the limestone.

Well 8815-3700-3, about a mile below Kentucky Dam, continued 17 feet into bedrock limestone after penetrating 83 feet of sand and gravel. The yield is unknown but has always been sufficient for the restaurant. No analysis is available but the owner complains of high iron content. All analyses of water from alluvium show high values for iron, and it is likely that much of the water pumped by this well actually comes from alluvium, having moved only a short distance down through crevices in the limestone.

Tuscaloosa Formation

The Tuscaloosa formation is a poorly sorted gravel, composed mainly of pebbles of light-colored chert with minor amounts of limestone. The pebbles average 1 to 4 inches in diameter but some are much larger. The matrix consists of variable amounts of clay, sand, and fine chert.

The Tuscaloosa formation is not exposed in the Calvert City-Gilbertsville area; the closest exposures are found to the northeast, across the Tennessee River. If the cherty gravel reported in well 8820-3700-3 in Calvert City is the Tuscaloosa, then the formation exists beneath the southern part of the area and dips gently to the south. Little is known of the quality or quantity of water available, but the large percentage of clay gives reason to expect the formation to be a poor aquifer.

Ripley Formation

The Ripley formation consists of sand and clay. Occasional thin beds of the sand and clay are hardened. The sand and clay show colors of white, buff, gray, orange, yellow, and red. The texture of the sand ranges from fine to coarse. Concretions of marcasite are common in the clay.

The log of well 8820-3700-1 indicates that the Ripley formation is about 100 feet thick beneath the upland 2 miles south of Calvert City. The formation thins to the north and is only 12 feet thick at Calvert City if the sand in the log of well 8820-3700-3 is indeed Ripley as indicated on the section, figure 2. Dug and bored domestic wells 50 to 60 feet deep in the lower part of the city provide up to 10 gallons per minute. Wells dug or drilled to depths of 70 to 144 feet on the uplands provide sufficient water for household supply. It might be possible to obtain larger supplies by proper screening of the sand and careful development. It should be noted that in the well 2 miles south of Calvert City only the lower 17 feet of the 100 feet of Ripley was water bearing.

Analysis of water from well 8820-3700-1, located in the upland area 2 miles south of Calvert City on State Highway 95, shows a total hardness of 21 parts per million, total iron of 0.50 part per million, and dissolved-solids content of 62 parts per million (see complete results of analysis in table 4).

Oral reports from users of water from the Ripley formation agree that the water is generally soft and free from troublesome amounts of iron.

Pliocene (?) Deposits

These deposits, of Pliocene (?) age, form a sheet of sand and gravel capping the uplands and not found below elevations of about 400 feet. These gravels are distinguished from those of the Tuscaloosa formation by the smaller size of chert pebbles, better rounding of pebbles, better sorting, and, above all, the presence of sand rather than clay between the pebbles. Occasional lenses of sand occur amid the gravel. Most of the pebbles and sand grains are stained dark brown by iron oxide.

Ground-water supplies adequate for limited domestic use may be obtained from the lower part of the Pliocene (?) deposits. The few wells in the upland areas that are deep enough to penetrate the full thickness of sand and gravel contain only a few feet of water and can be pumped dry in a short time. Most wells dug in the highest parts of the upland were abandoned before reaching water because of the great depth to water.

No analyses of water from the Pliocene (?) sediments are available, but owners of wells obtaining water from them reported large quantities of iron in the water.

Pleistocene and Recent Deposits

The deposits of Pleistocene and Recent time are stream-laid alluvium and wind-blown silt or loess. Alluvium underlies all the lowlands. Loess covers the uplands and slopes descending to the lowlands.

The loess and the alluvium of the minor valleys in the southwestern part of the area are fine-grained, and becuase of low permeability they are not expected to furnish significant amounts of water.

As shown by the geologic section, figure 2, constructed from well logs, the alluvium of the Tennessee Valley consists of sand and gravel overlain by silt and clay. In the center of the valley the sand and gravel are probably 90 feet thick; at Calvert City they are 30 feet thick; and they no doubt thin out rapidly south of Calvert City. The log of well 8820-3700-64, a mile southeast of Calvert City, showed 85 feet of sand and gravel, but some of the sand penetrated may be the Ripley formation. Well 8815-3700-3, a mile northwest of Kentucky Dam, penetrated 83 feet of sand and gravel before meeting bedrock.

Wells in alluvium yield all the water desired of them. Three of the wells inventoried are pumped at higher-than-average rates. Two miles north of Calvert City well 8820-3700-6 of the Pennsylvania Salt Manufacturing Co. yielded 195 gallons per minute with a drawdown of 6.5 feet during a pumping test. Well 8820-3700-65, drilled for the Air Reduction Co., Inc., 1-1/2 miles north of Calvert City, is pumped at 42 gallons per minute. Well 8815-3700-1 at Kentucky Dam State Park in Gilbertsville is pumped at 200 gallons per minute.

In August 1951 water levels in the flood plain north of the Illinois Central Railroad stood from less than 20 to almost 30 feet below the land surface.

The analyses show that water from alluvium is only moderately hard. The iron content is very high, two analyses showing 11 and 24 parts per million. For many uses, this water would have to be treated to remove the iron.

CONCLUSIONS

The present investigation reveals the presence of three important water-bearing formations in this area: the St. Louis limestone, sand of the Ripley formation, and the alluvial sand and gravel of the Tennessee Valley.

At and south of Calvert City the Ripley formation is an important source of moderate supplies of water of good quality. It seems improbable that in this area yields sufficient for municipal or industrial use could be developed.

The St. Louis limestone has been shown to yield considerable supplies where it lies beneath the flood-plain section of the area. The one analysis available shows that, though the water is hard, it does not have iron in highly objectionable quantities.

Very probably yields larger than the 125 gallons per minute reported for one well could be obtained. The following should be considered: If large amounts of water are pumped from the limestone, some part of this water probably will be derived from the overlying alluvial deposits, moving down into the limestone. The water from alluvium is very high in iron, so the water from heavily pumped wells in limestone may show gradual increases in iron content.

The best potential source of large supplies of ground water is the alluvium of the Tennessee Valley. The large volume of permeable sands and gravels is undoubtedly capable of yielding to individual wells far more than the 200 gallons per minute yielded by the largest well now in operation.

The larger part of the sand and gravel aquifer is below the normal pool elevation of the Tennessee River, which is 302 feet above sea level. If connection exists between the river and the aquifer, heavy pumping will induce water to flow from the river to the aquifer. It is very probable that the river and the aquifer are connected to some degree; to determine whether this is so it would be necessary to run pumping tests in this area. The tests would show also the permeability and storage capacity of the alluvium, and would permit predictions of maximum yields under specified conditions of well location and pumping water levels.

Three analyses show the water in the alluvium to be hard, and so high in iron that treatment would be required for most uses of the water. However, if infiltration from the river into the alluvium occurs, after prolonged pumping the iron content of the water would be likely to decline appreciably.

Although few accurate data were gathered, the temperature of ground water is expected to be close to 59 degrees, the average annual air temperature. If a substantial part of the water drawn from wells near the river has moved from the river bed to the ground-water reservoir, the temperature in these wells will show a range, but considerably less than that of the river itself.

Table 2.--Records of wells, springs, and test borings in Calvert City-Gilbertsville area, Marshall County, Kentucky

Well number 1/	Owner or name	Driller	Date completed	Topographic situation	Altitude above sea level (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Character of material	Geologic horizon	Depth of casing (feet)	Water level		Method of lift	Capacity of pump (gallons per minute)	Use of water	Remarks
												Below land surface (feet)	Date of measurement				
8615-3700-1	Commonwealth of Kentucky, Kentucky Dam State Park	Tennessee Valley Authority	1939	Flood plain	350	Drilled	85	10 to 8	Gravel	Alluvium	90.0	-	-	Electric, turbine	800	Public supply	Analysis available.
2	Lloyd Flora	R. S. Elrod	1949	do.	345	do.	66	4	Sand	Ripley	56	-	-	Electric, piston	5	Domestic	
3	The Veap Restaurant, James E. Griffith	Walter Bingham	1950	do.	353	do.	100	6	Limestone	St. Louis	83	-	-	do.	8	Restaurant	Log available.
4	James Owen	-	-	do.	350	Bored	48	8	Sand	Alluvium	48	-	-	Hand	-	Domestic	
5	R. L. Morrow	-	-	do.	349	Dug	42	24	do.	do.	42	-	-	Electric, jet	8	do.	
6	Idle Hour Cafe, Blanch Shields	-	-	do.	350	do.	34	24	do.	do.	34	-	-	do.	8	Restaurant	
7	Gilbertsville Missionary Baptist Church	-	1949	do.	350	Drilled	48	4	Gravel	do.	42	-	-	do.	8	Domestic	
8	M. L. Harmon	-	1941	do.	350	Bored	29	8	Sand	do.	29	16.21	8-1-51	Hand	-	do.	
9	E. S. Strickland	-	-	do.	348	Dug	42	24	do.	do.	42	22.50	8-1-51	Jet	8	Domestic, grocery	
10	W. W. Joyce	-	-	do.	349	Bored	35	24	do.	do.	35	-	-	do.	8	Domestic	
11	Cecil Stice	-	-	do.	348	do.	57	8	do.	do.	57	-	-	Rod	5	Domestic, grocery	
12	Kate's Cabins, L. E. Hanson	-	-	do.	348	do.	50	6	do.	do.	50	-	-	do.	5	Restaurant, cabins	
13	Camp 101, Charles B. Tarr	-	-	do.	348	do.	47	8	do.	do.	47	-	-	Jet	8	Cabin camp	
14	O. W. Jones	-	-	do.	348	do.	60	8	do.	do.	60	-	-	Rod	5	Domestic	
15	Roy Culp	-	1947	do.	343	do.	47	8	do.	do.	47	-	-	Hand	-	do.	
16	James Owen	-	-	do.	349	do.	42	8	do.	do.	42	-	-	Jet	8	do.	
17	V. M. Heath	-	-	do.	348	do.	40	8	do.	do.	40	-	-	do.	8	do.	
18	R. D. Smith	R. D. Smith	1949	do.	346	do.	51	8	do.	do.	51	27.60	8-1-51	Hand	-	do.	
19	Vastine Smith	-	-	do.	346	Dug	37	24	do.	do.	37	25.70	8-1-51	do.	-	do.	
20	W. J. Phelps	-	-	do.	345	Bored	36	8	do.	do.	36	23.22	8-2-51	do.	-	do.	
21	Alvey Miller	-	1939	do.	343	do.	38	8	do.	do.	38	20.54	8-2-51	do.	-	do.	
22	Andy East	-	-	do.	346	do.	42	8	do.	do.	42	26.07	8-2-51	do.	-	do.	
23	Wallace Boles	-	-	do.	346	do.	40	8	do.	do.	40	-	-	do.	-	Abandoned	
24	do.	-	1948	do.	346	Driven	47	4	do.	do.	43	-	-	Jet	8	Domestic	
25	do.	-	-	do.	346	do.	47	2	do.	do.	43	-	-	Hand	-	do.	
26	W. S. Watkins	-	-	do.	350	do.	47	2	do.	do.	43	-	-	do.	-	do.	
27	J. L. Draffen	-	-	do.	352	Dug	36	36	do.	do.	36	26.44	8-2-51	do.	-	do.	
28	Earl Devine	-	-	do.	352	Bored	33	8	do.	do.	33	25.54	8-2-51	do.	-	do.	
29	E. O. Frizzell	-	-	do.	353	do.	34	8	do.	do.	34	22.85	8-2-51	do.	-	do.	
30	C. W. Williams	-	-	do.	340	do.	31	8	do.	do.	31	18.40	8-3-51	do.	-	do.	
31	W. H. Williams	-	-	do.	345	do.	38	8	do.	do.	38	-	-	do.	-	do.	
32	Clarence Scillion	-	-	do.	345	do.	42	8	do.	do.	42	10.28	8-3-51	do.	-	do.	
33	B. O. Cutsinger	-	1951	do.	350	do.	34	8	do.	do.	26	9.09	8-3-51	do.	-	do.	

1/ For location of wells see map.

Table 8.--Records of wells, springs, and test borings in Calvert City-Gilbertsville area, Marshall County, Kentucky--continued

Well number	Owner or name	Driller	Date completed	Topographic situation	Altitude above sea level (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Character of material	Geologic horizon	Depth of casing (feet)	Water level		Method of lift	Capacity of pump (gallons per minute)	Use of water	Remarks
												Below land surface (feet)	Date of measurement				
8615-3700-34	Claude Dees	-	1920	Flood plain	345	Bored	19	8	Sand	Alluvium	19	7.92	8-3-51	Hand	-	Domestic	
35	Henry L. Smith	-	-	Hillside	380	Dug	46	24	do.	Ripley	46	-	-	Jet	8	do.	
8620-3700-1	T. Clyde Smith	R. B. Elrod	1948	Top of hill	455	Drilled	144	4	do.	do.	140	127	9-25-48	Rod	5	do.	Analysis and log available.
2	Lex Hulen	do.	1949	do.	378	do.	97	4	Gravel	Tuscaloosa(?)	93	59	4-15-49	do.	9	do.	
3	W. Hopgood	do.	1949	Hillside	370	do.	74	4	do.	do.	74	52	6-12-49	Jet	8	do.	Log available.
4	Pittsburgh Metallurgical Company, Inc.	-	-	Flood plain	345	Dug	35	24	Sand	Alluvium	35	-	-	do.	8	Abandoned	
5	do.	Walter Bingham	1949	do.	345	Drilled	141	6	Gravel	do.	141	-	-	Turbine	50	do.	
6	Pennsylvania Salt Manufacturing Company, Inc.	Layne-Central Company	1948	do.	347	do.	82	12	do.	do.	62	31	7-23-48	do.	195	Domestic and industrial	Analysis available.
7	Kentucky Highway Department	-	-	Hillside	410	Dug	4	24	do.	Pliocene (?)	4	1.5	7-31-51	Hand	-	Domestic	Spring.
8	T. Clyde Smith	-	-	Top of hill	450	do.	73	24	Sand	Ripley	73	67.73	7-31-51	do.	-	do.	
9	Q. R. Fleming	Q. R. Fleming	1940	do.	420	do.	18	24	Gravel and sand	Pliocene (?)	18	15	7-31-51	Jet	3	do.	
10	J. T. Lee	J. T. Lee	-	Hillside	415	Bored	70	8	Sand	Ripley	70	52.2	7-31-51	-	-	Abandoned	
11	Claude Dees	-	-	do.	364	Drilled	118	3	Limestone	St. Louis	-	96	5-6-37	Rod	5	Domestic	
12	Ardelle Franklin	-	-	do.	370	Dug	57	24	Sand	Ripley	57	-	-	do.	5	do.	
13	W. B. Elam	-	1929	do.	370	do.	63	24	do.	do.	63	44.24	7-31-51	Jet	8	do.	Analysis available.
14	J. F. Saltzgiver	-	-	Edge of flood plain	355	do.	58	24	do.	do.	58	-	-	do.	8	do.	
15	K. B. Murman	-	-	Flood plain	350	do.	33	24	do.	Alluvium	33	20.14	7-31-51	Hand	-	do.	
16	J. E. Saltzgiver	-	-	do.	348	do.	41	30	do.	do.	41	18.99	7-31-51	do.	-	do.	
17	Draffen Brothers Grocery	-	-	do.	352	do.	40	24	do.	do.	40	-	-	Jet	8	do.	
18	Mary Morehead	-	-	do.	340	do.	17	24	do.	do.	17	7.92	7-31-51	Hand	-	do.	
19	L. D. Morehead	-	-	do.	340	do.	18	24	do.	do.	18	-	-	do.	-	do.	
20	Mary Morehead	-	-	do.	342	do.	23	24	do.	do.	23	11.65	7-31-51	do.	-	do.	
21	Calvert City School	D. F. McNeely	1945	do.	347	Drilled	126	6	Limestone	St. Louis	-	113	6-1-45	Rod	10	School	
22	R. L. Barlow	-	-	do.	341	Dug	18	24	Sand	Alluvium	18	8.81	7-31-51	do.	3	Domestic	
23	Gypsy Tea Room	-	-	do.	348	do.	28	24	do.	do.	28	-	-	Jet	8	Restaurant	
24	V. A. Davis	-	1941	do.	347	do.	36	24	do.	do.	36	24.90	7-31-51	Hand	-	Domestic	
25	J. Southerland	-	-	do.	348	Bored	35	8	do.	do.	35	27.13	7-31-51	do.	-	do.	
26	Charles Devine	-	-	do.	345	Dug	36	24	do.	do.	36	-	-	do.	-	do.	
27	E. A. Smith	-	-	do.	340	do.	27	24	do.	do.	27	15.72	8-1-51	do.	-	do.	
28	R. Dees	-	-	do.	340	do.	25	24	do.	do.	25	-	-	do.	-	do.	
29	Dora Draffen	-	-	do.	343	do.	29	24	Gravel	do.	29	21.55	8-1-51	do.	-	do.	
30	Raymond Corsey	-	-	do.	343	do.	26	30	Sand	do.	26	16.40	8-1-51	Rod	8	do.	
31	Air Conerete Company	-	1917	do.	350	do.	33	24	do.	do.	33	23.01	8-1-51	Hand	-	Abandoned	
32	Tom Coursey	-	-	do.	347	do.	32	24	do.	do.	32	-	-	do.	-	Domestic	
33	A. L. Saltzgiver	-	-	do.	348	do.	28	24	do.	do.	28	15.73	8-1-51	do.	-	do.	

Table 2.--Records of wells, springs, and test borings in Calvert City-Gilbertsville area, Marshall County, Kentucky--continued

Well number	Owner or name	Driller	Date completed	Topographic situation	Altitude above sea level (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Character of material	Geologic horizon	Depth of casing (feet)	Water level		Method of lift	Capacity of pump (gallons per minute)	Use of water	Remarks
												Below land surface (feet)	Date of measurement				
8820-3700-34	Willie Hamm	-	-	Flood plain	348	Driven	33	2	Sand	Alluvium	30	-	-	Jet	5	Domestic	
35	Rufus Banfield	-	-	do.	348	Bored	33	8	do.	do.	33	19.05	8-1-51	Hand	-	do.	
36	K. D. Egner	-	-	do.	348	Dug	28	24	do.	do.	28	-	-	do.	-	do.	
37	Gene Butler	-	-	do.	345	Bored	38	8	do.	do.	38	-	-	do.	-	do.	
38	Pennsylvania Salt Manufacturing Company, Inc.	-	-	do.	338	Dug	27	24	do.	do.	27	20.27	8-1-51	do.	-	do.	
39	J. Salyers	-	-	do.	349	do.	35	36	do.	do.	35	24.84	8-1-51	do.	-	do.	
40	Tom Stevenson	-	-	do.	350	Bored	28	8	do.	do.	28	-	-	do.	-	do.	
41	Chester Vied	-	-	do.	345	do.	35	8	do.	do.	35	20.72	8-1-51	do.	-	do.	
42	Dave Davis	-	1925	do.	341	Dug	33	24	do.	do.	33	19.58	8-1-51	do.	-	do.	
43	Elmer Stokes	-	-	do.	347	do.	29	24	do.	do.	29	21.47	8-1-51	do.	-	do.	
44	D. M. Story	-	-	Top of hill	380	do.	64	24	do.	Ripley	64	56.45	8-2-51	do.	-	do.	
45	Richard Algood	-	-	Flood plain	340	Bored	40	8	do.	Alluvium	40	14.60	8-2-51	do.	-	do.	
46	M. L. Wilson	-	-	do.	341	Dug	23	30	do.	do.	23	-	-	do.	-	do.	
47	A. D. Schmidt	-	1940	Top of hill	380	do.	64	24	do.	Ripley	64	51.05	8-2-51	do.	-	do.	
48	C. R. Algood	-	-	Flood plain	348	do.	37	24	Gravel	Alluvium	37	-	-	do.	-	do.	
49	J. M. Hollard	-	-	do.	345	do.	17	24	Sand	do.	17	8.77	8-2-51	do.	-	do.	
50	Luther Draffen	Charles Yancey	-	Slope of hill	360	Drilled	77	5	do.	Ripley	73	-	-	Rod	5	do.	
51	J. DeHaven	-	-	do.	370	Dug	52	24	do.	do.	52	-	-	do.	5	do.	
52	Bessie Crase	-	-	Top of hill	375	do.	60	24	do.	do.	60	-	-	do.	3	do.	
53	Karl Hall	Charles Yancey	1939	do.	380	Drilled	112	5	Limestone	St. Louis	-	67	1939	do.	5	do.	
54	C. E. Atnid	do.	1939	Slope of hill	370	do.	124	5	do.	do.	-	59	1939	do.	5	do.	
55	Pearl Smith	-	-	Flood plain	343	Bored	29	8	Sand	Alluvium	29	17.07	8-2-51	Hand	-	do.	
56	Duckett and Ford	-	-	do.	343	do.	30	8	do.	do.	30	-	-	do.	-	do.	
57	Jewell Oakley	-	-	do.	344	do.	29	8	do.	do.	28	-	-	do.	-	do.	
58	J. Devine	-	-	do.	355	Dug	32	24	do.	do.	32	-	-	Jet	8	do.	
59	Ethel Houston	-	-	do.	342	do.	24	36	do.	do.	25	11.50	8-2-51	Hand	-	do.	
60	Dr. L. E. Smith	-	-	do.	348	do.	32	24	do.	do.	32	-	-	Jet	8	do.	
61	Allen Russell	-	-	Slope of hill	374	do.	57	24	do.	Ripley	57	47.98	8-2-51	-	-	do.	
62	Elza R. Smith	-	-	Top of hill	425	do.	32	24	Sand and gravel	Pliocene(?	32	14.86	8-2-51	Hand	-	do.	
63	John O'Daniel	-	-	do.	395	do.	72	24	Sand	Ripley	72	61.21	8-2-51	do.	-	do.	
64	Duckett and Arnold, Calvert Heights Housing Development	Walter Bingham	1949	do.	398	Drilled	875	6	Limestone	St. Louis	90	80	1949	Turbine	125	Public supply	Analysis and log available.
65	Air Reduction Company, Inc.	Beckman Drilling and Construction Company	1951	Flood plain	344	do.	95	8	Gravel	Alluvium	95	-	-	Jet	45	Industrial	
66	do.	Raymond Concrete Pile Company, Gow Division	1951	do.	345.83	Test boring	82	2.5	do.	do.	-	23.8	8-23-51	-	-	-	Log available.
67	do.	do.	1951	do.	345.23	do.	30	2.5	Sand	do.	-	23.3	8-23-51	-	-	-	

Table 2.--Records of wells, springs, and test borings in Calvert City-Gilbertsville area, Marshall County, Kentucky--continued

Well number	Owner or name	Driller	Date completed	Topographic situation	Altitude above sea level (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Character of material	Geologic horizon	Depth of casing (feet)	Water level		Method of lift	Capacity of pump (gallons per minute)	Use of water	Remarks
												Below land surface (feet)	Date of measurement				
8820-3700-68	Air Reduction Company, Inc.	Raymond Concrete Pile Company, Dow Division	1951	Flood plain	345.13	Test boring	30	2.5	Sand	Alluvium	-	22.3	5-23-51	-	-	-	
69	do.	do.	1951	do.	344.85	do.	30	2.5	do.	do.	-	22.0	5-23-51	-	-	-	
70	do.	do.	1951	do.	344.83	do.	30	2.5	do.	do.	-	23.8	5-23-51	-	-	-	
71	do.	do.	1951	do.	345.85	do.	30	2.5	do.	do.	-	23.0	5-23-51	-	-	-	
72	do.	do.	1951	do.	345.83	do.	30	2.5	do.	do.	-	23.8	5-23-51	-	-	-	
73	do.	do.	1951	do.	344.73	do.	30	2.5	do.	do.	-	22.3	5-23-51	-	-	-	
74	do.	do.	1951	do.	345.43	do.	30	2.5	do.	do.	-	23.0	5-23-51	-	-	-	
75	do.	do.	1951	do.	345.63	do.	30	2.5	do.	do.	-	22.7	5-23-51	-	-	-	
76	do.	do.	1951	do.	345.48	do.	30	2.5	do.	do.	-	19.8	5-23-51	-	-	-	
77	do.	do.	1951	do.	334.79	do.	30	2.5	do.	do.	-	18.4	5-23-51	-	-	-	
78	do.	do.	1951	do.	302.00	do.	30	2.5	do.	do.	-	4.3	5-23-51	-	-	-	
79	do.	do.	1951	do.	344.51	do.	30	2.5	do.	do.	-	19.3	5-23-51	-	-	-	

Table 3.--Logs of wells and test borings in
Calvert City-Gilbertsville area, Marshall County, Kentucky

Well number: 8815-3700-3
Location: State Highway 282, at junction with road to ferry landing
Driller: Walter Bingham
Date drilled: 1950
Altitude of land surface: 353 feet above mean sea level
Static water level: Unknown
Water-bearing formation: St. Louis limestone

Formation	Thickness (feet)	Depth (feet)
Sand and gravel	80	80
Sand, clean	3	83
Limestone, hard	17	100

Well number: 8820-3700-1
Location: 2 miles south of Calvert City, on east side of State Highway 95
Driller: R. B. Elrod
Date drilled: September 25, 1948
Altitude of land surface: 455 feet above mean sea level
Static water level: 127 feet below land surface, September 25, 1948
Water-bearing formation: Ripley formation

Formation	Thickness (feet)	Depth (feet)
Topsoil and clay	8	8
Gravel, hard, brown	37	45
Sand, brown	30	75
Clay, white	20	95
Sand	32	127
Sand, water	17.5	144.5

Well number: 8820-3700-3
Location: Near Illinois Central Railroad, in Calvert City
Driller: R. B. Elrod
Date drilled: 1949
Altitude of land surface: 370 feet above mean sea level
Static water level: 32 feet below land surface, June 12, 1949
Water-bearing formation: Tuscaloosa formation (?)

Formation	Thickness (feet)	Depth (feet)
Topsoil, clay	10	10
Gravel, brown	30	40
Sand	12	52
Gravel and flint, caving	22	74

52-115

FIGURE 1.

MAP OF

CALVERT CITY - GILBERTSVILLE AREA

MARSHALL COUNTY, KENTUCKY

SHOWING

LOCATION OF WELLS AND TEST BORINGS

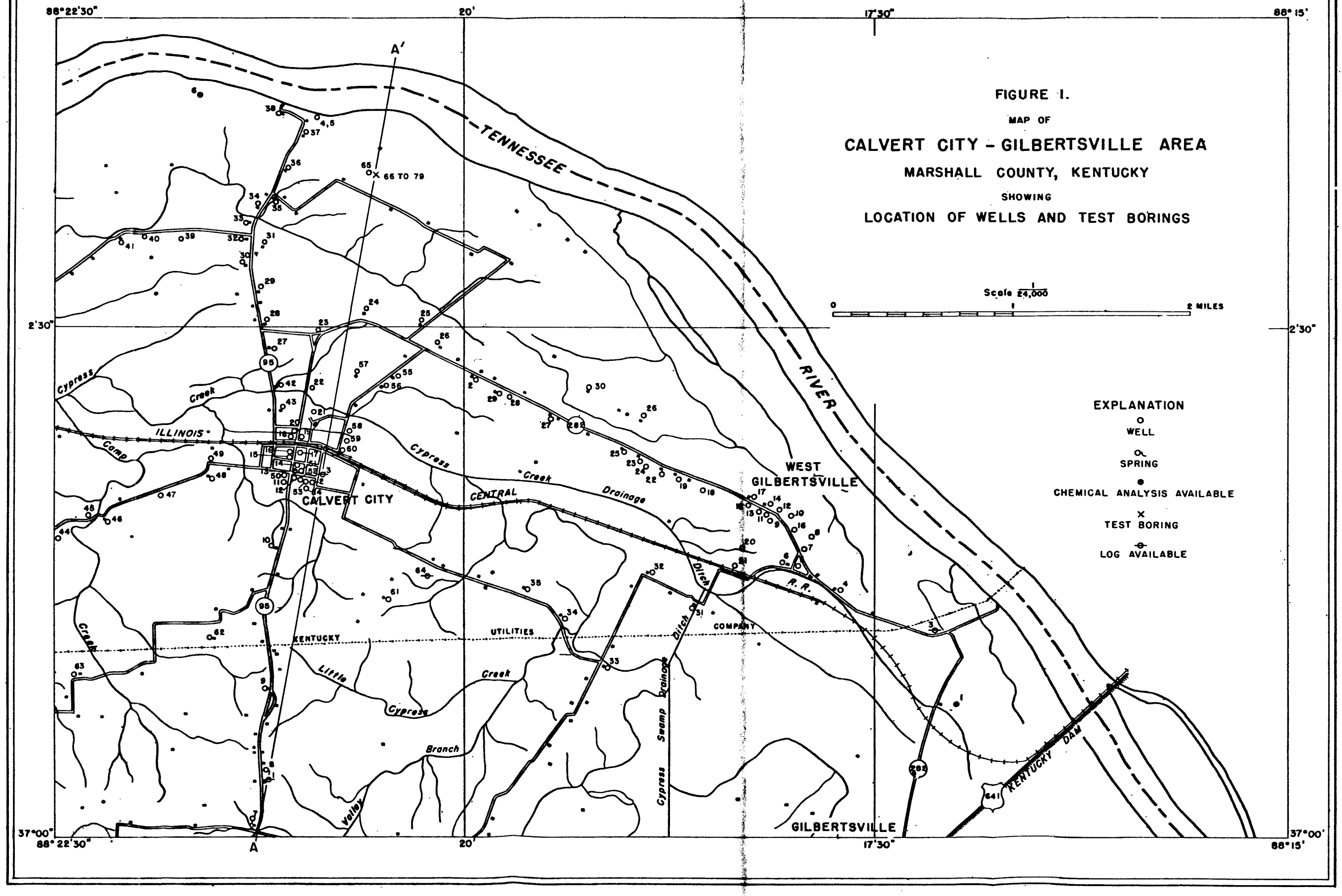

Table 4.--Analyses of water from wells in Calvert City-Gilbertsville area, Marshall County, Kentucky

(Dissolved constituents given in parts per million.)

Well number	8815-3700-1	8820-3700-1	a 8820-3700-6	8820-3700-13	8820-3700-64	8820-3700-65
Depth of well (feet)	95	144	82	63	375	95
Water-bearing formation	Alluvium	Ripley	Alluvium	Ripley	St. Louis	Alluvium
Date of collection	7-5-51	2-14-51	11-29-48	8-3-51	8-3-51	10-19-51
Temperature (degrees Fehrenheit)	59	50	-	-	-	-
pH	6.4	6.2	-	7.1	7.8	6.4
Dissolved solids	167	62	(b)	181	217	129
Silica (SiO_2)	16	10	25	12	9.4	22
Iron (Fe)	11	.50	24	.23	.35	33
Calcium (Ca)	41	6.8	7.1	31	66	12
Magnesium (Mg)	7.8	1.0	1.7	6.8	5.3	5.6
Sodium (Na)	7.9	} 15	-	13	7.3	8.6
Potassium (K)	.8		-	2.9	.6	.9
Bicarbonate (HCO_3)	168	58	-	92	226	74
Sulfate (SO_4)	4.9	2.2	-	11	9.9	4.6
Chloride (Cl)	6.8	2.5	32	14	6.0	6.0
Fluoride (F)	.1	.0	-	.0	.2	.2
Nitrate (NO_3)	3.5	.6	-	40	4.0	.0
Hardness as $CaCO_3$						
Total	135	21	c 40	106	188	53
Noncarbonate	0	0	-	30	1	0

Unless noted, analyses were made at U. S. Geological Survey regional laboratory at Columbus, Ohio.

a. Analyses made by LeWall and Harrison. Sample also contains 9.5 p.p.m. aluminum and .60 p.p.m. manganese.

b. Sample contained 144 p.p.m. total solids and 116 p.p.m. fixed solids.

c. Total hardness determined by soap method.