STATE OF MARYLAND
BOARD OF NATURAL RESOURCES

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in cooperation with
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DEPARTMENT OF THE INTERIOR
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GROUND-WATER RESOURCES OF THE MT. SAVAGE AREA, MARYLAND

By

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Introduction

A law providing for the establishment of sanitary districts in Allegany County was passed by the Maryland State Legislature in 1949. In connection with the establishment of these districts a commission, called the Allegany County Metropolitan Commission, was appointed on January 1, 1950. This commission is considering the construction of a new public water-supply system for the Mt. Savage Sanitary District, and this report was prepared in response to their request for information on the ground-water resources of the area.

General geology and hydrology

Mt. Savage, which is in the Appalachian Plateaus province, is close to the north end and the axis of the Georges Creek basin. The Georges Creek basin, geologically a syncline or trough of strata, trends north northeast

and is 8 to 10 miles wide. The rock layers within this basin dip toward the axis of the syncline.

The Mt. Savage area is immediately underlain by sediments of Pennsylvanian age. These rocks have been classified into three formations which, in descending order, are: Conemaugh, Allegheny, and Pottsville. The formations consist chiefly of alternating beds of sandstone, shale, siltstone, thin seams of fireclay, and some coal.

The Mauch Chunk shale of Mississippian age and other formations underlie the strata of Pennsylvanian age, but they occur at relatively great depth, and so far as is known no water wells have been drilled to them. It is probable that the deeper-lying Mississippian formations, in the central part of the syncline, contain highly mineralized water. For these reasons the three formations of Pennsylvanian age, the Conemaugh, Allegheny, and Pottsville, are the only formations considered as potential aquifers in this report.

Considerable detailed information concerning the geology of the coal-bearing rocks of the Mt. Savage area has been made available in a recent publication of the U. S. Bureau of Mines.[1/] This publication includes detailed logs of many test borings. The record of one boring, All-Ac 20, situated 0.5 mile east of Mt. Savage, near the residence of Stanley Weimer, shows that the upper 508 feet of strata penetrated are of Conemaugh age. Underlying these sediments the drill record shows 370 feet of strata considered to be part of the Allegheny and Pottsville formations. The boring is believed to have ended about 25 to 50 feet before encountering the underlying Mauch Chunk shale. The

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1/ Waage, Karl, and others, Investigation of Lower Coal Beds in Georges Creek and North Part of Upper Potomac Basins, Allegany and Garrett Counties, Maryland: U. S. Bureau of Mines Tech. Paper 725, 1949.

total thickness of sediments of Pennsylvanian age at this locality is therefore about 900 feet. The log of this boring shows four sandstone beds, in the Allegheny and Pottsville formations, which exceed 25 feet in thickness, one of the beds attaining a thickness of 70 feet. The record of the boring gives no data regarding the water-bearing properties of the sandstone, but it is reasonably certain that some of the sandstone will yield water to wells. Water wells penetrating sandstone in the Allegheny and Pottsville formations at Barton and Lonaconing, Maryland, yield as much as 30-50 gallons a minute at depths of approximately 500 to 1,000 feet.

So far as is known no water wells have been drilled to the Pottsville formation in the vicinity of Mt. Savage. It is stated by Lohman[2/] that in adjacent areas in Pennsylvania the Pottsville is very productive, but where it is deeply buried beneath synclinal coal basins it may yield salty water. Hence it seems possible that the aquifers in the Pottsville formation at Mt. Savage also may yield highly mineralized water.

The Conemaugh formation underlies the town of Mt. Savage and crops out on the adjacent hillsides except for the crests of a few of the highest hills, which are capped by rocks of the Monongahela formation. Table 1 gives records of eighteen water wells, all of which are believed to obtain water from beds of the Conemaugh formation. A driller's log of well All-Ac 7, situated at the new Mt. Savage High School, shows at least four water-bearing sandstone beds in the Conemaugh formation. However the beds of sandstone are lenticular and vary in character, making it difficult to predict distribution of these water-bearing beds. Where drilled wells have penetrated the same or similar beds in the

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2/ Lohman, S. W., Ground Water in South-Central Pennsylvania: Pa. Geol. Survey, 4th Series, Bull. W5, pp. 111-112, 1938.

Mt. Savage area yields of from 2 to 97 gallons a minute have been reported. Records show that depths of the wells generally range from about 40 to 200 feet. The wells are situated at elevations ranging from 1,190 feet above sea level to 1,580 feet above sea level.

In rocks of the type occurring in the Mt. Savage area ground water generally moves slowly through the rock material but moves more rapidly through crevices and fractures in the sandstone, coal, or limestone beds. Fire-clays and tight shales generally will retard the movement of ground water. The downward movement of the water is impeded or stopped where the strata lie in an essentially horizontal position. Thus springs are frequently observed to issue along the top of a clay or shale bed on a hillside. There is some evidence that in the town of Mt. Savage ground water is circulating from the uppermost water-bearing beds through uncased or partly cased drilled wells to underlying beds, thereby possibly causing contamination of deep aquifers.

The occurrence of ground water in the Mt. Savage area is related to geologic structure. Records of the coal test borings and coal mine data[3/] show that the general dip or slope of the Harlem coal bed in the Conemaugh formation is less than 10 degrees to the southeast in the vicinity of the Mt. Savage High School. The strata are believed to flatten in the vicinity of Jennings Run in Mt. Savage and to dip in a reverse direction southeast of the town. The topographic slope in parts of the town is about 45 degrees, consequently the topography is more important than rock structure in governing the movement of ground water in parts of the Mt. Savage area which are above the level of the major streams.

3/ Waage, Karl, and others, op. cit.

Water-supply developments

Existing developments.—The existing public supply of Mt. Savage is obtained chiefly from springs that issue at several places on the sloping hillsides to the north of town. The water from the springs is conducted to gathering points from which it flows by gravity through the distribution system. Two public-supply wells (All-Ac 6 and All-Ac 9 in Table 1) are near one of the gathering points north of town. One well is reported never to have been used and the other well used only occasionally. The yields of these wells are not known. About twenty families are supplied by another well near Jennings Run near the center of the town (well All-Ac 12). The consumption of water from the existing public-supply system is not known, but on the basis of an estimated population of 3,000 the consumption is estimated to be about 150,000 gallons a day.

Two industrial wells owned by the C. & P. Railroad formerly yielded moderately large quantities of water. A drilled well is in use at the Mt. Savage Catholic School, and a recently completed drilled well will supply the new high school, which is under construction at the present time. Various residences in the town are also supplied by private wells, but the total number is not known.

The springs that supply Mt. Savage are reported to flow throughout the year, but apparently the flow declines or fails during prolonged dry periods. It is reported that water from the springs is contaminated.

Quality of water

Data are too incomplete to properly evaluate the chemical quality of the ground water in the Mt. Savage area. Chemical analyses of water from four wells in the Mt. Savage area are given in Table 3.

The United States Public Health Service[4] has established the following maximum limits of chemical constituents ordinarily allowable in water supplies for drinking:

	(Parts per million)
Total solids	1,000
Chloride	250
Iron	0.3
Sulfate	250
Fluoride	1
Manganese	0.1
Magnesium	100
Sodium Carbonate (Na_2CO_3)	600
Arsenic	0.05
Copper	0.2
Lead	0.1

No minimum limit is given for the hardness or soap-consuming power of water, but water is frequently classed with regard to hardness according to the following scale:[5]

Parts per million of hardness	
0-50	Soft water
50-150	Water may be used for most purposes without treatment. Soap consumption is slightly increased. Laundries and other soap-using industries may find it economical to soften the water.
150-300	Hardness definitely noticeable. Above 200 parts per million it is common practice to soften water for domestic use or to collect and use rain water for laundry use.

4/ U. S. Public Health Service, Drinking-Water Standards, pp. 24-26, 1925.

5/ Lohman, S. W., op. cit., p. 76.

The results of the four analyses given in this report (Table 3) show that the water is below the limits set by the U. S. Public Health Service with respect to chloride, sulfate, and total solids. The water may be classed, however, as moderately soft to excessively hard. The iron content of two of the samples is in excess of 0.3 parts per million. Water containing excessive amounts of iron may, in time, cause staining of plumbing fixtures and clogging of pipes. Some wells in the vicinity of Mt. Savage are reported to yield water with a high iron content.

The four analyses show that the chemical constituents of water in the Conemaugh formation may differ appreciably.

A well tapping sandstone in the Pottsville formation is used for the public supply of Barton, Maryland, a few miles south of Mt. Savage. The water from this well is reported to be high in iron. According to Lohman[6/] the analyses of six water samples from the Pottsville formation in south-central Pennsylvania show that the water contains from 140 to 269 parts per million of dissolved solids, and that four of the samples contain an excess of iron. However where the Pottsville formation is deeply buried beneath synclinal coal basins it may yield salty water. Thus in the Mt. Savage area where the Pottsville formation is deeply buried it may contain highly mineralized water.

Summary and conclusions

The Mt. Savage area is underlain by about 900 feet of sediments of Pennsylvanian age which contain several water-bearing beds, chiefly sandstone. The Pennsylvanian rocks have been classified into three formations, which, in descending order, are: Conemaugh, Allegheny, and Pottsville. Apparently,

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6/ Lohman, S. W., op. cit., p. 80.

all of the drilled wells in the area obtain water from the Conemaugh formation. Reported yields of wells range from a few gallons a minute for domestic wells to 97 gallons a minute for one industrial well. Yields of 50 gallons a minute probably can be obtained from properly constructed wells within a depth of about 400 feet below the land surface. Although no water wells have been drilled to the underlying Allegheny and Pottsville formations in the Mt. Savage area, data from localities in southern Pennsylvania indicate that moderately large quantities of water may be obtained from them.

Four analyses indicate that the chemical quality of the water from the Conemaugh formation may be satisfactory for most purposes although it is possible that the iron content and total hardness may be high.

The available data indicate that a supply of 150,000 gallons of water a day, presumably adequate for the Mt. Savage public supply, can be obtained from wells. It would seem desirable to make pumping tests on the two public-supply wells (All-Ac 6 and 9) before drilling additional wells. If it is found that additional wells are needed they should be situated at least 500 feet from active wells so as to minimize the interference between them.

Table 1
RECORD OF WELLS
in
Mt. Savage area, Maryland

No.	Distance and direction from Mt. Savage High School	Name	Depth to water (ft. below l.s.)	Depth (ft.)	Diam. (in.)	Reported Yield (gal. a min.)	Remarks
All-Ae 1	700 ft. N.	J. M. Emailer	31.08	48	-	-	Dug well. Reported never has gone dry.
All-Ae 2	800 ft. S.	H. Turley	-	108	8	-	Elev. 1440 ft. Water reported stains clothes.
All-Ae 3	800 ft. S.	H. Turley	12.30 (1/5/50)	40	-	-	Dug well. Elev. 1440 ft.
All-Ae 4	900 ft. W.	F. Snyder	37.70 (5/10/50)	57	6	-	Elev. 1435 ft.
All-Ae 5	800 ft. W.	James Jenkins	30.46 (1/5/50)	47	6	-	Elev. 1425 ft. Well has 26 ft. of casing.
All-Ae 6	1000 ft. NE.	Mt. Savage Water Co.	-	98	8	30	Elev. 1380 ft. Reported used as stand-by well.
All-Ae 7	In school building	Allegany County Board of Education	93 (1/5/50)	200	8	52	Elev. 1450 ft. Well in basement of new school.
All-Ae 8	1000 ft. W.	I. Snyder	Dry (5/10/50)	20	-	-	Elev. 1435 ft. Dug well.
All-Ae 9	3000 ft. NE.	Mt. Savage Water Co.	-	-	-	16	Elev. 1560 ft. Stand-by well, seldom used.
All-Ae 10	2000 ft. S.	Mt. Savage Catholic School	-	100	-	16	Elev. 1350 ft. Supplies school and other buildings.
All-Ae 11	1390 ft. S.	Williams	-	110	-	-	Elev. 1370 ft. Drilled by Carpenter.
All-Ae 12	2400 ft. S.	Uhl	-	126	-	6½	Elev. 1190 ft. Supplies 20 families.

Table 1 - Cont'd

No.	Distance and direction from Mt. Savage High School	Name	Depth to water (ft. below l.s.)	Depth (ft.)	Diam. (in.)	Reported Yield (gal. a min.)	Remarks
All-Ae 13	2650 ft. S.	C. & P. RR.	13-15[a]	206	10	97	Elev. 1200 ft. Reported pumped for days without failing.
All-Ae 14	2850 ft. SSW.	C. & P. RR.	-	213	6	-	Elev. 1200 ft. Reported to have flowed. Abandoned.
All-Ae 15	2400 ft. SW.	C. & P. RR.	-	217	10	78	Elev. 1200 ft. Located at car shop.
All-Ae 16	3700 ft. W.	Adams	-	42	6	-	Elev. 1450 ft. Casing to 37 ft.
All-Ae 17	3050 ft. SW.	W. D. Williams	22[a]	127	6	2	Elev. 1400 ft. Casing to 22 ft.
All-Ae 18	2800 ft. SW.	F. F. Lancaster	7[a]	57	6	-	Elev. 1400 ft. Supplies 4 families.
All-Ae 19	1.7 miles NE.[b]	U. S. Bureau Mines test boring	-	980	-	-	Elev. 1405 ft. U.S.B.M. test no. 20-CC.
All-Ae 20	0.7 mile SE.	U. S. Bureau Mines test boring	-	878	-	-	Elev. 1380 ft. U.S.B.M. test no. 19-CC.
All-Ae 21	1.6 miles SW.[b]	U. S. Bureau Mines test boring	-	825	-	-	Elev. 1900 ft. U.S.B.M. test no. 25-CC.

a/ Static water level reported.
b/ Not shown in Figure 1.

Table 2

Well log - Mt. Savage area, Maryland

Well All-Ag 7 *

	Thickness (Feet)	Depth (Feet)
Yellow clay and boulders	16	16
Sandstone	18	34
Yellow soapstone	24	58
Coal	2	60
Fire clay	15	75
White soapstone	21	96
Coal	1.5	97.5
Gray sandstone	25.5	123
White soapstone	15	138
White sandstone	22	160
Hard fire-clay	12	172
White sandstone	28	200

* Mt. Savage High School well. Drilled in 1949 by F. Carpenter. Elevation 1450 feet.

Table 3

Analyses of water from wells in the Mt. Savage area, Md.
(Results in parts per million)

	All-Ac 7 New High School	All-Ac 12 Uhl	All-Ac 18 F. F. Lancaster	All-Ab 1[a/] Borden Mining Co.
Analysis No.[b/]	50-2080	50-2084	50-2086	-
pH	6.9	7.5	6.3	6.5
Silica (SiO_2)	4.4	7.0	10	5.4
Iron (Fe)	0.2	0.2	0.8	4.0
Aluminum (Al)	< 0.5	0	< 0.5	3.2
Manganese (Mn)	0.07	0	0	0.2
Calcium (CaO)	6	58	68	35
Magnesium (Mg)	19	12	22	0.07
Carbonate (CO_3)	0	0	0	0
Bicarbonate (HCO_3)[c/]	211	201	90	110
Sulfate (SO_4)	88	52	168	50
Chloride (Cl)	6	12	5	-
Dissolved solids	370	260	482	152
Hardness as $CaCO_3$	251	195	54	127

a/ Sample of water from 500-foot sandstone in deep well at Frostburg, Md. Well not listed in table 1 of this report.

b/ Analyses by Maryland State Board of Health. Date of analysis about May 1950.

c/ Computed by multiplying reported figures of M. O. Alkalinity by 1.22.

Figure 1. Map showing location of wells in the Mt Savage area, Maryland