PRELIMINARY INVESTIGATION OF THE GROUND-WATER RESOURCES OF COPIAH COUNTY

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INTRODUCTION

The absence of contemporary published information on the ground-water resources prompted the inclusion of a comprehensive study of the water resources as an integral part of the investigation of the Geology and Mineral Resources of Copiah County.

The purpose of this investigation is to collect and interpret information on the availability of ground-water. The increasing demand for more water for domestic, industrial and municipal use has emphasized the need for water facts to keep abreast of the demand. This preliminary report nor the final report will answer all of the water problems of the County, but will provide data which can serve as a guide for future planning and development.

Information being collected on water wells and test holes throughout the County consists of both geologic and hydrologic data where available. Field analyses of iron content, pH values and total hardness are being conducted on selected wells. Complete chemical analyses have been made on a number of wells by the Sanitary Engineering Department of the Mississippi State Board of Health. Figure 1 shows the location of water wells inventoried to date.

GEOLOGY

The geologic units on the surface in Copiah County are shown in Figure 2. The map shown here is from the Geologic Map of Mississippi by Belt and others, published by the Mississippi Geological Society.

The oldest formation found on the surface is the Catahoula formation of the Miocene system. The Catahoula crops out in the northern two-thirds of the County. Beginning in latitude of Township 10 North at higher elevations the Hattiesburg formation of the Miocene age can be encountered. The Hattiesburg becomes more prevalent to the South. The highest elevations in the County are usually covered by Citronelle sand and gravels of the Pleistocene age. Not illustrated on the geologic map are large areas of alluvium which are associated with the stream valleys.

The dip of the surface and shallow subsurface formations is roughly 40 feet to the mile in a south-southwesterly direction. The regional dip is interrupted in several areas of the County by intrusion of piercement type salt domes.

WATER BEARING UNITS

The water bearing strata are being separated and grouped together as units presently being utilized to supply domestic and municipal needs and those having possible potential for future development. Figure 3 is a generalized geologic section of the units from which water is now produced.

FOREST HILL FORMATION

The Forest Hill formation is the oldest stratum from which water is being produced at this time. The formation underlies all of the County except in areas where the sediments have been disturbed by salt penetration. It consists chiefly of irregularly bedded clay, silt, sand and lignite, with finer sediments being predominant. The formation is very lenticular and the areal distribution of the sand beds is difficult to predict.

Preliminary examination of available information indicates that the Forest Hill formation varies from 75 to 150 feet in thickness, however, the formation is commonly thought to be 75 to 90 feet thick. Where thicker sections are present, there appears to be well developed basal sands. Most Forest Hill sands appear to be rather thin bedded, but where the basal sands are developed the beds are as much as 90 feet thick. Depths to the formation range from about 600 feet in the extreme northern part of the County to in excess of 1000 feet near the Lincoln County boundary.

Data collected indicates two domestic wells in the extreme northern section of the County producing from the Forest Hill formation. Incomplete chemical analysis shows the water to have an iron content of 0.1 ppm. and the pH to be 8.8. The water does have some color.

CATAHOULA FORMATION

The acquifers of the Catahoula formation are the most widely used throughout the County. The formation consists of irregularly bedded sand, silt, clay, sandstone and siltstone. Surface and subsurface data show the formation is composed largely of the finer grain silts and clays. Sands are commonly present as lenticular beds at different levels within the formation and well developed beds can be encountered locally. The sands range from fine-grained to coarse-grained in size, but the fine-grained to medium-grained sizes predominate.

The total thickness of the formation has not been definitely established at this point of the investigation, but preliminary figures indicate that the thickness normally ranges from about 500 feet in the northern part of the County to possibly as much as 1100 feet in the southern part. Exceptions to these thicknesses may be found in areas where the stratum has been disturbed by piercement type salt domes. Individual sand beds range from a few feet in thickness to a maximum of 140 feet.

The aquifers of the Catahoula formation are sources of water for

many of the domestic wells in the County. In addition, municipal supplies of Gallman, Georgetown and Hazelhurst plus community water systems now in operation and those in the planning stage are all from the Catahoula formation. Depths of producing sands range from about 100 feet to a maximum of 919 feet. Maximum capacity of 600 gallons per minute has been developed as initial production in some wells.

CITRONELLE FORMATION

At this stage of the investigation all terrace deposits are being discussed as Citronelle. Until further data are available no attempt will be made to separate the true Citronelle deposits from obvious later aged terrace material.

The terrace deposits are composed of silt, sand, gravel and clay. The deposits are in many cases cross-bedded and lack stratification. The sands are generally more coarse-grained than those found in the underlying Miocene. Fossil wood has been reported to occur in the higher deposits.

Thickness of the terrace deposits varies depending upon location and depositional features. The maximum thickness encountered during preliminary investigation has been 120 feet in the vicinity of Crystal Springs. At this locality these deposits are of Citronelle age.

Many domestic wells throughout the County are producing from sands and gravels in this formation. The municipal supply of Crystal Springs and much of the industrial supply associated with the gravel industry are obtained from the Citronelle. The formation is also the source of many springs which abound throughout the County, some of which are being utilized as domestic supplies. Unconfirmed reports indicate that the municipal supply of Wesson is obtained from springs developed in the Citronelle.

Depths of wells producing from terrace deposits rarely exceed 100 feet in depth. The large number of domestic wells range in depth from 35 feet to 100 feet, the average being approximately 65 feet. Initial capacity of wells completed in the Citronelle ranges from a few gallons per minute to as much as 600 gallons per minute.

ALLUVIUM

The alluvial deposits are present in all stream valleys. They occur in varying amounts, dependent upon the size of the stream. The deposits consist of clay, silt, sand and gravels. Coarse materials usually are found near the base with progressively finer materials present near the surface. However, continuing erosion and deposition alters this sequence to some degree. The two larger streams, Pearl River and Bayou Pierre have extensively developed alluvial plains. The alluvial plains of some tributaries are well developed and furnish some water.

Recent field work indicates only domestic production from wells in the alluvium. However, it is believed that future investigation possibly

will indicate the feasibility of the coarse alluvium in the Bayou Pierre valley to furnish sufficient water for industrial purposes.

WATER LEVELS

Figure 4 shows some of the various water levels in the Miocene aquifers in the northern half of the County, and indicates areas of probable artesian flow. The water levels are shown by a numerical figure adjacent to the well location. These figures represent the elevation of the individual levels based upon sea level datum. The highest water levels are along the eastern edge of quadrangle J. They were obtained from engineer's and drilling contractor's reports and are considered to be reliable.

The shaded area on Figure 4 indicates areas of probable artesian flow. Areas consisting of the Pearl River and Bayou Pierre valleys at ground elevations below 250 feet mean sea level can be expected to furnish flowing wells. Some flowing wells near Carpenter in the northwestern part of the County in Township 12 North, Range 5 East have in recent years diminished to a mere trickle and others have ceased flowing altogether. However, it is believed that additional Miocene aquifers are present that have the potential to produce flowing wells in the area.

Flowing wells in the Pearl River flood plain are reported to have maintained their flowing rate. These reports are unconfirmed and in all probability the rate has reduced somewhat, however, there have been no reports of wells that have ceased to flow.

While there has been no definite pattern established for the decline of water levels in the Miocene strata, preliminary figures indicate a decline of about one foot per year for the last 10 years. This figure has been established for Hazelhurst and may not apply throughout the County.

Water levels in the Citronelle seem to fluctuate with periods of drought. Conflicting reports cloud the issue, but what appears to be the more reliable reports indicate a slight overall decline over the last few years.

WATER ANALYSES

The water analyses shown in Figure 5 give a comparison of the water used for some municiple and industrial supplies. Included in the table is one well, designated D-9, producing from the Citronelle formation. The remaining analyses are for wells producing from sands in the Catahoula. Other analyses were available, these were selected to illustrate the variety of qualities present in aquifers within the Catahoula.

Near the surface in shallow wells, water from the Catahoula formation often contains iron in quanity above the recommended maximum of 0.3 ppm. and has low pH values plus objectionable carbon dioxide content At greater depths the quality generally becomes good. Well numbered R-3,

which is producing from a depth of 761 feet does contain a large amount of dissolved solids and the color is high. By contrast, well 2-D, which is 925 feet deep, produces water that requires no treatment.

Most of the water from the Citronelle formation is similar to the analysis shown in Figure 5. This water usually has a low pH and in many instances contains iron in excess of the recommended maximum. Partial analyses of a number of domestic wells show the iron content to be as high as 3.9 ppm. in some areas.

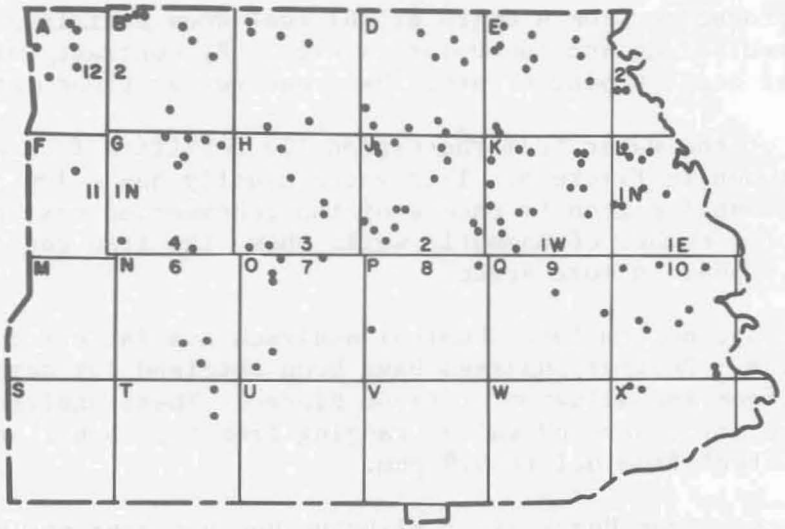
There are no complete chemical analyses available for water from the alluvium. Partial analyses have been obtained for several wells producing from the alluvium of Bayou Pierre. These analyses show the water to be soft, have pH values ranging from 5.5 to 6.2 and to have an iron content from 0.1 to 0.9 ppm.

The water from Pearl River alluvium has not been analyzed. The United States Geological Survey reports that water from the Pearl River alluvium in Hinds County is hard and contains iron from 0.04 to 33 ppm. The water from the Pearl River alluvium in Copiah County is probably similar.

POTENTIAL WATER-BEARING UNITS

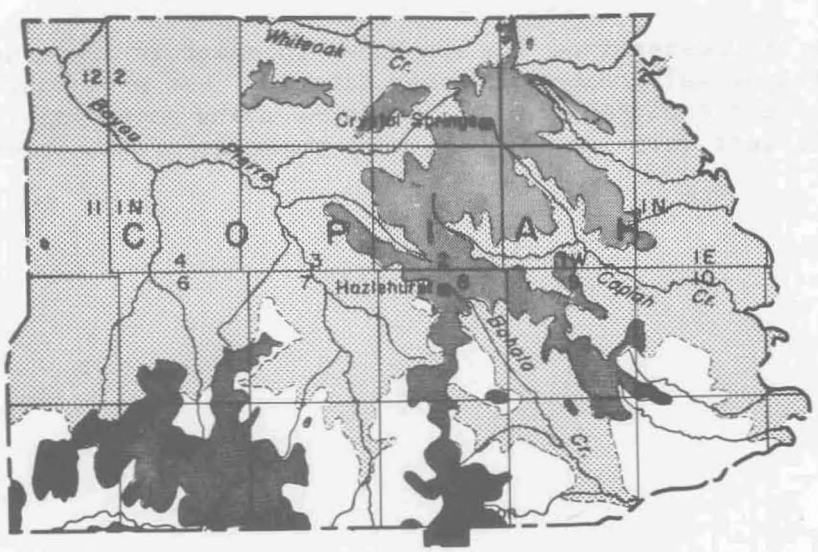
Fresh water-bearing sands are present in the Sparta and Cockfield formations. Chemical analyses indicate that water from these sands is of good quality, however, color content is somewhat high. In one deep test well, a Sparta section yielded water with color content of 200.

Sands of undetermined age are known to exist in areas near the piercement type salt domes. Present data do not show that these sands have been explored for their water-bearing potential. Electrical logs of oil test wells do indicate that these are fresh water-bearing sands.



LOCATION OF INVENTORIED WELLS

Figure 1



GEOLOGIC MAP OF COPIAH COUNTY

Citronelle Hattiesburg Catahoula

Figure 2

GENERALIZED GEOLOGIC SECTION

System	Series	Group	Stratigraphic Unit	Thickness	Lithologic Character	Water Bearing Properties
Quaternary	Recent		Alluvium	0 - 70	Clay, Silt, Sand and Gravel	Small To Moderate Supplies In Domestic Wells
	Pleistocene		Citronelle	0 - 120	Clay, Silt, Sand and Gravel	Domestic and Public Supplies
Tertiary	Miocene		Hattiesburg	?	Clay, Silt and Sand	Unknown
			Catahoula	? - 1000	Clay, Silt and Sand	Domestic And Public Supplies
	Oligocene	Vicksburg		100	Clay, Marl, Limestone	None
			Forest Hill	50	Fine Sand, Silt and Carbonaceous Clay	Domestic Wells In Northern Part Of County

Figure 3

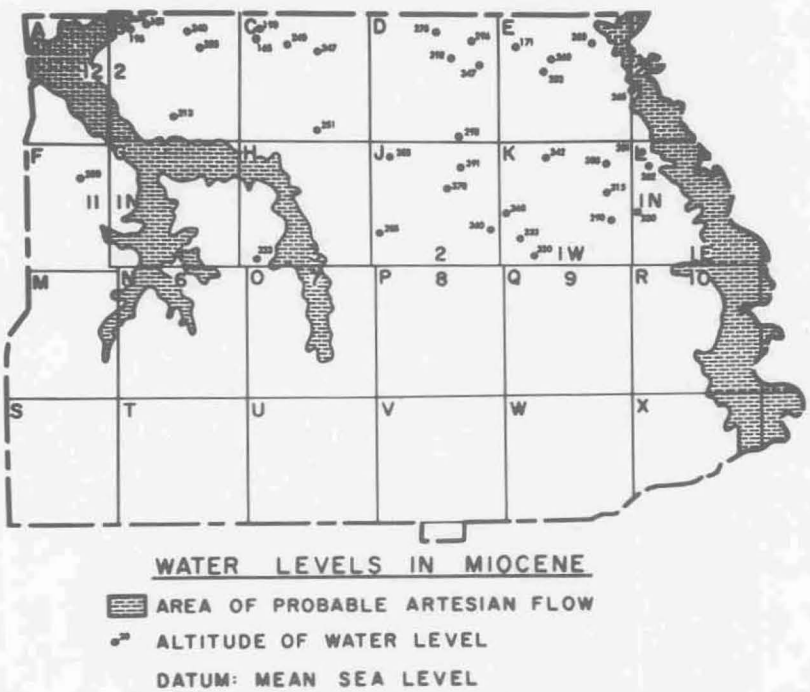


Figure 4

Comparison Of Chemical & Physical Characteristics Of Selected Wells Chemical Constituents in PPM

Well	D-9	J-6	R-3	3	2-D	5-D
Depth (ft.)	86	215	761	341	925	481
Formation	Citronelle	Catahoula	Catahoula	Catahoula	Catahoula	Catahoula
pH	< 5.2	5.2	8.6	5.9	8.4	7.1
Iron (Fe)	0	0.15	0	2.0	0	0.1
Calcium (Ca)	0	2.	0	9.54	1.6	1.6
Magnesium (Mg)	0	---	0	2.96	0	0
Sodium (Na) &Potassium	11.46	13.84	237.23	25.02	53.59	56.58
Alkalinity (Total)	8	9	460.	43.	106.	105.
Chloride (Cl)	12.	10.	11.	14.	3.	3.
Sulfate (SO_4)	0	11.52	14.48	5.43	9.71	17.12
Fluoride (F)	0.1	0.3	0.8	0.4	0.8	0.3
Silica (SiO_2)	0	0	4.4	14.0	2.8	10.4
Dissolved Solids	28.37	42.76	559.02	87.5	135.	152.29
Hardness	Trace	5.0	Trace	36.0	4.	4.
Carbon Dioxide	110.	121.	0	118.	0	18.
Turbidity	<2	<5	<5	<2	<2	<2
Color	<5	<5	250	--	30	--
Odor	None	None	--	H_2S	H_2S	--

Figure 5