

VALDOSTA AREA:

*Lowndes Co.*

Areal Extent:

The Valdosta Area is considered in this report as arbitrarily including six counties viz. Berrien, Brooks, Cook, Echols, Lanier, and Lowndes. The area takes its name from the City of Valdosta, in Lowndes County.

Geology of: General Statement:

The subsurface geology of this area includes a small part of the Coastal Plain of Georgia. It consists of geologically youthful sedimentary rocks, which have been deposited upon a much-eroded, beveled, and very old crystalline basement rock. The sediments composing these rocks are, for the most part, clastic by nature, and, as the term, sedimentary implies, aqueous in origin. These rocks were deposited on the bottom of a marine sea that was present over this area during various past geologic ages and, on account of this mode of origin, they possess certain characteristics which are economically important from the standpoint of ground-water resources. One such characteristic is that they are stratified, consisting of a series of superimposed beds, or strata, some of which are water-bearing. Another is that these strata are not horizontal with respect to the surface of the ground, but are inclined. Throughout most of this Area this inclination, or "dip", appears to be, with the exception of Brooks County, in an easterly or coastward direction. Such a subsurface structural condition necessitates, therefore, progressively deeper drilling in an easterly direction. From available subsurface data a regional up-folding, or "high," seems to be present over all of Brooks (and a small part of Thomas County) County. The presence of this high in Brooks County causes the overlying sedimentary rocks to dip away in several directions from Brooks County, but, in general, it has produced a reversal of dip in this county in contrast to the original coastward inclination. The present dip of the strata over most of Brooks County is now approximately north-northeast. Stated in another way, the rocks progressively rise toward the surface in a southwesterly direction, finally coming to the surface south of the State Line, that is to say, in Madison and Suwannee Counties, Florida. This structural condition means that progressively shallower drilling, in contrast to the remainder of this Area, is necessary in order to penetrate the various aquifers present in Brooks County. Topographically, such a subsurface

condition is expressed by the existence of numerous sink-holes over all of Brooks County. From the standpoint of ground-water resources possessed by this area, Brooks County represents what is known as a re-charge area, that is to say, a region where water is entering rather than leaving the ground.

Occurrence of Ground-Water:

Throughout this area every type of well is utilized for obtaining ground-water supplies, but the dug well, for economic reasons, predominates, as might be expected. For various reasons, however, the drilled type of well is considered much the more desirable. Greater yields and less danger of surface contamination are two of the more obvious advantages of drilled wells. Besides wells as a source of ground-water, many springs, usually of the surface seepage type, are present throughout this Area, but, except for several large springs in Brooks County, none are of economic importance. Flowing wells, with several minor exceptions, are not possible in this Area due to the deeply-buried condition of the principal aquifers as well as to surface elevations above mean sea level. Further, as noted above, all of Brooks County as well as southern Lowndes County represent a region of re-charge, a condition which militates against the existence of flowing wells at least in this part of our Area. Small flowing wells, however, are thought to be feasible along the principal river valleys, where surface elevations might be low enough to permit flow. In this connection also must be mentioned the existence of a considerable number of relatively shallow flowing wells situated in and about the City of Valdosta. The aquifers supplying these flowing wells belong to Quaternary-Miocene strata, which, in contrast to the older and more deeply-lying Oligocene and Eocene rocks, were unaffected by structural deformation noted earlier. These younger sediments, therefore, still maintain their original, though much more gentle, coastward dip. Such deposits constitute a special study in themselves and not be considered further.

Underlying the surface of this Area one finds an approximate thickness of 250 feet of unconsolidated, interbedded sands, gravels, and clays, all belonging, geologically, to formations of Quaternary and Miocene Age. Many water-bearing sands and gravels are found to be present in these deposits, such materials possessing yields ranging from 7 - 16 gallons per minute and sometimes amounting to as much as 150 gallons per minute. From a depth of 250 - 700 feet are encountered a series of limestones of Oligocene and Eocene Age, such rocks constituting the best aquifers to be found in this Area. Yields

from 5 - 40 gallons per minute and sometimes as high as 250 gallons per minute are obtained from Oligocene strata, while yields averaging 350 gallons per minute and often as much as 1100 gallons per minute are obtainable from rocks of Eocene Age.

Local Supplies:

In order to obtain some idea of individual ground-water supplies now being obtained throughout this Area the following data are here included.

In and about the City of Quitman, in Brooks County, are found drilled wells which range in diameter from 4 - 12 inches and vary in depth from 80 - 612 feet. Yields from these wells vary from little or no water to as much as 900 gallons per minute. The amounts of casing installed in these wells varies from 78 - 180 feet. Since the top of the Eocene deposits in this area is around 200 feet, in order to obtain maximum pumpage results from these rocks, 200 to 220 feet of casing is recommended. A well owned by the City of Quitman and obtaining water from Eocene strata shows the following analysis:

(Parts per Million):

Silica	_____	16
Sulphate	_____	1.9
Chloride	_____	4.1
Bicarbonate	_____	168
Total Hardness	_____	141
Color	_____	negligible

In Cook County several drilled wells are present within the City of Adel and surrounding regions. These wells, with diameters varying from 4 - 12 inches, range in depth from 358 - 675 feet and carry casing varying from 171 - 400 feet. Yields, which are apparently being obtained from Eocene strata having an estimated formational top of 350 feet, range from 200 - 500 gallons per minute. On the basis of the above data, for best pumpage results, therefore, 350 - 375 feet of casing should be installed in wells seeking Eocene aquifers. An analysis of the water from a well owned by the City of Adel and obtaining water from Eocene deposits is as follows:

(Parts per Million):

Silica	_____	22
Sulphate	_____	75.10
Chloride	_____	4.8
Bicarbonate	_____	144
Total Hardness	_____	193
Color	_____	0

1. Mason, W. P. and Buswell, A.M. 1917. Examination of Water, Chemical and Bacteriological. p.44. These authors indicate total hardness in parts per million as follows:  
soft water \_\_\_\_\_ up to 50 p.p.m.  
moderately hard \_\_\_\_\_ 50 - 100 p.p.m.  
hard \_\_\_\_\_ 100 - 300 p.p.m.  
very hard \_\_\_\_\_ over 300 p.p.m.

Within the City of Nashville and its environs, in Berrien County, are present drilled wells which vary in diameter from 4 - 12 inches, attain depths ranging from 105 - 564 feet, and carry casing varying from 98 - 401 feet. Yields from these wells vary from 40 - 200 gallons per minute. From the evidence at hand the majority of the wells in this area are obtaining water from Oligocene aquifers. The estimated top of the Eocene rocks for this County is 350 to 375 feet necessitating around 375 feet of casing in wells using such aquifers. A well owned by the City of Nashville and apparently pumping water from strata of Oligocene Age shows the following water analysis:

(Parts per Million):

Silica	_____	34
Sulphate	_____	75
Chloride	_____	4.2
Bicarbonate	_____	137
Total Hardness	_____	189
Color	_____	4

In Lanier County, in the City of Lakeland and surrounding areas, drilled wells are present having diameters varying from 4 - 6 inches, depths ranging from 124 - 365 feet, and carrying casing which varies, in amount, from 122 - 215 feet. Yields from these wells range from 2 - 200 gallons per minute. The estimated formational top of the Oligocene rocks for this area is around 240 feet, while the top of the Eocene strata should be encountered at a depth of 350 - 375 feet. In order to obtain maximum yields from these more deeply-buried Eocene rocks about 380 - 400 feet of casing should be installed in wells situated in this area. An analysis of the water from a well owned by the City of Lakeland, this well probably obtaining its water from Eocene strata, is as follows:

(Parts per Million):

Silica	_____	34
Sulphate	_____	72
Chloride	_____	5.4
Bicarbonate	_____	137
Total Hardness	_____	186
Color	_____	7

Well data concerning the ground-water resources available in the subsurface of Echols County is rather meagre. From the few wells on which records are available one finds that these wells, with diameters varying from 2 - 6 inches, range in depth from 96 - 250 feet, carry casing varying from 75 - 150 feet in total amount, and produce yields of 2 - 3 gallons per minute, only. Since the estimated top of the Oligocene rocks in this area is around 300 feet, that of the Eocene series being at a depth of 435 - 450 feet, one can conclude, on the basis of such data, that these wells are relatively shallow and,

Other, are obtaining water from Miocene deposits, none having been drilled deep enough to penetrate either the Oligocene or Eocene limestones. The estimated top of the Eocene strata being at a depth of around 435 feet, at least 450 feet of casing should be installed in wells seeking water from these rocks. An analysis of a well owned by the Garbutt Lumber Company, Statenville, Ga., and apparently using water from Miocene deposits shows the following results:

(Parts per Million):

Silica _____	54
Sulphate _____	11
Chloride _____	12
Bicarbonate _____	136
Total Hardness _____	108
Color _____	not reported

In Lowndes County, especially within the City of Valdosta, many drilled wells are present. These wells range in diameter from 1 and 1/4 to 15 inches, rarely 30 inches, vary in depth from 45 - 608 feet, and carry casing ranging from 25 - 260 feet in total amount. Yields run from 3 - 1250 gallons per minute depending upon the kind of aquifer utilized. The top of the Eocene strata in this area is close to 400 feet, necessitating 410 - 425 feet of casing in properly constructed wells that obtain water from these deposits. A deep well owned by the City of Valdosta and pumping water mostly from

Eocene strata shows the following water analysis:

(Parts per Million):

Silica _____	15
Sulphate _____	30
Chloride _____	3.8
Bicarbonate _____	78
Total Hardness _____	98
Color _____	35

Conclusions:

On the basis of the data presented above one can draw certain conclusions concerning the ground-water resources that are available throughout this Area.

First, aquifers ranging in geologic age, lithologic composition, and depths below the surface are present over this entire Area.

Second, yields from these various aquifers differ in total amounts, being smallest from the Quaternary-Miocene deposits and largest from the rocks of Eocene Age. The younger, surface formations, or Quaternary-Miocene deposits, produce water sufficient for domestic use, but yields large enough for small municipalities may sometimes be obtained. The Eocene limestones possess ground-water in amounts that are adequate for most municipal and

industrial purposes.

Third, the quality of the water coming from the overlying Quaternary and Miocene formations is, generally speaking, soft, from the standpoint of total hardness, whereas the water that is being obtained from Oligocene and Eocene rocks runs, in total hardness, from moderately hard to hard, rarely very hard. Further, water that is now being pumped from wells utilizing Eocene aquifers, these wells being situated within the City of Valdosta, contains color in amounts that must be considered as objectionable, a condition deserving of special treatment here.

As stated earlier, the City of Valdosta is situated in the midst of a large sink-hole, or re-charge, area, which affords surface water relatively easy access into the underlying limestones. It is entirely possible, therefore, that water, by means of subterranean fissures intersecting the drill hole at points below the lower limits of the well casing, carries coloring matter down into the wells from higher-level sink-holes. If this condition is a true representation of the facts, it is difficult to understand how such coloring matter may be eliminated from the wells of this area. Probably the only recourse is to treat the water after it has been pumped from the wells and before it has been allowed to reach the city mains. There is, however, a possibility that adequate casing, which is seated firmly in the top of the Eocene formations, might eliminate most of this objectionable property.

Fourth and last, the aquifers to be found in this Area fall into two lithologic types viz. unconsolidated deposits - sands and gravels belonging to the Quaternary and Miocene formations - and consolidated rocks - the limestones of Oligocene and Eocene Age. In order to obtain maximum yields from wells utilizing such aquifers two different types of well-construction are required. In wells, which obtain water from unconsolidated sands and gravels, screens and gravel-packing are recommended ~~xxxxxxxxxxxxxxxxxxxx~~ not only to insure best results, but for longevity of the wells, themselves. On the other hand, wells utilizing limestones as aquifers, although screens and gravel-packing are unnecessary, should possess adequate casing. Casing in wells of this kind should always be seated 10 - 20 feet below the top of the desired water-bearing formation. If too little casing is employed, loss of pressure with consequent lowering of pumpage yields is thereby incurred. Further, in wells with insufficient casing, "cave" is likely to take place, a condition which, in extreme cases, results in complete stoppage of the well. In summarizi-

~~the present status of drilled wells over this Area as a whole two facts should be noted.~~

Accordingly, most of the drilled wells have failed to penetrate the lower-lying, more abundantly water-bearing limestones viz. Eocene strata. ~~Finally, insufficient casing in those wells that have succeeded in entering the more desirable subsurface formations has been the rule rather than the exception. Economic reasons along with inaccurate subsurface data are two of the chief reasons which have resulted in the above conditions. Consultation with competent geologists before such wells are drilled should avoid undesirable situations of the kind just outlined.~~

*From C. W. Carleton*

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VALDOSTA AREA

Water Supplies From Wells

ALLOW

The Valdosta Area as here described includes Berrien, Brooks, Cook, Echols, Lanier, and Lowndes Counties. The area takes its name from the city of Valdosta in Lowndes County.

The information contained in this section is based on available reports and an investigation made by the Georgia Department of Mines, Mining and Geology, State Division of Conservation, Captain Garland Peyton, Director, in cooperation with the Geological Survey, United States Department of Interior. Systematic investigation of the ground water resources of the State has been in progress since 1938, but owing to limited funds studies of this area have been on a small scale. Further successful developments of the ground water resources of this area will require more detailed investigation by the Geological Survey than has hitherto been possible. Requests for additional information or field investigations in this area should be addressed to Captain Garland Peyton, 425 State Capitol, Atlanta 3, Georgia.

Underlying the surface of this area are about 250 feet of unconsolidated, interbedded sands, gravels, and clays of Miocene and Quaternary age. Some wells penetrating these formations may yield as much as 150 gallons per minute. However, most productive formations are a series of limestones of Oligocene and Eocene ages at depths of 250 to 700 feet. Yields of as much as 250 gallons per minute are obtained in the Oligocene strata, while yields from 350 gallons to 1100 gallons per minute are obtainable from wells in rocks of Eocene age.

Local Supplies

Valdosta, Lowndes County. Drilled wells in Lowndes County, especially within the city of Valdosta, range in depth from 45 to 608 feet and yield as much as 1250 gallons per minute. The largest yields are from wells in the



limestones of Eocene age. The top of the Eocene strata in this region is about 400 feet in depth.

Water from a deep well owned by the city of Valdosta which comes from Eocene strata, ~~is reported to contain~~ 15 parts per million of silica, 30 parts per million of sulphate, 3.8 parts per million of chloride, 78 parts per million of bicarbonate, 98 parts per million of total hardness, and 35 parts per million of color.

The city of Valdosta is situated in the midst of a large sink-hole area which affords surface water relatively easy access into the underlying limestones. It is possible, therefore, that surface water, with organic color may enter the wells below the lower limits of the well casing through sink holes. Adequate casing, which is seated firmly in the top of the Eocene deposits might reduce the amount of organic color. Although the high amount of color in the Valdosta water is a disadvantage for some purposes, it is possible that a detailed study of the area would lead to solving the problem. There are a number of relatively shallow, flowing wells in and about the city of Valdosta which may obtain water from the Miocene and Quaternary formations.

Quitman, Brooks County. In and about the city of Quitman, in Brooks County, are drilled wells which range from 4 to 12 inches in diameter and from 80 to 612 feet in depth. Yields from deeper wells which penetrate Eocene limestones are as much as 900 gallons per minute. The top of the limestones of Eocene age in this area is around 200 feet below the surface.

A well owned by the city of Quitman yields water from Eocene strata which contains 16 parts per million silica, 1.9 parts per million of sulphate, 4.1 parts per million of chloride, 168 parts per million of bicarbonate, 141 parts per million of total hardness, and with negligible color.

Adel, Cook County. Several drilled wells ranging in depth from 358 to 675

feet within the city of Adel and surrounding area yield from 200 to 500 gallons per minute. These wells apparently yield water from Eocene limestone. The top of the Eocene is at a depth of about 350 feet.

A well owned by the City of Adel yields water from Eocene strata that contains 22 parts per million of silica, 75 parts per million of sulphate, 4.8 parts per million of chloride, 144 parts per million of bicarbonate, 193 parts per million of total hardness, and no color.

Nashville, Berrien County. Within the city of Nashville and its environs in Berrien County, are drilled wells which range from 105 to 564 feet in depth and yield from 40 to 200 gallons per minute from Oligocene aquifers. The top of the Eocene rocks for this County is estimated to be about 350 to 375 feet below the surface.

A well owned by the City of Nashville yields water from Oligocene strata which contains 34 parts per million of silica, 75 parts per million of sulphate, 4.2 parts per million of chloride, 137 parts per million of bicarbonate, 189 parts per million of total hardness, and 4 parts per million of color.

Lakeland, Lanier County. In Lanier County, in the city of Lakeland and surrounding areas, drilled wells range in depth from 124 to 363 feet. Yields from these wells are as much as 200 gallons per minute. The top of the Oligocene ~~rocks~~ in this area is estimated to be about 240 feet, below the surface. The top of the Eocene strata is probably at a depth of 350 to 375 feet.

A well owned by the City of Lakeland yields water from Eocene strata that ~~is reported to contain~~ 34 parts per million of silica, 72 parts per million of sulphate, 3.4 parts per million of chloride, 137 parts per million of bicarbonate, 186 parts per million of total hardness, and 7 parts per million of color.

Bibliography: McCallie, S. W., Underground Waters of Georgia, Geological Survey of Georgia Bull. 15, 370 pp., 1908. (Out of date by 40 years, but the latest published discussion of the ground water of this region.)