

U. S. GEOLOGICAL SURVEY
TRAVERSE BOOK

9-904

UNDERGROUND WATER SCHEDULE

The following list enumerates the chief points to be considered in detailed hydrologic work. In folio work only the more general subjects need be covered.

GENERAL

- 1 Sources of water in area under investigation.
- 2 Chief source for domestic use; for stock; for manufacturing; for irrigation.
- 3 Range of depth of wells.
- 4 Most common depth.
- 5 Quality of supplies.
- 6 Head of water.
- 7 Yield of wells.
- 8 Depth to rock.
- 9 Character of water beds.
- 10 Character of springs. (For individual springs, see "Springs.")
- 11 Public water supplies. (For individual supplies, see "Public Supplies.")

RESIDUAL SOILS

- 12 Character of soils.
- 13 From what rock derived.
- 14 Waterbearing capacity.
- 15 Nature of transmission (seepage or open passages.)
- 16 Character and depth of wells.
- 17 Quality of water.
- 18 Pollution.
- 19 Quality obtained.
- 20 Seasonal variation.
- 21 Use (see "Wells.")

WATER IN QUARRIES

- 22 Relation of quarry to drainage.
- 23 Protection from surface wash.
- 24 Character of stripping.
- 25 Kind and texture of rock.
- 26 Character of bedding planes.
- 27 Character of joints.
- 28 Presence of dikes, veins, cleavage, schistosity, etc., determining circulation.
- 29 Present circulation in pores, joints or bedding planes.
- 30 Weathering of joints and bedding planes and other indications of past circulation.
- 31 Solution effects.
- 32 Amount of water pumped from quarry.
- 33 Mode of entrance of water.
- 34 Effect of quarrying on wells.

WELLS

- 35 Owner.
- 36 Town and county.
- 37 Exact location. (Town, range and section or distance and direction from postoffice.)
- 38 Driller and address.
- 39 Situation and elevation of well.
- 40 Type of well.
- 41 When completed.
- 42 Top and bottom diameters.
- 43 Material penetrated.
- 44 Depth of water beds.
- 45 Character of water beds.
- 46 Casing.
- 47 Head.
- 48 Kind of pump, if any.
- 49 Natural yield of well if flowing.
- 50 Yield to pump.
- 51 Increase or decrease of supply.
- 52 Effect of storms, etc. on well.
- 53 Chemical composition of water.
- 54 Samples taken or not.

- 55 Are analyses available?
- 56 Sanitary quality of water.
- 57 Pollution.
- 58 Uses; Washing. Cooking. Stock. Laundry. Steam boilers. Irrigation. Public supply. Industrial processes.
- 60 Does it corrode or incrust boilers?
- 61 Peculiarities of well or material penetrated.
- 62 Unsuccessful wells, if any.
- 63 Wells abandoned and cause.

SPRINGS

- 64 Owner.
- 65 Location (see "Wells.")
- 66 Name of spring.
- 67 Color, odor, taste, etc.
- 68 Chemical composition.
- 69 Samples taken or not.
- 70 Are analyses available.
- 71 Pollution.
- 72 Mineral or other deposits.
- 73 Volume of flow.
- 74 Seasonal or weather fluctuations.
- 75 Temperature.
- 76 Surroundings.
- 77 Manner of emergence.
- 78 From what does water come?
- 79 Does it form a stream?
- 80 Utilization (see "Wells").
- 81 Behavior in boilers.
- 82 Medicinal properties.
- 83 Trade name of water.
- 84 Amount sold.
- 85 Retail price.
- 86 Improvements at spring.
- 87 Other points of interest.

PUBLIC SUPPLIES

- 88 Owner.
- 89 Source.
- 90 From what distributed (reservoir, etc.).
- 91 Capacity of reservoir, etc.
- 92 Elevation of reservoir, etc., in relation to source and town.
- 93 How carried to distributing point.
- 94 How distributed (gravity, direct pressure, etc.).
- 95 Length of mains in miles.
- 96 Number of taps and fire hydrants.
- 97 People supplied.
- 98 Proportion of total population.
- 99 Describe source in detail (see "Wells" and "springs") etc.
- 100 How much is used daily.
- 101 Maximum capacity of pumps;
- 102 Effect of maximum pumping on supply. Average vacuum. Vacuum during fires.
- 103 Domestic and fire pressures.
- 104 Sufficiency of water.
- 105 Restrictions as to use of water.
- 106 Chemical composition at source.
- 107 Sanitary conditions at source.
- 108 Analyses if any. Did you take samples?
- 109 Deposit or organic growths in reservoir or pipes.
- 110 Quality of water at taps.
- 111 Causes of pollution if any.
- 112 Uses (see "Wells").
- 113 Is supply entirely satisfactory?
- 114 Improvements or new sources contemplated.

Gainsville and vicinity.

1. *Sept. 24 - 1905, 06*
Deep wells; shallow wells; cisterns; springs;

2. *The city of Gainsville is supplied from a spring; cisterns supply water for household use in the country districts; deep wells and shallow wells are used, however, to some extent.*

For stock the farming districts rely mostly upon long ponds, and shallow wells.

For purposes of irrigation water is taken from ponds, shallow wells, and to some extent from deep wells.

3. *Artesian wells range in depth from 90 to 323 ft.; surface wells from a few feet to 30 or 40 ft.*

4 -
5 - *The artesian water is a lime water with occasionally a very little sulphur.*

6. *The artesian water stands 48 to 50 ft. above sea level. (The Gainsville area varies in elevation from 60 to 179 feet above sea.)*

7. *Limit of supply of deep wells not known.*

8. *Depth to rock extremely variable; from a few to 50 or more feet.*

9. *Material of shallow wells, sand & clay; of the deep wells invariably limestone.*

10. *Such springs as occur are shallow springs.*

11. *The public city supply is from a spring.*

12. The soil is sandy or sandy loam.
13. Soils derived from sands, clays, and limestone.
14. Water bearing capacity good. The sandy soil also holds ~~water~~ moisture persistently.
15. Transmission through the soils by seepage.
16. Wells shallow and deep, mostly 2 to 6 in. in diameter, opened by pump.
17. Water from deep wells is a lime water; that from shallow wells variable.
- 18 -
- 19 - Quantity of water from deep well not determinable.
20. No very direct evidence as to seasonal variation on deep wells. Water level probably slightly affected.
21. use - ice manufacture; household use, stock; irrigation, etc.
- 22 to 34. No quarries are found within this area.
35. Wells - No I
- 35, owner Diamond Ice Co.
36. Gainesville, Alachua Co.
37. 3 blocks N.W. post office.
- 38, M. H. Hamilton, Alachua, Fla.
39. Surface of well 176 feet above sea (estimate from U.S. G.S. topographic map).
40. Bored well.
- 41.

from grade to center. A.C.S. from North to South

East side of county.



from Rockwell to center.

A.C.S. from North to South through eastern part of county.



from Hamilton & Allen Ridge, A.C.S.

from R.E. & S.W. through central part of county.



42. 8 in top to bottom.

43.

44. Depth of water beds 316 ft.

45. Limestone

46. - Reported cond. 160 ft

47. Head approximately 50 ft. above sea.

48. Air lift

49. - pumping capacity 600 gall. per minute.

50. Amount actually pumped is about 350 gals per min.

51. Tests made by owner indicated that the water could be lowered by pumping 9 ft. but can not be lowered beyond that point.

52. -

53.

54.

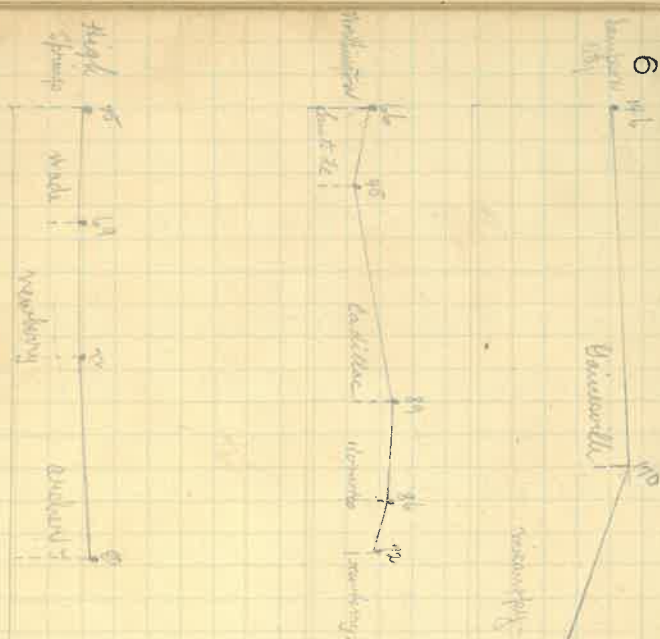
55.

56.

57. Surface location of well very unsanitary.

immediately surrounded by stable manure. Casing to the rock is supposed to keep out surface water. Probably, however, does not prevent surface water from following casing to the rock, and then seeping through to the well.

58. Used for ice manufacture



From Lawrenceville to Gainsville, 18.5 mi.
 Elevation of Lawrenceville 140 ft. above sea level.
 and Gainsville 100 ft. above sea level.
 From Lawrenceville to Gainsville, 18.5 mi.
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Well No. 2. of Gainsville area.

35. Amurion Oil and Chemical Co.
36. Gainsville, Alachua Co.
37. 1/2 mile south-west of post office.
38. W. F. Hamilton, Alcala, Fla.
39. 131 ft. above sea (Estimated from U.S. G.S. topographic map.)
40. Bored well.
41. 18.90
42. Jan.
- 43.
44. Depth of well 327 ft.
45. Limestone
46. Reported cased clamp 140 or 160 ft.
47. Head approximately 50 ft. above sea.
48. Air lift.
49. -
- 50.
51. Reported lowered by pump, not however exhausted or lowered beyond a definite level.

Well no. 3. of Gainsville area.

Surface elevation Est. 150 ft.
 Water stand from surface when completed 128 ft. or 52 ft. above sea
 this measurement made in very dry season.

Alochua and vicinity - Oct. 5 & 6.

1. Water supply of Alochua almost entirely from wells.
2. Chief source for domestic use wells. Some for stock, and for irrigation when practiced.
3. Range of depth of wells 40 to 225 ft.
4. -
5. Water is lime water.
6. Head of water apparently about 30 ft above sea.
7. Wells not exhausted by pumping.
8. Depth to rock very variable, a few to 200 ft.
9. Porous limestone.
10. No springs in area.
11. No public supply.
12. Soil sandy.
13. derived from clays, sands and limestone.
14. Good.
15. seepage.
16. Wells mostly tubular 2 to 6 in. 40 to 225 ft. deep.
17. lime water.
18. -
19. -
20. Wells reported to grow within a limit of about 4 ft. with extremes of seasonal variations.
21. General household and farm use.
- 22 to 34. No quarries in the area.
- Wells within the Alochua area.
- Not. -
35. S. M. Young.
36. Alochua, Alachua Co.
37. 1/2 mile south.
38. S. M. Young, Alachua.
39. Elevation.
40. 2 inch tubular well.

Notes - Alochua is located in an important cotton growing section. The soil is mostly a heavy sandy soil. The topography is rolling. The area is not elevated, being not more than 50 to 100 feet above sea. There are no streams or rivers in the immediate vicinity, and almost no crops or forests. The majority of the water is taken from the ground or from the water runs and into the ground at once, or through the operation of the seaboard in line. Depth of water in the well is 66 ft. (Well 274). Water in wells near the spot with a surface elevation estimated at 67 ft. is reported to stand 37 ft. from the surface or 30 ft. above sea. The water line is apparently constant for all the wells of the region.

Most likely the entire water supply for all purposes is taken from wells. There are a variety of small industry comparatively shallow. The water is found in a porous limestone and surface to find it at a distance level of 30 mostly so could be determined about 30 ft. above base level.

The city water system is not yet established. The water is not reported to be good. The water is mostly 2 in. above well, and entering the houses and getting a home water.

- 41.
- 42. 2 in. top and bottom
- 43. sand and rock
- 44. Total depth of well 85 ft.
- 45. Porous limestone
- 46.
- 47. Head 73 feet from surface
- 48. Steam pump
- 50. Not exhausted by pump. ✓

Well no. 2, Alochua,

- 35. F. E. Williams.
- 36. Alochua
- 37. 1/2 mile south of Post Office
- 38. S.W. Young, Alochua, Fla.
- 39. Elevated above sea (estimated) 65 feet.
- 40. drilled
- 41. 1905
- 42. 2 inch top & bottom
- 43. sand and rock
- 44. Total depth of well 60 ft.
- 45. porous limestone
- 46.
- 47. water reported to stand 37 feet from the surface or approximately 30 ft above sea.
- 48. Gasoline engine
- 50. House hold and farm use. ✓

Well no. 3, Alochua.

- 35. Alochua Ice Co.
- 36. Alochua Fla. Alochua Co.
- 37. 1/2 mile S.W. of Post Office
- 38. W. F. Hamilton, Alochua, Fla.
- 39. Elevated. estimated above sea. 70 ft.
- 40. bored.
- 41. 1904.
- 42. 6 in. top and bottom.
- 43. Ends in limestone
- 44. Total depth of well 216 ft.
- 45. Porous limestone
- 46.
- 47. water reported to stand 58 ft. 8 in from surface
- 48. Air lift
- 50. used for ice manufacture. ✓

Well no. 4. Alachua:

- 35. S. Porton
- 36. Alachua, Alachua Co.
- 37.
- 38. S. M. Youngs, Alachua.
- 39. Elevated
- 40. 2 in tubular, driven.
- 41.
- 42. 2 in top & bottom
- 43. Ends in rock
- 44. Total depth of well. 118 ft.
- 45. Porous limestone.
- 46.
- 47. head brings water to about 106 ft from surface
- 48. Household use. ^{49.} Lineal water.
- 58. Household use. ✓

Well no. 5 Alachua.

- 35. City of Alachua
- 36. Alachua Fla.
- 37. near.
- 38. S. M. Young, Alachua
- 39. located in the street.
- 40. Tubular
- 41.
- 42. 2 in.
- 43. Ends in rock
- 44. Total depth of well 40 ft.
- 45. Porous limestone.
- 46.
- 47. water stands 24 feet from surface. or approx-
imately 30 ft above sea.
- 48. Hand pump.
- 58. used for stock and general purposes. ✓

Well no. 6. Alachua.

- 35. J. M. Powell,
- 36. Alachua, Fla.
- 37.
- 38. S. M. Young, Alachua Fla.
- 40. tubular
- 42. 2 in top and bottom
- 44. Total depth of well, 40 ft.

43. Porous limestone
 47. water 26 ft. from surface.

well no. 7, Alochua,

35. Bell and Petit, Alochua, Fla.

36. Alochua,

37. near Fort Pierce.

38. S. W. Young.

40. tubular

42. 2 in top and bottom.

44. Total depth of well, 68 ft.

46. porous limestone.

47. water stands from surface, 28 ft. ✓

Starke, Fla., and vicinity. Oct. 12, 06

1. Surface well and deep wells.
2. For domestic use deep wells in the city. Shallow wells and springs in the surrounding country. Some for stock.
3. Surface well mostly very shallow. a few feet to 15 or 20 ft.; artesian wells 196 to 5-29 ft.
4. Lime water.
5. Two water horizons are found.
6. In the first the water rises to within 26 ft of the surface or 124 feet above sea level; in the 2nd or deeper horizon the water rises within 79 feet of the surface or 71 feet above sea level.
7. The wells so far as known are not exhaustible by pumping.
8. Limestone
9. Public supply from artesian well.
10. Sandy with clay subsail.
11. Sandy and clay.
12. Good
13. Surface
14. Many shallow dug and driven wells; a few deep bored wells.
15. Water from the deep wells is a lime water.
16. 22 to 24. No quarries within the Starke area.
17. wells in the Starke area.
18. No I. City of Starke
19. 35. Starke, Bradford Co.
20. 36. Two floors south of post office.
21. 37. Hughes & Co., Charleston, S.C.
22. 38. Elevation of well 130 ft.

Storke near the east line of Bradford Co is near the summit of a ridge extending north and south and has an elevation of 137 ft. (Antioch 8 A.L. from Bull. 274) The region is very flat notwithstanding its elevation. The soil is sandy, but underlain by clay subsoil. Surface water is not ordinarily obtained in abundance at a very shallow depth. For the country region such surface wells afford the chief supply. Drift is not practiced to any considerable extent. City water supply, secured by the city, is taken from a well 529 ft deep. The water is reported very satisfactory. Water for ice manufacture is taken from a well 1000 ft under the surface at a depth of 196 ft. There is a considerable difference between the head of water from the two regions. The water from the front lagoon stands 26 feet from the surface, while that of the second stands 79 feet from the surface.

They have found 3 1/2 miles north-west of Storke a fine water of good quality, reported also to be of some medicinal value.

40. Bored
41. 1902
42. 8 in. at top. 6 in. at bottom.
43. 1st 80 ft. sand etc. below that limestone.
44. Total depth of well. 529 ft. Principal supply from this depth. Lesser supply from above.
45. Limestone
46. Reported cased 80 ft. (and to rock).
47. water stands 78 ft from surface or 71 ft. above sea.
48. air lift
49. not affected by pumping
- 50.
- 51.
- 52.
- 53.
- 54.
- 55.
56. water apparently good slightly hard.
57. No evidence of pollution. Surrounding good.
58. City water supply.

Well no. 2 at Storke.

35. Storke Ice Co
36. Storke. Bradford Co.
37. 1/2 mi. east of Post Office
38. W. H. Hamilton, Acala. Fla.
39. Surface elevation approximately 150 feet above sea.
40. bored
41. 1906
42. 6 in top and bottom.
- 43.
44. Total depth 196 ft.
45. Limestone
47. water stands within 26 feet of the surface, or 12 ft. above sea level.
- 48.
49. 300,000 gallons per hour. (2)

Bellman 47 ft
open area.



51.

58. Used for ice Manufacture.

59.



Well No 3 of Storke Area.

35. Seaboard Air line R.R.

36. Storke, Bradford Co.

37. $\frac{1}{8}$ mi east of postoffice.

38.

39. Elevation approximately 100 above sea.

40. bed.

Spring at Stokes

64. Heilbrunn mineral water Co.
 65. Stokes, Bradford co. $5\frac{1}{2}$ miles North-west.
 66. Heilbrunn springs.
 67. Calcareous, odorless, tasteless.
 68.
 70. Analysis made by Henry Leffmann, M.D., Philadelphia, Pa. as follows: Grains per U.S. Gallon
- | | |
|--------------------------|-------|
| Sodium chloride | 2.08 |
| Sodium carbonate | 0.40 |
| Potassium carbonate | 0.20 |
| Potassium sulfate | 0.17 |
| Calcium carbonate | 5.13 |
| Magnesium carbonate | 0.20 |
| Ferrous carbonate | 0.33 |
| Silica | 1.57 |
| Nitrogen tetravanadate | 0.20 |
| Iron oxide and alumina | 0.92 |
| Dissolved oxygen | 11.70 |
| Dissolved carbon dioxide | 11.70 |
72. No mineral or other deposits around the spring.
 73. Reported not appreciably affected by venoms.
 74. Temperature 72° F.
 75. The stream is located in a flat woodland area and near a stream with yellow banks. During the rainy season the area around the spring is flooded from the overflow of the small river.
 77. Emerges as a boil through road.
 78. Unites with surface water to form stream.
 80. Used for household purposes, also offered for sale.
 82. Reported of medicinal value.
 83. Heilbrunn mineral spring water.
 86. Present improvements of spring consist of a cypress tank surrounding the spring & machinery near by for bottling.
 87. Additional bottling improvements are contemplated.

Storke. Public supplies.

88. Demand by the city.
89. Artesian well.
90. Reservoir
91. 40 000 gallons
92. Reservoir elevated above town and surface of well. $70 + 30 = 100$ ft.
93. Carried to distributing point by pipes.
94. Distributed by gravity.
95. 3 miles
96. 33 fire hydrants, 115 taps.
97. 115 families supplied.
98. Approximately $\frac{1}{2}$ of total population.
99. See pp. 21-22. well not.
100. Daily use about 35 000 gallons.
101. 70 000 gallons per hour.
102. Supply not appreciably affected by pumping.
103. Provision for connecting mains with direct pressure.
104. Water sufficient.
105. No restriction on use of water.
107. Sanitary conditions apparently good

Micanopy and vicinity Oct. 19-20 '08

1. Shallow wells; deep wells; cisterns, lakes.
2. For domestic use deep and shallow wells, and cisterns; for stock, wells and lakes. For irrigation mostly lakes.
3. Shallow wells 10 to 25 ft; deep wells 60 to 150 ft.
4. Deep wells, fine water.
5. Water stands 30 to 50 ft. from the surface depending upon the elevation; or approximately 70 feet above sea level.
6. Deep wells unaffected by pumping.
7. Depth to rock variable from a few to 30 or more feet.
8. Water found in porous and cavernous limestone.
9. Several small springs in the area reported to be sulphur springs.
10. No public supply of present.
11. Soils sandy.
- 12.
- 13.
- 14.
15. Transmission by siphon.
16. Wells driven or bored, from 2 to 6 in. in size. Depth 60 to 150 ft.
17. Fine water.
- 22 to 34. No Quarries.
35. Wells of the Micanopy area.
- Well no. 1.
35. J. L. Watkins.
36. Micanopy, Fla.
37. 2 mi S.E.
38. Brown Bros. Archers, Fla.
39. Elevation estimated 155 ft above sea.
40. 2 in well driven.
41. 18 9/16.
42. 2 in top and bottom.

43. Total depth of well 118 ft.
 44. Limestone
 45. -
 46. water stands 80 ft from surface; or
 about 75 feet above sea.
 47. Not affected by pumping.
 48. Household use. ✓

Well No. 2 of Micronophy area.

35. Montgomery
 36. Micronophy, Alachua Co.
 37. $2\frac{1}{4}$ miles N. W. Micronophy.
 38. Brown Brothers, Archer, Fla.
 39. Surface elevation, Est. U.S. top map
 100 ft above sea.

40.
 41.
 42.
 43. 3 in top and bottom.
 44. Total depth of well 91 ft.
 45. Limestone
 46. ^(reputed to)
 47. water stands about 65 ft. from surface.
 48.
 49. Not affected by pumping.
 50. Irrigation of grove. ✓

Well No. 3 of Micronophy area.

35. S. G. Gay and Co.
 36. Micronophy, Alachua Co.
 37. 3 blocks north.
 38.
 39. 100 ft. estimated above sea.
 40. 2 in diameter
 41.
 42. Top and bottom diameter 2 in.
 43. Total depth of well 60 ft.
 44.
 45. Limestone
 46. Hand pump. ✓

Well no. 4 of the Micronopy area.

35. C. E. Melton
36. Micronopy, Alachua Co. Fla.
37. $\frac{1}{2}$ mi. west
38. Dibble Ed Earnest
39. Surface elevation estimated 110 ft.
40. Bored.
- 41.
42. 5 $\frac{1}{2}$ inches top and bottom.
43. Total depth of well 151 ft.
44. Limestone
- 45.
- 46.
47. water stands 38 ft from the surface; or 72 feet above sea level.
- 48.
49. used as water supply for saw mill. ✓

Well No. 5, Micronopy area.

35. F. H. Clyatt
36. Clyatt Station $4\frac{1}{2}$ m. N.W. of Micronopy
37. H. D. Lewis, Gainesville, Fla.
38. ~~Surface~~ Surface elevation (Est.) 100 ft. above sea.
39. Driven.
40. 1896
41. 2 in. top & bottom.
42. 1st 20 ft. Soil and clay; limestone rock below 20 ft.
43. Total depth of well 55 ft.
44. Limestone
- 45.
- 46.
47. water stands 35 ft from surface; or 68 feet above sea.
48. Hand pump.
49. House hold use. ✓

Well No. 6 of the Micronopy area.

35. F. H. Clyatt
36. Clyatt Station $4\frac{1}{2}$ miles N.W. of Micronopy.
37. $4\frac{1}{2}$ m. N.W.
38. H. D. Lewis, Gainesville, Fla.
39. Surface elevation (estimated) 100 ft above sea. 35

40. dinner
 41. 1896
 42. 3 in top & bottom.
 43. Sand and clay for 62 ft. Limestone at 62 ft.
 44. Total depth of well slightly over 62 ft.
 45. Limestone
 46.
 47. water stands 32 ft of surface or 60 ft above sea.
 48.
 49. used for irrigation. ✓

Well No. 7. Miccosukee area.

35. T.H. Clyatt
 36. Clyatt Station $4\frac{1}{2}$ mi N.W. of Miccosukee
 37. 5 mi NW Miccosukee ($\frac{1}{2}$ mi W. Clyatt Station)
 38. Sumner Bros. High Springs, Fla.
 39. Elevation estimated 90 ft above sea.
 40. dinner
 41.
 42. 2 in top & bottom.
 43.
 44. Total depth of well 62 ft.
 45. Limestone
 46.
 47. water stands from surface 20 ft; or
 about 70 ft. above sea level. ✓

Well No. 8 of Miccosukee area.

- Well at Rochelle, 7 miles N.E. of Miccosukee.
 35. Atlantic Coast Line R.R.
 36. Rochelle, Alachua Co.
 37. 2 blocks north of post office.
 38. (Ball)
 39. Surface elevation 80 ft. above sea.
 40. Bored
 41.
 42.
 43.
 44. Limestone
 47. water ten feet from surface or
 70 feet above sea level.

48. Pumped by engine
 49.
 50. ✓

Well no. 9 of Miccosukee area.

35. F. M. Ramsey.
 36. Wacahoota, Alachua Co. Fla.
 37. $2\frac{1}{2}$ miles South-west of Wacahoota Station
 38. F. M. Ramsey, Wacahoota, Fla.
 39. In depression, about 65 ft above sea, limit of error in estimating level above sea not more than 5 ft.

40.
 41. 1903
 42. 4 in top & bottom
 43. Total depth of well 60 ft. Principal water supply from 5 ft.
 44. Water from a porous limestone.
 45. water stands 4 ft. from the surface or about 60 ft. above sea. Probable extreme limit of error in bottom above sea 5 ft.

46.
 47. yields 120 gallons per minute.
 48. water impregnated with lime & very slightly with sulphur.
 49. Irrigation. ✓

Well no. 10 of Miccosukee area.

35. F. M. Ramsey, Wacahoota, owner & digger.
 37. $2\frac{1}{2}$ miles S. W. Wacahoota Station, Alachua Co.
 39. Elevation above sea, probably 90 ft.
 41. 1900; 42. 4 in
 43. Sand and clay 14 ft. Rich 3 ft. Total depth 48 ft.
 44. Principal water supply 48 ft. 45. from a cavity.
 47. Water reported to stand 28 ft. from the surface. Probably about 62 to 65 ft. above sea.
 50. yields to pump 200 gal. per minute without being affected.
 51. Irrigation. ✓

[illegible]

Newberry, Colochua Co. & Vicinity.
Wells. Oct- 26 and 27 '08

Oct. 26 and 27, '06

1. Wells.
- 2.
3. 45 to 200 ft.
4. 50 to 60 ft.
5. Hard water.
6. Water level stands 36 to 46
7. Not exhausted by pumping
8. Exceedingly variable. 1 to 111 ft.
9. Limestone
10. No springs within the area.
11. No public supply, except street wells with pumps.
12. Soils sandy.
- 13.
14. Soils hold water well.
15. See page
16. Wells mostly 2 in driven, except in phosphate area
17. Hard water.
- 18.
19. No record of seasonal variations. (See well No.
- 20 to 34. No quarries.

Well no 1. Newberry area.

38. G.W. Livingston
36. Newberry, Blochua Co.
37. 1/2 mi NW. of Post Office
38. G.W. Livingston, Newberry, Fla.
39. Elevation about same or one or two feet above
+ S. Report, 72 ft. above sea A.C.B. levels!
40. driven
41. 1896
42. 2 in
43. Soil rock at 8 ft.
44. 55 ft.
45. limestone, water found in small cavity
46. water reported to stand 38 to 40 ft. from surface
47. }
48. Hand pump.
49. Not exhausted by pumping. ✓

Note - Type of well of Alachua Co. phosphate area

The wells used in working phosphate in the Alachua Co. phosphate area, ^{as made or better known}, consist of a pit from ten to 20 ft in diameter, the pit being either round or square, 12 ft deep to within about 3 or 4 ft of the ground water level of that locality. The pit is ^{usually} lined with boards, so as to form the entire distance through the workings, up to avoid covering or confining. In the bottom of the pit a boring, usually of 10 or 12 in. diameter is put down until a sufficient depth of water is obtained. The boring is ^{usually} ~~driven~~ ^{drilled} to the bottom of the pit and then brought to within a few feet of the water level. It is infrequently a second boring is put down in the same pit. This is done whenever it is desired to run two separate workings in the same well or usually not so deep, or only a short distance. The boring is left off. Both together it is unnecessary, ~~and~~ ^{and} the kind of soil, although soft, being sufficiently hard to pull up and because it is desired to allow the water to ~~settle~~ ^{settle} the entire length of the boring. The 10 or twelve inch boring ^{is used} ~~is used~~ ^{is used} for collecting ^{the} water from the water level to the bottom.

58. Household use.

Mr. G. Livingston has also a second well, at his house, depth 50 ft. otherwise entirely like the one described.

Well No. 2 of Newberry region

35. C. L. Mott
36. Newberry, Alachua Co.
37. 36 blocks north of post office
38. G. Livingston
39. about 4 ft higher than A.C.B. depot
40. driven
41. 18 99
42. 2 in.
43. limestone, no cavity found, ends in porous rock.
44. Total depth of well 113 ft.
45. limestone
- 46.
47. water reported to stand 40 ft from surface.
48. Gas engine
49. Not exhausted by pumping.
- 50.
- 51.
52. Household use

Well no. 3 of Newberry area.

35. Julia Gray
36. 2 blocks north
37. Newberry, Alachua Co. Fla.
38. Geo. Livingston, Newberry, Fla.
39. a few feet lower than depot, perhaps 3.
40. driven
41. 1906
42. 2 in.
43. 22 ft to rock. well ends in cavity.
44. Total depth 52 ft.
45. limestone, porous, ~~no~~ cavity.
46. Reported to stand 34 ft from surface
47. Gas engine
48. Not exhausted by pumping.
49. Household use

Note on variation of the ground water level in the Alachua Co phosphate area.

The table I well uniformly used in phosphate mining (see p. 43) is especially exceptional of the variability for observing changes in the ground water level. The pump is 25' in diameter (p. 43) and is put down in the shaft to within 3 or 4 ft. of the (average or top) ground water level. During the rainy season the water during the two or three months following the rainy season is not infrequently higher than that the water level used to the point of commencing the pump's activity. This is partly a result of water in the water level was confirmed by every phosphate operation - noted. The average annual variation is from 3 to 5 ft. The extremes of variation is 3 to 7 ft. It was reported by some or several of the mining companies that at this time examined to (Oct. 27). The water was high from the heavy season of the preceding spring and summer. It was reported that the water height of the well level came about three feet higher than the level of the water level about a foot or two higher, and the lowest water level about a foot or more.

Well No. 4 Newberry Area.

35. City of Newberry.
36. Newberry, Alachua Co.
37. 3 blocks south of postoffice.
38. Natural well formed by caving of limestone.
39. Elevation practically that of dept.
- 40.
41. — No record of time when formed, occurred before town was settled.
42. about 5 to 6 feet in diameter.
43. Soil about 5 ft. thick below 5 ft.
- 44.
- 45.
- 46.
- 47.
48. This well is reported to have contained water until ~~the~~ ^{some} years ago when it became dry and has been dry since.

Well no. 5 of the Newberry area.

35. Dan McKennon and Co.
36. Newberry, Alachua Co.
37. 6 mi. west of Newberry.
38. Geo. Livingston, Newberry, Fla.
39. —
40. Limestone.
- 41.
42. 2 in.
43. Rock (limestone) at 23 ft.; 6 ft. cavity at 96 ft.
44. Total depth 102 ft.
45. Limestone, 6 ft. cavity.
46. water reported to stand 32 ft. of surface.
- 47.
48. supply turpentine still.
49. Two other wells at some places, one 63 ft., one 78 ft. water 32 ft. from surface and otherwise as no 5.
- Well no. 6 of the Newberry area.
35. M. Langford.
36. Newberry, Alachua Co.
37. 6 miles west 1/2 north of Newberry.
38. G. Livingston, Newberry, Fla.

39.
40. driven
41.
42. 2 in
43. limestone rock at 96 ft.; 1st 96 ft of
clay and dark oily shale.
44. Total depth 102 ft.
45. cavernous limestone. 4 ft. cavity at bottom.
46.
47.

Well no 7. Newberry area. ✓

35.
36 Six miles west of Newberry. 1 1/2 mi N. W. of
37 Newberry, Alachua Co.
38. Geo. Livingston, Newberry, Fla.
39.
40.

41.
43. Phosphate at 80 ft. passed through ¹⁴⁸/₄₅ ft
of phosphate. well abandoned at 115 ft.

one hundred yards another well put down
gone rock at # 16 ft. well completed
at 42 ft. water stood at 27 ft.

Well no. 8 of Newberry area.

- 35 John McElmuel
36 Newberry, Alachua Co
37 1 mi. N. W. Newberry.
38. driven.
39.

40. Plug 39 ft. Bored. 80 ft.
41.

42. Plug part of well a pit, about 16 ft diam. bore 10 in.
43. Limestone rock from top to bottom.
44. Some water found at 38 ft. Principal supply
from cavity at 119 ft.
45. water in limestone.
46.
47. water stood Oct. 27 '06 at 38 ft from surface 47

48. Steam pump.

~~48~~ 800 gallons per minute does not appreciably affect the water level in well.

51. The extreme limits of seasonal variation is given by the owner as 8 ft between wet and dry seasons. About 5 ft as overage for ordinary seasonal variation.

58. Use phosphate manure.

60. Encrusts boiler with lime. ✓

Well no. 9 of Newberry area

35. John McFlannel.

36. Newberry, Alachua Co.

37. 1 mi west of Newberry.

38. Owner.

39.

40. dug: 38 ft. Bored 72 ft.

41.

42. Boring 10 in.

43.

44. approximately 40 ft some water chief supply at 110 ft.

45.

46. Limestone, from cor.

47.

48. water stands approximately 210 ft from surface.

49.

50. Steam

51.

52. not affected by pumping.

53.

54. Seasonal variation in water level of about 50 ft.

55.

56. Phosphate manure.

57.

58. Encrusts boiler. ✓

Well no. 10 of Newberry area.

35. C. H. Weston.

36. Newberry, Alachua Co. Fla.

37. 2 mi N. W. Newberry.

38.

39. Owner.

40.

41. Well dug 38 ft. bored 85 ft.

42.

43. Boring 12 in.

44.

45. Limestone rock

46.

47. Some water at 37 ft. Principal supply from cavity at 123 ft. ✓

45. water from limestone
 46.
 47. water stands 37 ft from surface.
 48. steam pump
 49. 1st. affected by pumping, 200,000 per day
 50. Given or estimate of amount pumped.
 51. Seasonal variation of 5 to 8 ft.
 52. used for washing phosphate.
 60. Corrodes boiler. Eminent boiler. ✓

Well no 11 of Newbury area.

35. to 63.
 This well is in same pit as lost, is also 12 in bore, details as no. 10, except in regard to depth; This well boring having encountered a sufficient cavity at 65 ft. a total depth of 103 ft.

Well no. 12 of Newbury area.

Well $\frac{1}{2}$ mi. N. of no. 10. Pit 36 ft. Boring 90 ft. Total depth 126 ft. Ends in cavity. Seasonal variation 7 to 8 ft or more. Average 4 to 6 water stands from surface 37 to 38 ft.

Well no. 13 of Newbury area.

a second 12 in well in same pit as No. 12. entering a cavity at 75 ft. total depth 111 ft. otherwise as No. 12.

Well no. 14 of Newbury area.

33. Currymora Lumber Co.
 36. Clark, Fla.
 37. 1 mi west of Clark.
 38. Crown.
 39.
 40. dug 44 ft; Bored 62 ft.
 41. 1906.
 42. Limestone.
 43. Boring 12 in.
 44. Some water at 47 ft and below. Principal supply at 108 ft.
 45. Limestone. water from cavity.
 47. water reported to stand 47 ft from surface

48. Steam pump.
 50. Amt. pumped per day estimated at
 200,000 gallons.
 58. Washing phosphate.
 60. ~~See~~ Engines to boilers.

Well no. 15 of Newberry Area.

35. L. W. Norfolk
 36. Newberry, Alachua Co.
 37. 4 mi N.W. of Newberry.
 38.

39. dug 47 ft. bored

40. Boring 12 in. 163 ft.

41. clay. Phosphate 200 ft. then sand.

42. Insufficient supply of water obtained.

Wells 8 to 10 are given as examples of wells supplying water for phosphate mining purposes. Many other wells are found in the phosphate area. There is great uniformity in the records of all the wells of the area.

Well no. 16 of Newberry area.

35. Wilcox Chemical Co.
 36. Wilcox, Fla. Alachua Co.
 37. 2 1/2 miles west of Newberry, near Wilcox post office.
 38. Geo. Livingston, Newberry, Fla.
 39.
 40. Bored.
 41. 1906.
 42. 7 in.
 43. 12 ft. sand and clay, limestone rock at 12 ft.
 44. Some water at 25 ft. Principal supply from cavity at 49 ft.
 45. Limestone
 46.
 47. water stood 25 ft from surface.
 48. Steam pump.
 49.
 50. not Exhausted by pumping.
 58. used to supply plant for distillation of turpentine

The following additional wells of the Newberry area may be noted here.

35. T. C. Sweeney; 36. Kankakee, Alcona Co. 37. Near Station; 38. F. M. Ramsey, Kankakee, Ill.; 39. Elkhart, 87 ft above sea; 40. 6 in. 41. 3 in. top 4 ft bottom; 42. Total depth 85 ft. 43. Limestone; 44. Water up to 5 ft above surface or 5 ft above sea; 45. Steam pump; 46. 47. water up to 4 ft and below, Principal supply from cavity in limestone at 88 ft. 48. Limestone; 49. water up to 4 ft and below, Principal supply from cavity in limestone at 88 ft. 50. Limestone; 51. 1904; 52. 4 in. 53. Sand 40 ft; Phosphate 44 ft; Limestone 4 ft. 54. Some water at 4 ft and below, Principal supply from cavity in limestone at 88 ft. 55. Limestone; 56. 4 in. 57. water up to 4 ft and below, Principal supply from cavity in limestone at 88 ft. 58. Steam pump; 59. Used to supply lumber mill.

well no. 17 of the Newberry area

35. Tyler Lumber Co.
36. Tyler, Alcona Co., Ill.
37. Near Tyler post office, 10 miles west of Newberry
38. Geo. Livingston, Newberry, Ill.
39. 6 in.
40. 1904
41. 4 in.
42. Sand 40 ft; Phosphate 44 ft; Limestone 4 ft.
43. Some water at 4 ft and below, Principal supply from cavity in limestone at 88 ft.
44. Limestone
45. 4 in.
46. water up to 4 ft and below, Principal supply from cavity in limestone at 88 ft.
47. Steam pump.
48. Used to supply lumber mill.

No. 18 of Newberry area.

35. Tyler Lumber Co.
36. Tyler Alcona Co. about 10 miles west of Newberry
37. Near Tyler
38. Geo. Livingston
39. 6 in.
40. material penetrated sand & until pipe was crushed, no rock found.
41. Some water found from 4 ft. and below. Supply not sufficient & no for foundation to support casing.

No. 19 of Newberry area.

- 2 in. well at Tyler for the Tyler Lumber Co. obtained water from cavity in limestone at 88 ft. 5 in. well.

No. 20 of Newberry area.

- Tyler Lumber Co. Tyler, 2 in. well. 87 ft to rock. 100 ft. solid rock, then cased a 10 ft cavity supplying an abundance of water. Total depth of well thus 197 ft. water stands 4 ft of top, completed 1904.

Well no. 21 of Newberry area.

- 35. S. Bailey
- 36. Judson, near Judson, bet in Alachua Co.
- 37. 12 mi South-west of Newberry, bet near Judson.
- 38. W. Livingston, Newberry, Fla.
- 39. Well driven 138 ft. no rock found and well abandoned.

Well no. 22 of Newberry area.

- 35. Riley and Underston
- 36. Wades, Alachua Co
- 37. 6 mi. north of Newberry, near Wades station.
- 38. W. Livingston, Newberry, Fla.
- 39. Elevation ~~67~~ from a.e.l. level. 69 ft.
- 40. driven
- 42. 2 in.
- 44. Total depth 55 ft
- 45. Limestone
- 47. water reported to stand about 38 ft from surface
- 48. windmill.
- 50. Household use.

Well no 23, of Newberry area.

- 35. G. H. Flemming
- 36. Archer, Fla.
- 37. 2 blocks north of post office.
- 38. a natural well
- 39. Elevation estimated as 4 ft. above depot, or 84 ft.
- 40. a natural well, formed by caving of limestone.
- 41. Well used since town was settled.
- 42. Well nearly circular, diameter about 8 ft.
- 43. 7 ft. soil. Limestone rock to bottom.
- 44.
- 45. Limestone
- 47. water stood Oct 26 '06 28 ft. 9 in from the surface.
- 50. Household use.

Many driven wells occur at Archer. No definite record. They are on a rule 50 to 150 ft. deep. all obtain living water. The water level is uniform for all the wells at approximately 55 ft. above sea, or 20 to 25 ft. from the surface depending upon surface elevation.

abandoned phosphate pit.

Well No. 24 of the Newberry Area, Dec. 12 '06.

35. Union phosphate co.

36. Tiogo, Alachua co.

37

38

40. 10 in. well

47. water stands 45 ft from the surface.

Lake Butler, Fla., Bradford Co.

Examined Nov. 3. 06

1. Wells, cisterns.
 2. Wells for domestic use and for stock, mostly
 3. Wells practically all shallow, a few to 25 or 30 ft.
 4. Surface water usually soft.
 5. Hard of surface water varies entirely with the seasons.
 6. Soils sandy with clay subsoil.
 - 13.-
 14. Hard water persistently.
- 22 to 37. No quarries within the area.

Jacksonville, Duval County.

Nov. 9, 10, & 11, '06

1. Artesian wells.
3. 550 ft. to 800 ft.
4. 550 to 650 ft.
5. Hard sulphur water.
6. Reported 6 ft. above sea level.
7. Some rock from the surface.
- 8.
- 9.
10. Public supplies see below.

Wells of Jacksonville.

35. City of Jacksonville
36. Jacksonville, Fla.
37. at City water works about six blocks north and two east of post office.
38. Elevation low, 5 to 10 ft above sea level.
39. Bored.
40. 1899.
- 41.
- 42.

43. material penetrated - Detailed section as supplied by the Superintendent of the City water works, R. N. Ellis. In order to obtain the record and samples the well was bored first as a six inch well and afterwards realigned out to 10 inches.

Scale of section 1 cm. = 10 ft.

	15 ft. { Surface fill	143	clay and sand, 13 ft. very dark and compact
15			
	Gravel band of 19 ft. various colors from gray to red.		
34	14. Quartz gravel.		
40	5 ft. Yellowish sand with	61 ft	clay with sand
44	4 ft. water bearing gravel		
	7 ft. Gray sand		
53	5 ft. clay with thin layers of rock.		
58			
	Blue clay with 23 ft. block gravel imbedded.	204	
81			
	8 ft. Blue clay with block gravel.		
89			
94	5 ft. Rock.		
100	6 ft. Blue clay with small block gravel.		
	Blue clay with 30 ft. Quartz sand and very fine block gravel.	250	
130		262	
		273	

	Sandy block clay 14 ft. some in fine block with some worked sand.		Sandy clay with gravel, shrapnel and sticky clay, 27 ft. and some rock nodules.
287	2 ft. sand with 1 ft. shell rock 4 ft. white clay	470	4 ft. rock.
	4 ft. sand with some clay.		
298	Compact sandy 16 ft. clay with streaks of nearly pure clay.	480	9 ft. very fine sandy clay.
314	5 ft. Shells in sand and clay.	487	7 ft. Sandy clay.
319	Shells also some 10 ft. scraps of four beds.	492	5 ft. Boulder rock in blue clay, 1 ft. flow of water.
329	1 ft. Coquina	496	1 ft. Blue clay.
			2 ft. white clay.
	Sandy clay and 20 ft. blue clay with sand.	504	5 ft. Brownish wch.
350		510	6 ft. very hard compact rock.
359	8 ft. Sticky blue clay, very little sand.	519	9 ft. Soft white wch.
365	7 ft. clay with block gravel.	524	Hard compact rock.
	2 ft. Blue clay		5 ft. Bluish. (like 504-510)
	1 ft. shell corals.		
375	7 ft. white clay with gravel.		
	10 ft. white clay with very little sand.		
385	5 ft. slightly colored clay.		
390	10 ft. clay greenish with pebbles & nodules.		
400	10 ft. Sandy clay		
410	18 ft. Sticky clay.		
428	6 ft. nearly pure clay, a little sand.		
434	9 ft. nearly pure clay light colored when dry.		
443		624	

An increased flow of 203 ft. water is obtained of upon beaking each compact layer.

alternate hard and soft strata of grayish rock, supplying water.

Flow of this strata will million gallons per day.

865

white rock with red and brown layers. The variegated layers 17 to 3 ft. 65 ft. in thickness. Increased flow of water in rock soft rock.

727

Brownish rock. Quite compact. no water.

55 ft.

930

935

5 ft. very hard brown rock.

Soft brownish rock with 35 ft. hard strata. flow of water increases with each hard stratum.

970

980

10 ft. Rock more compact. No water.

Flow at 980 ft. 2 millions gals. per minute.

Public water supply of Jacksonville.

88. City of Jacksonville
89. Artesian water.
90. Distributed by direct pressure, also a small reservoir.
- 91.
94. Direct pressure.
95. About 54 miles of mains (in 1906).
96. No. of taps (1906) about 4800; no. of fire hydrants about 550.
97. People supplied 1906 about 30,000.
98. About 75% of total population.
99. The supply is afforded by six flowing wells, for detailed section see above.
100. Daily use for 1905, 2,800,000 gals.
101. Maximum capacity of pumps 12,500,000 gallons daily.
104. Water sufficient for present demand.
105. Customers use meter, otherwise no restriction.
- 106.-
- 107.
108. Analysis supplied by the superintendent of the city water works. Analysis made by Albert Leeds, Stephens Institute of Technology. Sample of water as delivered at the tap. May 19, 1898.

Grains per U.S. Gallon.

Silica and insoluble matter	0.729
Alumina	0.047
Carbonate of lime	3.866
Sulphate of lime	4.053
Sulphate of magnesia	2.927
Sulphate of soda	5.843
Chlorides of soda	4.811

In parts per million.

Free ammonia	0.143
albuminoid ammonia	0.0044

22.276

35. American Suburban Corporation
of Norfolk, Va.
36. Jacksonville, Duval County.
37. 2 mi west $\frac{1}{2}$ mi north of Jacksonville P.O.
38. Hugh Partridge, 34 Eighth St. Jacksonville.
39. Section in depression
40. Bored
41. 1906
42. 6 in.
43. Sed. 40 ft; rock 40 ft. Blue clays etc.
variegated. a gray rock at 400 ft.
a white limestone at 525 ft.
44. water 525 to 600 ft. Principal supply 550 ft.
total depth of well 657 ft.
45. Head not determined, probably

35. Atlantic Coast Line R.R.
36. Jacksonville, Fla. Duval Co.
37. 2 mi west of P.O. on A.C.L. R.R.

41. 1906
42. 6 in.

46. cored 400 ft.

