



CONTENTS

	Page
Letter of transmittal	
Explanation	
Acknowledgements	
Arkansas County	
1. La Grue Spring.....	1
2. Cold Spring.....	1
Baxter County	
3. Cotter Spring	1
4. Hogan Spring	1
5. Lithia Spring	1
6. Big Spring	2
Benton County	
7. Siloam Springs	2
8. Springtown Spring	3
9. Little Clifty Creek Spring	4
10. Diamond Spring	4
11. Esculapia Springs	5
12. Silver Spring	6
13. Frisco Spring	6
14. Prairie Creek Spring	7
15. Silver Springs	7
16. Bath Rock Spring	7
17. Mossy Spring	7
18. Rogers Springs	8
19. Pump Spring	8
20. Diamond Spring	9
21. Electric Spring	9
22. Lono Spring	10
23. Decatur Spring	10
24. Frisco Spring	12
25. Cave Spring	12
26. Jefferson Spring	12
27. Park Springs	12
28. Bentonville Springs	12
29. Garfield Spring	13
30. Bayan Spring	14
31. Spanish Treasure Spring	14
32. Sulphur Spring	14
33. Box Spring	15
34. Chambers Spring	15
Boone County	
35. Valley Springs	15

CONTENTS
(Continued)

	Page
36. Sulphur Spring	16
37. Fodder Stack Spring	17
38. Beauty Spring	18
39. Mitchell Springs	18
40. Twin Springs	19
41. Marble Falls Spring	19
42. Elixir Spring	19
43. Leag's Mineral Springs	20
44. Sulphur Springs	21
45. Blue Springs	21
Calhoun County	
46. Holderness Spring	21
47. Hopeville Spring	21
48. Dr. W. A. Thomas's Mineral Spring	22
Carroll County	
49. Poison Spring	22
50. Berryville Spring	22
51. Bunch Spring	22
52. Davis Spring	22
53. Eureka Springs	23
54. Ozark Spring	26
55. Blue Spring	27
Clark County	
56. State Salt Spring	27
57. State Salt Spring	28
58. State Salt Spring	28
59. State Salt Spring	28
60. State Salt Spring	28
61. Saline Spring	28
62. Davidson's Camp Ground Spring	29
63. Mineral Springs	29
64. Whelen Springs	29
Cleburne County	
65. Quitman Spring	29
66. Sugar Loaf Spring (Arsenic	29
67. Black Sulphur Spring	31
68. Red Sulphur Spring	32
69. Eye Spring	32
70. White Sulphur Spring	33
71. Chalybeate Spring	34
72. Pearson Spring	35
Cleveland County	
73. Gum Springs	36

CONTENTS
(Continued)

	Page
Columbia County	
74. Macedonia Spring	36
Conway County	
75. Stillman Spring	36
76. Springfield Town Spring	36
Crawford County	
77. Quesenbury and Ferring Springs	37
78. Dean Springs	37
79. Fine Springs	37
80. Stewart Spring	37
81. Oliver Spring	37
82. Dripping Springs	37
83. Mulberry Spring	38
84. Shepherd Spring	38
85. Mineral Springs	38
86. State Salt Spring	38
87. Winfrey Spring	38
88. Locke Spring	38
89. Cold Spring	39
90. Saline Spring	39
Dallas County	
91. Mattocks Spring	39
Faulkner County	
92. Riggins Spring	40
93. Pinnacle Spring	40
Franklin County	
94. Manitou Spring	40
95. Watalula Spring	41
96. State Salt Spring	41
97. Fern Spring	42
98. Chalybeate Spring	42
Fulton County	
99. Mammoth Spring	42
Garland County	
100. Hot Springs	43
101. Mountain Valley Spring	45
102. Grandma Chase's Springs	46
103. McLendon Health Spring	47
104. Big Chalybeate Spring	48
105. Red Chalybeate Spring	49
106. Gillen's White Sulphur Spring	50
107. Blanco Spring	51
108. Crystal Springs	52

CONTENTS
(Continued)

	Page
109. Potash Sulphur Springs	52
110. Sour Rock Spring	54
111. Three Sisters Springs	55
112. Happy Hollow	55
113. Happy Hollow Chalybeate	56
114. Sleepy Water	58
115. De Soto Spring	58
116. Lithox Spring	58
117. Radio Magnesia Springs	59
118. Long Spring	60
119. Sulphur Spring	61
120. Lithia Springs	61
121. Dyke Spring	62
Hot Spring County	
122. Sulphur Springs	62
123. Chalybeate Springs	62
124. Dove Park Spring-No. 1	62
125. Dove Park Spring-No. 2	64
126. Dove Park Spring-No. 3	64
127. Dove Park Spring-No. 4	65
128. Fairchild Springs	66
Howard County	
129. Baker Springs	67
130. Baker's Sulphur Spring	67
131. Mineral Spring	67
Independence County	
132. Starnes No. 1 Spring	68
133. Starnes No. 2 Spring	69
134. Old Robert Morris Spring	70
135. Earnheart Spring	70
136. Walden Spring	70
137. Big Spring	71
138. Ferrell Cave Spring	71
Izard County	
139. Blowing Spring	71
140. Prim Spring	71
141. Melbourne (Wideman) Spring	71
142. Huron Spring	72
Jackson County	
143. Ross Spring	72
144. Grandglaise Spring	72
Little River County	

CONTENTS
(Continued)

	Page
145. Salt Spring	72
146. Big Springs	72
147. King's Spring	73
148. State Salt Springs	73
Logan County	
149. Magazine Spring	73
150. Gray's Spring	74
151. National Spring	75
Lonoke County	
152. Sandhill Spring	76
153. Camp Ground Spring	76
154. Quapaw Mineral Springs	77
155. Mountain Spring	77
Madison County	
156. Phelon's Spring	79
157. Denny's Spring (Horsetheif)	79
158. Town Spring	79
159. Withrow Spring	79
Marion County	
160. De Soto Spring	79
161. Intermittent Spring	80
162. Saltpeter Cave Spring	80
163. Stonewall Spring	80
164. Jackson Spring	80
165. Tutt & Everette Spring	81
166. Kingdon Springs	81
167. Greaver Spring	81
168. Marble Falls Spring	81
169. Crank's Spring	82
Montgomery County	
170. Black Spring	82
171. Cox Spring	82
172. Witherspoon Springs	82
173. North Spring	83
174. South Spring	84
175. Hot Spring	84
176. Warm Spring	84
177. Mattock Spring	85
178. Wisenaut Chalybeate Spring	85
179. Chalybeate Spring	85
180. Iron's Sulphur Spring	86
181. Collier Spring	86
Nevada County	

CONTENTS
(Continued)

	Page
182. Judge Hubbard's Spring	86
Newton County	
183. Spanish Piano Spring	87
184. R. L. Syerfield Spring	87
185. Edgemond Spring	87
186. Saltpeter	87
187. Tom Thumb Spring	87
Ouachita County	
188. Alum Spring	89
189. Poison Spring	89
Phillips County	
190. Big Spring	89
Pike County	
191. Hopper Spring	90
192. Royston Spring	90
Poinsett County	
193. Dr. Patten's Spring	90
Polk County	
194. Tannahill Spring	91
195. Bethesda Springs	91
196. Janssen Park Spring	92
197. Dallas Town Spring	93
198. Abernathy Spring	93
199. Mine Creek Spring	93
200. Silver World Tunnel Spring	94
201. Blalock Springs	94
202. Bard Spring	95
203. Cold Spring	95
204. Gilham Spring	95
205. Bog Springs	95
206. Tyra Springs	96
207. Gray's Spring	96
Pope County	
208. Gip Spring	96
209. State Salt Springs	96
210. State Salt Springs	97
211. Caglesville Spring	97
212. Shouse Spring	97
Pulaski County	
213. Sterling Spring	97
214. Worthen Spring	97
215. Boule Spring	98
216. Exchange Spring	98

CONTENTS
(Continued)

	Page
217. Fones Spring	98
218. Gum Spring	98
219. Cascade Spring	99
220. Radiant Springs	99
221. Raleigh Spring	99
222. Granite Mountain Spring	100
223. Hernando Spring	100
224. Hominy Hill Spring	100
225. New Spring	101
226. Watkins Springs	102
227. Newton Spring (Purdom)	103
228. Ravenden Springs	103
229. Rice's Spring	103
230. Elm Spring	104
231. Maynard Spring	104
232. Cox's Alum Spring	105
233. Chalybeate Hill Spring	105
234. Poteau Spring	105
235. Wittsburg Spring	106
236. Campbell Spring	106
237. Kimes Spring	106
238. Landis Spring	106
239. Pruitts Spring	106
240. Blowing Cave Spring	107
241. Zach Spring	107
Servier County	
242. Salt Spring	107
243. State Salt Spring	107
244. State Salt Spring	107
245. Walnut Springs	108
246. Norwoodville Spring	108
247. State Salt Spring	108
248. State Salt Spring	108
249. State Salt Spring	108
250. State Salt Spring	109
251. Walnut Spring	109
252. State Salt Spring	109
Sharp County	
253. Evening Shade	109
Stone County	
254. Bon Air (Chalybeate) Spring	109
255. Sulphur Spring	111
256. Lithia Spring	111

CONTENTS
(Continued)

	Page
257. Big Spring	111
258. Mountain View Springs	111
Union County	
259. Blanchard Spring	111
Van Buren County	
260. State Salt Spring	111
261. Choctaw Spring	112
262. Sugar Loaf Springs	112
263. Rock House Spring	112
Washington County	
264. Morrow's Spring	112
265. Sulphur City Spring	113
266. J. P. Neal Spring	113
267. Fayetteville Spring	113
268. William's Spring	113
269. Cato's Spring	114
270. Lewis Spring	114
271. Blue Water Spring	114
272. Johnson's Spring (Big Spring)	114
273. Air Spring	114
274. Springdale Spring No. 1	115
275. Springdale Spring No. 2	115
276. Shiloah Springs	115
277. Elm Springs	116
278. Sulphur Spring	117
279. Kuykendall Spring	117
280. Sulphur Spring	117
White County	
281. Essex Spring	118
282. Beebe Spring	118
283. Elliott Spring	118
284. Griffin Spring	118
285. Searcy Sulphur Spring	119
286. Griffin Spring	120
287. Armstrong Spring	121
288. Bradford Spring	122
289. Mineral Spring	122
Yell County	
290. Chikalah Spring	123
291. Sulphur Spring	123
292. Chalybeate Spring	123
293. North Dickens	123

CONTENTS
(Continued)

	Page
294. South Dickens Spring	124
295. Darling Spring	126
296. Gum Spring	126

KNOWN SPRINGS OF LARGE VOLUME IN ARKANSAS

County	Name of Spring	Area	Sec.	Twp.	Rte.	Est. Flow Gallons per day	Owner	Date of Source	Location	
									City or View	City or View
Stone	Mountain View Spring	Mountain View, Arkansas	5	15N	11W	3,024,000	City of Mt. View	1937		
Stone	Blanchard Spring	Osark Nat. Forest	5	15N	11W	2,180,000	"	1937		
Stone	Livingston Creek Spring	"	26	16N	11W	4,320,000	"	1937		
Stone	Gayna Spring	"	2	15N	13W	2,880,000	"	1937		
Washington	Johnson's Spring	Johnson, Ark.	15	17N	9W	1,440,000	"	1891		
Carroll	Blue Spring	"	26	21N	27W	2,745,967	"			
Fulton	Mammoth Spring	Mammoth Spgs	8	21N	5W	2,594,000,000	Boy F. Parkhill	1937		
						160,000,000	Tales, Okla			
							City of Mammoth Springs			

STATE OF ARKANSAS
ARKANSAS GEOLOGICAL SURVEY

George C. Branner
State Geologist

DATA ON SPRINGS IN ARKANSAS

Compiled Under the Direction
of

George C. Branner
State Geologist

LITTLE ROCK
1937

ARKANSAS COUNTY

No. 1

LA GRUE SPRINGS

Sec. 35, T. 5 S., R. 2 W., 10 miles southeast of De Witt. La Grue Springs have a large flow and the water is used for medicinal purposes. ~~W. Maxwell, County Surveyor, states~~ that on the western border of the county, along Big Bayou Meto, springs are very few, whereas on the east side, along the tributaries of White River, they are numerous. Elev. 170 feet (approximately). (U. S. G. S. P 46)

No. 2

COLD SPRING

Sec. 1, T. 5 S., R. 2 W., 10 miles east of De Witt. Cold Spring has a large flow. Elev. 170 feet. (U. S. G. S. P 46)

BAXTER COUNTY

No 3

COTTER SPRING

Sec. 1, T. 18 N., 15 W., at Cotter. This spring bursts from the banks of White River and is said to be one of the largest springs in the state. It is a miniature Mammoth Spring. The water is limpid and ice cold. Elev. 440.8 feet. (Arkansas Ozarks, p. 28)

No. 4

HOGAN SPRING

S $\frac{1}{2}$, Sec. 9, T. 19 N., R. 13 W., near Mountain Home. There is a fish rearing pond near by; the vicinity is used by sportsmen for camping. Elev. 809 feet. (Where to go in the Ozarks, p. 72)

No. 5

LITHIA SPRING

SW $\frac{1}{4}$, Sec. 28, T. 19 N., R. 14 W., near Gassville. This is one of the few Lithia springs in Arkansas. Dr. B. F. Denton reports its discharge as 4,320 gallons per day. For over half

BAXTER COUNTY

a century people have been visiting this spring for the benefit of its health-giving waters. It is on Highway 126. Elev. 720 feet (approximately). *

Analysis of Water

Constituents	Grains per U.S. gallon	Per cent of total solids
Chloride of Soda -----	4.000	16.25
Bicarbonate of Iron -----	1.100	4.47
Bicarbonate of Lithia -----	2.130	8.66
Sulphate of Magnesia -----	.832	3.38
Sulphate of Lime (sol.) -----	.320	1.30
Sulphate of Alumina -----	9.873	40.10
Sulphate of Zinc -----	5.112	20.77
Phosphate of Soda -----	1.246	5.07
Total -----	24.613	100.00

The above analysis is reported to have been made by Drs. R. J. Leonard and B. F. Denton of Louisville and St. Louis. (A. G. S. Rept., 1891, vol. 1, p. 61)

No. 6

BIG SPRING.

NW $\frac{1}{4}$, Sec. 3, T. 20 N., R. 14 W., 1 mile south of State Highway 5, 14 miles south of Gainsville, Mo. This spring issues from a cave owned by Gus Shade, it has a large flow and drains into Mountain Creek. It is also called Jenkins Cave Spring. Elev. about 1096 feet. (Information furnished by Zella Trumbo, Three Brothers, Ark.)

BENTON COUNTY

No. 7

SILLOAM SPRINGS

Sec. 6, T. 17 N., R. 33 W. These springs furnish the municipal water supply for the town of Siloam Springs. The water has no treatment. Discharge 375,000 gallons per day. Elev. 1105 feet. (Univ. of Ark. B 2, Hale)✓

BENTON COUNTY

Analysis of Water

Sample was submitted by Harrison Hale, Jr., Nov. 11, 1925. Condition: Turbidity, Color and Odor, none.

Determination

	Parts per million
Silica SiO_2 -----	20.90
Oxides of Iron and Alumi- num Fe_2O_3 - Al_2O_3 -----	2.30
Magnesium Mg -----	1.74
Calcium Ca -----	14.31
Sodium Na -----	2.24
Chloride Cl -----	3.44
Sulfate SO_4 -----	7.16
Alkalinity	
Methyl Orange -----	23.71
Phenolphthalein -----	0.00
Total Dissolved Solids --	77.50

Hypothetical Combination

	Parts per million	Grains per gallon
Silica SiO_2 -----	20.90	1.22
Oxides of Iron and Aluminum Fe_2O_3 - Al_2O_3 -----	2.30	0.13
Magnesium Sulfate MgSO_4 -----	8.62	0.50
Calcium Sulfate CaSO_4 -----	.40	0.02
Calcium Carbonate CaCO_3 -----	35.03	2.04
Sodium Chloride NaCl -----	5.68	0.33
	72.93	4.24
Total Hardness -----	42.49	2.48
Pounds of Scale per 1000 gallons -----		0.565
Pounds of Hard Scale per 1000 gallons -----		0.283
Coefficient of Scale Hardness -----		0.50

This water is of low mineral content, forming little medium scale.

No. 8

SPRINGTOWN SPRING

Sec. 8, T. 18 N., R. 32 W., 100 yards from Highway 12. Very fine spring and gives name to town. Elev. 1259 feet. (Where to go in the Ozarks, p. 115)

BELLA VISTA SPRING.

This spring was shown on maps of 35 years ago as "Cave Spring", but is 12 miles due north of what is now known as "Cave Springs" in the unincorporated town of Cave Springs, Benton County.

Bella Vista Spring rises almost in the center of the SE quarter of 1-20N-31W about one-half mile east of Sugar Creek, 4 miles north and 1 mile west of Bentonville. It issues from a low cave in a limestone bluff about 15 feet above the floor of the small valley leading away from the bluff. I have been back in this cave as far as was possible which was less than one-quarter mile. It was necessary to go much of the way on hands and knees in running water and to climb over and down several rock falls. The last of these made access to the last room of the cave difficult and dangerous as the entrance was closed except for a very small opening in a mass of loose rocks.

It appeared that some of the rock falls left a small amount of rock for a roof, and much water entered after heavy rains.

No stalactites and stalagmites of large size were found and the roof, walls, and floor were of limestone except in a few places where the stream banks were of clay.

This spring has supplied, through hydraulic rams which lift the water more than 200 feet to reservoirs, a summer population of 5000 people. The excess water has supplied a swimming pool 80 x 170 feet with a complete change of water each day.

A strong air current of nearly constant temperature issues from the cave. This temperature April 27, 1938 was 63°F. when outside air in the shade was 72°F.

The water is moderately hard and the temperature as it issued from the cave on the above date was 54°F.

Air and water temperatures are nearly constant throughout the year.

Dane M. Greer,
Supervisor, Benton County,
State Mineral Survey

April 27, 1938

BENTON COUNTY

No. 9

LITTLE CLIFTY CREEK SPRING

Sec. 17, T. 19 N., R. 27 W., on east prong of Little Clifty Creek. This spring emerges from the base of the Boone Chert. Elev. 1000 feet (approximately). (A. G. S. Ann. Rept. 1891, vol. 1, p. 114)

No. 10

DIAMOND SPRING

Sec. 8, T. 19 N., R. 29 W., 1 mile east of Rogers. This spring is large and clear with sparkling water emerging from the Boone chert. Elev. 1390 (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.52	3.80
Chloride of Soda NaCl -----	.01	.07
Carbonate of Lime CaCO_3 -----	13.12	95.96
Carbonate of Iron FeCO_3 -----	.02	.15
Sulphate of Magnesia MgSO_4 --	.003	.02
Total -----	<u>13.673</u>	<u>100.00</u>

Found.

Silica SiO_2 -----	.52	3.80
Sodium Na -----	.005	.04
Magnesium Mg -----	.006	.04
Calcium Ca -----	5.25	38.38
Iron Fe -----	.01	.07
Sulphuric Acid SO_4 -----	.002	.02
Carbonic Acid CO_3 -----	7.88	57.61
Chlorine Cl -----	.006	.04
Total -----	<u>13.679</u>	<u>100.00</u>

Water collected by assistant T. C. Hopkins.

Analysis by A. E. Menke.

Temperature of air, 29.3° F. (-1.5° C.) of water, 57.2° F. (14° C.)

Total solids in solution, 11.66 grains per U. S. gallon.
(A. G. S. Rept., 1891, vol. 1, p. 35)

BENTON COUNTY

No. 11

ESCULAPIA SPRINGS

SE $\frac{1}{4}$, Sec. 16, T. 19 N., R. 29 W., 3 miles from Rogers.
 These spring are noted for their medicinal properties.
 There are two of the springs, (walled in with cut limestone).
 They occur in the Boone chert formation at the base of the
 Lower Carboniferous, in the bottom of a small ravine about
 200 yards north of the road from Rogers to Van Winkle Mill,
 and three miles from Rogers. Elev. 1400 feet (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Chloride of Soda-NaCl -----	.84	6.80
Chloride of Potash-KCl -----	.23	1.86
Carbonate of Soda-Na ₂ CO ₃ ----	6.29	50.93
Carbonate of Lime-CaCO ₃ -----	3.49	28.26
Sulphate of Magnesia-MgSO ₄ --	.08	.65
Sulphate of Iron-FeSO ₄ -----	1.42	11.50
Total -----	12.35	100.00

Found.

Silica SiO ₂ -----	.75	5.72
Sodium Na -----	3.06	23.34
Potassium K -----	.11	.84
Magnesium Mg -----	.01	.08
Calcium Ca -----	1.40	10.68
Iron Fe -----	.40	3.05
Sulphuric Acid SO ₄ -----	1.09	8.32
Carbonic Acid CO ₃ -----	5.66	43.17
Chlorine Cl -----	.63	4.80
Total -----	13.11	100.00

Water collected by assistant T. C. Hopkins.

Analysis by A. E. Menke.

Temperature of air, 27.04° F.; of water, 52.7° F.

Total solid material in solution, 15.00 grains per
 U. S. gallon.

(A. G. S. Rept., 1891, vol. 1, p. 44)

No. 12

SILVER SPRING

Sec. 28, T. 19 N., R. 29 W. This spring is one of the largest and most beautiful springs in northern Arkansas. It emerges from the base of a bluff near the bottom of the Boone chert formation, in a crystal stream two or three feet deep and from six to ten feet across. The water is utilized to run a flour mill, distillery, and saw mill a short distance below the spring. Elev. 1102 feet. (A. G. S. Rept., 1891, vol. 1, p. 113)

No. 13

PRISCO SPRING

SW $\frac{1}{4}$, Sec. 33, T. 19 N., R. 29 W., near Silver Springs. This spring has a local reputation for great healing properties. It flows out of the chert formation of the Lower Carboniferous age at the head of a ravine 65 feet below the top of the hill and 340 feet above White River. Elev. 1102 feet.

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	.41	3.49
Chloride of Soda NaCl -----	.86	7.52
Chloride of Potash KCl -----	.14	1.22
Carbonate of Lime CaCO ₃ -----	8.77	76.66
Carbonate of Iron FeCO ₃ -----	.84	7.34
Sulphate of Magnesia MgSO ₃ ---	.42	3.67
Total -----	11.44	100.00

Found.

Silica SiO ₂ -----	.41	3.58
Sodium Na -----	.34	2.29
Potassium K -----	.07	.61
Calcium Ca -----	3.51	30.65
Iron Fe -----	.41	3.58
Sulphuric Acid SO ₄ -----	.34	2.97
Carbonic Acid CO ₃ -----	5.70	49.78
Chlorine Cl -----	.59	5.15
Total -----	11.45	100.00

BENTON COUNTY

No. 13--Analysis continued

Water collected by assistant T. C. Hopkins, March 18, 1892. Analysis by A. E. Menke. Temperature of air, 38.3° F.; of water, 53.6° F. Total solids in solution, 10.41 grains per U. S. gallon. (A. G. S. Rept., 1891, vol. 1, p. 47)

No. 14

PRAIRIE CREEK SPRING

Sec. 35, T. 19 N., R. 29 W., on the road from Rogers to Eureka Springs by way of Prairie Creek. This spring flows from Silurian rocks. Elev. 1102 feet. (A. G. S. Rept., 1891, vol. 1, p. 113)

No. 15

SILVER SPRINGS

Sec. 27, T. 19 N., R. 29 W., 5 miles southeast of Rogers, located in cool restful valley, surrounded by numerous springs and spring fed streams with an abundance of natural scenery. These springs were formerly known as Monte Ne. Elev. 1250 feet (approximately). (Where to go in the Ozarks p. 113)

No. 16

BATH ROCK SPRING

Sec. ⁶~~7-12~~, T. 19 N., R. 29 ~~and 30~~ W., Rogers, ~~Rogers Springs.~~ This spring is named from the natural cavity, shaped somewhat like a bath-tub, cut in the limestone. There are two springs which are slightly chalybeate, all the others being clear, odorless, and tasteless. The springs are all in the Boone chert formation and its accompanying limestones. Elev. 1383 feet. (A. G. S. Ann. Rept. 1891, vol. 1, p. 111)

No. 17

MOSSY SPRING

Sec. ⁶~~7-12~~, T. 19 N., R. 29 ~~and 30~~ W., Rogers, ~~Rogers Springs.~~ This spring is noted for its medicinal purposes. Elev. 1383 feet. (A. G. S. Ann. Rept. 1891, vol. 1, p. 111)

No. 18

ROGERS SPRINGS

Sec. 7-12, T. 19 N., R. 29 and 30 W., near Rogers. The ones most noted for their healing properties are those known as the Electric springs, a name given to three small springs, or one spring with three outlets. Elev. 1383 feet. (A. G. S. Ann. Rept. 1891, vol. 1, p. 111)

No. 19

PUMP SPRING

Sec. ⁷⁻¹²~~12-7~~, T. 19 N., R. 29 and 30 W., near Rogers. The spring is owned and the water is marketed by the Southwestern Gas & Electric Company. It is 2 feet in depth, 5 feet in diameter of basin, and 293 gallons per minute discharge. It drains into the White River, is in the limestone formation, and contributes toward the municipal water supply. Furnished by J. C. Black. Elev. 1383. (~~Univ. of Ark. B. & Hale~~)

Analysis of Water

Sample of water submitted from Municipal Water Plant, April, 1924. (WS-5) Condition: Turbidity, Color and Odor, none.

Determination

	Parts per million
Silica SiO ₂ -----	10.30
Oxides of Iron and Aluminum	
Fe ₂ O ₃ -Al ₂ O ₃ -----	3.75
Magnesium Mg -----	3.50
Calcium Ca -----	46.50
Sodium Na -----	5.76
Chloride Cl -----	8.90
Sulfate SO ₄ -----	6.20
Alkalinity	
Methyl Orange -----	129.00
Phenolphthalein -----	0.00
Total Dissolved Solids ----	166.20 cor.

Hypothetical Combination

	Parts per million	Grains per gallon
Silica SiO ₂ -----	10.30	0.60
Oxides of Iron and Aluminum Fe ₂ O ₃		
-Al ₂ O ₃ -----	3.75	0.22

BENTON COUNTY

No. 19--Analysis continued

	Parts per million	Grains per gallon
Magnesium Sulphate $MgSO_4$ -----	8.80	0.51
Magnesium Carbonate $MgCO_3$ -----	6.65	0.39
Calcium Carbonate $CaCO_3$ -----	116.25	6.78
Sodium Chloride $NaCl$ -----	14.66	0.86
	<u>160.41</u>	<u>9.36</u>
Total Hardness -----	130.65	7.62
Pounds of Scale per 1000 gallons ----		1.31
Pounds of Hard Scale per 1000 gallons		0.208
Coefficient of Scale Hardness -----		0.16

This water is of medium mineral content, forming but little scale and that of very low coefficient of hardness.

No. 20

DIAMOND SPRING

Sec. 7-12, T. 19 N., R. 29 and 30 W., near Rogers. This spring contributes toward the municipal supply of water. Furnished by J. C. Black. Elev. 1383 feet. (~~Univ. of Ark. B 2, Hale~~)

No. 21

ELECTRIC SPRING

Sec. 10, 19 N., R. 30 W., $1\frac{1}{4}$ miles west of Rogers. "The water belongs to the calcic or lime class of waters with small quantities of the alkalies. There is no free gas in the water and the mineral matter is not sufficient to give a taste to it. In general character it is not unlike the Bethesda water of Waukesha, Wisconsin, and the Yellow Springs water of Ohio."

The springs are a little over two hundred feet lower than the town of Rogers, and about a mile and a quarter distant from that town. Elev. 1300 feet.

Analysis of Water

Constituents	Grains per U.S. gallon
Silica SiO_2 -----	.552
Iron and Alumina Fe, Al -----	.025
Chloride of Soda $NaCl$ -----	.174

BENTON COUNTY

No. 21--Analysis continued

	Grains per U.S. gallon
Chloride of Potash KCl -----	.008
Sulphate of Potash K_2SO_4 -----	.397
Sulphate of Lime $CaSO_4$ -----	.328
Bi-carbonate of Lime $CaCO_3, CO_2$ ----	20.488
Bi-carbonate of Magnesia $MgCO_3, CO_2$	.488
Total -----	22.460

Temperature of the air, 90° F.; of the water, 55° F.
 Analysis made in 1881 by Potter and Riggs of St. Louis,
 Mo.; copy kindly furnished by Prof. W. B. Potter. (A.
 G. S. Ann. Rept. 1891, vol. 1, p. 41)

No. 22

LONO SPRING

Sec. 31, T. 19 N., R. 30 W., Frisco at Lowell. The spring is owned by E. E. Young, Tulsa Oklahoma. A dam has been built at this spring and a small lake formed which is fed by the water from this spring. Elev. 1343 feet (approximately). (Postmaster at Lowell)

No. 23.

DECATUR SPRING

Sec. 11, T. 19 N., R. 33 W., at Decatur. The spring is owned and the water marketed by the Decatur Water Company, Decatur, Arkansas. The spring furnishes the municipal water supply for Decatur. The water plant began service in 1912. Water is drawn from a spring, and emergency supply is insured by a concrete reservoir.

Total pumpage for the year 1924 was 495,000 gallons. Average daily pumpage, using the pumps about three hours per day, is 5,000 gallons. Daily pumpage during peak consumption was 6,000 gallons. The water is accorded no chemical treatment. Elev. 1232 feet.

Analysis of Water

Sample of water secured by Prof. N. T. Bourke, Engineering Experiment Station, from tap in yard of Mayor W. H. Bach, July, 1925.

Condition: Turbidity, Color and Odor, none.

BENTON COUNTY

No. 23--Analysis continued.

Determination

	Parts per million
Silica SiO_2 -----	6.70
Oxides of Iron and Alumi- num Fe_2O_3 - Al_2O_3 -----	1.10
Magnesium Mg -----	1.98
Calcium Ca -----	26.83
Sodium Na -----	5.36
Chlorine Cl -----	8.25
Sulfate SO_4 -----	6.32
Alkalinity	
Methyl Orange -----	53.02
Phenolphthalein -----	0.00
Total Dissolved Solids	90.50

Hypothetical Combination

	Parts per million	Grains per gallon
Silica SiO_2 -----	6.70	0.39
Oxides of Iron and Aluminum Fe_2O_3 - - Al_2O_3 -----	1.10	0.06
Magnesium Sulphate MgSO_4 -----	7.42	0.43
Magnesium Carbonate MgCO_3 -----	3.08	0.18
Calcium Carbonate CaCO_3 -----	67.07	3.90
Sodium Chloride NaCl -----	13.61	0.79
	98.98	5.75
Total Hardness -----	75.29	4.39
Pounds of Scale per 1000 gallons -----		0.752
Pounds of Hard Scale per 1000 gallons --		0.233
Coefficient of Scale Hardness -----		0.31

This water is low in mineral matter, forming very little medium scale. (Univ. of Ark. B 2, Hale) *WAL*

No. 24

FRISCO SPRING

Sec. 33, T. 19 N., R. 29 W., at Monte Ne. This spring is near White River. The discharge is 450,000 yearly. Elev. 1,100 feet. (Playgrounds in Ark.)

No. 25

CAVE SPRING

Sec. 1, T. ~~20~~¹⁸ N., R. ~~34~~³¹ W., near Cave Springs. The spring is owned by the Federal Reserve Bank, St. Louis, Mo. This spring which gets its name from a cave is a subteranian creek. It emerges from the mountain side about 45 feet from the base. It flows down over a terrace of rocks for about 20 feet. The Geodetic Survey found that it flowed 30 gallons per minute. Chemical analysis shows the water to be absolutely pure. The discharge is 1,073 gallons per minute. Elev. 1250 feet (approximately). (B. F. Alley, Houston, Texas)

No. 26

JEFFERSON SPRING

SW $\frac{1}{4}$, Sec. 28, T. 20 N., R. 30 W., near Bentonville. The spring is owned by S. A. Jefferson. This spring has a large flow and is cold water from the limestone flint. In 1903 it was used as part of the municipal water supply. The water is hard. Elev. 1250 feet (approximately). (U. S. G. S. W 102)

No. 27

PARK SPRINGS

NE $\frac{1}{4}$, Sec. 30, T. 20 N., R. 30 W., on Frisco Railway and U. S. Highway 71. Also State Highways 12, 72, and 100. Located at the City of Bentonville in a 45-acre park, which contains medicinal radio-active springs. Elev. 1297 feet. (Where to go in the Ozarks, p. 96)

No. 28

BENTONVILLE SPRINGS

S $\frac{1}{2}$, Sec. 30-31, T. 20 N., R. 30 W., at Bentonville. The spring is owned by the Municipal Water Works, Bentonville. Chlorination is used but no other treatment is given. The plant in 1894 drew water from 3 springs. Elev. 1927 feet.

Analysis of Water

Sample furnished by the Municipal Water Plant, May, 1924.
Condition: Turbidity, Color and Odor, none.

No. 28--Analysis continued

Determination

	Parts per million
Silica SiO_2 -----	12.00
Oxides of Iron and Alumi- num Fe_2O_3 - Al_2O_3 -----	2.30
Magnesium Mg -----	.73
Calcium Ca -----	46.75
Sodium Na -----	2.92
Chlorine Cl -----	4.50
Sulfate SO_4 -----	1.89
Alkalinity	
Methyl Orange -----	117.60
Phenolphthalein -----	148.60
Total Dissolved Solids	148.60

Hypothetical Combination

	Parts per million	Grains per gallon
Silica SiO_2 -----	12.00	0.70
Oxides of Iron and Aluminum Fe_2O_3 - Al_2O_3 -----	2.30	0.13
Magnesium Sulfate MgSO_4 -----	2.38	0.14
Magnesium Carbonate MgCO_3 -----	1.02	0.06
Calcium Carbonate CaCO_3 -----	116.88	6.82
Sodium Chloride NaCl -----	7.42	0.43
	<u>141.87</u>	<u>8.28</u>
Total Hardness -----	119.88	6.99
Pounds of Scale per 1000 gallons -----		1.182
Pounds of Hard Scale per 1000 gallons		.136
Coefficient of Scale Hardness -----		.12

This water is satisfactory for domestic purposes, forming but very little scale. (Univ. of Ark. B 2, p. 14) ✓

No. 29

GARFIELD SPRING

SE $\frac{1}{4}$, Sec. 32, T. 21 N., R. 28 W., at Garfield. This spring emerges from base limestone bluff and flows through a 3-inch pipe into the railroad water tank. It is hard water and belongs to the Frisco Railroad. Elev. 1520 feet. (U. S. G. S. W 102)

BENTON COUNTY

No. 30

BAYAN SPRING

SW $\frac{1}{4}$, Sec. 29, T. 21 N., R. 28 W., at Garfield. The spring is owned by B. F. Bayan. This spring emerges from base limestone bluff and is used for domestic purposes. The water is of medium hardness. The discharge is 15 gallons per minute and has a temperature of 65°. Elev. 1520 feet. (U. S. G. S. W 102)

No. 31

SPANISH TREASURE SPRING

Sec. 35, T. 21 N., R. 33 W., 2 miles south of Sulphur Springs. This spring is owned by the Knight Estate of Kansas City and is of interest because of its history and traditions. Elev. 1000 feet (approximately). (Walter R. Eaton, Sulphur Springs, Arkansas)

No. 32

SULPHUR SPRING

Sec. 23, T. 21 N., R. 33 W., at Sulphur Spring. This spring is located in a beautiful park of century old elms. The water is of medium hardness. It is used for medicinal purposes and the water temperature is 61.7°. Elev. 920 feet (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	.72	3.17
Chloride of Soda NaCl -----	9.34	41.13
Carbonate of Magnesia MgCO ₃ -	4.48	19.73
Carbonate of Lime CaCO ₃ -----	6.51	28.66
Carbonate of Iron FeCO ₃ -----	.12	.53
Sulphate of Soda Na ₂ SO ₄ -----	1.33	5.86
Alumina Al ₂ O ₃ -----	.21	.92
Total -----	22.71	100.00

Found

Silica SiO ₂ -----	.72	3.17
Sodium Na -----	4.10	18.05
Magnesium Mg -----	1.28	5.64
Lime CaO -----	3.64	16.03
Iron Fe -----	.06	.27
Alumina Al ₂ O ₃ -----	.22	.97
Sulphuric Acid SO ₄ -----	.90	3.96
Carbonic Acid CO ₃ -----	6.13	26.99
Chlorine Cl -----	5.66	24.92
Total -----	22.71	100.00

No. 32--Analysis continued

Collected by A. E. Menke, November 16, 1891.

Analysis by A. E. Menke.

Temperature of air, 28.4° F.; temperature of water, 61.7° F.

Hydrogen sulfide
Sulphuretted hydrogen gas in solution, 0.0002 grains per U. S. gallon.

Total solids in solution, 22.59 grains per U. S. gallon.
(A. G. S. Ann. Rept., vol. 1, p. 96)

No. 33

BOX SPRING

NW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 33, T. 17 N., R. 33 W., near Siloam Springs on Kansas City Southern Railway. Elev. 1105 feet. (U. S. G. S. Top. Quad. in Arkansas)

No. 34

CHAMBERS SPRING

SE $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 30, T. 17 N., R. 32 W., near Springtown. Elev. 1259 feet. (U. S. G. S. Top. Quad. in Arkansas)

BOONE COUNTY

No. 35

VALLEY SPRINGS

Sec. 3, T. 17 N., R. 19 W., at Valley Springs sometimes called Double Springs. There are two large springs of clear cold water which flow from the chert bed, possibly near the bottom of it, near the base of the Lower Carboniferous beds. In dry weather they are the head of running water on Elm Branch, a tributary of Hog Creek. The analysis given below is of water taken from the eastern one of the two springs, the one to the rear of the post-office. Elev. 1075 feet (approximately).

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	1.25	7.90
Chloride of Soda NaCl -----	.27	1.71
Carbonate of Lime CaCO ₃ -----	13.89	87.75

No. 35--Analysis continued

	Grains per U.S. gallon	Per cent of total solids
Carbonate of Iron FeCO_3 -----	.14	.88
Sulphate of Magnesia MgSO_4 ----	.28	1.76
Total -----	15.83	100.00

Found.

Silica SiO_2 -----	1.25	7.94
Sodium Na -----	.10	.63
Magnesium Mg -----	.06	.38
Calcium Ca -----	5.55	35.24
Iron Fe -----	.07	.44
Sulphuric Acid SO_4 -----	.23	1.46
Carbonic Acid CO_3 -----	8.33	52.89
Chlorine Cl -----	.16	1.02
Total -----	15.75	100.00

Water collected by assistant T. C. Hopkins, February 10, 1892.

Analysis by A. E. Menke.

Temperature of air, 53.15°F. ; of water, 58.1°F.

Total solids in solution, 16.75 grains per U. S. gallon.

(A. G. S. Ann. Rept. 1891, vol. 1, p. 99)

No. 36

SULPHUR SPRING

Sec. 24, T. 17 N., R. 20 W., on the north side of Sulphur Mountain, two miles and a half from Watkins' post-office, and nearly nine miles from Harrison, the county seat.

"The spring is at the head of one of the tributaries of Crooked Creek. The water is slightly clouded, and gives a very perceptible odor and taste of sulphuretted hydrogen gas.

"The shale in which the spring occurs is an aluminous, pyritiferous shale containing ferruginous, calcareous nodules. The overlying rocks are shales, shaly sandstones and impure limestone. The sulphuretted hydrogen gas (not shown in the analysis) and the sulphuric acid are probably due to the decomposition of the iron pyrites in the shale.

"The spring is in Lower Carboniferous rocks and emerges near the top of the Marshall shale which at this point is 250 feet thick. It is 300 feet above Watkins' post-office and 500 feet above Harrison, both of which are on the Boone chert; it is probably not far from 500 feet above the base

of the Lower Carboniferous series and about the same distance below the base of the Millstone Grit, which occurs on both ends of Sulphur Mountain." Elev. 2000 feet (approximately).

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.35	1.63
Chloride of Soda NaCl -----	.02	.10
Chloride of Potash KCl -----	.01	.05
Carbonate of Soda Na_2CO_3 ----	6.23	29.65
Carbonate of Lime CaCO_3 -----	7.72	36.73
Carbonate of Iron FeCO_3 -----	1.42	6.72
Sulphate of Magnesia MgSO_4 --	4.80	22.83
Alumina Al_2O_3 -----	.82	3.90
Total -----	21.02	100.00

Found.

Silica SiO_2 -----	.35	1.63
Sodium Na -----	2.71	12.70
Magnesium Mg -----	.96	4.47
Potassium K -----	.01	.04
Calcium Ca -----	3.09	14.44
Iron Fe -----	.69	3.22
Alumina Al_2O_3 -----	.82	3.83
Sulphuric Acid SO_4 -----	3.84	17.95
Carbonic Acid CO_3 -----	8.90	41.61
Chlorine Cl -----	.02	.09
Total -----	21.39	100.00

Water collected by assistant T. C. Hopkins, Feb. 9, 1892.
Analyzed by A. E. Menke.

Temperature of air, 36.86°F .; of water, 50°F .

Total solids in solution, 22.91 grains per U. S. gallon.
(A. G. S. Ann. Rept. 1891, vol. 1, p. 94-95)

No. 37

FODDER STACK SPRING

Sec. 26, T. 17 N., R. 20 W., on Fodder Stack Mountain two miles west of Sulphur Springs. This spring has a stronger sulphur odor and taste than the one on Sulphur Mountain. Both are in the same geologic level--the Marshall shale, of Lower Carboniferous age. Elev. 1250 feet (approximately).
(A. G. S. Ann. Rept. 1891, vol. 1, p. 95)

BOONE COUNTY

No.

BEAUTY SPRING

T. 17 N., R. 21 W., 11 miles southwest of Harrison. The spring is owned by Marvin Wagley, Harrison. Elev. 1500 feet (approximately). (C. R. Christian, Hill Top, Arkansas)

No. 3

MITCHELL SPRINGS

T. 18 N., R. 20 W., at Harrison. The spring is owned by the City of Harrison. The water is the municipal supply for Harrison. The average daily pumpage during 1923 was 105,035 gallons using the pumps from 4 to 10 hours per day. The water is not chemically treated or otherwise treated by sedimentation processes. Elev. 1061 feet.

Analysis of Water

Sample furnished by Municipal Water Plant, June, 1924.
Condition: Turbidity, Color and Odor, none.

Determination

	Parts per million
Silica SiO_2 -----	21.40
Oxides of Iron and Aluminum	
Fe_2O_3 - Al_2O_3 -----	1.35
Magnesium Mg -----	Slight
Calcium Ca -----	83.72
Sodium Na -----	1.29
Chlorine Cl -----	1.99
Sulfate SO_4 -----	1.81
Alkalinity	
Methyl Orange -----	209.72
Phenolphthalein -----	0.00
Total Dissolved Solids -----	243.80

Hypothetical Combination

	Parts per million	Grains per gallon
Silica SiO_2 -----	21.40	1.25
Oxides of Iron and Aluminum Fe_2O_3		
- Al_2O_3 -----	1.35	0.09
Magnesium Sulfate MgSO_4 -----	2.27	0.13
Calcium Carbonate CaCO_3 -----	209.30	12.21
Sodium Chloride NaCl -----	3.28	0.19
	<u>237.60</u>	<u>13.87</u>

BOONE COUNTY

No. 39--Analysis continued

	Parts per <u>million</u>	Grains per <u>gallon</u>
Total Hardness -----	211.19	12.32
Pounds of Scale per 1000 gallons -----		2.251
Pounds of Hard Scale per 1000 gallons -		0.200
Coefficient of Scale Hardness -----		0.09

Water is of medium mineral content, forming much scale but of very low coefficient of hardness. (Univ. of Ark. B 2, p. 44, Harrison Hale).

No. 40

TWIN SPRINGS

SW $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 14, T. 19 N., R. 21 W., near Francis, locally known as Bear Creek Springs. One has a very dependable flow and is the main feeder for beautiful Bear Creek, which flows east and north and empties into White River at the northern edge of Boone County on the Missouri line. Elev. 1105 feet. (Sam A. Leath, Harrison, Arkansas)

No. 41

MARBLE FALLS SPRING

Sec. 27, T. 20 N., R. 19 W., on A. L. Dirst's place at the head of a tributary of West Music Creek. The marble outcrops in a bold bluff, from beneath which the spring issues; in this bluff are several varieties of marble, the most characteristic ones being red, pink, and pink and light gray mottled. Elev. 900 feet (approximately). (A. G. S. 1890, vol. 4, p. 324)

No. 42

ELIXIR SPRING

Sec. 36, T. 20 N., R. 19 W., near the head of one of the terminal ravines of upper Sugar Loaf Creek. There are two principal springs, one on each side of the ravine, and several minor ones in the immediate vicinity. They emerge near the top of the Silurian rocks from saccharoidal sandstone and siliceous limestone. The one on the west side of the ravine is the stronger spring and is the one from which the water was taken for analysis. The result of the analysis

shows the water to contain less solid matter in solution than that of any of the springs of the north part of the state that have been analyzed. This is no doubt due in great measure to the fact that the water was taken for analysis shortly after heavy rains when the springs were swollen to twice their normal size. Elev. 1000 feet.

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.41	33.53
Chloride of Soda NaCl -----	.26	6.18
Chloride of Potash KCl -----	.01	.24
Carbonate of Soda Na_2CO_3 ---	.60	14.27
Carbonate of Lime CaCO_3 -----	1.92	45.66
Carbonate of Iron FeCO_3 -----	.001	.02
Sulphate of Magnesia MgSO_4 -	.004	.10
Total -----	4.205	100.00

Found.

Silica SiO_2 -----	1.41	32.46
Sodium Na -----	.36	8.29
Potassium K -----	.05	1.15
Magnesium Mg -----	.0008	.02
Calcium Ca -----	.77	17.72
Iron Fe -----	.0005	.01
Sulphuric Acid SO_4 -----	.0032	.07
Carbonic Acid CO_3 -----	1.59	36.60
Chlorine Cl -----	.16	3.68
Total -----	4.3445	100.00

Water collected by assistant T. C. Hopkins, February 7, 1892.

Analysis by A. E. Menke.

Temperature of air, 41.9°F .; of water, 55.4°F .

Total solids in solution, 4.25 grains per U. S. gallon.
(A. G. S. Ann. Rept. 1891, vol. 1, p. 42)

BRADLEY COUNTY

No. 43

LEAG'S MINERAL SPRINGS

Sec. 32, T. 12 S., R. 10 W., 6 miles west of Warren. Elev. 200 feet (approximately). (U. S. G. S. F 46)

BRADLEY COUNTY

No.

SULPHUR SPRINGS

SE $\frac{1}{4}$, Sec. 34, T. 14 S., R. 9 W., near Sumpter. Elev. 140 feet. This information applies to both Nos. 44 and 45: Owen reports this as a strong alkaline sulphuret water, alkaline to test paper, and containing the following principal constituents: Carbonate of alkalies, probably both soda and potash; sulphuret of alkalies; sulphate of magnesia (Epsom salts), and chloride of sodium (common salt).

Owen states that of several springs examined, the strongest gave: Sulphate of magnesia (Epsom salts), sulphate of soda (Glauber's salt), Chloride of sodium (common salt, carbonate of liem, carbonate of magnesia, carbonate of soda (a trace), and carbonate of potash. (U. S. G. S. P 46, p. 236)

No.

BLUE SPRINGS

Sec. 3, T. 12 S., R. 12 W., near New Edinburg. The bottom of the springs of this group is covered with blue moss, hence the name. The community around these springs was one of the earliest settlements in this vicinity. The Indians used the springs prior to the white settlement. The original community comprised a small part of three counties, Bradley, Calhoun, and Cleveland. Elev. 300 feet (approximately). (Mrs. Barbara Denton, Warren Eagle--11-26)

CALHOUN COUNTY

No.

HOLDERNESS SPRING

Sec. 4, T. 11 S., R. 14 W., 3 miles north of Little Bay. This spring is a double mineral spring and is owned by J. I. Holderness. Elev. 100 feet. (approximately). (U. S. G. S. P 46)

No.

HOPEVILLE SPRING

Sec. 6, T. 11 S., R. 14 W., 1 mile west of Hopeville. The water from this spring was used commercially prior to the war between the states. Elev. 225 feet (approximately). (U. S. G. S. P 46)

CALHOUN COUNTY

No.

THOMAS'S MINERAL SPRING

Located on Beaver pond branch of Freeo. The spring is owned by Dr. W. A. Thomas and the water is used for medicinal purposes. Elev. 200 feet (approximately).

Qualitative Chemical Analysis

Bicarbonate of the protoxide of iron,
Chloride of sodium,
A trace of magnesia.

It is slightly alkaline to litmus paper. It is a saline chalybeate. (Arkansas Geological Survey Second Report of a Geological Reconnaissance-1860. p. 138)

CARROLL COUNTY

No.

POISON SPRING

NW $\frac{1}{4}$, Sec. 29, T. 18 N., R. 24 W., on the Dry Fork of King's River. The water from this spring is said to cause sickness to persons or anamials using the water. Elev. 1500 feet (approximately). (A. G. S. Ann. Rept., 1891, Vol. 1, p. 111)

No.

BUNCH SPRING

Sec. 4, T. 20 N., R. 24 W., Berryville. The spring is owned by C. F. Bunch. The spring has a large flow of water, is cold, and is used for domestic purposes. Elev. 1246 feet. (U. S. G. S. W 102)

No.

DAVIS SPRING

Sec. 10, T. 20 N., R. 24 W., Berryville. The spring is owned by W. W. Davis. It is a strong stream, cold and is used for domestic purposes. Elev. 1246. (U. S. G. S. W 102)

CARROLL COUNTY

No.

BERRYVILLE SPRING

Sec. 30, T. 20 N., R. 23 W., at Berryville. There is a sanitarium also hotels, etc., located at this spring. The water is soft. The spring is owned by the Berryville Milling Company. Elev. 1246 feet.

Analysis of Water

Constituents	Parts per million	Combining Values
Calcium Ca -----	11.25	0.561
Manganese Mn -----	trace	
Iron Fe -----	.20	.007
Aluminum Al -----	.26	.029
Ammonium NH ₄ -----	.02	.001
Magnesium Mg -----	.20	.016
Sodium Na -----	5.00	.217
Potassium K -----	1.49	.038
Lithium Li -----	trace	
Silica SiO ₂ -----	9.20	0.869
Bicarbonate ion HCO ₃ -----	35.63	0.584
Carbonate ion CO ₃ -----	0.00	
Sulphate ion SO ₄ -----	3.60	.075
Chloride ion Cl -----	5.00	.141
Bromide ion Br -----	trace	
Iodoide ion I -----	trace	
Nitrate ion NO ₃ -----	4.00	.064
Nitrate ion NO ₂ -----	trace	
Phosphate ion PO ₄ -----	trace	0.864
*Sum of Constituents	57.58	1.733
Total Residue on Evaporation	58.00	
Error -----	0.42	0.005
Percentage of Error -----	0.72	0.29%

*Note--The sum of constituents is calculated on the dry basis with bicarbonates converted into carbonates.
Harrison Hale--Consulting Chemist.

(Information furnished by E. F. Hassensall)

CARROLL COUNTY

No. 53

EUREKA SPRINGS

Sec. 16, T. 20 N., R. 26 W., at Eureka Springs. The City of Eureka Springs has more than fifty springs within the city limits and more than 1000 within a radius of seven miles. The United States Government which originally owned the springs, has by a decree placed them in trust with the city for the perpetual free use of the public. These springs supply an abundance of pure and health-giving waters not only for the visitors who go there in the winter from the North, and in the summer from the South, but for shipment to those who cannot make a visit to this delightful resort. The rugged landscape gives the place an Alpine effect, noticeable especially in the meanderings of streets through the valley and up the mountain side, where the terraces are lined with attractive hotels, beautiful homes and here and there a park or pavilion with resting places for the tourists. Elev. 1461 feet.

Note on springs in the Eureka Springs area. Condensed from SPRINGS, by T. C. Hopkins, The American Geologist, Vol. XIV, No. 6, December 1894, p. 365.

There is probably nowhere in the United States a better opportunity for observing the influence of stratigraphy on the emergence of springs than in the Paleozoic area of northern Arkansas and southwestern Missouri, an area known as the Ozark uplift.

Eureka Springs and vicinity represent a typical area in the western half of the district. Of the thirty-eight springs on this area of five square miles, twenty-six emerge at the base of the chert bed, and only twelve find their way through the shale and sandstone into the underlying magnesian limestones. Even this proportion is much greater in many other parts of the area, owing to the thinness of the sandstone bed in this region.

It is noteworthy that this horizon of springs should represent the interval between the Silurian and Carboniferous rocks over a large part of the area. Those of Silurian age occur only in the eastern part of the area. The fact that this interval is a marked horizon of springs, is probably a coincidence rather than a result of the long time interval, as apparently the only effect it might account for would be the induration of the sandstone. There is no unconformity, either of dip or erosion.

CARROLL COUNTY

Water from springs supplies the municipal reservoir. More than 300,000 gallons daily are used by the city. An analysis of the city water follows.

Analysis of Water

Sample submitted from filling station at foot of water tower, 7-17-25. Condition: Turbidity, Color and Odor, none. (Univ. of Ark. B 2, Hale.

This water is of low mineral content, forming very little scale of medium hardness.

Determination

	Parts per million
Silica SiO_2 -----	11.80
Oxides of Iron and Aluminum	
$\text{Fe}_2\text{O}_3\text{-Al}_2\text{O}_3$ -----	1.15
Magnesium Mg -----	2.49
Calcium Ca -----	31.29
Sodium Na -----	3.31
Chloride Cl -----	5.10
Sulfate SO_4 -----	15.00
Alkalinity	
Methyl Orange -----	70.15
Phenolphthalein -----	0.00
Total Dissolved Solids ----	111.00

Hypothetical Combination

	Parts per million	Grains per gallon
Silica SiO_2 -----	11.80	0.69
Oxides of Iron and Aluminum Fe_2O_3		
- Al_2O_3 -----	1.15	0.07
Magnesium Sulfate MgSO_4 -----	12.35	0.72
Calcium Sulfate CaSO_4 -----	7.28	0.42
Calcium Carbonate CaCO_3 -----	72.86	4.25
Sodium Chloride NaCl -----	8.41	0.49
	<u>113.85</u>	<u>6.64</u>
Total Hardness -----	88.48	5.16
Pounds of Scale per 1000 gallons ----		0.912
Pounds of Hard Scale per 1000 gallons		0.310
Coefficient of Scale Hardness -----		0.34

CARROLL COUNTY

No. 53--Continued

Some of these springs located within the city limits are: Basin Spring which was the first to be developed, Carrie A. Nation's Spring, Sweet Spring, Onyx Spring, Harding Spring, Grotto Spring, Magnetic Spring, and Crescent Spring. The following is the analysis of two of the springs. The analysis of the water of the other springs is about the same, excepting the variation in the water of the Magnetic.

Analysis of Water

BASIN SPRING

	Parts per million	Grains per U.S. gallon
Ammonium Chloride (NH CL) ---	0.4	0.14
Potassium Chloride (KCL) -----	1.9	0.13
Sodium Chloride (NaCL) -----	1.3	0.19
Sodium Sulphate (Na ₂ SO ₄) ----	3.4	0.09
Sodium Bicarbonate (Na(HCO ₃) ₄)	3.3	0.15
Magnesium Bicarbonate (Mg(HCO ₃) ₂)	8.1	0.47
Calcium Bicarbonate (Ca(HCO ₃) ₂)	75.8	4.43
Iron Oxide and Aluminum Fe 2O ₃ (Al ₂ O ₃) -----	1.4	0.08
Silica (SiO ₂) -----	5.3	0.31
Total solids -----	100.9	5.85

Radio-activity 65.8

Beta emanations predominating

Uranium Grams x 10⁻⁴ as the standardCo₂ calculated to satisfy basis

Gaseous contents 28.52 to the gallon.

MAGNETIC SPRINGS

	Parts per million	Grains per U.S. gallon
Silica SiO ₂ -----	9.90	0.578
Oxide of Al. Fe, Al ₂ O ₃ -Fe ₂ O ₃	1.20	0.070
Sodium Chloride NaCl	13.85	0.808
Magnesium Sulphate MgSO ₄	5.46	0.318
Magnesium Carbonate MgCO ₃	42.78	2.495
Calcium Carbonate Ca CO ₃	128.05	7.471
Total dissolved solids	201.24	11.740
Gas in solution with water	110.85	6.466
	312.09	12.206

CARROLL COUNTY

No. 54

OZARKA SPRING

Sec. 6, T. 20 N., R. 26 W., 2 miles northeast of Eureka Springs. Elev. 1461 feet (approximately).

Analysis of Water
No. 1

	Parts per million
Sodium Chloride NaCl -----	None
Magnesium Chloride MgCl_2 -----	6.00
Calcium Chloride CaCl_2 -----	None
Magnesium Sulphate MgSO_4 -----	9.50
Magnesium Bicarbonate (MgHCO_3) ₂ -----	18.60
Calcium Bicarbonate (CaHCO_3) ₂ -----	116.20
Aluminum Oxide Al_2O_3 -----	0.70
Silica SiO_2 -----	7.20
Total Solids -----	158.20

Analysis of Water
No. 2

	Parts per million	Grains per U.S. gallon
Silica (SiO_2) -----	5.3	0.31
Iron (Fe^{++}) -----	0.1	0.006
Alumina (Al_2O_3) -----	1.8	0.10
Calcium (Ca^{++}) -----	28.7	1.67
Magnesium (Mg^{++}) -----	6.5	0.38
Sodium (Na^{+}) -----	0.2	0.01
Bicarbonates (HCO_3^{-}) -----	103.0	6.02
Carbonates (CO_3^{-}) -----	0.0	0.00
Chlorides (Cl^{-}) -----	4.5	0.26
Sulphates (SO_4^{-}) -----	7.6	0.44
Nitrate (NO_3^{-}) -----	0.5	0.02

"This is very pure water. The amount of solids in solution is remarkably low. Wherever a pure natural water containing a minimum amount of mineral substances in solution is indicated this water serves the purpose admirably. As a table water for general use it is of excellent quality." Ozarka water is marketed commercially by the Eureka Springs Water Company and as Roc-Arc Water by the Roc-Arc Company of Little Rock.

Analysis of
 SPRING WATER FROM BERRYVILLE, ARKANSAS

Laboratory number 3372
 August 9, 1937

Constituents		Parts per Million	Combining Values
Calcium	Ca	11.25	0.561
Manganese	Mn	trace	
Iron	Fe	.20	.007
Aluminum	Al	.26	.029
Ammonium	NH ₄	.02	.001
Magnesium	Mg	.20	.016
Sodium	Na	5.00	.217
Potassium	K	1.49	.038
Lithium	Li	trace	
Silica	SiO ₂	9.20	0.869
Bicarbonate ion	HCO ₃	35.63	0.584
Carbonate ion	CO ₃	0.00	
Sulphate ion	SO ₄	3.60	.075
Chloride ion	Cl	5.00	.141
Bromide ion	Br	trace	
Iodoide ion	I	trace	
Nitrate ion	NO ₃	4.00	.064
Nitrite ion	NO ₂	trace	
Phosphate ion	PO ₄	trace	0.864
<hr/>			
*Sum of Constituents		57.58	1.733
Total Residue on Evaporation		58.00	
<hr/>			
Error		0.42	0.005
Percentage of Error		0.72%	0.29%

*Note--The sum of constituents is calculated on the dry basis with bicarbonates converted into carbonates.

Harrison Hale
 Consulting Chemist

ANALYSIS OF BERRYVILLE, ARKANSAS, SPRING WATER

JULY 28, 1931

G. H. Woodroffe, Metallurgical Engineer, New York
C. T. Ressler, Dir. of Bur. of Tests and Inspection.

Upon analysis of the Johnson Spring water obtained by our Mr. Blalock from Mr. Basore, Water Commissioner of Berryville, Arkansas, we obtained the following results:

Reaction slightly alkaline	
Permanent Hardness	none
Temporary Hardness	30.3 parts/million
Total Hardness	30.3
Carbon Dioxide	none
Organic Matter	none
Suspended Matter	none
Non-incrusting Solids	trace
Incrusting Solids	2.44 grains/gallon

Composition of None-incrusting Solids

Sulphur Trioxide	trace
Calcium Oxide	trace
Chlorine	trace
Sodium & Potassium Oxide	none

Composition of Incrusting Solids

Sulphur Trioxide	None
Silica	0.57 grains/gallon
Iron and Aluminum Oxide	0.1
Calcium Oxide	0.57
Magnesium Oxide	0.19

Composition of Non-incrusting Salts

Magnesium Sulphate	trace
Calcium Chloride	trace

Composition of Incrusting Salts

Silica	0.57 grains/gallon
Iron and Aluminu Oxide	0.1
Calcium Carbonate	1.37
Magnesium Carbonate	0.40

of Little Red River. There are a number of them and they furnish the municipal supply for the city. This spring is about 48 inches in depth. Elev. 348 feet.

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.43	10.82
Chloride of Soda NaCl -----	1.88	14.22
Carbonate of Soda Na_2CO_3 ----	2.21	16.72
Carbonate of Magnesia MgCO_3 --	1.30	9.83
Sulphate of Lime CaCO_3 -----	5.53	41.83
Sulphate of Soda Na_2SO_4 -----	.70	5.29
Sulphate of Alumina $\text{Al}_2(\text{SO}_4)_3$	.14	1.06
Nitrate of Lime $\text{Ca}(\text{NO}_3)_2$ ---	.03	.23
Total -----	13.22	100.00

Found.

Silica SiO_2 -----	1.43	11.27
Sodium Na -----	1.20	9.47
Magnesium Mg -----	.37	2.91
Lime CaO -----	3.10	24.45
Alumina Al_2O_3 -----	.04	.32
Sulphuric Acid SO_4 -----	.57	4.49
Carbonic Acid CO_3 -----	4.81	37.94
Nitric Acid NO_3 -----	.02	.16
Chlorine Cl -----	1.14	8.99
Total -----	12.68	100.00

Water collected by assistant J. F. Newsom, October 30, 1891.
Analysis by A. E. Menke.

Temperature of air, 45.68°F .; temperature of water, 59°F .

Total solids in solution, 15.18 grains per U. S. gallon.

Free ammonia, 0.086 parts per million.

Albuminoid ammonia, 0.048 parts per million.

Arsenic spring is under the same roof with the White Sulphur and the Chalybeate springs; its distance from the former is about 15 feet; from the latter, about 10 feet. The water is not much used, and at the time of collection contained much foreign matter, such as leaves and twigs. The discharge is about one gallon in ten minutes. No gas escapes. A thin, white, mossy deposit is formed on the sides of the sewer tile through which the water flows. Reaction, neutral. (A. G. S. Ann. Rept. 1891, vol. 1, p. 87-88)

No. 57

STATE SALT SPRING

SE $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 22, T. 6 S., R. 19 W., near Arkadelphia. 40 acres, sold to J. E. M. Barkman, by state, April 20, 1854, for \$1.25 per acre (then in Hot Spring County). Elev. 198 feet (approximately). (Office of Commissioner of State Lands)

No. 58

STATE SALT SPRING

SE $\frac{1}{4}$, Sec. 21, T. 6 S., R. 19 W., near Arkadelphia. Sold to Jacob Barkman in 1834, by United States, for \$1.25 per acre. Elev. 198 feet (approximately). (Office of Commissioner of State Lands)

No. 59

STATE SALT SPRING

SW $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 3, T. 7 S., R. 19 W., near Arkadelphia. 120 acres, sold to Geo. W. Reed, assignee of Jas. K. Rogers, by state, June 26, 1872, for \$1.25 per acre. Elev. 180 feet (approximately). (Office of Commissioner of State Lands)

No. 60

STATE SALT SPRING

NW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 10, T. 7 S., R. 19 W., near Arkadelphia. 120 acres, sold to Geo. W. Reed, assignee of Jas. K. Rogers, by state, June 26, 1872, for \$1.25 per acre. Elev. 170 feet (approximately). (Office of Commissioner of State Lands)

No. 61

SALINE SPRING

NE $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 6, T. 8 S., R. 21 W., Hollywood. The amount of salt in the waters of the principal salines of the Ouachita bottoms is reported to be from 9 to 20 per cent. This spring belongs to the Terre Noire Methodist Camp Ground and drains into Terre Noir Creek. Elev. 297 feet (U. S. G. S. P 46)

No. 62

DAVIDSON'S CAMP GROUND SPRING

NE $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 6, T. 8 S., R. 21 W., Hollywood. This spring is now known as the Davidson's Methodist Camp Ground Spring and is the same as the above. It is a large spring of clear cold water. It has been used as a water supply for the camp for more than 50 years. It is adjacent to No. 62. Elev. 297 feet. (Ark. Geol. Surv. files.)

No. 63

MINERAL SPRINGS

T. 8 S., R. 23 W., two miles northeast of Antoine Post Office, a quarter of a mile south of the military road, on the Smith-Okolona road, six miles north of Okolona, the nearest railway point. Seven springs issue near each other, and one larger spring a short distance away. These springs are well tiled, and the large one has a cover. The water issues from a dark colored, sandy deposit, with streaks of black shale or clay, all of which are probably of Cretaceous age. These beds dip to the south at an angle of 45°. Elev. 283 feet. (A. G. S. Ann. Rept. 1891, vol. 1, p. 111)

No. 64

WHELEN SPRINGS

NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 35, T. 10 S., R. 20 W., Whelen Springs. Elev. 247 feet. (Gurdon Quad. U. S. G. S.)

CLEBURNE COUNTY

No. 65

QUITMAN SPRING

T. 9 N., R. 11 W., near Quitman. This spring is used occasionally for medicinal purposes. A strong spring of chalybeate water is located 200 yards below this spring. A number of sulphur and other mineral springs are reported in the surrounding region. Elev. 480 feet. (U. S. G. S. W 102)

No. 66

SUGAR LOAF SPRING (ARSENIC)

SW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 14, T. 10 N., R. 10 W., at Heber Springs. The springs in the City of Heber Springs drain into Spring Creek

of Little Red River. There are a number of them and they furnish the municipal supply for the city. This spring is about 48 inches in depth. Elev. 348 feet.

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.43	10.82
Chloride of Soda NaCl -----	1.88	14.22
Carbonate of Soda Na_2CO_3 ----	2.21	16.72
Carbonate of Magnesia MgCO_3 --	1.30	9.83
Sulphate of Lime CaCO_3 -----	5.53	41.83
Sulphate of Soda Na_2SO_4 -----	.70	5.29
Sulphate of Alumina $\text{Al}_2(\text{SO}_4)_3$	.14	1.06
Nitrate of Lime $\text{Ca}(\text{NO}_3)_2$ ---	.03	.23
Total -----	13.22	100.00

Found.

Silica SiO_2 -----	1.43	11.27
Sodium Na -----	1.20	9.47
Magnesium Mg -----	.37	2.91
Lime CaO -----	3.10	24.45
Alumina Al_2O_3 -----	.04	.32
Sulphuric Acid SO_4 -----	.57	4.49
Carbonic Acid CO_3 -----	4.81	37.94
Nitric Acid NO_3 -----	.02	.16
Chlorine Cl -----	1.14	8.99
Total -----	12.68	100.00

Water collected by assistant J. F. Newsom, October 30, 1891.
Analysis by A. E. Menke.

Temperature of air, 45.68°F .; temperature of water, 59°F .

Total solids in solution, 15.18 grains per U. S. gallon.

Free ammonia, 0.086 parts per million.

Albuminoid ammonia, 0.048 parts per million.

Arsenic spring is under the same roof with the White Sulphur and the Chalybeate springs; its distance from the former is about 15 feet; from the latter, about 10 feet. The water is not much used, and at the time of collection contained much foreign matter, such as leaves and twigs. The discharge is about one gallon in ten minutes. No gas escapes. A thin, white, mossy deposit is formed on the sides of the sewer tile through which the water flows. Reaction, neutral. (A. G. S. Ann. Rept. 1891, vol. 1, p. 87-88)

No. 67

BLACK SULPHUR SPRING

Sec. 14-23, T. 10 N., R. 10 W., Heber Springs. The discharge of this spring is one gallon in three minutes. When the sample was taken a little inflammable gas was escaping. A heavy white ropy deposit, which waves to and fro in the water, is formed on the sides of the tile in which the water collects. Objects on which the deposit collects are turned black. Reaction, neutral. The spring is owned by the Town of Heber Springs. Discharge, 1/3 g.p.m. Elev. 348 feet.

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.93	3.59
Chloride of Soda NaCl -----	.96	3.71
Carbonate of Soda Na_2CO_3 -----	14.65	56.59
Carbonate of Magnesia MgCO_3 --	2.61	10.13
Carbonate of Lime CaCO_3 -----	3.95	15.27
Sulphate of Soda Na_2SO_4 -----	2.69	10.40
Sulphate of Alumina $\text{Al}_2(\text{SO}_4)_3$	.07	.27
Nitrate of Lime $\text{Ca}(\text{NO}_3)_2$ -----	.01	.04
Total -----	25.87	100.00

Found.

Silica SiO_2 -----	.93	3.60
Sodium Na -----	7.25	29.09
Magnesium Mg -----	.74	2.86
Lime CaO -----	2.21	8.55
Alumina Al_2O_3 -----	.02	.08
Sulphuric Acid SO_4 -----	1.90	7.35
Carbonic Acid CO_3 -----	11.94	46.19
Nitric Acid NO_3 -----	.01	.04
Chlorine Cl -----	.58	2.24
Total -----	25.85	100.00

Water collected by assistant J. F. Newsom, October 30, 1891.

Analysis by A. E. Menke.

Temperature of air, 38.66°F .; temperature of water 61.7°F .

Total solids in solution, 30.87 grains per U. S. gallon.

Hydrogen sulphide gas, 0.02 grains per U. S. gallon.

Free ammonia, 0.01 parts per million.

Albuminoid ammonia, 0.01 parts per million.

(A. G. S. Ann. Rept. 1891, vol. 1, p. 89)

No. 68

RED SULPHUR SPRING

SW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 14, T. 10 N., R. 10 W., at Heber Springs. The discharge is 1152 gallons in 24 hours. Elev. 348 feet.

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	.75	3.00
Chloride of Soda NaCl -----	6.45	25.80
Carbonate of Soda Na ₂ CO ₃ -----	11.73	46.92
Carbonate of Magnesia MgCO ₃ --	.76	3.04
Carbonate of Lime CaCO ₃ -----	3.44	13.76
Sulphate of Soda Na ₂ SO ₄ -----	1.79	7.16
Sulphate of Alumina Al ₂ (SO ₄) ₃	.07	.28
Nitrate of Lime Ca (NO ₃) ₂ ---	.01	.04
Total -----	25.00	100.00

Found.

Silica SiO ₂ -----	.75	3.00
Sodium Na -----	8.18	32.72
Magnesium Mg -----	.27	1.08
Lime CaO -----	1.93	7.72
Alumina Al ₂ O ₃ -----	.02	.08
Sulphuric Acid SO ₄ -----	1.30	5.20
Carbonic Acid CO ₃ -----	8.63	34.52
Nitric Acid NO ₃ -----	.01	.04
Chlorine Cl -----	3.91	15.64
Total -----	25.00	100.00

Water collected by assistant J. F. Newsom, October 30, 1891.

Analysis by A. E. Menke.

Temperature of air, 45.68° F.; of water, 61.7° F.

Total solids in solution, 34.63 grains per U. S. gallon.

Free ammonia, 0.02 parts per million.

Albuminoid ammonia, 0.01 parts per million.

(A. G. S. Ann. Rept. 1891, vol. 1, p. 92.)

No. 69

EYE SPRING

Sec. 14-23, T. 10 N., R. 10 W., at Heber Springs. The discharge of this spring is very weak--only one gallon in thirty minutes. The spring is owned by the Town of Heber Springs. The water is used for medicinal purposes. Elev. 348. (A. G. S. Ann. Rept. 1891, vol. 1, p. 91)

No. 69--Continued

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.96	3.72
Chloride of Soda NaCl -----	1.16	4.49
Carbonate of Soda Na_2CO_3 ----	14.49	56.12
Carbonate of Magnesia MgCO_3 -	2.39	9.26
Carbonate of Lime CaCO_3 -----	4.08	15.80
Sulphate of Soda Na_2SO_4 -----	2.67	10.34
Sulphate of Alumina $\text{Al}_2(\text{SO}_4)_3$	.06	.23
Nitrate of Lime $\text{Ca}(\text{NO}_3)_2$ ---	.01	.04
Total -----	25.82	100.00

Found.

Silica SiO_2 -----	.96	3.72
Sodium Na -----	7.54	29.20
Magnesium Mg -----	.68	2.64
Lime CaO -----	2.28	8.83
Alumina Al_2O_3 -----	.02	.08
Sulphuric Acid SO_4 -----	1.87	7.25
Carbonic Acid CO_3 -----	11.75	45.51
Nitric Acid NO_3 -----	.01	.05
Chlorine Cl -----	.70	2.72
Total -----	25.81	100.00

Water collected by assistant J. F. Newsom, October 30, 1891.

Analysis by A. E. Menke.

Temperature of air, 45.68° F.; of water, 54.5° F.

Total solids in solution, 31.39 grains per U. S. gallon.

Hydrogen sulphide gas, 0.002 grains per U. S. gallon.

Free ammonia, 0.01 parts per million.

Albuminoid ammonia, 0.01 parts per million.

No. 70

WHITE SULPHUR SPRING

SW $\frac{1}{2}$ SE $\frac{1}{2}$, Sec. 14, T. 10 N., R. 10 W., at Heber Springs.
This spring is owned by the Town of Heber Springs. It
has a discharge of about 1440 gallons in 24 hours.

No. 70--Continued

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.44	10.19
Chloride of Soda NaCl -----	1.77	12.53
Carbonate of Soda Na_2CO_3 -----	1.02	7.22
Carbonate of Magnesia MgCO_3 -----	1.45	10.26
Carbonate of Lime CaCO_3 -----	7.09	50.17
Sulphate of Soda Na_2SO_4 -----	1.25	8.85
Sulphate of Alumina $\text{Al}_2(\text{SO}_4)_3$ -----	.10	.71
Nitrate of Lime $\text{Ca}(\text{NO}_3)_2$ -----	.01	.07
Total -----	14.13	100.00

Found.

Silica SiO_2 -----	1.44	10.19
Sodium Na -----	1.92	13.59
Magnesium Mg -----	.41	2.90
Lime CaO -----	3.97	28.10
Alumina Al_2O_3 -----	.03	.21
Sulphuric Acid SO_4 -----	.47	3.33
Carbonic Acid CO_3 -----	4.81	34.04
Nitric Acid NO_3 -----	.01	.07
Chlorine Cl -----	1.07	7.57
Total -----	14.13	100.00

Water collected by assistant J. F. Newsom, October 30, 1891.

Analysis by A. E. Menke.

Temperature of air, 45.68°F .; of water, 59.9°F .

Total solids in solution, 16.66 grains per U. S. gallon.

Free ammonia, 0.01 parts per million.

Albuminoid ammonia, 0.01 parts per million.

(A. C. S. Ann. Rept. 1891, vol. 1, p. 93)

No. 71

CHALYBEATE SPRING

Sec. 14-23, T. 10 N., R. 10 W., at Heber Springs. The discharge of this spring is about 1 gallon in 15 minutes.
Elev. 348 feet.

No. 71--Continued

Analysis of Water
Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.16	9.94
Chloride of Soda NaCl -----	1.13	9.68
Carbonate of Soda Na_2CO_3 -----	.81	6.94
Carbonate of Magnesia MgCO_3 --	1.37	11.75
Carbonate of Lime CaCO_3 -----	6.09	52.18
Sulphate of Soda Na_2SO_4 -----	1.06	9.08
Sulphate of Alumina $\text{Al}_2(\text{SO}_4)_3$	.04	.34
Nitrate of Lime $\text{Ca}(\text{NO}_3)_2$ -----	.04	.06
Total -----	<u>11.67</u>	<u>100.00</u>

Found.

Silica SiO_2 -----	1.16	9.94
Sodium Na -----	1.09	9.34
Magnesium Mg -----	.39	3.34
Lime CaO -----	3.41	29.22
Alumina Al_2O_3 -----	.01	.09
Sulphuric Acid SO_4 -----	.76	6.51
Carbonic Acid CO_3 -----	4.15	35.56
Nitric Acid NO_3 -----	.01	.09
Chlorine Cl -----	.69	5.91
Total -----	<u>11.67</u>	<u>100.00</u>

Water collected by assistant J. F. Newsom, October 30, 1891.

Analysis by A. E. Menke.

Temperature of air, 45.68°F. ; of water, 56.30°F.

Total solids in solution, 13.76 grains per U. S. gallon.

Free ammonia, 0.01 parts per million.

Albuminoid ammonia, 0.01 parts per million.

(A. C. S. Ann. Rept. 1891, vol. 1, p. 90)

No. 72

PEARSON SPRING

Sec. 32, T. 10 N., R. 10 W., at Pearson. Another fine spring of water, similar in quality to that of Mr. Stacy's is reported on the land of Louis Porten, while a spring of white sulphur water is reported on the land of J. T. Harglewood, 2 miles to the west. The Pearson Spring is pure and is used for medicinal purposes. . Elev. 450 feet. (U. S. G. S. W. 102)

COLUMBIA COUNTY

No.

MACEDONIA SPRING

Sec. 25, T. 18 S., R. 21 W., at Macedonia. Elev. 250 feet (approximately). (U. S. G. S. P 46)

CONWAY COUNTY

No.

STILLMAN SPRING

Sec. 31, T. 6 N., R. 17 W., on Petit Jean Mt. South side of Cedar Creek Canyon, $\frac{1}{2}$ mile below Cedar Creek Falls. Elev. 600 feet (approximately). (D. N. Graves, State Park Service).

No.

SPRINGFIELD TOWN SPRING

Sec. 11?, T. 7 N., R. 15 W., at Springfield. The spring is owned by the Town of Springfield. "Another chalybeate spring of the same character occurs at Peach Orchard gap, in section 20, township 6 north, range 10 west, in the edge of White County, and belongs to Mr. Elliott." Elev. 401 feet.

Analysis of Water

Carbonic Acid;
Bicarbonate of Lime;
Bicarbonate of Magnesia;
Bicarbonate of the Protoxide of Iron (strong).

(A. G. S. Ann. Rept. 1891, vol. 1, p. 114)

CRAWFORD COUNTY

No.

QUESENBURY AND FERRING SPRINGS

Sec. 21, T. 10 N., R. 29 W., within a few miles of Mulberry. The owner of the spring is W. P. Winfrey. Elev. 292 feet. (U. S. G. S. W. 102)

No. 78

DEAN SPRINGS

SW $\frac{1}{4}$ S $\frac{1}{2}$, Sec. 16, T. 10 N., R. 30 W., at Dean Springs. They come from Winslow sandstone. The water is soft coming as it does from sandstone. Elev. 750 feet (approximately). (U. S. G. S. W 145, p. 87)

No.

FINE SPRINGS

SE $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 18, T. 10 N., R. 30 W., near Dean Springs. The water is soft. Elev. 750 feet (approximately). (U. S. G. S. W 145, p. 87)

No.

STEWART SPRING

Sec. 11, T. 10 N., R. 31 W., near Stewart. The water is soft. Elev. 1000 feet (approximately). (U. S. G. S. W 145, p. 87)

No.

OLIVER SPRING

SE $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 20, T. 10 N., R. 31 W., near Rudy. The water is soft. Elev. 494 feet (approximately). (U. S. G. S. W 145, p. 87)

No.

DRIPPING SPRINGS

NE $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 27, T. 10 N., R. 32 W., near Stattler. The water is soft. Elev. 750 feet (approximately). (U. S. G. S. W 145, p. 87)

CRAWFORD COUNTY

No.

SHEPHERD SPRING

Sec. 4, T. 11 N., R. 29 W., 6 miles northeast of U. S. Highway 71, which is left at concrete bridge two miles north of Mountainburg. Elev. 1200 feet (approximately). (Where to go in the Ozarks, p. 112)

No.

MINERAL SPRINGS

Sec. 32, T. 11 N., R. 32 W., $1\frac{1}{2}$ miles northeast of Uniontown. This spring is strong in sulphur and is used locally for medicinal purposes. The spring is enclosed. Elev. 859 feet. (U. S. G. S. W 145, p. 87)

No.

STATE SALT SPRING

SE $\frac{1}{4}$, Sec. 2, T. 11 N., R. 33 W., near Uniontown. Elev. 755 feet (approximately). (Office of Commissioner of State Lands)

No.

WINFREY SPRING

Sec. 17, T. 12 N., R. 29 W., at Winfrey. The spring comes from Winslow sandstone. The water is soft coming as it does from sandstone. Elev. 1152 feet. (U. S. G. S. W 145, p. 87)

No.

LOCKE SPRING

Sec. 33, T. 12 N., R. 29 W., near Locke. This spring comes from Winslow sandstone. The water is soft coming as it does from sandstone. Elev. 1610 feet. (U. S. G. S. W 145, p. 87)

CRAWFORD COUNTY

No.

COLD SPRING

SW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 8, T. 12 N., R. 32 W., near Liberty Hill.
This spring drains into a fork of Cove Creek. Elev. 700
feet (approximately). (U. S. G. S. Winslow Quad.)

No.

SALINE SPRING

13 miles from Van Buren. The chemical reactions indicate
only small quantities of saline matter. It is, therefore,
a weak saline sulphuretted water. Elev. 425 feet (approx-
imately)

Analysis of Water

A small quantity of free sulphuretted hydrogen.
Bicarbonate of Lime.
Bicarbonate of Magnesia.
Sulphate of Soda (glauber salts).
Sulphate of Magnesia, (epsom salts).
Chloride of Sodium, (common salt).
Chloride of Magnesium.
(G. R. of Arkansas, 1859)

DALLAS COUNTY

No.

MATTOCKS SPRING

Sec. 2, T. 9 S., R. 16 W., 8 miles west of Princeton. The
spring is owned by Mrs. Helena Mattocks. This water was
neutral to test-paper, and had a slight odor of sulphuretted
hydrogen, though none could be detected in the water by
acetate of lead. Its character is that of a weak saline
sulphuret, and from the small amount of mineral matter which
it contains, cannot be considered unhealthy. Elev. 250 feet
(approximately)

Analysis of Water

Bicarbonate of Lime -----	A small quantity
Bicarbonate of Magnesia -----	A small quantity
Chloride of Sodium -----	A small quantity
Sulphate of Magnesia -----	A small quantity
Sulphate of Soda -----	A small quantity

(A. G. S., Second Rept. Reconnaissance-1860, p. 411)

7 and known
name. Soil of ~~any~~
of frogs.

Concrete - 18" basin -

Copperas Springs -
water

~~in small~~

near cemetery.

Leo H. Henry -

FAULKNER COUNTY

No.

RIGGIN SPRING

Sec. 3?, T. 6 N., R. 11 W., near Holland. The spring is owned by C. B. Riffin. It issues from slate and is used for domestic purposes. Elev. 300 feet.

No.

PINNACLE SPRINGS

SE $\frac{1}{4}$, Sec. 16, T. 8 N., R. 13 W., Pinnacle Springs. The spring is owned by C. C. Martin, Pinnacle Springs. The water forms a heavy deposit of iron and issues from a crevice in a sandstone bluff, immediately west of Cadron Creek. The rock beds in this locality lie approximately flat. Cadron Creek cutting deep down through these flat beds makes the landscape very rugged and picturesque. Elev. 390 feet (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	.277	1.50
Carbonate of Magnesia MgCO ₃ --	2.007	10.85
Carbonate of Lime CaCO ₃ -----	.277	1.50
Carbonate of Iron FeCO ₃ -----	13.649	73.82
Sulphate of Potash K ₂ SO ₄ -----	.184	1.00
Sulphate of Magnesia MgSO ₄ ---	1.435	7.76
Sulphate of Lime CaSO ₄ -----	.323	1.75
Organic matter -----	.338	1.82
Total -----	18.490	100.00

Analyzed in 1881, by Messrs. Wright and Merrill, of St. Louis, Missouri. Carbonic acid gas, (cubic inches) 38.3. (A. G. S. Ann. Rept., 1891, vol. 1, p. 76)

FRANKLIN COUNTY

No.

MANITOU SPRING

Sec. 5, T. 10 N., R. 27 W., Ozark. The spring is owned by the Manitou Springs Company. This spring issues from sandstone and has a yellowish gelatinous deposit. The temperature of the water from the spring is 61° and the discharge is 4 gallons per minute. Elev. 387.4 feet. (U. S. G. S. W 102)

FRANKLIN COUNTY

No.

MULBERRY SPRING

Sec. 12, T. 11 N., R. 29 W., Mulberry. The water of this spring is soft and there is an iron deposit below the spring. Elev. 292 feet. (U. S. G. S. W 102)

No.

WATALULA SPRING

Sec. 35, T. 11 N., R. 27 W., North of Ozark. This spring comes from rocks of Lower Carboniferous age. The water forms a yellow sediment on standing. Elev. 610 feet. (approximately).

Analysis of Water

Partial Analysis.

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.29	58.64
Magnesium Mg -----	.28	12.73
Calcium Ca -----	.57	25.90
Iron sesquioxide Fe_2O_3 -----)	.06	2.73
Alumina Al_2O_3 -----)		
Total -----	2.20	100.00

Water collected by assistant Arthur Winslow.

Total solid material in solution, 5.66 grains per U. S. gallon. (A. G. S. Ann. Rept., 1891, vol. 1, p. 100)

No.

STATE SALT SPRING

SW $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 24, T. 11 N., R. 28 W., Mulberry. Elev. 750 feet (approximately). (Office of Commissioner of State Lands)

Analysis of Water

"Chloride of sodium (common salt).

Bicarbonate of lime.

Bicarbonate of magnesia.

Bicarbonate of the protoxide of iron.

Sulphates, a trace."

Quoted from Owen. It is a saline water and flows from rocks of the Coal Measures. (A. G. S. Ann. Rept. 1891, vol. 1, p. 115)

FRANKLIN COUNTY

No. 97

CHALYBEATE SPRING

1½ miles northeast of Bonner's Mill near William Parker's house. This water appears to contain a considerable amount of oxide of iron, and it is therefore somewhat remarkable that it should also indicate, with acetate of lead, the presence of sulphuretted hydrogen, a combination that can only exist when the oxide of iron is held in solution by a free acid.

At and near Mr. Parker's spring, is seen the following succession of rocks: coarse-grained sandstone, alternating with flagstones, reddish-yellow and gray shales; in all about two hundred feet. In the gray shales, ten feet above the spring, there is a thin coal-dirt. Elev. 533 feet.

Analysis of Water

Bicarbonate of Lime.
Bicarbonate of Magnesia.
Bicarbonate of the Protoxide of Iron.
(First Rept. G. R. 1857, p. 228)

FULTON COUNTY

No. 98

MAMMOTH SPRING

Sec. 5-8, T. 21 N., R. 5 W., 1/8 of a mile north of Mammoth Spring Post Office. This spring issues as a subterranean stream near the base of a high bluff of cherty limestone. The course of the subterranean river that feeds the spring is thought to be marked, 8 miles northwest, by a sink hole three-fourths of a mile long known as the "Grand Gulf." The spring pool is 64 feet deep at its mouth, and the water apparently issues from a large cavern and from other large crevices in the limestone. The water is described as having a bluish tinge but as being odorless and tasteless and having a temperature of 58° or 59° F. in summer. The water is hard having about 158 parts per million of lime and 139 parts of magnesia.

The discharge was estimated by Purdue at about 150,000 gallons a minute, or about 335 second-feet, but in 1904 it was, according to Fuller, as low as 150 second-feet. On December 13, 1922, the discharge was 258 second-feet, according to a

FULTON COUNTY

measurement by F. H. Davis, of the United States Engineer Office at Memphis, Tenn. The Morgan Engineering Co., made a number of approximate measurements of this spring and concluded that the discharge at low stages is about 250 second-feet. The water from the spring is now used to operate a modern hydroelectric plant, which, according to the owners, develops 1,100 horsepower and supplies electric energy for the town of Mammoth Springs and for several towns in Missouri. Elev. 500 feet (approximately). (U. S. G. S. W 557, 1927, p. 21).

GARLAND COUNTY

No. ~~122~~ 99

HOT SPRINGS

Sec. 2 and 3, T. 3 S., R. 19 W., Hot Springs. There are 47 hot springs which gush from the base of Hot Springs Mountain in a daily flow of nearly 1,000,000 gallons. They supply 19 splendidly equipped Bath Houses and sanatariums, as well as the Government's own Army and Navy Hospital, recently completed at a cost of \$1,500,000. Elev. 579.1 feet (approximately)

Table of Hot Springs in Hot Springs National Park

1. Egg Spring--Water about 8 feet below surface of ground.
2. Arsenic Spring.
3. Arlington Spring--Spring issues from between rock ledges. Water level 7 feet below ground. Spring lies beneath gentle grassy slope.
4. Cliff Spring--Outflow from base of tufa cliff.
5. Avenue Spring--Outflow resulted from excavations and spring is not on the old maps.
6. Bath House Spring.
7. Imperial Spring--This spring is the result of sinking a hole to develop hot water in 1892.
8. Crystal Spring.
9. Rector Spring--Outflow from base of tufa cliffs.

GARLAND COUNTY

10. Cave Spring--The mound about this spring has been dissected by an open cut 5 feet wide extending from the border to the center. The best example of recent tufa formation is seen here.
11. Little Iron Spring--This spring is one of a cluster of three or more seepages and outflows gathered into the long narrow reservoir built against the base of the tufa bluff.
12. Little Geyer Springs
13. Little Iron South Spring.
14. Ral Spring--This spring flows from a mound of tufa.
15. Big Iron Spring--The spring comes from under bottom of tufa cliff 5 to 6 feet below the present surface of the ground.
16. Imperial Spring South.
17. Arsenic Spring North--Lies at base of tufa cliff.
18. Hitchcock Spring--Water level 11 to 12 feet below surface of grassy flat.
19. Sumpter Spring.
20. Superior Spring North--Occurs beside sandstone outcrop.
21. Alum Spring.
22. Superior Spring South--Lies at end of sandstone reef.
23. Twin Spring North.
24. Twin Spring South.
25. Old Hale Spring.
26. Palace Spring.
27. Tunnel Spring.
28. Maurice Spring.
29. Dripping Spring--It drops from freshly deposited tufa, colored green by hot water algae.
30. Arch Spring.
31. Haywood Spring.
32. Noble Spring.
33. Lamar Spring.
34. Wiley Spring.
35. Harding Spring.
36. Eisele Spring.
37. Stevens Spring.
38. Horseshoe Spring.
39. Army and Navy Spring.
40. W. J. Little Spring.
41. Mud Spring.
42. Magnesia Spring.
43. Reservoir Spring
44. Liver Spring--Cold-water spring.
45. Kidney Spring--Cold-water spring.
46. Fordyce Spring.
47. New Spring.

CARLAND COUNTY

No.

Typical Analysis of Hot Springs National Park Water

	<u>Grains</u>
Silica Acid -----	24.74
Sesqui Oxide of Iron -----	1.12
Alumina -----	5.15
Lime -----	28.93
Magnesia -----	.73
Chlorine -----	.07
Carbonic Acid -----	21.36
Organic Matter -----	8.31
Water -----	1.72
Sulphuric Acid -----	4.40
Potash -----	1.46
Soda -----	2.01
Iodide and Bromide, a trace -----	----
Total -----	100.00

(United States Department of Interior. The Hot Springs of Arkansas)

No.

MOUNTAIN VALLEY SPRING

NE $\frac{1}{4}$, Sec. 19, T. 1 S., R. 19 W., 12 miles north of Hot Springs. The spring is owned by Mountain Valley Springs Company. The water comes from rocks of the Lower Silurian formation on the south side of a considerable ridge. It tastes of iron and forms an iron deposit in the spring; the reaction is neutral. Elev. 750 feet. (approximately).

Analysis of Water

Hypothetical Combination

Constituents	<u>Grains per U.S. gallon</u>	<u>Per cent of total solids</u>
Silica SiO ₂ -----	.91	5.51
Chloride of Soda NaCl -----	.43	2.60
Carbonate of Magnesia MgCO ₃ --	1.90	11.50
Carbonate of Lime CaCO ₃ -----	11.38	68.86
Sulphate of Soda Na ₂ SO ₄ -----	.64	3.83
Sulphate of Potash K ₂ SO ₄ -----	.06	.37
Sulphate of Magnesia MgSO ₄ ---	.74	4.49
Sulphate of Iron FeSO ₄ -----	.02	.12
Sulphate of Alumina (Al ₂ (SO ₄) ₃)	.44	2.67
Total -----	16.52	100.00

100
No. ~~100~~ Analysis continued

46

Found.	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.91	5.51
Sodium Na -----	.38	2.30
Potassium K -----	.03	0.19
Magnesium Mg -----	.69	4.18
Calcium Ca -----	4.55	27.51
Iron Fe -----	.01	.06
Aluminum -----	.07	.43
Barium and Strontium Ba, Sr -----	.00	.00
Sulphuric Acid SO_4 -----	1.45	8.78
Carbonic Acid CO_3 -----	8.18	49.46
Bromine, Iodine, Manganese, Titanium, Lithium (Br, I, Mn, Ti, Li) -----	.00	.00
Chlorine Cl -----	.26	1.58
Phosphoric Acid P_2O_5 -----	.00	.00
Total -----	16.53	100.00

The water for analysis was collected by assistant L. S. Griswold, from the largest and most used spring at Mountain Valley. (A. G. S. Ann. Rept. 1891, vol. 1, p. 69)

No. ~~100~~ 101

GRANDMA CHASE'S SPRINGS

NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 30, T. 2 S., R. 18 W., 6 miles northeast of the City of Hot Springs. The best known of the springs are the Red Chalybeate and the Dripping springs. These come from the north face of Cutter's Mountain and are on the south side of the middle fork of Gulpha Creek. The rocks of this region belong to the Lower Silurian age. These little springs issue almost at the foot of the north slope of Cutter's Mountain, on the west bank of the middle fork of Gulpha Creek. The water is clear, tasteless and odorless, with a neutral reaction. No deposit of iron is made by the water.

The water for analysis was collected from what appeared to be the boldest of these springs, which is next to the last one going up the creek (east), and low down on the bank of the creek. The flow of this spring is intermittent. A stream of clear water about the size of an ordinary lead pencil flows from five to ten minutes at a time. Elev. 533 feet.

101

47

No. ~~102~~--Continued

Analysis of Water from Dripping Spring

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.81	6.12
Chloride of Soda NaCl -----	.30	2.26
Chloride of Potash KCl -----	.05	.38
Chloride of Magnesia MgCl_2 ----	.20	1.51
Carbonate of Lime CaCO_3 -----	10.90	82.33
Sulphate of Magnesia MgSO_4 ----	.59	4.46
Sulphate of Lime CaSO_4 -----	.19	1.43
Sulphate of Iron FeSO_4 -----	.20	1.51
Total -----	13.24	100.00

Found.

Silica SiO_2 -----	.81	6.11
Sodium Na -----	.12	.90
Potassium K -----	.03	.23
Magnesium Mg -----	.17	1.28
Calcium Ca -----	4.42	33.36
Lithium Li -----	.00	.00
Iron Fe -----	.07	.53
Aluminum Al -----	trace	trace
Sulphuric Acid SO_4 -----	.73	5.51
Carbonic Acid CO_3 -----	6.54	49.36
Chlorine Cl -----	.36	2.72
Phosphoric Acid P_2O_5 -----	.00	.00
Total	13.25	100.00

Water collected by R. N. Brackett, November 3, 1889.

Temperature of water, 59.18°F .

Total solid material in solution, 13.003 grains per U. S. gallon.

Carbonic Acid CO_2 , free and for bicarbonates, 3.33 grains per U. S. gallon. (A. G. S. Ann. Rept. 1891, vol. 1, p. 48)

No.

McLENDON HEALTH SPRINGS

SW $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 32, T. 2 S., R. 18 W., 7 miles east of Hot Springs. The springs are owned by Bertha J. Busch. Four springs, combined flow about 40,000 gallons per day. They are marketed by McLendon Health Spring Water Company. Elev. 400 feet (approximately). (Bertha J. Busch)

No. ~~102~~ ¹⁰² --Continued

48

Analysis of Water from McLendon Spring

	Parts per million
Silica Oxide -----	8.5
Iron Fe -----	0.6
Aluminum Al -----	1.6
Lime Ca -----	42.5
Magnesium Mg -----	3.6
Sulphates SO ₄ -----	8.7
Chlorine Cl -----	5.0
Sodium Na -----	1.1
Potassium K -----	2.1
Lithium Li -----	0.5
Carbonate radicle CO ₃ -----	66.0
Total Solids -----	140.0
Volatile Substances -----	10.0
(Bertha J. Busch)	

No. ~~104~~ 103

BIG CHALYBEATE SPRING

NW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 22, T. 2 S., R. 19 W., Mountain Valley. This spring comes from shales of Lower Silurian age, that underlie the novaculites of that region. The spring is rectangular in shape, about 6 feet wide by 9 feet long and from 15 inches to 2 feet deep. The loose rocks in the bottom of the pool are covered with patches of flocculent, moss-like deposit, of pale greenish or reddish yellow color, adhering in places. The deposit in the stream flowing from the spring is light reddish yellow near the spring, changing to bright, slightly yellowish red farther away. The discharge of the spring is 268,540 gallons every 24 hours (determined by H. D. Mitchell) Elev. 750 feet (approximately).

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	.22	1.65
Chloride of Soda NaCl -----	.20	1.50
Chloride of Lithium LiCl ---	trace	trace
Carbonate of Magnesia MgCO ₃	1.12	8.39

103
No. ~~103~~ Analysis continued

49

	Grains per U.S. gallon	Per cent of total solids
Carbonate of Lime CaCO_3 -----	10.24	76.70
Carbonate of Iron FeCO_3 -----	.89	6.67
Sulphate of Potash K_2SO_4 ---	.66	4.94
Sulphate of Magnesia MgSO_4 -	.02	.15
Total -----	13.35	100.00

Found.

Silica SiO_2 -----	.22	1.64
Sodium Na -----	.08	.60
Potassium K -----	.18	1.34
Magnesium Mg -----	.24	1.79
Calcium Ca -----	4.10	30.55
Iron Fe -----	.43	3.20
Sulphuric Acid SO_4 -----	.55	4.10
Carbonic Acid CO_3 -----	7.50	55.89
Chlorine Cl -----	.12	.89
Total -----	13.42	100.00

Water collected by assistant H. E. Williams; analysis by A. E. Menke.

Total solid material in solution, 12.08 grains per U. S. gallon.

Temperature of air, 40.28° F.; water, 78.98° F.

(A. C. S. Ann. Rept. 1891, vol. 1, p. 28)

No. ~~103~~ 104

RED CHALYBEATE SPRING

NE $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 25, T. 2 S., R. 19 W., 6 miles northeast of Hot Springs. The spring forms a copious deposit of reddish brown hydroxide of iron on the sides and on the bottom. It is clear, and has a very slight odor but no sulphuretted hydrogen. This spring is one of Grandma Chase's. Elev. 533 feet (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.72	24.74
Chloride of Soda NaCl -----	.08	24.75
Chloride of Potash KCl -----	.01	.34
Chloride of Magnesia MgCl_2 --	.19	6.53

104

50

No. ~~105~~ Analysis continued

	Grains per U.S. gallon	Per cent of total solids
Carbonate of Lime CaCO_3 -----	.18	6.53
Sulphate of Magnesia MgSO_4 ----	.49	16.84
Sulphate of Lime CaSO_4 -----	.49	16.84
Sulphate of Iron FeSO_4 -----	.75	25.77
Total -----	<u>2.91</u>	<u>100.00</u>

Found.

Silica SiO_2 -----	.72	24.87
Sodium Na -----	.03	1.04
Potassium K -----	.005	.17
Magnesium Mg -----	.14	4.84
Calcium Ca -----	.22	7.60
Lithium Li -----	good trace	good trace
Iron Fe -----	.27	7.33
Aluminum Al -----	trace	trace
Sulphuric Acid SO_4 -----	1.21	41.79
Carbonic Acid CO_3 -----	.11	3.80
Chlorine Cl -----	.19	6.56
Phosphoric Acid P_2O_5 -----	<u>strong trace</u>	<u>strong trace</u>
Total -----	<u>2.89</u>	<u>100.00</u>

Water collected by R. N. Brackett, November 3, 1889.

Amount of water used for analysis, $1\frac{1}{2}$ gallons.

Temperature of water, 62.78°F .

Total solid material in solution, 3.02 grains per U. S. gallon.

Carbonic Acid CO_2 , free and for bicarbonates, 6.34 grains per U. S. gallon.

(A. G. S. Ann. Rept. 1891, vol. 1, p. 50)

No. ~~104~~ 105GILLER'S WHITE SULPHUR SPRING

$\text{SE}\frac{1}{4}$, Sec. 26, T. 2 S., R. 19 W., 3 miles northeast of Hot Springs. The water comes from rocks of Lower Silurian age and is said to have good medicinal properties.

Analysis of Water

Constituents

Carbonates of iron, lime, and magnesia; traces of organic matter and very small quantities of sulphuric acid and free carbonic acid.

105⁵
No. ~~105~~ 106--Analysis continued

51

Chlorine is absent. Sulphuretted hydrogen cannot be detected even in traces. Exposed to the air, iron oxide in small amount is slowly deposited. Total residue on evaporation, sixteen grains to a gallon. Altogether similar in composition to "Mountain Valley" water, near Hot Springs. Elev. 525 feet (approximately). (A. G. S. Ann. Rept. 1891, vol. 1, p. 107).

No. ~~105~~ 106

BLANCO SPRING

NE $\frac{1}{4}$, Sec. 1, T. 2 S., R. 21 W., Cedar Glades. It is in rocks of the Lower Silurian formation. Elev. 810 feet (approximately).

Analysis of Water

Hypothetical Combination

Constituents	Grains per U. S. gallon	Per cent of total solids
Silica SiO ₂ -----	1.29	7.93
Chloride of Potash KCl -----	.06	.37
Chloride of Magnesia MgCl ₂ -----	.51	3.13
Carbonate of Soda Na ₂ CO ₃ -----	.53	3.26
Carbonate of Potash K ₂ CO ₃ -----	.28	1.72
Carbonate of Magnesia MgCO ₃ -----	1.16	7.13
Carbonate of Lime CaCO ₃ -----	11.71	71.98
Sulphate of Magnesia MgSO ₄ -----	.14	.86
Sulphate of Lime CaSO ₄ -----	.52	3.20
Iron Oxide Fe ₂ O ₃ -----	.03	.18
Alumina Al ₂ O ₃ -----	.04	.24
Total -----	16.27	100.00

Found.

Silica SiO ₂ -----	1.29	7.93
Sodium Na -----	.23	1.41
Potassium K -----	.19	1.17
Calcium Ca -----	4.84	29.73
Magnesium Mg -----	.49	3.10
Iron Fe -----	.02	.12
Aluminum Al -----	.02	.12
Sulphuric Acid SO ₄ -----	.48	2.95
Carbonic Acid CO ₃ -----	8.28	50.86
Chlorine Cl -----	.41	2.52
Oxygen (basic) -----	.03	.18
Total -----	16.28	100.00
Total solid material in solution, 16.41 grains per U. S. gal.		

No. ~~105~~ ¹⁰⁶ --Continued

58

The natural deposit made by the Blanco spring was analyzed with the following result:

Analysis of the deposit made by Blanco Spring.

Silica SiO_2 -----	4.81
Soda Na_2O -----)	.71
Potash K_2O -----) by Difference (	.71
Magnesia MgO -----	.11
Lime CaO -----	50.61
Iron (ferric oxide) (Fe_2O_3) ----	.42
Alumina Al_2O_3 -----	1.21
Phosphoric Acid P_2O_5 -----	.07
Loss on ignition -----	42.06
Total -----	<u>100.00</u>

Water lost at $230^\circ\text{--}239^\circ\text{ F. (}110^\circ\text{--}115^\circ\text{ C.)}$.78

Material dried at $230^\circ\text{--}239^\circ\text{ F. (}100^\circ\text{--}115^\circ\text{ C.)}$

(A. G. S. Ann. Rept. 1891, vol. 1, p. 30-31)

No. ~~106~~ ¹⁰⁷

CRYSTAL SPRINGS

Sec. 34, T. 2 S., R. 22 W. In the black dolomite, near an anticlinal fold, a number of excellent chalybeate springs emerge along the sides of the Crystal Creek. Some of them are quite small, but there are several of large dimensions. These springs are mostly clustered within a small area in the little town of Crystal Springs, which is admirably situated for a watering place. A few of the bowls of the springs are surrounded by evidence of former greater activity, and some have deposits which suggest that thermal waters once overflowed from them. Elev. 814 feet. (A. G. S. Ann. Rept. 1891, vol. 1, p. 106)

No. ~~107~~ ¹⁰⁸

POTASH SULPHUR SPRINGS

NW $\frac{1}{4}$, Sec. 17, T. 3 S., R. 21 W., about 7 miles southeast of the City of Hot Springs. The springs, which have attained a wide and valuable reputation for their curative properties, are three in number and are all within a radius of twenty feet. Each spring is under cover; the water wells up in each through large sewer tiles which are imbedded in the rock, and from which the water is dipped. The springs flow from metamorphosed sedimentary rocks but they are very near the line of contact between the sedimentary and the igneous rocks. To the east, north and west of the springs

are high hills, those east and north being of sedimentary, and those to the west, of igneous origin. Elev. 389 feet.

Analysis of Water from West Spring

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.90	3.66
Chloride of Soda NaCl (common salt) -----	5.04	9.71
Carbonate of Soda Na_2CO_3 ----	10.45	20.14
Carbonate of Magnesia MgCO_3 -	trace	trace
Carbonate of Lime CaCO_3 ----	.49	.95
Carbonate of Iron FeCO_3 ----	.32	.62
Carbonate of Manganese MnCO_3	trace	trace
Sulphate of Soda Na_2SO_4 ----		
(Glauber's salt) -----	32.80	63.22
Sulphate of Potash K_2SO_4 ----	.88	1.70
Sulphide of Soda Na_2S -----	trace	trace
Alumina Al_2O_3 -----	trace	trace
Total -----	51.88	100.00

Found.

Silica SiO_2 -----	1.90	3.66
Sodium Na -----	17.16	33.08
Potassium K -----	.40	.77
Magnesium Mg -----	trace	trace
Calcium Ca -----	.19	.37
Iron Fe -----	.15	.29
Aluminum Al -----	trace	trace
Manganese Mn -----	trace	trace
Sulphuric Acid SO_4 -----	22.65	43.67
Carbonic Acid CO_3 -----	6.37	12.28
Chlorine Cl -----	3.05	5.88
Sulphuretted Hydrogen H_2S ---	trace	trace
Total -----	51.87	100.00

Water collected by C. B. Gannaway, October, 1887.
Analysis by the Geological Survey, C. B. Gannaway
analyst.

Temperature of the water, 64° F.

Total solids in solution, 51.89 grains per U. S. gallon.

Free carbonic acid, 2.56 grains per U. S. gallon.

Faint order of sulphuretted hydrogen.

GARLAND COUNTY

No.

Analysis of Water from East Spring

Hypothetical Combination

Constitutents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.60	4.10
Chloride of Soda NaCl (common salt) -----	1.91	4.90
Chloride of Potash KCl -----	2.52	6.46
Carbonate of Soda Na_2CO_3 ----	15.00	38.44
Carbonate of Lime CaCO_3 -----	.46	1.18
Sulphate of Soda Na_2SO_4 (Glauber's salt) -----	17.42	44.64
Alumina Al_2O_3 -----	.11	.28
Total -----	39.02	100.00

Found

Silica SiO_2 -----	1.60	4.12
Sodium Na -----	12.92	33.29
Potassium K -----	1.32	3.41
Magnesium Mg -----	.00	.00
Calcium Ca -----	.18	.46
Alumina Al_2O_3 -----	.11	.28
Sulphuric Acid SO_4 -----	11.82	30.46
Carbonic Acid CO_3 (by differ- ence) -----	8.50	21.90
Sulphuretted hydrogen H_2S	.00	.00
Chlorine Cl -----	2.36	6.08
Total -----	38.81	100.00

Analysis by Prof. F. W. Clarke, chemist of the U. S. Geological Survey. Quoted from Bulletin No. 55 of the U. S. Geological Survey, p. 92.
Total solids in solution, 39.04 grains per U. S. gallon.
(A. G. S. Ann. Rept. 1891, vol. 1, p. 77-78-79.)

No.

SOUR ROCK SPRING

$2\frac{1}{2}$ miles west of Hot Springs. This spring is owned by Miss Ruth Van Loon. The water is marketed by Sour Rock Mineral Spring Water Company. Elev. 513 feet (approximately)

GARLAND COUNTY

No.

Analysis of Water from Sour Rock Spring

	Parts per million	Grains per U. S. gallon
Acidity in terms of CaCO_3 -----	89.0	5.192
Free carbon dioxide	32.1	1.873
Mineral acid and sulphates	42.0	2.450
Odor--none		
Nitrates--none		
Total dissolved solids	67.2	3.920
Silica SiO_2 -----	6.4	0.268
Oxides of iron and alumina		
$\text{Al}_2\text{O}_3\text{Fe}_2\text{O}_3$ -----	6.0	0.350
Calcium Ca -----	7.9	0.461
Magnesium Mg--trace		
Sulphate SO_4 -----	23.2	1.353
Chlorine Cl -----	5.0	0.292
(Analyst: Hale. Laboratory No. 2080)		

No.

THREE SISTERS SPRINGS

21 miles off Cedar Glades Road northwest of Hot Springs.
The spring is owned by W. M. Cecil and the water is marketed
by the McFadden Water Company, Royal Theater Building, Hot
Springs.

Analysis of Water

	Water No. 1	Water No. 2	Water No. 3
	Grains per gallon		
Sodium chloride -----	43.00	.296	.207
Magnesium chloride -----	.038	.11	.183
Potassium sulphate -----	.26	.36	.26
Calcium sulphate -----	.89	.813	.89
Calcium carbonate -----	1.56	1.50	1.56
Oxide of iron and alumina -	.17	.136	.192
Silica -----	.95	.87	.76
(W. M. Cecil)			

No.

HAPPY HOLLOW

T. 2 S., R. 19 W., Hot Springs. The spring is owned by the
Arlington Hotel, Hot Springs. This water is marketed by
the Happy Hollow Springs, Hot Springs. The water is colorless,
odorless and tasteless, with neutral reaction. Elev. 580
feet (approximately).

111
No. ~~111~~2--Continued

56

Analysis of Water from Happy Hollow

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.38	23.30
Chloride of Soda NaCl -----	.22	13.51
Chloride of Potash KCl -----	.04	2.45
Chloride of Magnesia MgCl_2 --	.001	.05
Carbonate of Magnesia MgCO_3 -	.09	5.51
Carbonate of Lime CaCO_3 -----	.77	47.23
Sulphate of Magnesia MgSO_4 --	.09	5.51
Sulphate of Alumina $\text{Al}_2(\text{SO}_4)_3$	.02	1.22
Sulphate of Iron FeSO_4 -----	.02	1.22
Total -----	1.63	100.00

Found.

Silica SiO_2 -----	.38	23.00
Sodium Na -----	.09	5.43
Potassium K -----	.02	1.20
Magnesium Mg -----	.04	2.43
Calcium Ca -----	.31	18.77
Lithium Li -----	.00	.00
Iron Fe -----	.01	.54
Aluminum Al -----	.004	.20
Sulphuric Acid SO_4 -----	.11	6.65
Carbonic Acid CO_3 calculated	.53	32.10
Bromine and Iodine Br, I ----	.00	.00
Chlorine Cl -----	.16	9.68
Phosphoric Acid P_2O_5 -----	trace	trace
Manganese Mn -----	trace	trace
Titanium Ti -----	.00	.00
Total -----	1.654	100.00

Total solid material in solution, dried at 110° - 115° C.,
1.69 grains per U. S. gallon.

Free carbonic acid (CO_2), 4.54 grains per U. S. gallon.
(A. G. S. Ann. Rept. 1891, vol. 1, p. 52)

No. ~~111~~ 112

HAPPY HOLLOW CHALYBEATE

T. 2 S., R. 19 W., Hot Springs. This spring is
about 100 feet west of the Happy Hollow spring. The water
has a faint chalybeate taste and the sides of the pipe
through which it flows and the bottom of the spring are

covered with a flocculent, yellowish-red precipitate of hydrated oxide of iron; the water is colorless and odorless.

Analysis of Water from
Happy Hollow Chalybeate Spring

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.86	28.17
Chloride of Soda NaCl -----	.35	11.46
Chloride of Potash KCl -----	.10	3.28
Carbonate of Magnesia MgCO_3 --	.20	6.55
Carbonate of Lime CaCO_3 -----	.20	6.55
Sulphate of Potash K_2SO_4 -----	.003	.10
Sulphate of Magnesia MgSO_4 ---	.16	5.24
Sulphate of Iron FeSO_4 -----	1.01	33.08
Sulphate of Alumina $\text{Al}_2(\text{SO}_4)_3$	.17	5.57
Total -----	3.05	100.00

Found.

Silica SiO_2 -----	.86	28.10
Sodium Na -----	.14	4.58
Potassium K -----	.05	1.63
Magnesium Mg -----	.09	2.94
Calcium Ca -----	.08	2.61
Lithium Li -----	trace	trace
Iron Fe -----	.37	12.09
Aluminum Al -----	.03	.98
Manganese Mn -----	.00	.00
Sulphuric Acid SO_4 -----	.92	30.07
Carbonic Acid CO_3 -----	.26	8.50
Phosphoric Acid P_2O_5 -----	.00	.00
Chlorine Cl -----	.26	8.50
Bromine and Iodine Br and I --	.00	.00
Barium and Strontium Ba, Sr --	.00	.00
Titanic Acid TiO_2 -----	.00	.00
Total -----	3.06	100.00

A little less than seven gallons of the water was collected and concentrated for analysis.
The temperature of the air ranged from 50.9° to 74.3° F.
Average temperature of the water, 64.58° F.
Total solid material in solution, 3.81 grains per U. S. gallon.
Carbonic acid (CO_2), free and for bicarbonates, 6.43 grains per U. S. gallon. (A. G. S. Ann. Rept. 1891, vol. 1, p. 54)

GARLAND COUNTY

No.

SLEEPY WATER

NE $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 27, T. 2 S., R. 19 W., Hot Springs National Park. The spring is owned and the water is marketed by the Chewaukla Mineral Springs Company, 400 W. Erie St., Chicago. It is marketed under the name of Sleepy Water. The approximate flow per day is 16,500 gallons. Elev. 580 feet (approximately).

Analysis of Water

	Parts per million
Carbon dioxide CO ₂ -----	11.00
Chloride Cl -----	8.00
Sulphates SO ₄ -----	21.00
Silicon, as silicon dioxide SiO ₂ -----	6.70
Aluminum, as aluminum oxide Al ₂ O ₃ -----	3.07
Iron, as ferric oxide Fe ₂ O ₃ -----	3.60
Calcium oxide CaO -----	7.56
Magnesium, as magnesium oxide MgO -----	1.43
Sodium and potassium, as sodium oxide Na ₂ O -----	14.10
Manganese, as manganese dioxide MnO ₂ -----	0.80
Ammonia NH ₄ -----	0.115
(Chewaukla Mineral Springs Company).	

No.

DE SOTO SPRING

Sec. 33, T. 2 S., R. 19 W., Hot Springs National Park. The spring is owned by the Mountain Valley Spring Co., Hot Springs. It is marketed by the De Soto Spring Company, 306 Central Avenue, Hot Springs. The maximum discharge per day is 5,000 gallons. Elev. 578.1 feet. (De Soto Spring Company)

No.

← LITHOX SPRING

Sec. 33, T. 2 S., R. 19 W., Hot Springs National Park. The spring is owned by George W. Jamieson. The water is marketed by the Lithox Mineral Company, 179 Cedar St., Hot Springs. The maximum discharge per day is 25,000 gallons. Elev. 579.1 feet. (Lithox Mineral Company)

GARLAND COUNTY

No.

Analysis of Water

	Parts per million
Silica SiO_2 -----	14.45
Oxides of Iron and Aluminum FeO & Al_2O_3 -----	18.50
Calcium Ca -----	124.95
Magnesium Mg -----	31.43
Sulphates SO_4 -----	32.43
Bicarbonates HCO_3 -----	152.43
Sodium Na -----	18.32
Phosphates PO_4 -----	3.00
Lithium Li -----	1.48
Chlorine Cl -----	13.75
Potassium K -----	2.97
Total Solids -----	<u>391.00</u>
Organic impurities -----	none
Analyst: Wm. F. Manglesdorf, M. D., Little Rock, Ark.	

No.

RADIO MAGNESIA SPRINGS

Sec. 33, T. 2 S., R. 19 W., Hot Springs National Park. The spring is owned by Thos. H. Hulbert, Est. The water is marketed by the Radio Magnesia Springs Company, 206 Central Avenue, Hot Springs. The maximum discharge per day is 1,000 gallons. Elev. 579.1.

Analysis of Water

	Parts per million
Silica -----	<u>.573</u>
Ferric oxide -----	trace
Alumina -----	2.57
Calcium Sulphate -----	4.96
Calcium Bicarbonate -----	9.14
Magnesium Bicarbonate -----	2.02
Sodium Chloride -----	2.81
Free Carbonic Acid -----	24.61
Analyst: L. McMaster, Professor of Chemistry, Bush Hall, Washington University, St. Louis, Mo. (Radio Magnesia Springs Company).	

GARLAND COUNTY

No. 117

PINE MOUNTAIN SPRING

Sec. 26, T. 2 S., R. 17 W., Lonsdale. A spring on Pine Mountain above the station at Lonsdale on the Missouri Pacific Railroad. Elev. 400 feet (approximately). Information and analysis furnished by E. F. Hassensall, 2941 Field Avenue, Detroit, Michigan.

Analysis of Water

Constituents	Parts per Million	Combining Values
Calcium (Ca)	58.40	2.920
Iron (Fe)	1.34	0.072
Magnesium (Mg)	3.61	0.300
Aluminum (Al)	0.16	- - -
Sodium (Na)	2.77	0.120
Potassium (K)	1.22	0.031
Silica (SiO ₂)	14.47	
	Total	- - - 3.443
Bicarbonate Radical (HCO ₃) .	176.00**	2.885
Carbonate Radical (CO ₃) . .	0.00	- - -
Sulfate Radical (SO ₄) . . .	15.62	0.325
Chloride Radical (Cl)	3.00	0.098
Bromide Radical (Br)	trace	- - -
Iodide Radical (I)	trace	- - -
Phosphate Radical (PO ₄) . .	3.00	0.095
Nitrate Radical (NO ₃)	0.85	0.013
Nitrite Radical (NO ₂) . . .	0.0005	- - -
	Total	- - - 3.416
Sum of Constituents	181.00	
Total Residue on Evaporation	191.31	

** In calculating the sum of the constituents the bicarbonates are converted into carbonates.

(Signed) James R. Thayer, P.A., M.S., Ph.D. St. Louis, Mo.

HEMPSTEAD COUNTY

No. 118

LONG SPRING

Sec. 19, T. 9 S., R. 24 W., near Dotson. Elev. 350 feet
(approximately).

Analysis of Water

Qualitative Analysis

Magnesium Mg -----)	--Chief constituents
Hydrochloric Acid HCl -----)	
Sodium Na -----)	
Potassium K -----)	--Small quantities
Calcium Ca -----)	
Iron Fe -----)	
Sulphuric Acid SO ₄ -----)	--very little.

The dissolved matter in the water, therefore, appears to be:

Chloride of Magnesia MgCl ₂ -----)	--Chiefly.
Sulphate of Magnesia MgSO ₄ -----)	
Chloride of Soda NaCl -----)	--in smaller quantities
Chloride of Potash KCl -----)	
Chloride of Lime CaCl ₂ -----)	
Sulphate of Potash K ₂ SO ₄ -----)	
Sulphate of Lime CaSO ₄ -----)	
Sulphate of Oxide of Iron -----)	

Water collected by Hon. J. D. Conway, Washington, Hempstead county.

Analysis by Brackett and Smith.

Temperature of air, 85° F; of water, 58° F.

Total solids in solution, dried on water bath, 4.33 grains per U. S. gallon.

Total solid material after ignition, 3.58 grains per U. S. gallon. Upon ignition the solids burn brown and finally white, giving off white fumes with no decided odor. The water is clear, odorless and tasteless. A slight yellowish sediment (iron hydroxide) is formed by the water.

(A. G. S. Ann. Rept., 1891, vol. 1, p. 110.)

HEMPSTEAD COUNTY

No.

SULPHUR SPRING

Sec. 28, T. 9 S., R. 25 W., near Hickory Creek. Elev. 300 feet (approximately). (United States Geological Survey p 46)

No.

LITHIA SPRINGS

Sec. 19, T. 13 S., R. 24 W., 5½ miles south of Hope. The springs are owned by E. Merrick. The water is clear but has a brownish yellow color and contains much organic matter. A slight sediment was formed in each bottle. Elev. 300 feet (approximately).

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silicate of Soda Na_2SiO_3 ----	9.62	14.96
Silicate of Potash K_2SiO_3 ---	.02	.03
Chloride of Soda NaCl -----	13.82	21.53
Chloride of Magnesium MgCl_2 -	11.13	17.31
Chloride of Lime CaCO_3 -----	8.02	12.48
Sulphate of Magnesia MgSO_4 --	4.75	7.39
Sulphate of Lime CaSO_4 -----	4.05	6.30
Sulphate of Iron FeSO_4 -----	2.81	4.37
Sulphate of Alumina ($\text{Al}_2(\text{SO}_4)_3$)	2.14	3.33
Organic matter -----	7.91	12.30
Total -----	64.27	100.00

Found

Silica SiO_2 -----	4.74	7.37
Sodium Na -----	9.08	14.12
Potassium K -----	.01	.02
Magnesium Mg -----	3.76	5.85
Calcium Ca -----	4.40	6.84
Lithium Li -----	undt.	undt.
Iron Fe -----	1.03	1.63
Aluminum Al -----	.34	.53
Sulphuric Acid SO_4 -----	10.24	15.93
Carbonic Acid CO_3 calculated	4.81	7.48
Chlorine Cl -----	16.70	25.97
Oxygen (basic) -----	1.26	1.96
Organic matter -----	7.91	12.30
Total -----	64.28	100.00

(A. G. S. Ann. Rept., 1891, vol. 1, p. 62)

HEMPSTEAD COUNTY

No.

DYKE SPRING

Near Hope. Water was hauled from this spring and sold in Hope when it was a village and had but few wells. The price was 25¢ per barrel, 5 buckets for 10¢, and 2 buckets for 5¢. (Hope Star, Centennial Edition, 1936)

HOT SPRING COUNTY

No.

SULPHUR SPRINGS

Sec. 19, T. 3 S., R. 17 W., near Magnet Cove. This spring is owned by Andrew Mitchell. The spring was tested qualitatively at the fountain-head, and found to be an alkaline, saline water, similar in its properties to the Main Fairchild's Spring, but less strongly impregnated with alkalies. Elev. 525 feet. (Arkansas Geological Survey Second Report of a Geological Reconnaissance-1860, p. 106)

No.

CHALYBEATE SPRINGS

Sec. 19, T. 3 S., R. 17 W. The spring is owned by Andrew Mitchell. This spring is on Stone quarry Creek. Elev. 199 feet (approximately).

Analysis of Water

Bicarbonate of Iron
Bicarbonate of Lime
Bicarbonate of Magnesia
Chloride of Sodium (Common Salt)
Sulphate of Soda
Sulphate of Magnesia
Subcarbonate of Soda
(Arkansas Geological Survey Second Report of a Geological Reconnaissance-1860, p. 106)

No.

DOVE PARK SPRING-No. 1

NE $\frac{1}{4}$, Sec. 35, T. 6 S., R. 18 W., 4 miles east of Witherspoon on the Mo. Pac. The Dove Springs were formerly generally known as the "Brown Springs." There are not less than six flowing springs with numerous seeps, many of which might flow if opened.

HOT SPRING COUNTY

68

68

A hill of sand covered with gravel, and about 50 feet high, extends in a general east and west direction along the south side of White Oak Creek south of the springs, forming a bluff on the creek bank a few hundred yards above the main group. At the base of this hill is a small exposure of yellow clay. The soil about the springs is of a clayey nature.

A considerable deposit of iron is formed around all the springs. The water has a pleasant taste and no odor. There is no village about the springs, and but few houses, which during the summer season are often occupied by visitors; in November 1891, there was no one living there, the nearest resident being half a mile south.

Water for analysis was collected from these springs by assistant T. C. Hopkins.

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	3.26	29.66
Chloride of Soda NaCl -----	1.37	12.47
Carbonate of Magnesia MgCO_3 ---	.59	5.37
Carbonate of Lime CaCO_3 -----	2.92	26.57
Carbonate of Iron FeCO_3 -----	.74	6.73
Sulphate of Soda Na_2SO_4 -----	1.91	17.38
Alumina Al_2O_3 -----	.20	1.82
Total -----	10.99	100.00

Found.

Silica SiO_2 -----	3.26	29.69
Sodium Na -----	1.16	10.56
Magnesium Mg -----	.17	1.55
Lime CaO -----	1.63	14.84
Iron Fe -----	.35	3.19
Alumina Al_2O_3 -----	.20	1.82
Sulphuric Acid SO_4 -----	1.29	11.75
Carbonic Acid CO_3 -----	2.09	19.04
Chlorine Cl -----	.83	7.56
Total -----	10.98	100.00

Analysis by A. E. Menke.

Temperature of air, 70.88° F.; temperature of water 61.7° F.

Total solids in solution, 11.16 grains per U. S. gallon.

(A. G. S. Ann. Rept, 1891, vol. 1, p. 36-37)

No. 125

DOVE PARK SPRING-No. 2

NE $\frac{1}{4}$, Sec. 35, T. 6 S., R. 18 W., 4 miles east of Wither-
spoon on the Mo. Pac. (see note under spring No. 127)
Elev. 212 feet (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	3.60	39.47
Chloride of Soda NaCl -----	.89	9.76
Carbonate of Magnesia MgCO ₃ ---	.79	8.66
Carbonate of Lime CaCO ₃ -----	1.97	21.60
Carbonate of Iron FeCO ₃ -----	.69	7.57
Sulphate of Soda Na ₂ SO ₄ -----	.96	10.53
Alumina Al ₂ O ₃ -----	.22	2.41
Total -----	<u>9.12</u>	<u>100.00</u>

Found.

Silica SiO ₂ -----	3.60	39.48
Sodium Na -----	.66	7.24
Magnesium Mg -----	.22	2.42
Lime CaO -----	1.10	12.05
Iron Fe -----	.35	3.86
Alumina Al ₂ O ₃ -----	.22	2.46
Sulphuric Acid SO ₄ -----	.65	7.14
Carbonic Acid CO ₃ -----	1.77	19.42
Chlorine Cl -----	.54	5.94
Total -----	<u>9.11</u>	<u>100.00</u>

Analysis by A. E. Menke.

Temperature of air, 70.88° F.; temperature of water,
63.5° F.

Total solids in solution, 9.25 grains per U. S. gallon.
(A. G. S. Ann. Rept., 1891, vol. 1, p. 38).

No. 126

DOVE PARK SPRING-No. 3

NE $\frac{1}{4}$, Sec. 35, T. 6 S., R. 18 W., 4 miles east of Wither-
spoon, Mo. Pac. (see note under spring No. 127). Elev. 212
feet (approximately).

No. 126-Continued

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	3.61	38.00
Chloride of Soda NaCl -----	1.03	10.84
Carbonate of Magnesia MgCO_3 ---	.51	5.37
Carbonate of Lime CaCO_3 -----	1.97	20.74
Carbonate of Iron FeCO_3 -----	.88	9.26
Sulphate of Soda Na_2SO_4 -----	1.24	13.05
Alumina Al_2O_3 -----	.26	2.74
Total -----	9.50	100.00

Found.

Silica SiO_2 -----	3.61	38.01
Sodium Na -----	.80	8.43
Magnesium Mg -----	.15	1.59
Lime CaO -----	1.10	11.59
Iron Fe -----	.42	4.43
Alumina Al_2O_3 -----	.26	2.75
Sulphuric Acid SO_4 -----	.84	8.86
Carbonic Acid CO_3 -----	1.69	17.80
Chlorine Cl -----	.62	6.54
Total -----	9.49	100.00

Analysis by A. E. Menke.

Temperature of air, 40.68°F .; temperature of water, 63.05°F .

Total solids in solution, 9.08 grains per U. S. gallon.

(A. G. S. Ann. Rept., 1891, vol. 1, p. 39)

No. 127

DOVE PARK-SPRING- No. 4

$\text{NE}\frac{1}{4}$, Sec. 35, T. 6 S., R. 18 W., 4 miles of Witherspoon,
Mo. Pacific. (see note under spring No. 127). Elev. 212
feet (approximately).

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	3.59	44.82
Chloride of Soda NaCl -----	.89	11.11

No. 127-Analysis continued

	Grains per U.S. gallon	Per cent of total solids
Carbonate of Lime CaCO_3 -----	.83	10.36
Carbonate of Iron FeCO_3 -----	.74	9.24
Sulphate of Soda Na_2SO_4 -----	1.84	22.97
Alumina Al_2O_3 -----	.12	1.50
Total -----	8.01	100.00

Found.

Silica SiO_2 -----	3.59	44.88
Sodium Na -----	.94	11.75
Lime CaO -----	.46	5.75
Iron Fe -----	.35	4.38
Alumina Al_2O_3 -----	.12	1.50
Sulphuric Acid SO_4 -----	1.25	15.62
Carbonic Acid CO_3 -----	.75	9.37
Chlorine Cl -----	.54	6.75
Total -----	8.00	100.00

Analysis by A. E. Menke.

Temperature of air, 72.68°F. ; temperature of water 62.15°F.

Total solids in solution, 8.83 grains per U. S. gallon.
(A. G. S. Ann. Rept., 1891, vol. 1, p. 40)

No. 128

FAIRCHILD SPRINGS

These mineral springs are southwest of Hot Springs near Gulpha Creek. Near the Fairchild's Mineral Spring, the rock is a kind of quartz porphyry, among which a calc spar rock is also found. This mineral water was tested at the fountain-head, and the main constituents found to be

Subcarbonate of Soda,	Sulphate of Magnesia
Chloride of Sodium (common salt),	(Epsom salts),
Sulphuret of Sodium,	Bicarbonate of Lime,
Trace of free sulphuretted hydrogen.	

This is a very strong alkaline, saline, sulphuretted water, the alkaline effect being the most prominent in its medical properties. The Upper Chalybeate Fairchild's Spring was found to contain pretty much the same ingredients, only less sulphates. There was not much iron.

The Lower Chalybeate contains rather more iron than any of the springs, but still a very small proportion. (A. G. S. Second Rept.-Geological Reconnaissance-1860. p. 106)

HOWARD COUNTY

No.

BAKER SPRINGS

SW $\frac{1}{4}$, Sec. 13, T. 5 S., R. 30 W., Baker Springs. Drains into Baker Creek. Elev. 679 feet. (V. B. Goddard, Mena Chamber of Commerce.)

No.

BAKER'S SULPHUR SPRING

SE $\frac{1}{4}$, Sec. 14, T. 5 S., R. 30 W., Baker Springs. This spring rises from the slate at the base of a ridge of quartzose sandstone. Elev. 679 feet.

Analysis of Water

Carbonate of alkali, which is probably in the state of
Carbonate of soda,
Chloride of sodium,
A small quantity of free sulphuretted hydrogen,
Traces of sulphate of soda and magnesia.
(A. G. S. Ann. Rept., 1891, vol. 1, p. 101)

No.

MINERAL SPRINGS

Sec. 19, T. 10 S., 27 W., 8 miles southwest of Nashville. The springs emerge from the base of a low gravel hill of Pleistocene age, on which the village is located. They are the southwest part of the village, on the north bank of a little brook that flows to the southeast and drains into Mine Creek. There is a small deposit of iron oxide around the mouth of these springs. Several springs at Nashville have a local reputation for medicinal properties. Three large springs flow approximately 20 gallons per minute.

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	1.91	51.27
Chloride of Soda NaCl -----	.29	7.79
Chloride of Potash KCl -----	.01	.27
Carbonate of Soda Na ₂ CO ₃ -----	1.02	27.38

No. 131-Analysis continued

	Grains per U.S. gallon	Per cent of total solids
Carbonate of Lime CaCO_3 -----	.47	12.62
Carbonate of Iron FeCO_3 -----	.02	.54
Sulphate of Magnesia MgSO_4 ----	.005	.13
Sulphuretted hydrogen H_2S ----	trace	trace
Total -----	3.725	100.00

Found.

Silica SiO_2 -----	1.91	51.19
Sodium Na -----	.56	15.01
Potassium K -----	.006	.16
Magnesium Mg -----	.001	.02
Calcium Ca -----	.19	5.09
Iron Fe -----	.01	.27
Sulphuric Acid SO_4 -----	.004	.11
Carbonic Acid CO_3 -----	.87	23.32
Chlorine Cl -----	.18	4.72
Total -----	3.731	100.00

Water collected by assistant T. C. Hopkins, January 23, 1892.

Analysis by A. E. Menke.

Temperature of air, 43°F .; of water, 53°F .

Total solid material in solution, 4.66 grains per U. S. gallon.

(A. G. S. Ann. Rept., 1891, vol. 1, p. 66)

No. 132

GRAY'S SPRING

Sec. 20, T. 5 S., R. 29 W. This spring is also known as Shurd's Sulphur Spring. The temperature of air is 52°F .; of water, 58°F .

Analysis of Water

The main characteristic constituents of this water are:

Carbonate of soda.

Chloride of sodium.

Sulphuret of sodium.

Traces of sulphate of soda.

Traces of sulphate of magnesia.

Its medical properties will be found to be analogous to those of Baker's Spring.

(V. B. Goddard, Sec'y., Mena Chamber of Commerce)

INDEPENDENCE COUNTY

No. ~~154~~ 133

STARNES NO. 1 SPRING

NW $\frac{1}{4}$, Sec. 30, T. 12 N., R. 7 W., 6 miles southwest of Jamestown, and 13 miles southwest of Batesville. The springs are on the southwest side of a small tributary of Copperas Creek, which flows into Salado Creek and thence into White River. There are possibly twenty or more springs in this vicinity, only four of which form any marked deposit about their outlet, and from only two of which could clear water be obtained. The springs are so close to the brook that its waters flow over them during freshets and fill them up with sediment, unless they are boxed high. The springs flow from a sandy soil formed by the disintegration of a yellow, ferruginous sandstone of the Barren Coal Measures. The same rock forms the low hills on each side of the spring, and the higher hills on each side of Grassy Creek to the northeast. Elev. 750 feet (approximately).

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	.70	13.41
Chloride of Soda NaCl -----	.30	5.74
Carbonate of Soda Na ₂ CO ₃ -----	.02	.38
Carbonate of Magnesia MgCO ₃ ----	1.28	24.52
Carbonate of Lime CaCO ₃ -----	.72	13.78
Carbonate of Iron FeCO ₃ -----	1.52	29.12
Sulphate of Lime CaSO ₄ -----	.68	12.94
Total -----	5.22	100.00

Found.

Silica SiO ₂ -----	.70	13.46
Sodium Na -----	.12	2.31
Magnesium Mg -----	.36	6.92
Calcium Ca -----	.50	9.62
Iron Fe -----	.73	14.04
Sulphuric Acid SO ₄ -----	.48	9.23
Carbonic Acid CO ₃ -----	2.13	40.96
Chlorine Cl -----	.18	3.46
Total -----	5.20	100.00

Water collected by assistant T. C. Hopkins, December 18, 1891.

Analysis by A. E. Menke.

Total solids in solution, 6130 grains per U. S. gallon.
(A. G. S. Ann. Rept., 1891, vol. 1, p. 84-85)

INDEPENDENCE COUNTY

No. ~~133~~ 134

STARNES NO. 2 SPRING

NW $\frac{1}{4}$, Sec. 30, T. 12 N., R. 7 W., 6 miles southwest of Jamestown, and 13 miles southwest of Batesville. Elev. 750 feet (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U. S. gallon	Per cent of total solids
Silica SiO ₂ -----	.35	5.87
Chloride of Soda NaCl-----	.30	5.03
Carbonate of Soda Na ₂ CO ₃ -----	.01	.17
Carbonate of Magnesia MgCO ₃ ----	1.45	24.31
Carbonate of Lime CaCO ₃ -----	1.92	32.25
Carbonate of Iron FeCO ₃ -----	1.43	23.98
Sulphate of Lime CaSO ₄ -----	.50	8.39
Total-----	5.96	100.00

Found.

Silica SiO ₂ -----	.35	5.88
Sodium Na-----	.12	2.02
Magnesium Mg-----	.41	6.89
Calcium Ca-----	.91	15.29
Iron Fe-----	.69	11.60
Sulphuric Acid SO ₄ -----	.35	5.88
Carbonic Acid CO ₃ -----	2.94	49.41
Chlorine Cl-----	.18	3.03
Total-----	5.95	100.00

(A. G. S. Ann. Rept., 1891, vol. 1, p. 86)

No. ~~135~~ 135

OLD ROBERT MORRIS SPRING

Sec. 17, T. 13 N., R. 5 W., 1 mile west of north of Moorefield. This is the boldest and generally conceded to be the best spring in Independence County. Elev. 327 feet. (approximately). (U. S. G. S. W 102)

No. ~~137~~ 136

EARNHEART SPRING

Sec. 29, T. 13 N., R. 7 W., near Batesville. Elev. 280 feet (approximately). (U. S. G. S. W 102)

IZARD COUNTY

No.

HURON SPRING

Sec. 16, T. 18 N., R. 10 W., Huron. Mr. S. Scott is the owner of 5 springs, located in secs. 9, 16, and 17. The waters are generally medium soft. One of the springs carries a greenish bronze glistening scum on the surface, and gives a reddish brown sediment on standing. The water of the latter has not been used except for stock. The springs are abundant all through the hilly country of the vicinity. The great majority of the inhabitants in fact depend on springs rather than on wells for their water supply. (U. S. G. S. Water-Supply and Irrigation Paper No. 102. No. 19, p. 388)

JACKSON COUNTY

No.

ROSS SPRING

Sec. 22, T. 10 N., R. 4 W., Grandglaise. This spring is of considerable strength and issues from a bed of loose sand beneath the Tertiary limestone and just above the level of the lowlands to the east. There is another spring at the same horizon, about half a mile south of Grandglaise station. Elev. 232 feet. (U. S. G. S. W 145, p. 113)

No.

GRANDGLAISE SPRING

Sec. 27, T. 10 N., R. 4 W., $\frac{1}{2}$ mile south of Grandglaise Station. Elev. 232 feet. (U. S. G. S. W 145)

LITTLE RIVER COUNTY

No.

SALT SPRING

Sec. 36, T. 9 S., R. 33 W., near Cerro Gordo. Elev. 400 feet (approximately). (U. S. G. S. P 46)

No.

BIG SPRINGS

NE $\frac{1}{4}$, Sec. 1, T. 12 S., R. 30 W., near Winthrop. The spring is owned by W. A. Black. Elev. 314 feet (approximately). (U. S. G. S. P 46)

INDEPENDENCE COUNTY

No.

WALDEN SPRING

Sec. 13, T. 14 N., R. 4 W., near Hazelgrove. A number of other large springs are reported in the vicinity. Elev. 500 feet (approximately). (U. S. G. S. W 102)

No.

BIG SPRING

Sec. 34, T. 14 N., R. 7 W., at James Hill half way between Batesville and Cushman. It flows from the side of a hill, is more than fifty feet wide, and is ten feet deep. The large volume of water discharged becomes Spring Creek. Formerly a mill was operated at the spring, but at present no use is made of the water. Elev. 300 feet (approximately) (Sonator J. Paul Ward, Batesville)

No.

FERRELL CAVE SPRING

Sec. 9, T. 14 N., R. 7 W., near Cushman. The water flows from a spring within a cave through a hole below entrance. The water is clear and cool. Elev. 734 feet (approximately). (Bryan Parks, Fort Smith)

IZARD COUNTY

No.

BLOWING SPRING

Sec. 2, T. 14 N., R. 8 W., near Cushman. Elev. 400 feet (approximately). (J. Reed Denison, Cushman, Arkansas)

No.

PRIM SPRING

T. 15 N., R. 8 W., 5 miles southwest of Mt. Pleasant. Elev. 400 feet (approximately). (A. G. S. Cave File).

No.

MELBOURNE (WIDENAN) SPRING

Sec. 19, T. 16 N., R. 9 W., 5 miles southwest of Melbourne. The spring is owned by R. Harris. Elev. 800 feet (approximately) (Mrs. T. W. Gorham, Melbourne)

LITTLE RIVER COUNTY

No.

KING'S SPRING

Sec. 7, T. 12 S., R. 31 W., south of Winthrop. The spring is owned by the King-Rider Lumber Company. Elev. 350 feet (approximately). (U. S. G. S. P 46)

No.

SE $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 2, T. 13 S., R. 28 W., near Coleboro. Elev. 300 feet (approximately). (U. S. G. S. P 46)

LOGAN COUNTY

No.

MAGAZINE SPRING

NE $\frac{1}{4}$, Sec. 19, T. 6 N., R. 26 W., one mile east of Magazine. The water is very clear and has a discharge of one gallon in two minutes. It comes from a black pyritiferous shale of the Coal Measures twelve feet beneath the surface of the ground. The reaction is neutral; lead paper gave no reaction for sulphuretted hydrogen, though bubbles of gas which may be ignited rise in the pipe. Heavy rains do not appear to alter the discharge or the clearness of the water. This spring was once locally known as Ellington's gas well. Elev. 456 feet (approximately).

Analysis of Water

Hypothetical Combination

Constitutents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	1.96	6.16
Chloride of Soda NaCl -----	3.25	10.21
Chloride of Potash KCl -----	.19	.60
Carbonate of Soda Na ₂ CO ₃ ----	20.94	65.74
Carbonate of Magnesia MgCO ₃ -----	.01	.03
Carbonate of Lime CaCO ₃ -----	.70	2.20
Sulphate of Potash K ₂ SO ₄ ----	.29	0.90
Sulphate of Iron FeSO ₄ -----	.09	.28
Sulphate of Alumina (Al ₂ (SO ₄) 3) -----	.05	.16
Organic matter -----	4.37	13.72
	<u>31.85</u>	<u>100.00</u>
Carbonic Acid CO ₂ , free and for bicarbonates -----	9.59	
Total -----	<u>41.44</u>	

150

74

No. ~~149~~ Analysis continued

	Grains per U.S. gallon	Per cent of total solids
Found		
Silica SiO_2 -----	1.96	4.73
Sodium Na -----	10.38	25.03
Potassium K -----	.23	.56
Magnesium Mg -----	.004	.01
Calcium Ca -----	.28	.68
Lithium Li -----	.00	.00
Iron Fe -----	.03	.07
Aluminum Al -----	.01	.03
Sulphuric Acid SO_4 -----	.26	.63
Carbonic Acid CO_3 -----	21.86	52.74
Chlorine Cl -----	2.06	4.97
Sulphuretted hydrogen H_2S -----	slit trace	slit trace
Organic matter -----	4.37	10.55
Total -----	41.44	100.00

Water for analysis collected by assistant J. P. Smith,
June 3, 1889.

Temperature of the air, 62.78°F .; of water, 51.34°F .

Total solid material in solution, 31.13 grains per U. S.
gallon.

(A. G. S. Ann. Rept., 1891, vol. 1, p. 63-64).

No. ~~150~~ 151GRAY'S SPRING

Sec. 20, T. 5 N., R. 29 W., near Dial. Its medical proper-
ties will be found to be analogous to those of Baker's Spring.
Elev. 500 feet (approximately).

Analysis of Water

Carbonate of Soda.
Sulphuret of Sodium.
Chloride of Sodium.
Traces of Sulphate of Soda.
Traces of Sulphate of Magnesia.

Temperature 58°F .

Temperature of the air, 52°F .

(A. G. S. Ann. Rept., 1891, vol. 1, p. 108)

No. ~~151~~ 152NATIONAL SPRING

NW $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 8, T. 7 N., R. 27 W. This spring is about 100 yards south of the Iron Spring. The flow of the spring is westward. The water comes from Carboniferous shales that contain much iron pyrites (FeS O_2), the sulphur of which goes to form the large per cent of sulphuric acid (SO $_4$). There is no odor of sulphuretted hydrogen and apparently no gas escaping. Reaction on litmus paper is neutral. The spring is seven feet deep, the water is clear and forms no sediment of iron. Elev. 750 feet (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO $_2$ -----	1.40	.97
Chloride of Soda NaCl -----	11.79	8.16
Chloride of Potash KCl -----	.56	.39
Carbonate of Magnesia MgCO $_3$ --	18.89	13.07
Carbonate of Lime CaCO $_3$ -----	31.92	22.09
Sulphate of Soda Na $_2$ SO $_4$ -----	33.01	22.84
Sulphate of Magnesia MgSO $_4$ ----	46.55	32.22
Sulphate of Iron FeSO $_4$ -----	.15	.11
Sulphate of Alumina (Al $_2$ (SO $_4$) $_3$)	.22	.15
Total -----	144.49	100.00

Found

Silica SiO $_2$ -----	1.40	.95
Sodium Na -----	15.35	10.44
Potassium K -----	.29	.20
Magnesium Mg -----	14.70	10.00
Calcium Ca -----	12.77	8.69
Lithium Li -----	slit trace	slit trace
Iron Fe -----	.06	.04
Aluminum Al -----	.03	.02
Sulphuric Acid SO $_4$ -----	59.84	40.69
Carbonic Acid CO $_3$ -----	32.64	23.94
Chlorine Cl -----	7.41	5.03
Total -----	144.49	100.00

Water collected by assistant J. P. Smith, June 3, 1889.
 Temperature of air 78.53° F.; of water, 61.43° F.
 Total solid material in solution, 151.23 grains per U. S. gallon.
 Carbonic acid (CO $_2$), free and for bicarbonates, 2.56 grains per U. S. gallon. (A. G. S. Ann. Rept., 1891, vol. 1, p. 75)

No. ~~152~~ 153SANDHILL SPRING

Sec. 16, T. 4 N., R. 9 W., near Cabot and Austin. The number of springs within the lowland area is so limited that for all practical purposes they might be left out of consideration as water producers. There are but three localities within the lowlands where springs occur, viz, at Newark, Grandglaise, and the Sandhill area east of the towns of Austin and Cabot. The limited number of springs is due to the usually level surface of the region, the horizontal position of the beds, and the shallow stream valleys. The springs at the localities mentioned issue from erosion remnants, the edges of whose horizontal beds outcrop above the adjacent areas.

The town of Newark is situated upon a heavy deposit of gravel, probably of post-Tertiary age. This gravel is an excellent source of water, as it rests directly upon the Moorefield shale, which, because of its impervious nature, prevents the water from sinking. In the eastern part of the town, at the base of the gravel and the top of the shale, there are several springs. East of the towns of Austin and Cabot are several springs which issue from the slopes of the ridges on the east, north, and west sides. The Sandhill area is underlain by a bed of clay near the base, which, being impervious, causes the water to flow out on the hillsides as springs. Elev. 300 feet (approximately). (U. S. Geological Survey Water-Supply Paper No. 145, p. 113)

No. ~~153~~ 154CAMP GROUND SPRING

NW $\frac{1}{4}$, Sec. 22, T. 4 N., R. 9 W., east of Austin and Cabot. Sandhill area is underlain by a bed of clay near the base, this being impervious causes water to flow out of the base, resulting in a number of springs in this vicinity. The same formation as given in No. 153 applies to this spring. Elev. 300 feet (approximately). (U. S. Geological Survey Water-Supply Paper No. 145)

LONOKE COUNTY

No.

QUAPAW MINERAL SPRINGS

NE $\frac{1}{4}$, Sec. 34, T. 4 N., R. 10 W., near Cabot. This water is marketed by Quapaw Mineral Springs Water Company, 112 $\frac{1}{2}$ E. 7th Street, Little Rock, Arkansas. Elev. 250 feet.

Analysis of Water

	Parts per <u>million</u>	Grains per <u>gallon</u>
Silica Oxide -----	20.0	1.16
Iron Fe -----	0.4	0.02
Aluminum Al -----	0.6	0.03
Lime Ca -----	38.0	2.20
Magnesium Mg -----	11.0	0.63
Sodium Na -----	20.0	1.16
Potassium K -----	2.4	0.13
Sulphates SO ₄ -----	4.1	0.23
Carbonates HCO ₃ -----	216.0	12.52
Chlorine radicle Cl -----	4.0	0.23
Suspended matter -----	1.0	0.05
Alkalinity as Lime Carbonate ----	177.0	10.26

Hypothetical Combination of Above

Silical Oxide -----	20.0	1.16
Iron Oxide -----	0.7	0.04
Aluminum Oxide -----	1.3	0.07
Lime Sulphate -----	5.8	0.33
Lime Bicarbonate -----	147.6	8.56
Magnesium Bicarbonate -----	66.7	3.86
Potassium Carbonate -----	6.1	0.35
Sodium Chloride -----	6.5	0.37
Sodium Carbonate -----	63.7	3.70

(Manglesdorf Laboratory, Little Rock)

No.

MOUNTAIN SPRING

Sec. 33, T. 5 N., R. 10 W., 5 miles northwest of Austin northwest corner of Lonoke County. There is a considerable

LONOKE COUNTY

~~155~~ 156No. ~~155~~-Continued.

deposit of iron in and around the spring. The water flows in a small stream from a crevice near the base of a ledge of yellow ferruginous sandstone of the Barren Coal Measures. The ridge on which the spring is situated is mainly composed of sandstone, a small outcrop of black shale showing near the top of the hill and larger outcrops of shale along the road leading from the base of the hill east towards Austin. The spring is about 60 feet below the top of the hill, 40 feet above the base of the hill, and 180 feet above Austin (barometric measurement). Elev. 200 feet (approximately).

Analysis of Water

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.46	9.33
Chloride of Soda NaCl -----	.23	4.67
Carbonate of Magnesia MgCO_3 -----	.92	18.66
Carbonate of Lime CaCO_3 -----	.88	17.85
Carbonate of Iron FeCO_3 -----	1.94	39.35
Sulphate of Lime CaSO_4 -----	.50	10.14
Total -----	<u>4.93</u>	<u>100.00</u>

Found

Silica SiO_2 -----	.46	9.33
Sodium Na -----	.09	1.83
Magnesium Mg -----	.26	5.27
Calcium Ca -----	.50	10.14
Iron Fe -----	.94	19.07
Sulphuric Acid SO_4 -----	.35	7.10
Carbonic Acid CO_3 -----	2.19	44.42
Chlorine Cl -----	.14	2.84
Total -----	<u>4.93</u>	<u>100.00</u>

Water collected by assistant T. C. Hopkins.

Analysis by A. E. Penke.

Temperature of air, 44.78°F. ; temperature of water, 59°F.

Total solids in solution, 4.16 grains per U. S. gallon.
(A. G. S. Ann. Rept., 1891, vol. 1, p. 69)

MADISON COUNTY

No. ~~156~~ 157PHELON'S SPRING

Sec. 10, T. 13 N., 25 W., at Pettigrew. Mr. Phelon owns a number of other springs located near this one, no two of which are alike. Several of them are reported to possess medicinal properties. One of the springs deposits some iron. Elev. 2000 feet (approximately). (U. S. G. S. W 102)

No. ~~157~~ 158DENNY'S SPRING (Horsethief Cave)

Sec. 4, T. 17 N., R. 25 W., 4 miles northeast of Alabam. This spring is large and emerges about 200 feet from entrance of cave. Water is ice cold. Elev. 1300 feet (approximately). (Leonard Kendall, Fact-Finding Tribunal)

No. ~~158~~ 159TOWN SPRING

SW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 34, T. 17 N., R. 26 W., near Huntsville. The water is marketed by the City Water Company, Huntsville, and is the water supply for the City of Huntsville. Elev. 1453 feet. (Arlis Coger, Huntsville)

No. ~~159~~ 160WITHROW SPRING

Sec. ¹⁰32, ¹⁷18 N., 26 W., four miles north of Huntsville on Highway No. 23. One of the largest springs in the county, and one of its beauty spots. It is one-half mile north of War Eagle River and is a favorite camping place. Elev. 1250 feet. (Arkansas Ozarks, p. 50)

MARION COUNTY

No. ~~160~~ 161DE SOTO SPRING

NW $\frac{1}{4}$, Sec. 20, T. 17 N., R. 15 W., near Sylva Post Office. The spring emerges from the limestone at the base of the

MARION COUNTY

161

No. ~~130~~-Continued

Lower Carboniferous rocks. Other springs, some of them larger, occur along the ravine at a lower level. A quarter of a mile below the water from all the springs flows over a perpendicular ledge of sandstone, in a stream several feet in width, forming a cataract thirty feet or more in height. Elev. 449 feet (approximately) (A. G. S. Ann. Rept., 1891, vol. 1, p. 106)

No. ~~161~~ 162INTERMITTENT SPRING

Sec. 3, T. 17 N., R. 17 W., at Bruno. No regularity has been observed in the periods of flow. A bold stream flows from the spring for several hours, stops for a few hours or a half a day, and then suddenly begins again. In wet weather it flows continuously. It is in rocks of Lower Silurian age. Elev. 927 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 108)

No. ~~162~~ 163SALTPETER CAVE SPRING

NW $\frac{1}{4}$, Sec. 22, T. 18 N., R. 18 W., 4 miles northeast of Everton. Elev. 950 feet (approximately). (T. S. Lancaster, Everton, Arkansas.)

No. ~~163~~ 164STONEWALL SPRING

T. 19 N., R. 15 W. This spring has a local reputation as a health resort. The water flows from rocks of Silurian age. Elev. 550 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 115)

No. ~~164~~ 165JACKSON SPRING

T. 19 N., R. 16 W., 3 miles northwest of Yellville. This spring has a local reputation as a health resort. The water flows from rocks of Silurian age. Elev. 1100 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 108)

MARION COUNTY

No. ~~105~~ 166COWAN'S SPRING

SW $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 26, T. 18 N., R. 16 W., Town of Cowan. This spring is situated on the north side of the hill forming the south wall of a break, 50 feet south of county road. The sand formation is broken, forming a spur west of the spring. Elev. 850 feet (approximately). (Chas. LeVasseur, January 1, 1929).

Analysis of Water

<u>PROPERTIES.</u>	<u>Per Cent.</u>
Primary Salinity	2.00
Secondary Salinity	0.00
Tertiary Salinity (acidity)	0.00
Primary alkalinity	3.00
Secondary alkalinity	95.00
	<u>100.00</u>

<u>REACTING VALUES</u>	<u>Per Cent</u>	<u>Mg. per liter</u>	
Groups			
Alkalies	2.50	0.27	
Earths	47.59	5.28	
Hydrogen	0.00	0.00	
Strong acids	1.00	0.11	
Weak acids	48.91	5.45	
	<u>100.00</u>	<u>11.11</u>	

METALS

Lead - none
Copper - trace
Zinc - trace

<u>RADICLES</u>	<u>Per Cent</u>	<u>Mg. per liter</u>
Sodium	2.50	0.27
Potassium	2.50	0.27
Calcium	29.40	3.26
Magnesium	18.19	2.02
Hydrogen	0.00	0.00
Sulphate	0.00	0.00
Chloride	1.00	0.00
Bicarbonate	48.91	5.45
Carbonate	0.00	0.00
Concentration values	<u>100.00</u>	<u>11.11</u>

Chemical Character

Calcium
Magnesium
Bicarbonate.

<u>BASE ANALYSIS.</u>	<u>Parts per million</u>
Radicals	
Sodium (Na)	
Potassium (K)	6.32
Calcium (Ca)	65.26
Magnesium (Mg)	24.56
Sulphate (SO ₄)	0.00
Chloride (Cl)	3.90
Bicarbonate (HCO ₃)	330.14
Carbonate (CO ₃)	0.00
Free Carbon dioxide (CO ₂)	5.30
Total dissolved solids	<u>435.48</u>

MARION COUNTY

No. ~~166~~^x 167CHEEK'S SPRING.

SE part, T. 18 N., R. 16 W., Cowan Barrens north of Rush and Clabber Creeks. This spring is situated near the surface--some six feet below the top of a sand broken boulders formation. This spring issues from a flinty lime stratum 250 feet of the Cheek's house, 200 feet north of the east Barren's branch. This spring is on the south slope of the hill forming a divide between the branch on the Horner property and the east Barren's branch. Elev. 850 feet (approximately). (Chas. LeVasseur, January 1, 1929).

Analysis of Water

Properties	Per Cent	
Primary salinity	2.40	
Secondary salinity	0.00	
Tertiary salinity (Acidity)	0.00	Lead - none
Primary alkalinity	0.86	Copper- trace
Secondary "	96.74	Iron - 0.0002
	100.00	Zinc - trace

<u>REACTING VALUES.</u>	<u>Per Cent</u>	<u>Mg per liter</u>
Groups		
Alkalies	1.63	0.16
Earth	47.65	4.76
Hydrogen	0.00	0.00
Strong acids	1.20	0.12
Weak acids	49.52	4.95
Concentration Values	100.00	9.99

<u>RADICLES</u>	<u>Per Cent</u>	<u>Mg per liter</u>
Sodium		
Potassium	1.63	0.16
Calcium	28.71	2.87
Magnesium	18.49	1.89
Hydrogen	0.00	0.00
Sulphate	0.00	0.00
Chloride	1.20	0.12
Bicarbonate	46.10	4.61
Carbonate	3.42	0.34
Concentration Values	100.00	9.99

<u>BASE ANALYSIS</u>	<u>Parts per million</u>	
Radicles		
Sodium (Na)	0.00	
Potassium (K)	3.80	<u>Chemical Character.</u>
Calcium (Ca)	54.71	
Magnesium (Mg)	21.16	Calcium
Sulphate (SO ₄)	0.00	Magnesium
Chloride (Cl)	4.21	Bicarbonate
Bicarbonate (HCO ₃)	264.03	
Carbonate (CO ₃)	9.16	
Free Carbonate dioxide (CO ₂)	0.10	
Total dissolved solids	357.17	

MARION COUNTY

No. ~~167~~x 168HORNER'S UPPER SPRING

SE part, T. 18 N., R. 16 W., Cowan Barrens north of Rush and Clabber Creeks. This spring is situated on the north side of a break, about 100 feet south of the county road. The water came out of a heavy ledge of sand stone. This ledge is well exposed between the spring and the Horner house. Elev. 1000 feet (approximately). (Chas. LeVasseur, January 1, 1929).

Analysis of Water

<u>PROPERTIES</u>	<u>Per Cent</u>	
Primary salinity	1.86	
Secondary salinity	0.00	
Tertiary salinity (acidity)	0.00	
Primary alkalinity	3.28	
Secondary alkalinity	94.86	
	100.00	

METALS

Lead - none
Copper - trace
Zinc - trace

<u>REACTING VALUE</u>	<u>Per Cent</u>	<u>Mg per liter</u>
Groups		
Alkalies	2.57	0.28
Earth	47.30	5.25
Hydrogen	0.00	0.00
Strong acids	0.93	0.10
Weak acids	49.20	5.46
Concentration Values	100.00	11.09

Chemical Character

Calcium
Magnesium
Bicarbonate.

<u>RADICLES</u>	<u>Per Cent</u>	<u>Mg per liter</u>
Sodium		
Potassium	2.57	0.28
Calcium	29.30	3.25
Magnesium	18.00	2.00
Hydrogen	0.00	0.00
Sulphate	0.00	0.00
Chloride	0.93	0.10
Bicarbonate	49.20	5.46
Carbonate	0.00	0.00
Concentration Values	100.00	11.09

<u>BASE ANALYSIS</u>	<u>Parts per million</u>
Radicles	
Sodium (Na)	
Potassium (K)	6.60
Calcium (Ca)	65.05
Magnesium (Mg)	24.21
Sulphate (SO ₄)	0.00
Chloride (Cl)	3.55
Bicarbonate (HCO ₃)	332.10
Carbonate (CO ₃)	0.00
Free carbon dioxide (CO ₂)	5.25
Total dissolved solids	436.76

MARION COUNTY

No. ~~182~~ 169HORNER'S LOWER SPRING

SE part, T. 18 N., R. 16 W., Cowan Barrens north of Rush and Clabber Creeks. Water from Horner's lower spring. This spring is situated on the north side of the ridge, at a contact line of a break and lime bar, about 300 feet south of the county road. The contact line forms a draw, having a general southeasterly direction. This spring issues from a lime ledge and the channel of said spring has formed a small cave. This spring is on a different formation than the upper spring which is at an elevation 300 feet above. Elev. 800 feet (approximately). (Chas. LeVasseur, January 1, 1929).

Analysis of Water

<u>PROPERTIES</u>		<u>Per Cent</u>	<u>METALS</u>	
Primary Salinity		2.38	Lead -	none
Secondary salinity		0.00	Copper-	none
Tertiary salinity (acidity)		0.00	Zinc -	0.0001
Primary alkalinity		2.84		
Secondary alkalinity		94.78		
		100.00		

<u>REACTING VALUES</u>		<u>Per Cent</u>	<u>Mg. per liter</u>
<u>Groups</u>			
Alkalies		2.61	0.26
Earth		47.40	4.74
Hydrogen		0.00	0.00
Strong acids		1.19	0.12
Weak acids		48.80	4.88
Concentrating values		100.00	10.00

<u>RADICLES</u>		<u>Per Cent</u>	<u>Mg. per liter</u>
<u>Sodium</u>			
Potassium		2.61	0.26
Calcium		28.90	2.89
Magnesium		18.50	1.85
Hydrogen		0.00	0.00
Sulphate		0.00	0.00
Chloride		1.19	0.12
Bicarbonate		48.80	4.88
Carbonate		0.00	0.00
Concentration values		100.00	10.00

<u>BASE ANALYSIS</u>		<u>Parts per million</u>	<u>Chemical Character</u>
<u>Radicles</u>			
Sodium	(Na)	0.00	Calcium Magnesium Bicarbonate.
Potassium	(K)	3.96	
Calcium	(Ca)	58.05	
Magnesium	(Mg)	22.65	
Sulphate	(SO ₄)	0.00	
Chloride	(Cl)	4.20	

Analysis of water from Horner's lower spring.

	<u>Parts per million</u>
Bicarbonate (HCO_3) .	298.80
Carbonate (CO_3) .	0.00
Free Carbon dioxide (CO_2) .	1.30
<u>Total dissolved solids</u>	<u>388.96</u>

MARION COUNTY

No. ~~169~~ 170HAMLET NORTHEAST SPRING

SE part, T. 18 N., R. 16 W., Cowan Barrens north of Rush and Clabber Creeks. This spring is situated on the south side of hill in the line of a break, about 150 feet due west from Hamlet house and 100 feet north of East Barren Branch. This spring comes out from a lime stratum, which contains streaks of calcium along the planes of the formation. Elev. 850 feet (approximately). (Chas. LeVasseur, January 1, 1929).

Analysis of Water

<u>PROPERTIES.</u>	<u>Per Cent</u>	<u>METALS</u>
Primary salinity	2.00	Lead - none
Secondary salinity	0.00	Copper - trace
Tertiary salinity (Acidity)	0.00	Iron - trace
Primary alkalinity	1.86	Zinc - trace
Secondary alkalinity	96.14	
	<u>100.00</u>	

<u>REACTING VALUES.</u>	<u>Per Cent</u>	<u>Mg. per litre</u>
Groups		
Alkalies	1.93	0.17
Earth	48.32	2.20
Hydrogen	0.00	0.00
Strong Acids	1.00	0.08
Weak Acids	48.75	4.18
Concentration Values	<u>100.00</u>	<u>8.63</u>

<u>RADICLES.</u>	<u>Per Cent</u>	<u>Mg. per litre</u>	
Sodium			
Potassium	1.93	0.17	
Calcium	29.03	2.52	
Magnesium	19.29	1.68	<u>Chemical Character</u>
Hydrogen	0.00	0.00	
Sulphate	0.00	0.00	Calcium
Chloride	1.00	0.08	Magnesium
Bicarbonate	44.94	3.85	Bicarbonate.
Carbonate	3.81	0.33	
Concentration Values	<u>100.00</u>	<u>8.63</u>	

<u>BASE ANALYSIS</u>	<u>Parts per million</u>
<u>Radicles</u>	
Sodium (Na)	
Potassium (K)	3.84
Calcium (Ca)	50.80
Magnesium (mg)	20.25
Sulphate (SO ₄)	0.00
Chloride (Cl)	3.00
Bicarbonate (HCO ₃)	241.33
Carbonate (CO ₃)	10.12
Free Carbon dioxide . (CO ₂)	0.00
Total dissolved solids	<u>329.34</u>

MARION COUNTY

No. ~~170~~ 171HAMLET NORTHWEST SPRING

SE part, T. 18 N., R. 16 W., Cowan Barrens north of Rush and Clabber Creeks. This spring is situated from 50 feet west of the other Hamlet spring on the same formation, but which at this place is more broken than that of No. 5. Elev. 850 feet (approximately). (Chas. LeVasseur, January 1, 1929).

Analysis of water

<u>PROPERTIES.</u>	<u>Per Cent</u>	
Primary salinity	1.92	
Secondary salinity	0.00	
Tertiary salinity (acidity)	0.00	
Primary alkalinity	1.72	
Secondary "	96.36	
	100.00	
		<u>METALS</u>
		Lead - none
		Copper- trace
		Zinc - 0.00002

<u>REACTING VALUES</u>	<u>Per Cent</u>	<u>Mg. per litre</u>
<u>Groups</u>		
Alkalies	1.82	0.16
Earth	48.16	4.18
Hydrogen	0.00	0.00
Strong Acids	0.96	0.08
Weak Acids	49.06	4.26
Concentration Values	100.00	8.68

<u>RADICLES</u>	<u>Per Cent</u>	<u>Mg. per litre.</u>
<u>Sodium</u>		
Potassium	1.82	0.16
Calcium	29.16	2.53
Magnesium	19.00	1.65
Hydrogen	0.00	0.00
Sulphate	0.00	0.00
Chloride	0.96	0.08
Bicarbonate	45.54	3.96
Carbonate	3.52	0.30
Concentration Values	100.00	8.68

<u>BASE ANALYSIS.</u>	<u>Parts per million</u>	
<u>Radicals</u>		<u>Chemical Character</u>
Sodium (Na)		
Potassium (K)	3.70	
Calcium (Ca)	50.89	Calcium
Magnesium (Mg)	20.18	Magnesium
Sulphate (SO ₄)	0.00	Bicarbonate.
Chloride (Cl)	2.81	
Bicarbonate (HCO ₃)	245.91	
Carbonate (CO ₃)	9.50	
Free Carbon dioxide (CO ₂)	0.00	
Total dissolved solids	332.99	

MARION COUNTY

No. ~~171~~ 172STERLING WEASE SPRING

SW part, T. 18 N., R. 15 W., Cowan Barrens north of Rush and Clabber Creeks. This spring is located at the head of a depression running east towards Clabber Creek in a mass of broken formation, in a brake - snag, flint and lime boulders, 150 north of Sterling Weast house. Elev. 850 feet (approximately). (Chas. LeVasseur, January 1, 1929).

Analysis of Water

<u>PROPERTIES.</u>	<u>Per Cent</u>	
Primary salinity	1.86	<u>METALS</u> Lead - none Copper - trace Zinc - trace
Secondary salinity	0.00	
Tertiary salinity	0.00	
Primary alkalinity	1.84	
Secondary alkalinity	96.30	
	100.00	

<u>REACTING VALUES.</u>	<u>Per Cent</u>	<u>Mg. per litre</u>
Groups		
Alkalies	1.85	0.16
Earth	48.13	4.22
Hydrogen	0.00	0.00
Strong Acids	0.93	0.08
Weak Acids	49.09	4.29
Concentration Values	100.00	8.75

<u>RADICLES</u>	<u>Per Cent</u>	<u>Mg. per litre</u>
Sodium		
Potassium	1.85	0.16
Calcium	29.11	2.55
Magnesium	19.02	1.67
Hydrogen	0.00	0.00
Sulphate	0.00	0.00
Chloride	0.93	0.08
Bicarbonate	45.59	3.99
Carbonate	3.50	0.30
Concentration Values	100.00	8.75

<u>BASE ANALYSIS</u>	<u>Parts per million</u>	
<u>Radicles</u>		<u>CHEMICAL CHARACTER</u> Calcium Magnesium Bicarbonate.
Sodium (Na)		
Potassium (K)	3.70	
Calcium (Ca)	49.50	
Magnesium (Mg)	20.16	
Sulphate (SO ₄)	0.00	
Chloride (Cl)	2.86	
Bicarbonate (HCO ₃)	244.82	
Carbonate (CO ₃)	9.31	
Free carbon dioxide (CO ₂)	1.00	
Total dissolved solids	331.35	

MARION COUNTY

No. ~~172~~ 173S. BRYANT SPRING

SE part, T. 18 N., R. 16 W., Cowan Barrens north of Rush and Clabber Creeks. This spring is situated near the surface in sand ledge which is outcropping on the west of the spring. This spring is situated at the head of a small ravine running to the east, 300 feet west of Bryant's house. Elev. 850 feet (approximately). (Chas. LeVasseur, January 1, 1929).

Analysis of Water

PROPERTIES	Per Cent	
Primary salinity	1.84	
Secondary salinity	0.00	
Tertiary salinity (acidity)	0.00	
Primary alkalinity	1.60	
Secondary "	96.56	
	100.00	

METALS

Lead - none
Copper - none
Zinc - none

REACTING VALUES	Per Cent	Mg. per litre
Groups		
Alkalies	1.72	0.17
Earth.	47.38	4.75
Hydrogen	0.00	0.00
Strong acids	0.92	0.09
Weak Acids	49.98	4.99
Concentration Values	100.00	10.00

RADICLES	Per Cent	Mg. per litre
Sodium		
Potassium	1.72	0.17
Calcium	28.12	2.81
Magnesium	19.26	1.94
Hydrogen	0.00	0.00
Sulphate	0.00	0.00
Chloride	0.92	0.09
Bicarbonate	46.85	4.68
Carbonate	3.13	0.31
Concentration Value	100.00	10.00

BASE ANALYSIS.Parts per millionRadicles

		Chemical Character
Sodium (Na) . .		
Potassium (K) . .	4.01	
Calcium (Ca) . .	53.43	Calcium
Magnesium (Mg) . .	21.57	Magnesium
Sulphate (SO ₄) . .	0.00	Bicarbonate.
Chloride (Cl) . .	3.22	
Bicarbonate (HCO ₃) . .	267.04	
Carbonate (CO ₃) . .	8.45	
Free Carbon dioxide (CO ₂) . .	0.13	
Total dissolved solids	357.85	

MARION COUNTY

No.

TUTT & EVERETTE SPRING

NW $\frac{1}{4}$, Sec. 16, T. 19 N., R. 17 W., 4 miles north and east of Pyatt. The spring is owned by Ernest Young, Pyatt, Arkansas. Elev. 1100 feet (approximately). (Jim Casey, Pyatt, Arkansas)

No.

KINGDON SPRINGS

Sec. 35, T. 20 N., R. 16 W., 8 miles north of Yellville. Elev. 750 feet (approximately). (Helath & Pleasure Resorts, Arkansas Ozarks)

No.

GRIMMER SPRING

NW $\frac{1}{4}$, Sec. 35, T. 20 N., R. 17 W., near Dodd City. At this spring the marble measures 50 feet in thickness, is red and variegated in color and crinoidal in places. The overlying chert contains some intercalary gray limestone. Elev. 1100 feet (approximately). (A. G. S. 1890, vol. IV, p. 323)

No.

MARBLE FALLS SPRING

Center of Sec. 27, T. 20 N., R. 17 W., on A. L. Dirst's place. At the head of another tributary of West Music Creek, the marble is well exposed in a bed 50 feet thick, the top of which is 190 feet below Mr. Dirst's house, a mile from the spring. The marble outcrops in a bold bluff, from beneath which the spring issues; in this bluff are several varieties of marble, the most characteristic ones being red, pink, and pink and light gray mottled. The exact contact of the marble with the underlying rocks could not be seen at the spring, but the interval between the St. Joe bed and the underlying gray limestone is only four inches; the limestone is ten feet thick and is underlain by white sandstone and blue limestone. The marble outcrops at intervals west and north of Marble Falls Spring, on the other branches of Music Creek, in sections 27, 22, and 15 (20 N., 17 W.), yet in many places it is so much decayed as to be concealed beneath the broken chert. Elev. 1100 feet (approximately). (A. G. S. 1890, vol. IV, p. 324)

MILLER COUNTY

No.

CRANK'S SPRING

SW $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 18, T. 16 S., R. 27 W., at Crank. The spring is owned by J. W. Crank. This is a large magnesia spring of Sabine formation. Elev. 200 feet (approximately). (U. S. G. S. P 46)

MONTGOMERY COUNTY

No.

BLACK SPRING

Sec. 30, T. 3 S., R. 25 W., northern edge of the town of Black Spring. In the northern edge, the road crosses a little run in which the black shales are imperfectly exposed, the alluvial deposits of the ancient Caddo having obscured the rock formations. The shales seem to lie near the base of the quartz-bearing division. The water which flows from these shales is agreeable to the taste, slightly charged with sulphur. Elev. 717 feet. (A. G. S. Ann. Rept., 1891, vol. 1, p. 102)

No.

COX SPRING

Sec. 30, T. 3 S., R. 25 W., at Black Spring. This spring is on State Highway No. 8. The Black Springs Lumber Company has set aside 40 acres and the spring as a memorial to Levi J. Witherspoon, former president of the company. Elev. 725 feet (approximately). (Arkansas Gazette, 5-13-34. Arkansas Geological Clipping Book)

No.

WITHERSPOON SPRINGS

SW $\frac{1}{4}$, Sec. 22, T. 3 S., R. 27 W. The springs are owned by Mrs. L. J. Witherspoon, Mena, and were formerly the old Box Springs. Elev. 1500 feet (approximately). (V. B. Goddard, Sec'y., Mena Chamber of Commerce)

MONTGOMERY COUNTY

No. ~~173~~~~x 177~~~~178~~ 182NORTH SPRING

Sec. 13, T. 4 S., R. 25 W., in gap through Caddo Mountain, Caddo Gap. The hot springs at Caddo Gap were discovered in February, 1908, by J. M. Davis, of that place. The hot water has its outlet in the bed of Caddo River, in the gap where this stream cuts through Caddo Mountain, and this peculiar location prevented the springs from being discovered earlier. The water rises between the vertical beds of the uppermost division of the Arkansas novaculite. Cement enclosures have been constructed around two points of issue, 22 feet apart, on the west side of the river, and the springs issuing through these enclosures are here called North Spring and South Spring. Much hot water still issues from the bed of the river. The surface of the North Spring stands about 15 inches and that of the South Spring about 10 inches above the river at average stage.

The temperatures of the springs were determined on July 2, 1910, by Mr. Purdue, who found the North Spring to have a temperature of 95° F. and the South Spring 96.5° F. Mr. Miser determined the temperatures at 6 p.m. May 8, 1916, at the places where the hot waters enter the concrete basins, and found them to be 94° F. for the North Spring and 96.8° F. for the South Spring. The flow of each spring was calculated from a rough determination to be 5 gallons a minute. Elev. 619 feet

Analysis of Water

	South Spring	North Spring
Silica SiO_2 -----	15.600	18.700
Ferric Oxide and Alumina $\text{Fe}_2\text{O}_3 + \text{Al}_2\text{O}_3$ -----	7.000	7.200
Calcium Ca -----	38.876	41.680
Magnesium Mg -----	2.166	4.235
Sodium Na -----	7.526	3.349
Potassium K -----	.000	.000
Carbonic Acid radicle CO_3 -----	68.265	67.085
Sulphuric Acid radicle SO_4 -----	1.419	2.313
Chlorine Cl -----	4.848	7.138
	<u>145.700</u>	<u>151.700</u>
Carbon Dioxide (free CO_2) -----	20.000	16.000
Analysis given in parts per million. (U. S. G. S. Bulletin 808, p. 187)		

MONTGOMERY COUNTY

No. ~~174~~~~178~~ ~~179~~ 185SOUTH SPRING

Sec. 13, T. 4 S., R. 25 W., in gap through Caddo Mountain, Caddo Gap. (See note and analysis--No. 171. Elev. 619 feet. (U. S. G. S. Bulletin 808, p. 187))

No. ~~175~~~~179~~ ~~180~~ 184HOT SPRING

Sec. 23-26, T. 4 S., R. 25 W., 2 miles southwest of Caddo Gap. This spring is reported by Mr. W. B. Barton. Mr. Barton said that the analysis furnished by him of the hot water contained some cold surface water that was entering the spring. W. P. Manglesdorf, analyst. Elev. 620 feet.

Analysis of Water

	Parts per million
Silica SO ₂ -----	15.4
Iron Fe -----	1.2
Aluminum Al -----	.7
Calcium Ca -----	39.8
Magnesium Mg -----	2.3
Potassium K -----	1.3
Lithium Li -----	.6
Sodium Na -----	9.1
Carbonic Acid radicle CO ₃ -----	69.0
Sulphuric Acid radicle SO ₄ -----	8.3
Chlorine Cl -----	8.0
	<u>155.7</u>

(U. S. G. S. Bulletin 808, p. 188)

No. ~~176~~~~180~~ ~~181~~ 185WARM SPRING

Sec. 17, T. 4 S., R. 27 W., Slatington, on Little Missouri River, 6½ miles southeast of Big Fork Post Office. The water issues from a crevice between two massive, steeply dipping layers of novaculite in the uppermost division of the Arkansas novaculite. The flow is sufficient to fill a 1-inch pipe leading from the spring. The water contains in solution much iron, which is deposited as a brown coating

MONTGOMERY COUNTY

No.

in the wooden troughs carrying the water down the mountain side and on the rocks over which the water flows. Temperature of water, 74° F. Elev. 1250 feet. (U. S. G. S. Bulletin 808, p. 188)

No.

MATTOCK SPRING

This spring issues from the slate in a ravine below Mattock's house, not far from limestone, is a strong alkaline sulphuretted water, containing sulphuret of sodium, bicarbonate of magnesia (strong), bicarbonate of lime, chloride of magnesia, a trace of chloride of sodium and silica. This water has remarkable effect on the tincture of Campeachy, due, I believe, to the reaction of the sulphuret of alkali present, and contrasting strongly with the same test added to the waters of Kates' Creek, near by. (A. G. S. Second Rept. of a Geological Reconnaissance-1860, p. 99)

No.

WISENAUT CHALYBEATE SPRING

Near Kates' Branch of the Ouachita River. This water has a slight deoxidizing effect on salts of soda.

Analysis of Water

Bicarbonate of Iron
Bicarbonate of Lime
Bicarbonate of Magnesia
Bicarbonate of Soda
Sulphate of Magnesia (trace)
Sulphate of Soda (trace)
(A. G. S. Second Rept. of Geological Reconnaissance-1860,
p. 100)

No.

CHALYBEATE SPRING

Near Kates' Branch of the Ouachita River. The spring is owned by J. E. Lemon. It has only a feeble deoxidizing effect.

MONTGOMERY COUNTY

189
No. ~~178~~--Continued

Analysis of Water

Bicarbonate of Iron
Bicarbonate of Lime
Bicarbonate of Magnesia
Chloride of Sodium
(and perhaps a trace of)
Carbonate of Alkali.
(A. G. S. Second Report of a Geological Reconnaissance-
1860, p. 100)

No. ~~180~~ 190

IRON'S SULPHUR SPRING

This spring is located on the Sulphur Rock of the north branch of the Ouachita. There are four principal springs which are situated within about half a mile of each other, known as the White, Black, and Red Sulphur, etc. They all contain essentially the same ingredients, but in different proportions. They are alkali and free sulphuretted hydrogen. (A. G. S. Second Rept. of a Geological Reconnaissance-1890, p. 100)

No. ~~181~~ 191

COLLIER SPRING

Sec. 27, T. 2 S., R. 24 W., near Norman. This spring is in the Ouachita National Forest and has a covered spring-house with concrete floor. The water is piped through two 2-inch pipes and flows into Collier Creek. The Discharge has not been measured, but is estimated at 1000 gallons per day. This spring is on the Scenic Highway through the Forest and is in one of the roadside developments undertaken by the CCC. (W. B. McDowell)

MONTGOMERY COUNTY

No. ~~184~~ ~~185~~ ~~190~~ 192

EPP SPRING No. 1

At Caddo Gap. Elev. 419 feet (approximately).

Analysis of Water

	Parts per <u>million</u>
Total Dissolved Solids -----	24.0
Alkalinity (methyl orange) -----	4.5
Alkalinity (phenolphthalein) -----	0.0
Chloride -----	2.6
Nitrite -----	none

	Grains per U.S. <u>gallon</u>
Total Dissolved Solids -----	1.40
Alkalinity (methyl orange) -----	0.26
Alkalinity (phenolphthalein) -----	0.00
Chloride -----	0.15
Nitrite -----	none

Laboratory Number 2488. Harrison Hale, University of Arkansas, analyst.

No. ~~185~~ ~~188~~ ~~191~~ 193

EPP SPRING No. 2

At Caddo Gap. Elev. 419 feet (approximately).

Analysis of Water

	Parts per <u>million</u>
Total Dissolved Solids -----	36.8
Alkalinity (methyl orange) -----	5.8
Alkalinity (phenolphthalein) -----	0.0
Chloride -----	2.0
Nitrite -----	none

MONTGOMERY COUNTY

~~181~~ 193No. ~~186~~ Cont.

	Grains per U.S. gallon
Total Dissolved Solids -----	2.15
Alkalinity (methyl orange) -----	0.33
Alkalinity (phenolphthalein) -----	0.00
Chloride -----	0.12
Nitrite -----	none

Laboratory Number 2488. Harrison Hale, University of Arkansas, analyst.

No. ~~186~~ ~~187~~ ~~188~~ 194DALE SPRING

At Caddo Gap. Spring of Dr. J. R. Dale, Caddo Gap. Elev. 419 feet (approximately).

Analysis of Water

	Parts per million
Total Dissolved Solids -----	161.8
Alkalinity (methyl orange) -----	125.0
Alkalinity (phenolphthalein) -----	0.0
Chloride -----	2.9
Nitrite -----	none

	Grains per U.S. gallon
Total Dissolved Solids -----	9.44
Alkalinity (methyl orange) -----	7.29
Alkalinity (phenolphthalein) -----	0.00
Chloride -----	0.17
Nitrite -----	none

The Dale Spring also contains an unusual amount of iron, but we are unable to find any appreciable amount of lithium. Laboratory Number 2488. Harrison Hale, University of Arkansas, analyst.

NEVADA COUNTY

No. ~~190~~ 195

JUDGE HUBBARD'S SPRING

Sec. 13, T. 10 S., R. 23 W., 2 or 3 miles north of Prairie
D'Anne. Elev. 250 feet (approximately).

Bicarbonate of iron, A small quantity of
Chloride of sodium, (sulphate of soda and
A trace of chloride of magnesia, magnesia).
This water was found to be a weak saline chalybeate.
(A. G. S. Second Rept. of a Geological Reconnaissance-
1860, p. 117)

No. ~~191x~~ 196

IRON SPRING

Sec. 13, T. 10 S., R. 23 W. Known as Judge Hubbard's spring. The following qualitative analysis is given: This water was found to be a weak saline chalybeate, containing bicarbonate of iron, a trace of chloride of magnesia, chloride of sodium, and a small quantity of sulphate of soda and magnesia. Elev. 319 feet. (U. S. G. S. P 46, p. 266, No. 553)

No. ~~192~~ 197

BIG SULPHUR SPRING

Sec. 21, T. 13 S., R. 21 W. Rosston is one of the oldest villages in the state. The Boswell Tavern near the spring was the stage stand and place for changing horses in the early days. Elev. 370 feet (approximately). (Hope Star, June 26, 1936)

NEWTON COUNTY

No.

SPANISH PLAIN SPRING

Sec. 14, T. 15 N., R. 22 W., near Murray. The spring is owned by Amos A. Neal, Murray, Arkansas. Elev. 1200 feet (approximately). (Amos A. Neal)

No.

R. L. SHERFIELD SPRING

Sec. 9, T. 15 N., R. 23 W., near Boxley. The spring is owned by R. L. Sherfield. Elev. 1200 feet (approximately). (Luther Edgmond)

No.

EDGEMOND SPRING

NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 11, T. 15 N., R. 23 W., near Boxley. The spring is owned by Fayette Edgmond. Elev. 1200 feet (approximately). (Luther Edgmond)

No.

SALTPETER

Sec. 20, T. 15 N., R. 23 W., 36 miles south of Harrison. The spring is owned by M. L. Edgmond. Elev. 1200 feet (approximately) (Luther Edgmond)

No.

TOM THUMB SPRING

SW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 20, T. 17 N., R. 21 W., 6 miles from Marble City. It is on the west side of Gaither Cove, on a bench of Baither Mountain, and 520 feet above the bottom of the cove. The location is beautiful and picturesque; the bench on which the spring is situated is from a few yards to a quarter of a mile in width and extends around the cove. The spring is in rocks of the Lower Carboniferous age, 520 feet above the Silurian rocks, which outcrop in

NEWTON COUNTY

the creek in the bottom of the cove. It is 190 feet above the Boone chert and either in or just above the Marshall shale. At the spring the surface is covered with debris and talus from the cliff, but below the spring the Marshall shale is exposed in a heavy bed. The high perpendicular cliff above the spring is of Millstone Grit, which forms a prominent wall around the cove. There is but one spring which is not large, flowing seventy-five gallons per hour, but which is said to remain constant, uninfluenced by continued rains or drouth. Elev. 1000 feet (approximately).

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.49	11.86
Chloride of Soda NaCl -----	.14	1.12
Carbonate of Soda Na_2CO_3 -----	2.84	22.63
Carbonate of Lime CaCO_3 -----	7.53	60.00
Carbonate of Iron FeCO_3 -----	.19	1.32
Sulphate of Magnesia MgSO_4 ---	.36	2.87
Total -----	12.55	100.00

Found

Silica SiO_2 -----	1.49	12.31
Sodium Na -----	1.29	10.68
Magnesium Mg -----	.0004	.003
Calcium Ca -----	3.01	24.876
Iron Fe -----	.09	.74
Sulphuric Acid SO_4 -----	.0016	.013
Carbonic Acid CO_3 -----	6.13	50.65
Chlorine Cl -----	.09	.74
Total -----	12.102	100.00

Water collected by assistant T. C. Hopkins, February 11, 1892.

Analysis by A. E. Menke.

Temperature of air, 40.28° F.; of water, 56.3° F.

Total solids in solution, 15.00 grains per U. S. gallon.

The water is clear, odorless, and has a slightly alkaline taste. The analysis given above shows it to contain much more solid matter in solution than the Eureka Springs water. (A. G. S. Ann. Rept., 1891, vol. 1, p. 97)

OUACHITA COUNTY

No.

ALUM SPRING

Sec. 8, T. 13 S., R. 17 W., 3 miles west of Camden. The principal constituents of this spring are acid sulphate of alumina (and perhaps potash), but the acid reaction of the water rather indicates the more feeble base, alumina; a sulphate of the protoxide of iron; and traces of sulphate of magnesia and lime. (U. S. G. S. P. 46, p. 268)

No.

POISON SPRINGS

Sec. 35, T. 12 S., R. 18 W., 9 miles northwest of Camden on Highway No. 24. There are between 30 and 35 small springs all coming from a sand formation. Poison Springs is a historical spot being the site of a bitter Civil War battle, the only one fought in South Arkansas. Although the water is pure and wholesome the name Poison Springs was given it many years ago when a force of men were busy cutting the road through the forests in mid-summer. It seems that one of the workmen became overheated and then drank too much of the cold water, became ill and later died. Some of the others thought the spring water was poisonous, and that is how the springs were named. Under a WPA project a recreation park is being established there. A dam will be constructed to form a 150 acre lake which will be fed by the water from the spring. (Paul Carruth, County Agent)

PHILLIPS COUNTY

No.

BIG SPRING

T. 2 S., R. 5 E., near Helena. This spring is saturated with sulphuretted hydrogen and the water gave no indication, either in an acid or alkaline solution, of any metal except a trace of iron. Therefore, it is not likely to contain any mineral poison; and though strongly charged with bicarbonate of lime and magnesia, it is not probable that these ingredients are particularly injurious in water; except it be to those suffering from calculus. Elev. 194 feet.

PHILLIPS COUNTY

205

No. ~~190~~ --Continued

Analysis of Water

Carbonic acid -----	strong
Lime -----	strong
Magnesia -----	strong
Iron -----	trace

(A. G. S. Ann. Rept., 1891, vol. 1, p. 102)

PIKE COUNTY

No. ~~191~~ 206HOPPER SPRING

Sec. 12, T. 5 S., R. 26 W., at Hopper. The water issues from a crevice between two massive, steeply dipping layers of novaculate in the uppermost division of the Arkansas novaculite. This water contains in solution much iron which is deposited in the wooden troughs carrying the water down the mountain side and on the rock over which the water flows. Believed waters are meteoric. Elev. 1000 feet (approximately). (U. S. G. S. Bulletin 808)

No. ~~192~~ 207ROYSTON SPRING

Sec. 33, T. 7 S., R. 25 W., near Murfreesboro. This is a chalybeate saline spring. Elev. 400 feet (approximately) (U. S. G. S. P 46)

POINSETT COUNTY

No. ~~193~~ 208DR. PATTEN'S SPRING

2 miles south of Walnut Camp. This is a very weak chalybeate, and can hardly be said to have medicinal properties. (Elev. 200 feet (approximately))

Analysis of Water

Bicarbonate of Lime -----	A small quantity
Bicarbonate of Iron -----	A small quantity
Bicarbonate of Magnesia -----	A small quantity
Sulphates -----	A trace

(A. G. of A. 1860, p. 419)

POLK COUNTY

No. ~~184~~ 209TANNAHILL SPRING

NE $\frac{1}{4}$, Sec. 5, T. 1 S., R. 30 W. Elev. 900 feet (approximately). (V. B. Goddard, Sec'y. Mena Chamber of Commerce)

No. ~~185~~ 210BETHESDA SPRINGS

NW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 31, T. 2 S., R. 30 W., 3 miles south of Mena. Bethesda springs has always been a popular spot for outings and its waters have always been considered of medicinal value. In the early days, they were the Mecca of ailing Indians and white settlers who came to camp beside them, drink of their waters and bathe in the little stream. The following story is told of the naming of the springs:

It was in 1881 that old Uncle Bille Green, a resident of Dallas, the first settlement in Polk County, journeyed to north Arkansas seeking relief from an ailment at the then widely known curative springs of that section. While there, he noticed the similarity of the springs there with those near his home. He remembered how people from the lowlands came and camped at the Dallas springs and praised their curative powers, and finally he came back home, convinced that the springs at his own door were as potent as the much advertised northern springs.

This thought was so constantly on his mind that one night he had a dream or, as he felt, a vision. A "voice" told him that these were healing waters and that their name should be called Bethesda, which name he would find at a certain place in the Bible. Waking, he sought his Bible, turned to the place, and read there the story of the troubled waters of Judean Bethesda.

He told his friends of his vision, the story was published in the little newspaper, the Dallas Courier; and with the naming of the springs, their fame spread until in a few years a settlement had sprung up around them that rivaled Dallas, the county seat less than a mile away. In its heyday, the little town of Bethesda boasted a population of nearly 500 people, an academy, a 40-room hotel, a telephone line, and a 75-foot observation tower that crowned one of the peaks that cluster round the hollow where flow the springs. Today, all that remains is the springs and a few scattered houses fast falling into decay. Elev. 1142 feet (approximately)

BOLK COUNTY

No.

Analysis of Water

	No. 1	Bethesda No. 2	No. 3
	Grains	Grains	Grains
	<u>per gal.</u>	<u>per gal.</u>	<u>per gal.</u>
Silica -----	2.11	.021	.005
Oxides of Iron & Alum- inum -----	1.01	.81	.74
Sodium -----	.23	.35	.14
Potassium -----	trace	--	--
Calcium -----	1.07	1.23	.95
Magnesium -----	1.50	1.72	2.01
Chloride radical -----	.31	.41	.23
Nitrate radical -----	trace	trace	--
Sulphate radical -----	1.92	2.04	2.27
Carbonate radical -----	2.21	1.87	1.72

Shows trace of hydrogen sulphate gas.

Analysis made by chemist of International Creosoting &
Construction Co., Texarkana, Texas, Sept. 24, 1924.

No.

JANSEEN PARK SPRING

Sec. 18, T. 2 S., R. 30 W. The spring is owned by the City
of Mena. It is a beautiful spring in Janseen Park, Mena.
Elev. 1142.5 feet.

Analysis of Water

	<u>Parts per</u> <u>100,000 parts of water</u>
Silica -----	.61
Iron & Aluminum Oxides ---	.26
Calcium Carbonate -----	1.00
Magnesium Carbonate -----	----
Sodium Sulphate -----	----
Sodium Carbonate -----	----
Sodium Chloride -----	1.02
Magnesium Sulphate -----	----
Magnesium Chloride -----	.67
Calcium Sulphate -----	.06
Calcium Chloride -----	.06

Made by Chemical Dept., College of Agriculture, University
of Arkansas, Sept. 10, 1910.

POLK COUNTY

No. 212

DALLAS TOWN SPRING

Sec. 32, T. 2 S., R. 30 W., 1 mile west of Dallas. The town spring was tested at the fountain-head, and found to be a tolerably pure water, containing only traces of carbonates, chlorides, and sulphates of the alkalies and alkaline earths. Elev. 1000 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 106)

No. 213

SW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 25, T. 3 S., R. 28 W., near Big Fork. There are two springs at this location about 20 feet apart. One has a wooden box while the other has not been improved. The water "boils" up out of the ground. This is a weak chalybeate water, is odorless and has a neutral reaction. Elev. 1099 feet (approximately).

Analysis of Water

The chief constituent is carbonate of iron.

There are present besides: Carbonates of lime and magnesia;

Chlorides of the alkalies (sodium and potassium);

Small quantity of organic matter;

Silica; free carbonic acid.

Discharge from 70 to 130 gallons per hour.

Total solid material in solution, 2.5 grains per U. S. gallon.

(Forest Service Personnel, Mena)

No. ~~200~~ 214

MINE CREEK SPRING

SE $\frac{1}{4}$, Sec. 31, T. 3 S., R. 28 W., near Big Fork at Mine Creek Camp Ground on Mine Creek Road. This spring development is the water supply for the camp ground which is owned and operated by the U. S. Forest Service as a full public recreational area. Elev. 1300 feet (approximately). Temperature of water is 50° F. (Forest Service Personnel, Mena)

POLK COUNTY

No.

ABERNATHY SPRING

SW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 25, T. 3 S., R. 28 W., near Big Fork. The spring is owned by R. S. Abernathy, Big Fork. The water from this spring drains into Big Fork Creek and it is used for domestic purposes. The discharge is 30 gallons per minute. Elev. 1099 feet (approximately).

Analysis of Water

The chief constituent is carbonate of iron.

There are present besides: Carbonates of lime and magnesia; chlorides of the alkalies (sodium and potassium); small quantity of organic matter; silica; free carbonic acid.

Discharge from 70 to 130 gallons per hour.

Total solid material in solution, 2.5 grains per U. S. gallon.

This is a weak chalybeate water; it is odorless and has a neutral reaction.

There are two springs at this location about 20 feet apart. One has a wooden box while the other has not been improved. The water boils up out of the ground. The temperature of the water is 50°. (Forest Service Personnel)

POLK COUNTY

No. 215

SILVER WORLD TUNNEL SPRING

SE $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 15, T. 3 S., R. 29 W., near Board Camp. Elev. 1200 feet (approximately). (Forest Service Personnel, Mena)

No. 216

BLALOCK SPRINGS

Sec. 19, T. 4 S., R. 28 W., near the head of Saline Creek. Elev. 1000 feet (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Chloride of Soda NaCl -----	2.07	11.17
Chloride of Lithia LiCl -----	.35	1.90
Sulphate of Soda Na ₂ SO ₄ -----	1.85	9.99
Sulphate of Potash K ₂ SO ₄ -----	.37	2.00
Sulphate of Magnesia MgSO ₄ ----	2.08	11.22
Sulphate of Lime CaSO ₄ -----	8.36	45.05
Sulphate of Iron Fe SO ₄ -----	.24	1.30
Organic matter -----	3.23	17.37
Total -----	18.54	100.00

Found

Sodium Na -----	1.42	7.65
Potassium K -----	.17	.91
Magnesium Mg -----	.41	2.21
Calcium Ca -----	2.46	13.25
Lithium Li -----	.14	.74
Iron Fe -----	.09	.47
Sulphuric Acid SO ₄ -----	9.18	49.46
Chlorine Cl -----	1.47	7.90
Organic matter -----	3.22	17.31
Total -----	18.56	100.00

Analysis by C. M. Riley.

Total solid material in solution, 18.56 grains per U. S. gallon.

Sulphuretted hydrogen (H₂S), 6.94 grains per U. S. gallon.
(A. G. S. Ann. Rept. 1891, vol. 1, p. 29)

POLK COUNTY

No.

BARD SPRING

SW $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 20, T. 4 S., R. 28 W., near Athens Junction, Big Fork-Athens Road and Blalock County Road. This spring is part of a camp ground development called Bard Springs Camp Ground owned and supervised by the U. S. Forest Service for full public use. This water is said to have medicinal properties. Temperature of water is 60° F. Elev. 1000 feet (approximately). (Forest Service Personnel, Mena)

Analysis of Water

Sample of water received 8/25/36.

	Parts per million
Total Solids -----	175.0
Volatile -----	32.0
Silica (SiO ₂) -----	14.7
Iron Oxide (Fe ₂ O ₃) -----	5.3
Calcium Oxide (CaO) -----	47.1
Magnesium Oxide (MgO) -----	23.0

Theoretical Combination

Sodium Chloride (NaCl) -----	3.4
Magnesium Chloride (MgCl ₂) -----	6.0
Magnesium Carbonate (MgCO ₃) -----	42.7
Calcium Sulfate (CaSO ₄) -----	26.2
Calcium Carbonate (CaCO ₃) -----	64.7
Ferric Oxide (Fe ₂ O ₃) -----	5.3
Silica (SiO ₂) -----	14.7
Organic & Volatile Matter -----	12.0

Laboratory No. HHP-874.

Analysis of spring for K. E. Merren.

No.

COLD SPRING

NE $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 12, T. 4 S., R. 30 W., Hartley, near Junction Holly Briar and Cossatot Roads. Temperature of water is 45° F. Elev. 1300 feet (approximately). (Forest Service Personnel, Mena)

POLK COUNTY

No.

GILNAM SPRING

NE $\frac{1}{4}$, Sec. 21, T. 4 S., R. 30 W., Hartley, across river from Cold Spring. Elev. 1300 feet (approximately). (V. B. G. Goddard, Sec'y, Mena Chamber of Commerce)

No.

BOG SPRINGS

S $\frac{1}{2}$ SW $\frac{1}{4}$, Sec. 10, T. 5 S., R. 32 W. These springs are owned by Walter Jones, Bog Springs and are located in the pass of Cross Creek through South or Bog Mountain on the west side of the creek. They flow out from the foot of the mountain only a few yards from the creek. The principal spring forms a considerable bog. As a rule, this area of Carboniferous rocks is well supplied with springs, and the streams are remarkably clear and the waters soft. Elev. 1160 feet. (V. B. Goddard, Sec'y., Mena Chamber of Commerce)

No.

TYRA SPRINGS

Sec. 2, T. 5 S., R. 32 W. These springs are on the north bank of a small tributary of the Rolling Fork of Little River just west of Hatton Gap. The south bank and bed of the stream are novaculite, so that they appear to come from a layer of shale immediately overlying the novaculite. The temperature of the water is 58° and the temperature of the air is 52°. (V. B. Goddard, Sec'y., Mena Chamber of Commerce)

No.

WILEY SPRING

NE $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 12, T. 4 S., R. 30 W., near Hartley. Elev. 1300 feet (approximately). (V. B. Goddard, Sec'y., Chamber of Commerce)

POPE COUNTY

No.

GIP SPRING

Sec. 5, T. 8 N., R. 19 W., at Gip. The spring is owned by I. L. Talkington. On standing the water leaves a yellowish brown deposit. The water is used for medicinal purposes and has a temperature of 65° F. Elev. 700 feet (approximately). (U. S. G. S. W. 102)

POPE COUNTY

No.

STATE SALT SPRINGS

NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 12, T. 8 N., R. 18 W. 40 acres were sold to James B. Jones, heir-at-law of William J. Jones, by State on March 15, 1854, for \$2.00 per acre. Elev. 500 feet (approximately). (State Land Commissioner's Office)

No.

CAGLESVILLE SPRING

Sec. 25, T. 10 N., R. 19 W., Caglesville. The temperature of water is 55° F. The water is soft and shows trace of gas. Elev. 700 feet (approximately). (U. S. G. S. W 102)

No.

SEMOUSE SPRING

Sec. 26, T. 12 N., R. 20 W., near Freeman. The mineral content is iron and sulphur. Elev. 1000 feet (approximately). (U. S. G. S. W 102)

PULASKI COUNTY

No.

STERLING SPRING

T. 1 N., R. 12 W., Little Rock, 514 Rock Street. The spring is leased by Sterling Department Stores. The diameter of the basin is 72 inches and is walled with concrete. Elev. 266 feet. (C. J. McShane, Assistant Manager, Sterling Dept. Store)

No.

WORTHEN BANK SPRING

T. 1 N., R. 12 W., Little Rock, 4th & Main Streets. The spring is owned by the Worthen Bank, Little Rock. It is beneath the Worthen Bank Building, is not used, and drains into the city sewer. The discharge of this spring is 35 gallons per minute. (Elev. 266 feet. (A. E. Hayes, building engineer)

PULASKI COUNTY

No. ~~215~~ 230BOYLE BUILDING SPRING

T. 1 N., R. 12 W., Boyle Building, Little Rock. Mr. C. M. Duncan, building manager, relates that he was told by Mr. Brack who owned the property where the Boyle Building is located that years ago there was a fine well on the place. When the basement for the Boyle Building was dug in 1908, this spring was struck. It flowed a stream as large as a man's arm. For six years the water was utilized for all purposes in the building but in 1915 when the basement for the Blass Building was dug at 4th & Main Streets the Boyle Building spring was diminished over 90 per cent and now the water is only sufficient for condensation purposes. The discharge was 15,000 gallons per ~~minute~~ *day.* in 1915. Elev. 266 feet. (C. M. Duncan, building manager)

No. ~~216~~ 231EXCHANGE BANK SPRING

T. 1 N., R. 12 W., Exchange Bank Building, Capitol Avenue and Main Streets, Little Rock. This spring was struck when the Exchange Bank Building basement was dug in 1920. The spring was concreted, with holes left in the floor of the basin for the water to come through and the basin was filled with gravel. Water was obtained that was used for toilet purposes. When the basement of the Worthen Bank Building at 4th and Main Streets was dug in 1929, a spring was encountered which diminished the flow at the Exchange Bank Building, but Mr. Baldwin had the spring deepened and the flow was maintained. After he left the managership the spring was filled up. Elev. 266 feet. (Asst. to J. D. Weeks building engineer, and Warren Baldwin)

No. ~~217~~ 232FONES SPRING

T. 1 N., R. 12 W., 2nd and Rock Streets, Little Rock. This spring has a discharge of $\frac{1}{2}$ gallon per minute. Elev. 266 feet. (Claude Barron, warehouse manager)

No. ~~218~~ 233GUM SPRING

T. 1 N., R. 12 W., 1613 McGowan Street, Little Rock. This is an old spring in Little Rock and was used during the

PULASKI COUNTY

Civil War days when the soldiers encamped nearby. It has been continuously used since that time particularly by negroes who live in its vicinity. During the summer of 1935 when Little Rock city water was so bad, it is reported that people stood in line to fill containers. It was analyzed several years ago, and last summer the bacterial count was made several times and the water was found to be safe for drinking purposes. Elev. 266 feet. (Dr. L. L. Marshall)

No.

CASCADE SPRING

T. 1 N., R. 12 W., 3018 High Street, Little Rock. The spring is owned by Mrs. J. W. Bailey, Little Rock. The water is marketed under the name of Cascade Water. The discharge is 5,000 gallons per minute daily. Elev. 266 feet (approximately) (Orville Farquharson) *day*

No.

RADIANT SPRING

T. 1 N., R. 12 W., Little Rock. The spring is owned by E. B. Jones, 2106 High, Little Rock. The discharge is 2 gallons per minute. Elev. 266 feet (approximately). (E. B. Jones)

No.

RALEIGH SPRING

T. 1 N., R. 12 W., 2301 Pulaski Street, Little Rock. This water flows from the side of a slope into a 2-inch pipe. It is exceptionally clear and has no odor. There are three basins at the emergence of water on the side of the hill. A 2-inch pipe carries the water to the salesroom some 50 feet below. The water is marketed by the Raleigh Springs Water Company. Elev. 266 feet (approximately)

Analysis of Water

Constituents	Grains per U.S. gallon
Sulphate of Magnesia -----	2.82
Chloride of Sodium -----	2.82
Sulphate of Lime -----	2.82
(L. D. Harp. Raleigh Water Company)	

PULASKI COUNTY

No.

FERN CLIFF SPRING

SE $\frac{1}{4}$, Sec. 35, T. 2 N., R. 15 W. This spring is owned by
Dr. A. C. Shipp.

Analysis of Water

Determinations

	Parts per million	Grains per U.S. gallon
Silica SiO ₂ -----	3.00	0.17
Oxides of Iron and Aluminum Fe ₂ O ₃ -Al ₂ O ₃ -----	1.85	0.11
Magnesium -----	trace	trace
Calcium Ca -----	3.64	0.21
Sodium Na -----	1.30	0.08
Chloride Cl -----	2.00	0.12
Sulfate SO ₄ -----	5.38	0.31
Alkalinity-methyl orange -----	3.50	0.20
Phenolphthalein -----	0.00	0.00
Total Dissolved Solids -----	19.20	0.11

Hypothetical Combination

Silica SiO ₂ -----	3.00	0.17
Oxides of Iron and Aluminum Fe ₂ O ₃ -Al ₂ O ₃ -----	1.85	0.11
Magnesium Sulfate MgSO ₄ -----	trace	trace
Calcium Sulfate CaSO ₄ -----	7.62	0.44
Calcium Carbonate CaCO ₃ -----	3.50	0.20
Sodium Chloride NaCl -----	3.30	0.19
	<u>19.27</u>	<u>1.11</u>

This water is of exceptionally low mineral content.
In my analytical work on waters I have examined many,
many samples, but do not recall any coming from the
earth with so small an amount of mineral matter.
(Harrison Hale, Consulting Chemist, Univ. of Arkansas.)

PULASKI COUNTY

No.

GRANITE MOUNTAIN SPRING

Sec. 3, T. 1 S., R. 12 W., $\frac{1}{4}$ mile south of Sweet Home, Granite Mountain Hospital. The spring is owned by Dr. S. P. Junkin. It is in a heavy pine forest on the lower slope of Granite Mountain and has a local reputation as pure water. Elev. 255.6 feet. (Dr. S. P. Junkin.)

No.

HERNANDO SPRING

Sec. 3, T. 1 S., R. 13 W., at Habelvale. The spring is owned by Walter Nash, Habelvale. This spring was formerly known as Rock Wall Spring. The name of the spring changed about 1931 to avoid confusion with "Hoc-Arc", another spring water marketing company. The water from Hernando Spring is marketed. The discharge of the spring is 48 gallons per minute. Elev. 309 feet.

Analysis of Water

	Parts per <u>million</u>		Parts per <u>million</u>
Silica Oxide ---	10.00	Sodium Na -----	16.80
Iron Fe -----	0.10	Potassium K ----	1.30
Aluminum Al ----	0.50	Sulphates SO ₄ --	5.00
Lime Ca -----	37.00	Chlorine Index Cl	5.00
Magnesium Mg ---	1.70	Carbonate Radical	
		CO ₃ -----	30.00
		Bicarbonate HCO ₃	48.00

Wm. F. Manglesdorf, H. D. State Chemist. (Walter Nash)

No.

ROWNEY HILL SPRING

Sec. 27, T. 1 N., R. 14 W., at General Garland's place. (Upper spring). The water comes from shales of Lower Silurian age. Elev. 325.1 feet.

Analysis of Water

Hypothetical Combination

FULASKI COUNTY

239

No. ~~224~~ Analysis continued

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	.71	10.95
Carbonate of soda Na ₂ CO ₃ -----	.80	12.32
Carbonate of Potash K ₂ CO ₃ -----	.41	6.32
Carbonate of Magnesia MgCO ₃ -----	.69	10.55
Carbonate of Lime CaCO ₃ -----	3.54	54.62
Sulphate of Lime CaSO ₄ -----	.34	5.24
Total -----	6.49	100.00
Carbonic Acid CO ₂ , free -----	1.61	

Found

Silica SiO ₂ -----	.71	11.09
Sodium Na -----	.27	4.23
Potassium K -----	.23	3.60
Magnesium Mg -----	.20	3.13
Calcium Ca -----	1.51	23.57
Lithium Li -----	trace	trace
Iron and Aluminum Fe and Al -----	traces	traces
Sulphuric Acid SO ₄ -----	.24	3.76
Carbonic Acid CO ₃ -----	3.25	50.62
Bromine and Iodine Br and I -----	.00	.00
Chlorine Cl -----	trace	trace
Boric Acid B ₂ O ₃ -----	.00	.00
Ammonium NH ₄ -----	.00	.00
Total -----	6.41	100.00
Carbonic Acid CO ₂ , free -----	1.61	

Total solid material in solution, 6.50 grains per U. S.
gallon (by analysis).

(A. G. S. Ann. Rept. 1891, vol. 1, p. 55)

No. ~~225~~ 240NEW SPRING

Sec. 27, T. 1 N., R. 14 W., Alexander, at General Garland's
place (New or lower spring). Elev. 325.1 feet.

Analysis of Water

Hypothetical Combination

PULASKI COUNTY

240

No. ~~235~~ --Analysis continued

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.58	13.55
Carbonate of Soda Na_2CO_3 -----	.48	11.22
Carbonate of Potash K_2CO_3 -----	.12	2.80
Carbonate of Magnesia MgCO_3 --	.48	11.22
Carbonate of Lime CaCO_3 -----	1.92	44.86
Sulphate of Lime CaSO_4 -----	.70	16.35
Total -----	4.28	100.00
Carbonic Acid CO_2 , free -----	.53	

Found

Silica SiO_2 -----	.58	13.52
Sodium Na -----	.21	4.90
Potassium K -----	.07	1.63
Magnesium Mg -----	.14	3.26
Calcium Ca -----	.98	22.83
Lithium Li -----	trace	trace
Iron Fe -----	trace	trace
Aluminum Al -----	.00	.00
Sulphuric Acid SO_4 -----	.49	11.42
Carbonic Acid CO_3 -----	1.82	42.42
Boric Acid B_2O_3 -----	.00	.00
Ammonium NH_4 -----	.00	.00
Bromine and Iodine Br and I --	.00	.00
Chlorine Cl -----	trace	trace
Total -----	4.29	100.00
Carbonic Acid (CO_2 , free -----	.53	

Total solid material in solution, 4.30 grains per U. S. gallon.

The analyses of the Lower and Upper springs were made in the laboratory of the U. S. Geological Survey, by J. E. Whitfield. (A. G. S. Ann. Rept. 1891, vol. 1, p. 56)

No. ~~236~~ 241WATKINS SPRINGS

Sec. 30, T. 2 N., R. 11 W., North Little Rock. These springs withstood the drouths of 1925 and 1930. There are three springs. One is one half mile east of this location and the other is 200 yards northwest over the hill. This is very fine water and was marketed some years ago as Puritan Spring Water. Temperature of water is 60° F. These springs are tiled. Elev. 257 feet.

PULASKI COUNTY

241
No. ~~225~~ --Continued

	Parts per million	Grains per gallon
Silica Oxide -----	10.5	0.6
Iron Oxide -----	0.5	0.02
Aluminum Oxide -----	4.5	0.26
Lime Oxide -----	6.5	0.37
Magnesium Oxide -----	1.2	0.06
Oxides of Sodium & Potassium	6.	0.34
Chlorine Radicle -----	8.	0.46
Sulphates -----	1.	0.05
Carbonates CO ₃ -----	12.	0.69
Total solids -----	50.	2.9
Organic matter -----	0.	0.

Sample showed to be an excellent low mineral content spring water.

Wm. F. Manglesdorf.

Laboratory No. 13513, Aug. 17, 1927.
(Fred D. Watkins)

No. 242

NEWTON SPRING (PURDOM)

Sec. 26, T. 3 N., R. 12 W., 8 miles north of North Little Rock at Purdom Hill. The owner of this spring is John W. Purdom. This is a strong chalybeate water and of limestone character. Elev. 500 feet (approximately). (G. R. of A., 1859)

No. 243

DE LEON SPRINGS

NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 24, T. 1 N., R. 14 W., near Martindale. This spring is owned by De Leon Springs Water Company, 707 Center Street, Little Rock, Ark. (U. S. G. S. Alexander Quad.)

Analysis of Water

Chemical Analysis and Bacteriologic Examination

	Grains per gallon
Silica Oxide -----	0.35
Aluminum (Al) -----	0.01
Magnesium (Mg.) -----	0.01
Chlorine Radical (Cl.) -----	0.29
Poassium (K) -----	0.14

PULASKI COUNTY

No.

	<u>Grains per gallon</u>
Carbonate Rad. (CO) -----	0.09
Volatile Substances -----	0.99
Iron (Fe) -----	0.01
Lime (Ca) -----	0.60
Sulphates (SO) -----	0.19
Sodium (Na) -----	0.18
Lithium (Li) -----	0.01
Total Mineral Solids -----	1.42

Bacteriological Examination shows water to be free from any disease-producing bacteria. W. F. Manglesdorf, M. D., State Chemist.

No.

CRYSTAL SPRING

Sec. 16, T. 1 N., R. 12 W., Little Rock, Ark. This spring is owned by Chas. E. Nolting, 2606 High Street and the water is marketed by Nolting Crystal Spring Company, 2606 High Street. Elev. 266 (approximately). (Chas. E. Nolting)

RANDOLPH COUNTY

No.

RAVENDEN SPRINGS

Sec. 6, T. 19 N., R. 2 W., at Ravenden, 6 miles back of Ozark foothills. "In the canyon about 200 yards below the spring, is a perpendicular cliff about 150 feet high. Just about 100 feet up the cliff is a hole almost five feet in diameter. Old settlers say that for many years, in the early history of the settlement, ravens, known to inhabit that part of Arkansas at that time, built their nests in this hole from year to year, where, 'safe from the eye of the hawk and the nose of the fox, they could raise their expectant young in absolute safety.' Hence the name, Ravenden Springs." Elev. 500 feet (approximately). (Rev. Joseph G. Taylor, Arkansas Gazette, October 24, 1937)

No.

RICE'S SPRING

Sec. 11, T. 21 N., R. 1 W., situated on the waters of Mud Creek, a branch of Fourche Dumas. This is a health resort. The examination of this spring was made at a very unfavorable

RANDOLPH COUNTY

time; the unusually heavy rains, which fell in the spring, had completely saturated the surface of the earth, and diluted the spring with fresh water. From the analysis it appears to be a weak chalybeate, whereas it is represented by those who frequent it in a dry time to be a strong sulphur water. In its present state, acetate of lead would give no reaction of sulphuretted hydrogen. Small deposits of hydrated brown oxide of iron (limonite) are seen at various places in this county. The most extensive are those near J. E. Imboden's on Eleven Point river, and in the vicinity of Old Jackson, close to the boundary line between Randolph and Lawrence counties. It is possible a sufficiency of good ore may be found at the latter locality to supply a small forge. The temperature of water is 62° F. Elev. 270 feet (approximately)

Analysis of Water

Temperature of the air, 82°F., temperature of water, 62° F.
Carbonic acid (abundant).
Bicarbonate of lime.
Bicarbonate of magnesia.
Bicarbonate of the protoxide of iron.
Sulphates, a trace?
(First Report of a Geological Reconnoissance of Arkansas, 1857-1858, p. 207)

No.

ELM SPRING

Sec. 9, T. 21 N., R. 2 W., near Elm Store. The spring is owned by Joe Stubblefield. This spring suddenly broke through the soil about fourteen years ago, 1890, making a passage about as large as a barrel. An oily scum showed for some time on the water. Another spring of hard water with medicinal properties is reported on the land of W. W. Waggoner, sec. 9, T. 21 N., R. 2 W. Elev. 500 feet (approximately). (U. S. G. S. W 102, 1904)

No.

MAYNARD SPRING

Sec. 29, T. 21 N., R. 2 E., near Maynard. The spring is owned by R. J. E. Wyatt. Numerous other springs are reported within a radius of two or three miles. They are all of about the same character. The discharge of this spring is 50 gallons per minute. Elev. 500 feet (approximately) (U. S. G. S. W 102)

SCOTT COUNTY

No. ~~232~~ ~~250~~ 249COX'S ALUM SPRING

SW $\frac{1}{4}$, Sec. 5, T. 1 N., R. 28 W. The water flowing from the shales is highly charged with mineral ingredients. Much of it is highly concentrated and cannot well be drunk without dilution. It is similar in taste to the well water at Sloane's on the southeast quarter of section 31, 3 S., 25 W. in Montgomery County. Mr. Cox has a number of tanks or pans in which he first soaks and boils pieces of the rock, afterward evaporating to dryness the solution obtained. Some of the reddish powder, in all respects like that made by evaporating the water of Sloane's well, was analyzed with the result as follows: Iron (ferrous), Sulphuric acid, Magnesium, Potassium, and Aluminum--very slight trace. Some quarrying or digging has been done along the line of the fault which occurs at this place, and in the gorge of a stream which follows the fracture for some distance. At the head of the gorge, several natural and artificial pools collect strong alum water from crevices in the rocks. Elev. 250 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 105)

No. ~~233~~ ~~251~~ 250CHALYBEATE HILL SPRING

Sec. 16-21, T. 3 N., R. 30 W., probably towards the southwest corner of 16. About 275 feet below the top of the Chalybeate Hill, a strong chalybeate water issues from the ferruginous sandstones in the southern slope of that hill, and considerable iron ore is strewed along the hillside. The water is a saline chalybeate, possessing strong deoxidizing powers. Elev. 600 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 112)

No. ~~234~~ ~~252~~ 251POTEAU SPRING

Located in the Poteau Valley. The spring water rising from the shales of the Millstone grit, at Dr. James H. Smith's was also tested qualitatively, and found to contain principally chloride of sodium, a trace of bicarbonate of lime, and a trace of bicarbonate of magnesia. Elev. 600 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 113)

SEARCY COUNTY

No.

CAMPBELL SPRING

3 miles south of Snowball. The spring is owned by J. M. Isreal. Elev. 748 feet (approximately). (Homer L. Campbell, Snowball, Arkansas)

No.

KINES SPRING

NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 27, T. 14 N., R. 18 W., 5 miles south of Eula. The spring is owned by Braskee Kines. Elev. 801 feet (approximately). (J. C. Wasson, Eula, Arkansas)

No.

LANDIS SPRING

Sec. 23, T. 15 N., R. 14 W., Landis. Elev. 681 feet (approximately). (W. K. Williams, Marshall Arkansas)

No.

PRUITTS SPRING

NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 25, T. 15 N., R. 15 W., northeast of Marshall. The spring is owned by J. P. Cypert, Joplin, Missouri. Elev. 1067 feet (approximately). (Frank Ellsworth, Hot Springs, Arkansas)

SEARCY COUNTY

No. ~~240~~ 256BLOWING CAVE SPRING

Sec. 10, T. 15 N., R. 16 W., at Zack. Blowing Cave is a remarkable wonder. A cold blast of air flows from this cave the year around, and a cold spring spouts from its mouth. It is a natural refrigerator and perishable products can be kept in it for long periods as in cold storage plants. Elev. 689 feet (approximately). (The Arkansas Ozarks, p. 31)

No. ~~241~~ 257ZACK SPRING

Sec. 10?, T. 15 N., R. 16 W., Zack, 100 feet from railroad station. This spring has a large flow and the water is good. It has a discharge of 8 gallons per minute. Elev. 689 feet (approximately). (Geo. C. Branner, State Geologist)

SEVIER COUNTY

No. ~~242~~ 258SALT SPRING

Sec. 20?, T. 8 S., R. 32 W., near Chapel Hill. Elev. 372 feet (approximately). (U. S. G. S. P. 46)

No. ~~243~~ 259STATE SALT SPRING

W $\frac{1}{2}$, SW $\frac{1}{4}$, Sec. 29, T. 8 S., R. 32 W. 160 acres were sold to George F. Boring by the United States on May 28, 1836, for \$1.25 per acre. Elev. 500 feet (approximately). (State Land Commissioner's Office)

No. ~~244~~ 260STATE SALT SPRING

E $\frac{1}{2}$ SE $\frac{1}{4}$, Sec. 30, T. 8 S., R. 32 W. 160 acres were sold to George F. Boring by the United States on May 28, 1836, for \$1.25 per acre. Elev. 500 feet (approximately). (State Land Commissioner's Office)

SEVIER COUNTY

No.

COWDEN SPRING

Sec. 36, T. 9 S., R. 32 W., near Horatio. The spring is owned by Herbert Cowden. The discharge is 80 gallons per minute. Elev. 331.5.

Analysis of Water

Taste: Negative.
Odor: Negative.
Color: Clear and sparkling.
Turbidity (Suspended matter): None.

	Parts per thousand	Grains per gallon
Total Solids -----	0.0400	2.34
Organic Matter -----	0.0012	0.07
Silica -----	0.0118	0.69
Iron and Alumina Oxides -----	0.0018	0.11
Magnesium Oxide -----	0.0029	0.17
Calcium Oxide -----	0.0050	0.29
Sodium and Potassium Oxides ---	0.0054	0.32
Carbonic Acid Anhydride -----	0.0068	0.40
Chlorine -----	0.0067	0.39
Sulphuric Acid Anhydride -----	None	None
Probable Combinations as they exist in the water:		
Organic Matter -----	0.0012	0.07
Silica -----	0.0118	0.69
Iron and Alumina Oxides -----	0.0018	0.11
Magnesium Carbonate -----	0.0061	0.36
Calcium Carbonate -----	0.0077	0.45
Calcium Chloride -----	0.0013	0.08
Sodium Chloride -----	0.0101	0.59
Total Solids -----	0.0400	2.35
Alkalinity as Calcium Carbonate -----		0.91
Soap Hardness as Calcium Carbonate -----		1.76

C. M. Adams, Consulting Chemical and Sanitary Engineer.
(Furnished by H. S. Cowden, Horatio, Arkansas)

SEVIER COUNTY

No. 261

WALNUT SPRINGS

SE $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 27, T. 9 S., R. 31 W. The discharge of these springs was 25 gallons per minute, January 10, 1934. Elev. 500 feet (approximately). (Arkansas Geological Survey File)

No. 262

NORWOODVILLE SPRING

NE $\frac{1}{4}$, Sec. 32, T. 9 S., R. 31 W. Water is hauled to Nashville, Hope, De Queen, and Foreman, Arkansas, and to nearby towns in Texas for drinking purposes. The discharge of this spring is 80 gallons per minute, January 10, 1934. Elev. 300 feet (approximately). (Arkansas Geological Survey File)

No. 263

STATE SALT SPRING

SE $\frac{1}{4}$, Sec. 10, T. 10 S., R. 29 W., 6 miles northeast of Ben Lomond. 160 acres were sold to Ira Smoot by the United States on May 20, 1830. (L. R. Donation). Elev. 300 feet. (State Land Commissioner's Office)

No. 264

STATE SALT SPRING

SE $\frac{1}{4}$, Sec. 12, T. 10 S., R. 29 W. 160 acres were sold to John Rainey by the United States on May 19, 1830 (L. R. Donation) sale. This sale prior to admission of the state and before the Salt Springs were selected. Elev. 300 feet. (State Land Commissioner's Office)

No. 265

STATE SALT SPRING

SW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 15, T. 10 S., R. 29 W., 4 miles northeast of Ben Lomond. 40 acres were sold to R. A. Gilliam by the state on March 12, 1900, for \$1.25 per acre. Elev. 300 feet. (State Land Commissioner's Office)

SEVIER COUNTY

No. 266

STATE SALT SPRING

W $\frac{1}{2}$ NW $\frac{1}{4}$, Sec. 1, T. 10 S., R. 32 W., south of Horatio. 80 acres were sold to B. H. Kinsworthy by the state on January 4, 1873 for \$1.25 per acre. Elev. 331 feet. (State Land Commissioner's Office)

No. 267

WALNUT SPRING

SE $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 27, T. 9 S., R. 31 W., near Horatio. There are several other springs near this spring. The discharge of this spring is 25 gallons per minute. Elev. 330 feet. (approximately). (Arkansas Geological Survey File.)

No. 268

STATE SALT SPRING

SE $\frac{1}{4}$, Sec. 19, T. 18 S., R. 32 W. 160 acres were sold to John Orr by the United States on May 30, 1936. Elev. 330 (approximately). (State Land Commissioner's Office)

SHARP COUNTY

No. 269

TOWN SPRING

NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 3, T. 16 N., R. 6 W., on Main Street of Evening Shade. This spring belongs to the Estate of C. W. Shaver, Evening Shade, Ark. This spring forms the only source of water for many families in the town. During the 90 years of observations by three generations of the Shaver family the supply has never varied. The spring was originally called "Plum Spring" by pioneer settlers who were wont to lie in wait and shoot deer that came to drink there. In time of drought people came from towns several miles away for water. Depth is 18 inches and diameter of basin is 30 inches. Discharge is 60 gallons per minute and is about the same all the time. (Mrs. Caruth S. Moore)

SHARP COUNTY

No. 260

BUBBLING SPRING (MILL CREEK SPRING)

NW $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 10, T. 16 N., R. 6 W., near Evening Shade.
Feeds Mill Creek, source of power for hydro-electric plant
which supplies Evening Shade. Elev. 500 feet (approximately)
(Mrs. Caruth S. Moore)

No. 261

CHRISTENBERRY SPRING

Sec. 25, T. 16 N., R. 4 W., near Emery. The owner of the
spring is P. M. Christenberry, Emery, Ark. Elev. 500 feet
(approximately). (Mrs. Caruth S. Moore).

STONE COUNTY

No. 262

BON AIR (CHALYBEATE) SPRING

NW $\frac{1}{4}$, Sec. 8, T. 13 N., R. 9 W., 7 miles from Marcella at the
foot of the Boston Mountains. The spring forms the waters of

STONE COUNTY

one of the small tributaries of Coon Creek, which flows into the Devil's Fork of Red River. It is 150 feet below the highest point of the mountain and 1200 feet above sea level. There are three springs close together, only one of which is used for its medicinal properties, and the water from which was analyzed. This one has a strong flow, throwing out a stream of remarkably clear water, large enough to fill a two-inch pipe. There is a heavy deposit of iron in the spout through which the water flows, and in a box or trough in which it collects, making it frequently necessary to clean out the sediment from the latter.

The water flows from the base of a bed of yellow ferruginous sandstone from 25 to 30 feet thick that is close to the top of the mountain and near the base of the Coal Measures. No other rock was observed on the mountain near the spring. Elev. 337 feet (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.70	17.24
Chloride of Soda NaCl -----	.30	7.39
Carbonate of Magnesia MgCO_3 ----	.70	17.24
Carbonate of Lime CaCO_3 -----	1.08	26.60
Carbonate of Iron FeCO_3 -----	.91	22.42
Sulphate of Lime CaSO_4 -----	.37	9.11
Total -----	4.06	100.00

Found

Silica SiO_2 -----	.70	17.24
Sodium Na -----	.12	2.96
Magnesium Mg -----	.20	4.93
Calcium Ca -----	.54	13.30
Iron Fe -----	.44	10.84
Sulphuric Acid SO_4 -----	.26	6.40
Carbonic Acid CO_3 -----	1.62	39.90
Chlorine Cl -----	.18	4.44
Total -----	4.06	100.00

Water collected by assistant T. C. Hopkins, December 18, 1891.

Analysis by A. E. Menke.

Total solids in solution, 4.75 grains per U. S. gallon.
(A. G. S. Ann. Rept., 1891, vol. 1, p. 32)

STONE COUNTY

No.

BLANCHARD SPRING

SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 5, T. 15 N., R. 11 W., 3/4 mile north of state Highway No. 14, the nearest town is Mountain View. This beautiful spring is in the Sylamore Recreational Area of the Ozark National Forest. It is on North Sylamore Creek a tributary of White River, it emerges from the mouth of a cave, 8 feet above the valley, it has an estimated discharge of from 1500 to 3000 gallons per minute. The water comes from the limestone is clear and palatable, has a temperature of about 70°. The spring will be kept in its natural condition. Picnicking facilities will be maintained downstream, such as wading, swimming, and boating, including shelters, concession building, and dam. The historic old water mill will be restored. Area designed for recreation use is approximately 4,000 by 1,000 feet. (H. R. Koen, Forest Supervisor)

No.

LIVINGSTON CREEK SPRING

NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 26, T. 16 N. R. 11 W., on West Livingston Creek the nearest town is Mountain View. This spring is in the Sylamore Recreational Area of the Ozark National Forest. It emerges from the mouth of a small cave at the bottom of hillside. Estimated discharge 2000 gallons per minute. Temperature 70°. The area near the spring is used by hunters as a camp ground. Recreation development of 25 acres in vicinity of spring is contemplated but detail plans have not yet been prepared. (H. R. Koen, Forest Supervisor) 1-15-38

No.

SMYRNA SPRING

SW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 2, T. 15 N. R. 13 W., on Roasting Ear Creek the nearest town is Mountain View. This spring is in the Sylamore Recreational Area of the Ozark National Forest. It emerges from bottom of creek at base of a bluff. Estimated discharge 1000 gallons per minute. Temperature 75°. This spring is said to flow muddy water at times. (H. R. Koen, Forest Supervisor).

STONE COUNTY

No. ~~255x~~ 263SULPHUR SPRING

T. 14 N., R. 11 W., $\frac{1}{2}$ of one mile west of Mountain View.
Elev. 692 feet. (Arkansas Ozarks, p. 13)

No. ~~256~~ 264LITHIA SPRING

T. 14 N., R. 11 W., $\frac{1}{4}$ of one mile north of Mountain View
on State Highway 66. Elev. 692 feet (approximately).
(Arkansas Ozarks, p. 13)

No. ~~257~~ 265BIG SPRING

T. 14 N., R. 12 W., 9 miles west of Mountain View on State
Highway 66. Elev. 692 feet (approximately). (Arkansas
Ozarks, p. 13)

No. ~~258~~ 266MOUNTAIN VIEW SPRINGS

Sec. 5, T. 15 N., R. 11 W., Mountain View. The temperature
of water is 55° F., and the discharge is 2,100 gallons per
minute. Elev. 692 feet. (U. S. G. S. W 102)

UNION COUNTY

No. ~~259~~ 267BLANCHARD SPRING

Sec. 33, T. 19 S., R. 15 W., at Blanchard Springs. The dis-
charge of this spring is 30 gallons per minute. Elev. 179
feet (approximately). (U. S. G. S. P. 46)

VAN BUREN COUNTY

No. ~~260~~ 268STATE SALT SPRING

Sec. 4, T. 10 N., R. 11 W?., east of Little Red River. 81.12
acres were sold to Christian L. Goodman by the state on July
20, 1857, for \$1.25 per acre.
(State Land Commissioner's Office)

VAN BUREN COUNTY

No.

CHOCTAW SPRING

T. 10 N., R. 13 W., $1\frac{1}{2}$ miles south of Choctaw. The spring is owned by Will Lovell. Water issues from crevice of flat rock and is cold, clear and soft, and comes from the south side of a long slope. The discharge of this spring is 3 gallons per minute. Elev. 497 feet (approximately). (G. J. Shaw, 2105 State, Little Rock, Arkansas)

No.

SUGAR LOAF SPRINGS

Sec. 20?, T. 10 N., R. 13 W. The Sugar Loaf Springs are situated about 3 miles southwest of Sugar Loaf Mountains. There are several fine springs of mineral water there. White Sulphur Spring and Puce Spring have about the same mineral content. The analysis is given below. There is also a good chalybeate spring in this location. Elev. 1000 feet (approximately)

Analysis of Water

Its principal constituents are:

Free sulphuretted hydrogen.

Bicarbonate of lime.

Bicarbonate of magnesia.

Chloride of sodium.

Chloride of magnesium.

(A. G. S. First Rept. of a Geological Reconnaissance-1857-1858)

No.

ROCK HOUSE SPRING

NW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 3, T. 11 N., R. 12 W., 5 miles southeast of Shirley. The spring is owned by George Johnson, Rt. #1, Shirley. Elev. 500 feet (approximately). (G. W. Washburn, Edmont, Arkansas)

WASHINGTON COUNTY

No.

MORROW'S SPRING

Sec. 36, T. 14 N., R. 33 W., on the south side of the Boston Mountains in the vicinity of Morrow's School House on Cove Creek. Elev. 987 feet. (A. G. S. Rept., 1891, Vol. 1, p. 118)

WASHINGTON COUNTY

No.

SULPHUR CITY SPRING

NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 27, T. 15 N., R. 29 W., Sulphur City. This spring issues from the Wedington formation and gives rise to a local resort. Elev. 1304 feet. (U. S. G. S. W 145, p. 87)

No.

J. P. NEAL SPRING

Sec. 19, T. 15 N., R. 31 W., Prairie Grove. The spring is owned by Col. J. P. Neal. This is another beautiful spring, flowing from limestone at or very near its point of contact with the Eureka shale. Elev. 1180 feet. (A. G. S. Ann. Rept., 1891, vol. 1, p. 117)

No.

FAYETTEVILLE SPRING

Sec. 2, T. 16 N., R. 30 W., Fayetteville. This spring is a fine flowing spring issuing from what appears to be the opening of a cavern in the Pentremital limestone. (Elev. 1334 feet approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 117)

No.

WILLIAM'S SPRING

T. 16 N., R. 30 W., Fayetteville. The spring is owned by the City of Fayetteville. This spring is in an east-west ravine that extends through the northern part of Fayetteville, and, in its general character, resembles Lewis' Spring, but probably differs in its geologic position, inasmuch as the sandstones near at hand are very much disturbed, being completely turned on edge. May 28, 1887, it discharged 8607 gallons in twenty-four hours. Elev. 1334 feet. (A. G. S. Ann. Rept., 1891, vol. 1, p. 116)

No.

CATO'S SPRING

T. 16 N., R. 30 W., Fayetteville. The spring is owned by the City of Fayetteville. This spring is situated in a ravine at the foot of East Mountain. The water issues from the Pentremital limestone. On May 21, 1887, its measured flow was 12,067 gallons in twenty-four hours. Elev. 1334 feet (approximately) (A. G. S. Ann. Rept., 1891, vol. 1, p. 116)

WASHINGTON COUNTY

No. 278

LEWIS SPRING

T. 16 N., R. 30 W., Fayetteville. This spring is situated between Dixon and Spring Streets. It issues from rocks that immediately overlie the Archimedes limestone. It does not flow from the edge of eroded strata, like the preceding, but is rather a welling up of water. May 23, 1887, its flow was at the rate of 26,221 gallons in twenty-four hours. Elev. 1334 feet. (A. G. S. Ann. Rept., 1891, vol. 1, p. 116)

No. 279

BLUE WATER SPRING

Near NW corner of SW $\frac{1}{4}$ of the NE $\frac{1}{4}$, Sec. 7, T. 17 N., R. 28 W. This spring is in the bed of Brush Creek, a short distance above its union with White River. It is a very large spring and issues from the cherty limestone. Elev. 1200 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 117)

No. 280

JOHNSON'S SPRING (BIG SPRING)

SE $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 15, T. 17 N., R. 30 W., Fayetteville. This spring is the largest spring examined and is widely known. It wells up from the cherty limestone, and covers an area of perhaps an eighth of an acre. On August 2, 1888, its measured capacity was 2,345,967 gallons in twenty-four hours. The flow from this and two smaller springs is utilized for power at Johnson's mill. On this date the mill flume was also gauged showing a flow of 2,562,491 gallons in twenty-four hours. This locality may, in the future, be very valuable from an economic standpoint, as a source of water supply for the city of Fayetteville. Elev. 1334 feet. (A. G. S. Ann. Rept., 1891, vol. 1, p. 117)

No. 281

AIR SPRING

Sec. 36, T. 17 N., R. 32 W., near the center of section 36. This spring issues from the same limestone at or very near its point of contact with the Eureka shale. The water, as it flows from the rock, seems to be accompanied by a current of air. Elev. 1200 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 117)

WASHINGTON COUNTY

No.

SPRINGDALE SPRING NO. 1

Sec. 23, T. 18 N., R. 30 W., Springdale. The spring is owned by J. Smith and J. W. Stults. There are a large number of other springs of similar character in this region. Some give a red sediment on standing and have other mineral properties. Among the more important of the springs are the Stults Spring, 2 miles northwest of town; Hewitt Spring, 3 miles east of town; Graham Spring, 3 miles east of town; Henson Spring, 2 miles southeast of town, and Vernon Spring, 3 miles south of town. The temperature is 48° F. Elev. 1324 feet. (U. S. G. S. W 102, p. 388)

No.

SPRINGDALE SPRING NO. 2

Sec. 23, T. 18 N., R. 30 W., Springdale. The water is used for domestic purposes. The discharge of this spring is 30 gallons per minute. (U. S. G. S. W. 102, p. 386)

No.

SHILON SPRINGS

SW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 22, T. 18 N., R. 30 W., 3 miles northwest of Springdale. This spring is municipally owned and is the water supply of the town of Springdale. In 1925 the daily pumpage was 94,000 gallons. This water is used for all purposes including fire. Marketed by Springdale Water Plant, Springdale, Ark. Tem. of water is 48°. Elev. 1324. (Univ. of Ark. B 2, Hale)

Analysis of Water

Sample of water was submitted May, 1924. Condition:
Turbidity, slight; Color and Odor, none.

Determination

	Parts per million
Silica SiO ₂ -----	18.10
Oxides of Iron and Alumi- num Fe ₂ O ₃ -Al ₂ O ₃ -----	11.80
Magnesium Mg -----	.41
Calcium Ca -----	30.68
Sodium Na -----	3.21
Chloride Cl -----	4.97
Sulfate SO ₄ -----	4.75

WASHINGTON COUNTY

284
No. ~~276~~--Analysis continued

	Parts per million
Alkalinity	
Methyl Orange -----	74.50
Phenolphthalein -----	0.00
Total Dissolved Solids -	123.00

Hypothetical Combination

	Parts per million	Grains per gallon
Silica SiO_2 -----	18.10	1.05
Oxides of Iron and Aluminum Fe_2O_3 Al_2O_3 -----	11.80	0.69
Magnesium Sulfate MgSO_4 -----	2.03	0.12
Calcium Sulfate CaSO_4 -----	4.43	0.26
Calcium Carbonate CaCO_3 -----	73.48	4.29
Sodium Chloride CaCl -----	8.18	0.48
	<u>118.02</u>	<u>6.89</u>
Total Hardness -----	119.88	6.99
Pounds of Scale per 1000 gallons -----		1.040
Pounds of Hard Scale per 1000 gallons -----		0.248
Coefficient of Scale Hardness -----		0.24

This water is of medium mineral content, forming but little scale and that of less than medium hardness.

No. ~~284~~ 285

ELM SPRINGS

Sec. 25, T. 18 N., R. 31 W., Elm Springs near Brush Creek. This spring has clear, sparkling water which gushes from the cherty limestone, forming many springs along the bank of a small branch, locally called Brush Creek, a tributary of the Osage. Elev. 1324 feet.(approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 117)

WASHINGTON COUNTY

No. ~~278~~ 286SULPHUR SPRINGS

1 mile south of Payetteville. Several so-called "sulphur springs," rise through the black bituminous shales, at the bottom of the sections, in the central part of Washington County. The water of one, which was obtained from John May's place, one mile south of Payetteville, was found by the application of chemical reagents, to contain the principal constituents given in the analysis below. Elev. 1334 feet (approximately).

Analysis of Water

Sulphate of magnesia, (Epsom salts)

Sulphate of alumina, a trace

Sulphate of iron, a trace

Bicarbonate of lime.

Bicarbonate of magnesia.

(A. G. S. First Rept. of a Geological Reconnaissance-1857-1858, p. 117)

No. ~~279~~ 287KUYKENDALL SPRING

This spring is located on the east fork of the Illinois River on Dr. Kuykendall's place. It is a fine chalybeate spring issuing from the bed of ferruginous sandstone of the millstone grit series. This water has a powerful deoxidizing effect, instantly blackening a silver solution, even without the addition of ammonia; from this fact and the comparative small amount of carbonic acid present, it is probable that the protoxide of iron present, is held in solution by some organic acid. This water will probably be found to have valuable alterative and tonic effects combined. (A. G. S. First Rept. of a Geological Reconnaissance-1857-1858, p. 119)

No. ~~288~~ 288SULPHUR SPRING

$\frac{1}{4}$ mile from Dr. Kuykendall's.

WASHINGTON COUNTY

289

No. ~~288~~--Continued

Analysis of Water

Free sulphuretted hydrogen
Chloride of magnesium
Chloride of sodium
Only a trace of sulphates
Bicarbonate of lime
Bicarbonate of magnesia
(A. G. S. First Rept. of a Geological Reconnaissance-1857-1858)

WHITE COUNTY

No. ~~288~~ 290ESSEX SPRING

Sec. 19, T. 6 N., R. 8 W., near Essex. Elev. 250 feet
(approximately). (U. S. G. S. W 102)

No. ~~282~~ 291BEEBE SPRING

Sec. 14, T. 6 N., R. 9 W., near Beebe. The discharge of
this spring is 60 gallons per minute. The mineral content
is iron, sulphur, and magnesia. Elev. 244.2 feet.
(U. S. G. S. W 102)

No. ~~287~~ 292ELLIOTT SPRING

Sec. 20, T. 6 N., R. 10 W., at Peach Orchard Gap. Another
chalybeate spring of the same character as the Springfield
Town Spring, No. 76, in Conway County. Elev. 250 feet
(approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 115)

No. ~~284~~ 293GRIFFIN SPRING

T. 7 N., R. 7 W., near Searcy. Elev. 245 feet (approx-
imately). (Arkansas Ozarks)

WHITE COUNTY

294

No. ~~285~~ --Continued

In order to ascertain whether the amount of mineral matter in solution varied much, water was collected again on the 11th of August, 1891, by R. N. Brackett, and the following determinations made:

Total solids, 18.72 grains per U. S. gallon.

Sulphuretted hydrogen, (0.09 grains per U. S. gallon.
(0.22 cubic inches.

(A. G. S. Ann. Rept., 1891, vol. 1, p. 82-83)

No. ~~286~~ 295GRIFFIN SPRING

SW $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 28, T. 8 N., R. 7 W., about 4 miles north slightly west from the town of Searcy. The water issues from rocks of the Farren Coal Measures and is strongly chalybeate. Immediately north of the spring is an escarpment from 125 to 175 feet high with a bed of sandstone at the top, which has a low dip to the north, slightly west. Elev. 245 feet (approximately).

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO ₂ -----	1.54	21.78
Chloride of Soda NaCl -----	.06	.85
Chloride of Potash KCl -----	.01	.14
Chloride of Magnesia MgCl ₂ ----	1.15	16.27
Carbonate of Lime CaCO ₃ -----	1.82	25.74
Sulphate of Magnesia MgSO ₄ ----	.22	3.11
Sulphate of Lime CaSO ₄ -----	2.16	30.55
Sulphate of Iron FeSO ₄ -----	.11	1.56
Total -----	7.07	100.00

Found

Silica SiO ₂ -----	1.54	6.13
Sodium Na -----	.02	.08
Potassium K -----	.01	.04
Magnesium Mg -----	.33	1.32
Calcium Ca -----	1.36	5.42
Iron Fe -----	.04	.16

WHITE COUNTY

No. ~~225~~ 294SEARCY SULPHUR SPRING

T. 7 N., R. 7 W., at Searcy. The water comes from rocks of the Barren Coal Measures. Gas was bubbling up from the water when the collection was made; there was a strong odor of sulphuretted hydrogen, but lead paper showed only a slight reaction for it. Elev. 245 feet (approximately)

Analysis of Water

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.36	7.61
Chloride of Soda NaCl -----	2.89	16.21
Chloride of Potash KCl -----	.46	2.67
Carbonate of Soda Na_2CO_3 -----	5.49	30.81
Carbonate of Magnesia MgCO_3 ---	1.19	6.77
Carbonate of Lime CaCO_3 -----	3.25	18.23
Sulphate of Soda Na_2SO_4 -----	2.99	16.77
Sulphate of Iron FeSO_4 -----	.04	.21
Sulphate of Alumina $(\text{Al}_2(\text{SO}_4)_3)$	.13	.72
Total -----	<u>17.80</u>	<u>100.00</u>
Carbonic Acid (CO_2), free -----	<u>16.29</u>	
	<u>34.09</u>	

Found

Silica SiO_2 -----	1.36	3.99
Sodium Na -----	4.56	13.38
Potassium K -----	.24	.71
Magnesium Mg -----	.34	1.01
Calcium Ca -----	1.30	3.83
Iron Fe -----	.01	.04
Aluminum Al -----	.02	.07
Sulphuric Acid SO_4 -----	2.16	6.35
Carbonic Acid CO_3 -----	22.12	64.83
Chlorine Cl -----	1.97	5.79
Sulphuretted Hydrogen H_2S -----	trace	trace
Total -----	<u>34.08</u>	<u>100.00</u>

100.46 per cent account for.

Water collected by assistant J. P. Smith, March 23, 1888.

Analysis by R. N. Brackett and J. P. Smith.

Temperature of air, 58° F.; of water, 59° F.

Total solid material in solution, 17.73 grains per U. S. gallon.

WHITE COUNTY

295

No. ~~288~~--Analysis continued

	Grains per U.S. gallon	Per cent of total solids
Sulphuric Acid SO_4 -----	1.77	7.04
Carbonic Acid CO_3 -----	19.14	76.23
Chlorine Cl -----	.90	3.58
Total -----	25.11	100.00

Water collected by assistant J. P. Smith, March 23, 1888.

Temperature of air, 50° F.; of water, 58° F.

Total solid material in solution, 7.33 grains per U. S. gallon.

Carbonic Acid (CO_2), free and for bicarbonates, 18.05 grains per U. S. gallon.

(A. G. S. Ann. Rept., 1891, vol. 1, p. 51)

No. ~~287~~ 296ARMSTRONG SPRING

SW $\frac{1}{4}$, Sec. 33, T. 8 N., R. 8 W., Armstrong Springs. The water in this spring comes from arenaceous shale of the Barren Coal Measures, and is near the axis of the Searcy anticline. The spring is five feet deep; the water is drawn through a pipe from the bottom, and is clear, odorless and sparkling; it has a slightly chalybeate taste, and forms the usual yellow deposit at the end of the waste-pipe.

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	3.04	28.07
Chloride of Soda NaCl -----	.90	8.31
Carbonate of Soda Na CO_3 ----	1.27	11.73
Carbonate of Magnesia MgCO_3 --	1.12	10.34
Carbonate of Lime CaCO_3 -----	3.32	30.66
Sulphate of Soda Na_2SO_4 -----	.69	6.37
Sulphate of Iron FeSO_4 -----	.23	2.12
Sulphate of Alumina ($\text{Al}_2(\text{SO}_4)_3$)	.26	2.40
Total -----	10.83	100.00

WHITE COUNTY

No.

	Grains per U.S. gallon	Per cent of total solids
Found		
Silica SiO_2 -----	3.04	28.07
Sodium Na -----	1.13	10.43
Potassium K -----	trace	trace
Magnesium Mg -----	.32	2.96
Calcium Ca -----	1.33	12.28
Lithium Li -----	trace	trace
Iron Fe -----	.08	.74
Aluminum Al -----	.04	.37
Sulphuric Acid SO_4 -----	.83	7.66
Carbonic Acid CO_3 -----	3.51	32.41
Chlorine Cl -----	.55	5.08
Total -----	<u>10.83</u>	<u>100.00</u>

Water collected by assistant J. H. Means, June 5, 1891.
Total solid material in solution, 9.39 grains per U. S.
gallon.

Temperature of the air, 81.68°F. ; of water, 61.88°F.
(A. G. S. Ann. Rept., 1891, vol. 1, p. 27)

No.

BRADFORD SPRING

Sec. 6, T. 9 N., R. 4 W., Bradford. The spring is owned by
O. J. Davis. The mineral content of this spring is iron,
sulphur, and magnesia. The discharge is 5 gallons per minute.
Elev. 242 feet. (U. S. G. S. W 102)

No.

MINERAL SPRING

Sec. 6, T. 9 N., R. 5 W., near Steprock. The spring is owned
by D. E. Hawse. This spring, charged with mineral matter, is
located on the land of D. E. Hawse. Elev. 250 feet (approx-
imately). (U. S. G. S. W 102)

YELL COUNTY

No.

CHICKALAH SPRING

Sec. 10, T. 6 N., R. 22 W., Chickalah. The spring is owned by J. F. Choate. The mineral content of this spring is sulphur and gas. The discharge is 2 gallons per minute. Elev. 342 feet. (U. S. G. S. W 102)

No.

SULPHUR SPRINGS

SE $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 10, T. 6 N., R. 22 W., south of Spring Mountain. The spring is owned by New York Mercantile Trust Company, New York and St. Louis. These five springs are highly charged with sulphuretted hydrogen. Elev. 500 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 115)

No.

CHALYBEATE SPRING

Sec. 28, T. 6 N., R. 22 W., south of Chickalah Mountain. There are two chalybeate springs found at this location. Elev. 750 feet (approximately). (A. G. S. Ann. Rept., 1891, vol. 1, p. 116)

No.

NORTH DICKENS

Sec. 29-32, T. 7 N., R. 21 W., west side of Mt. Nebo, and about 100 yards south of Gum Spring. Dickens springs are named from a Mr. Dickens who is said to have been the first settler in that region. These springs flow from a mass of yellow ferruginous sandstone, the talus from the steep bluff above, the rock of which belong to the Barren Coal Measures. They are two in number, the outlets being not more than two feet apart, so close, in fact, that in their present natural condition the waters from both mingle in the same pool. Their close proximity would indicate that the two might be separate outlets of the same spring, but the one to the south gave a very perceptible odor of sulphur, which could not be noticed in the other. Water collected from these springs by assistant G. D. Harris, November 15, 1889, gave total solids, 7.77 grains per U. S. gallon. Elev. 1750 feet (approximately).

YELL COUNTY

302

No. ~~295~~ --Continued

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.46	6.17
Chloride of Soda NaCl -----	.30	4.02
Carbonate of Soda Na_2CO_3 -----	2.10	28.15
Carbonate of Magnesia MgCO_3 -	1.59	21.31
Carbonate of Lime CaCO_3 -----	2.04	27.35
Carbonate of Iron FeCO_3 -----	.50	6.70
Sulphate of Lime CaSO_4 -----	.47	6.30
Total -----	7.46	100.00

Found

Silica SiO_2 -----	.46	6.17
Sodium Na -----	.72	9.66
Magnesium Mg -----	.45	6.12
Calcium Ca -----	.95	12.75
Iron Fe -----	.24	3.22
Sulphuric Acid SO_4 -----	.33	4.41
Carbonic Acid CO_3 -----	4.12	55.28
Chlorine Cl -----	.18	2.40
Total -----	7.45	100.00

Water collected by assistant T. C. Hopkins, Dec. 24, 1891.

Analysis by A. E. Menke.

Temperature of air, 57.2°F. ; of water, 55.4°F.

Total solid material in solution, 8.75 grains per U. S. gallon.

(A. G. S. Ann. Rept., 1891, vol. 1, p. 72-73)

No. ~~294~~ 303SOUTH DICKENS SPRING

Sec. 29-32, T. 7 N., R. 21 W., west side of Mt. Nebo, and about 100 yards south of the Gum Spring. (Note on No. 293, North Dickens Spring, applies to this spring) Elev. 1750 (approximately).

YELL COUNTY

303
No. ~~224~~ --Continued

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.52	7.43
Chloride of Soda NaCl -----	.63	9.00
Carbonate of Soda Na_2CO_3 ----	1.66	23.71
Carbonate of Magnesia MgCO_3 -	1.45	20.71
Carbonate of Lime CaCO_3 -----	1.89	27.00
Carbonate of Iron FeCO_3 -----	.17	2.43
Sulphate of Lime CaSO_4 -----	.68	9.71
Total -----	7.00	99.99

Found

Silica SiO_2 -----	.52	7.45
Sodium Na -----	.87	12.46
Magnesium Mg -----	.41	5.87
Calcium Ca -----	.95	13.61
Iron Fe -----	.03	1.15
Sulphuric Acid SO_4 -----	.48	6.88
Carbonic Acid CO_3 -----	3.46	49.57
Chlorine Cl -----	.21	3.01
Total -----	6.21	100.00

Water collected by assistant T. C. Hopkins, Dec. 24, 1891.

Analysis by A. E. Menke.

Temperature of air, 57.2°F .; of water, 55.4°F .

Total solid material in solution, 8.75 grains per U. S. gallon.

(A. G. S. Ann. Rept., 1891, vol. 1, p. 71)

No. ~~225~~ 304

DARLING SPRING

Sec. 29-32, T. 7 N., R. 21 W., Mt. Nebo. This spring is about 175 feet below the bottom of the cap rock of Mt. Nebo, and seems to come from the black shales. It is situated on the bench on the west side of the mountain. When the sample for analysis was collected the water was quite clear, with the exception of a slight precipitate of oxide or hydroxide of iron; when it reached the Survey laboratory it had formed a heavy, dark colored precipitate of iron. Elev. 1750 feet (approximately).

YELL COUNTY

304
No. ~~295~~ --Continued

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	1.04	19.25
Chloride of Sodium NaCl -----	.49	9.16
Carbonate of Soda Na_2CO_3 -----	.69	12.90
Carbonate of Potash K_2CO_3 -----	.18	3.36
Carbonate of Magnesia MgCO_3 ---	.39	7.29
Carbonate of Lime CaCO_3 -----	1.07	20.00
Carbonate of Iron FeCO_3 -----	.20	3.74
Sulphate of Iron FeSO_4 -----	.99	18.51
Sulphate of Alumina $(\text{Al}_2(\text{SO}_4)_3)$	.31	5.79
Total -----	5.35	100.00

Found

Silica SiO_2 -----	1.04	19.37
Sodium Na -----	.49	9.12
Potassium K -----	.11	2.05
Magnesium Mg -----	.11	2.05
Calcium Ca -----	.43	8.01
Iron Fe -----	.47	8.75
Alumina Al -----	.05	.93
Sulphuric Acid SO_4 -----	.88	16.39
Carbonic Acid CO_3 calculated -	1.50	27.93
Chlorine Cl -----	.29	5.40
Total -----	5.37	100.00

Water collected by J. C. Branner, October 26, 1888.

Analysis by J. P. Smith.

Temperature of air, November 13, 1889, 59.1°F. ; of water, 42°F.

Total solid material in solution, 5.89 grains per U. S. gallon.

(A. G. S. Ann. Rept., 1891, vol. 1, p. 70)

No. ~~295~~ 305

GUM SPRING

Sec. 29-32, T. 7 N., R. 21 W., on the bench of Mt. Nebo, close to the foot of the cliff on the west side. This spring issues from a mass of debris at about the same geological level as the Dickens springs. The stream flowing from it is

YELL COUNTY

No. ~~226~~ 305

remarkably clear and cold, about half filling a 1-inch pipe. It is said to vary little, if any, in either volume or temperature during the year. The water is odorless and almost tasteless. There is a considerable deposit of iron about the outlet. Elev. 1750 feet (approximately)

Analysis of Water

Hypothetical Combination

Constituents	Grains per U.S. gallon	Per cent of total solids
Silica SiO_2 -----	.64	14.71
Chloride of Soda NaCl -----	.23	5.29
Carbonate of Magnesia MgCO_3 -	.92	21.15
Carbonate of Lime CaCO_3 -----	1.21	27.81
Carbonate of Iron FeCO_3 -----	1.01	23.22
Sulphate of Lime CaSO_4 -----	.34	7.82
Total -----	4.35	100.00

Found

Silica SiO_2 -----	.64	14.71
Sodium Na -----	.09	2.07
Magnesium Mg -----	.26	5.98
Calcium Ca -----	.58	13.33
Iron Fe -----	.49	11.26
Sulphuric Acid SO_4 -----	.24	5.52
Carbonic Acid CO_3 -----	1.91	43.91
Chlorine Cl -----	.14	3.22
Total -----	4.35	100.00

Water collected by assistant T. C. Hopkins, Dec. 24, 1891.
 Analysis by A. E. Menke.
 Temperature of air, 46.4°F .; temperature of water, 58.1°F .
 Total solid material in solution, 5.00 grains per U. S.
 gallon.
 (A. G. S. Ann. Rept., 1891, vol. 1, p. 74)