

Surficial Geology of the Ramsey Quadrangle Bergen and Passaic Counties, New Jersey

New Jersey Geological Survey
Open-File Map 62
2004

pamphlet to accompany map

Table 1.--Selected well and boring records.

Well No.	Identifier ¹	Depth to bedrock or driller's log with depth and description ²	
1	23-6929	10	
2	23-6750	8	
3	23-3806	35	
4	23-3682	0-34 34-130	hardpan and boulders (Qn) red sandstone
5	23-4179	0-26 26-115	hardpan overburden (Qn) red rock
6	23-3377	0-44 44-115	hardpan and boulders (Qn) red sandstone
7	23-3724	35	
8	23-3923	0-39 39-90	hardpan overburden (Qn) red sandstone
9	23-4943	36	
10	23-4286	0-36 36-125	hardpan with layers of sand (Qn) red sandstone
11	23-4028	24	
12	23-5069	20	
13	23-5168	0-14 14-197	hardpan and boulders (Qn) trap rock
14	23-5171	19	
15	23-3953	0-10 10-75	dirt overburden (af over Qs) hardpan and layers of sand (Qfl3a over Qn)
16	23-3879	39	
17	23-3654	0-36 36-120	hardpan and boulders (Qn) red sandstone
18	23-3674	0-27 27-105	red hardpan (Qn over Qr?) red sandstone
19	23-3944	22	
20	23-3880	39	
21	23-3986	27	

22	23-3583	29	
23	23-3582	0-52 52-105	hardpan (Qn) red rock
24	23-3226	0-37 37-130	red hardpan (Qn over Qr?) red sandstone
25	23-3126	0-37 37-105	red hardpan (Qn over Qr?) red sandstone
26	23-3317	27	
27	23-3291	0-44 44-108	sand and boulder overburden (Qn) red sandstone
28	23-3288	0-37 37-105	overburden: hardpan with boulders (Qn) red sandstone
29	23-4077	53	
30	23-3447	0-45 45-126	red hardpan with boulders (Qn over Qr) red sandstone
31	23-3544	0-47 47-105	hardpan and boulders (Qn) red sandstone
32	23-6279	0-5 5-10 10-25 25-100	brown hardpan with boulders (Qn) red sandy hardpan (Qr) soft red sandstone hard red sandstone
33	23-5145	10	
34	23-8134	3	
35	23-5229	14	
36	23-7340	0-5 5-160 160-600	red hardpan (Qn over Qr) trap rock red sandstone
37	23-131	30	
38	23-3655	0-19 19-105	red hardpan (Qn over Qr) red sandstone
39	23-3035	0-29 29-106	overburden of hardpan and boulders (Qn) red sandstone
40	23-1920	20	
41	23-2873	0-75 75-130	overburden of sand, gravel, and hardpan with boulders (Qf3a over Qn) red sandstone
42	23-328	0-20 20-78 78-NR	coarse gravel (Qf3a) sandy hardpan and boulders (Qn) red sandstone
43	23-340	0-78 78-133	dead sand (Qn) red rock
44	23-772	0-62 62-125	sandy hardpan (Qn) red rock
45	23-350	10	

46	23-4945	10	
47	23-5289	38	
48	23-1076	0-67 67-130	sandy hardpan (Qn) red sandstone
49	23-4772	10	
50	23-4770	7	
51	23-4475	14	
52	23-3392	0-17 17-107	hardpan and boulders (Qf13 over Qn) trap rock
53	23-3154	0-18 18-105	hardpan with boulders (Qf13 over Qn) trap rock
54	23-3529	0-29 29-103	bouldery hardpan (Qf13 over Qn) trap rock
55	23-3490	0-28 28-150	hardpan, boulders, broken trap rock (Qf13 over Qn) trap rock
56	23-5367	14	
57	23-1634	0-28 28-51 51-67 67-127	hardpan (Qn) broken trap rock trap red sandstone
58	23-161	7	
59	23-7931	0-8 8-24 24-44 44-155	hardpan (Qn) clay (Qn or weathered basalt) trap red rock
60	23-5297	0-16 16-225	hardpan and boulders (Qn) trap rock
61	23-5360	16	
62	23-5481	14	
63	23-5562	5	
64	23-5317	12	
65	25-6633	0-30 30-115 115-161	clay and hardpan (Qf12) trap rock red sandstone
66	23-3115	6	
67	23-351	0-61 61-120	extremely hard hardpan with stone throughout, gravel bed and surface water, yellowish brown sandy hardpan (Qic over Qn) trap rock
68	23-7747	0-68 68-188 188-320	clay, boulders, sand (Qn) trap rock red rock
69	23-860	0-18 18-29 29-80 80-105 105-120	hardpan (Qic) rotten trap rock trap red sandstone trap

		120-121	red sandstone
70	23-1153	0-22 22-122 122-200	hardpan (Qic) trap rock red sandstone
71	23-5211	22	
72	23-765	0-54 54-112	brown hardpan, layers of sand and boulders (Qn) red rock
73	23-95	56	
74	23-521	0-16 16-97	yellow clay overburden (Qn) fine grained igneous rock
75	23-5344	7	
76	23-4149	15	
77	23-6813	32c	
78	23-4062	15	
79	23-5983	0-30 30-75	gravel (Qf12) trap rock
80	23-4173	20	
81	23-3945	27	
82	23-3621	0-10 10-21 21-103	boulders in overburden (Qn) broken trap rock trap rock
83	23-3937	0-52 52-167	hardpan with boulders and some sand (Qn) bedrock
84	23-4413	24	
85	23-8742	0-31 31-155	gravel, sand, clay (Qf12) trap rock
86	23-3911	30	
87	23-4609	0-116 116-365	sand and boulders (Qf12) bedrock
88	23-177	0-48 48-96 96-125	coarse gravel (Qf12) sand and gravel (Qf12) red rock
89	23-3892	0-72 72-120	sand, gravel, clay (Qf12) trap rock
90	23-5684	0-63 cased to 63, yield 30 gpm	gravel (Qf12)
91	23-3160	0-87 cased to 83, yield 30 gpm	sand and gravel (Qf12)
92	23-4007	0-63 cased to 63, yield 10 gpm	clay, sand and gravel
93	23-5318	38	
94	23-5227	35	

95	23-7044	0-23 23-50 50-110 cased to 100, yield 10-15 gpm	sand, gravel and boulders (Qf12, delta deposits) fine sand and clay (Qf12, lake-bottom deposits) sand and gravel (Qf12, lacustrine-fan deposits)
96	23-7286	0-25 25-55	sand and gravel, up to cobbles (Qf12, delta deposits) very fine sand, silt, clay (Qf12, lake-bottom deposits)
97	23-7266	0-37 37-51 51-71	very fine-to-medium sand, some silt (Qf12, delta deposits) silt, some fine sand (Qf12, lake-bottom deposits) sand, some small gravel, some silt (Qf12, lacustrine-fan deposits)
98	23-7267	0-21 21-51 51-53 53-71	fine-to-medium sand (Qf12, delta deposits) very fine sand, silt, some clay (Qf12, lake-bottom deposits) cobbles and gravel (Qf12, lacustrine-fan deposits) sand and gravel (Qf12, lacustrine-fan deposits)
99	23-4062	15	
100	23-4893	50	
101	23-5027	31	
102	23-4507	40	
103	23-4727	29	
104	23-3979	0-10 10-15 15-43 43-59 59-136	hardpan and boulders (Qf13) fine sand (Qf13) sand and gravel with cobbles (Qic) hardpan (Qn) trap rock
105	23-6580	0-58 58-60 60-151	sand, boulders (Qic) broken rock trap
106	23-5035	0-33 33-150	boulders, hardpan (Qic over Qn) red rock
107	23-5543	0-25 25-125 125-158	hardpan (Qn) trap red rock
108	23-3595	0-40 40-214	bouldery hardpan (Qn) red rock
109	23-6606	0-28 28-395	clay, boulders (Qic over Qn) trap rock
110	23-1441	0-20 20-150 150-220	hardpan (Qn) trap rock red sandstone
111	23-5006	abbreviated log 0-3 3-23 23-31 31-64 64-79 79-90 90-93 93-150	fill gravel, large boulders (Qal over Qn) brown sand (Qn or Qsp) red sand, little gravel and silt (Qsp) greenish, gray, brown clay (Qsp) red and brown sand and fine gravel (Qsp or weathered sandstone) broken rock, sand and gravel (Qsp or weathered sandstone) red rock
112	23-5246	abbreviated log 0-30 30-70 70-110 110-140	hardpan and boulders (Qrm1) sand and gravel (Qrm1) sand (Qrm1 over Qrmlb) fine sand (Qrmlb)

		140-150	fine sand, rock pieces (Qrmlb over bedrock)
		150-157	red sandstone
113	23-5281	abbreviated log	
		0-28	clay, sand and gravel (af over Qrm1)
		28-36	coarse sand and gravel (Qrm1)
		36-61	medium sand, fine gravel, clay (Qrm1 over Qrmlb)
		61-75	silt, fine sand (Qrmlb)
		75-116	hardpan, streaks of sand and silt (Qrmlb)
		116-122	silt, sand, fine gravel, clay (Qrmlb)
		122-146	sand and fine gravel (Qrmf)
		146-149	sand, gravel, clay (Qrmf or Qn)
		149-160	red shale
114	23-5408	0-75	sand, boulder (Qrm1)
		75-110	sand (Qrmlb)
		110-170	red rock
115	23-5967	0-40	boulders (Qic)
		40-58	clay (Qn)
		58-160	brown stone
116	23-5085	120	
117	23-4995	82	
118	23-1045	0-24	old dug well
		24-94	fine sandy gravel and red hardpan (Qic over Qn or Qr)
		94-128	rock
119	23-408	0-20	boulders (Qn)
		20-60	gravel (Qn or Qsp)
		60-70	hardpan (Qn or Qb)
		70-135	red rock
120	23-5833	0-67	hardpan, boulders (Qic)
		67-400	red rock
121	23-4461	abbreviated log	
		0-35	sand, gravel, boulders, with clay binders (Qic)
		35-45	very fine sandy hardpan (Qic or Qn)
		45-55	very fine sandy clay (Qic or Qn)
		55-90	yellow weathered rock with clay (weathered sandstone or Qb)
		90-115	brownish sandy clay (weathered sandstone)
		115-275	red sandstone
		275-330	trap rock
122	23-3358	0-58	sand and gravel (Qf13)
		58-120	trap rock
		120-141	red rock
123	23-2300	0-77	hardpan and boulders (Qf13 over Qn)
		77-109	trap rock and red rock
124	23-3849	0-73	hardpan with boulders (Qf13 over Qn)
		73-115	red rock
125	23-2304	0-87	layers of sand, gravel, boulders, and hardpan (Qf13 over Qn)
			cased to 87, yield 12 gpm
126	23-1128	0-80	gray hardpan (Qn)
		80-90	sand (Qsp)
		90-110	red hardpan (Qb)
		110-175	red sandstone
		175-189	trap rock
127	23-3653	0-31	hardpan and large stones (Qn)
		31-51	clay (Qsp)
		51-126	hardpan and stones with some very large boulders (Qb)

		126-155	trap rock
128	23-218	0-84 84-87 cased to 84, yield 4 gpm	sand and clay (Qn over Qsp) gravel (Qsp)
129	23-1412	0-102 102-157	hardpan, boulders (Qn) trap rock
130	23-272	0-71 71-166	glacial fill, with water-bearing gravel at 30 feet and quicksand from 40 to 71 (Qn over Qsp) igneous rock
131	23-666	0-79 79-110	bouldery overburden (Qn) trap rock
132	23-841	0-81 81-127	boulders (Qn) trap rock
133	23-2902	0-6 6-66 66-230	hardpan (Qf3) broken trap red sandstone
134	23-3865	0-25 25-100 100-105	hardpan overburden (Qn) trap rock red sandstone
135	23-2901	33	
136	23-4047	0-34 34-120	hardpan, boulders (Qn) trap rock
137	23-344	abbreviated log 0-58 58-68 68-NR	sand and gravel (Qf3) granite boulders (Qn) red sandstone
138	23-4132	0-40 40-47	sandy clay and boulders (Qf3 over Qn) trap rock
139	23-32-815	40	
140	23-2008	0-99 99-130	hardpan and layers of sand (Qf3 over Qn) red sandstone
141	23-8947	abbreviated log 0-6 6-10 10-20 20-24	brown-red sand, gravel, rock fragments (fill) gray silt and fine sand, trace organic matter (Qs) gray, brown silty sand, trace gravel (Qf3) rock (bedrock or boulder)
142	23-162	85	
143	23-2279	0-76 76-130	boulders and hardpan (Qn) red sandstone
144	23-5560	0-49 49-118	overburden with boulders (Qn) red sandstone
145	23-7758	0-45 45-155	sand and gravel (Qic) red rock
146	23-1637	0-77 77-125	sand and gravel, boulders (Qic) brown sandstone
147	23-7587	0-45 45-214	sand, gravel, boulders (Qic) red rock
148	23-1683	0-45	sand and gravel with boulders (Qn)

		45-100	brown sandstone
149	23-4052	0-48 48-110	hardpan (Qn) red sandstone
150	23-4057	0-60 60-110	clay, boulders, hardpan (Qn) red rock
151	23-7095	20	
152	23-7843	5	
153	23-6915	0-17 17-120 120-405	clay overburden (Qn) trap rock red rock
154	23-6931	0-12 12-150 150-330	clay overburden (Qn) trap rock red rock
155	23-2583	0-79 79-120 120-130	hardpan and boulders (QfB over Qn) trap rock red sandstone
156	23-5371	0-79 79-175	bouldery hardpan (QfB over Qn) trap rock
157	23-2876	0-80 80-182 182-185	sand and gravel, huge boulders encountered all the way down (QfB over Qn) red rock trap rock
158	23-5057	0-69 69-228 228-300	boulders (QfB over Qn) trap red rock
159	23-863	0-55 55-60	boulders and gravel (QfB over Qn) gravel (Qn or Qsp) cased to 55, yield 25 gpm
160	23-3228	0-71 71-185	hardpan (QfB over Qn) trap rock
161	23-4824	0-38 38-194 194-309	hardpan and boulders (Qn) trap rock red sandstone
162	23-5303	0-15 15-120	overburden clay and fine sand (Qf4) trap rock
163	23-5327	0-21 21-108	hardpan with boulders (QfB over Qn) red sandstone
164	23-4810	28	
165	23-5712	0-56 56-300	sand and gravel (Qic) red shale and sandstone
166	23-3310	0-44c 44-183	sand, gravel, boulders (QfB) red rock
167	23-401	32c	
168	23-2792	0-32c 32-110	gravel, boulders (QfB) red rock
169	23-4767	0-35 35-500	sand, boulders (QfB) red rock

170	23-6962	abbreviated log 0-24 24-32 32-32.4	sand and gravel (Qho3) red-brown silt and fine sand, very dense, little gravel (Qr) rock (penetrated to 110 feet in adjacent boring)
171	23-6756	0-30 30-50 50-830	fine sand (Qho3) fine sand and coarse gravel (Qho3) brown and red sandstone
172	23-2231	0-73c 73-370	sand, gravel, hardpan (Qho3 over Qn) red rock
173	23-2196	0-40 40-60 60-220	dirt and boulders (Qho3) sand (Qho3) red rock
174	23-8408	abbreviated log 0-36 at 36	brown fine-to-coarse sand and gravel (Qho3) refusal on bedrock
175	23-5582	0-45 45-55 55-59 59-205	sand (Qho3) red clay (Qr) red clay--sand (Qr) red sandstone
176	23-1838	0-18 18-85	hardpan (Qn) red sandstone
177	23-1207	0-17 17-115	hardpan and sand (Qn) red sandstone
178	23-1151	0-20c 20-155	sand, hardpan (Qn) red rock
179	23-7181	0-17 17-202	hardpan, boulders (Qn) red rock
180	23-639	0-10 10-15 15-95	gravel (Qr) hardpan (Qr) red rock
181	23-1766	0-18 18-145	sand (Qn) sandstone
182	23-1240	0-13 13-105	red hardpan (Qn over Qr) red sandstone
183	23-1767	0-30 30-50 50-67 67-125	sand and gravel (Qho3 over Qn) boulders (Qn) gravel and fine sand (Qsp) sandstone
184	23-4823	32	
185	23-2230	0-51c 51-301	hardpan, boulders (Qn) shale and sandstone
186	23-2228	0-30c 30-400	hardpan (Qho3 over Qn) red rock
187	23-3687	0-34 34-110	red hardpan (Qho3 over Qr) red rock
188	23-232	35	
189	23-2278	21	
190	23-1345	16	

191	23-1046	0-9 9-17 17-28 28-37 37-41 41-51 51-68 68-416	loam, boulders (Qn) brown sand and gravel (Qsp) gravel and sand (Qsp) hardpan (Qsp or Qb?) clay (Qsp) hardpan (Qb?) red hardpan (Qb) red rock
192	23-3025	0-21c 21-150	hardpan (Qn) red shale and sandstone
193	23-4246	65	
194	23-1047	0-10 10-67 67-77 77-87 87-97 97-103 103-113 113-420	sandy brown clay (Qn) clay, sand and gravel (Qsp) hardpan (Qsp or Qb) sandy clay (Qsp) hardpan (Qb) red sandy clay (Qb) soft red rock red rock
195	23-1922	0-34 34-302	sand and boulders (Qn) red sandstone
196	23-2178	0-98c 98-170	boulders, sand, gravel, hardpan (Qn over Qsp over Qb?) red rock
197	23-2349	0-30 30-40 40-45 45-65 65-300	sand and clay, gravel (Qho6) sand and gravel (Qho6) sand and gravel with gray silt (Qho6) sand and gravel with water (Qho6) red sandstone
198	23-143	65	
199	23-3169	0-70c 70-300	clay (Qho6 over Qn) red shale, sandstone
200	23-1673	0-50 50-180 180-300	gravel and sand (Qmt over Qho6 over Qn) red shale sandstone
201	23-6378	0-14 14-50 50-300	boulders (Qho6) hardpan (Qn) red rock
202	23-3843	0-21 21-162	red hardpan (Qn over Qr) red rock
203	23-4811	0-4 4-16 16-23 23-300	fill clay (Qn) sand (Qn) red rock
204	23-7471	0-24 24-31 31-205	sandy soil with boulders (Qn) red hardpan (Qr) red shale
205	23-642	0-70c 70-150	hardpan, boulders (Qn) red rock
206	23-7589	0-42 42-85 85-180	sandy soil with boulders (Qn) sand and gravel (Qsp) red sandstone
207	23-5396	0-75 75-250	boulders, red gravel (Qn over Qsp) red rock

208	23-4793	0-5 5-30 30-60 60-75 75-200	clay and boulders (Qn) sand and boulders (Qn) gray clay (Qsp) red clay (Qsp or Qb) red sandstone
209	23-2470	0-62 62-75 75-169	sand and gravel with boulders (Qn) brown hardpan (Qb?) red rock
210	23-4197	0-52 52-125 125-215	boulders (Qn) sand, gravel (Qsp) red rock
211	23-2598	0-107 107-150	red hardpan and layers of sand (Qn over Qsp) red sandstone
212	23-3222	0-130 130-184	hardpan with boulders (Qn) red rock
213	23-4004	0-20 20-63 63-85 85-120 120-138 138-200	brown sandy hardpan (Qn) gray hardpan (Qn) brown sand (Qsp) red, sandy hardpan (Qb) soft red sandstone hard red sandstone
214	23-4216	0-20 20-27 27-35 35-60 60-78 78-97 97-205	brown sandy hardpan (Qho5) gray hardpan (Qn) brown hardpan (Qn) light gray hardpan (Qn) red sandy hardpan (Qb or Qr) soft red sandstone hard red sandstone
215	23-4133	0-30 30-50 50-65 65-69 69-86 86-190	brown sandy hardpan (Qn) reddish sand (Qsp) brown sand (Qsp) reddish brown sand (Qsp) soft red sandstone hard red sandstone
216	23-4214	0-30 30-140	boulders, hardpan (Qn) red rock
217	23-4215	0-30 30-183	hardpan, boulders (Qn) red rock
218	23-3181	0-32 screened 29-32, yield 60 gpm	sand and gravel (Qho4) screened 29-32, yield 60 gpm
219	23-1811	0-95c 95-200	gravel, boulders, hardpan (Qn) red rock
220	23-2282	0-5 5-300	hardpan (Qho5) hard red rock
221	23-3224	25	
222	23-2365	0-15 15-300	topsoil and sand (Qho5) red rock
223	23-2786	0-17 17-35 35-300	boulders in hardpan (Qho5) very hard and rocky hardpan (Qn) brown sandstone and red shale
224	23-3997	0-16 16-33	hard sandy soil with small stones mixed (Qho6) gray hardpan with a lot of boulders at 30 feet (Qn)

		33-51	gray hardpan with streaks of gravel (Qn over Qsp)
		51-60	red hardpan with layers of red sandstone (Qb over bedrock)
		60-300	red and brown sandstone
225	23-3857	0-42	hardpan and boulders (Qmt over Qho5)
		42-48	gray hardpan (Qn)
		48-52	gravel (Qsp)
		52-58	reddish hardpan (Qb)
		58-63	gravel (Qsp or weathered sandstone)
		63-300	sandstone, shale
226	23-2787	16	
227	25-23625	0-10	olive fine-to-medium sand, fine gravel, trace silt (Qho6)
		10-15	brown coarse sand, fine gravel (Qho6)
228	23-1414	abbreviated log	
		0-7	sand, gravel, boulders (Qho6)
		7-22	gray hardpan, boulders (Qn)
		22-30	gray sand and clay (Qn or Qsp)
		30-39	hardpan and boulders (Qn)
		39-57	clay bound gray sand and gravel (Qsp)
		57-71	clay and heavy stone (Qsp or Qb)
		71-74	brown clay, large gravel, hardpan (Qb)
		74-77	brown coarse sand (Qsp or weathered sandstone)
		77-97	conglomeration of quartz, shale, sandstone, and clay (weathered rock)
		97-504	sandstone and shale
229	23-4257	0-50c	sand, hardpan (Qho5 over Qn)
		50-348	red rock
230	23-6784	0-40	hardpan with boulders (Qn over Qr)
		40-44	some sand (Qsp or weathered sandstone)
		44-325	red shale
231	23-7398	0-40	hardpan, boulders (Qho5 over Qn)
		40-162	red rock
232	23-1844	0-5	boulders and dirt (Qn over Qr)
		5-300	shale and sandstone
233	23-5210	0-6	fill dirt and boulders (af)
		6-19	sand, gravel (Qho4)
		19-300	shale and sandstone
234	23-3711	0-74	sand and gravel (Qho4)
		74-215	red rock
235	23-3715	0-38	sand (Qho4)
		38-135	red rock
236	23-16	30	
237	23-5929	30	
238	23-4465	65	
239	23-6318	0-70	sand and gravel (Qn)
		70-300	red rock
240	23-1790	0-40	red hardpan (Qn over Qr)
		40-110	red sandstone
241	23-130	66	
242	23-4085	0-71	hardpan with boulders (Qn)
		71-255	red rock

243	23-2628	0-51 51-174	sand and gravel (Qic over Qn) red sandstone
244	23-999	0-70 70-141	sandy glacial fill (Qic over Qn) red rock
245	23-26	62	
246	23-7249	65	
247	23-5504	80	
248	23-6105	0-73 73-93 93-200	sand, boulders (Qic) broken rock red rock
249	23-7740	0-40 40-62 62-205	light color sand (Qic) soft red sandstone red sandstone
250	23-7736	0-60 60-234	sand and gravel (Qho4 over Qic) red rock and trap rock
251	23-8859	0-15 15-30 30-307	medium sand (Qho4) gravel, boulders, fine sand (Qic) brown and red sandstone
252	23-8191	0-35 35-50 50-52 52-200	medium brown sand (Qic) brown hardpan (Qic or Qn) fine sand (Qic or Qn) sandstone
253	23-5536	60	
254	23-6926	10	
255	23-5474	0-55 55-57 57-180	sand (Qmt over Qic) gravel, red clay (Qr or weathered sandstone) red sandstone
256	23-5466	0-72 72-76	sand (Qmt over Qic) coarse gravel (Qic) cased to 73, yield >50 gpm
257	23-5573	0-61 61-390	sand and large gravel (Qic) red rock
258	23-5574	0-73 73-214	sand (Qic) red rock
259	23-5571	0-81 81-500	sand and gravel (Qic) soft red rock
260	23-5472	0-15 15-32 32-39 39-52 52-60 60-302	hardpan and boulders (Qic) sandy hardpan and rocks (Qic) dirty sand and gravel (Qic) sandy clay, hardpan (Qn) hardpan, some conglomerate (Qn over bedrock) sandstone
261	23-1101	0-75 75-92	sand and gravel overburden (Qho3) red sandstone
262	23-1084	0-74 74-93	sand and gravel overburden (Qho3) red sandstone
263	23-6220	0-42 42-80 80-200	sand (Qho4) boulders (Qn) red rock

264	23-2039	0-76 76-146	sand and gravel (Qn) red rock
265	23-2890	0-65 65-141	sand and gravel (Qho4) red rock
266	23-1630	0-16 16-82	red hardpan (Qn over Qr) red sandstone
267	23-2420	5	
268	23-4643	0-76c 76-143	hardpan and boulders, gravel and sand (Qho3 over Qn) sandstone
269	23-5491	0-102 102-270	coarse sand and gravel (Qic) red rock
270	23-5580	0-122 122-360	sand and gravel (Qic) red rock
271	23-5497	0-112 112-400	coarse sand and gravel (Qic) red rock
272	23-8339	0-7 7-47 47-70 70-300	clay, sand, small gravel (Qic) boulders, sand, clay, gravel (Qic over Qn) clay, small boulders, gravel (Qn) red shale and sandstone
273	23-5307	0-82 82-157	hardpan with boulders (Qfl4 over Qn) red sandstone
274	23-8769	0-15 15-65 65-75 75-95 95-245	brown hardpan (Qic over Qn) large boulders in hardpan (Qn) sand and gravel (Qsp) very soft sandstone red sandstone
275	23-3521	0-62 62-70	hardpan overburden (Qn) red rock
276	23-19	56	
277	23-317	0-38 38-130	gravel fill (Qn) red rock
278	23-6178	0-57c 57-145	sand and gravel (Qmt over Qic) red shale
279	23-3992	0-90c 90-165	sand, boulders, hardpan, gravel (Qr over Qsp or Qfl4?) red rock
280	23-7255	0-40 40-60 60-104 104-305	brown sand (Qfl4) sand and gravel (Qfl4) soft red rock red rock
281	23-7671	0-40 40-50 50-245	fine sand (Qfl4) red sand and gravel (Qfl4) red shale and sandstone
282	23-1980	0-88 88-140	layers of hardpan and clay with a few boulders (Qfl4) red rock
283	23-6737	0-45 45-60 60-175	sand (Qfl4) sand and gravel (Qfl4) red shale and sandstone

284	23-1629	0-50 50-84 84-120	sand (Qf4) red hardpan (Qr) red sandstone
285	23-2820	0-83 83-120	layers of hardpan and gravel (Qf4) red sandstone
286	23-7428	0-50 50-205	coarse brown sand (Qf4) brown and red sandstone
287	23-5276	0-90 90-130	sand (Qf4) red rock
288	23-4666	0-90	gravel (Qf4) cased to 55, yield 20 gpm
289	23-4668	0-100	gravel (Qf4) cased to 60, yield 20 gpm
290	23-3246	0-50 50-82 82-130	sand and silt (Qf4) red hardpan (Qr) bedrock
291	23-3703	0-75 75-115	boulders and hardpan with layers of sand and gravel (Qf4 over Qn) red rock
292	23-7617	0-55 55-62 62-265	brown medium sand (Qf4) gravel (Qf4) red sandstone
293	23-2439	0-93 93-225	hardpan, sand, gravel (Qf4 over Qn) red sandstone
294	23-2009	0-67 67-110	red hardpan and boulders (Qf4 over Qr) red rock
295	23-2795	0-67 67-115	sand, gravel, boulders, hardpan (Qf4 over Qr) trap rock and red sandstone
296	23-6796	0-50 50-70 70-200	sand (Qf4) broken rock (Qn?) trap rock
297	25-14864	0-57 57-93	sand hardpan (Qf4 over Qn) rock gravel (weathered basalt?)
298	23-4204	0-41 41-90	hardpan and boulders (Qn) trap rock
299	23-5214	30	
300	23-7245	0-23 23-35 35-71 71-330	hardpan and boulders (Qn) coarse gravel (Qsp or weathered bedrock) soft red rock red sandstone
301	23-4973	0-57	hardpan and boulders, gravel formation with water at 57 feet (Qn over Qsp) cased to 57, yield 10 gpm
302	23-4311	0-67 67-87 87-410	hardpan (Qn) sand and gravel (Qsp) red rock
303	23-3244	0-85c 85-183	sand, boulders, hardpan (Qn over Qsp) red rock
304	23-5490	0-70 70-78	sand, sand and gravel, fine sand (Qn over Qsp) gravel (Qsp) cased to 71, yield >50 gpm

305	23-2794	0-35 35-49 49-120	sand and boulders (Qn) red hardpan (Qr) red sandstone
306	23-3918	0-61 61-275	hardpan with boulders (Qn) red rock
307	23-4310	0-50 50-70 70-204	hardpan (Qn) sand and gravel (Qsp) red rock
308	23-3232	0-86 86-175	sand and gravel (Qfl4) red rock
309	23-3617	0-70 70-88 88-195	sand and gravel (Qfl4) red hardpan (Qr) red rock
310	23-3359	0-70 70-86 86-165	sand and gravel (Qfl4) hardpan (Qr) red rock
311	23-3284	0-56 56-170	sand and gravel (Qfl4) red rock
312	23-3230	0-70 70-265	sand and gravel (Qfl4) red rock
313	23-3286	0-56 56-170	sand and gravel (Qfl4) red rock
314	23-4857	0-52 52-205	sand and gravel (Qfl4) red rock
315	23-1052	0-40 40-114	clay, sand, red hardpan, and unconformed [sic] rock (Qic over Qr over weathered sandstone) red sandstone
316	23-6331	0-35 35-45 45-160	sand and gravel (Qic) red hardpan (Qr) red sandstone
317	23-3218	0-41 41-145	sand and gravel (Qic) red rock
318	23-3234	0-33 33-105	sand, gravel, boulders (Qic) red rock
319	23-4634	0-61 61-186	sand, gravel, boulders (Qic over Qn) red rock
320	23-4472	0-50 50-195	sand and gravel with boulders (Qic over Qn) red rock
321	23-4625	0-61 61-204	sand and gravel (Qic) red rock
322	23-3987	30	
323	23-6432	0-10 10-20 20-40 40-300	clay (Qn) sand and boulders (Qn) soft sandstone red sandstone
324	23-5554	0-30 30-36 36-145	coarse sand with large boulders (Qic) red sand and clay (Qr) red sandstone and conglomerate

325	23-3742	0-3 3-400	boulders and hardpan (Qn) red rock
326	23-4205	0-25 25-250	sandy overburden mixed with boulders (Qn) red shale and sandstone
327	23-5305	0-10 10-25 25-200	clay (Qn) gravel (Qn or Qsp) red rock
328	23-5284	29c	
329	23-8185	0-20 20-22 22-23 23-500	glacial till with boulders (Qn) boulders, sand and gravel with water (Qn or Qsp) red clay and sand (Qr or Qsp) sandstone
330	23-4140	0-35 35-348	hardpan (Qn) red rock
331	23-2606	0-25c 25-330	sand, gravel (Qho5) red rock
332	23-7257	0-12 12-30 30-68 68-71 71-300	fine sand with small cobbles (Qn) sandy hardpan with streaks of gravel (Qn) hardpan with boulders and cobbles (Qn) red hardpan with red sticky clay (Qr or Qb) red sandstone
334	23-3700	0-50 50-118 118-130	hardpan (Qn) gravel, sand (Qsp) red rock
335	32-4253	0-95 95-115 115-120	hardpan (Qn) boulders, gravel (Qsp) red rock
336	23-1776	0-85 85-130 130-180	sandy hardpan with boulders (Qn) fine sand with some water (Qsp) red sandstone
337	23-4500	0-25 25-84 84-119 119-132 132-348	brown sandy hardpan with boulders (Qn) gray sandy hardpan (Qn) reddish brown sandy hardpan (Qb or Qr) soft red sandstone hard red sandstone
338	23-903	0-27 27-35 35-40 40-51 51-76 76-77 77-98 98-101 at 101	boulders (Qn) yellow sand, boulders (Qn or Qsp) coarse brown sand (Qsp) gray sand (Qsp) very fine sand (Qsp) coarse gray sand (Qsp) very fine gray sand (Qsp) fine red sand (Qsp) red shale
339	23-1882	0-52 52-400	boulders, sand, hardpan (Qn) red rock
340	43-42	0-4 4-25 25-33 33-297	silt, clay (Qn) sandy clay, soupy (Qn) red hardpan (Qr) red shale
341	23-32-655	20	
342	23-938	26	

343	23-1025	30	
344	23-3701	0-6 6-19 19-47 47-84	brown sandy hardpan (Qic) gray sandy hardpan with boulders (Qn) soft red sandstone hard red sandstone
345	23-4126	0-105 105-155 155-400	boulders and hardpan (Qn) unconsolidated rock red sandstone
346	23-2015	0-80 80-140 140-190	boulders, hardpan (Qn) red sand (Qsp) red rock
347	23-659	0-50 50-58 58-155	hardpan and boulders (Qn) fine sand and small gravel (Qsp) red sandstone
348	23-4023	0-45 45-130	hardpan and boulders, reddish hardpan (Qn over Qr) red shale
349	23-6274	0-31 31-200	hardpan (Qic over Qn) red rock
350	23-4002	0-55 55-61 61-160	sand and gravel (Qic over Qn) red hardpan (Qr) red rock
351	23-4350	0-40 40-50 50-122	sand (Qic) red hardpan (Qr) red rock
352	23-3978	0-41 41-286	sand and gravel (Qfl4 over Qic) red rock
353	23-4182	0-50 50-76 76-162	hardpan (Qfl4) sand and gravel (Qfl4) red rock
354	23-1839	61	
355	23-3958	0-44 44-120	hardpan with boulders (Qfl4 over Qn) red rock
356	23-4074	0-40 40-255	hardpan (Qfl4 over Qn) red rock
357	23-4764	0-48 48-110	sand and gravel (Qfl4 over Qn) red rock
358	23-3976	0-72 72-175	hardpan with boulders (Qn) red rock
359	23-4096	0-30 30-60 60-320	hardpan and boulders (Qn) hardpan (Qn or Qr) red rock
360	23-3575	0-15 15-20 20-24 24-65	brown sandy hardpan with boulders (Qn) red sandy hardpan(Qr) soft red sandstone hard red sandstone
361	23-821	0-25 25-35 35-40 40-42 42-45	sand and gravel, boulders (Qdb1) gray sand (Qdb1) brown sand (Qdb1) red very fine sand (Qdb1 or Qr) red rock

362	23-3706	0-20 20-70 70-278	hardpan (Qn) trap red shale
363	23-5346	0-50 50-311 311-513	hardpan (Qn) trap red rock
364	23-6030	0-7 7-51 51-300	boulders (Qn) hardpan (Qn over Qr) red rock
365	23-1016	0-10 10-20 20-33 33-43 43-150	gravel (Qic) hardpan (Qn) sand (Qn or Qsp) boulders (Qn or Qr) red rock
366	23-4107	0-26 26-155	hardpan, boulders (Qdb1 over Qn) red rock
367	23-939	32	
368	23-846	0-47c 47-150	boulders, gravel (Qn) red rock
369	23-638	0-20 20-36 36-38 38-46 46-140	sandy hardpan and boulders (Qn) brown hardpan (Qn) gravel and sand (Qsp) red hardpan (Qr or Qb) red rock
370	23-4125	0-4 4-6 6-10 10-23 23-30 30-51 51-62 62-81 81-82 82-400	fill (af) black muck (Qs) gray hardpan(Qmh1) some sand and gravel (Qmh1) gray hardpan, some small stones (Qn) sandy hardpan (Qn) yellow hardpan (Qn) hard yellow sand, small stones (Qn) brown hardpan (Qr) red sandstone
371	23-788	0-100 100-270	sand, gravel, boulders (Qmh1 over Qn) red rock
372	23-8450	0-10 10-12 12-32 32-155	clay and boulders (Qn) sand, clay, and boulders (Qn) clay and boulders (Qn) red shale and sandstone
373	23-2797	0-20 20-88 88-132	topsoil and dirt (Qn) sand and gravel (Qsp) red rock
374	23-2317	0-17 17-32 32-41 41-52 52-62 62-170	brown hardpan (Qn) gray hardpan (Qn) light gray hardpan (Qn) gray sand (Qsp) red hardpan (Qb) red sandstone
375	23-2316	0-19 19-36 36-44 44-50 50-54 54-170	brown hardpan (Qn) light gray hardpan (Qn) dark gray hardpan (Qn) very sandy gray hardpan (Qn or Qsp) red hardpan (Qb) red sandstone

376	23-5682	30	
377	23-2219	0-13 13-26 26-38 38-44 44-49	brown hardpan (Qmh1 over Qn) gray hardpan (Qn) dark gray hardpan (Qn) gray sand (Qsp) red sandstone
378	23-1033	0-40c 40-475	sand, boulders, fine sand (Qn over Qsp) red rock
379	23-889	0-50 50-65 65-75 75-90 90-100 100-105	hardpan (Qn) fine sand to coarse washed sand and gravel (Qsp) hardpan (Qn or Qsp) sand (Qsp) silt (Qsp) hardpan (Qb)
			screened from 55-60, yield 11 gpm
380	23-5294	0-115 115-315	hardpan, boulders (Qn) red rock
381	23-4865	0-172 172-295	hardpan with boulders overburden (Qn) red sandstone
382	23-3947	0-25 25-50 50-70 71-109 109-148 149-160 160-215	brown, sandy hardpan (Qn) light gray hardpan with boulders (Qn) brown sand with boulders (Qn) yellowish brown sand with boulders (Qn over Qsp) reddish brown sand (Qsp) soft red sandstone hard red sandstone
383	23-8133	0-150 150-500	hardpan, boulders (Qn) red rock
384	23-6664	0-152 152-290	hardpan, boulders (Qn) red rock
385	23-6242	0-35 35-45 45-75 75-80 80-100 100-105	reddish sandy hardpan with boulders (Qn over Qr) brown hardpan with boulders (Qn) yellow sandy hardpan with boulders (Qn or Qsp) gray sandy hardpan with boulders (Qn or Qsp) brown sandy hardpan with boulders (Qn or Qsp) red sandy hardpan (Qb)
386	23-8852	abbreviated log 0-34 34-65 65-76	brown silt, fine-to-medium sand, trace gravel (Qn) gray and tan fine-to-medium sand, some silt (Qsp) red-brown coarse-to-fine sand, some silt, trace gravel (Qb)
387	23-2457	0-20 20-60	hardpan (Qn) red rock
388	23-6155A	0-30 30-125	hardpan, boulders (Qn) red rock
389	23-6158	0-30 30-120	boulders and sand (Qn) red rock
390	23-4056	0-38 38-122	red hardpan with boulders (Qn over Qr) red rock
391	23-3451	0-26 26-86	red hardpan (Qn over Qr) red rock
392	23-6301	0-30 30-50	hardpan and boulders (Qn) sand and gravel (Qsp)

		50-70 70-300	soft red rock sandstone
393	23-2251	0-55c 55-110	sand, boulders trap rock
394	23-3996	0-90 90-97 97-300	sand and gravel (Qrm2 over Qn?) gravel (Qn or Qsp) trap rock
395	23-8423	0-29 29-53 53-55 55-69 69-80	sand, gravel, clay (Qal over Qrmlb) medium gravel and sand (Qrmf) heavy clay and gravel (Qrmf) hardpan and gravel (Qrmf) dark gray slate
396	23-2179	0-93	gravel, sand, boulders (Qrm2 over Qrmf) cased to 92, yield 10 gpm
397	23-1517	0-11 11-85 85-105	stony dirt (Qn) gray trap rock black shale
398	23-282	0-12 12-152	buff-gray clay, sand, gravel, with gneiss boulders (Qrm2 over Qn) conglomerate and sandstone
399	23-7674	47	
400	23-6599	>152	cased to 152, yield 8 gpm from gravel (Qrmf)
401	23-8436	abbreviated log 0-40 40-130 130-160 160-485	brown sand and gravel (Qrm2) gray fine sand (Qrmlb) brown sand and gravel (Qrmf) shale, sandstone, slate
402	23-5519	100	
403	23-5547	30c	
404	23-7851	0-20 20-37 37-60 60-265	coarse compacted sand and gravel (Qrm2) fine sand with large gravel (Qrm2) hard trap rock trap and granitic gray rock
405	23-8479	abbreviated log 0-129 129-258	brown sand and gravel (Qrm1 over Qrmf) slate
406	23-8217	abbreviated log 0-40	fine-to-coarse silty sand and gravel (Qal over Qrm1)
407	23-7600	0-72	sand, boulders, little gravel (Qrm1) screened 62-72, yield 0.25 gpm
408	23-2594	0-3 3-125	dirt (Qn) granite
409	23-3556	0-22c 22-107	hardpan, boulders (Qn) granite
410	23-4903	0-16 16-236	gravel, sand, boulders (Qn) granite
411	23-5410	30	
412	23-6230	0-20 20-200	clay, gravel, and boulders (Qn) granite

413	23-677	0-30 30-43 43-155	boulders (Qn) hardpan (Qn) rock
414	23-1242	0-17 17-75	bouldery hardpan (Qn) granite
415	23-8939	abbreviated log 0-50 50-60 60-80 80-85 screened 70-85, yield 901 gpm	sand and gravel and clay (Qal over Qrmlb) fine-to-medium sand and silt (Qrmlb) fine-to-coarse sand and gravel (Qrmf) broken rock, slate and quartz rock
416	23-11423	0-15 15-75 75-95 95-105 105-125 125-130	dirty sand and gravel (Qal) soft clay, silt (Qrmlb) dirty fine sand, silty clay (Qrmlb) silty clay (Qrmlb) dirty sand and gravel (Qrmf) rock--granite
417	23-6668	0-5 5-10 10-15 15-25 25-85 85-86 86-95 95-105 105-120 120-124 124-126 126-147 147-149 screened 116-149, yield 900 gpm	brown clay (Qal) sand-silt, clay (Qal) brown clay, sand, gravel (Qal) gray clay, soft (Qrmlb) gray clay (Qrmlb) gray clay, sand, slate rocks (Qrmlb) gray clay (Qrmlb) sandy gray clay (Qrmlb) gray fine sandy clay (Qrmlb) gray sand (Qrmf) gray sand, small gravel (Qrmf) gray sand, small gravel, silt (Qrmf) gray sand, clay, small gravel, rock chips (Qrmf)
418	23-6933	0-4 4-20 20-30 30-50 50-60 60-70 70-80 80-100 100-115 115-135 135-138 138-142 142-164 164-168 at 168 screened 137-169, yield 465 gpm	top soil and gravel (Qal) silty yellow-brown sand and gravel (Qal) sandy gray clay (Qrmlb) fine gray sandy clay (Qrmlb) fine sand and gray clay (Qrmlb) fine sandy gray clay (Qrmlb) fine sand with chunks of gray clay throughout (Qrmlb) silty fine gray sand (Qrmlb) very fine gray sand and gray clay (Qrmlb) fine gray sand with gravel throughout (Qrmf) silty gray sand with coarse gravel (Qrmf) silty gray sand with gravel (Qrmf) varying layers of sand and gravel, some gravel quite coarse (Qrmf) sandy clay hardpan, light pink in color (Qr) red sandstone
419	23-450	0-90 90-404	stratified drift (Qmt over Qrmlb) red sandstone
420	23-634	0-30 30-85 85-115 115-136 136-138	sand (Qmt) gray clay (Qrmlb) fine gray silt (Qrmlb) fine sand (Qrmlb) gravel and sand with water (Qrmf)
421	23-2190	0-85c 85-290	sand, gravel, boulders (Qn) red rock
422	23-5658	90	
423	23-2408	0-11	brown hardpan and boulders (Qn)

		11-20	gray hardpan and boulders (Qn)
		22-75	granite
424	23-3876	0-90	sand and gravel with boulders (Qn over Qr)
		90-100	hardpan (Qr or Qsp)
		100-116	gravel (Qsp)
		116-305	broken trap and red rock mixed
425	23-3875	0-80	sand and gravel (Qn)
		80-100	hardpan (Qno or Qsp)
		100-104	gravel (Qsp)
		104-215	trap and red mixed
426	23-8162	0-40	sand, boulders (Qn)
		40-50	sand, gravel (Qsp)
			screened 40-50, yield 5 gpm
427	23-8637	0-12	stones and sand (Qmt)
		12-40	clay (Qrmlb)
428	23-7868		abbreviated log
		0-22	tan fine-to-coarse sand, some fine-to-coarse gravel, trace silt and clay (Qmt)
		22-107	brown silty fine sand (Qrmlb)
		107-128	gray clayey silt (Qrmlb)
		128-161	gray fine sand (Qrmlb or Qrmf)
429	23-7042	0-36	fine silty sand (Qmt over Qrmlb)
		36-50	fine silty sand with clay (Qrmlb)
430	23-54	0-35	sand (Qmt)
		35-80	quicksand (Qrmlb)
		80-95	sand and gravel (Qrmf)
431	23-7651		abbreviated log
		0-28	fine-to-coarse sand, some fine gravel (Qmt)
		28-60	gray, grayish brown silt, fine sand, trace clay and medium sand (Qrmlb)
432	23-789	0-51	layers of red hardpan and sand (Qmh1 over Qr)
		51-80	red sandstone
433	23-7009 and 23-7649		abbreviated log
		0-3	silty, gravelly coarse-to-fine sand (Qmt)
		3-8	sandy coarse gravel (Qmt)
		8-21	gravelly coarse-to-fine sand (Qmt)
		21-25	coarse-to-fine sand (Qmt)
		25-35	silty coarse-to-fine sand (Qmt)
		32-55	silty fine sand (Qrmlb)
		55-72	silt with some clay, trace fine sand (Qrmlb)
434	23-7011	0-5	medium to fine silty sandy gravel (Qmt)
		5-13	silty clay (Qmt)
		13-30	silty coarse-to-fine sand (Qmt)
435	23-7012 and 23-7647		abbreviated log
		0-3	fill: clayey gravelly sand
		3-6	silty medium-to-fine sand (Qmt)
		6-13	clayey fine sand (Qmt)
		13-24	silty coarse-to-fine sand (Qmt)
		24-28	silt with sand seams (Qmt)
		28-30	silty sand (Qmt)
		29-35	brown silty fine-to-medium sand (Qmt)
		35-60	silt, with some thin layers of clay and fine sand (Qrmlb)
436	23-7013	0-2	sandy clay (af)
		2-8	sandy silt (af)
		8-14	silty coarse-to-fine sand (Qal)
		14-32	coarse gravelly clay (Qmt)
437	23-7366		abbreviated log

		0-8	sand, silt, cobbles--fill
		8-12	sand and gravel, no cobbles (Qmt)
		12-25	grayish brown silt and very fine sand, with interbeds of pink clay (Qrmlb)
		25-63	gray soft silt, a few thin laminae of clay (Qrmlb)
		63-75	(not reported)
		75-80	loose till (maybe gravel, Qrmf)
		80-86	harder till (Qrmf)
438	23-2845	0-20	coarse sand and gravel (Qmt)
		20-45	quick sand (Qrmlb)
		45-90	gray hardpan (Qrmlb)
		90-116	reddish sand and gravel, yield 20 gpm (Qrmf)
		116-200	red and gray shale
439	23-828	0-25	yellow hardpan and boulders (Qn)
		25-61	fine yellow sand, some fine gravel (Qsp)
		61-120c	clay (Qsp over Qb?)
		120-500	red rock
440	23-7310	abbreviated log	
		0-30	sand and gravel (Qmh2)
		30-45	gray sticky clay (Qmh2)
		45-55	fine brown sand, clay (Qmh2)
		55-70	brown fine sand (Qmh2)
		70-95	fine brown sand, big to medium gravel (Qmh2)
		95-404	red sandstone and conglomerate
441	23-7368	abbreviated log	
		0-17	gray, olive, brown silty sand (af over Qal)
		17-23	brown, grayish brown silt (Qal or Qn)
		23-27	brown till, loose, sandy (Qn)
		at 27	rocks, probable bedrock
442	23-884	0-24	fill
		24-25	sand and gravel (Qmh2)
		25-40	silt with some gravel (Qmh2)
		40-68	gray clay (Qmh2)
		68-71	clay and gravel (Qmh2 or Qr)
443	23-862	0-4	sand (Qmh2)
		4-6	boulders (Qmh2)
		6-30	fine sand some clay (Qmh2)
		30-45	clay (Qmh2)
		45-55	clay with some sand (Qmh2)
		55-78	fine sand (Qmh2)
		78-83	red gravel with some red clay (Qr)
		83-203	red sandstone rock
444	23-932	0-12	fill
		12-26	sand and gravel with traces of clay (Qmh2)
		26-39	coarse sand and gravel (Qmh2)
		39-42	red rock
445	23-7214	abbreviated log	
		0-40	coarse-to-fine sand and coarse-to-fine gravel (Qmh1)
		40-48	boulders and cobbles (Qmh1)
		48-59	tan silt and cobbles (Qn)
446	23-5533	0-5	clean sand (Qmh1)
		5-13	hard-packed dead sand (Qmh1)
		13-24	loose water-bearing sand (Qmh1)
		24-44	hard-packed silty sand (Qmh1)
		44-61	reddish sand with pea gravel (Qmh1)
		61-76	hard silty sticky sand (Qmh1)
		76-88	coarse sand and gravel (Qmh1)
		screened 78-88, yield 115 gpm	
447	23-5532	0-1.5	topsoil

		1.5-11	fine sand (Qmh1)
		11-21	fine sand with gravel (Qmh1)
		21-56	good clean sand and gravel (Qmh1)
		56-61	very fine sand (Qmh1)
		61-77	fine sand but clean (Qmh1)
		77-102	sand and pea gravel (Qmh1, log says rock at 95 but layers add up to 102)
		102-107	rock
448	23-7202	0-15	hard sand (Qmh1)
		15-25	gravel and boulders (Qmh1)
		25-47	soft red sandstone (Qmh1)
		47-185	brown sandstone
449	23-988	0-100	sand, gravel, boulders (Qmh1)
		100-170	red rock
450	23-829	0-5	fill (af)
		5-26	black muck (Qs)
		26-30	gray sand (Qho4)
		30-35	gray sand, fine grained (Qho4)
		35-41	fine-to-coarse varicolored sand and pea gravel (Qho4)
		41-47	similar, but chiefly coarse sand (Qho4)
		47-105	fine yellow sand, no good water-bearing sand (Qn?)
		105-107	red sandstone
451	23-819	0-45	hardpan (Qic)
		45-55	fine sand, clay, small gravel (Qic)
		55-60	sand and gravel (Qic)
		60-100	yellow clay (Qn?)
		100-115	sand, yellow, with water (Qsp?)
			cased to 115, yield 15 gpm
452	23-1691	0-40	sand (Qic)
		40-65	sand and gravel (Qic)
		65-105	boulders (Qic or Qn)
		105-125	gravel (Qic or Qsp)
		125-275	sandstone
453	23-1883	0-21	hardpan and boulders (Qn)
		21-400	red rock
454	23-2245	0-7	light-brown sand and gravel (Qn)
		7-19	brown hardpan (Qn)
		19-24	red hardpan (Qrl)
		24-42	crumbly red sandstone
		42-100	good red sandstone
455	23-6504	0-40	sand (Qn)
		40-55	boulders (Qn)
		55-70	gravel (Qsp)
		70-81	sandstone
		81-260	red sandstone
456	23-1335	0-34	bouldery hardpan (Qn)
		34-90	red sandstone
457	23-990	>95	
458	23-991	>95	
459	well 53, Canace and Hutchinson (1988)	0-10	sand, gravel, fill dirt
		10-40	sand, gravel (Qrm2)
		40-50	sand and silt (Qrm2)
		50-60	sand, silt, fine gravel (Qrm2)
		60-70	sand, gravel, silt (Qrm2)
		70-90	sand and silt (Qrmlb)
		90-100	sand and mud (Qrmlb)
		100-115	sand, silt, gravel (Qrmf)
		115-116	slate rock

460	23-940	abbreviated log 0-3 brown loamy sand with plant roots 3-36 slightly clayey brown to olive sand and gravel (Qrm2) 36-49 fine-to-coarse sand with an occasional small pebble (Qrm2) 49-140 slightly clayey fine-to-coarse sand and gravel (Qrmlb over Qrmf)
461	DOT 43	abbreviated log 0-13 brown and gray gravel and sand, trace silt (Qal) 13-61 gray to grayish brown silt and clay, some fine sand (Qrmlb)
462	DOT 50	abbreviated log 0-10 brown sand and gravel, little silt (Qmt) 10-41 brownish gray silt, trace to some fine sand (Qrmlb)
463	DOT 51	abbreviated log 0-15 gray and brown sand, some gravel, little silt (Qal) 15-30 brown coarse-to-fine sand, trace silt and clay (Qal over Qrmlb)
464	23-7418	abbreviated log 0-5 silty brown sand (Qmt) 5-20 (not reported) 20-48 yellowish brown medium-to-coarse sand (Qrm2) 48-60 yellowish brown fine sand (Qrmlb)
465	DOT 55	abbreviated log 0-12 brown and gray sand and gravel (Qmt) 12-26 brownish gray silt and clay, trace fine sand (Qrmlb)
466	23-7794	0-75 sand and gravel (Qrm2) 75-75.5 granite screened 52-73, yield 578 gpm
467	23-5240	0-105 sand, gravel, clay, hardpan (Qal over Qrmlb) 105-125 red sandstone
468	23-926	0-26 sand and coarse gravel (Qmt) 26-60 fine sand with clay (Qrmlb) 60-108 fine sand (Qrmlb) 108-112 sand with some water (Qrmf) 112-115 stony hardpan (Qn) 115-126 mixture of red, black, gray sandstone
469	23-7367	abbreviated log 0-10 sand and gravel, brown (Qmt) 10-12 silt, brown (Qrmlb) 12-20 silt and clay, gray, with layers of very fine sand to fine sand, some pebbles (Qrmlb) 20-27 sand, brown, very fine to fine (Qrmlb) 27-35 silt, gray to brownish gray, with some very fine sand and clay (Qrmlb) 35-37 sand, grayish brown, very fine (Qrmlb) 37-41 silty sand, brown, some fine gravel (Qrmf or Qn) 41-42 till, sandy, not compact (Qn) at 42 refusal on boulder
470	23-5675	0-50 sand and gravel (Qmt over Qn) 50-80 fine sand (Qsp) 80-90 hardpan (Qb) 90-210 red rock
471	23-975	0-24 hardpan and boulders (Qn) 24-63 gray sand (Qsp) 63-75 brown sand (Qsp) 75-82 red sand and 3/4 inch gravel (Qsp) 82-147 red shale 147-252 red and gray slate
472	23-4813	83

473	23-7369	abbreviated log 0-12 12-30 30-35 at 35	brown sand and gravel (Qmt) interbedded silt and very fine sand with thin clay laminae (Qrmlb) brown very loose sandy gravelly till (Qn or Qrmf) refusal
474	23-5102	0-55 55-75 75-400	sand and gravel (Qmt over Qn) red hardpan (Qr or Qb) red rock
475	23-2524	36	
476	23-6430	0-5 5-400 400-580	hardpan (Qn) igneous, granitic rock sandstone
477	23-7417	abbreviated log 0-35 at 35	yellowish brown to dark yellowish brown silty sand and gravel (Qrm2) weathered bedrock
478	23-7415	abbreviated log 0-2 2-13 13-18 18-30 30-53 at 53	sand and gravel, yellowish brown (Qal) gray, brown clayey silt, laminated from 8-10 (Qal over Qrmlb) silty sand, grayish brown, fine (Qrmlb) sand, grayish brown, fine (Qrmlb) sand, grayish brown, fine (Qrmlb) till, red, sandy, with cobbles (Qrmf)
479	23-11424	0-74 74-104 104-123	sandy clayey silt (Qal over Qrmlb) sand and gravel, screened 75-103 for future production (Qrmf) granite
480	23-12284	0-7 7-25 25-123 123-124	clay and silt with a little gravel (Qal) silty sand and gravel (Qrm2 over Qrmlb) sand and gravel, screened 51-123 (Qrmf) granite
481	23-12283	0-27 27-40 40-53 53-58 58-80 80-81 at 81	coarse-to-fine sand (Qrm2) fine-to-very fine sand (Qrm2) silt and clay (Qrmlb) silt, traces fine-to-coarse sand (Qrmlb) fine-to-coarse sand with gravel (Qrmf) compact sand and gravel (Qrmf or Qn) weathered rock
482	23-4227	0-43 43-100	sand and gravel with boulders (Qrm2) trap rock
483	23-3294	0-69 69-89	hardpan and big boulders (Qrm2 over Qn) rock
484	23-2851	0-90	sand and gravel and boulders mixed (Qrm2 over Qn) cased to 90, yield 20 gpm
485	23-3663	0-42 42-133	gravel with boulders (Qrm2 over Qn) granite
486	23-4600	0-83 83-122	sand and gravel (Qrm2) granite
487	23-440	0-42 42-136	gravelly sand (Qrm2) trap
488	23-5101	0-123 123-225	sand and gravel (Qrm2 over Qrmf) red rock
489	23-307	0-35 35-106	Wisconsin drift (Qrm2) alternating layers of quicksand and heaving sand (Qrmlb)

		106-115	gray sandstone
490	23-5885	0-20 20-103 103-160	hardpan (Qal or Qrm2) sand (Qrmlb) trap rock
491	23-2186	0-5 5-35 35-50 50-52	hardpan (Qal) sand with clay (Qrmlb) coarse sand (Qrmf) pea gravel (Qrmf) cased to 52, yield 25 gpm
492	23-3810	0-50 50-60	hardpan with boulders (Qrm2) sand and gravel (Qrm2)
493	23-3769	0-14 14-91 91-97	sandy gravel (Qrm2) hardpan and clay (Qrmlb over Qn) coarse sand and gravel (Qsp?)
494	23-3860	0-103 103-265	sand, gravel, boulders (Qrm2 over Qn) trap rock
495	23-8311	abbreviated log 0-5 5-25 25-35 35-53 53-128 128-200	fill brown sand, gravel (Qn) brown sand and clay (Qn) brown sand and gravel (Qn or Qsp) red shale blue to black slate
496	23-5338	0-40 40-60 60-210	clay (Qal over Qn) sand and gravel (Qn or Qsp) red rock
497	23-2507	0-10 10-25 25-45 45-70 70-80 80-85 85-95 95-97 97-110 110-112	overburden sand and gravel (Qmt) gray clay (Qrmlb) brown sand and silt (Qrmlb) brown sand, silt, fine gravel (Qrmf) brown sand, silt, small gravel (Qrmf) brown sand, medium gravel (Qrmf) sand, gravel, sharp gravel (Qrmf) sand, gravel, medium size (Qrmf) hardpan, no water (Qrmf or Qn) screened 85-110, yield 970 gpm
498	23-1929	0-3 3-16 16-31 31-80 80-85 85-88 88-93 93-96	hardpan (Qmt) hardpan, boulders (Qmt) coarse sand, gravel, clay (Qmt over Qrmlb) gray silt (Qrmlb) fine brown sand, fine gravel (Qrmf) coarse brown sand with gravel (Qrmf) medium gravel, brown sand, coarse sand (Qrmf) granite gneiss rock screened 83-96, yield 308 gpm
499	Oakland Soons wellfield #9	0-10 10-20 20-30 30-70 70-77 77-84 84-88	sand, gravel (Qmt) (not reported) fine brown sand and silt (Qrmlb) fine gray sand and silt (Qrmlb) fine gray sand and gravel (Qrmf) fine brown sand, silt, gravel (Qrmf) red rock
500	23-2197	0-18 18-47 47-67 67-76	fine sand (Qmt) sand, little gravel (Qrmlb over Qrmf) sand, gravel, little water (Qrmf) coarse gravel, little clay (Qrmf)

76-100 red rock
 screened 56-76, yield 419 gpm

501	23-2105	42	
502	TH 3.1	0-41 41-44 44-48 48-69	sand and gravel and boulders (Qrm1) fine sand (Qrm1) sand and gravel (Qrmf) gneiss
503	TH 3.2	0-37 37-51 51-61 61-71 71-136 136-144 144-165	sand and gravel and boulders (Qrm1) fine sand (Qrm1) sand and gravel and boulders (Qrmf) coarse and fine sand (Qrmf) fine sand (Qrmf) coarse and fine sand (Qrmf) gneiss
504	TH 3.5	0-25 25-90 90-127 127-147	sand and gravel and boulders (Qrm1) coarse and fine sand (Qrm1 over Qrmf) fine sand (Qrmf) trap rock
505	TH 3.3	0-59 59-108 108-128	sand and gravel and boulders (Qrm1) coarse and fine sand (Qrm1 over Qrmf) trap rock
506	TH 3.4	0-60 60-70 70-88 88-108	sand and gravel and boulders (Qrm1) fine sand (Qrm1) gravel and sand (Qrmf) trap rock
507	23-7790	0-35 35-40 40-117	sand and gravel (Qal over Qrm1) clay (Qrmlb) gravel (Qrmf) screened 85-117, yield 1227 gpm
508	23-373	0-60 60-160 160-190	gravel and small boulders (Qrm1) fine sand (Qrmlb) fine sand and gravel (Qrmf)
509	23-7519	0-8 8-17 17-22 22-32 32-50 50-55 55-63 63-67 67-70	sand, boulders, gravel, clay (Qrm1) sand and gravel (Qrm1) coarse and fine sand with clay (Qrm1) medium and fine sand and clay (Qrm1) fine sand, silt, clay (Qrmlb) silt, fine sand, clay (Qrmlb) silt, fine sand, clay, boulders, small stone (Qrmlb over Qn) clay and broken granite rock, silt (Qn) rock, granite
510	TH 1.1	0-31 31-40 40-53 53-67 67-92	coarse and fine sand (Qal over Qrm1) fine sand (Qrmlb) silt (Qrmlb) gravel and sand (Qrmf) gneiss
511	TH 1.3	0-11 11-23 23-63 63-67 67-87	sand and gravel (Qrm1) fine sand (Qrmlb) silt (Qrmlb) sand and gravel (Qrmf) gneiss
512	TH 1.2	0-75 75-117 117-121 121-141	sand and gravel (Qrm1) fine sand (Qrmlb) sand and gravel (Qrmf) gneiss
513	TH 1.4	0-78	sand and gravel (Qrm1)

		78-170	fine sand (Qrmlb)
		170-180	silt (Qrmlb)
		180-191	fine sand (Qrmf)
514	TH 1.5	0-61	sand and gravel (Qrm1)
		61-212	fine sand (Qrmlb)
		212-233	red sandstone
515	TH 1.6	0-60	sand and gravel (Qrm1)
		60-175	fine sand (Qrmlb)
		175-197	red sandstone
516	23-4818	0-51	hardpan, large boulders (Qmh1 over Qn)
		51-84	hardpan (Qn)
		84-400	red sandstone
		400-600	red shale and sandstone

¹Identifiers of the form 26-xxxx and 46-xxxx are well permit numbers issued by the N. J. Department of Environmental Protection, Bureau of Water Allocation. Identifiers of the form Nxx-xx-xxx are N. J. Atlas Sheet grid coordinates of wells in the Bureau of Water Allocation files that do not have permit numbers. Identifiers of the form DOT xx are borings drilled for the N. J. Department of Transportation with logs on file at the N. J. Geological Survey. Identifiers of the form TH 1.x or TH 3.x are dam borings from Weston and Sampson (1924).

²A number without a log is the depth, in feet below land surface, to bedrock reported for wells where the surficial material is either not identified or identified only as “overburden” or “glacial fill”. For wells and borings with logs of the surficial materials, the depth (in feet below land surface) and driller’s or logger’s description is provided. Depths followed by “c” are reported lengths of well casing for wells where the depth is not otherwise reported; typically, casing extends several feet into the top of bedrock, so these are maximum values. Inferred map units and comments by author are in parentheses. All descriptions are reproduced as they appear in the original source, except for minor format, punctuation, and spelling changes. Logs identified as “abbreviated” have been condensed for brevity. Many bedrock descriptions have been condensed; these are not identified as abbreviated. The notation “NR” indicates “not reported”. For wells completed in surficial materials, the screened interval or length of well casing and yield (in gallons per minute, gpm) are reported beneath the log. Map units are inferred from the known extent of materials at the surface and from known depositional settings, in addition to the drillers’ descriptions.

Table 2.--Composition of pebbles in surficial deposits

Site	Unit	Number of pebbles	Percentages of pebbles					
			gneiss ¹	gray mudstone ²	red sandstone, mudstone, conglomerate ³	purple quartzite ⁴	basalt ⁵	white quartz pebbles ⁶
1	Qbs2	111	90	8		2		
2	Qmh1	158	63	25	12			
3	Qmh1	104	33	19	48			
4	Qrm1	117	73	20	7			
5	Qn	147	61	38 ⁷	1			
6	Qrm1	120	83	14	3			
7	Qrm2	123	81	16	4			
8	Qmt	120	83	17				
9	Qrm2	108	74	25		1		
10	Qr	129	39	8	44			9
11	Qn	115	87	12 ⁷		1		
12	Qfl2	158	70	23	7			
13	Qfl2	183	55	31	8			6
14	Qfl2	161	62	25	6		1	6
15	Qfl2	150	67	25	4			4
16	Qfl2	133	75	18	2	2		3
17	Qfl2	114	79	18	3			
18	Qfl2	122	74	23				3
19	Qfl2	128	78	18	3			1
20	Qic	176	76	17	3	1	2	1
21	Qn	118	73	25		2		
22	Qfl3	110	64	27		5	4	
23	Qn	129	77	20		2		1
24	Qn	149	60	21	7	7		5
25	Qfl3	128	70	16	5	3		6
26	Qfl3	187	70	22	1	3		4
27	Qfl3	135	74	19	4			3
28	Qic	133	75	14	7			4
29	Qic	138	72	17	7			4
30	Qn	129	87	11		2		

31	Qho3	124	64	25	6			5
32	Qho3	146	56	23	13			8
33	Qfl3	122	61	28	7			4
34	Qfl3	176	57	27	8			8
35	Qho3	143	60	24	11			5
36	Qfl3	113	66	20	9			5
37	Qho3	116	42	21	23			14
38	Qho3	218	46	26	17			11
39	Qho3	187	53	27	11			9
40	Qn	143	70	29		1		
41	Qho4	150	67	19	7			7
42	Qho4	147	68	16	4			12
43	Qho4	194	51	17	11			21
44	Qho4	152	66	19 ⁷	3			12
45	Qic	167	60	22 ⁷	14			2
46	Qho4	149	67	26	3			4
47	Qic	148	67	26	5			2
48	Qfl4	151	66	24	6			4
49	Qic	154	65	29 ⁷	6			
50	Qn	111	63	33	2			2
51 ⁸	Qn	103	87	11		2		
52	Qn	132	72	26		2		
53	Qn	152	46	54				
54	Qn	112	8	91 ⁷		1		
55	Qn	141	71	29 ⁷				

¹Proterozoic gneiss from the Hudson Highlands and Ramapo Mountain.

²Paleozoic sedimentary rocks from the Wallkill and Hudson valleys.

³Local sedimentary rocks from the Newark Basin.

⁴Quartzite-conglomerate from the Green Pond and Skunnemunk formations in the Hudson Highlands.

⁵Local basalt from the Watchung basalt flows of the Newark Basin.

⁶Quartz pebbles are chiefly from local weathered conglomerates of the Newark Basin. Some may be from the Pensauken Formation, a preglacial fluvial deposit that formerly occupied lowland areas of the Newark Basin.

⁷Includes 1% chert from Paleozoic carbonate rocks in the Wallkill Valley or Hudson Highlands.

⁸Count is of boulders.