Consultation - Rocky Dell Spring, Inc.. 1934

Rocky Dell Spring

Introduction

Description

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Introduction. The Rocky Dell Spring is located in the NW¼ of SE¼ sec. 36, T. 7 N., R. 4 W., Grant County, Wisconsin on the F. C. Culver farm. The spring is leased to H. P. steinbach of Detroit, Michigan, who is developing it under the name of "Rocky Dell Spring, Inc." a corporation formed under the laws of the state of Michigan. The writer visited the locality on Oct. 15, 1934.

Description. The Rocky Dell Spring lies at the end of a ridge on the south side of the valley from Fennimore to Woodman which was formerly traversed by a narrow guage branch of the Chicago and North Western Railway. Photos 1081 1-2 and 1083 1-4 show the spring itself and 1084 1-5 and 1085 1-6 the surroundings. The spring is about 10 ft above the valley floor. Water emerges from a crevice several inches wide in the Jordan sandstone. Overlying this formation is about 215 feet of dolomite belonging to the Prairie du Chien group which is exposed in cliffs and crags as shown in photos 1086-1091 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6. The contact of the dolomite and the underlying layer of sandstone is, however, covered with soil and could not be inspected at this locality. The discharge from the concrete basin can be made by several different outlets. Most of the time water is led by a wooden flume to an old-fashoned overshot water wheel which drives a 32 volt generator for charging storage batteries. In the photo 1083 1-4, however a lower outlet was opened. The discharge from this pipe was measured roughly with a 55 gallon drum and estimated at approximately 150 gallons per minute. Other lower outlets for draining the basin are now plugged. There is considerable leakage under the concrete wall.

At the time of visit the bottom of the basin was covered with leaves. ~~Frogs and water snakes were found in the spring.~~

Quality of the water. Mr. Steinbach gave the writer an analysis of the water made by W. A. Richards of the General Testing Laboratories of Detroit, Michigan. As a check the writer took two samples of water for analysis at the State Laboratory of Hygiene in Madison, Wisconsin. The different chemical analyses were not made in the same way and represent waters taken at different dates. As a result they do not check very well. Richards reports 16 parts per million of suspended matter whereas the writer could not detect any at all. ~~He recorded 2.7 p. p.m. of iron and the State Laboratory found none.~~ Both analyses show that the water is a ~~normal~~ calcium-magnesium carbonate water with only a small amount of sulphate.

~~Analysis~~ by Richards recomputed

Silica	8 parts per million
Iron	2.7
Calcium	48.5
Magnesium	13.5
Carbonate	112.8
Chlorine	22
Sodium	22
Misc.	7.7
Total solids	358

Analysis by State Laboratory of Hygiene

Hardness 280 parts per million
Alkalinity 228
Iron 0

It is evident that ~~the~~ Richards figure for "total solids" is not the sum of the ~~foregoing~~ above quantities but included a double amount of carbonate as the calcium and magnesium was recorded as "bicarbonate." This is not the usual way to compute total solids and it is possible that the copy of the analysis was in error in stating "bicarbonate" for ~~normal~~ "carbonate." As a matter of fact such waters normally contain bicarbonates of calcium and magnesium regardless of the way in which the analysis is ~~stated~~ computed. The State Laboratory analysis records ~~a~~ total hardness ~~of~~ 280 ppm computed as ~~normal~~ calcium carbonate and ~~an~~ "alkalinity ~~of~~ 238 ppm computed as the same.

Alkalinity is the same as "temporary hardness" which may be removed by boiling.

The difference between total hardness and alkalinity is the "permaneant" or sulphate hardness. In the State analysis this is equivalent to about 40 p.p.m. of sulphate radicle. If the Richards analysis is correct as stated then the computed temporary hardness is 188.3 p.p.m but if the bicarbonate is really simple carbonate then the temporary hardness would be 294 p.p.m. Richards places the sulphate radicle as 8 which is equvalent to a permanent hardness of 8.3 ppm, computed as calcium carbonate. The writer concludes that the differences between the two analyses, although ~~accountable~~ explicable in part by changes in amount of fresh rain water at different times are mainly due to varying customs of the two analysts. The Richards analysis is unsatisfactory in many respects and is misleading in that it shows considerable iron wheras there are in fact no noticable iron deposits where the spring water flows. The water is of very satisfactory quality for chemical drinking.

Bacterial quality of the water. One sample taken by the writer on Oct. 15, 1934 was tested at the State Laborary of Hygiene for the organism "B. coli" which is known to be present in the intestines of man and many animals including some cold blooded animals. Mr. Steinbach stated that other similar tests have been made but showed no copies of the results. The State test showed positive B. coli in only one of the five 10 cubic centimeter portions. This shows a very low concentration of such organisms and the water was declared "safe". ~~Other~~ some laboratories, under the classification of the U.S. Public Health service. would, however, class such water as "questionable." In the opinion of the writer the contamination is readily explained by the known presence of frogs and snakes in the pool, although blowing or washing in of fecal matter of other derivation is possible. The water must be regarded as of questionable bacterial purity until the spring is properly covered.

Conclusions. The Rocky Dell Spring should be enclosed with a concrete-walled house with a waterproof roof. The rear wall of such house should be placed several feet back from the present earth bank behind the spring leaving open only those crevices which supply substantial amounts of water. This wall should be carried at least a foot above the ground level and diversion ditches should be dug to carry off storm waters from the pasture above. Windows in the house should be screened with copper or bronze netting to exclude leaves ~~and~~ insects and animals. The leaks at the bottom of the wall should be plugged up so as to exclude the entrance of snakes ~~etc~~ and rodents which seek springs for winter quarters. Daily inspection should be made of the spring in the fall to see if such creatures have undiscovered entrances. The public should be excluded from the spring house and an ornamental overflow should be constructed below the spring house to satisfy the curiosity of visitors. The overflow should be screened to prevent entrance of animals. Bacterial analyses should be made several times a year particularly after unusually heavy rains and in the fall when animals may have entered the spring. ~~With~~ These sanitary precautions ~~the spring~~ are necessary because the B. coli deposited by animals ~~in the spring~~ cannot be distinguished from that derived from human faeces. Although the animals are not known to have ~~carry~~ diseases which affect man it is easy to see that they might carry dangerous filth into the spring. With the above precautions the Rocky Dell Spring, which has maintained so large a flow despite the drought, ought to be a dependable source of safe drinking water.

ROCKY DELL SPRING

Introduction. Rocky Dell Spring is located in the NW¼ of SE¼ of section 36, T. 7 N., R. 4 W., Grant County, Wisconsin on County Trunk K about 8 miles from Woodman and 11 miles from Fennimore. The spring is leased to H. P. Steinbach of Detroit, Michigan, who is developing it under the name of Rocky Dell Spring, Inc., a corporation formed under the lows of the state of Michigan. The writer visited the locality on Oct. 15, 1934.

Description. The Rocky Dell Spring lies at the end of a ridge on the south side of the valley which reaches Wisconsin River just west of Woodman and which was formerly traversed by the narrow guage branch of the Chicago and North Western Railway. The spring is about 10 feet above the valley floor. Photos 1081 and 1083 show the spring itself and 1084 and 1085 its immediate surroundings. The hills are underlain by dolomite (magnesian limestone) and sandstone bed rock formations in approximately horizontal layers. The spring emerges from a formation of sandstone called Jordan. The contact of this sandstone with the overlying Prairie du Chien dolomite formation is now exposed at this locality but the bulk of the hill which rises about 215 feet above the level of the spring immediately to the south is composed of dolomite. Photos 1086-1091 show views of the surrounding country with cliffs and crags of dolomite. The discharge from the concrete basin of the spring can be made by several different outlets. Most of the time water is led by a wooden flume to an old-fashoned overshot water wheel which drives a 32 volt generator for charging storage batteries. In photo 1083, however, a lower overflow had been opened. This pipe is estimated to discharge about 150 gallons per minute as measured with a 55 gallon drum. Other lower outlets for draining the basin are now plugged. There is considerable leakage under the concrete wall. At the

time of the writer's visit the bottom of the basin was covered with dead leaves.

Chemical quality of the water. Mr. Steinbach gave thw writer an analysis of the water made by W. A. Richards of the General Testing Laboratories of Detroit, Michigan. The writer also had a sample analyzed at the State Laboratory of Hygiene, Madison, Wisconsin.

Analysis by Richards recomputed		Analysis by State Laboratory	
All quanities in parts per million			
Silica	8.0	Total hardness	280
Iron	2.7	Alkalinity	238
Calcium	48.5	Iron	0
Magnesium	13.5		
Carbonate	112.8		
Sulphate	8.0		
Chloride	22.0		
Sodium	22.0		
Aluminum etc	7.7		
Total solids	358.0		

Richards also reports 16 p.p.m. of suspended matter although to the writer the water appeared entirely clear. The two analyses agree in showing that the water contains a moderate amount of bicarbonates of calcium and magnesium although in computation these are given as simple or normal carbonate with half the amount of carbon dioxide. The amount of sulphate is low and the amount of chloride, chiefly sodium chloride or common salt, is still less. However, there are some important differences in the results and comparison suggests that Richards analysis was incorrectly stated as bicarbonate when ordinary carbonate was intended. In order to compare the results the total hardness was computed as calcium carbonate from the Richards analysis. If we take the figures stated above which are based on computation as bicarbonate the result is 196.6 whereas if we assume that an errorin statement was made the result is 302.3 Neither result agrees very well with the State analysis but this could easily be explained by the changes in composition of thw water on account of varying amounts of fresh rain water as well as by differences in the methods followed by different chemists. We can also compare the analyses in other ways. Alkalinity is equivalent to temporary hardness

or hardness which may be removed by boiling. Total hardness includes also sulphate hardness which cannot be so removed. Richards analysis makes the permanent hardness 8.3 computed as calcium carbonate and the State analysis makes this amount 42.0 which is equivalent to 40. p.p.m. of sulphate. It seems likely that the water was really of different composition at the diffeeent dates of sampling. However, this can hardly account for the relatively large amount of iron reported by Richards because the condition of the overflow pipes, the flume, and the outlet channel demonstrate that the amount of iron is in fact very small if there is any at all. This discrepancy can only be explained by the use of different chemical methods some of which are known to give misleading results. However, the fact stands out that the water is very moderately charged with dissolved matter and from the chemical standpoint is very satisfactory for human consumption.

Bacterial quality of the water. A sample of water from Rocky Dell Spring was taken by the writer and tested at the State Laboratory of Hygiene for the organism B. coli which is known to be present in the intestines of man and many animals, some of them cold-blooded. Mr. Steinbach stated that other similar tests had been made and that all showed safe water but did not show the results in detail. The State test showed positive B. coli in only one of the five 10 cubic centimeter portions. This demonstrates a very low concentration of such organisms and the water was declared "safe" under the standards of the U. S. Public Health Service. Some labooratories would, however, term such a water "questionable." In the opinion of the writer the contamination is readily explained by the known presence of frogs and snakes in the pool, although the blowing in or washing in of faecal matter from other sources is possible and birds certainly visit the spring. It is, therefore, impossible at present to tell whether or not the contamination is of human origin.

It is very unlikely, however, that under present conditions with no human habitations on the ridge above the spring for a minimun distance of half a mile any dangerous human contamination could enter the spring by an underground route. The water is on account of the high rate of flow probably now safer than are the majority of springswith similar construction.

Conclusions. The Rocky Dell Spring should be enclosed with a concrete-walled house with a water-proof roof. The rear wall of such house should be placed several feet back from the present earth bank behind the spring leaving open only those crevices which supply substantial amounts of water. This wall should be carried at least a foot above the ground level and diversion ditches should be dug to carry off storm waters which run down from the pasture above. Windows of the house should be screened with copper or bronze netting to exclude animals and birds. As far as possible light should also be excluded to decrease plant growth such as is now noted in the flume. The outlet pipe should also be screened. It would be well to build a new and stronger wall below the pool and to stop all leaks below the wall so far as possible. Snakes, frogs, and so forth seek for springs in the fall as they furnish good winter quarters. Special care should be taken during the fall to seek for such creatures in the spring, for they may have undiscoverable underground entrances. The public should be excluded from the spring house and an ornamental cascade overflow below the building should be constructed to satisfy the curiosity of visitors. Bacterial analyses, which are made free by the State Laboratry of Hygiene, should be obtained several times a year especially after heavy rains. It must be remembered that although the water comes from a considerable depth below the hill tops ~~that~~ most of the overlying rock is dolomite (magnesian limestone) in which there are large openings in which the water is not filtered.

For this reason no houses or cottages should be built on the hill behind the spring. Pasturage and casual visitors do not create any hazard. The sanitary precautions are necessary because the droppings of animals cannot be distinguished from the results of human contamination. Moreover, although it is not demonstrated that any of the animals which requent springs have diseases which are dangerous to man, such animals might accidently carry dangerous contamination into the spring. Proper safeguards against contamination and the entrance of animals should not, however, be a reason for neglecting to make bacterial tests for purity of the water. With such safeguards and such examination the Rocky Dell Spring, which has maintained so large a flow despite the drought, ought to be a dependable source of safe drinking water.

Respectfully submitted,

F. T. Thwaites, Geologist

Oct. 26, 1934