

NEWSLETTER

1963



Richardson, D.T. 1963
“Analysis of Water Samples from Upper Long Churn Cave
and Springs in the Vicinity of Alum Pot, Selside”
Newsletter Vol.1 No.2, NCMRS, pp.24-26

Published by the

THE NORTHERN CAVERN & MINE RESEARCH SOCIETY
SKIPTON U.K.

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ANALYSIS of WATER SAMPLES from UPPER LONG CHURN CAVE and SPRINGS in the VICINITY of ALUM POT, SELSIDE HORTON - in - RIBBLESDALE, YORKSHIRE.

by

D.T. Richardson, A.R.I.C.

The table on page 25 gives the results of the analysis of water samples collected on the 28th. April 1963.

Determinations of Free Carbon dioxide were carried out in the field.

Attempts were made to take p.H. measurements with p.H. papers were not very successful and in consequence the p.H.'s of the water samples were subsequently checked by means of a laboratory p.H. meter on Monday 29th, April. Care was taken when taking the samples to ensure that no air space remained above the level of liquid in the sample bottles.

POOLS:

The pools from which both samples "B" and "c" were taken are true rimstone pools. They are lined with calcite crystals and have stalagmite barriers. There was however no surface crystallisation taking place.

The pool from which sample "A" was taken was situated in a cavity in the limestone floor of a small dry inlet passage off the main stream passage. It had a silt floor and did not contain any calcite deposits. From its position and nature it is concluded that the high mineral content of this water is due to concentration of the water by evaporation from the pool. The free carbon dioxide content of this pool was significantly higher than that of the true rimstone pools. All three pools were in Upper Long Churn Cave S.D.771.775.

STREAMS:

Samples "F" and "G" represent water flowing in the main stream passage of Upper Long Churn Cave S.D.771.775. This is a fast flowing stream. Sample "F" was taken from the underground pool known as "Dr. Bannister's Handbasin" and sample "G" was taken from the same stream where it emerges onto the moor some 400 yards lower down at the point where it enters Diccan Pot entrance - S.D. 7742.7568. These waters are identical, the lower p.H. of "G" is probably directly linked to its higher free carbon dioxide content. One conclusion which can be arrived at is that no significant quantities of other waters enters this stream. In actual fact, with the exception of two small underground trickles the only other water which enters the main stream is that represented by sample "H", the composition of which is not sufficiently different from "F" to cause an alteration in the composition of the water reaching the point at which sample "G" was taken.

The water represented by "E" was taken from a small stream entering the main stream passage underground a little lower downstream than Dr. Bannister's Hand basin. This water has picked up some hardness salts during its course underground yet it has retained the slightly characteristic yellow colour of a moorland surface water. This may mean that the water has travelled somewhat quickly for some considerable distance underground before finding its way into the main stream

ANALYSIS OF SAMPLES OF WATER FROM UPPER LONG CHURN CAVE, HORTON-IN-RIBBLESDALE
AND SURFACE STREAMS AND SPRINGS IN THE VICINITY OF UPPER LONG CHURN CAVE
SAMPLES TAKEN 28th APRIL 1963

SAMPLE NUMBER	UNDERGROUND						SURFACE		
	POOLS			STREAMS			STREAMS		
	A	B	C	D	E	F	G	H	J
Total Hardness(as CaCO_3)	209.6	136.0	126.0	113.6	73.5	54.4	54.4	46.4	83.2
Temp. Hardness(")	198.0	96.0	90.0	96.0	54.4	35.0	34.0	36.0	62.0
Perm. Hardness(")	11.6	40.0	36.0	17.6	19.1	19.4	20.4	10.4	21.2
Calcium Salts(")	192.0	112.0	118.4	105.6	65.5	41.6	41.6	46.4	70.4
Magnesium Salts(as MgCO_3)	14.2	19.3	7.7	6.4	6.4	10.3	10.3	7.7	10.3
Free Carbon dioxide(as CO_2)	1.0	5.0	4.0	5.0	1.0	0.5	2.0	0.5	1.0
Chlorides (Cl)	Tr	Tr	Tr	Tr	Tr	Tr	Tr	Tr	Tr
Sulphates (SO_4)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Manganese (Mn)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
p.H.	7.6	8.2	8.2	8.0	8.2	8.2	7.0	7.6	7.6
Colour	C	C	C	C	SY	VSY	VSY	VSY	VSY
Temperature °C.	4.5	5.5	5.3			9.5			
Temperature °F.	40.0	41.5	41.0			49.0			

Results in milligrammes per litre. (Parts per million.)

SYMBOLS: Tr. = Trace; C = Colourless; SY = Slightly Yellow; VSY. = Very Slightly Yellow.

Analyses carried out by D. T. Richardson. A.R.I.C.

passage of Upper Long Churn Cave.

Sample "D" is from another slow flowing stream entering the main stream of Upper Long Churn Cave. This water is absolutely colourless and has a composition almost identical to that of the water in the rimstone pools "B" and "C". Does this therefore mean that this water is a spill over from rimstone pools?

SPRING WATER.

The water "J" was taken from a surface spring further down the valley S.D.7781.7545. The composition suggests that this water has travelled sufficiently far underground to enable it to pick up relatively high amounts of hardness salts. It has the characteristic yellow tinge of a moorland water.

REMARKS.

The above survey represents a preliminary insight into the usefulness of water analysis in the study of caves. The results are sufficiently interesting to indicate that such surveys will be of great value. In view of this a more thorough programme is to be introduced whereby all springs and streams in the area are to be included.