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1986/42. Blue coloration of water from bores near the Forth River.

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Abstract

Low pH water from bores in basalt areas in the lower Forth River region has dissolved copper from domestic pipes causing a blue coloration to the water. The low pH water may be associated with deep weathering in the basalt or to interbedded Tertiary sediments.

INTRODUCTION

While collecting groundwater information and advising on groundwater prospects in the lower Forth River area, two property owners reported that blue-coloured water was coming from cold water taps inside their houses. Each was being supplied from bores. A water sample was collected from the laundry of the first house where the problem was reported (at Kindred) and analysed for standard items usually determined in water analyses as well as for copper. When the further occurrence (at Lower Barrington) was reported, samples were obtained from the bathroom and directly from the bore in this location as well as directly from the bore at Kindred.

DESCRIPTION OF BORES

The bore at Kindred [DQ357376] penetrated 26.5 m of soil, clay, weathered basalt and basalt followed by 4 m of gravel (in which the water was struck) and 3 m of clay.

No record appears to have been obtained for the Lower Barrington bore [DQ394294] although a bore about 100 m away on the same property penetrated 62.5 m of basalt.

CHEMICAL ANALYSES OF WATER

Analyses undertaken by the Department of Mines laboratory in Launceston are given in Table 1.

It can be seen that water samples taken before entering each house have a low copper content and it must be concluded that the copper is dissolved inside the house rather than occurring naturally in the local groundwater.

Copper piping is known to have been used for the cold water supply in the Kindred house and this is probably the situation for the Lower Barrington residence.

The analyses do not indicate any other factor than the low pH that is likely to cause significant corrosion of copper piping. The reason for the low pH in the water is unknown. Each bore has an extensive area of basalt surrounding it and in general most groundwater in basalt in the Devonport-Sheffield area has a pH in the range 6.5-8.5. Although the Kindred bore extended into gravel (probably Tertiary in age), it would be expected that the dissolved solids in the water would be largely derived from the widespread basalt.

Table 1
CHEMICAL ANALYSES OF WATER

| | Mrs J. Thomas Lower Barrington Bore* | Bathroom | Scolyer Holdings Kindred Bore* | Laundry |
|--|--|----------|--------------------------------------|--------------|
| pH | 5.5 | | | 6.0 |
| Conductivity (nS/cm) | 95 | | | 150 |
| CO ₃ (mg/l) | nil | | | nil |
| HCO ₃ (mg/l) | 3.7 | | | 24 |
| Cl (mg/l) | 9.2 | | | 14.5 |
| SO ₄ (mg/l) | <5 | | | <5 |
| Ca (mg/l) | 5 | | | 3.2 |
| Mg (mg/l) | 2.9 | | | 4.3 |
| Fe (mg/l) | <0.1 | | | <0.1 |
| Al (mg/l) | <0.2 | | | <0.2 |
| K (mg/l) | 1.3 | | | 1.3 |
| Na (mg/l) | 9.7 | | | 23 |
| TDS (mg/l) | 65 | | | 145 |
| Hardness - permanent (mg/l) | 21 | | | 6.1 |
| temporary (mg/l) | 3.0 | | | 19.5 |
| Alkalinity - as CaCO ₃ (mg/l) | 3.0 | | | 19.0 |
| Cu (mg/l) | <0.1 | 0.2‡ | <0.1 | 1.8‡ 1.1‡ |

* Directly from bore.

‡ 25 October 1985.

‡ 28 November 1985.

A few bores in basalt in the Devonport-Sheffield region have a lower pH than the range given above. The logs as supplied by contract drillers suggest that most bores have encountered deeply weathered zones of basalt or Tertiary sediments intercalated with basalt.

Copper in small quantities is essential for plant growth and for humans. Hart (1974) gives various limits. Copper concentrations in the range of 0.1-1.9 mg/l in nutrient solutions are toxic for a wide range of plants. Most soils remove copper from solution and it is unavailable for use by the plant although a limit of 0.2 mg/l is given for irrigation waters. Concentrations of 1-5 mg/l impart a taste to the water while large doses over long periods can cause damage to health. A limit of 1.0 mg/l is given for drinking water to avoid taste effects. An adverse taste had been noted by the users of the Kindred water.

CONCLUSIONS

The blue coloration in water from the above bores is due to the presence of copper in the water but it does not occur naturally in the groundwater. The most likely explanation is the corrosion of copper piping in the reticulation system in the houses.

Low pH is probably the main cause of the corrosion.

Although water from basalt generally has a pH of 6.5 or greater, the low pH may be related to extensive weathering of the basalt or to the presence of interbedded Tertiary sediments.

REFERENCE

HART, B. T. 1974. A compilation of Australian water quality criteria.
Tech. Rep. Aust. wat. Resour. Counc. 7.

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