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# A note on the quality of groundwater in the Hafnarfjörður region of SW-Iceland

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**Greinargerð JÖB-94-04**

**ORKUSTOFNUN**
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September 5, 1994



**Report**
JÖB-94/04
jöb

# A NOTE ON THE QUALITY OF GROUNDWATER IN THE HAFNARFJÖRÐUR REGION OF SW-ICELAND

In recent years, the staff of the Chemical Laboratory of Orkustofnun (The National Energy Authority of Iceland) has on occasion collected samples of groundwater from the Hafnarfjörður region for chemical analysis. In particular, samples have been collected from the supply to the Hafnarfjörður Water Works at Kaldárbotnar, from two wells in Kapelluhraun, across the road from the Icelandic Aluminium Co. smelting plant, from a well at the nearby steel micromill, and from another well at the transformer station at Hamranes.

The composition of a sample from Kaldárbotnar is given in Table 1 on the following page. Here, *Carbonate* and *Sulfide* denote the concentrations of *total* carbonate and *total* sulfide, computed as $CO_2$ and $H_2S$, respectively. The value for *total dissolved solids* is obtained by evaporating the sample to dryness. Concentrations are given in mg/kg, with the obvious exception of pH. The specific conductivity of the water is 84.9 $\mu$S/cm at 22.2°C. No attempt to analyze the water for organic constituents has been made by Orkustofnun.

The chemical composition of groundwater at the other four sites is virtually identical to that of the sample in Table 1.

The water at Kaldárbotnar and the other sites constitutes excellent drinking water. In particular, the concentrations of dissolved components fall far below the limits set by the World Health Organization for drinking water. (Guidelines for Drinking-Water Quality. Vol. 1, Recommendations. World Health Organization, Geneva, 1984.)

The only count on which this water exceeds WHO guideline values is the pH. In no way does the high pH here spoil the water for drinking, however. The reason for the WHO guideline being set at 8.5 is that the efficiency of the chlorine disinfection process decreases progressively above pH 8.0. In Iceland, there is rarely any need to treat water, however, so the high pH, which is typical of deeply circulating groundwater in SW Iceland, is not a problem.

The water should be quite acceptable for most industrial process applications. In particular, the high pH would be expected to impede corrosion in iron and steel pipes.

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*Table 1. Chemical composition of water at Kaldárbotnar. Concentrations in mg/kg.*

| Sample date | | 03-Oct-91 |
|---|---|---|
| Sample number | | 91-9106 |
| **Component** | **Measured value** | **WHO guideline value** |
| pH/°C | 8.94/24.0 | 6.5-8.5 |
| Carbonate ($CO_2$) | 18.4 | |
| Sulfide ($H_2S$) | <0.03 | taste, odor |
| Boron (B) | <0.02 | |
| Silica ($SiO_2$) | 13.9 | |
| Total dissolved solids | 47.9 | 1000 |
| Sodium (Na) | 9.92 | 200 |
| Potassium (K) | 0.61 | |
| Magnesium (Mg) | 1.73 | |
| Calcium (Ca) | 4.61 | |
| Fluoride (F) | 0.077 | 1.5 |
| Chloride (Cl) | 8.42 | 250 |
| Bromide (Br) | 0.031 | |
| Sulfate ($SO_4$) | 2.56 | 400 |
| Aluminum (Al) | 0.022 | 0.2 |
| Chromium (Cr) | 0.0011 | 0.05 |
| Manganese (Mn) | <0.0001 | 0.1 |
| Iron (Fe) | 0.0024 | 0.3 |
| Cobalt (Co) | <0.001 | |
| Nickel (Ni) | <0.001 | |
| Copper (Cu) | <0.0001 | 1 |
| Zink (Zn) | 0.0012 | 5 |
| Cadmium (Cd) | <0.0001 | 0.005 |
| Lead (Pb) | <0.0005 | 0.05 |