

**Chemical composition of saltwater from a
well in Helguvík, Reykjanes Peninsula
Southwestern Iceland**

Jón Örn Bjarnason

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CHEMICAL COMPOSITION OF SALTWATER FROM A WELL IN HELGUVÍK, REYKJANES PENINSULA, SOUTHWESTERN ICELAND

At the request of Mr. Þorsteinn Erlingsson of Helguvíkurmjöl, a fluid sample was collected from one of the company's wells on November 25, 1998. The intent was to determine its chemical composition.

The well is located near the base of the Hólmsberg cliff by the Helguvík harbor in the township of Reykjanesbær. The well is the deepest of three that the company operates, and the only saltwater well. The two shallower wells yield freshwater. The primary use of the saltwater is for rinsing capelin roe.

The sampling and the chemical analyses of inorganic constituents were carried out by the staff of the Chemical Laboratory of Orkustofnun (the National Energy Authority of Iceland). The results of the analyses are presented in Table 1, with concentrations given in mg/liter. Here, CO₂ represents total carbonate calculated as carbon dioxide, and H₂S denotes total sulfide calculated as hydrogen sulfide. The figure for dissolved solids represents the total mineralization, as measured by evaporating an aliquot to dryness at 110°C.

*Table 1. Chemical composition of fluids from well HB-46 in Helguvík.
Concentrations in mg/liter.*

Sample number 1998-0594		Date of sampling November 25, 1998	
pH/°C	7.82/21.2	Sodium (Na)	9390.
Carbonate (CO ₂)	60.1	Potassium (K)	294.
Sulfide (H ₂ S)	<0.03	Magnesium (Mg)	984.
Boron (B)	3.1	Calcium (Ca)	679.
Silica (SiO ₂)	12.2	Aluminum (Al)	0.003
Fluoride (F)	0.23	Manganese (Mn)	0.01
Chloride (Cl)	17025.	Iron (Fe)	0.12
Bromide (Br)	56.8	Phosphate (PO ₄)	0.05
Sulfate (SO ₄)	2350.	Dissolved solids (TDS)	33530.

The high salinity of the fluid in the well comes as no surprise. The geological formations in the Reykjanes peninsula are quite open and readily permeated by seawater, which

surrounds the peninsula. The temperature of the fluid in the well, 12.6°C, is, however, considerably higher than the mean annual ambient temperature of about 5°C, and also higher than the mean temperature of the warmest month, July, which is around 11°C. This is a manifestation of the high geothermal gradient in the area, and is not exceptional, though slightly unusual in the northern part of the peninsula.

The salinity of the fluid, as measured by the chloride concentration, is about 10% lower than that of local seawater. The reason is without doubt freshwater dilution. The cation ratios of the well fluid also differ somewhat from those of seawater. In particular, the concentrations of potassium and magnesium are relatively lower, and the concentration of calcium is relatively higher, than in seawater of equal chlorinity. The reason for this is ion exchange with the rock. This process is widely observed and well understood.

A sample for the analysis of petroleum hydrocarbons was also collected. This sample was analyzed by the staff of the Department of Pharmacology of the University of Iceland, as described in the letter attached to this report. No traces of petroleum hydrocarbons were detected.

Nothing in the chemical composition of this fluid argues against its use in food processing. In fact, it appears to be saltwater of fine quality.


Jón Örn Bjarnason, Ph.D.



Reykjavík, November 27. 1998

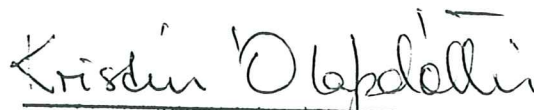
Jón Örn Bjarnason
National Energy Authority of Iceland,
Chemistry Laboratory,
Grensásvegi 9,
108 Reykjavík,
Iceland.

The analysis of TPH in a water sample from Helgufvík, Iceland.

One sample of water was received on November 26. 1998. The sample came in a glass flask, previously rinsed in this laboratory, and was kept refrigerated in the laboratory and analyzed on November 27. The sample was to be analyzed for total petroleum hydrocarbons (TPH).

The water sample was extracted by pentane, using bromobenzene as an internal standard, and analysed by gas chromatography (HP5890, FID, column: DB-1, 15 m, 0.25 mm i.d., 1 μ m film) (Nordtest Technical report 329:118-125). Deionized water from the laboratory was used as a blank. Different petroleum products were added to deionized water and used as standards. The method detects the range of petroleum products from gasoline to heavy lubricating oils (C₆-C₃₀) with a limit of 0.2-0.5 μ l petroleum product /liter water (ppm), and the measurement uncertainties are approx. \pm 10%.

The analysis revealed no traces of a petroleum product in the sample at levels above the detection limit.


Kristín Ólafsdóttir, Ph.D.