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# Further comments on geology and hydrogeology of Gvendarbrunnar and Myllulækur east of Reykjavík, Iceland

**Kristján Sæmundsson, Hrefna Kristmannsdóttir**

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# FURTHER COMMENTS ON GEOLOGY AND HYDROGEOLOGY OF GVENDARBRUNNAR AND MYLLULÆKUR EAST OF REYKJAVÍK, ICELAND

The authors of the original report "KS/KHS/HK-91/06 have been asked to clarify the relationship of the borefields used for the Reykjavík water supply with regard to the question of one or more sources or aquifers.

The following information is pertinent:

The spring area SE of Lake Ellidavatn is situated in the lowest part of a rift zone with open faults and fissures. The springs are distributed over a 2.5 km area elongated NE-SW in the direction af the fault swarm (Fig. 1). Most of the springs emerge below the lake level of Ellidavatn and other small lakes east of it. A conservative estimate is that the total yield of the spring area varies seasonally between 1-1.5 $m^3/s$. This can be regarded as the outflow from a single aquifer that is located primarily within fractured interglacial lava.

At Gvendarbrunnar a tounge of Holocene lava reaches down to the lakes and the groundwater level is within the bottom part of the lava. Yet the upwelling is related to faults in the underlying interglacial lava, as is the case farther to the SW.

For obvious reasons the Reykjavík Water Works produces water from more than one borefield along the spring area. The prime reason is to keep the drawdown within in safe limits. The two groups of boreholes at Gvendarbrunnar and Jadar are considered as being one production field because of interference between the two. At the present time Gvendarbrunnar and Jadar together are producing at a pumping rate of 700-750 l/s. The Myllulækur field with a producing capacity of about 330 l/s adds at present a moderate 150-200 l/s to the City supply without causing interference with the Gvendarbrunnar field.

Table 1 shows chemical analyses from the borefields of Gvendarbrunnar, Jadar and Myllulækur. As seen from the table the chemical composition of the water from the three fields is very similar. For the main components the deviation from one to the other is within analytical error confirming origin from a single aquifer.

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The map (Fig. 1) is from Jón Jónsson 1965. [Faults and fissures in the vicinity of Reykjavík] Náttúrufrædingurinn Vol. 35, p. 75-95 (in icelandic).

The chemical analyses are done by Jón Ólafsson who is employed at the Marine Research Institute and thus the analyses are performed by an independent testing laboratory.

Kristján Sæmundsson
Kristján Sæmundsson

Hrefna Kristmannsdóttir
Hrefna Kristmannsdóttir

TABLE 1. Chemical composition of water in drillholes operated by Vatnsveita Reykjavíkur (From Jón Ólafsson, 1987)

| | | Myllulækur | Gvendarbrunnar | Jadar |
|---|---|---|---|---|
| pH | | 8.9 | 8.9 | 9.0 |
| Conductivity in | umh/cm | 83 | 87 | 88 |
| Total dissolved solids (at 105°C) | mg/l | 78 | 68 | 76 |
| Sodium (Na) | " | 10.0 | 10.7 | 10.9 |
| Potassium (K) | " | 0.37 | 0.46 | 0.43 |
| Calcium (Ca) | " | 4.8 | 3.8 | 4.3 |
| Magnesium (Mg) | " | 0.80 | 1.01 | 0.85 |
| Silica ($SiO_2$) | " | 13.1 | 13.1 | 13.5 |
| Chloride (Cl) | " | 9.4 | 10.3 | 9.8 |
| Sulphate ($SO_4$) | " | 3.1 | 3.1 | 3.0 |
| Fluoride (F) | " | 0.02 | 0.02 | 0.03 |
| Bicarbonate ($HCO_3$) | " | 26.1 | 24.5 | 26.5 |
| Carbonate ($CO_3$) | " | 0.3 | 0.3 | 0.4 |
| Hardness ($CaCO_3$) | " | 15.3 | 13.6 | 14.2 |
| Boron (B) | " | 0.02 | 0.02 | 0.02 |

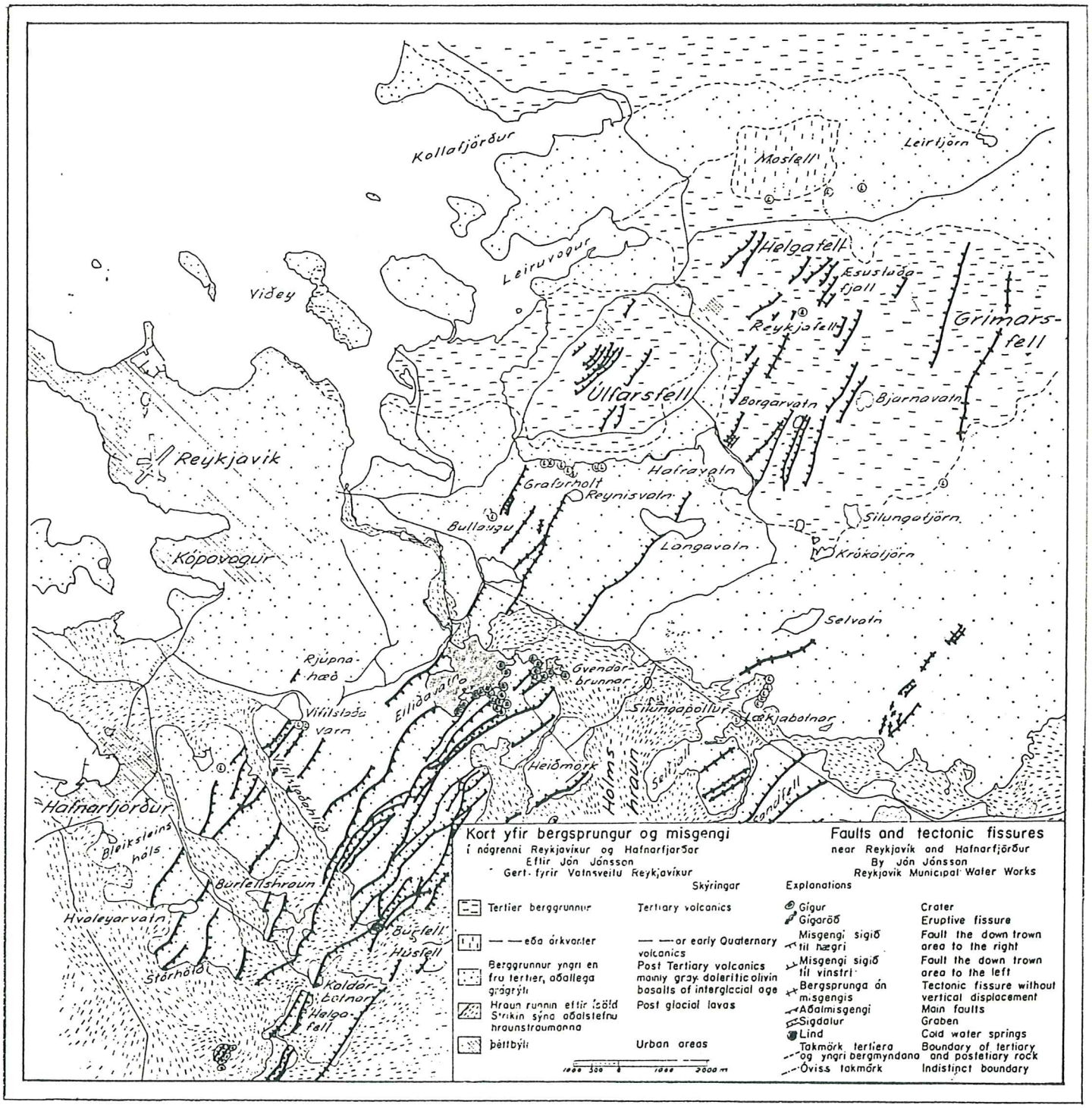
Kollafjörður
Leirtjörn
Mosfell
Leirvogur
Helgafell
Esustaða-fjall
Grímarsfell
Viðey
Reykjafell
Úlfarsfell
Borgarvatn
Bjarnavatn
Reykjavík
Hafravatn
Grafarholt
Reynisvatn
Bullaugu
Silungatjörn
Langavatn
Krókatjörn
Kópavogur
Selvatn
Rjúpnahæð
Gvendarbrunnar
Elliðavatn
Vatnsveitu-vatn
Silungapollur
Lækjarbotnar
Heiðmörk
Holms-hraun
Selfjall
Sandfell
Hafnarfjörður
Bleiksleins háls
Búrfellshraun
Hvaleyrarvatn
Búrfell
Húsfell
Stórhöfði
Kaldárbotnar
Helgafell
Kort yfir bergsprungur og misgengi
í nágrenni Reykjavíkur og Hafnarfjarðar
Eftir Jón Jónsson
Gert fyrir Vatnsveitu Reykjavíkur
Skýringar
Tertier berggrunnur
Tertiary volcanics
— — eða árkvarter
— — or early Quaternary volcanics
Berggrunnur yngri en fru tertier, aðallega grágrýti
Post Tertiary volcanics mainly gray doleritic olivin basalts of interglacial age
Hraun runnin eftir síðöld Strikin sýna aðalstefnu hraunstraumanna
Post glacial lavas
þéttbýli
Urban areas
1000 500 0 1000 2000 m
Faults and tectonic fissures
near Reykjavik and Hafnarfjörður
By Jón Jónsson
Reykjavik Municipal Water Works
Explanations
Gígur
Crater
Gígaröð
Eruptive fissure
Misgengi sigið til hægri
Fault the down trown area to the right
Misgengi sigið til vinstri
Fault the down trown area to the left
Bergsprunga án misgengis
Tectonic fissure without vertical displacement
Aðalmisgengi
Main faults
Sigdalur
Graben
Lind
Cold water springs
Takmörk tertiera og yngri bergmyndana
Boundary of tertiary and postetiary rock
Óviss takmörk
Indistinct boundary

Fig 1