ORKUSTOFNUN

Well test in the field

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Greinargerð ÞHH-2003-14

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Rannsóknasvið

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Date: July 1st 2003.

Site: *Geldinganes.* Still uninhabitated peninsula in the vicinity of Reykjavik.

Geology: As shown on the enclosed map the exposed bedrock in the peninsula consists almost entirely of *Reykjavik olivine tholeiite compound lava;* fresh and permeable grey basalt. The age is approximately 100.000 years and this enormous lava flow is frequently exposed in the Reykjavik-area; therefore named "the Reykjavik Grey Basalt" The thickness of the lava-flow is approximately 35 m in Geldinganes and it is covering silty sediments and palagonitized breccia.

Geolocical profile in brief:
0 to 28 m: Grey basalt, relatively sound, with little or no clay fillings.
28 to 36 m: Scoraceous basalt or pillow lava, partly filled with grey clay.
36 to 44 m: Partly consolidated sand and silt sediment layer with low permeability.
44 to 117 m: Tuffaceous palagonite and breccia; low permeability.
This profile is according to drill-cuttings collected from HS-54. The geology of the topmost basalt can also be observed in the quarry,
which is not so far away from our site.

Name of drillhole to be pumped: HS - 54 (OS-database no. 1847). The hole was originally drilled for investigation of the geothermal gradient in the area. You can see the result in brief on the enclosed map.

Date of **drilling**: december 3rd 1998.

Location of well: 64°10'06.19"N, 21°49'16.76"W. Top: 18.80 m above sea level.

Depth: 117 m. Casing length: 6 m. Casing diameter (id.): 143 mm. The diameter of the drillhole beneath 6 m is approx. 140 mm.

The **drill-rig** used (named Grímnir) is a small one mounted on a tiny crawler and powered by a powerful air-compressor, using Down The Hole (DTH) hammer and odex-casing system.

Low yield is estimated (ca. 1 l/s), therefore we are using a small downhole pump. In fact we are going to have almost laboratoty-size well test! The pump is approximately 100 mm in diameter, mounted on plastic pipe. Maximum yield is less 1 than liter per second.

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In spite of that low yield, this is enough in this area. The pump is powered by portable 1 kW generator.

An old core-hole, drilled for investigation of rock quality, is several tens of meters away. It may be used as an observation hole.
Observation borehole (corehole no. 9) depth approx. 23 m, diameter: 76 mm.

HS – 54. - Procedure proposal.

When we arrive, the pump will already be installed. First of all we will measure the undisturbed ground water level in the hole and also in theobservation borehole.

Then we start the generator and pumping as well!

We perform water level measurements at one minutes interval for the first ten minutes. (HS-54). Try to be accurate! Exact time- and water-level readings will increase the quality og the pumping test and ensure correct calculations.
As soon as possible we'll measure the yield, using bucket (12 liters) and a stop-watch. Also we measure temperature of the water.

With continous pumping we gradually find the water-level changes to become slower and slower. Therefore we can take it more easy! Now we measure the water level at five to fifteen minutes intervals (HS-54) and we start collecting data from well no-9 too.
Yield and temperature measurements performed now and then.
The pumping is to be continiued for approximately two hours or until water table has stabilized at same depth in the hole at constant yield.

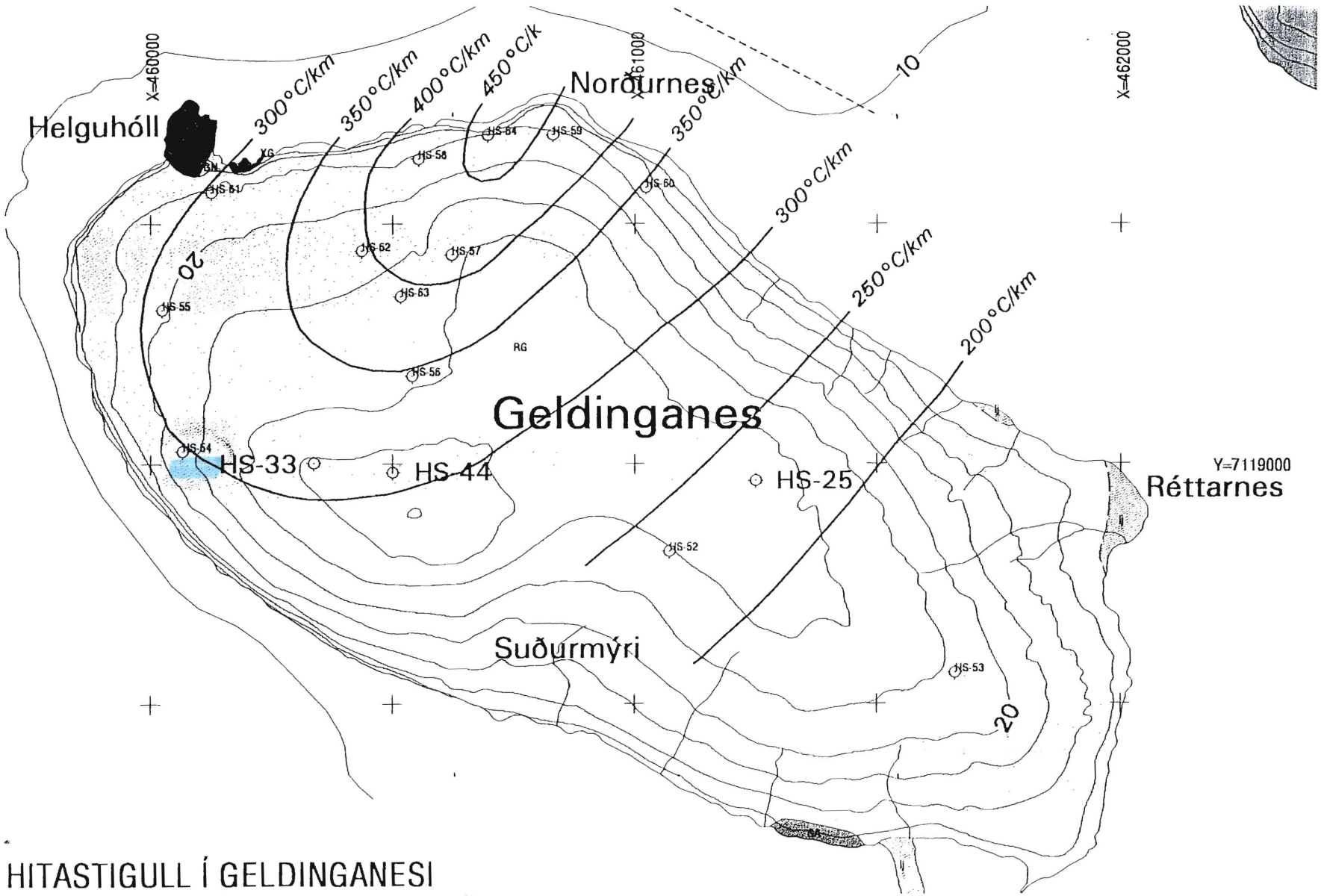
Then we switch the generator off and stop pumping. But we are not finished yet. We must record how the groundwater is recovering.

Water level measuresments should be done at one minute intervals (in HS-54 and no. 9) for the first five minutes, then at three to five minutes interval.
When the water table has almost recovered fully again, pump is removed from the hole.

Finally; temperature logging right down to the bottom of the hole. This temerature profile is to be compared to older ones to detect "veins" or permeable layers

Before we leave we measure the ground water table for the last time. Of course we should have taken water sample for chemical analysis, but in this case it's unnecessary.

Enclose: .Temperature profiles and location map



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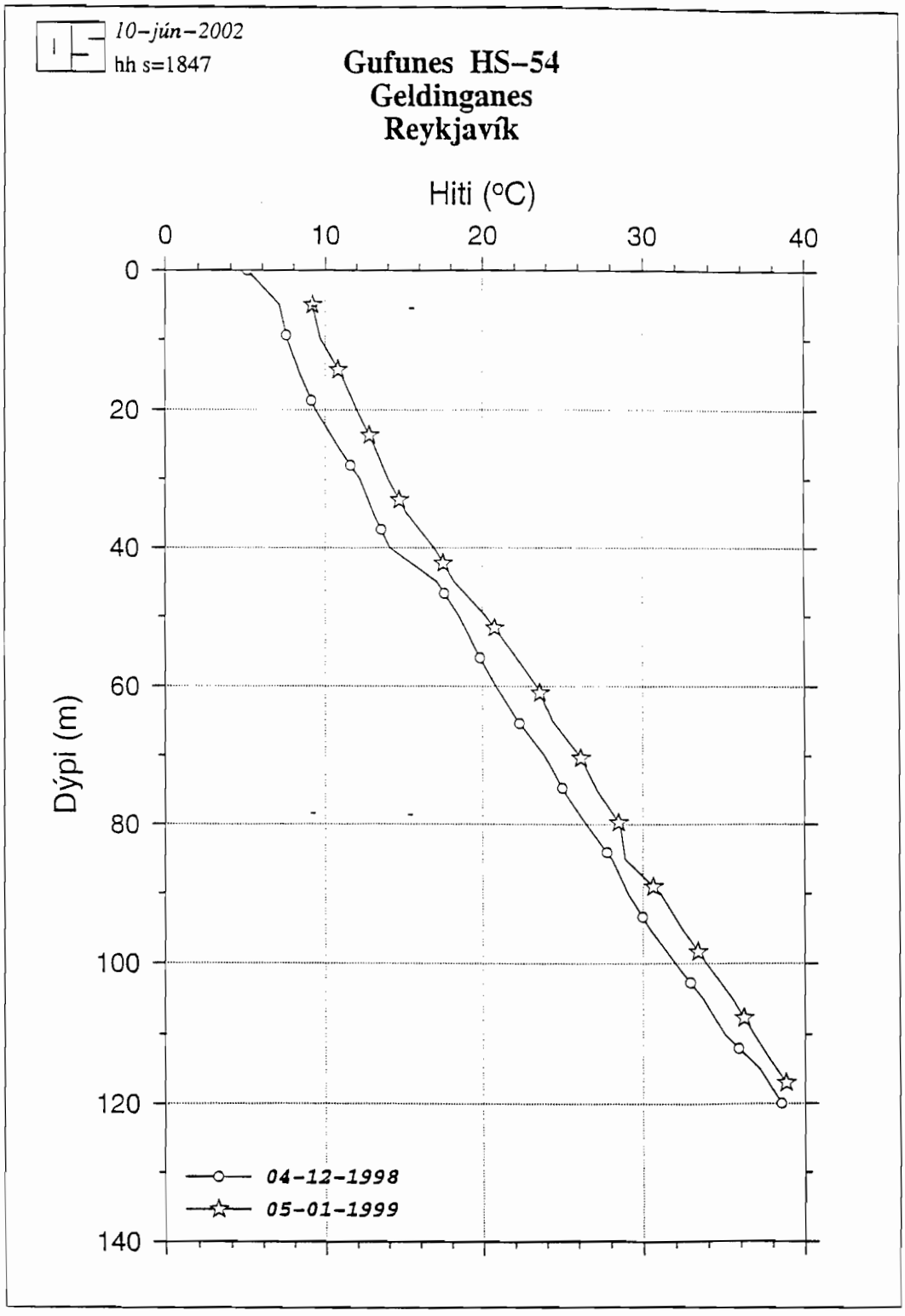
10-jún-2002
hh s=1847
Gufunes HS-54
Geldinganes
Reykjavík
Hiti (°C)
0
10
20
30
40
Dýpi (m)
0
20
40
60
80
100
120
140
04-12-1998
05-01-1999