

NASA Ames Research Center
Sanjoy M Som
M/S 239-4 Moffett Field,
94035 California
United States

Umhverfisstofnun
Áb. _____
17. mars 2014 9.5.1
Tilv. _____



Reykjavík, March 14 2014
Ref: UST20140200229/mik

Subject: Permits to collect water and dissolved gas samples from for Seltun at Krysvík, the Hveragedi area, Geysir park, Hveravellir, Deildartunguhver and Landbrotalaug.

The Environment Agency of Iceland has received a request from Dr. Sanjoy Som from the National Aeronautics and Space Administration dated 25th of February 2014 regarding permits to collect water and dissolved gas samples from for Seltun at Krysvík, the Hveragedi area, Geysir park, Hveravellir, Deildartunguhver and Landbrotalaug.

Seltun at Krysvík is inside the country park Reykjanes. Disturbance to geological formations in the protected area is prohibited without permission from the Environment Agency of Iceland. That also includes sampling for scientific research.

Hveravellir is protected as a natural monument. Disturbance to geological formations, vegetation and wild animal life in the protected area is prohibited without permission from the Environment Agency of Iceland. That also includes sampling for scientific research.

Geysir is a site of special interest, where the hot springs are protected by article 37 in the Icelandic nature protection law. The Environment Agency of Iceland handles the part owned by the government inside Geysir area.

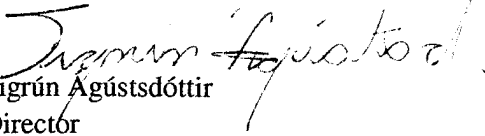
Description of the project: The purpose of this study is to measure dissolved hydrogen (H₂) concentration in a host of hydrothermal springs. The reaction of water with rock produces hydrogen via several processes that are widespread on Earth. Those processes are expected to occur on rocky planetary bodies where liquid water is present. Such reactions could represent a continuous supply of chemical energy for putative chemosynthetic life. Hydrogen metabolisms are of particular interest because they are both widespread and deeply rooted in the phylogenetic tree of life, implying they may have emerged extremely early in the evolution of life on Earth, and possibly even at the origin of life. As a result, H₂-based metabolisms are strong candidates for the potential of life beyond Earth. The goal of this work is to assess the variation in continental H₂ abundance in hydrothermal springs across basaltic host rocks, in order to assess their potential habitability. Spring samples will be collected with a peristaltic pump and non-reactive tubing, and gases extracted using simple techniques requiring pure nitrogen (brought along in a nonpressurized container) where nitrogen is mixed in the collected spring water. The mixture is shaken for 2 minutes, and the resulting headspace, capturing previously dissolved gasses, is collected in evacuated Kevlar/aluminum bags to allow shipment back to the US.

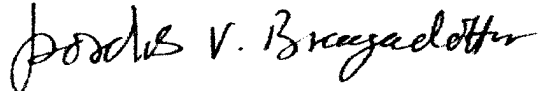
Water samples will be also be filtered and collected in glass vials for shipment to provide geochemical context to the gas samples. Sampling will take place in June. It is estimated to collect maximum 5x50ml gas samples and 10x40ml water samples, per site.

Hveragerdi, Deildatunguhver and Landbrotalaug are not protected areas and no permission of the Environment Agency is needed to collect samples there. You will however need permission from landowners to collect samples at those sites. For Hveragerdi you should contact the Hveragerði municipality (hve@hveragerdi.is) to gain permission for the sampling in that area. For Deildatunguhver you should speak to Borgarbyggð municipality (borgarbyggd@borgarbyggd.is) and for Landbrotalaug you should speak Eyja og Miklaholtshrepp (eyjaogmiklaholtshreppur@vortex.is). The Environmental Agency of Iceland grants you permission for the research project as described above at Seltún at Krýsuvík, Geysir area and Hveravellir. The research permit is subjected to the following conditions:

- This permission is granted for the period 15th to 29th of June 2014.
- The Environment Agency requests that the researcher will contact the rangers working in these areas before field work begins and inform him on your intentions. For Seltún you may contact Þórdís (+354 822 4058) to get the rangers telephone number. For Geysir area and Hveravellir you should contact Ingibjörg (+354 822 4034).
- Hveravellir is in the highland and the road usually opens sometime in the period 5th to 22th June. The time may differ in years and depends on when the road dries up after the winter. You may find Information about the time of opening at the Icelandic Road and Coastal Administration <http://www.vegagerdin.is/english/road-conditions-and-weather/condition-of-mountain-tracks/> webpage
- Keep the signed permit letter with you during your research.
- Sample quantity is restricted to maximum 5x50ml gas samples and 10x40ml water samples, per site as described above.
- This permit is only valid for research purposes. It does not include permit to utilize the samples for commercial purposes. The samples cannot be signed over to third party for the purpose of commercial use.
- Every measure should be taken to avoid damage to the sites and unnecessary disturbance.
- It is strictly prohibited to walk on the sinter.
- The Environment Agency of Iceland wishes to be secured, free of charge, a copy of all reports and scientific articles that result from the research project.
- Off road driving is prohibited in all circumstances.
- A separate permit from the National Energy Authority in Iceland, os@os.is is needed to conduct research at geothermal sites in Iceland which should also be kept with you at the research site.
- If you wish to transport the samples from Iceland you will need a permission from the Icelandic Institute of Natural History (www.ni.is), e-mail: ni@ni.is

Yours sincerely


Sigrún Agústs dóttir
Director


Þórdís V. Bragadóttir
Advisor