

Stony Brook University
145 Endeavour Hall

United States

Reykjavík, 27. júní 2022
UST202206-064/P.V.B.
09.05.01

Subject: permit to conduct research at Arnarnesstrýtan, Strýtan and Reykjanes country park

The Environment Agency of Iceland has received an application from Roy E. Price at Stony Brook University, dated June 3rd 2022, for research permit within Arnarnesstrýtan, Strýtan hydrothermal vent chimneys and Reykjanes country park.

Arnarnesstrýtur hydrothermal vent is protected cf. regulation no. 510/2007. Research and collection of specimens are subject to a permit from the Environment Agency of Iceland. It is prohibited to disrupt the hydrothermal vent chimneys and attach any kind of sign on the vents.

Reykjanes country park is protected cf. regulation 520/1975. Disturbance to geological formations is prohibited.

The Strýtur hydrothermal vent is protected cf. regulation no. 249/2001. Research and collection of specimens are subject to a permit from the Environment Agency of Iceland. It is prohibited to disrupt the hydrothermal vent chimneys and attach any kind of sign on the vents.

Description of the project:

The goal of the project is to evaluate how and to what extent, energy generated by ancient, saponite-rich, alkaline hydrothermal settings on Mars could have supported biological processes. Several litres of fluids will be collected from cones in the Hydrothermal areas at Arnarnesstrýtan and Strýtan. Small pieces of active cones will be taken from out of site locations when possible and placed into zip lock baggies. It is anticipated to collect 2-4 samples from the cones (<4 cm in height each) by using a small pipe (maybe ~5 cm diameter) to push into an area of fresh precipitation, then pull out the core. The hole left behind can be plugged, e.g., with rubble or other pieces of the cone, and within a few weeks the hole seals up again. This will be done in an area that divers rarely visit. If there are small cones (10 cm height max) lying around that have already broken off, they will be collected as well. There will be no noticeable disturbances to the Strýtan or Arnarnesstrýtan cones. For analysis on environmental characterization of the microbial community ecosystem at Strýtan following samples will be collected: max 30 filtered water samples, 15 vials max of 100 ml fluid samples, 30 vials max of 10 ml hydrothermal fluids, 30 vials max of 20 ml Eppendorf tubes containing 1 ml each of hydrothermal fluids and 30 vials max of minerals precipitates (max

30 grams each) that will be collected the same way as above. All samples will be collected under the direction of Erlendur Bogason.

Similar sampling will take place at the Lake Kleifarvatn underwater vents where 1-2 litres of hydrothermal fluids. 30 samples, 10 grams each, total 300 grams (this is a total cone piece about the size of a half litre volume). At Krýsuvík 0.5 litres of hydrothermal fluids will be collected and 5-10 samples, 10 grams each, or 50-100 grams total of precipitate. There are 3 participants in the sampling group and sampling will take 5 days in the period of June 26th til July 6th 2022.

Review:

The Environment Agency of Iceland requested review from the committee of protection of Hverastrytur á botni Eyjafjarðar and Hverastrytur á botni Eyjafjarðar, norður af Arnarnesnöfum on June 20th. The review from the committee was received on May 27th. In their review they dont object granting the permit.

Impact assessment:

The Environment Agency of Iceland considers the project not likely to have negative effect on the area if conditions of the permit are followed.

Conclusions and conditions:

The Environment Agency of Iceland hereby grants Roy E. Price at Stony Brook University permission on its behalf to collect fluid samples and cone samples within Arnarnesstrytan and Strýtan hydrothermal vent chimneys and at Kleifarvatn and Krýsuvík in Reykjanes country park as described above in the period of June 27th til July 6th 2022 on the following conditions:

- Keep this letter with you on diving site during the project. The permit conditions should be introduced to the staff of the project before work begins.
- The project shall be done in cooperation with Erlendur Bogason and follow his instructions at Arnarneshydrothermal vent and at Strýtan.
- The applicant shall inform rangers in Reykjanes country park about their arrival and departure. This is to be done 24 hours before entering the area and again before leaving it.
- If the project dates or description changes the Environment Agency shall be notified as soon as possible.
- The crew must follow rules of conduct that apply to the areas.
- If any complications occur during the project, please contact the Environment Agency of Iceland, tel. +354 591 2000.
- 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 commercial use.
- Every measure should be taken to avoid damage to the sites and unnecessary disturbance while collecting samples.
- Samples should be collected where any resulting disturbance of geological formations is not visible to other visitors where the depth is at least 36 meters.
- This permit is only valid for sample collection according to the application.
- The Environment Agency shall be informed as soon as possible if any accidental damages occur to the hydrothermal vent chimneys.
- All disturbance to animals and wildlife is strictly prohibited.

- All participants in the project at Reykjanes country park must wear high-visibility clothing during field work, labelled with the identity of the researcher or the research institute.

If the developer causes damage to nature, according to art. 87 in the Nature Conservation Act no. 60/2013, the Environment Agency of Iceland can, according to the Nature Conservation Act, f.e. order the licensee to fix damage to nature and vegetation and/or stop the project.

The Environment Agency of Iceland can according to art. 89 in the Nature Conservation Act no. 60/2013 change conditions of the permit, add new conditions or withdraw the permit in order to prevent damage to nature if environmental conditions change.

According to art 89. in the Nature Conservation Act no. 60/2013 the Environment Agency can withdraw the permit if conditions of the permit are not complied to.

A permission from the municipality might be needed for the project in Reykjanes country park.

Permit from the National Energy Authority is needed for researches in geothermal areas (www.os.is).

If you wish to export samples from Iceland a special permit is needed from the Icelandic Institute of Natural History (www.ni.is).

The Environment Agency of Iceland wishes to receive, free of charge, a copy of all reports and scientific articles that result from the research project.

Permission fee:

Environment Agency of Iceland charges a fee for processing applications for permits in protected areas based on Article 92 of Act no. 61/2013 on Nature Conservation. The fee for researches is 39.400 ISK according to art. 24. b. in the agency's tariff no. 535/2015.

Supervision:

The Environment Agency will supervise the project at Reykjanes country park. The supervisor will be a ranger from the Environment Agency.

Sincerely

Davíð Örvar Hansson
advisor

Þórdís Vilhelmína Bragadóttir
advisor