Soil Gas Hydrocarbons

"SGH"

Geochemistry

SAMPLING INFORMATION

And OVERVIEW

June , 2023

For more information contact:
sgh@actlabs.com

Activation Laboratories Ltd.
41 Bittern Street, Ancaster,
Ontario, Canada L9G 4V5

SGH OVERVIEW

- SGH – A Geochemical analysis researched since 1996.
- Uses near surface samples (not only soils) which act as long term collectors.
- SGH measures 162 organic compounds in the C5-C17 carbon series range.
- Low parts-per-trillion (ppt) concentrations are reported.
- SGH are not gaseous compounds at room temperature.
- The SGH geochemistry has been proven to be robust to sampling, handling, shipping, sample preparation, and site cultural activity.

SGH OVERVIEW–Science & Capability

- Through research conducted with the Canadian Mining Industry Research Organization (CAMIRO) and the University of Western Ontario, SGH hydrocarbon signatures have been shown to be directly linked to bacterial activity in direct contact to mineralization or petroleum plays at depth.

- SGH is a deep penetrating geochemistry. It has been successful at spatially locating and identifying blind mineral targets at depths from very near surface to 720 metres (McArthur River P2 Uranium Pod in the Athabasca Basin), and further to deep petroleum targets at 1,500 metres (Bromhead Oil Pool in S.E. Saskatchewan).

SGH OVERVIEW–Science & Capability

- SGH is a method that samples the continuous and rapid hydrocarbon flux emanating from bacterial activity on the mineral or petroleum target at depth.
- The SGH method is a weak leach of near surface samples which are used as collectors of the hydrocarbon flow.
- SGH is precise. Sample replicate analyses have an overall precision of 7% coefficient of variation (CV) with a range of 3%.
- One of the outstanding characteristics of the SGH Geochemistry is the clarity of anomalies directly related to blind mineralized targets.

SGH OVERVIEW–Science & Capability

- SGH reports 162 compounds that defines a specific "SGH signature". This signature or template defines the *identity* of the target at depth.
- Comparison of the zonation produced between compound classes defines the geochromatography which *vectors to the precise vertical projection* of the mineral or petroleum target at depth.
- SGH has been successful at locating and identifying a wide variety of deposits: Gold, Nickel, Copper, Uranium, SEDEX, VMS, Polymetallic, Rare Earth Elements, Kimberlite as well as Coal, Oil and Gas.
- Selectivity to many different lithologies are included in the SGH Signature templates e.g. for Gold – epithermal, vein, porphyry, sediment hosted; for Uranium, unconformity, roll-front, breccia; etc.
- SGH has been successful in a wide variety of climates from the deserts in Africa, Australia or Nevada through to swamps and peat laden tundra in the very northern territories of Canada or Scandinavia.

SGH SAMPLING OVERVIEW

- Collect near surface samples: soil, peat, humus, sand, rock, till, snow and even fully submerged lake or sea bottom sediments.
- A *small* fist sized sample is all that is required. This reduces shipping costs. Very wet samples can be drip dried in the field.
- Only one trip to the field is necessary to locate and collect the samples.
- Marking pens or fingerprints will not contaminate a sample. Water and paper towels are usually adequate to clean hands, shovels or trowels between samples.
- Tyvek 1422A, Olefin or Ziplock bags are preferred sample containers. Kraft bags can only be used if the samples are completely dry.
- Snow samples can be collected in Nalgene plastic bottles (100mL or 120mL). Fill this bottle. There will then some 5–10 mL of water when melted for testing.

SGH SAMPLING OVERVIEW

- A great benefit of this geochemistry is the wide variety of samples that can be used: different soil horizons, peat, till, sand, humus, rock, sea or lake-bottom sediments and even snow. Trying to take a consistent type of sample over the survey is always best, however if this is not possible, different types of samples can still be used in the same survey.
- When encountering an area with an unexpected type of sample, the rule is, always take a sample.
- Samples should not be taken directly at the surface if possible.

SGH SAMPLING OVERVIEW

- The interpretation of SGH data is very different from other geochemistry's. SGH has been shown to be robust due to the interpretation using forensically derived signatures or templates. Confidence in the interpretation is significantly lower if less than fifty sample locations are submitted as the complete signature may not be observed.

- Taking different sample media in the same grid or transect is okay. It is important to not have any missed sample locations.

- To reduce bias in the interpretation, all samples should be equally spaced (approximately).

- Individual samples at extended distances for background measurements are not useful for this geochemistry. Background or site noise is automatically removed due to the specificity of the method and the approach in interpretation.

SGH SAMPLING – General Example

- **LARGER TARGETS:** A grid pattern is the best sampling design to obtain the highest confidence in interpretation for larger targets in order to interpret the SGH geochromatography.

- Ideally, samples should extend well into background on either side of the target and should be integrated at the ends of all sides of the grid. Background samples from a completely different geographical area are not useful for SGH.

- Approximately one-third of the samples should be over the target. For example: A 500m x 500m target, should ideally have 500m of samples into background on all sides, thus a grid of 1500m x 1500m. At a sample spacing of 100m there would be 15 x 15 or a minimum 225 samples and the target would be represented by 25 samples.

- Depending on the size of the target. Sample spacing for SGH over larger targets can be 100 to 750 meters.

SGH SAMPLING – General Example

- **SMALLER TARGETS:** A grid formation is still best. Two parallel transects, or cross formation transects that intersect at the potential target can also be used (50 sample site minimum).

- Samples should extend well into background on either side of the target and must be integrated at the ends of the transect or grid. Background samples from a completely different geographical area are not useful for SGH

- Approximately one-third of the samples should be over the target. For example: A 100m x 100m target, should have 100m representation into background at each end of say a pair of orthogonal transects. To compensate for the lesser amount of information as that provided by a grid pattern, narrower spacing is required. At a spacing of 12m, the two 300m transects should have 25 samples each for a total of 50 sample sites (the bare minimum).

- Sample spacing for SGH over smaller targets can be from 10 to 100 metres.

SGH ANALYSIS OVERVIEW

- Samples are best prepared at Actlabs in Ancaster, Ontario.
- Samples are air dried at 40 degrees Celcius in dedicated environmentally controlled drying rooms.
- Samples are then sieved. The fraction that falls through a 60 mesh sieve is used for analysis. If samples are not prepared at ACTLABS, sieves must be vacuum cleaned and not blown off with compressed air. The trace hydrocarbons in compressor air has poisoned samples in some cases.
- In Ancaster, the prepared samples are then transported from our sample preparation building, down the street, to one of our instrumentation buildings.
- A small sub-sample is taken and accurately weighed in the organics laboratory.
- An extraction analogous to a very weak, essentially aqueous leach is conducted.

SGH ANALYSIS OVERVIEW

- Sample extracts are then analyzed by a High Resolution Gas Chromatograph / Mass Spectrometer (HRGC/MS) to a Reporting Limit of 1-part-per-trillion (1 ppt.).

- The raw concentration data is reported in an Excel spreadsheet. There is no statistical processing applied.

- Sample coordinates (UTM or relative) are to be provided with the samples. An SGH Interpretation Report is also generated which takes advantage of our extensive research and our knowledge of the geochromatography of different compound classes used to vector to "*the spatial projection*" of the target and the ratios of the different compound classes that define the signature that are used to "*identify*" the type of target. Over 500 targets have been interpreted to date.

- The client should make the lab aware if there is the potential for multiple targets that are in close proximity (within 250 metres) for the commodity type in the survey i.e. if indicated from geophysical data. Overlapping SGH signatures can be more complex to interpret.

SGH INTERPRETATION OVERVIEW

- Included in the SGH analysis price: The client receives an SGH Interpretation report from the analysis that includes a Microsoft Excel spreadsheet containing the concentration in parts-per-trillion (ppt) for each of the 162 SGH compounds for all of the samples, the laboratory replicates and the laboratory materials blank analysis.

- The SGH Interpretation Report contains an explanation of the analysis, plan and 3D maps, interpretation, and a rating of the similarity of the SGH signature found for the particular target type reviewed in the client's survey, to known case studies. If less than 50 samples are submitted for a target, the SGH rating of the target is automatically reduced in the report.

SGH–SURVEY SUBMISSION

REQUIREMENTS - ***

- Upon submission of samples from a survey the client needs to provide:
- An ACTLABS sample submittal form (available from our website).
- A sample list with either UTM or Relative sample location coordinates to enable the interpretation of the SGH data (preferably in Excel and emailed to dalesutherland@actlabsint.com
- A title used to identify the survey (will appear on the title page of the report)
- An indication of the target type (e.g. for "gold" mineralization) which will define the SGH template that will be used in the interpretation (additional reports relative to other target types can also be developed at a modest surcharge using other interpretation templates on the original data).

SGH–SOIL GAS HYDROCARBONS

BENEFITS

- SGH has been shown to be an excellent "Redox Cell" locator.
- SGH has been proven in laboratory experiments as linked to bacterial interactions with specific ore types.
- SGH has been successful at identifying and locating mineralization at over 700 metres below the surface.
- SGH has been successfully tested in a wide variety of geographical environments for mineralization with a wide variety of lithology.
- SGH correlated well with some geophysical results.
- SGH has illustrated basement structures in some projects.

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SGH–SOIL GAS HYDROCARBONS

BENEFITS

- Easy and flexible sampling – a wide variety of sample types can be used.
- Unobtrusive, shallow hole can be filled in after sampling.
- Only one field visit required.
- Easy shipping – small "fist-size" samples.
- No special preservation for shipping.

SGH–SOIL GAS HYDROCARBONS

BENEFITS

- Analysis is robust to sampling procedures.
- Analysis is robust to geographical features.
- Analysis is robust to cultural activity.
- Built in data redundancy.
- Highly sensitive and highly specific.
- Deliverables: Spreadsheet of raw SGH data and SGH Interpretation Report.
- Cost effective.

ACTIVATION LABORATORIES LTD.

For more information on SGH, our new laboratory locations, and list of services, please visit our website at www.actlabs.com

Or contact us at our head office and laboratory at:
41 Bittern Street, Ancaster, Ontario, Canada L9G 4V5
1-888-ACTLABS (N. America), or 905–648-9611

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