SGH - Predictive Geochemisty

Get the Most Out of Your Orientation Survey

Although SGH was developed in 1996 and has, as of this date, been used in nearly 1,000 surveys, this organic-based geochemistry is still new to many exploration companies. Faced with adjectives like, “intriguing”, “you nailed it”, “why doesn’t everyone know about this”, and performance statistics that are unprecedented in the field of Geochemistry, mining exploration companies still seek to undertake a relatively small orientation study over known mineralization as due diligence that most often reflects the type of target or geology that is expected to be encountered in larger exploration surveys.

In April of 2012, a research study conducted by the Ontario Geological Survey (OGS) was purposely designed to ensure that the location and specifics regarding the target types were kept from Activation Laboratories. This has been the norm, that details other than sample location relative coordinates and the general target type have not been revealed to Actlabs in independent research studies. In this lake sediment study the SGH data delineated the major mining camps in the McFaulds Lake “Ring of Fire” area. The Ontario Geological Survey (OGS) carried out a helicopter-supported lake sediment geochemical orientation survey over the Ni-Cu-PGE magmatic massive sulphide deposits in the McFaulds Lake area of Northern Ontario in the summer of 2011. This research underlines the capability of SGH to be able to use not only “Soil” but can use a very wide variety of sample types, i.e., soil, sand, silt, till, humus, peat, and even fully submerged lake-bottom sediment as used in the OGS study. This is because the hydrocarbons measured rely only on the requirement of the existence of some type of sample surface area regardless of the sample type. Thus SGH does not work for water samples, but in recent years snow sample surveys have also been successful with SGH. Thus the golden rule is to always take a sample with this vary user friendly geochemistry. One of the conclusions of this OGS study was the statement “The Deep penetrating SGH method on lake sediment samples shows promise as a technique to help overcome the landscape challenges of the Far North” – Dr. Richard Dyer, Sedimentary Geoscience Section Poster (Dr. Richard Dyer, Geoscience Section, OGS).

In considering the design of an orientation survey, as well as for subsequent exploration surveys, it is important to take advantage of the latest geochemical theories to best ensure the probability of success. In the last decade there has been more focus, evidence and recognition of the importance of the detection of Redox conditions that occur in the overburden over mineralization. Later work theorized the existence of an electrochemical cell in this zone. In 2011, SGH played a vital role in mapping the effect of the electrochemical cell. As relatively neutral species the hydrocarbons measured by SGH obey electrochemical physics and self-organize to reflect the hydrocarbon flux pathways that exist. The recognition of these highly symmetrical pathways provides vital information and confidence in determining the anomalies that are developed from the mineralized target. This conclusive evidence of the existence of the Electrochemical Cell was presented at the International Applied Geochemistry Symposium organized by The Association of Applied Geochemists (AAG) that took place in Rovaniemi, Finland, in August 2011 as 3D-SGH (Sutherland, 2011).

The review of results to assess the performance of a geochemical method is only as good as the design of the orientation survey. The new Electrochemical Cell theory has revealed a weakness in the practice of using a single transect in orientation studies. The anomalies developed over the Redox zone associated with mineralization do not form a perfect ring or halo anomaly. There are gaps. Thus there is a risk that a single transect might be oriented to lie within the gaps or nodes in the anomalies produced by the electrochemical cell. This would potentially result in the failure to detect anomalies associated with known mineralization even when a geochemical technique might have the capability of detecting the anomalies present had the transect been aligned slightly differently. Using the observations of SGH data, a Nano-technology, an estimate of this risk can be predicted. The estimate of obtaining a “false-negative” result when using single transects to test a geochemistry in an orientation study is 1 in 10.

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In using an orientation survey to truly test and experience the capabilities of SGH as well as other geochemistries we highly recommend the following two choices:

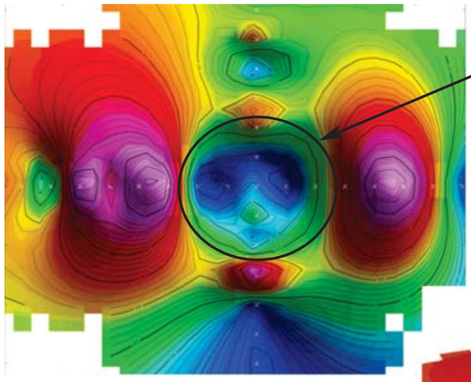
1. Better Method: Use a set of three or four parallel transects. The spacing of samples along transects should be tied to the size of the deposit or target to be tested. For very narrow vein like targets, a narrower spacing is required. Where veins are expected to be less than 5 metres in width a suggested spacing using SGH would be 25 metres. The minimum resolution ever needed for SGH is 20 metres. A ratio of transect spacing: sample spacing that has proven to provide very good results is 4:1, i.e. for narrow vein targets a survey of 100 metres between transects having samples space at 25 metres can be used. Some survey designs have used wider spacing at each end of the transects to help the survey reached further into background areas. Today, it is preferred and recommended to use a design having consistent spacing whenever possible which will ensure that anomalies that may occur near the ends of the transects will not bias the interpretation from the survey imbalance.

In considering the suggested sample spacing in an orientation survey using SGH the type of target to be tested must also be considered. Targets of small Copper mineralization or vein like gold targets would require 25 to 50 metre spacing while spatially larger Copper and Gold targets can use 50 to 100 metre spacing. At the other end of the scale, as the SGH signature for Uranium relies on higher molecular weight hydrocarbon species, the sample spacing in these transects can be from 200 – 1,000 metre spacing. All other target types can use spacing from 50 to 250 metres.

2. Best Method: Use a survey that is intended to be essentially a perfect grid. When a grid is used the spacing between samples can be increased by perhaps 30%. The interpretation of the data obtained from a grid of samples is not biased by the survey design and best illustrates the highly symmetrical anomalies that can illustrate the hydrocarbon flux pathways observed from the effect of the electromotive forces of the Electrochemical Cell. Such symmetrical anomalies provide an exceptional high degree of confidence in identifying the anomalies that are truly associated with the buried mineralization. Grid based surveys can result in a high degree of agreement with geophysical results. A grid type survey is also the best at reducing the possibility of a false negative result for an orientation survey. When highly symmetrical anomalies are encountered there may even be the opportunity to estimate the depth to mineralization when using SGH. This is perhaps the first geochemistry to be able to make such an estimate.

Other orientation survey designs are of course possible. Actlabs is available to provide advice on orientation and exploration survey designs specifically to be used for our SGH geochemistry. This consultation is at no cost to the client.

For additional information contact us at ***SGH@actlabs.com***



Location of Kimberlite Pipe

Beneath 25 metres of James Bay overburden in Northern Ontario.

Spacing is 25 metres.