

MMI™ ORIENTATION SURVEYS

MMI™ INTRODUCTION

Mobile Metal Ion (MMI™) technology is a proprietary SGS geochemical survey technique used to accurately locate deep ore deposits. During the MMI™ procedure, we use sophisticated chemical processes and instrumentation to measure mobile metal ions (charged metal atoms and molecules) that have migrated into surface soils from mineralization below. MMI™ geochemistry strips mobile metal ions from the exterior of soil particles using a partial dissolution without digesting the soil itself, to measure metal ion concentrations in the parts per billion range.

By measuring only mobile metal ions in surface soils, SGS MMI™ surveys produces sharp responses (anomalies) over buried ore deposits. Significant reductions in your exploration costs may be realized as traditional exploration techniques such as geophysics and drilling can be focused into smaller, prioritized exploration zones, saving you both time and money. Trust SGS, the global technical leader and proprietary owner of MMI™ for your survey needs.

MMI™ ORIENTATION SURVEYS

Before a full MMI™ exploration project is undertaken, it is important that you test the technique using a properly designed Orientation Survey at a small scale over a known area of mineralization. This will ensure MMI™ applicability, and will help determine optimum survey parameters. MMI™ Orientation Surveys are valuable in all geologic settings but are strongly recommended in areas of highly transported and/or depositional soils.

An MMI™ Orientation Survey consists of a single transect over a known target, with dense site spacing and multiple samples collected from each sample pit.

The primary reasons for performing this survey are to:

- Determine a site spacing that is sufficiently dense to identify mineralization.
- Identify which elements fingerprint the mineralized zone.
- Establish the appropriate depth below live organic material at which to collect samples.
- Determine whether to do a complete MMI™ survey.
- Establish the appropriate elements to use as a reduced MMI™-M package, or whether to do a complete package.

MMI™ ORIENTATION SURVEY DESIGN

The MMI™ Orientation Survey, consisting of a single transect, must be done over a known exploration target such as an identified mineralized zone, structure, or geophysical anomaly. After this consideration is met, the following guidelines should be followed to ensure the proper design of your Orientation Survey:

- The survey spacing should be 15 – 25m generally and then reduced below 15m when directly over the mineralization target.
- Samples should be taken over the target's center and beyond to include the hanging footwalls or edges of the mineralized zone.
- Sampling must be extended at least 150m beyond the targets edges to capture the background levels of mobile metal ions.
- 25 sampling sites are required (at least 3 must be over the target) to ensure sufficient coverage to properly design an effective MMI™ survey for your exploration program.
- Each site must expose at least 40cm of soil profile.



The final, optimal distance between sample sites will be dictated by the type and size of mineral deposit being explored. For example, fault-hosted gold deposits will likely have closer sample spacing than a porphyry copper deposit.

SAMPLE COLLECTION PROCEDURES

SAMPLING DEPTH

Proper collection procedures are vital to the success of an MMI™ Orientation Survey. Four samples must be taken from each pit to obtain a broad cross section of data sufficient to capture the optimal sampling depth. First, the interface or depth to begin sampling must be located. Typically, this interface is defined by the top of the humified organic layer lying just below the stratum containing leaf litter and organic material with visible structure (i.e. decomposing leaves, bark, twigs and peat). Below this interface, four depths are marked out (0-10cm, 10-20cm, 20-30cm, and 30-40cm) and samples are carefully taken from each, beginning at the bottom and working upwards.

SAMPLING PROCEDURE, SIZE AND STORAGE

Ensure that samples are taken from the bottom to the top of the hole. This will minimize the contamination of lower samples with soil from higher in the profile. The profile's stratigraphy or pedogenic mineral horizons are of no concern, as they do not affect concentrations of mobile metal ions. Using a plastic or vinyl scoop, take a cross section of material from each layer, ensuring each sample contains 200-300g of soil and is placed in a snap-seal plastic bag (e.g. Ziploc). Samples are not dried or sieved, and no sample preparation is required other than ensuring the sample is not contaminated. Record landscape characteristics at each sample station, including moisture content, range in particle size, thickness, nature of organic/inorganic materials, colour, and contamination caused by human activity (anthropogenic contamination).

CLEANLINESS

MMI™ geochemistry measures metallic mobile ions in parts per billion or sub-parts per billion. At these concentrations contamination can easily overwhelm

metal ion counts and strict adherence to survey cleanliness is required to ensure accuracy and repeatability on your Orientation Survey. Cleanliness practices that must be followed during your MMI™ Orientation Survey include:

- Sampling equipment to be brushed clean and flushed with soil from the new sample site before digging to eliminate residue from previous samples.
- During sample collection and handling, no jewelry (watches, rings, bracelets, chains etc.) can be worn, as this can be a major source of contamination.
- Sampling pits must be excavated with "clean" shovels that are paint and rust free.
- Vertical pit surfaces must be scraped clean to remove any debris and potential contaminants.
- Sampling equipment must be made of plastic or vinyl only.

SUMMARY

Mining companies worldwide are now using the SGS MMI™ (Mobile Metal Ion) technique to find gold, base metal mineralization and kimberlites. MMI™ is a powerful geochemical exploration tool that is enabling companies to explore areas that have been previously too difficult for surface geochemistry.

An MMI™ Orientation Survey ensures your full MMI™ Geochemical Survey is properly designed to maximize its impact on your exploration program. MMI™ Orientation Survey geochemistry measures metallic mobile ions in parts per billion and requires proper methodology and attention to cleanliness to ensure accurate, repeatable data. When done properly, it will help to ensure the applicability and optimization of your full SGS MMI™ survey.

The Orientation Survey consists of a single transect over a known target, with dense site spacing and multiple samples collected from each sample pit. It will help to:

- Determine a site spacing that is sufficiently dense to identify mineralization.
- Identify which elements are fingerprinting the mineralized zone.
- Establish the appropriate depth below live organic material at which to collect samples.

Establish the appropriate elements to use as a reduced MMI™-M package, or whether to do a complete package.

The success of your MMI™ Orientation Survey depends on proper methodology that produces representative, uncontaminated samples. SGS represents the global benchmark for accuracy and integrity in analytical procedures. We will work with you to ensure your survey is performed to the level of excellence required to achieve optimum MMI™ results. Our consultants can advise you on details of specific orientation surveys or data interpretation.



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SGS

WHEN YOU NEED TO BE SURE