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Drill Core Sampling and Analysis Protocols

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1. Introduction

This document describes the protocols applied by East Asia Minerals for the collection, sampling and analysis of diamond drill core. The senior management team and the project geologists are accountable to ensure this protocol is applied to the company's exploration projects.

The project geologist and manager are responsible for quality assurance and control of the sampling procedure, shipping of samples, chemical analyses (including selection of analytical method), verification of analyses, and security of the core and samples. Project geologists and managers must ensure there is complete hard copy documentation of all procedures and results at all stages of the project to provide a clear audit trail.

Standardized quality control procedures are implemented for all of East Asia Minerals' exploration programs. Although this document is for drill core only, the approach to quality control described in this document can be applied to rock samples, core, and soil/silt samples.

The quality control program consists of:

- The submission of blanks to monitor contamination and data accuracy.
- The submission of control samples of known metal concentration to monitor data accuracy.
- Acquisition of internal laboratory pulp replicate results to monitor analytical precision.
- Collection and review of all internal laboratory data for blanks and in-house control standards to monitor accuracy.
- The submission of reject replicates to monitor sample homogeneity and preparation procedures.
- The submission of pulps to a secondary laboratory (cross-checks) to verify analytical methodology, laboratory bias and data accuracy.
- Management and review of all quality control data.

The project manager assigns responsibility for different procedures to specific individuals so that there is accountability for each step of the quality control program. Any changes/additions that must be made to the procedures and the date of the change must be recorded. Investment bankers, third party engineering firms, and other individuals from outside the company may request documentation of the sampling, sample preparation and quality control procedures used by East Asia Minerals.

Inclusion of quality control samples such as blanks, control standards and replicates will allow errors to be readily identified and correction measures implemented. It is envisioned that the procedures may be modified over time, however, this document provides the minimum protocols that will be applied by East Asia Minerals. Compliance with these protocols will be reported to senior management on a monthly basis.

2. Terms of Reference

The quality control protocols described in this document are designed to maintain a high level of confidence in analytical results for East Asia Minerals management and geologists, partners, regulatory authorities and the public domain.

Adequate mineralogical and metallurgical testing and geotechnical measurements also need to be introduced at specific stages to identify negative economic consequences early in the exploration process. The additional objective of this protocol is to characterize potential ores early in the process. The results are to be carried to the advanced metallurgical testing stage with the clear identification of potential negative impacts of deleterious elements and complex mineralogy early in the process.

The components of a quality control program will vary according to commodities, deposit type and location. Quality control items will increase as a project advances and the financial risks associated with the project increase. This protocol is governed by three stages that reflect increasing success from grassroots through to feasibility. Each stage represents the progression of quality controls and implementation of metallurgical, mineralogical, and rock physical property measurements (e.g. RQD).

Grassroots Exploration Stage primarily involves drill testing geophysical, geological and/or surface geochemical targets. These projects may not encounter mineralization. In the absence of significant mineralization the focus then becomes identification of anomalous metal values and alteration patterns. For this, geochemical multi-element analysis may be used a less expensive alternative to assaying. Significant mineralization will automatically be assayed.

Quality control procedures are applied to develop a baseline confidence level with respect to chemical analyses. Control standards, blanks and replicates are submitted and monitored. The data is verified as each set of analyses is received. With increased success, grassroots projects evolve into stages requiring the addition of further quality controls as well as the initiation of metallurgical and geotechnical data collection.

Discovery Stage Projects represent a transitional stage triggered by the first discovery of potentially economic mineralization. It is directed towards additional quality controls, as well as the beginning of the characterization of a potential ore body.

The discovery of potential economic mineralization automatically implies that assay methods are to be used for all samples within a mineralized interval. Geochemical multi-element analysis can be used to characterize mineralization for elements other than precious and base metals with the objective of identifying deleterious components. Geochemical and assay analyses are not to be mixed in calculating the composite grade.

Replicate samples (pulp and coarse crush) are incorporated in the quality control procedure. Drill core duplicates are optional. Quality control data are verified upon return of each sample batch and monitored in a centralized database.

Characterization studies for deleterious elements, optical predictive metallurgical characterization studies, and geotechnical data collection are initiated.

Advanced Exploration and Evaluation Stage applies to projects that have advanced to resource delineation and definition. More robust quality control procedures are designed and implemented for the specific project. Control standards (multiple control samples specific to the style, type and grade of mineralization) and blanks are submitted with each sample batch. Quality control data are verified upon receipt. Pulp cross-checks and coarse crush replicates are submitted, and drill core duplicates remain optional. Crush and pulverization sizes are optimized.

Chemical analysis must be compared with metallurgical evaluations that may be run on individual holes, bulk samples composed of combined holes and/or large scale bulk samples. Analysis of deleterious elements is systematic so results can be incorporated in bulk composites. At this stage the objective is to characterize the deposit on the basis of geology, chemistry and metallurgy.

Conclusion

This manual is designed to define a rigorous set of quality assurance and control procedures for all of East Asia Minerals' exploration projects. Any additions to the recommended procedures must be documented and reasons provided for these deviations. Management approval is required.

In addition, the adaptation of this protocol will provide the basis on which opinions are developed during the evaluation of projects reviewed by East Asia Minerals.

3. Glossary of Terms

Analyses

A.A.S.: Atomic absorption spectroscopy is a single element, solution based technique. Geological samples must be dissolved prior to A.A.S. analysis. Sample solutions are compared against the quantity of light adsorbed for calibration solutions at a specific wavelength to determine elemental concentrations.

Accuracy: The degree to which an analysis, or the mean of a set of analyses, approaches the true concentration.

Assays: Assays are distinguished from geochemical analysis by being more precise and designed for higher-grade material. In general, assays are assumed to represent total metal. Assays are used to quantify metal contents for ore reserve definition. The precision of the method is dependent on the amount of sample used, the digestion (or fusion) technique used to dissolve the sample, dilution procedures, spectral interference and optimization of the instrumentation for specific grade ranges.

Deleterious Elements: Smelters will reduce payments for concentrates if there are elements present that negatively impact metal recovery or create environmental concern.

Fire Assay: Fire assay is a traditional assay method for precious metals, specifically gold, silver, platinum and palladium. There are four steps consisting of fusion, cupellation, parting and weighing of the precious metal bead. A gravimetric finish includes weighing of the precious metal bead. To achieve lower detection limits and to determine platinum and palladium, the bead is dissolved and the solution analyzed by A.A.S. The traditional fire assay method includes collection of the precious metals by lead during the fusion. A nickel sulphide fusion can be used for collection and determination of the entire suite of platinum group elements but the procedure generally costs many times more than the standard lead collection procedure.

Geochemical Analyses: Geochemical analyses generally cost less than assays. The laboratory uses partial digestions and lower sample weights for geochemical analyses than for assays. In general, geochemical analyses are less precise than assays and have a lower upper detection limit. Geochemical analyses often provide multi-element data and compromises are made in order to report a wide range of elements.

I.C.P.-O.E.S.: Inductively coupled plasma - optical emission spectroscopy is most often used as a multi-element, solution based technique. Quantification is achieved with reference to multi-element aqueous solutions. Matrix effects can be more significant than for A.A.S. determinations but mathematical corrections can be applied to correct for interference and spectral overlap. I.C.P. has a greater dynamic range than A.A.S. meaning that a broader range of concentrations can be determined without requiring dilutions or calibration changes for higher concentration samples.

I.C.P.-M.S.: Inductively coupled plasma - mass spectrometry is a multi-element, solution based technique. Mass spectra are measured, as opposed to emission spectra I.C.P.-O.E.S., which are less complicated so that there is less potential interference. I.C.P.-M.S. is primarily used for the determination of rare earth elements, low-level elemental concentrations (in the ppb-range) and some isotopes.

MIBK (or DIBK)-A.A.S.: An analytical procedure used in some regions to determine gold. A 10 to 20 gram sample is digested in aqua regia and the digest solution is extracted. The digest solution is then shaken with an organic solvent (methyl isobutyl ketone or an alternative) and the gold is extracted into the organic solvent. The organic solvent is then analyzed for gold using an instrumental method such as A.A.S. The method is usually restricted to use with geochemical surface samples and may underestimate gold content.

Precision: Precision is the difference or range of differences between similar estimates or measurements.

Quality Control

Blanks: A material with negligible metal values that is used to monitor contamination during sample preparation or analysis.

Certified Reference Materials (CRM): Certified reference materials (CRM) are a special classification of control samples that are high quality materials. CRMs have been subjected to rigorous international testing and are seeing wider use in exploration and development programs. However, they are typically used in routine testing to develop analytical methods and calibrate equipment.

Coarse Crush Reject: In most circumstances, an entire drill core interval or rock sample is crushed. The crushed material is referred to as the coarse crush. A sub-sample is usually removed for pulverizing. Any coarse crush material remaining is referred to as the coarse crush reject.

Control Samples: Control samples are materials of a known metal concentration, which are usually fine-grained and homogeneous. Control samples, controls or standard reference materials (SRM) are used to monitor the accuracy of laboratory results. Control samples can be prepared from project materials and recommended values are determined from a process of submitting sub-samples to various laboratories to measure the homogeneity and metal content. (a round robin). Alternatively, these materials can be purchased. Certified reference materials (CRM) are a special classification of control samples that are high quality materials that have been subjected to rigorous international testing (see CRMs).

Drill Core Duplicate: The second half of the drill core may be submitted for preparation and analysis, and is referred to as a drill core duplicate.

Field Duplicates: A second sample collected at the same time, using the same sampling protocol as the primary sample, to measure sample representivity. Field duplicates are collected

for rock samples, stream sediments, soils and other sample media. A comparable procedure for drill core programs is submission of the second half of the drill core for analysis.

Primary Laboratory: The primary or principal laboratory where samples are originally submitted for analysis.

Primary Samples: The first sample collected at any stage of sample collection or sample preparation is arbitrarily referred to as the primary sample.

Pulp: A finely ground rock sample or fine fraction of a soil or stream sediment that is usually only a portion of the original sample collected. In most cases analysis is done on the pulp.

Pulp Replicate: A sample pulp may be analyzed a second time to measure analytical precision. A sub-sample is removed from the original pulp for analysis. Most commercial laboratories routinely perform pulp replicate determinations and these are also referred to as laboratory duplicates. Alternatively, the pulp may be submitted to a secondary laboratory for analysis, which is referred to as a cross-check analysis.

QA (Quality Assurance): Quality assurance has a broad definition outside the mining industry and has been defined as “All those planned or systematic actions necessary to provide adequate confidence that a product or service will satisfy given needs”.

QC (Quality Control): Quality control is one aspect of quality assurance. The difference between the two concepts is described as; “Assurance in the quality context is the relief of concern about the quality of a product. Sampling plans and audits, the quality control devices, are designed to supply part of this assurance”.

Reject Replicate: A second split of the reject may be submitted for pulverization and analysis, which is referred to as a reject replicate. The same preparation and analytical procedures are performed on the reject replicate as the primary sample.

Secondary Laboratory: A laboratory selected for analysis of a selection of sample pulps in order to check the accuracy or bias of the primary laboratory’s results.

Other Terms

Geotechnical Data: Rock property data and physical property measurements such as rock quality description (RQD), fracture frequency, hardness (mineralization, gangue and host rock), and alteration on fracture surfaces. As well these data may include analyses of the acid generating capability of waste rock, self-heating analyses (oxidation rates) of any sulphides present, magnetic susceptibility and radioactivity among others.

Predictive Metallurgical Analyses: Predictive metallurgical analyses allow for an early stage characterization of the metallurgy of significant mineralization with the objective of an early stage characterization of a potential ore body. Predictive metallurgy evolves into more advanced bulk and bench scale testing. Both stages rely on good sampling techniques, abundant sample

availability and importantly a uniform drill density and spacing that is representative of the variable nature of most deposits. Samples are subjected to optical, chemical, microprobe and, with increased sample availability, bench testing. Optical analyses investigate the mineralogical features (minerals present, oxides vs. sulphides, etc.) and textures (grain size, grain to grain relationships, intergrowths, etc.) including the nature of the gangue (hardness, etc.) and host rock (dilution). Chemical analyses determine the presence of potentially deleterious elements. In combination with the optical investigations, the microprobe analyses determine the distribution of these elements in the minerals present and will give a good indication of where, if at all, the deleterious elements will report. Bench testing subjects a larger quantity of material to the milling and recovery process.

4. Preparation and Analytical Procedures

Commercial laboratories offer a wide range of preparation and analytical methods. Cost and availability of services, and characteristics of the sample will determine the optimum methods for a project. Each sample submission must be accompanied by a request for analysis that specifies the specific analytical procedure, preparation, handling of pulp and crush rejects, and a request for all lab control standards and replicates associated with the sample batch.

4.1 Laboratory Selection

A laboratory is selected based on logistics, price, quality, and availability of services. A laboratory visit is recommended, where possible, to assess the laboratory's facilities

Some items to record when conducting a laboratory visit include (Smee, 1999):

1. Building Description.
2. Sample Receiving and Sorting: Workspace and work order entry system.
3. Sample Preparation: Workspace, cleanliness, drying facilities, equipment list and condition, dust control, reject storage, cleaning procedures, and preparation quality control procedures.
4. Fire Assay Facilities: Workspace, equipment list and condition, flux preparation, ventilation and safety, quality control procedures.
5. Sample Digestion/Fusion Preparation: Workspace, cleanliness, distilled water source, fume hood extraction, range of procedures.
6. Instrument Facilities: Equipment list, calibration standards and procedures.
7. Weighing Room: Workspace, equipment list, and maintenance.
8. Warehouse and Storage: Pulp and reject storage, organization.
9. Quality Control Methods: Description of in-house controls, frequency-of-use, pulp replicates, blanks, quality control management, quality control charts.
10. Reporting: Computer assisted data management (LIMS: laboratory information management systems), fax or email capabilities, reporting format, billing procedures.
11. Personnel: Number of employees, educational background, number of shifts.

A laboratory visit may also include submission of a series of control standards to test the laboratory's performance.

4.2 Laboratory Communication

It is preferable to negotiate a contract with a commercial laboratory that clearly defines the services required, reporting formats, quality control parameters, pricing, turnaround time and turnaround time penalties.

Laboratories can be asked to report:

1. Analyses of the second quartz chip sample (i.e. cleaner) to be passed through the preparation equipment prior to each batch of samples being prepared.

2. Results of prepared and analyzed samples from a second split of the coarse crush.
3. Laboratory or pulp replicate results.
4. Blank and control standard results.
5. Results of coarse crush particle size analysis performed by the laboratory to monitor sample preparation quality.
6. Results of participation in round robins.

4.3 Sample Preparation

4.3.1 Crushing

Samples are generally crushed to achieve at least 95% passing a –10 mesh (less than 2 mm) screen. A riffle splitter or rotary splitter is used to select a sub-sample for pulverizing. The amount of sample to be pulverized must be specified. Variations of crush size made be required on a project basis.

4.3.2 Pulverizing

Crushed material is recommended to be pulverized to achieve at least 90% passing a -200 mesh (75 microns) screen for typical samples.

Pulverizing may have to be customized for particular types of mineralization. Optimal particle size, for a particular style of mineralization, is determined by conducting studies of multiple splits of the coarse crush reject. Both the size of the sub-sample and the grinding time can be varied. The sample size and grind characteristics impact on equipment selection. The coarse crush replicates are used to determine whether appropriate sub-sample size and particle size have been achieved. In the event of excess variation these parameters must be changed.

The laboratory's procedures to clean pulverizer bowls between samples must be investigated. The use of silica sand cleaners after each sample is recommended to be specified in cases where samples are high in sulphides or clay content, to avoid sample cross-contamination.

4.4 Selecting Analytical Method - Geochemical or Assay

The request for analysis should include the method code or quotation number that will identify a specific analytical procedure. Analytical methods are selected to achieve acceptable precision for the anticipated grade range. Cost savings may be achieved by using multi-element techniques, however detection limits need to be carefully selected in order not to miss trace concentrations that may be key to further exploration targeting.

In general, assay determinations provide more precise data than geochemical determinations for sub-economic or economic ore grades. There is a continuum of procedures available that may not be clearly identified as being specifically assay or geochemical determinations.

It is recommended that laboratories be asked to specify potentially interfering elements, elements that are volatilized (i.e. lost) during digestion or fusion, and minerals that might not be dissolved by the procedure.

Specialized procedures may be required to characterize ore-grade samples, such as acid soluble techniques that preferentially dissolve copper present as oxides. The precision of these techniques is not typically the same quality of total metal assays but is used to assess ore resources and reserves.

Some of the technical issues to consider when selecting an analytical method are summarized in the following table.

Selecting an Analytical Method

Analytical Procedure	Geochemical Analysis	Assays
Sample Weight	0.2 – 0.5 g	0.25 – 1.0 g
Sample Dissolution	Selective extractions Aqua regia digestion	HCl+ HNO ₃ + HClO ₄ ± HF Alkaline fusion
Elements	Compromises used to achieve maximum number of reported elements	Optimized for single elements
Dilutions	Usually imprecise and performed in test tubes	Precise and performed in volumetric flasks
Upper Limit of Detection	Precision is poor at upper limits of detection	No upper limit of detection
Detection Limit	Generally less than 1 ppm or 0.01% for major elements	Usually 0.01% for base metals
Instrumentation	A.A.S., I.C.P.-O.E.S., I.C.P.-M.S., neutron activation	A.A.S., I.C.P.-O.E.S., XRF, fire assay
Specialized Methods	Includes analysis of water, biogeochemical samples, gases, MMI, Enzyme Leach, etc.	Colorimetry and gravimetric techniques may be used for high grade samples or concentrates

4.5 Analysis for Deleterious or Secondary Pay Elements

Secondary elements present within a mineral deposit may present problems in the recovery of minerals during the metallurgical process (deleterious elements). These may also impact the treatment of the tailings. Additionally, secondary elements may be present in sufficient quantities to positively impact the deposit economics (secondary pay elements). In both cases the presence of these elements may have a significant impact and must be researched early in the exploration process.

These elements may be present in the bulk rock sample in very low relative concentrations, sometimes below the detection limits of many analytical techniques. Under certain metallurgical conditions these elements are concentrated between six and ten times their bulk concentration.

For example, if selenium was solely present in the mineral sphalerite and its bulk concentration in the core sample was 0.02%, it could be concentrated up to six times in the sphalerite concentrate where its concentration would be 0.12%. This would represent significant added costs through recovery problems and treatment charges.

The elements listed below are an example of the deleterious tolerance limits in a generic sphalerite (zinc) concentrate. The concentrations indicated are simply guidelines because different zinc plants have different tolerances for specific. Similarly, plants processing copper concentrates may have other tolerances.

The purpose of this list is moreover to be used to identify potentially deleterious elements in ores. Once identified, a program is formalized to determine if those elements will be present in concentrates at levels that cause difficulty. The final assessment of a potential problem must be made through discussions with metallurgists.

The concentrations quoted in the table below are for concentrates. It is necessary to approximate the corresponding concentrations in rock samples.

Table of Deleterious Elements

Element	Symbol	Concentration in Sphalerite (Zinc) Concentrates (%)
Arsenic	As	<0.30
Antimony	Sb	<0.20
Cadmium	Cd	<0.60
Calcium	Ca	<1.0
Carbon	C	<0.30
Chlorine	Cl	<0.10
Chromium	Cr	<0.10
Cobalt	Co	<0.030
Copper	Cu	<2.0
Fluorine	F	<0.30
Indium	In	<0.050
Iron	Fe	<14.0
Germanium*	Ge	<0.030
Lead	Pb	<3.0
Magnesium	Mg	<2.0
Manganese	Mn	<1.0
Mercury	Hg	<0.040
Molybdenum	Mo	<0.060
Nickel	Ni	<0.0080
Selenium	Se	<0.04
Silicon	Si	<2.0
Sulphur	S	28 - 36

Tellurium	Te	<0.005
Thallium	Tl	<0.0050
Tin	Sn	<0.50
Uranium	U	not available
Vanadium	V	<0.010

*Germanium is an example of a secondary pay element where additional credit may be payable by the smelter if included when contracts are negotiated.

There is a wide variation in the possibilities for the occurrence of deleterious or potential secondary pay elements in the minerals being processed to a final product. These elements may in fact be present only in waste minerals and would therefore report to the tails. As such the presence of a deleterious element in the bulk chemical analyses may have no effect on the recovery of a desired element. It is however important to know what is reporting to the tails for treatment and environmental reasons. Optical mineralogical and microprobe analyses will determine in what minerals potentially deleterious or secondary pay elements occur.

4.6 Documentation

A brief description of the method used is included in a project report and a detailed description included in appendices. Where possible, methods should be specified using the method codes. Most laboratories will supply detailed method descriptions if requested or they may be available from some laboratories' web sites. Documentation will be specific to each project.

It may be necessary to change procedures during the course of a drilling program. The reasons for these changes and which samples are affected must be documented.

5. Quality Control at the Sampling Stage

Quality control starts at the planning stages of a drill program. The project geologist must acquire suitable materials to be used as blanks and control standards prior to the commencement of drilling. A procedure must be in place for the submission of these materials with samples to the laboratory.

This section describes the use of blanks and control standards. Additional quality control procedures including cross-check analyses on pulps, analysis of coarse crush reject replicates, and the use of drill core duplicates is described in Section 12. The procedures described in this section assume that split drill core is shipped off-site for both sample preparation and analysis.

5.1 Blanks

5.1.1 Preparation of Blanks

Blank material is submitted with samples to the laboratory to monitor contamination caused when crushing or pulverizing equipment is not cleaned properly after mineralized samples are processed, or due to dust. It is also possible to identify sample mix-ups and other sources of contamination.

Suitable material consists of an unmineralized rock type (barren drill core). The rock type is preferably relatively hard so that the preparation equipment is thoroughly scoured.

Laboratories are also expected to analyze barren quartz chips or silica sand that is used to clean sample preparation equipment. Laboratories will routinely include analytical blanks in sample batches. The blanks described in this section are submitted without the knowledge of the laboratory and are designed to monitor contamination throughout both sample preparation and analysis.

Materials Required

Unmineralized quartzite or sandstone (for example)
20-litre pails

Procedure

1. A geologist locates a source of suitable material.
2. Determine how much material to collect by (a) dividing the total of number of samples by the frequency of blank insertion to determine the total number of blanks for the program and (b) multiplying by 2 kg (the approximate weight of material submitted).
3. Store the blank material in pails so that it is ready for routine core sampling.
4. Record a description of the material and its origin.

5. Submit five 200-500 gm sub-samples of the blank material to the primary laboratory to confirm low metal values.
6. Blank material is not processed in advance of its insertion into sample batches. Individual pieces of rock should be no larger than 10 centimetres by 10 centimetres so that they are small enough to pass the hopper of the crusher.

5.1.2 Insertion of Blanks

A blank sample is inserted routinely into sample batches. When the sample is analyzed, the reported analytical values should be near the detection limit of the method. If the reported values are higher than expected, contamination of the samples during crushing, pulverizing or analysis may have occurred.

Sample preparation procedures would then be reviewed to isolate the cause of contamination and corrective action would be taken.

Materials Required

Sample bags
Sample tags
Blank material

Procedure

1. As example, samples are assigned sample numbers ending in “15”, “50” and “85”, or three sample numbers are chosen at random from each series of 100 sample numbers. The insertion of blanks randomly is a more robust test of the laboratory.
2. Prior to moving samples to a sample preparation facility, coarse blank samples are added as follows:
 - a) label a plastic sample bag with the sample tag ending in the number “15”, “50” or “85”, or the pre-selected random number.
 - b) insert the sample tag in the sample bag.
 - c) add an amount of coarse blank material to the bag that is similar to that submitted for samples.
3. Sort all samples into consecutive numerical order. Submit the blank sample to the sample preparation facility with the samples.

Note: Plastic bags can be filled with blank material in advance, then labeled and the sample tag added when preparing samples for shipment. Where possible, barren drill core is submitted so that the laboratory cannot recognize the blank material.

5.2 Control Standards

5.2.1 Purchase or Preparation of Control Standards

In different circumstances it may be appropriate to purchase control standards or prepare control standards from materials on the property.

Purchased Control Standards

Purchased control standards fall into two main categories: a) certified reference materials (CRM) and b) control samples. Certified reference materials are available for a wide range of elements and different matrices. The “1994 Compilation of Working Values and Sample Descriptions for 383 Geostandards” (Geostandards Newsletter, Vol. 18, July 1994) includes a listing of many of the materials which are mostly available from the geological surveys of different countries. Canadian CANMET standards are an example of available CRMs. CRMs are meant to be used for the development of analytical methods and calibration of laboratory equipment, and are generally too expensive to use on a routine basis for the quality control programs of an exploration campaign, which assay thousands of samples.

A variety of reference materials are also available, with most suppliers based in Australia. One such supplier, Geostats, has an extensive number of gold and base metals standards, which are significant less costly than CRMs.

Control samples (reference material) have not been treated to the same rigorous international analytical round robins as the CRMs. However, the Geostats reference materials have been analyzed at significant number of different laboratories and recommended values are determined using statistical procedures in accordance with ISO9000 guidelines. Other suppliers offer similar materials thus broadening the availability of materials with appropriate metal concentrations and matrices.

Assuming that samples are being submitted for gold assay, it is necessary to include a minimum of 75 grams of reference material. For example, if one sample in 50 is a control standard, one kilogram of reference material will be used with the submission of approximately 650 samples.

If samples are being submitted for only base metal analysis, it is necessary to submit only 5 grams of the reference material. Thus one kilogram of reference material could be used for the submission of almost 10,000 samples. This translates into a cost of a few cents per sample if reference materials are purchased.

It is important to carefully review the care and storage instructions for purchased control standards. In some cases, control standards must be stored under nitrogen or may have a specified shelf life.

Early stage discoveries will undoubtedly have to rely on purchased control standards, as there is likely to be insufficient material to prepare control standards from project material.

The Advantage of Control Standards Prepared from Project Materials

The principal drawback for the use of purchased control standards is that the mineralogy of the reference material may not match that of the samples. It is preferable in many circumstances to prepare control standards from locally available materials. This is particularly important for gold projects where the flux used for the fire assay may have to be adjusted according to concentration of sulphides, oxides, carbon, etc. Similarly, for copper-oxide, nickel-laterite and other projects, where a variety of specialized digestions are used to predict metal recovery, it is important to monitor the effectiveness of the digestions based on reference materials built from sub-economic and economic ores.

A series of control standards at different grade ranges is required and possibly materials with different characteristics. Where necessary, control standards are recommended to be prepared that are representative of different ore types. As example, East Asia Minerals considers both oxide and sulphide mineralization. Ore types should not be mixed when selecting materials for control standards. It may be possible to use control standards prepared for other projects in the same region.

A total of 3 to 5 control standards are recommended. These control standards can usually be developed from drill core, outcrop or other sources. They must be carefully prepared, well homogenized, split and then submitted to 5 to 6 laboratories to determine the range of acceptable values.

Samples rich in sulphides require special handling. The oxidation of these materials may alter the analytical results, particularly using hydrochloric and nitric acids for the determination of base metals. It is preferable to store these materials in vacuum-sealed bags in a nitrogen environment to maintain the stability of the sulphides. Control standards developed for a specific project must be strictly monitored with respect to a reasonable shelf life and/or the effects of oxidation or degradation over time.

Limitations of Using Control Standards Prepared from Project Materials

Once the material for the control standards is received at a laboratory it is likely to take 4 to 6 weeks to complete the preparation and analytical stages. An approximate cost to prepare 5 kilograms of control standard is in the order of \$2500 to \$3500 depending on the number of variables being determined. Most of the costs are related to submission of the material for determination of acceptable values and measurement of homogeneity. This becomes a significant expense and the time delay is not always manageable.

It can be particularly difficult to prepare a homogeneous control standard with respect to gold or other metals that are distributed as nuggets or discrete grains. The insertion of control standards where metal concentrations cannot be anticipated reduces the effectiveness of a quality control program. It may be preferable to use purchased control standards in such cases.

Since it is expensive to prepare control standards, a relatively few number of different materials are generated. Unfortunately, some laboratories will learn to anticipate the location and grade of the control standards and perhaps submit only acceptable results. In order to monitor a

laboratory effectively, it is advantageous to occasionally submit commercial control standards that are available in a wide range of concentrations.

5.2.2 Insertion of Control Standards

Summary

This procedure deals with the insertion of control standards or purchased reference materials to monitor laboratory performance.

Materials Required

Fully prepared (crushed, pulverized, homogeneous and certified) control standards
Small sample bags (approximately 10 x 16 cm)
Sample log (see Note below)

Procedure

1. Regularly spaced sample numbers are used for control standards. The number of control standards should reflect the size of the analytical batch used by the laboratory, which may be in the order of 20 samples for gold fire assay and 40 samples for routine geochemical analysis. For some projects, it may be preferable to randomly insert control standards. This requires detailed record keeping and careful organization.
2. Bags labeled with these numbers are filled with 5 grams of one of the control standards and the sample tag is inserted in the bag. Approximately 75 grams is suitable to be submitted if gold fire assays are requested. Care must be taken to ensure that control standards are not contaminated when handled and, if necessary, packets of the control standards should be prepared by suppliers or in a laboratory environment.
3. Record which control standard was put in each bag in the sample log or sample cards.
4. Control standards are inserted in numerical order with the samples prior to shipping. Ensure that the laboratory analyses the samples in numerical order. In some situations control standards may be inserted after samples have been pulverized but East Asia Minerals personnel should supervise insertion of control standards and descriptions of the procedures included quality control reports.
5. The control standards are used on a rotational basis, i.e. the same control standard is not inserted consecutively.

5.3 Sample Log

The internal sample log records a minimum of the following information:

- the sample number,

- drill hole number,
- meterage/footage,
- sample shipment number or batch number,
- the date samples were shipped,
- the date results were reported and/or laboratory certificate number,
- sample numbers assigned for blanks,
- sample numbers assigned for control standards and which control standard was inserted,
- sample numbers assigned for drill core duplicates, if used.

The following is an example of a sample log.

Example of a Sample Log

Sample Number	Hole-ID	From	To	Shipment	Shipped	Date Rec'd/ Cert #
1001	DH-06	100	101	33BH	Oct.3	Oct.12 A990343
1002	DH-06	101	103.4			
1003	DH-06	103.4	104.87			
1004	DH-06	104.87	105.5			
1005	DH-06	105.5	107			
1006	DH-06	BLANK				
1007	DH-06	107	108			
1008	DH-06	108	110			
1009	DH-06	110	111			
1010	DH-06	113	113.5			
1011	DH-06	113.5	114			
1012	DH-06	114	115.23			
1013	DH-06	115.23	115.9			
1014	DH-06	115.9	116.8			
1015	DH-06	Control	STD05 BM&S			
1016	DH-06	116.8	117.33			
1017	DH-06	117.33	118.75			

6. Staged Exploration Procedures

The staged exploration, discovery, and advanced exploration and evaluation process is governed by an evolution reflecting increased success, sample availability, and capital risk. While the Grassroots Stage encompasses accepted baseline QA/QC practices, the Discovery and Advanced Exploration and Evaluation Stages reflect the addition of complimentary QA/QC procedures, metallurgical testing and analysis for deleterious (and pay) elements.

6.1 Grassroots Stage Projects

Grassroots Stage projects typically involve drill testing geophysical, geological and/or surface geochemical targets. These projects may not encounter mineralization. In the absence of significant mineralization the focus then becomes identification of anomalous metal values and alteration patterns.

Generally, geochemical multi-element ICP analysis is acceptable for Grassroots Stage projects to evaluate the metal content of zones of interest. The analytical technique may vary on a project basis. Potential economically significant intersections will automatically move the project to more mature stages.

One control standard and one blank sample are submitted with each sample batch with a minimum of one each per every 30 samples. Coarse reject replicates and drill core duplicates are optional. Cross-check analysis of pulps at a secondary laboratory is recommended (and conducted by East Asia Minerals) for 5% of mineralized samples. Quality control results are verified upon receipt of analysis and the lab contacted immediately upon any quality failure.

Under the Grassroots Stage and specific to ICP analyses and geochemical analysis for gold, the following guidelines are recommended.

- Samples with reported base metal results greater than 10,000 ppm and silver values greater than 10 ppm are automatically assayed.
- Samples analyzed for gold using a geochemical analysis (MIBK-A.A.S. or fire assay with an instrumental finish) that report gold values greater than 1000 ppb are automatically fire assayed using a gravimetric finish.
- Intervals selected for assay, based on the above criteria, shall include lower grade samples on each end of the interval so that the “cut-off” grade for the mineralized interval is determined using the same analytical method.

6.2 Discovery Stage Projects

Discovery Stage projects represent a transitional phase that is initiated by the discovery of potentially economic mineralization. It is directed towards additional quality controls, as well as the beginning of the characterization of a potential ore body. At this stage there is usually limited sample availability.

The discovery of potential economic mineralization automatically implies that assay methods are to be used for all samples within a mineralized interval. It is very important not to combine geochemical analyses for low grade or barren samples with assays when calculating the grade and width of mineralized intervals.

One control standard and one blank sample are submitted with each sample batch with a minimum of one each per every 30 samples.

Samples are selected for coarse crush (reject) replicates to represent the range of grade and texture. At least 5% of the mineralized interval(s) samples are re-submitted to the primary lab. Drill core duplicates are optional.

Cross-check analyses of pulps at a secondary laboratory are recommended (and conducted by East Asia Minerals) for 5% of mineralized samples.

Quality control results are verified immediately upon receipt of analyses and the laboratory is contacted immediately upon failure at any point.

Geochemical multi-element analysis can be used for initial characterization of the chemistry of the mineralization for elements other than base and precious metals with the objective of identifying deleterious elements. Alternative analytical methods, sometimes with lower detection limits or use of strong acid digestions may be required to determine the absolute concentration of deleterious elements and must be employed early in the process.

Under Discovery Stage projects the following guidelines are recommended.

- Complete multi-element (deleterious) chemical characterization analyses on individual representative samples. If practical, characterize all samples that comprise composite.
- As an indication of a potential resource develops, initiate optical predictive metallurgical characterization and compare results with chemical analyses.
- Microprobe work can compliment this type of study by locating host minerals of deleterious elements.
- Begin collection of geotechnical data.

6.3 Advanced Exploration and Evaluation Stage Projects

This stage applies to projects that have advanced to resource delineation and definition. Chemical analyses lead to and compliment metallurgical evaluations that may be run on individual holes, bulk samples composed of combined holes, and/or large-scale bulk samples.

The objective is to characterize the deposit chemically and metallurgically to have a confident and comprehensive understanding of the deposit prior to capital expenditures. The approach must reflect the fact that mineral deposits are not generally homogeneous and that advanced economic models need to reflect variances in metallurgy.

One control standard and one blank sample are submitted with each sample batch with a minimum of one each per every 30 samples. It is required that the laboratory be consulted for the size of the analytical batch.

Samples are selected for coarse crush (reject) replicates to represent the range of grade and texture. At least 5% of all samples are re-submitted. Drill core duplicates are optional.

Cross-check analyses of pulps at a secondary laboratory are recommended (and conducted by East Asia Minerals) for 5% of all samples.

Samples are analyzed for deleterious elements until the deposit is reasonably characterized. Metallurgical analyses will provide a further check on analytical results and deleterious elemental concentrations.

Under Advanced Exploration and Evaluation Stage Projects the following guidelines are recommended.

- Assays to be used for all samples.
- The selection of deleterious elements may vary for different parts of an ore body and the analytical requests must reflect a detailed investigation to document these variations.
- Specified sample preparation protocols must be adhered to. Samples required for metallurgical testing may require different sample preparation procedures.
- Initiate systematic predictive metallurgy prior to advanced metallurgical analyses and compare results with chemistry. Microprobe work may compliment this type of study by locating host minerals of deleterious elements.
- Assays of metallurgical re-samples (either assays of reject or re-sampling of drill core) are compared immediately with initial results. Deleterious results from the metallurgical flow test are compared with geochemical data of the original samples.
- Initiate a statistical review of the spatial (hole to hole) variance of the assay data.

7. Procedures at the Drill and Drill Core Sampling

7.1 Communication with the Drill Company and Drill Crew

Success in collecting core samples requires good communication with the drill company and crew. East Asia Minerals' core sampling protocol is designed to collect quality core samples. This protocol is discussed with the drill companies prior to awarding a contract.

Geologists on site must communicate with and monitor the drill crew to ensure attention to acceptable practices is maintained at all times. This relates not only to the drilling and sampling, but also to health, safety and environmental issues. Prior to a drill program, materials that may interfere or contaminate the core must be identified and not used in the program.

7.2 Security

Core must be secured from outside inspection and interference, or accidental internal interference. The chain of custody must be strictly maintained during transportation, sample collection, shipping and preparation to avoid tampering or inappropriate release of privileged information. Assay results must be kept confidential and only released to those on a need to know basis. Public release of results will only be conducted through a news release approved by East Asia Minerals' board of directors. All project staff must be made aware of the need to maintain the confidentiality of assay and drill results.

7.3 Procedures at the Drill

- Core boxes are labeled, and arrows drawn so that the core is systematically laid in the box.
- The core box is placed away from any source of contamination.
- A wooden or plastic marker is placed in the core box after each run. The meterage/footage is written on the marker.
- Transfer of the core from the core barrel to the box should be done as carefully as possible. No core is allowed to fall onto the ground. Core is directly placed in the core box and a plastic mallet is used to loosen core in the core tube. Breakage of core will produce inaccurate geotechnical measurements.
- Photographs of the core at the drill site will be beneficial for geotechnical analyses. Often transportation may result in degradation of the core.
- Document intervals of ground core and immediately address inaccuracies in depth labeling in the core boxes. A rod count must be conducted immediately to accurately measure the depth of the hole (this is at the drill company's cost if poor attention to labeling is apparent).
- Rod counts should be done at each bit change as a matter of course.
- As soon as a core box is full, a lid is properly secured so that no accidents occur.
- Poor quality or broken core boxes must be discarded.

7.4 Transportation

Sample collection and transportation procedures vary considerably between projects. Differences are commonly related to access, climate, local infrastructure and region. Sample collection and transportation procedures must be documented and made available to the appropriate field staff. These procedures are recommended where applicable:

- Transportation of core from the drill site to the logging facility must be conducted in a manner to minimize or eliminate shifting of material in the core boxes.
- Transportation and storage of cut or split core must ensure that the remaining core does not shift excessively and that marked sample intervals remain intact.
- Appropriate measures must be taken to eliminate the possibility of sample tampering through proper chain of custody management.

7.5 Core Sampling

The project geologist is responsible for the handling of drill core at the core logging and sampling facility, as well as the sampling process. Accurate sample selection, collection and documentation are the responsibility of the geologist.

The health, safety and environmental aspects of core splitting and cutting must be enforced. This includes protection for the eyes, ears and hands, and where appropriate, additional protection such as washable or throwaway overalls may be required. Cuttings that are high in sulphides, and/or cutting oils must be disposed of properly.

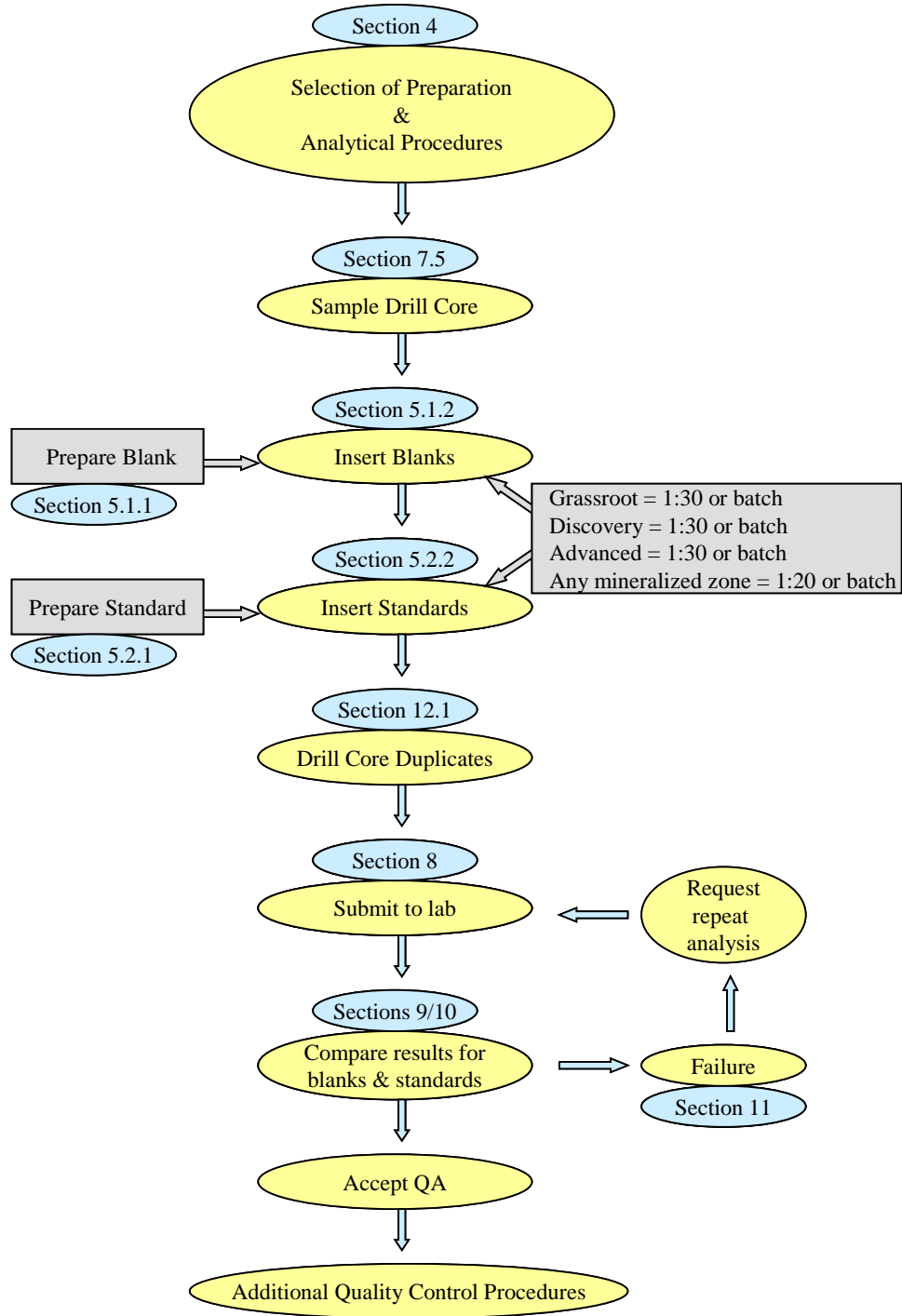
- Upon arrival, ensure core boxes are intact. Document all problems.
- Organize and open boxes with care.
- Measure depth intervals in each box and document any lost core or depth inaccuracies. Immediately report depth inaccuracies to the drill foreman and initiate a rod count.
- Tag boxes with metal (or other durable) tags listing hole name and the interval.
- Wash core where possible. Care should be taken with friable core or poorly bound mineralization (fractures, etc.).
- Geotechnical analyses for Discovery and Advanced Exploration and Evaluation Stage projects must be conducted before samples are selected. Photographs may be necessary. Physical property measurements can be conducted at the same time (i.e. magnetic susceptibility, conductivity).
- Align core to be sampled by matching broken pieces.
- The Project Geologist is responsible for selecting material and intervals to be sampled.
- Intervals are selected on the basis of mineralogy (e.g. oxide vs. hypogene, pyrite vs. pyrrhotite) and significant grade variations, textures (grain size, banded vs. massive, disseminated, stringer, folded intervals) and concentrations of specific minor minerals. Sample intervals must never cross geological boundaries and significant grade variations.
- Intervals should not exceed 2 meters for porphyry deposits in mineralized zones and 1 meter for massive sulphide deposits. Smaller intervals are often required for gold.

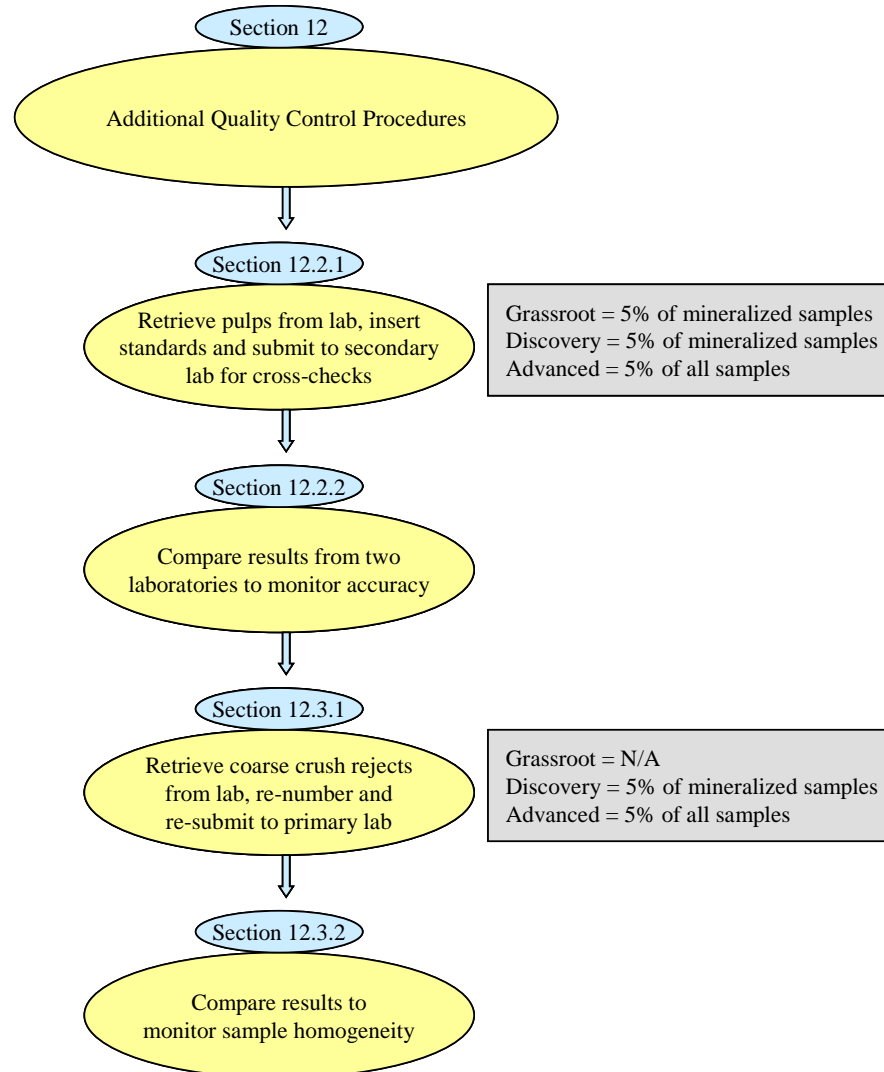
- Intervals should be marked with a grease pencil on the core, and a metal tag or other permanent tag fixed to the core box in case the pencil mark is lost in cutting/splitting.
- The geologist marks the core within each interval with a line down the middle of the core to guide cutting/splitting. In addition arrows pointing down core often help to ensure that the core is replaced in the box in the correct orientation. This line must be selected to reflect the best equal distribution of grade, mineralogy and texture in both halves of the core.
- A diamond saw should be used unless washing action, inherent in the sawing process, could degrade friable or highly fractured samples.
- After cutting, both halves are washed and placed back in the core box and again aligned. Care must be taken with this according to the nature of the core and mineralization.
- Dry the core to avoid oxidation of sulphides.
- Prior to collecting half core samples, the geologist reviews the sample intervals with the sampler. It is recommended that the same half of the core be systematically taken unless the best equal distribution of grade, mineralogy and texture cannot be made.
- Sample numbers to be used for quality control standards are not used for drill core samples.
- The sampler labels plastic bags with the appropriate sample numbers, saws the core along the marked line and places the drill core for the appropriate intervals in the sample bags. Every effort is made to select a representative sample of drill core having poor consistency.
- The designated geologist, sampler or quality control manager prepares the quality control standards to be included with the sample shipment and completes the sample log.

Conclusion

Exceptions to the above recommended procedures may apply to specific projects. The recommended procedures can be customized within the context of this document. Changes to the recommended procedures must be documented and reasons provided for these deviations. Senior management approval is required.

7.6 Sampling Procedure Flow Charts





8. Submission of Samples to Primary Laboratory

Summary

All of the work carried out collecting and preparing the sample will be wasted if the samples are lost in transit. Therefore, it is worthwhile taking special precautions to ensure that they reach their destination.

Depending on project specifics, strict protocol with respect to chain of custody may be required for transportation of samples. In some areas samples may need to be transported only in the custody of an East Asia Minerals employee who never leaves the samples unattended. If the sample preparation facility and analytical laboratories are at different sites, the packaging and transportation procedures of samples must be approved. The security of storage facilities, both on-site and at the laboratory must be critically reviewed.

It is also critical that the laboratory performs the same preparation and analytical procedures for the entire duration of the project. Instructions for the retention or disposal of pulps and rejects must be included with each sample batch or included in a laboratory contract.

Materials Required

Analytical Requisition Form

Sample log

Re-sealable sample pails, boxes or sacs

Procedure

1. Insert control standards and blanks per appropriate ratio, or per batch.
2. Pack samples tightly into pails, boxes or sacs in numerical order. The containers are numbered according to the order that they were used.
3. Complete the Analytical Requisition Form to indicate which samples are included in the shipment, when samples were shipped, the total number of samples in the shipment, and the analytical procedures. The laboratory should be advised when samples with high sulphide content or other special characteristics are in the shipment.
4. Enclose a copy of the Analytical Requisition Form in the first container. A second copy of the form is retained in the files. This form may be submitted in person with the samples where high security is an issue.
5. Fax a copy of the Analytical Requisition Form to the laboratory where possible.

9. Data Entry and Database Management

Sample locations and the insertion of quality control standards are recorded at the drill core handling site but must be transferred to a digital format following these guidelines:

- Data is entered or imported (digital) in a timely fashion. All digital data is to be followed by a hard copy that is verified and filed.
- All database records are backed-up regularly.
- Data entry is validated using software validation routines where available/practical, and also by manual comparison with the original documentation.
- Results for quality control standards must be verified prior to accepting data in the database.

10. Review of Preliminary Quality Control Data

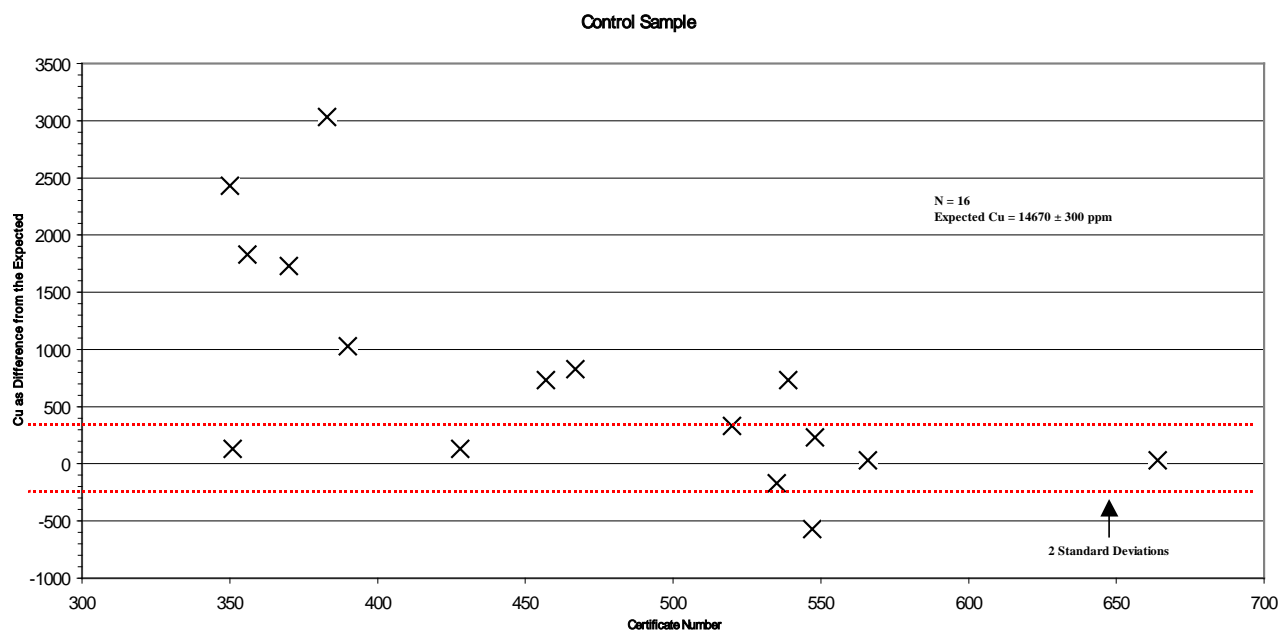
Summary

Results for control standards and blanks must be assessed as received. Data must not be transferred to a database until the results are verified. If the results for control standards and blanks are not deemed acceptable, immediate corrective action is required.

Discussion of the use of pulp replicates and coarse reject duplicates is continued in Section 12.

Control Charts

There are different methods to assess control data. A common method is the use of control charts to plot the results for the blank and each control standard (as follows).



The results for the blank and each control standard are extracted from the laboratory data manually or electronically. The results are sorted according to control standard.

The graph is constructed by plotting:

- the sample number, batch number or laboratory certificate number on the x-axis.
- the analytical value or the difference of the value from the expected value on the y-axis.
- the expected value.
- the acceptable range of expected values.
- the total number of determinations of the control standard or blank.

The data points should fall within the acceptable range of expected values. If data points fall outside these limits, it is first verified that the control standard or blank was recorded properly. If a laboratory error is suspected, repeat analyses are requested (Section 11).

For multi-element analyses, it may not be necessary to monitor each element. Several elements of particular economic or exploration significance can be selected.

Laboratories should report results for their internal control standards, analytical blanks and laboratory replicate analyses. This information is used to assess analytical precision and laboratory performance. However, it is preferable to base an evaluation of the laboratory's performance on the basis of hidden or blind quality control standards.

11. Quality Control Failure: Request for Repeat Analyses

If the results for blanks or control standards are outside acceptable limits it is necessary to determine the appropriate action. The following items should be checked prior to contacting the laboratory (this list is a guide-line only, and not exhaustive):

- If the values for blanks are unacceptably high, determine if the previous samples are high grade as this may explain sample carry-over in preparation or analysis. Further discussion with the laboratory is required to isolate the cause.
- If all the values for a control standard are outside the acceptable limits check that the control standard was recorded correctly.
- To determine if a sample mix-up is likely, review the data for several samples before and after the questionable quality control sample to see if any results are similar to the expected values. If a sample mix-up is identified, request re-analysis of the suspect samples.
- If the value for a control standard is nominally outside the acceptable limits and all other quality control data for the sample batch are acceptable, no further action is necessary.
- If the values for several quality control standards are similarly biased high or low, even though close to acceptable values, repeat analyses are requested for all the samples (and control standards) bracketed by the questionable control standard results.

If it is determined that there is no immediate explanation for unacceptable quality control results, the following guidelines apply:

- If a sample mix-up is suspected or there is no explanation for unacceptable quality control results, request re-analysis of sample pulps that incorporate the suspect quality control sample(s). Repeat analyses should be requested for approximately 10 samples before and 10 samples after the suspect quality control sample(s). It is preferable to request return of the pulps for the samples that are subsequently re-numbered and submitted with different quality control samples.
- If sample contamination is suspected based on poor results for the blank, request that a new pulp is prepared from the reject and re-analyzed. Sample cross-contamination is more likely at the pulverization stage than the crushing stage of sample preparation, but is also possible during analysis.
- When re-analyses are reported, compare these values against the original results. If results are similar no further action is required and it is acceptable to retain the original results in the database. The repeat analyses should be retained in a separate table.
- If repeat values are different than the original results, the laboratory must provide an explanation and state changes to their internal procedures that will prevent another occurrence. The original values are replaced with the corrected data.
- If quality control results are consistently unacceptable for a sample submission, the entire sample batch must be re-analyzed.

It is preferable to discuss the quality control requirements of a program with the contracted laboratory prior to the program. Most major laboratories will provide repeat analyses, based on a

quality control program, free of charge. A laboratory contract is a useful business tool, which can define the conditions under which repeats are free of charge or when charges may apply.

Invoices for analytical services should not be paid until quality control data has been verified and any necessary repeat analyses completed.

12. Additional Quality Control Procedures

12.1 Drill Core Duplicates

At the drilling stage the equivalent of field duplicates is the collection of the second half of the drill core for analysis. Drill core duplicates are recommended for Discovery, and Advanced Exploration and Evaluation Stage projects. Generally drill core duplicates are introduced for fewer than one in 100 samples and they should be carefully selected to represent different ore types, alternation styles and rock competency.

There is generally reluctance to submit the second half of the drill core for analysis. Removal of the second half of the drill core eliminates its use as a reference or library sample, and the intersection cannot be used for metallurgical studies.

The purpose of analyzing the second half of the drill core is to compare the result with that of the primary sample. This comparison will provide an understanding of variability introduced by selecting one half of the drill core versus the other. The study of drill core duplicates may lead to the conclusion that alternative drilling or sampling techniques are required, such as larger diameter drill core.

If drill core duplicates are not utilized, management must be provided with a clear explanation of the reasons why the procedure was not implemented. Approval is required.

12.2 Pulp Replicates

12.2.1 Submission of Pulp Replicates to the Secondary Laboratory

Pulps prepared at the primary laboratory are regularly submitted to a secondary laboratory for cross-checks. This procedure is generally used to verify the accuracy and analytical procedures of the primary laboratory. It is important to request that the same analytical procedures be used at both laboratories.

Inter-laboratory bias may account for differences between results for two laboratories, which influences the extent to which the accuracy of the primary laboratory can be tested.

Analytical Methods

In some circumstances, it is preferable to request check assays using different procedures. For example, there may be a logistical reason for using a local laboratory that does not offer x-ray fluorescence analysis but has used a supposedly total digestion. To determine if the total digestion is appropriate for the mineralogy of the samples, it may be preferable to submit samples to a secondary laboratory that offers x-ray fluorescence analysis that determines total metal values.

Sample Selection

Approximately 5 to 10% of the sample pulps should be submitted for cross-checks especially at the beginning of an Advanced Exploration and Evaluation Stage project. If the accuracy of the primary laboratory is confirmed (and other aspects of the quality control program are acceptable), it may be possible to reduce the number of checks to 2 to 5% of the total number of samples.

The optimum approach is to randomly select samples for cross-checks, or to select every 10th or 20th sample. It is useful to ensure that a selection of high-grade samples, typical of different types of ore, are also submitted for cross-checks.

Cross-checks are performed less often for a Discovery Stage project and may only be randomly performed for a Grassroots Stage project.

Sample Submission

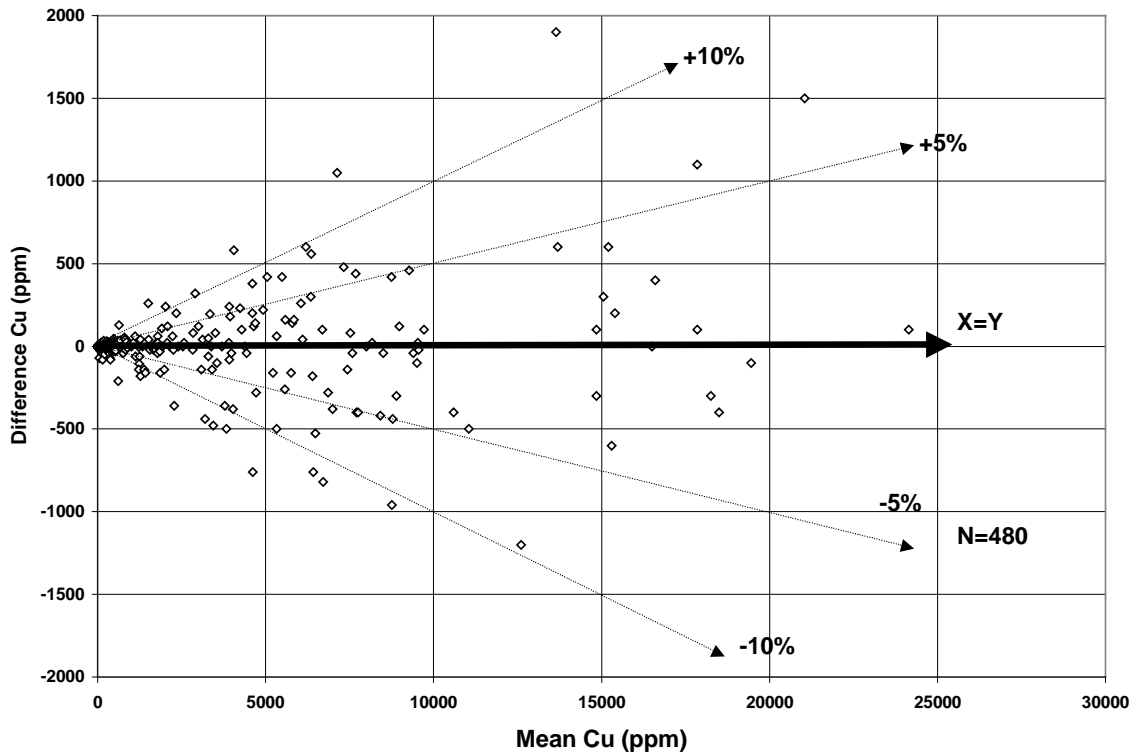
Control standards should be included with the submission of cross-checks to ensure that the secondary laboratory has performed properly.

12.2.2 Comparison of Results for Cross-Checks

When results from the secondary laboratory are reported it is necessary to systematically compare these results against the original results. Standard x-y graphs or log-log x-y plots can be used to quickly assess whether there are significant differences between the data sets.

Mean vs. the Difference Plot

It is possible to document more subtle variations in the data by using a “mean versus the difference plot”. In this case, the mean (or average) of two values is calculated as well as the difference between the two values. The mean is then plotted against the difference for each sample.



In the above figure, if the copper values from both laboratories were always exactly the same, all the points would lie along the horizontal $y = 0$ line. In this example it can be seen that most of the time the difference between two values is less than ± 500 ppm. This graph is particularly useful to graphically display data where there appears to be a bias, such that more points will appear below the $y = 0$ line than above the line (or vice versa).

The “precision envelopes” can also be drawn on this graph to show how many samples fall between $\pm 5\%$ and $\pm 10\%$.

The number of points above and below the $y = 0$ line can be counted or determined by sorting the data or creating a cumulative frequency graph. If a bias is suspected, the amount of the bias (and whether it is positive or negative) can be determined from the graph.

Similar graphs can be used to compare results for any two data sets including drill core duplicates, laboratory replicates, and reject replicates. Advanced users are recommended to use Thompson-Howarth (Howarth and Thompson, 1976) plots to estimate precision.

Corrective Action

If it is determined that a bias exists, it is necessary to determine what the cause of the bias might be and if the primary laboratory needs to take corrective action. Segregation of samples during transport, oxidation of samples, and different analytical methods should be considered as

possible explanations. In extreme cases it may be necessary to find an alternative primary laboratory if the secondary laboratory results are reliable. It is then necessary to determine if all the project samples need to be re-analyzed.

12.3 Reject Replicates

12.3.1 Submission of Reject Replicates for Check Analyses

Objective

A second split of the reject material (the –2 mm or –10 mesh left over crushed sample) is prepared in a similar manner to the original pulp. A second split is prepared in order to (a) measure sampling errors introduced by the selection of a split for pulverizing, (b) check for sample mix-ups in sample preparation, and (c) determine if sample preparation procedures should be changed to improve representivity of the analysis.

Sample Selection

Approximately 5 to 10% of the sample rejects should be submitted for replicate analysis at the beginning of a project for Advanced Exploration and Evaluation Stage projects. Rejects should be returned and re-numbered. In general, 30 replicate pairs should be accumulated prior to assessing the reproducibility of the results. If analytical reproducibility is determined to be adequate, the number of checks can be decreased to 1 to 2% of the total number of samples. The re-numbered rejects are returned to the primary laboratory for preparation and analysis so that methods are duplicated as closely as possible.

For Discovery Stage projects, less than 5% of the sample rejects can be submitted for replicate analysis. Replicate analysis is generally only carried out for a Grassroots Stage project if significant mineralization has been intersected.

The optimum approach is to randomly select samples.

Sample Submission

In many cases a laboratory crushes and pulverizes samples. Preparation of two splits at the same time is advantageous since the –2 mm material is probably relatively homogeneous after crushing. The disadvantage of requesting that two splits be prepared at the same time is that the second split is not submitted to the laboratory blind.

In some cases, particularly in remote locations, crushing but not pulverizing may be carried out on-site. Usually a split of the crushed material is prepared for shipment to a laboratory for pulverizing and analysis. In this case, a second split of the crushed material should be prepared for submission to the laboratory, but numbered differently than the primary sample.

12.3.2 Comparison of Results for Reject Replicates

The graphs described in above Section 12.2.2 (Comparison of Results for Cross-Checks) can be used to compare results for replicates. The reproducibility of the results for the rejects is a reflection of:

- i) whether the material was crushed finely enough to achieve a representative split,
- ii) whether the size of the split to be pulverized was large enough to be representative,
- iii) whether the crushed material was pulverized sufficiently,
- iv) whether the sample selected from the pulp for analysis (usually 0.5-1.0 grams for base metals) was representative of the pulp,
- v) whether the analyses were accurate and precise.

The imprecision of all the steps in the preparation and analytical procedures is cumulative and reflected in the comparison of results for crusher replicates.

The reproducibility of results based on laboratory replicates (on the same pulp), cross-checks and control standards is expected to be better than the reproducibility of results based on rejects.

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