

ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES



Working Effectively with the Mineral Analysis Laboratory

*Right solutions....
....Right partner*

The Lab is Part of the Team

- **significant costs are involved in collecting geological samples for analysis**
- **significant decisions are made based on the data provided by mineral analysis laboratories.**
- **it is critical to work effectively with your laboratory and to consider the lab as part of your exploration team**



6 Recommendations

- **to help improve your experience when working with any mineral analysis laboratory**
- **to help improve your own due diligence**
- **to help ensure your expectations are met**
- **common sense but sometimes overlooked**



Communication

**For optimal project outcome,
communicate with your laboratory**

- **before the project starts**
- **during the project**
- **after the project**





Recommendation # 1

Understand & Verify Laboratory Statements Regarding

- Registration,**
- Certification &**
- Accreditation**



Statements from Relevant Regulations & Related Guidelines

- “Describe ... **whether the laboratories are certified** by any standards association and the particulars of any certification”
 - *NI 43-101 Technical Reports (NI 43-101F1)*
- “The **accreditation of each laboratory**, or lack thereof, **must also be disclosed.**”
 - *Disclosure Standards for Companies Engaged in Mineral Exploration, Development & Production, Toronto Stock Exchange*
- “**Analysis and testing of samples should be done by a reputable and preferably accredited laboratory** qualified for the particular material to be analyzed or tested.”
 - *Mineral Exploration Best Practices Guidelines, CIM, June 2000*



Misleading Information?

- NI 43-101 requires that a “qualified person” does not issue misleading information in news releases or technical reports
- Understand and verify laboratory statements involving the terms “registration”, “certification” & “accreditation” as part of your laboratory selection process and in disclosure of mineral projects



2 Types of Independent Verification

- **ISO 9001 Registration / Certification**

- proof that Quality Management System meets international best practices
- for specific scopes of activity & geographic locations
- DOES NOT evaluate the analytical capability of the lab



- **ISO 17025 Accreditation**

- proof of technical capability to perform specific tests
- 2 components
 - audit of analytical methods & technical capability (every 2 yrs)
 - analysis of proficiency test samples (every 6 months)
- for specific analysis methods & geographic locations





Recommendation # 2

Visit the Laboratory



Personal Visit to the Laboratory

- **Essential part of due diligence**
- **Tour the preparation, analysis, and sample storage areas**
- **Understand how samples are managed to minimize loss and mix-ups**
- **Trace final result back to original samples through audit trail**
- **Meet key contacts**
- **Observe cleanliness, organization, H&S, space & security**
- **Helps improve communication with the lab**





Recommendation # 3

**Choose Appropriate
Methods for
Preparation and Analysis**



Method Selection - Preparation

- **THE MOST CRITICAL STEP IN THE ANALYSIS PROCESS**
 - watch for organization and contamination control
- **Lab must produce a homogenous analytical subsample fully representative of the material submitted**
- **Several options available for**
 - **Rock / Core** - particle size & distribution, amount pulverized
 - **Soil / Sediment** – separate size fractions (sieve / screen) or pulverize
- **Discuss options with lab before submitting samples**



Sample Preparation – Quality Control

- **Prepared particle size monitoring**
 - to ensure required specification (geostatistical control) is met consistently
 - lab should provide proof
 - erratic crushed or pulverized particle size can lead to erratic analysis results
- **Project Specific or External QC Protocols**
 - frequency & type (crushed or pulverized) of prep duplicates
 - additional crusher or pulverizer cleaning
 - insertion of standards & blanks (in field or at lab)



Method Selection - Analysis



1. Decomposition



2. Analysis



Sample Decomposition - Options

- **Aqua Regia (partial) Digestion**
 - least expensive and good for initial investigation or looking for trends
 - may not provide full recovery of base metals
- **4 Acid (near-total) Digestion**
 - more expensive but dissolves most minerals
- **Fusion (total)**
 - best recovery for metals that don't dissolve well in acid like Rare Earth Elements (REEs)
- **Fire Assay Fusion** – precious metals
- **Recovery of specific elements by any decomposition method depends on the sample matrix & mineral form**

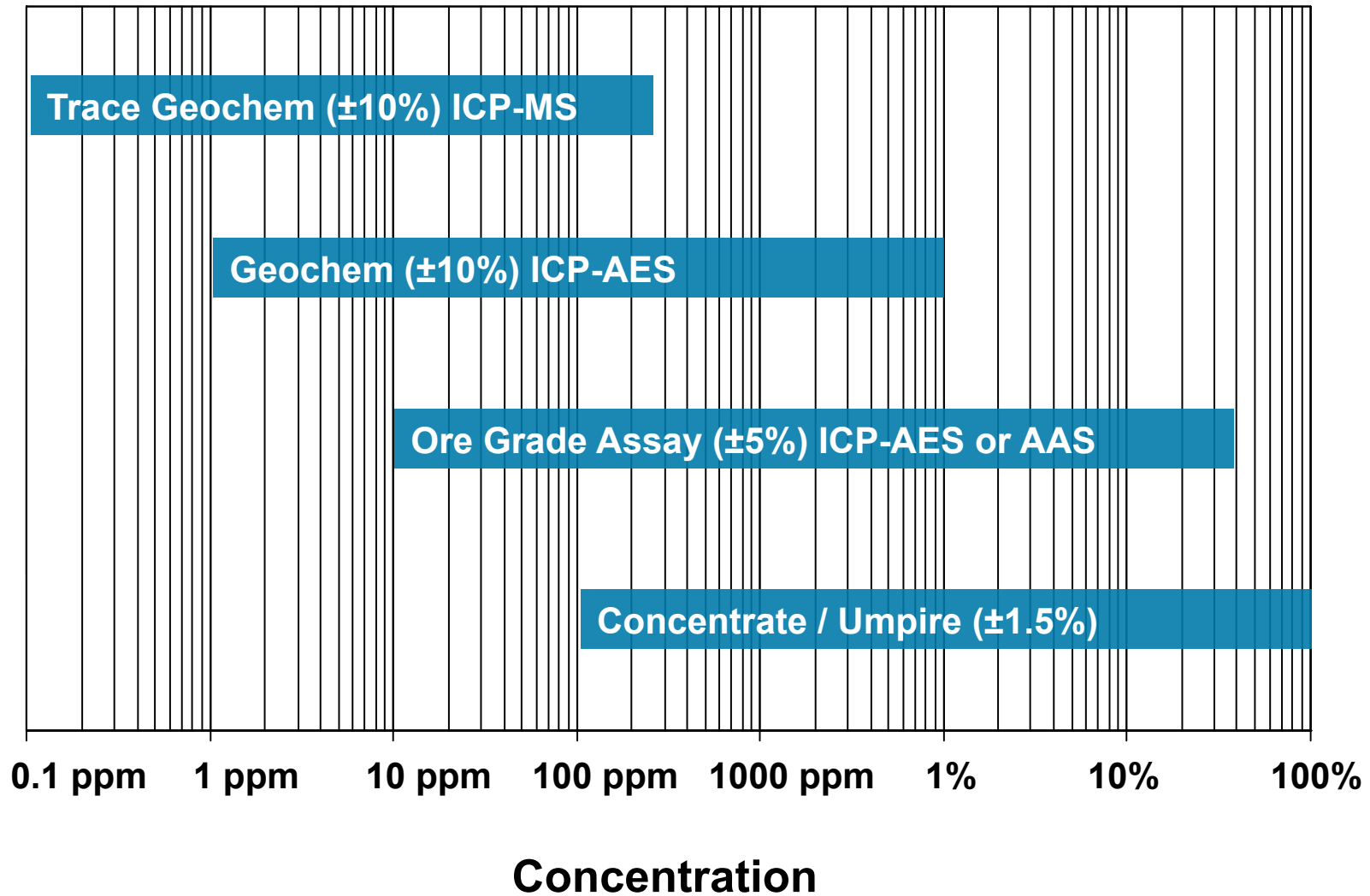


Sample Analysis - Considerations

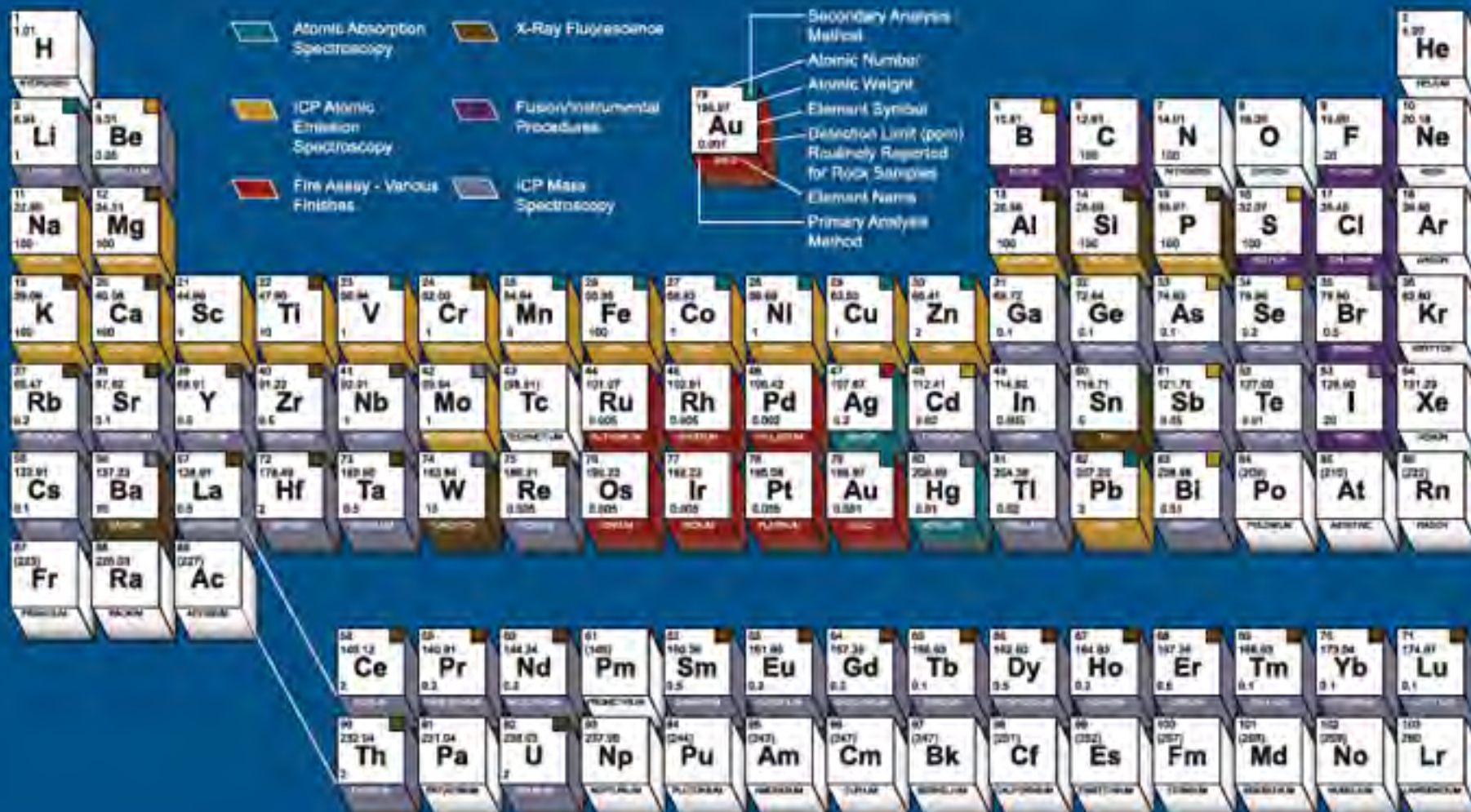
- **Elemental Coverage**
 - single or multi-element (future use of data)
- **Reliability**
 - Geochemical ~ +/-10% precision (grassroots)
 - Ore Grade ~ +/-5% precision (resource)
 - Umpire or Concentrate ~ +/-2% precision (trade)
- **Detection Limits (DL) and Upper Range**
 - Lower Limit of interest (DL should be 50x lower)
 - Expected Upper Limit
 - if concentration is too low or too high for the method results may be unreliable



Method Range for Copper



Preferred Methods of Analysis for Geological Materials



Method Selection - Summary

- All methods have limitations to some degree
- Discuss objectives with the lab before submitting samples to determine the most appropriate analysis methods
- Compare methods with a small set of duplicate samples
- The geologist is responsible for selecting methods suitable for the project – the lab can only provide suggestions





Recommendation # 4

**Submit Samples Securely
with Clear Identification &
Instructions**



Sample Packaging & Shipping



Sample Submission

- **Unclear identification & instructions will cause delays**
- **Use of Sample Submittal Form**
 - **Contact info**
 - Quote & PO #
 - Sample type – matrix & grade (trace or ore)
 - Sample ids & number
 - Analysis methods required – lab codes or description
 - Special instructions & RUSH requests
 - Data & invoice distribution and formats
 - Sample disposition – store, return, dispose
- **Identify any high grade or unusual samples**



Sample Submission - Suggestions

- **notify lab as soon as possible that samples are coming in so that resources can be allocated**
- **group and package samples in sequential order**
- **number multiple shipment containers**
- **clearly mark the bag or box that contains the submittal form and first samples**
- **also email sample submittal form or sample ids in digital form help minimize transcription errors**
- **Rush Analysis Requests**
 - Notify lab prior to shipping samples
 - Package RUSH samples separately from routine
 - Clearly mark **RUSH** on OUTSIDE of bag





Recommendation # 5

**Evaluate
Quality Control (QC) Data
in Real Time**



Data Evaluation

- **For a comprehensive understanding of the data you need to evaluate both**
 - your (external) QC results
 - the lab's (internal) QC results
- **You should question QC data that falls outside of acceptable ranges**
- **Evaluate the quality of each batch of data as it is received so modifications to the process can be made if necessary**
- **Work with the lab as part of your team to resolve any issues**





Recommendation # 6

Communicate Effectively With the Lab



Communication

- **2 way, timely, communication is critical to the success of any project**
- **Get to know your contacts at the lab**
 - Client Service Team
 - Quality Control Team
 - Management Team
- **Provide your contact options**
- **Feedback on service and data through the season – don't wait until it's too late**





Working Effectively with the Laboratory - Summary

- 1. Understand & verify lab statements regarding registration, certification & accreditation**
- 2. Visit the Laboratory**
- 3. Choose appropriate methods**
- 4. Submit samples securely with clear identification and instructions**
- 5. Evaluate QC data in real time**
- 6. Communicate effectively with the lab**

