CONCEPT

Mineral Exploration QA/QC: Sampling, Assay Quality Control and Database Validation

8 – 12 August 2027
Jeddah - Corniche four-star



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Introduction:

Mineral exploration QA/QC failures surface late and cost dearly: a drill programme reports high-grade intercepts, but missing blanks, drifting reference material results, poorly split duplicates and unchecked database tables leave the competent person unable to vouch for the assays, and resource estimates are downgraded or delayed. This Core Concept course trains exploration teams to design and run a QA/QC programme, from sampling protocols and chain of custody to control sample insertion, QC charting, laboratory audits and database checks. Participants produce an Exploration QA/QC Programme and QC Data Review for a case project.

Course Objectives:

- Quantify sampling error sources with Gy's sampling theory and set sample mass and interval rules for core and chip samples
- Write drill core and reverse circulation sampling, logging and chain of custody procedures that field crews can follow
- Design control sample insertion schemes of certified reference materials, blanks and duplicates for a drill programme
- Select and audit assay and umpire laboratories and specify sample preparation checks such as pulverising pass rates
- Analyse QC data with control charts and precision plots, apply failure rules and validate the drill-hole database
- Document the QA/QC programme and its results in the form public resource reporting codes expect from a competent person

Target Audience:

- Exploration geologists who plan drill programmes and supervise core and chip sampling
- Project geologists responsible for accepting assay batches before resource modelling starts
- Geological database managers who import laboratory results and maintain drill-hole tables
- Laboratory liaison staff who dispatch samples, track batches and resolve assay queries
- Resource geologists who depend on validated assays and must describe data quality in reports
- Core shed and field supervisors accountable for sample handling, storage and custody

Course Outline:

Day 1: Sampling Theory, Error Sources and QA/QC Programme Scope

- Gy's Sampling Theory: Fundamental Sampling Error, Particle Size and Sample Mass
- Sampling Error Taxonomy: Grouping and Segregation, Delimitation, Extraction and Preparation Errors
- Nugget Effect and Coarse Gold Behaviour in Sample Representativeness
- Quality Assurance Versus Quality Control: Roles of Geologist, Database Manager and Laboratory Liaison
- Current-State QA/QC Gap Assessment Using a Drill Programme Checklist

Day 2: Drill Core and Chip Sampling, Logging and Chain of Custody

- Diamond Core Cutting, Half-Core and Quarter-Core Intervals Against Geological Contacts
- Reverse Circulation Chip Sampling: Riffle and Cone Splitters, Recovery Weighing and Wet Sample Handling
- Geological Logging Codes, Core Photography and Recovery and RQD Recording
- Sample Numbering, Ticket Books, Bagging and Dispatch Sheets
- Chain of Custody Records: Secure Storage, Transport Seals and Laboratory Receipt Reconciliation

Day 3: Control Samples, Sample Preparation and Assay Laboratory Management

- Certified Reference Material Selection: Grade Range, Matrix Match and Certificate Uncertainty
- Field, Coarse and Pulp Blanks for Detecting Contamination and Sample Swaps
- Field, Coarse Reject and Pulp Duplicates: Insertion Rates and Placement Design
- Sample Preparation Protocol: Drying, Crushing, Pulverising Pass Rates and Sieve Tests
- Assay Laboratory Selection, Umpire Laboratory Checks and Laboratory Audit Checklist

Day 4: QC Charting, Failure Handling, Precision Statistics and Database Validation

- Reference Material Control Charts: Warning and Failure Limits, Bias Trends and Drift
- QC Failure Handling Rules: Batch Re-Assay Triggers, Investigation Log and Sign-Off
- Duplicate Precision Analysis: HARD and RPD Plots, Scatter and Quantile-Quantile Plots
- Drill-Hole Database Validation: Collar, Survey, Assay and Logging Table Integrity Checks
- QA/QC Disclosure Under Public Resource Reporting Codes and Competent Person Sign-Off

Day 5: Case Study: Exploration QA/QC Programme and QC Data Review

- Case Exploration Project Briefing: Deposit Style, Drilling Methods and Assay Batches
- Control Sample Insertion Plan Drafting for the Case Drill Programme
- QC Data Review of Case Batches: Reference Material, Blank and Duplicate Performance
- QA/QC Findings Register and Corrective Action Recommendations
- Exploration QA/QC Programme and QC Data Review Presentation and Peer Challenge

Skills You Will Gain:

- Sampling Error Assessment
- Core and Chip Sampling Protocols
- Chain of Custody Control
- Control Sample Insertion Design
- Assay Laboratory Auditing
- QC Chart Interpretation
- Duplicate Precision Analysis
- Drill-Hole Database Validation

Why Attend This Course:

- Leave with an Exploration QA/QC Programme and QC Data Review you can adapt to your own drill projects
- Spot contamination, sample swaps and laboratory bias early, before they reach the resource model
- Answer auditor and competent person questions on assay reliability with documented evidence
- Compare QA/QC practice with geologists working on gold, base metal, phosphate and industrial mineral projects

Conclusion:

Assays are only as trustworthy as the sampling, custody and control behind them. The week moves from sampling theory and error sources, through drill core and chip sampling, logging and chain of custody, to reference materials, blanks, duplicates, sample preparation and laboratory audits, then QC charting, failure handling, precision statistics, database validation and disclosure under reporting codes. The final day applies the method to a case project and closes with an Exploration QA/QC Programme and QC Data Review.