ALS Methods*
Au-SCR21
Au-SCR24
Au-SCR22AA

**Other options available*

Gold Screen Fire Assays

Understanding the process and the potential benefits for gold projects

Gold is found in many deposit styles, as disseminated fine-grained gold or as coarse gold; it can be visible to the naked eye or bound in minerals. These variations are the result of the prevailing physical and chemical conditions during deposit formation and can lead to significant variations in gold deportment. Due to these variations in ore, characterisation of gold mineralisation is an important step that should be carried out early in a project.

Improve knowledge of gold occurrence and distribution within your deposit

A well-designed screen fire assay program paired with robust geology and resource models can aid in determining the proportion and location of coarse gold within a deposit. This information can also aid in planning appropriate sampling programs, and feed into resource modelling to better understand the deposit's internal domains. Screen fire assay data can provide early indications of process methodology for gold exploration projects, such as an indication of the proportion of gravity recoverable gold present within a deposit; which in turn can impact a project's economics and potential development timescale.

Screen fire assays explained

Traditionally, fire assays are undertaken on a 30-50g aliquot of a pulverised sample. The key difference with a screen fire assay lies in the larger volume of sample (typically 1kg), and screening (usually to -106 micron) to separate coarse gold particles from fine material.

After screening, two aliquots of the fine fraction are analysed using the traditional fire assay method. The fine fraction is expected to be reasonably homogenous and well represented by the duplicate analyses. The entire coarse fraction is assayed to determine the contribution of the coarse gold.

To aid in distinguishing the proportion of coarse and fine gold within the sample the following results are included in a screen fire assay report:

- The results of both fine fraction assays, plus the mean of the results.
- The coarse fraction gold assay.
- Weights of both the fine and coarse fractions.
- A "total" gold calculation for the 1kg sample based on the weighted average of the coarse and fine fractions.

DETERMINATION	DESCRIPTION	RANGE
Au Total (+)(-) Combined	Total weight-averaged gold content in the 1kg sample.	0.05-1000 ppm
Au (+) Fraction	Gold content of plus fraction.	0.05-100000 ppm
Au (+) mg	Weight of gold in plus fraction.	0.001-1000 mg
Au (-) Fraction	Gold content of minus fraction. Reported as mean of two subsamples.	0.05-1000 ppm
Au-AA25/26*	Gold content of first minus fraction subsample.	0.05-100 ppm
Au-AA25D/26D*	Gold content of second minus fraction subsample.	0.05-100 ppm
WT. (+) Fraction Entire	Weight of plus fraction.	up to 1000 g
WT. (-) Fraction Entire	Weight of minus fraction.	**1000g

** Method codes depend on option chosen (eg: 30g subsample or 50g subsample)*
***Dependent on method chosen*

Total Au in the sample is calculated as below:

$$\text{AuTotal(g/t)} = \frac{(\text{Au-avg(g/t)} \times \text{Wt.Minus(g)} \times 10^{-6}\ \text{t/g}) + (\text{Weight Au in Plus(mg)} \times 10^{-3}\ \text{g/mg})}{(\text{Wt.Minus(g)} + \text{Wt.Plus(g)}) \times 10^{-6}\ \text{t/g}}$$

Where $\bar{\text{Au}}\text{avg} = \frac{\bar{\text{Au}}\ (1) + \bar{\text{Au}}\ (2)}{2}$

Fire assay explained

Fire assay has been used for centuries as a total decomposition technique to determine the amount of gold present within a sample. Homogenised and pulverised samples are mixed with flux composed of PbO and SiO_2 with variable amounts of borax, soda ash and other reagents. The flux and sample are mixed, then heated at high temperature (>1000°C) to decompose rock lattices and allow gold within the sample to be collected into a lead button. The button is placed in a porous cupel and heated again in an oxidising environment to convert lead to lead oxide that is absorbed into the cupel, leaving the precious metals behind as a doré bead or prill. The gold content of the prill is then determined either gravimetrically or spectroscopically.

Sampling and preparation

Coarse gold in a deposit creates sampling issues, and unless these are overcome, the sample that is submitted for assaying will not provide a representative and repeatable result no matter what assay technique is used. Therefore, both sampling and sample preparation techniques should be critically evaluated in the case of coarse gold deposits. Sample crushing and pulverising fineness, as well as the sample size, should be considered.

Alternatives to screen fire assays

If gold is present in multiple forms, such as free gold and sulphide hosted gold, a customised program which can include bulk leaching and fire assaying residual material can be designed for your project. Other approaches include requesting multiple fire assays on a single sample or assaying a sample to extinction.

METHOD CODE	DESCRIPTION
Au-SCR21	**1kg pulp** dry screened to **-106 microns**. Duplicate **30g** assay on undersize. Assay of entire oversize fraction **gravimetrically.**
Au-SCR24	**1kg pulp** dry screened to **-75 microns**. Duplicate **50g assay** on undersize. Assay of entire oversize fraction **gravimetrically.**
Au-SCR22AA	**1kg pulp dry or wet** screened to **-75 microns**. Duplicate **50g assays** on undersize. Assay of entire oversize fraction by **spectroscopy**.

** Note: Various options available for pulp and screen sizes, and undersize assays.*

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