Routine Round Robin Participation, a Central QA/QC Component

Florin Analytical Services

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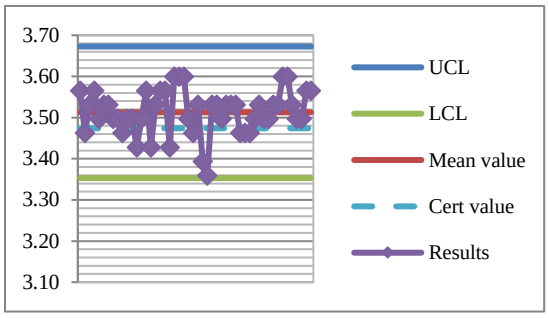


At Florin Analytical Services (FAS) our goal is to generate the highest quality assays of geologic, metallurgical materials and process solutions available. A key component of high quality analyses is extensive quality assurance and control (QA/QC). Components of the FAS quality assurance program include insertion of blanks, replicate, and appropriate Certified Reference Materials (CRM) with all samples processed in the laboratory. CRM's are obtained from Rocklabs, ORE Research & Exploration Pty. Ltd., Geostats Pty. Ltd., CANMET and NIST. An often over looked benefit of QA/QC samples is that they help insure that samples are processed in order. Blanks aid with the evaluation of possible contamination from either reagents or lab ware. Replicate samples provide a means to evaluate precision. Certified Reference Materials help with the assessment of method and instrument accuracy. Above is an example of a control chart, plotting Fire Assay with gravimetric finish results from September to December 2015 at FAS for Rocklab's HiSilK2 CRM. These are used internally by FAS to monitor and evaluate data quality.

Participation in Round Robin analyses, where samples are provided and evaluated by independent, external sources to several assay laboratories for analyses, are also an important part of the FAS quality assurance protocol. FAS participates in four Society of Mineral Analyst (SMA) and two Geostats Pty. Ltd Round Robins annually on geologic materials and carbon. FAS also participates in biannual ASTM bullion Round Robin determinations. Data from these Round Robins allow FAS to monitor how our analyses compare to other laboratories. To the right is an example of the type of statistical information provided by the SMA from the November 2016 Round Robin, Sample 2. A statistical summary of the analyses is present in table at the top. The distribution of the results from participants is present in the graph. Each lab is assigned a confidential symbol. In the graph the results for FAS are represented by the red circle. This data gives us valuable insight on how we performed for the particular samples submitted in the Round Robin. It allows us to see if our results fall in the 95% confidence limits and if our error is high or low. Over time, as results are accumulated, these data provide valuable insight into any systematic errors that are present in our assays.

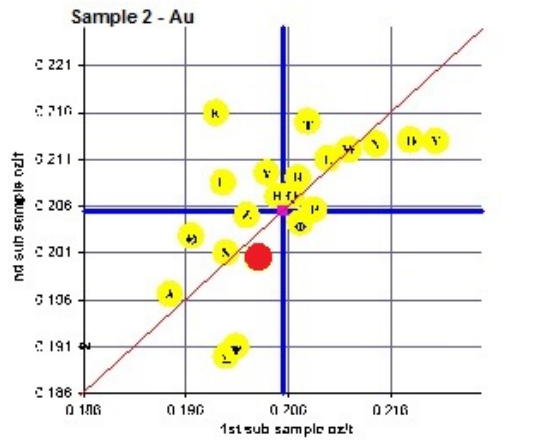
Statistical Details, Nov. 2016 Round Robin Sample Set

A total of 26 labs returned results for sample 2

Number of Assays Used (excluding outliers)		25
Average for Coeur Alaska Kensington Mine S2, excluding outliers:		0.2055
Median Value for this sample:		0.2065
Variance Between Samples within Labs		0.0000
Variance Between Labs (excluding outliers)		0.0001
Std Dev Between Labs (excluding outliers)		0.0099
Between Labs Coeff Varn		4.8%

1 Outliers, Lab IDs dropped = Δ
Criteria: remove if > ± 0.03 (3 Std Dev) off interlab average

95% Conf limits on average	+/-	0.004
95% Conf limits on individual	+/-	0.020
	-3 stdev	0.176
	+3 stdev	0.235



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