Complexity to Certainty

CASE STUDY: COARSE CRM ANALYSIS IDENTIFIES CRUSHER MALFUNCTION

A major iron ore mining company in the Pilbara operates an automated laboratory for routine analysis of production samples. Coarse Certified Reference Materials (CRM) were used to monitor the performance throughout the analytical process from sample preparation, to bead fusion and analysis. Timely quality control (QC) data of the coarse CRM allowed for the identification of automated sample crusher failure within the sample preparation stage, resulting in an analytical bias. Prompt action also prevented compromising further production samples.

ISSUES ON SITE

Accurate elemental analysis of iron ore samples impacts the entire mining cycle - from resource definition to grade control, process control to commercial settlement.

The preferred analytical method is fusion XRF analysis. This method requires samples to be dried, split, crushed and pulverised, with sub-sampling down to a 0.5g aliquot for fusion bead preparation prior to the XRF read. Coarse CRMs are used to monitor the entire analytical system from sample delivery to results. Pulverised CRMs are used to test the fusion and XRF analysis stages only.

IMS is Australia's leading supplier of coarse CRMs to the iron ore industry. These CRMs are used in routine quality control of sample preparation and XRF analysis.

An IMS client with an automated sample preparation and analysis laboratory, noted the following case study which was used to identify automated sample preparation equipment failure.

This laboratory operates three 'in-parallel' sample preparation trains. Each preparation train was monitored with coarse CRMs at regular intervals. Quality control (QC) data identified four samples (numbers 7, 10, 13 and 16), had failed with a high Fe reading – over three times the standard deviation of the expected value.

The same samples also failed at the low end for both SiO_2 and $Al2O_3$. A key property of the CRM was that the fines were known to contain elevated concentrations of both SiO_2 and $Al2O_3$ compared to that of the entire sample.

Interrogation of the prep logs also showed that all the failed samples had passed through the same crusher (No 2).

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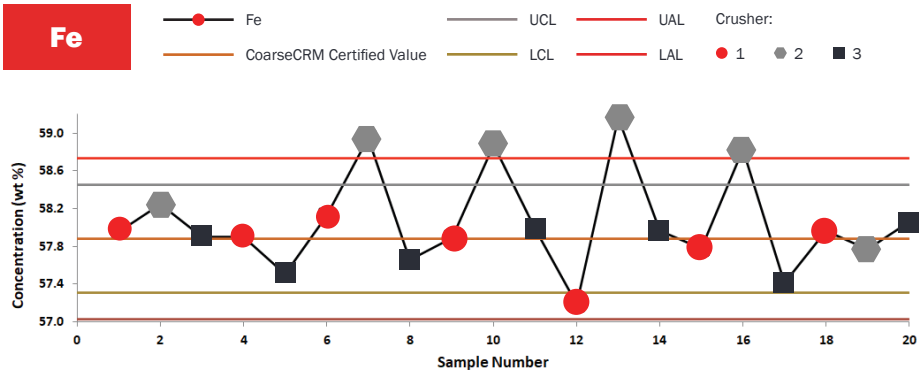
THE SOLUTION

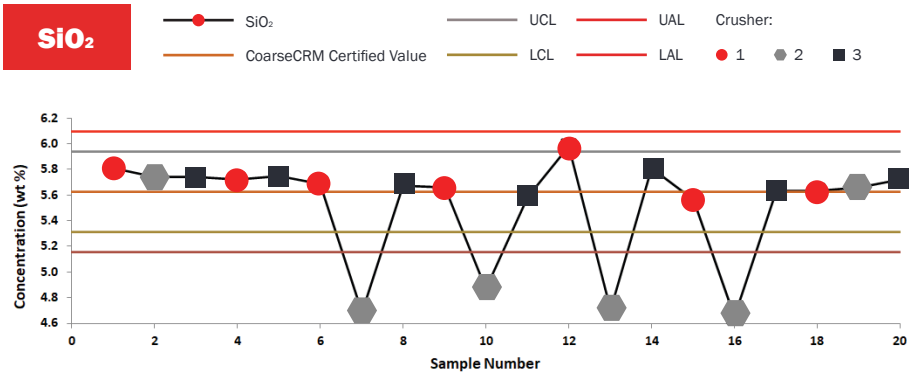
IMS' expertise in the manufacture and certification of coarse CRM with tight uncertainty tolerances, allowed the client to effectively monitor sample preparation performance. Coupled with the clients timely monitoring of QC data, allowed prompt identification of equipment failure and subsequent compromising of further samples submitted for analysis.

The cause of the problem was identified as a damaged valve within the primary crusher. The damage was preventing the valve from fully closing whilst processing the sample. This caused loss of fines in the sample, that led to depression of SiO_2 and Al_2O_3 and elevation of Fe; thus, affecting the crusher's performance, and potentially biasing the analysis of routine samples.

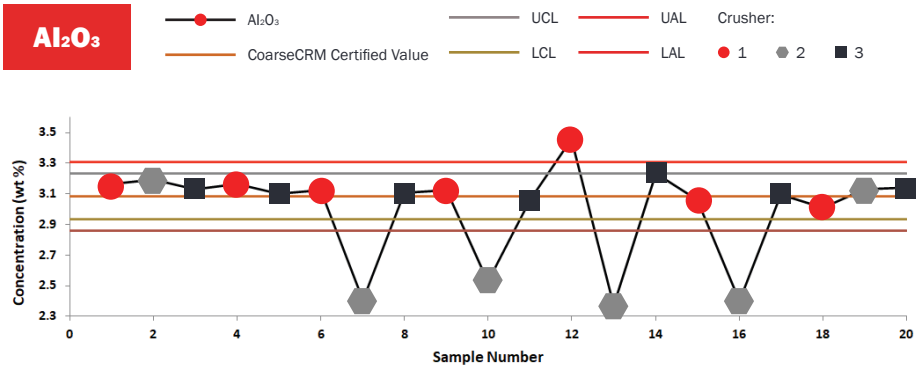
Fe



SiO_2



Al_2O_3



For more information about this case study, contact IMS today.

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