

# Bauxite Analysis with the Thermo Scientific Niton XL3 GOLDD Series

*Niton XL3 GOLDD Series XRF Analyzers Enable Speedy Light Element Analysis*



## Introduction

Globally, bauxite is the primary source of aluminum (Al) ore and a major industry in many countries including China, Australia, and Brazil. As such, grading Al concentration is of paramount interest in the mine as is the need to determine concentrations of penalty elements. The desired goal is to conduct all the analysis in a way that maximizes productivity.

## Application

Analysis of Al, silicon (Si), and iron (Fe) presents unique challenges. Accurate analysis of all three is critical for either ore grading or understanding their influence on the processing and production of the primary metal of interest. Previously, it was not possible to measure light elements such as Al and Si in the field without helium (He) or vacuum systems. This often meant costly time delays and reduced productivity while waiting for laboratory results. With the introduction of the Thermo Scientific Niton XL3 with geometrically optimized large area drift detector (GOLDD™) technology, light elements are analyzed with a minimum of sample preparation, enabling quick decisions in the mine. Additionally, Fe data is acquired quickly with a high level of both precision and accuracy. Concentrations of all elements of interest are now at your fingertips, enabling decisions that minimize downtime.

## Handheld XRF Analyzer

Our advanced Niton® XL3 Series analyzers, including the performance-leading Niton XL3 GOLDD, easily analyze elements from magnesium (Mg) to uranium (U), to fill all exploration and mining needs. These instruments make it easy to perform trend analysis by averaging readings in real-time or by downloading results later to a PC. They deliver fast, accurate elemental analysis for intensive metals exploration and production whether base metals, precious metals, or even rare earth elements.

These superior instruments provide the following key benefits:

- Instant chemistry for ore, rock, drill chips
- Significantly reduce the number of samples sent for lab analysis
- Decision-making tools at your fingertips
- Ore concentration tracked instantly
- Simultaneous Al, Fe, Si analysis, plus 25 other elements
- Rapid analysis of impurity concentration

## Method

Fourteen certified reference materials (CRM) and in-house standards were packed into standard XRF sample cups fitted with polypropylene film and measured for 120 seconds (on the light filter for Al and Si) and 30 seconds (on the main filter for Fe) using the Niton XL3 900 GOLDD analyzer. Analysis time may vary depending on precision requirements.



The Thermo Scientific Niton XL3 GOLDD is an ideal instrument for fast mine or field analysis.

## Results

Figures 1 through 3 show the correlation curves for Al, Si, and Fe, with certified results vs. the Niton XL3 900 GOLDD handheld XRF results. The coefficient of determination ( $R^2$ ) for each element is provided in the figures. The  $R^2$  value is a measure of how closely the data sets correlate with each other, where a perfect correlation would have an  $R^2$  of 1. Additionally, Table 1 displays repeatability data detailing the robust precision of the Niton XL3 900 GOLDD analyzer.

Aluminum Correlation

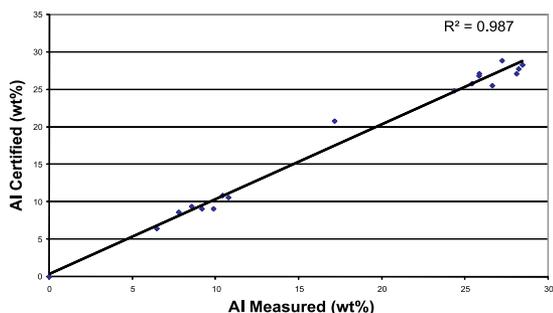


Figure 1. Correlation curve for Al – CRM vs. the Niton XL3 900 GOLDD

Silicon Correlation

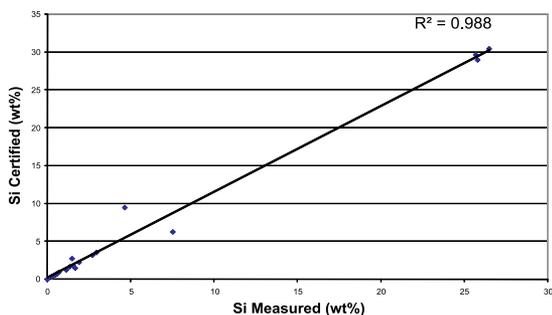


Figure 2. Correlation curve for Si – CRM vs. the Niton XL3 900 GOLDD

Iron Correlation

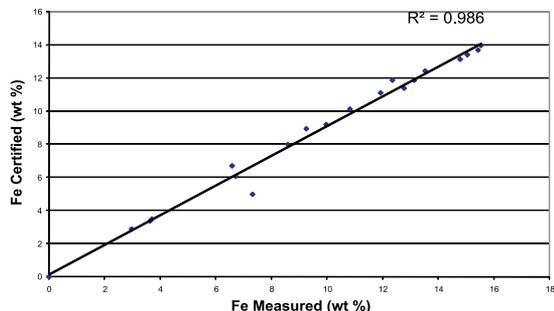
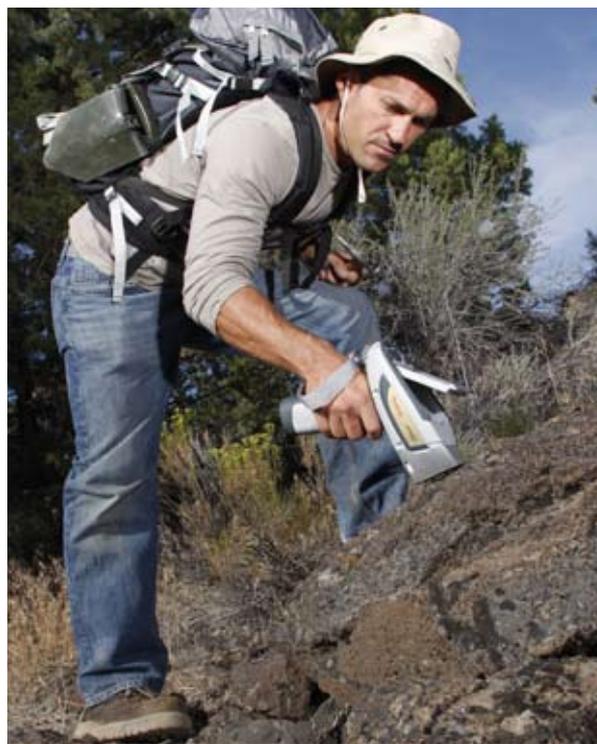


Figure 3. Correlation curve for Fe – CRM vs. the Niton XL3 900 GOLDD

## Comments

The correlation coefficients and repeatability data for the key elements in bauxite analysis demonstrate the excellent accuracy and precision of the handheld Niton XL3 900 GOLDD, indicating that the Niton XL3 GOLDD is an ideal instrument for fast mine or field analysis. The instant chemistry it provides allows the user to make critical decisions with a minimum of downtime, keeping projects running and productive. Additionally, they provide information that minimizes the expense and time of shipping samples for analysis and increases savings. The Thermo Scientific Niton XRF analyzer is a great addition to any process in the life of the mine.

To discuss your particular applications and performance requirements, or to schedule an on-site demonstration and see for yourself how Niton analyzers can help save you time and money, please contact your local Thermo Scientific Niton Analyzer representative or contact us directly by email at [niton@thermofisher.com](mailto:niton@thermofisher.com), or visit our website at [www.thermo.com/niton](http://www.thermo.com/niton).



Thermo Scientific Niton XL3 GOLDD analyzers deliver fast analysis for intensive metals, precious metals, or even rare earth elements.

BXT-14	Al	Si	Fe
<b>Average</b>	29.82	1.68	10.31
<b>Standard deviation</b>	0.69	0.025	0.040
<b>%RSD</b>	2.3	1.5	0.4

Table 1. Repeatability data for Al, Si, and Fe in sample BXT-14.

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