

# Geochemical Analysis of Mining Samples with the Thermo Scientific NITON® XL3t and XL3p

*NITON XL3 Series Portable Mining Analyzers – Simply Superior*



## Introduction

In all stages of the mining process, decisions are made based on the elemental composition of representative samples. Whether the task is mining exploration, mine mapping, sorting, grading, extraction, or the prevention of environmental hazards as byproducts of a mining operation, chemical data is used to guide mining operations at every step. Obtaining accurate geochemical data quickly in order to guide operations is one of the biggest obstacles to high-productivity operations. Maintaining permanent on-site labs or dispatching samples to off-site laboratories can be expensive, untimely and impractical. Quickly obtaining geochemical data for rapid delineation of ore boundaries and the in-depth, quantitative analysis of metal concentrations required for mine mapping and grade control is critically important for efficient mining operations. The new generation of Thermo Scientific NITON XL3t and XL3p 500 Series handheld x-ray fluorescence (XRF) analyzers are the ideal tools for these demanding jobs.

## The Thermo Scientific NITON Solution

Thermo Scientific NITON XL3t 500 Series analyzers, manufactured by Thermo Fisher Scientific, come with 50 kV miniature x-ray tubes and multiple primary filters – the most powerful and flexible XRF sources ever offered in handheld XRF instruments. The NITON second generation patented Infiniton™ instruments offer unparalleled isotope source performance and the lowest lifetime cost of ownership of any XRF analyzers available. The NITON XL3t and XL3p have both been designed to maximize productivity.

The handheld NITON XL3 500 Series of portable XRF mining analyzers offers unprecedented performance at all stages of the mining process, often with little to no sample preparation required.

Weighing less than 3 lbs (~1.3 kg) and made of durable GE Lexan plastics, NITON XL3 500 Series analyzers are the ideal tools for obtaining real-time geochemical data in the field. NITON XL3 analyzers provide users with real-time elemental sample analysis directly at the mine face, from bagged samples during survey or drilling operations, or from prepared samples. With the ability to easily set up multiple programs based on sample composition, NITON XL3 analyzers measure ores, soils, sediments and cores, concentrates, heads and tailings, coatings, and filter media, allowing for quick and easy delineation of ore boundaries, process adjustments and much more.

Thermo Scientific NITON XL3 analyzers represent the state-of-the-art in elemental analysis for geochemical applications, allowing the user to perform rapid, on-the-spot screening for qualitative elemental identification with the simple pull of a trigger. Assaying samples in the field significantly reduces the cost, time and labor involved in exploration and survey activities. NITON XL3t and XL3p 500 Series analyzers provide geochemical data within seconds, allowing for immediate ore flagging, avoidance of lab turnaround delays, and rapid delineation of ore boundaries.



In-field instantaneous elemental analysis with the Thermo Scientific NITON XL3t.

## A Range of Accessories for Easy Use

NITON XL3 analyzers offer integrated Bluetooth™ GPS readings for rapid mine mapping or for identifying areas of interest during exploration activities. The NITON XL3 shielded, folding test stand instantly converts the instrument into a benchtop analyzer for measuring drill cores and bagged or cupped samples, while the telescoping Extend-a-Pole™ improves ergonomics to minimize fatigue during in-situ screening, when operators often measure many hundreds of samples per day.

## Lab-Quality Geochemical Analysis

Mine mapping, development and grade control require accurate elemental composition data in large numbers of samples. The handheld NITON XL3 analyzer makes it easy to do trend analysis by averaging readings in real-time on the instrument or evaluating downloaded readings on a PC or PDA afterwards. Geochemists and program managers who need rapid laboratory-grade sample analysis need only prepare their samples through a grinding and sifting procedure and then test them on-site with a NITON XL3 analyzer; in other words, lab-quality sample preparation yields lab-quality results. In many cases, the flexibility and ease of use of the NITON XL3 reduces or even eliminates the need for dedicated technical personnel to operate instruments. The NITON XL3's high speed and sample throughput ensure that samples which are sent to a laboratory are representative of the local geochemical values.

NITON XL3t and XL3p analyzers easily identify a wide range of elements including magnesium, aluminum, silicon, sulfur, copper, nickel, tantalum, silver, zinc, molybdenum, calcium, potassium, Rare Earth Elements (REE's), and platinum group metals (PGM's), and are ideal for a wide variety of samples such as rock face, bagged or ground samples, drill cores, mineral sands, and clays.

## Environmental Monitoring and Cultural Resource Management

Mining processes produce large volumes of waste, some of it highly toxic. This waste can result in acid mine drainage and groundwater contamination, and needs to be closely monitored to ensure that it has been neutralized before being returned to the earth. NITON XL3 analyzers are very effective doing "double duty" when used to monitor elemental contaminants at mine sites and in waste streams, in addition to being used for exploration and mining applications. They measure a wide range of



Direct analysis of core without requiring sample preparation.

elements, including sulfur, lead, and arsenic – the elevated presence of which is a sign of potentially hazardous mining practices.

Cultural resource management (CRM) is another challenge for the mining industry in many places where legislation requires miners and developers to ensure that they are not disturbing sites of historic cultural value such as burial grounds of native peoples during their operations. The wide range of capabilities of a NITON XL3 analyzer allows the user to conduct in-situ soil analysis to detect evidence of historic human activity.

## Conclusion

Thermo Scientific NITON XL3 500 Series analyzers can be used to supplement other sample testing techniques and can provide a more cost-effective sample testing solution than traditional benchtop analyzers. On-site measurement of drill cores and cuttings provides real-time feedback to exploration managers. Ore-grade assessment manages blasting, excavation and hauling activities to optimize the site blend provided to the concentrator, while preventing grade dilution or the erroneous transport of ore to the waste dump. Handheld NITON XL3 XRF analyzers can offer many benefits, including:

- Rapid delineation of ore boundaries
- Immediate determination of non-visual ore zones
- Legally defensible data to prove financial, environmental and social responsibility
- Overall improvement in mine productivity

The Thermo Scientific NITON XL3t and XL3p Mining analyzers – Simply Superior XRF.

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