

Drilling for Nickel Laterites

Thermo Electron Corporation's NITON Field Portable XRF Provides Immediate Determination of Nickel Concentrations with Direct Analysis of RC Drill Cuttings.



Application

Nickel laterites are residual products derived from a prolonged process of mechanical and chemical weathering of ultramafic rocks. The characteristics of a Ni laterite, including grade, tonnage and mineralogy, are controlled by the dynamic interaction of climatic and geological factors that allows nickel to concentrate in regolith, the loose, heterogeneous material covering solid rock on the earth's surface.

Laterites represent around 70% of the world's onshore nickel resources with the majority located in the tropical and subtropical belts of the world including New Caledonia, Philippines, Australia, Indonesia and the Caribbean.

Exploration drilling for nickel laterites typically involves the use of percussion drills or trenching, as deposits are located very close to the surface (typically less than 50m in depth). The finely ground homogeneous material produced by the action of RAB (rotary air blast)/RC (reverse circulation) drilling rigs and cutters makes for an ideal application for direct testing by one of Thermo Electron's portable NITON x-ray fluorescence (XRF) analyzers.

This application bulletin investigates the effectiveness of using a NITON analyzer to immediately determine nickel concentrations on RC drill cuttings to improve the overall efficiencies of a nickel laterite near mine exploration program.

Method

A NITON XLi 500 Series XRF analyzer was calibrated using the results of twenty site-specific pulp samples to allow the instrument to obtain optimum results at the

cut-off grade used by the mine. The NITON XLi 500 Series was then used to test directly onto RC sample bags for a minimum of 60 seconds. One hundred of these RC bags (5%) were selected from the weeks drilling program and dispatched to an off-site laboratory for confirmatory analysis.



The NITON XLi 500 Series performing direct analysis on RC drill cuttings.

Results

Almost perfect linear correlations were demonstrated between the laboratory and NITON analyzer data for nickel (R^2 0.98 at a slope of 1.01). Excluding RC bags containing Ni at less than 0.15%, ninety-five percent of the samples tested for nickel using the NITON analyzer were within 10% of the laboratory values reported.

Conclusions and Comments

The results obtained by the NITON XLi 500 Series XRF analyzer show excellent agreement with laboratory results and provide clear evidence that Thermo's portable NITON XRF analyzer is the perfect tool for rapidly determining nickel concentrations during exploration drilling programs.

The NITON XLi 500 Series achieved the project goal of allowing immediate determination of nickel concentrations on RC drill cuttings and made significant improvements to the overall efficiencies of the exploration program, resulting in dramatic cost savings.

NITON analyzers provide many operational and cost benefits to exploration drilling programs. Integration of portable NITON XRF analyzers into green-field, resource and near mine exploration drilling:

- Dramatically reduces sample assay and freight costs
- Minimizes remobilization costs
- Allows infill and step-out decisions to be made daily
- Immediately determines non-visual ore zones
- Ensures drilling is not halted above the base of the anomaly
- Guarantees the drill rig spends more time drilling mineralized zones

Real-time modeling of exploration assay results is now a reality. Users routinely upload NITON analyzer results and related data into modeling software overnight, then plan and relay new drilling locations before drill rig has been moved.

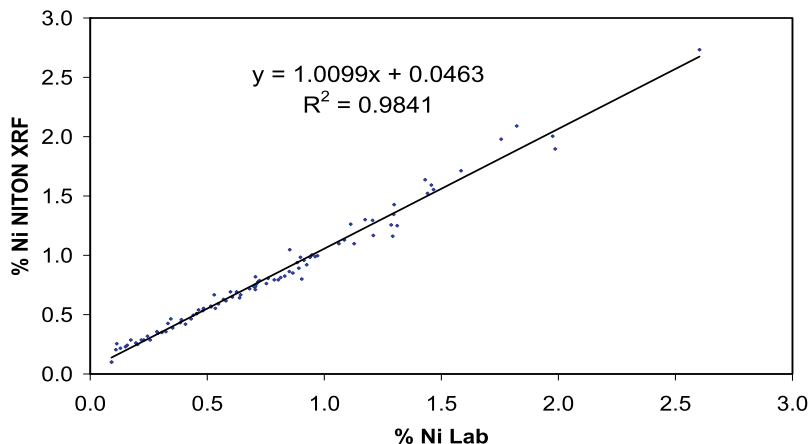


Figure 1 shows comparative nickel data as reported by the NITON analyzer and the average of the laboratory results.



Clients using NITON analyzers for Ni applications in the mining industry:

COMPANY	COUNTRY
Exco Resources.....	AUSTRALIA
OMG Cawse Pty Ltd.....	AUSTRALIA
Noranda.....	Quebec CANADA
INGEOMINAS / Ministerio.....	COLOMBIA
Bosphorus Nickel Madencilik Tic AS.....	TURKEY

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