



**Portable XRF** For Mining  
and Metals Operations

INNOVATIVE XRF TECHNOLOGIES



# Innov-X Portable XRF Solutions

REVOLUTIONIZE MINING EXPLORATION



**Mining exploration is a high risk business. Most companies try to minimize the financial outlay at the start of a project - the time of highest risk. What is the best way to do this?**

Sampling and analysis right there at the site. You don't lose any time sending samples to the lab and waiting for results. In addition you don't run up unnecessary lab costs or devote a large amount of time and money to a site with less potential than you expected.

Instead, with Innov-X Systems portable XRF solutions, you have the sampling and analysis capabilities you need on hand, at the site, at the time you need them:

- Sample, analyze and make decisions on the spot
- Determine zonal patterns and mine mapping
- Perform real-time surveys to delineate and define anomalies
- Evaluate data there and then and pinpoint areas of highest potential profit
- Check the composition of ores, rock chips and residual soils for base and precious metals, and their byproducts
- Perform real-time elemental analysis from magnesium to uranium, from ppm to 100% in solids, liquids, powders, core, oil shale, fragments, filters and films, slurries and more

## Accuracy

Underground and surface mining applications are easily handled by Innov-X portable XRF analyzers. Data analysis capabilities include

Fundamental

Parameters, Empirical Analysis, and linear or quadratic calibration modes. By combin-

ing the empirical correction

with fundamental parameters analysis, the analyzers offer accuracy over a large concentration range with minimal ore-specific calibration requirements.

## SPOT-ON ANALYSIS, ON-THE-SPOT

22 Ti
47 Ag
78 Pt
29 Cu
79 Au



### System Flexibility

The portable XRF solutions from Innov-X Systems also can be set up for contamination control and environmental monitoring. Innov-X portable XRF analyzers meet:

- EPA Method 6200 for metals in soil
- NIOSH Method 7702 for lead in air filters
- OSHA Method ID-204 for lead in air filters and dust wipes

In addition, Innov-X analyzers can provide quality and contamination control and help determine ore grade for optimum processing. QC checks can be performed at any point in a process - during milling, concentrating and smelting.

### Access To Critical Data

Portable PC operation, analytical computing capabilities, wireless data transfer, and GPS capabilities ensure that your information is readily accessible and available in real-time to review analyses, see audit trails, QC data and more.

### ULTRA RUGGED HANDHELD XRF



Ultra Rugged, Completely Sealed System

### CLASSIC HANDHELD XRF

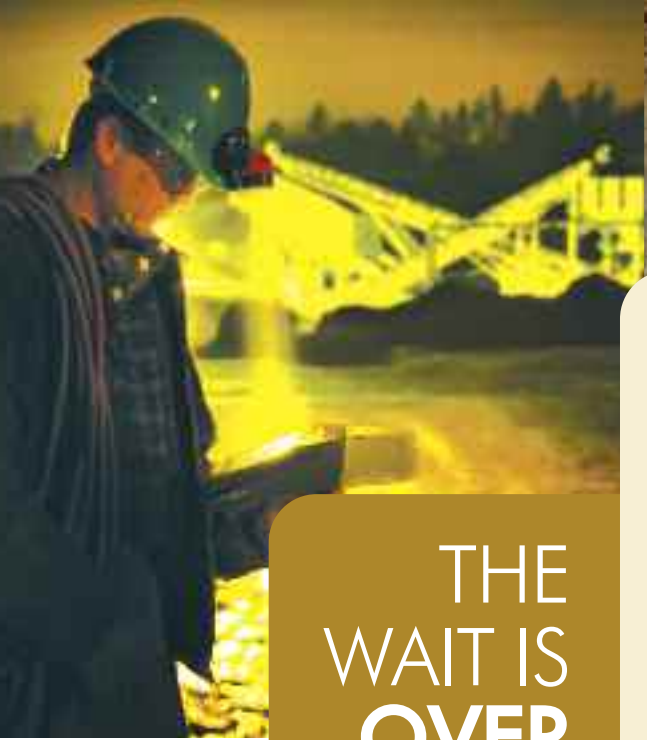


Removable PDA for Data Capture and Transfer Convenience

### X-50 MOBILE XRF



Lab Power in a Portable Configuration



## THE WAIT IS OVER

Site sampling has often been an obstacle in a comprehensive mining investigation. In the past, mining operations relied exclusively on expensive and time consuming laboratory analysis based on samples they hoped fully characterized the site.

Innov-X Systems has taken the uncertainty and the waiting out of this process. With Innov-X portable XRF analyzers, more samples can be characterized from more locations at the site and analyzed on the spot – to give mining operations a more complete picture in less time.

The data obtained using Innov-X portable analyzers provides accurate readings consistent with results previously only available through lab tests. The standardless fundamental parameters (FP) method delivers accurate results simply and easily, with no user calibration. The method automatically corrects for inter-element effects and interferences without site-specific calibrations, making it the ideal field instrument.

## These Portable XRF Analyzers Provide the Software to Perform

### Data modeling

- Compton normalization – quantitative analysis without site-specific calibrations
- Fundamental parameters – “standardless” for samples with high and low concentrations of several elements plus site specific “fine-tuning” with assayed samples
- Empirical calibrations – “calibration curves”

### Data collection & storage

- Add new elements & calibrations easily
- Rerun stored tests with new parameters or models
- Data security - data stored in binary format – hard to alter

### Data presentation & reporting

- View and compare spectra on-screen & ID peaks
- Streamlined report generation
- Data input via touchscreen or bar code reader
- Set up customized test data entry to assure accurate test information
- Tag alloy tests by job #, PO #, inspector, etc...

Additionally, operators may test characterized samples to fine-tune the FP results for even greater accuracy or create dedicated empirical calibrations.

### Environmental Monitoring

Innov-X portable XRF analyzers are also perfect for environmental monitoring. In fact, in a recent EPA study, Innov-X generally outperformed all other “portable” XRF’s and outperformed or matched laboratory (benchtop) XRF’s.

Key performance points included:

- Superior cadmium (Cd) LOD performance 20 ppm or less and the best accuracy for Cd (RPD<10%)
- Excellent detection limits for As, Cu,Pb, Hg, Se,and Zn
- More precise on more of the RoHS elements: Pb, Cd, Hg all in the RSD<5% range



# REAL ANSWERS IN REAL-TIME

## Innov-X portable analyzers are ideally suited for:

- In-situ soil analysis for rapid comprehensive site investigations
- Measure high volume of field tests to minimize off-site analytical costs
- Delineate metals present and contamination patterns
- Establish contamination boundaries and depth profiles for remediation and disposal
- Collect core samples and test directly through plastic corings
- XRF is non-destructive – submit the same sample for lab confirmation
- Measure airborne metal concentrations
- Analyze metals in water, waste oils

## Mining & Process Control

Ultimate Low-Cost, Fast QC for all stages

- Control contamination: immediately determine the presence of S, P and other penalty elements
- Control grade at milling, concentrating and smelting
- Real-time check of ore block: don't let Si, Al and Mg lower your grade
- Reduce stockpiles of untreated ore: check stockpiles in-situ to carry out your blendings
- Analyze mine tailings: don't leave your profits behind

## Mining Equipment Maintenance

To keep your mining machinery at peak performance, Innov-X portable analyzers can be integrated into your preventative maintenance programs. The analyzers can detect wear metals in oils – an early indicator of equipment wear that can help identify and prevent component failure. By preventing unplanned and catastrophic breakdowns, maintenance can be scheduled in a timely and cost saving manner.

*Innov-X is the leading supplier to the marine shipping industry or metals analysis in oils, fuels and lubes. Put our expertise to work measuring machinery lubricants for predictive maintenance and early failure warning.*

22

Ti

47

Ag

78

Pt

29

Cu

79

Au

## ULTRA RUGGED HANDHELD XRF



## CLASSIC HANDHELD XRF



## X-50 MOBILE XRF



# FREEDOM OF CHOICE

### Handhelds – Classic or Ultra Rugged

Looking for a handheld XRF analyzer with the convenience of a removable PDA? Try the Innov-X classic model, a field proven analyzer with an off-the-shelf, removable PDA with instant data syncing to your PC. This handheld XRF delivers a stable, reliable analyzer that combines portable tube-based XRF technology with advanced, universal data modeling for superior metals analysis in the field.

Or for the ultimate rugged configuration, Innov-X offers a sealed model with totally internal electronics. This analyzer is weatherproof and built for heavy duty applications.

Each handheld analyzer is configured with a standard package of up to 25 elements including precious metals. You can specify additional or replacement elements at any time. The handheld analyzers offer integrated portable PC operation with analytical computing capabilities, bar code reading, wireless data transfer and GPS capability for real-time access to results, audit trails, QC data and more.

### The X-50 Mobile XRF - The Performance of a Benchtop And True Portability

For situations where the power and performance of a benchtop XRF analyzer is critical in the field, Innov-X offers the X-50 Mobile XRF. Built like a robust toolcase, the X-50 has up to 25x the power of the handhelds. This makes the X-50 ideal for ores, tailings, concentrates, borings, cores, fragments, slurries, filters and films. The X-50 delivers greatly improved performance for many transition metals, such as Cd, Ag, Sn, Sb, precious metals and rare earths. It truly brings the power of a benchtop from the lab to the field.

Whichever portable solution you require, Innov-X delivers the capabilities and power for on-site analysis that is accurate, cost-effective and time sensitive – you have a more complete and better picture of your site's potential in less time – right at the site.

## NEW

### Light Element Analysis for Innov-X Handhelds



No need to carry a pump  
No need to lug tanks of He gas  
Upgrade to vacuum anytime

# SELECT THE PORTABLE ANALYZER THAT BEST FITS YOUR APPLICATION

Different mining applications have different requirements - will you need a handheld XRF analyzer? Or, do you need to take it up a notch with our high powered X-50 Mobile Analyzer? By carefully evaluating your needs, Innov-X allows you the freedom to select the most appropriate solutions.

Limits of Detection shown are interference-free, for 1-2 minute tests, in sample matrices ranging from SiO<sub>2</sub> to 5% Fe content. Actual limits of detection depend upon specific sample types, and presence of interfering elements. Elements below are common. The Alpha Series analyzes up to 25 elements shown, and additional elements may be added or substituted.



Handheld XRF LOD Table

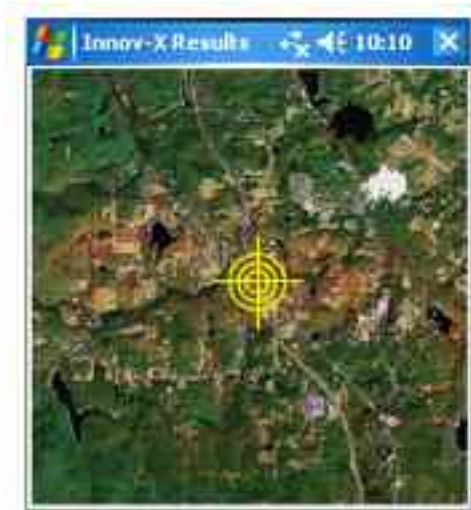
Application	Handheld LOD (ppm)
<b>Precious Metals Exploration &amp; Mining</b> Gold (Au) in soil, sediment Silver (Ag) in soil, sediment Platinum Metals Group 1: Pd, Rh, Ru Platinum Metals Group 2: Pt, Ir, Os	10-20 15-50 15-20 15-25
<b>Some Rare Earth Elements</b> (non alloys only) La, Ce, Pr, Nd	250/Higher
<b>EPA RCRA &amp; Priority Pollutant Metals</b> (Soil Ranging from SiO <sub>2</sub> to 3-5% Fe content)	
<b>Many Liquids, Oil or Fuels, Al Alloys</b> Soil Ranging from SiO <sub>2</sub> to 3-5% Fe content)	
Cr	30-50
Cd	15-20
Ag	15-20
Sn	30-50
Sb	30-50
Ba	150-200
Pb	10-15
As	7-10
Hg	10-15
Tl	10-15
Se	7-10
Cu	15-20
Ni	20-25
Zn	15-20

Mobile X-50 LOD Table

Application	X-50 LOD (ppm)
<b>Precious Metals Exploration &amp; Mining</b> Gold (Au) in soil, sediment Silver (Ag) in soil, sediment Platinum Metals Group 1: Pd, Rh, Ru Platinum Metals Group 2: Pt, Ir, Os	3-5 1-2 1-2 3-5
<b>Some Rare Earth Elements</b> (non alloys only) La, Ce, Pr, Nd	15-25
<b>EPA RCRA &amp; Priority Pollutant Metals</b> (Soil Ranging from SiO <sub>2</sub> to 3-5% Fe content)	
<b>Many Liquids, Oil or Fuels, Al Alloys</b> Soil Ranging from SiO <sub>2</sub> to 3-5% Fe content)	
Cr	5-10
Cd	1-2
Ag	1
Sn	4-5
Sb	4-5
Ba	20
Pb	3-5
As	3-5
Hg	3-5
Tl	3-5
Se	3-5
Cu	5-8
Ni	5-8
Zn	5-8

# OPTIMIZE GEOCHEMICAL SURVEYS

REAL-TIME GPS MAPPING SYSTEMS & XRF FIELD ANALYSIS



Don't Wait! Get the facts on sample content and location where you are – get real-time answers to take real-time action. Whichever corner of the earth you work from, you can depend on Innov-X Portable XRF with GPS Mapping for quick and easy geochemical exploration.

## Worldwide Operations

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