



# Rock Solid Material Measurement for Mining

## ASD Real-time Mineral Analyzers





# Speed Exploration and Optimize Mining



Obtain accurate mineral identification and quantitative analysis results in seconds, rather than in hours or days, using spectroscopy solutions from ASD Inc. Perform analyses in the field or in the lab using portable spectroscopic technology that provides rapid, non-destructive mineral analysis. Get the real-time information needed to make immediate decisions that improve productivity, reduce costs, and increase yield.

Our solutions can be applied across a range of mining applications from early-stage exploration through production. The TerraSpec® 4 line of analyzers is available in compact, portable units designed to withstand the challenging environments of field exploration, drilling sites, mining operations, or as a stationary laboratory unit. The QualitySpec® 7000 is designed to provide real-time measurements over a conveyor to enhance process efficiencies.

When our instruments are combined with the capabilities of our SummitCAL Solutions Team, a complete solution is created that reduces costs while increasing productivity.

## Why Trust ASD Analytical Instrumentation and Solutions?

- More than 500 TerraSpec analyzers are in use in exploration programs and mining operations around the world.
- Robust, portable instruments that produce laboratory-quality results in the field or in the lab.
- The only real-time technology that can accurately measure mineral identity and abundances, as well as many metallurgical properties as material is transported on a conveyor belt.





ASD provides real-time mineral analysis designed to meet the challenges of the mining industry. Built for field or laboratory operation, these powerful instruments provide the precise analysis required by today's mineral exploration programs and mining operations.

**Widely Used:** TerraSpec instruments are the most widely used spectrometers for alteration zone and gangue mineralogy mapping, whether it is for early-stage target generation or late-stage geometallurgical studies. In production, the TerraSpec 4 mineral analyzer is optimal for a wide range of operations including ore sorting, blending, feed control and tailing monitoring for both heap leach and mineral processing.

**Sample Flexibility:** Working with a full line of accessories, TerraSpec analyzers are suitable for measurement of outcrops, hand samples, tailings, drill cores, cuttings and pulps.

**Rapid Analysis Results:** Results are presented within seconds and are available for analysis through a range of spectral analysis software.

**Portable:** Both the TerraSpec 4 Hi-Res and TerraSpec 4 Standard-Res mineral analyzers are portable devices well-suited for both field, drill site and laboratory analysis.

**Non-destructive Analysis:** Materials are analyzed in their original state, intact and unprocessed.

## Applications

### Exploration

- Geological/deposit field mapping
- Indicator mineral identification
- Mineralogical parameters related to thermal and chemical zonation
- Drill cuttings analysis
- Core logging

### Laboratory Analysis

- Acid consumption determination
- Swelling clay assessment
- Gangue mineral concentrations
- Blast chip analysis

### Extractive Metallurgy

- Ore sorting and blending
- Block model development
- Improved site mapping
- Agglomeration optimization
- Heap leach optimization
- Flotation feed control

# Mineral Analyzers Built for Exploration through Production



## **TerraSpec 4 Hi-Res for High-tech Mineral Exploration**

The TerraSpec 4 Hi-Res spectrometer is a portable, rugged analyzer for field mineral mapping and analysis that represents a new generation of high-speed, high-performance field portable analyzers. It provides mineralogy of altered rocks and hence assists in classifying ore systems, identifying alteration patterns and vectoring to areas of potential interest. The ability to rapidly identify and determine key alteration minerals, and in many cases, the thermal and chemical environs of their formation, makes the TerraSpec an ideal tool for field mapping in mineral exploration.



## **TerraSpec 4 Standard-Res for Mine Process Optimization and Lab Analysis**

The TerraSpec 4 Standard-Res mineral analyzer has the resolution and performance required for logging core, analyzing blast chips and providing valuable geometallurgical information that can be used in mining operations. When combined with chemometric calibration modeling, the TerraSpec 4 Standard-Res analyzer can perform valuable quantitative mineral analysis in the lab or in the field. For example, information provided by the TerraSpec 4 Standard-Res analyzer is used to reduce acid usage and assure proper hydration during agglomeration, and manage levels of problem gangue minerals in flotation ore feeds.



## **QualitySpec 7000 for Measurement of Material Moving on a Conveyor**

The QualitySpec 7000 analyzer embodies state-of-the-art spectroscopic technology capable of accurately measuring material as it is transported on a conveyor belt. This stationary unit is designed to produce real-time, accurate data in a non-contact manner for process control. The QualitySpec 7000 system saves significant cost in material sorting and quantifying gangue mineralogy. In copper production, the system monitors ore entering the agglomerator to predict and potentially reduce acid usage, and measures swelling clay content for proper hydration.





# SummitCAL Solutions Team

## Translating Mining Research and Data into Actionable Information

No deposit is the same. The SummitCAL Solutions Team works with exploration and operations groups to create customized models and instrument calibrations for the unique mineral makeup of the location, and for specific exploration or operations goals.



**SUMMIT**CAL

## How SummitCAL Makes Mining Faster and More Precise

SummitCAL is focused on creating material measurement solutions, multivariate modeling, and developing advanced calibrations across a broad range of mining applications.

For instance, using a SummitCAL-generated model, geologists can now perform mineral analysis in-situ with no sample preparation and gain immediate results. This real-time on-site analysis capability reduces the wait time on samples at the lab.

In the lab, the speed of analysis provided by ASD's solutions enables easy analysis of hundreds of samples per day.

SummitCAL performs feasibility studies for those who want to know about the applicability and performance of ASD's solution for a specific application. SummitCAL also offers model development, model updates, training and consulting.

## SummitCAL Service Offerings:

- Feasibility studies
- Chemometric calibration modeling
- Calibration model updates
- Consulting services
- Training




# Applications

## Exploration

Today, it is crucial to have an in-depth and well-defined understanding of the geological region when targeting and developing prospective sites. Extensive field work is essential to identify economically significant deposits prior to any extraction operation. This includes comprehensive geologic sampling and analysis, which is costly and time consuming when performed with traditional laboratory-based methods. The TerraSpec 4 Hi-Res portable mineral analyzer has made a major impact on mining exploration by providing real time mineralogical information allowing geologists to make more informed decisions; lowering field and drilling costs. When used at an outcrop, at the drilling site, in the core shack, or in the open pit, the TerraSpec 4 Hi-Res mineral analyzer provides the mineralogical information needed to understand the relationship between the potential economic deposit and the local geology and provides the means to use that relationship to better target exploration efforts. As a rapid and reliable analytical technique that requires no sample preparation, it has proven to be an essential tool for field geologists and mine operators.

### The TerraSpec 4 Hi-Res mineral analyzer:

- Provides rapid results that can be interpreted to gain immediate mineral identification.
  - Yields spectral signatures that can be compared against characterized references manually or using computer algorithms operating against a database of reference minerals.
  - Provides other information through the spectral signature including chemical substitution, crystallinity, effects of water, paragenesis and temperature.
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## Extractive Metallurgy and Mining Production

With the ever-increasing cost of mining operations, gathering real-time data assists in productivity and expense containment. Rapid on-site blast chip analysis allows for efficient sorting decisions and enables mine managers to control the quality of material sent for further processing. Immediate ore-sorting information minimizes costs by reducing the time between blasting and excavation. Mineral analysis for improved block mapping and ore feed control can happen on-site, without waiting for off-site lab results.

### The TerraSpec 4 Standard-Res mining instrument:

- Eliminates wait time for laboratory analysis.
- Reduces laboratory analysis costs, sample preparation and sample transport costs.
- Non-destructive, so sample can be further analyzed if necessary.
- Produces laboratory-quality results without the need to send samples to an off-site lab.
- Facilitates efficiency gains in ore sorting and blending decisions.

## Agglomeration/Heap Leach/Flotation

Swelling clays, kaolinite, biotite, muscovite, talc and hornblende are just a few of the minerals that can be quantified using an ASD QualitySpec 7000 system. The QualitySpec 7000 over-the-conveyor analyzer provides real-time data on acid-consuming minerals and swelling and total clay content prior to agglomeration. This enables accurate control of the acid-to-water ratio and total fluid applied, reducing acid usage and costs, and ensuring proper hydration occurs for optimal agglomeration; maximizing heap leach permeability and extraction rates.

In flotation operations, the QualitySpec 7000 system provides real-time information on the concentration of problem gangue minerals, such as talc and hornblende, to guide ore blending decisions and to optimize the addition of depressant reagents.

### The QualitySpec 7000 over-the-conveyor analyzer:

- Performs real-time mineral analysis for water and acid application control.
- Allows for significant savings through reductions in acid usage.
- Improves heap leach percolation rates by accurately identifying swelling and total clay content.
- Provides valuable gangue mineralogic information to optimize the flotation process.





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ASD real-time mineral analyzers are setting new standards for mineral identification and analysis in the mining market. From exploration to production, ASD instruments provide non-contact, non-destructive, real-time measurement for simplified decision-making. Performing analysis on-site or in the field allows for significant cost savings by speeding up decision processes and reducing ore processing expenses.

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