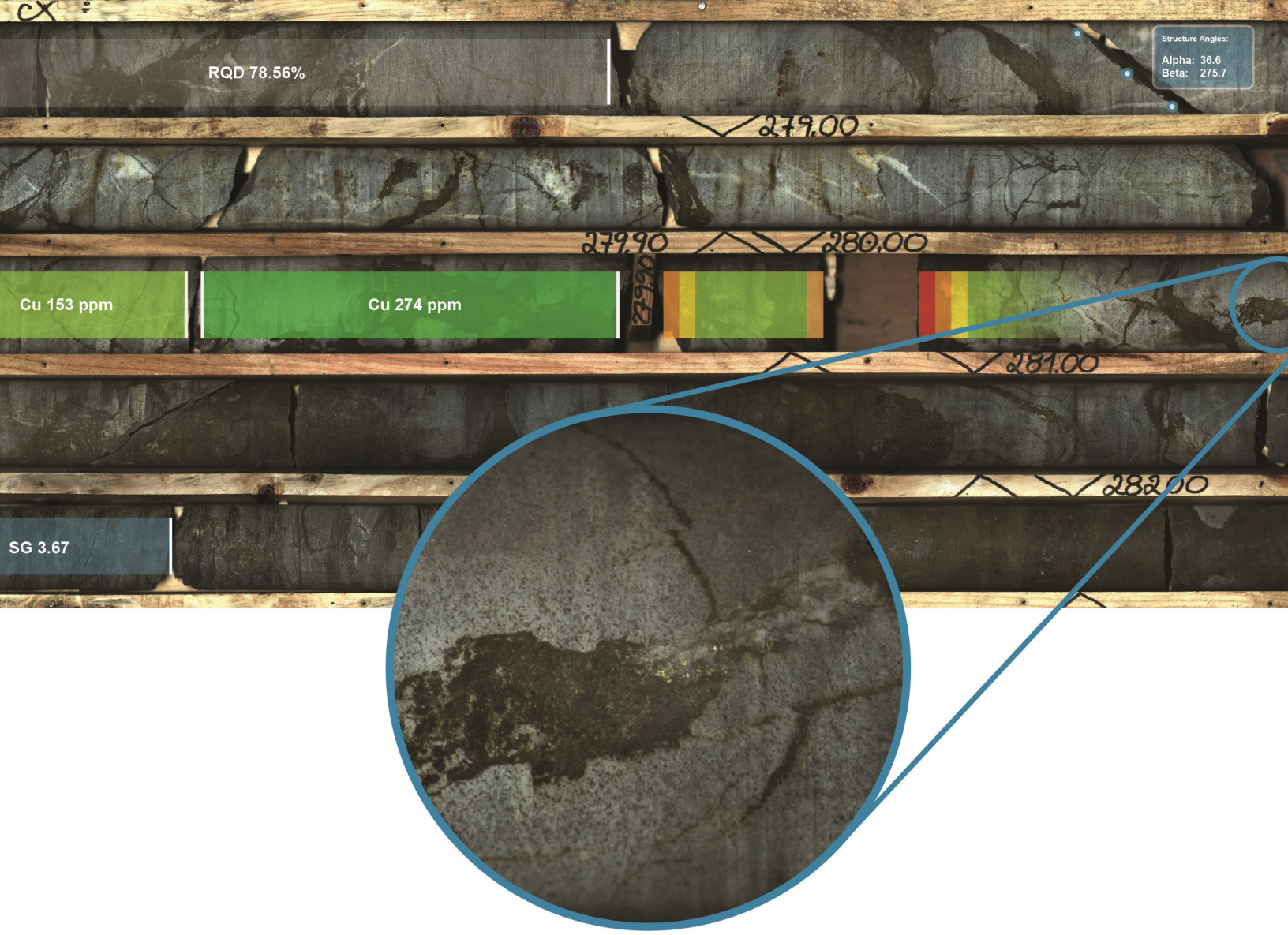


FAST SOLUTIONS: XRF CORE SCANNING WITH MINALYZER CS

Enabling Field-based Decision Making

SGS

INTRODUCTION

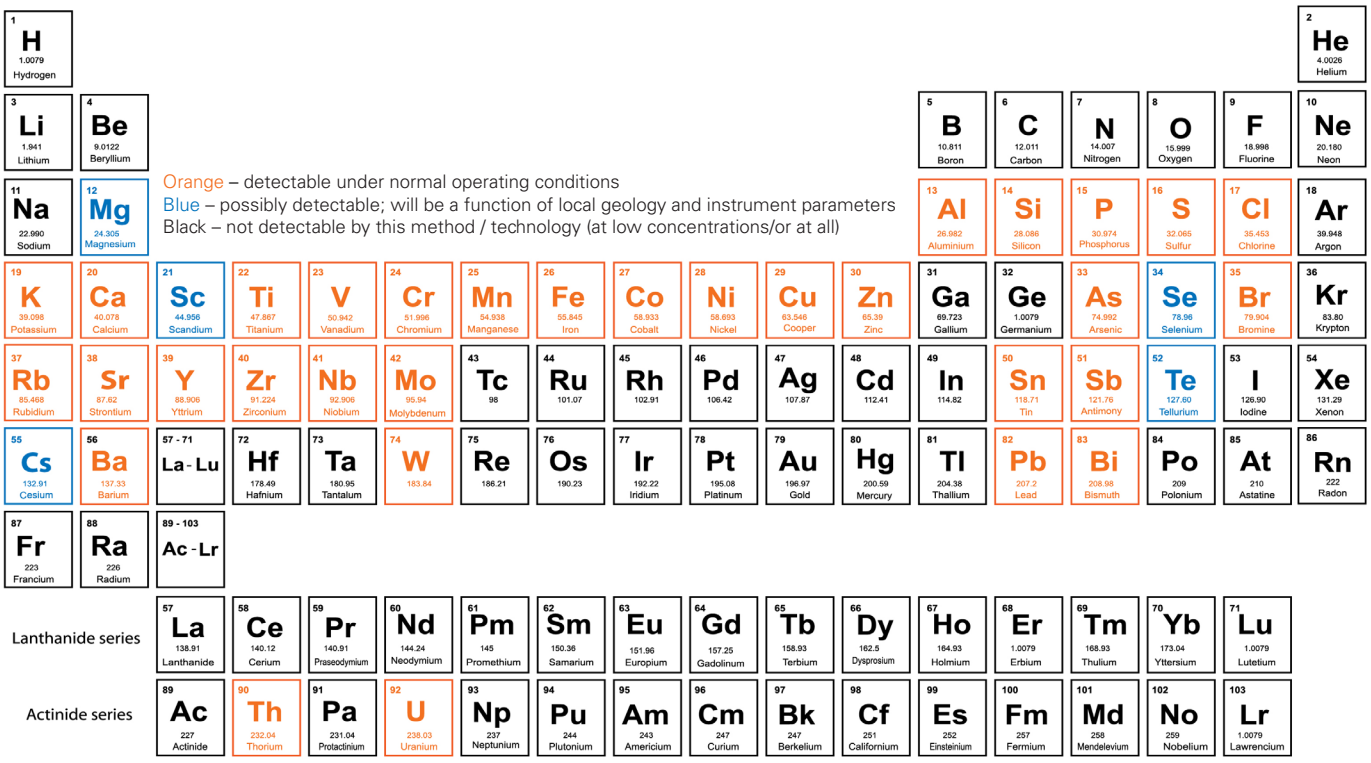
During exploration and production, having rapid turnaround on data is vital for making accurate and timely decisions. SGS FAST solutions provide you with essential analytical data using new analytical technologies including FTIR, pXRF and the Minalyzer CS. This dedicated field-based preparation and analytical testing gives you the information you need to make quick but accurate decisions around exploration, mining and plant production. We have incorporated the Minalyzer CS into our FAST suite of instruments because of its rapid, non-destructive, objective and standardized chemical testing and digital core logging through its proprietary, cloud-based Minalogger portal. When pairing the XRF data with SGS' AI and machine learning services can bring about a step change in core logging practices.

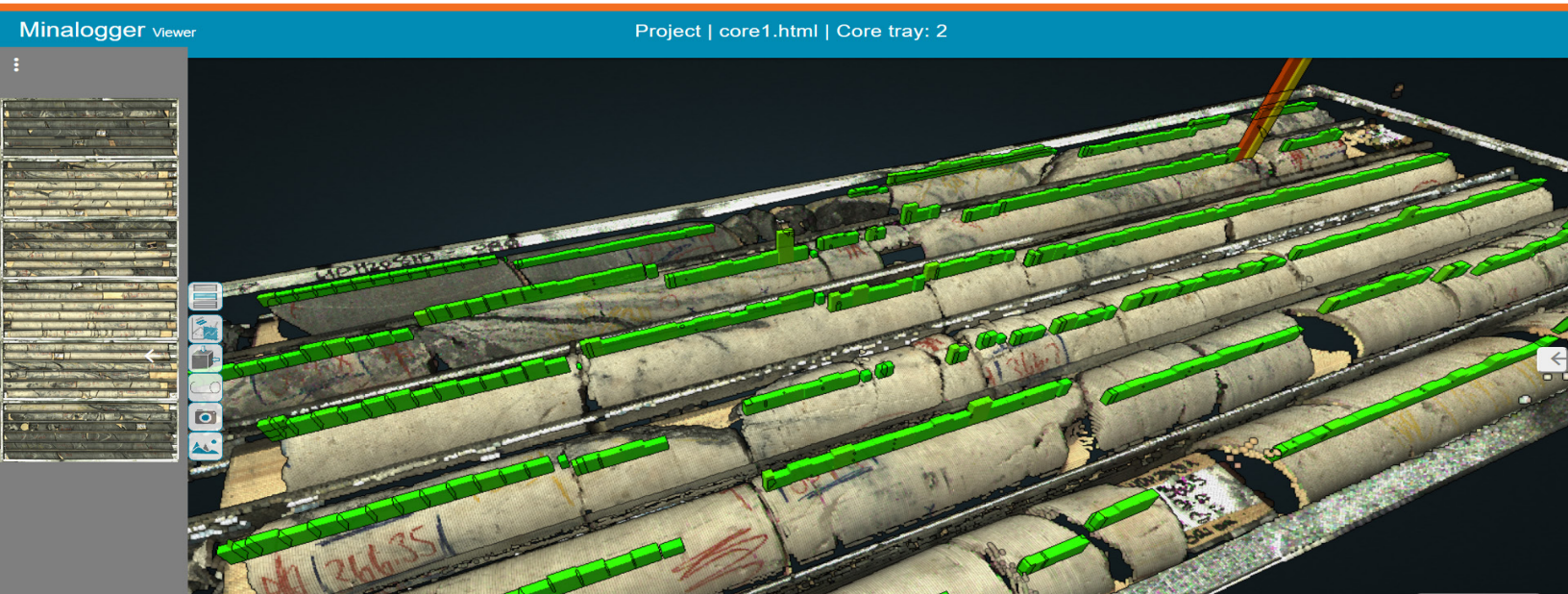
When taken on-site, the Minalyzer CS provides quality analysis in a fraction of the time compared to traditional analytical labs. By using the Minalyzer CS as part of our FAST solution, you can expect to optimize operational spending and increase efficiency by:

- Receiving critical information quickly to enable field-based operational decision making, in-turn spending less time and money waiting for data to determine next steps.
- Obtaining lab quality data on-site through an instrument that is specifically calibrated for your geology, diverting costs away from traditional commercial lab expenses and into dedicated field-based analysis.
- Performing accurate and consistent logging of core through the Minalogger software for future availability of information.

TECHNICAL SPECIFICATIONS

The Minalyzer CS performs accurate and timely geochemical analysis while ensuring your core stays intact and without needing any special sample preparation techniques. A summary of the detectable elements is indicated below:





CASE STUDY: MINALYZER IN THE FIELD, GEORGE FISHER MINE (GFM)

GFM, owned by Glencore, contracted Minalyzer to perform XRF core scanning at their underground lead-zinc-silver mine, located in NW Queensland, Australia. GFM currently produces three million tonnes of ore per year and required informed sample selection and accurate, high-density core logging in a mine with very complex geology to optimize operations and profit.

Testing of the unit began in 2017 and on the back of promising analytical results, GFM fully implemented the Minalyzer CS unit in October, subsequently fully implemented the instrument into core logging workflow scanning.

SGS, Minalyze and GFM worked together on trials to compare Minalyzer CS (EDXRF) core scan data directly to accredited full digest laboratory methods.

Through the implementation of the instrument, GFM was able to enact new sample protocols, including:

- Using 10cm EDXRF data to choose only intervals that are greater than 0.5% Zn or greater than 0.5% Pb,
- Achieving consistent domaining of the ore zones by the geological team with inconsistencies resolved quickly,
- Reducing sample volume for subsequent lab testing (1.25 samples per tray (5m) instead of 2.5).

FIGURE 1 Example of a typical highly folded ore and rock found at the GFM with 10 cm integration marks for subsequent core cutting for lab testing (SGS / Minalyze/ Glencore Trial 2017).

Through the new workflow, GFM realized a 17% reduction of sampling costs and a reduction of two weeks or more in waiting for assay data, thus enabling rapid update of the geological models within hours instead of weeks or months. Also, the modelling of thickness and grade of ore zones was much more accurate resulting in more profitable mining.

QA/QC

The Minalyzer CS data, as with other technologies provided by SGS, experiences the same levels of QA/QC for which SGS has become known. The backbone of the service you receive from us is the global quality protocol used by our laboratories worldwide. It controls methodology, data management and reporting, quality control and governance activities. The Minalyzer CS setup is tested and checked against internationally approved Certified Reference Materials (CRM), and SGS produced site-specific reference materials (SSRM). We can customize the setup from generic to fully customized calibration to your local project; all of them are traceable back to standard laboratory methods.

WHY SGS

We have fully adopted the Minalyzer CS technology into our proven laboratory operations to ensure that data used by your model is consistent to your project's requirements. When combining the data with our XRF expertise, we can work with you to further advance the capabilities and workflows of your site, enabling rapid decision making.

We are committed to partnering with you throughout the project lifecycle. Using our services, you can progress your project seamlessly knowing you have the expertise and capability support through all stages of development. Other SGS services include:

- Full suite of geological services including technical reporting, resource estimation, geological modelling and targeting using XploreIQ from exploration into pre-feasibility,
- Complete expertise in analytical and metallurgical testing, including custom exploration and pilot plant programs,
- Mine optimization and process design throughout production.

SGS' technical activities and supervision skills are globally accepted by financiers, environmental agencies and the international mining community. When you partner with SGS for field services through FAST, you, your stakeholders and your financiers will feel confident that your valuable project, and all the data derived from it, is in trustworthy hands.

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WHEN YOU NEED TO BE SURE

SGS