

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.

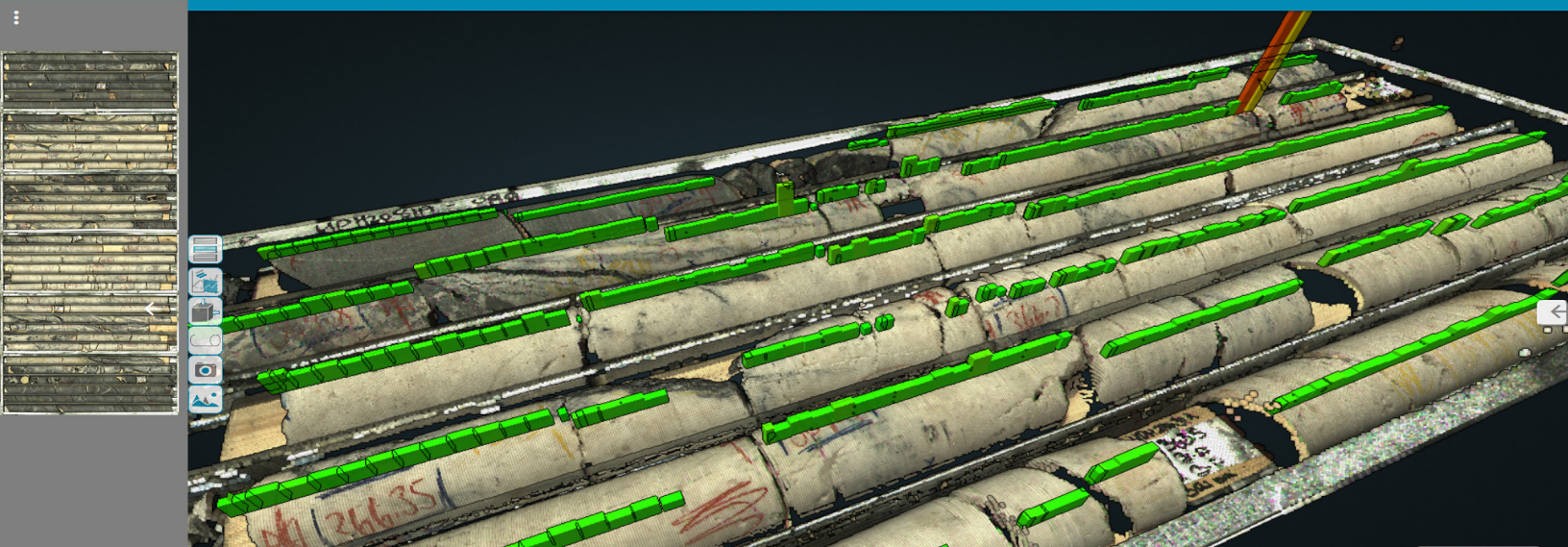
TECHNICAL SPECIFICATIONS

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:

1 H 1.0079 Hydrogen																	2 He 4.0026 Helium						
3 Li 6.941 Lithium	4 Be 9.0122 Beryllium																	5 B 10.811 Boron	6 C 12.011 Carbon	7 N 14.007 Nitrogen	8 O 15.999 Oxygen	9 F 18.998 Fluorine	10 Ne 20.180 Neon
11 Na 22.990 Sodium	12 Mg 24.305 Magnesium	<p>Orange – detectable under normal operating conditions Blue – possibly detectable; will be a function of local geology and instrument parameters Black – not detectable by this method / technology (at low concentrations/or at all)</p>																13 Al 26.982 Aluminium	14 Si 28.086 Silicon	15 P 30.974 Phosphorus	16 S 32.065 Sulfur	17 Cl 35.453 Chlorine	18 Ar 39.948 Argon
19 K 39.098 Potassium	20 Ca 40.078 Calcium	21 Sc 44.956 Scandium	22 Ti 47.887 Titanium	23 V 50.942 Vanadium	24 Cr 51.996 Chromium	25 Mn 54.938 Manganese	26 Fe 55.845 Iron	27 Co 58.933 Cobalt	28 Ni 58.693 Nickel	29 Cu 63.546 Copper	30 Zn 65.39 Zinc	31 Ga 69.723 Gallium	32 Ge 72.63 Germanium	33 As 74.922 Arsenic	34 Se 78.96 Selenium	35 Br 79.904 Bromine	36 Kr 83.80 Krypton						
37 Rb 85.468 Rubidium	38 Sr 87.62 Strontium	39 Y 88.906 Yttrium	40 Zr 91.224 Zirconium	41 Nb 92.906 Niobium	42 Mo 95.94 Molybdenum	43 Tc 98 Technetium	44 Ru 101.07 Ruthenium	45 Rh 102.91 Rhodium	46 Pd 106.42 Palladium	47 Ag 107.87 Silver	48 Cd 112.41 Cadmium	49 In 114.82 Indium	50 Sn 118.71 Tin	51 Sb 121.76 Antimony	52 Te 127.60 Tellurium	53 I 126.90 Iodine	54 Xe 131.29 Xenon						
55 Cs 132.91 Cesium	56 Ba 137.33 Barium	57 - 71 La - Lu	72 Hf 178.49 Hafnium	73 Ta 180.95 Tantalum	74 W 183.84 Tungsten	75 Re 186.21 Rhenium	76 Os 190.23 Osmium	77 Ir 192.22 Iridium	78 Pt 195.08 Platinum	79 Au 196.97 Gold	80 Hg 200.59 Mercury	81 Tl 204.38 Thallium	82 Pb 207.2 Lead	83 Bi 208.98 Bismuth	84 Po 209 Polonium	85 At 210 Astatine	86 Rn 222 Radon						
87 Fr 223 Francium	88 Ra 226 Radium	89 - 103 Ac - Lr																					
Lanthanide series		57 La 138.91 Lanthanide	58 Ce 140.12 Cerium	59 Pr 140.91 Praseodymium	60 Nd 144.24 Neodymium	61 Pm 145 Promethium	62 Sm 150.36 Samarium	63 Eu 151.96 Europium	64 Gd 157.25 Gadolinium	65 Tb 158.93 Terbium	66 Dy 162.5 Dysprosium	67 Ho 164.93 Holmium	68 Er 167.26 Erbium	69 Tm 168.93 Thulium	70 Yb 173.04 Ytterbium	71 Lu 174.96 Lutetium							
Actinide series		89 Ac 227 Actinium	90 Th 232.04 Thorium	91 Pa 231.04 Protactinium	92 U 238.03 Uranium	93 Np 237 Neptunium	94 Pu 244 Plutonium	95 Am 243 Americium	96 Cm 247 Curium	97 Bk 247 Berkelium	98 Cf 251 Californium	99 Es 252 Einsteinium	100 Fm 257 Fermium	101 Md 258 Mendelevium	102 No 259 Nobelium	103 Lr 260 Lawrencium							

Minalogger Viewer

Project | core1.html | Core tray: 2



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).

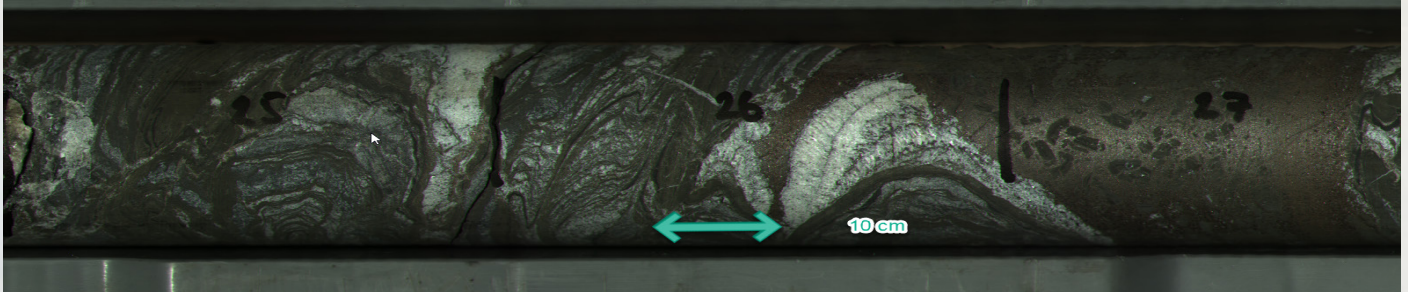


FIGURE 1 Example of a typical highly folded ore and rock found at the GFM with 10 cm integration marks for subsequent core cutting for lab testing (SGS / Minalyze/ Glencore Trial 2017).

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.

CONTACT US

MINERALS@SGS.COM
WWW.SGS.COM/FAST

WWW.SGS.COM

WHEN YOU NEED TO BE SURE

SGS