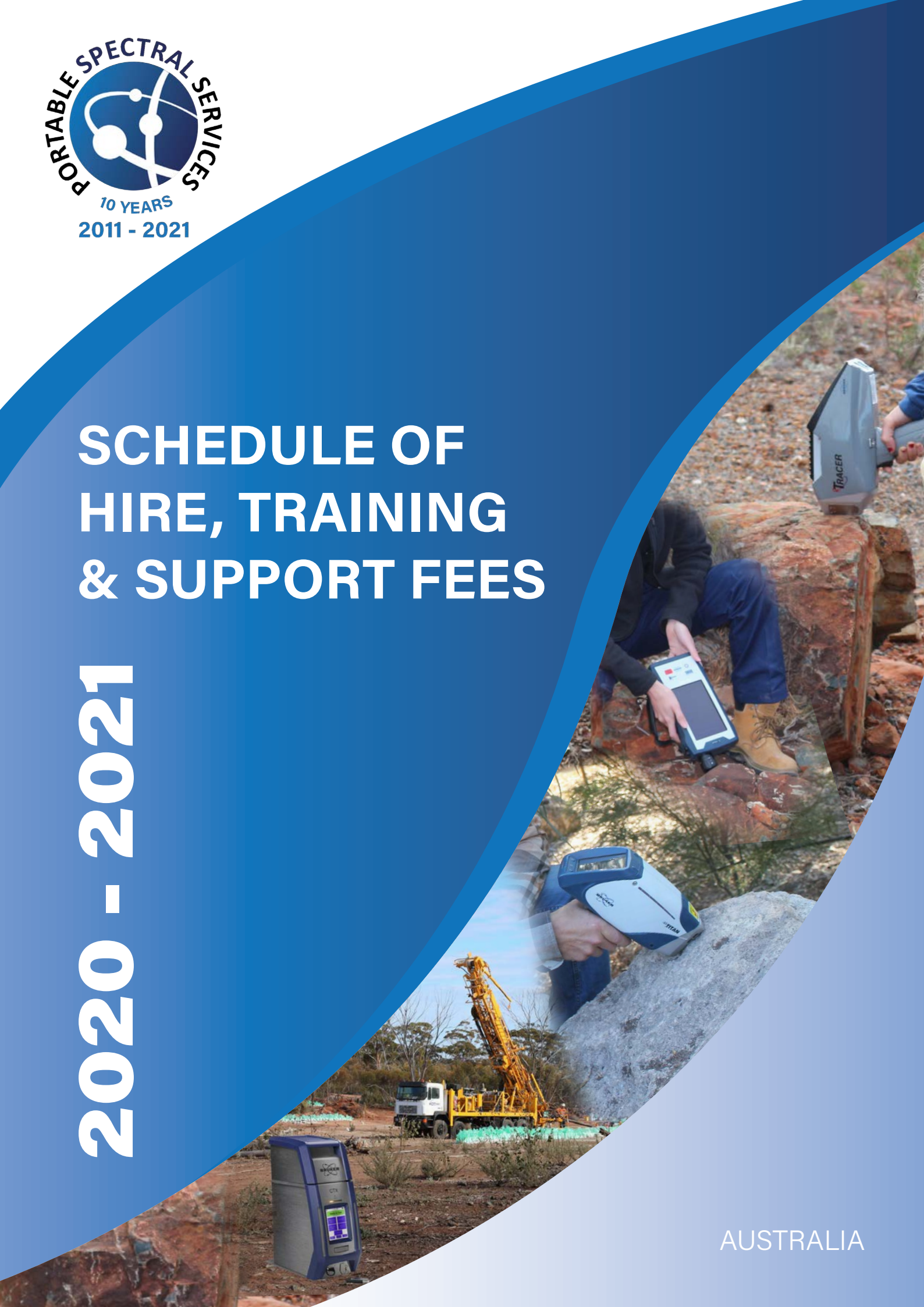
PORTABLE SPECTRAL SERVICES

10 YEARS

2011 - 2021

SCHEDULE OF HIRE, TRAINING & SUPPORT FEES

2020 - 2021



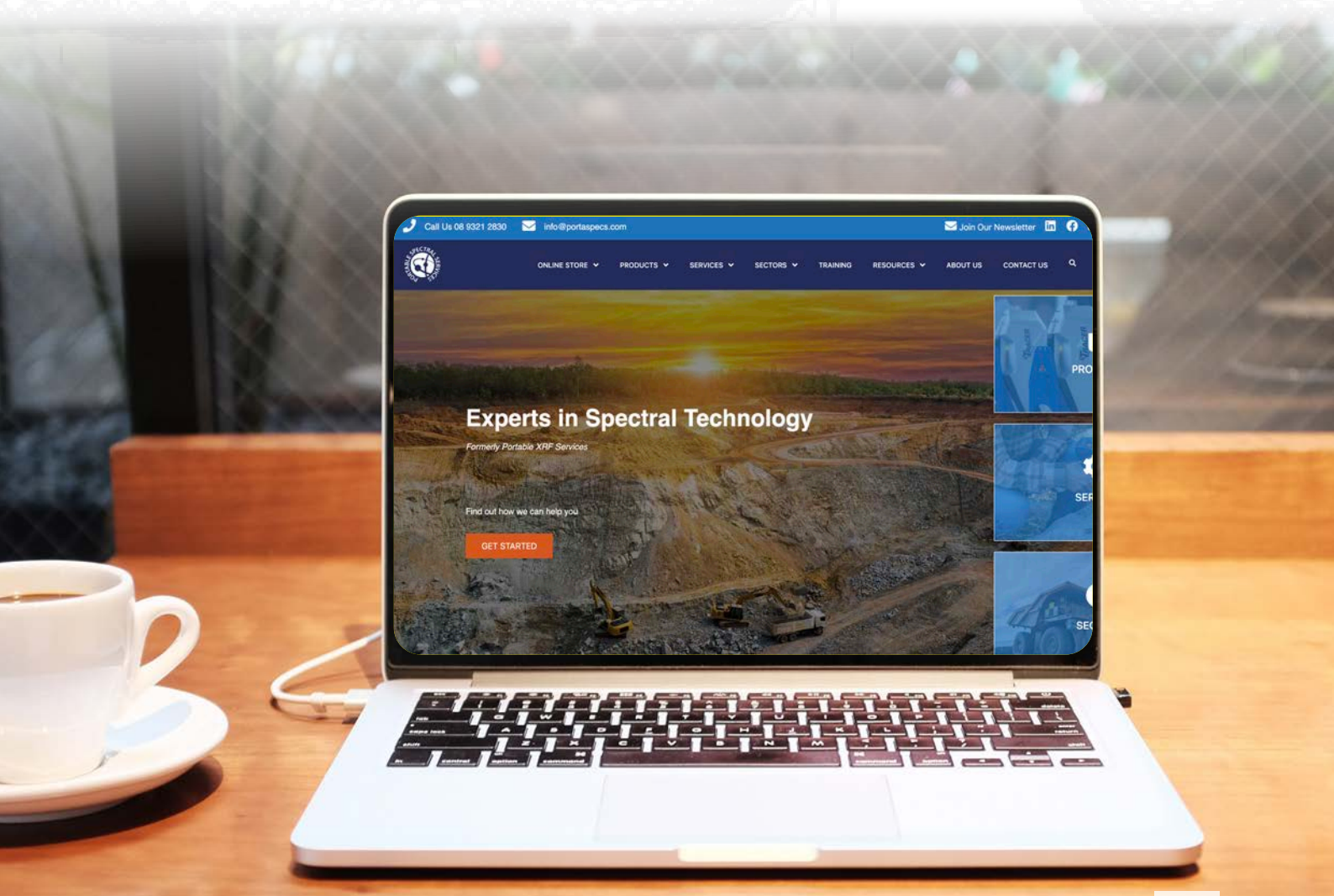
AUSTRALIA

HIRE FROM ANYWHERE!
WITH ONLINE BOOKING

The days of waiting for business hours to organise a hire are over. Hire at your leisure with **Portable Spectral Services**' online hiring service. Now located in one convenient place, customers can browse available instrument options such as portable XRF, NIR/SWIR, FTIR, Raman and book in the required training at the same time.

Get decked out with the best accessories for your next hire. Purchase wherever, whenever, at the click of a button. Improve your QAQC with our CRM kits and purchase windows, cleaning brushes, screwdrivers and more from our range of accessories!

Visit us at
www.portaspecs.com/store



EQUIPMENT AT THE RIG

Bring the laboratory into the field & analyse samples in real time!

With the advancement and portability of spectral equipment, decisions based on chemistry and mineralogy, can be made at the rig or in the field in real-time. **Portable Spectral Services** has a proven track record of supplying quality equipment into the field to support exploration and mining projects.

INSTRUMENT SUMMARY & TARGET MATERIALS

INSTRUMENT	SPECTRAL CHARACTERISTICS	CHEMICAL CHARACTERISTICS	QUALITATIVE Vs QUANTITATIVE	TARGET MATERIALS	HIRE	CONSULTING	SERVICING	COMPLIANCE	TRAINING	CONSUMABLES
NIR-SWIR	✓		Semi quantitative	Inorganic and organic compounds containing H_2O and OH- (Al, Fe, Mg), CO_3, NH_4, PO_4, BO_3, AsO_4, VO_4	✓	✓	✓		✓	✓
pRAMAN	✓		Qualitative	Inorganic and organic compounds	✓	✓			✓	
FTIR (ATR)	✓	✓	Qualitative & Quantitative	Inorganic and organic compounds and predicted chemical analysis	✓	✓			✓	
pXRF		✓	Quantitative	Chemical analysis of solids and liquids	✓	✓	✓	✓	✓	✓

FROM SMALL BEGINNINGS TO EXCITING FUTURES

CELEBRATING 10 YEARS

Portable Spectral Services (formerly Portable XRF Services) was established in Perth, Western Australia in 2010. The company began with the mission to provide an independent voice to the ever-increasing portable XRF market.

We have since grown substantially to become a **unique provider for all kinds of spectral technology, training & licensing.** We pride ourselves on delivering **a standalone voice** for a wide range of services, sectors and products.

At **Portable Spectral Services**, we provide quality service to industry specific needs. By imparting **expert knowledge** and reaching farther with **innovative applications**, our staff enable clients to push scientific boundaries and surpass project goals.

Our company is founded on a strong commitment to research and development in order to consistently meet dynamic industry demands. Having a comprehensive array of services allow us to work across a large range of industries, with a focus on client needs and project goals.

Portable Spectral Services offers a comprehensive suite of spectral instruments for hire and purchase. We can help you decide which option best suits your project needs.

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SPECTRAL INSTRUMENT RENTALS

There is an increasing application of spectral technology in all disciplines to characterise and identify materials in a non-destructive manner.

Spectral instruments can provide high speed, real time analysis of your sample. The derived spectra is the sample's unique "DNA" enabling organic and inorganic compounds to be identified and qualified.

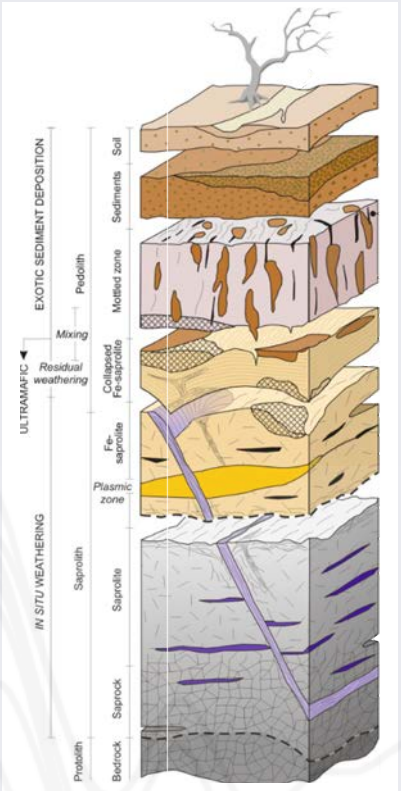
INFRARED SPECTROSCOPY

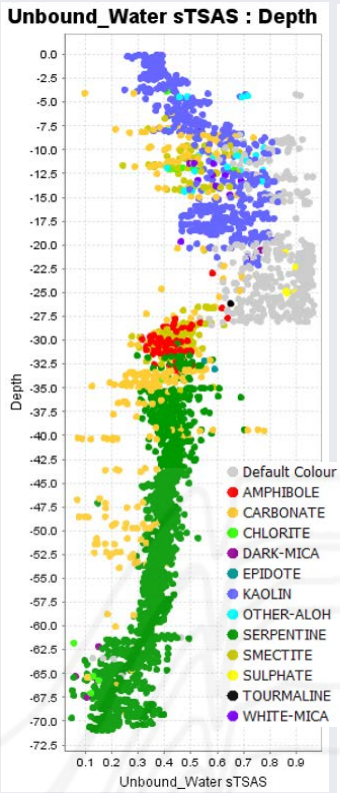
Infrared spectroscopy offers **rapid identification and characterisation of minerals** active in the NIR-SWIR range. Common minerals and mineral groups that can be identified include hematite, goethite, kaolin, gibbsite, garnet, pyroxene, amphibole, epidote, apatite, tourmaline, topaz, clay, mica, chlorite, serpentine, carbonates, hydrous silicates and rare earth minerals. The scan information can be used to identify and characterise mineralogy to **map alteration zones** associated with various ore forming processes.

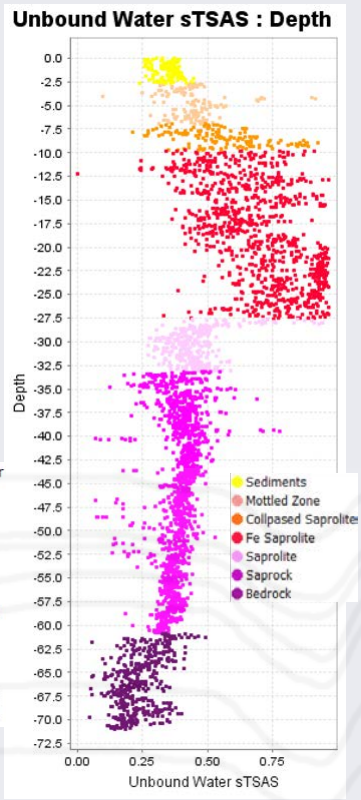
For best results, it is recommended to verify mineral analysis by an alternative technique.

CODE	INSTRUMENT	DESCRIPTION	APPLICATION	PRICE PER DAY*
NIR-01 	High-resolution TerraSpec 4	The TerraSpec 4 is the work horse to rapid identification and characterisation of minerals active in the NIR-SWIR range	Identification and characterisation of minerals active in the NIR-SWIR range	$400

*Price based on two week rental rate







Infrared Spectroscopy excels when applied to weathered and altered rocks, as many of the minerals can be challenging to map visually or with other common spectroscopic tools.

RAMAN SPECTROSCOPY

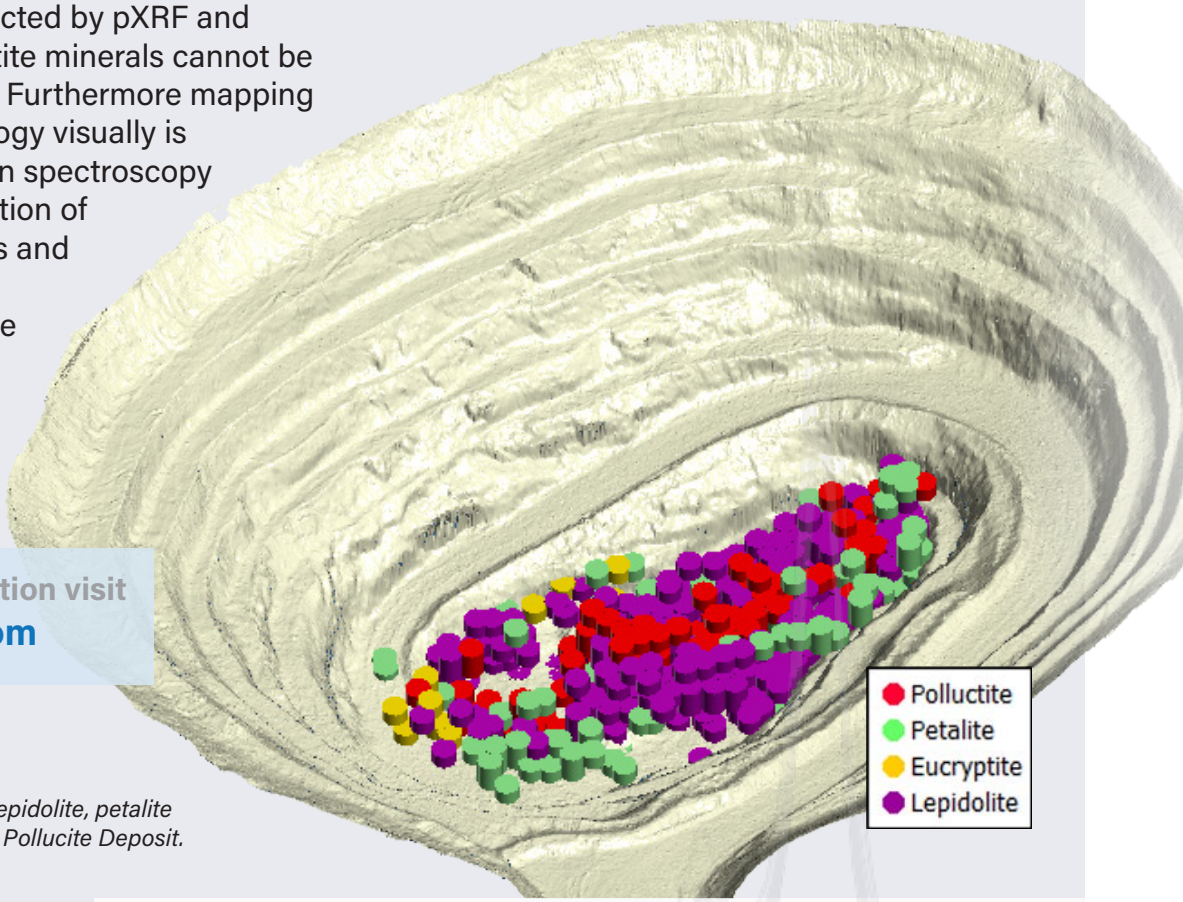
The application of Raman spectroscopy in the exploration and mining industry compliments and enhances established methods for grade control and ore sorting.

Raman spectroscopy is a **laser based vibrational technique** that generates a unique spectrum, which is matched to a known mineral using an extensive inhouse mineral library. The technique is **non-destructive** and provides a **rapid method to identify minerals** in drill core, rock chips or hand specimens. In addition, mineral assemblages and spectral features related to the project geology can be extracted using spectral software to enhance spectral interpretation.

CODE	INSTRUMENT	DESCRIPTION	APPLICATION	PRICE PER DAY*
RAM-01 	Portable RAMAN (Bruker Bravo)	The Bruker BRAVO has a duel laser system to minimise fluoresence and is ideal for geological investigation and product QAQC	Identification and characterisation of minerals, pharmaceutical products etc.	$305

*Price based on two week rental rate

Lithium is not detected by pXRF and anhydrous pegmatite minerals cannot be detected by SWIR. Furthermore mapping pegmatite mineralogy visually is challenging. Raman spectroscopy excels in the detection of pegmatite minerals and produces reliable analysis to separate subtle changes in pegmatite mineralogy.



Distribution of pollucite, lepidolite, petalite and eucryptite at Sinclair Pollucite Deposit.

For the latest information visit
www.georaman.com

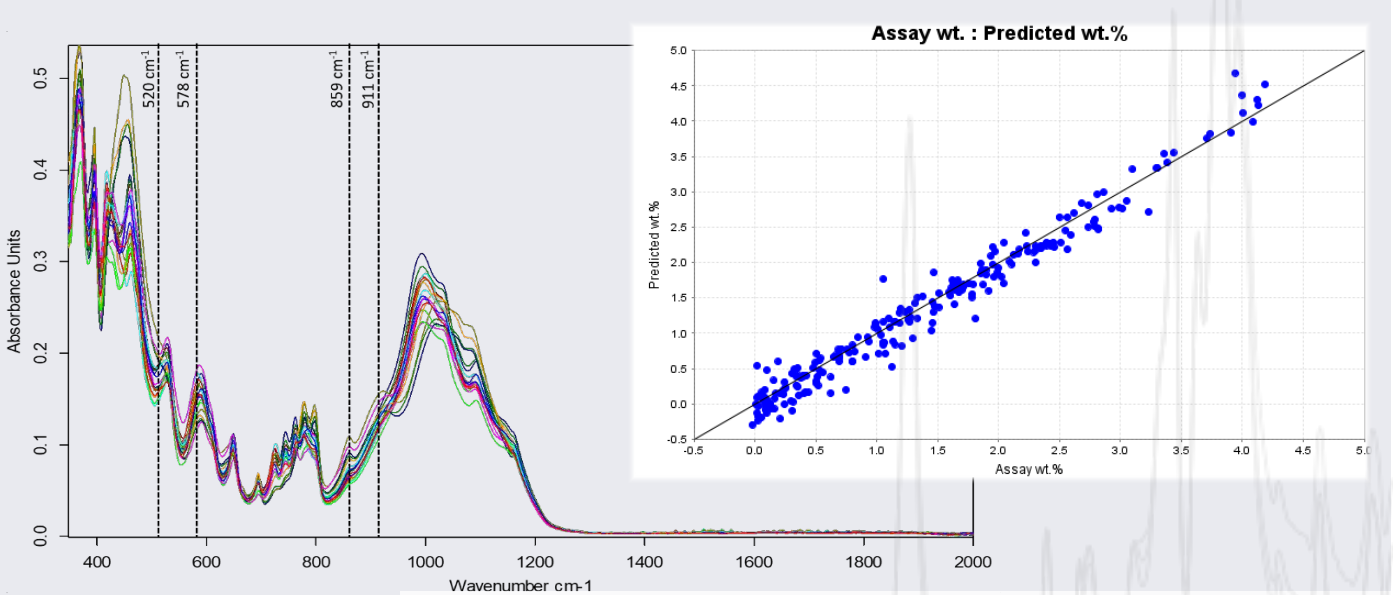
FOURIER TRANSFORM INFRARED SPECTROSCOPY (FTIR)

The FTIR instrumentation obtains an **absorption or emission spectrum in the thermal infrared region** for a solid, liquid or gas. Minerals have unique molecular structures that vibrate upon excitation by an energy source. The resultant spectrum will be characteristic of a mineral, based on it's molecular bonding.

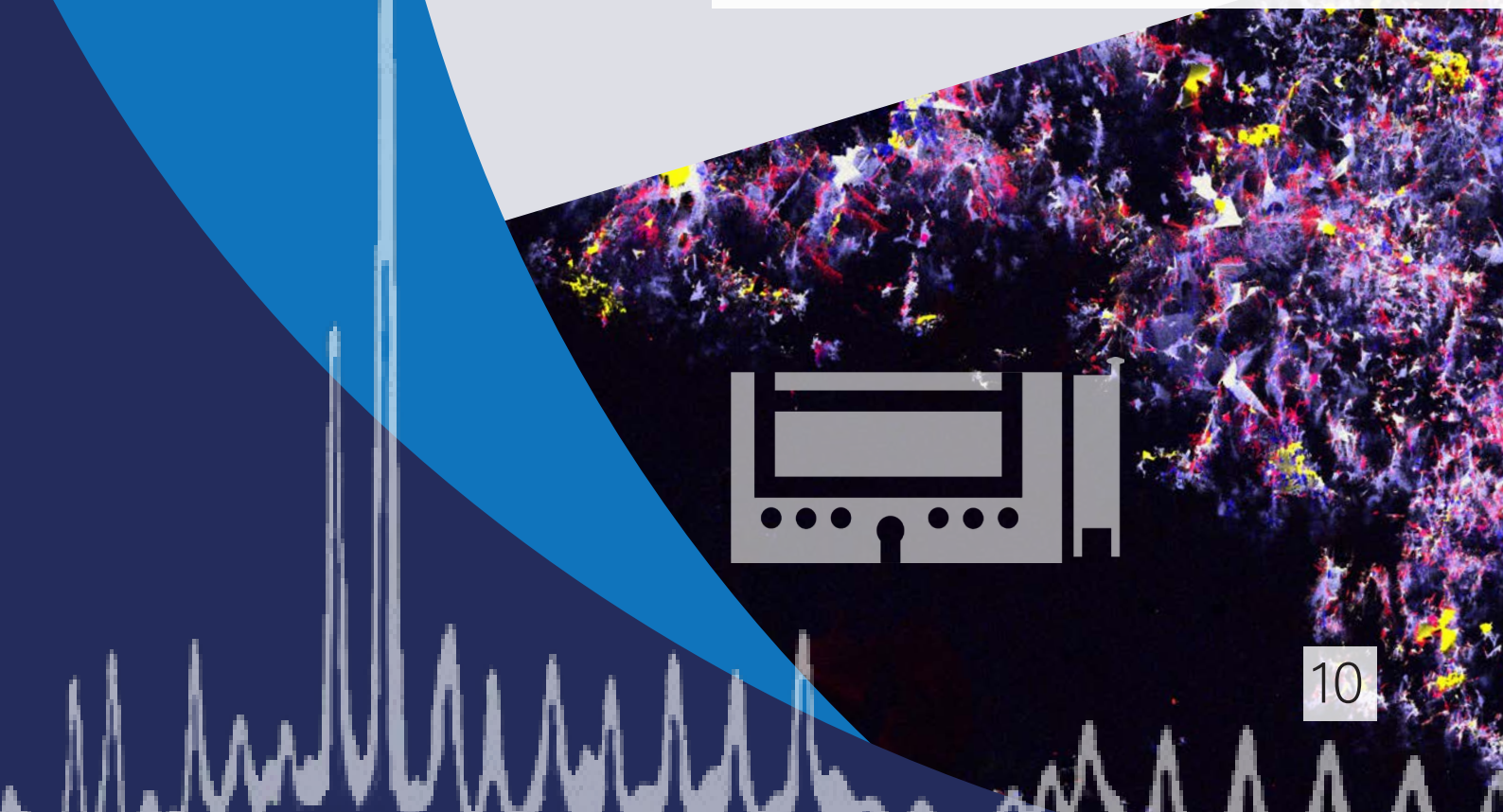
Portable Spectral Services has developed a set of FTIR mineral applications using standard analytical pulps to determine the **weight percent of selected minerals** using **Attenuated Total Reflection** (ATR-FTIR). As a result of the **rapid analysis time** (<1 min), FTIR is **ideal for screening large volumes of sample pulps.** Immobile and larger samples (e.g. chips and core) can also be analysed with ease. Individual mineral phases can be targeted using the onboard video camera to record exact measurement positions. Through extensive R&D, **Portable Spectral Services** have investigated numerous mineral systems and developed in-house expertise that offers **customised matrix matched** and **site specific setups**, which can include process specific parameters.

CODE	INSTRUMENT	DESCRIPTION	APPLICATION	PRICE PER DAY*
FTR-01 	FTIR (ATR)	Ideal for analysing powders, liquids and solids	Identification, characterisation and quantification of inorganic and organic materials e.g. minerals and pharmaceutical products	$235
FTR-02 	FTIR (DRIFT)	Ideal for analysing soils and powders	Identification, characterisation and quantification of inorganic and organic materials e.g. minerals and pharmaceutical products	$225
FTR-03 	FTIR (reflectance)	Ideal for analysing solids such as rock and drill core	Identification, characterisation and quantification of inorganic and organic materials e.g. minerals and pharmaceutical products	$225

*Price based on two week rental rate

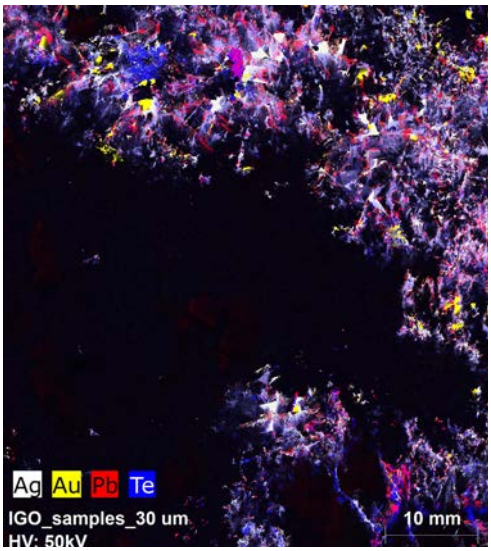


MICRO XRF INSTRUMENT RENTAL



MICRO XRF

Micro XRF is an ideal method for **element mapping** large samples (up to 19 x 16 cm) with little or no sample preparation. The technique is **rapid** and **non-destructive**, and is used to quickly acquire **qualitative** and **quantitative** geochemical data at high spatial resolution (i.e. μm-scale). Measurements are collected either under normal atmospheric conditions (air) or under vacuum for the detection of elements from **sodium (Na) to uranium (U)** with quantification limits ranging from parts per million to percentage.



ELEMENT AND MINERAL MAPPING

Element mapping and identification of mineral phases, in situ, at the micron scale on drill core, drill chips, hand specimens, thin sections etc.

CODE	DESCRIPTION	APPLICATION	PRICE PER SAMPLE**
μXRF-01	Routine scan: scan a standard set area and resolution (1.5 hour scan) and receive a standard report	Elemental mapping drill core, thin sections and rock samples to investigate process and association	$295.00
μXRF-02	Customised scan for targeted projects goals and objectives, high resolution, large sample size	In depth element mapping investigation to determine process, paragenesis and fluid pathways	$50.00 - 95.00* per hour
CHEM-M4	Element verification and standard report	Verifying element distribution maps	$200.00
AMCS-M4	Semi-automated mineralogy, mineral anatomy, distribution and deportment	Identify preliminary geometallurgical and ore quality parameters	$200.00 per hour (capped at 2 hours)

*price will vary depending on length of scan

** For atypical samples that may require more extenisve chemical or mineral processing beyond the standard parameters. Any additional processing required will only be performed with the clients prior approval.

For the latest information visit www.microXRF.com.au

ADVANCED MINERAL IDENTIFICATION & CHARACTERISATION SYSTEM (AMICS)

Automated mineralogy via AMICS (Advanced Mineral Identification & Characterisation Software) is used to **identify mineral phases**, in situ, at the **micron scale** on drill core, drill chips, hand specimens, thin sections etc. The software identifies the sample mineralogy from geochemical data collected by a micro-XRF instrument.

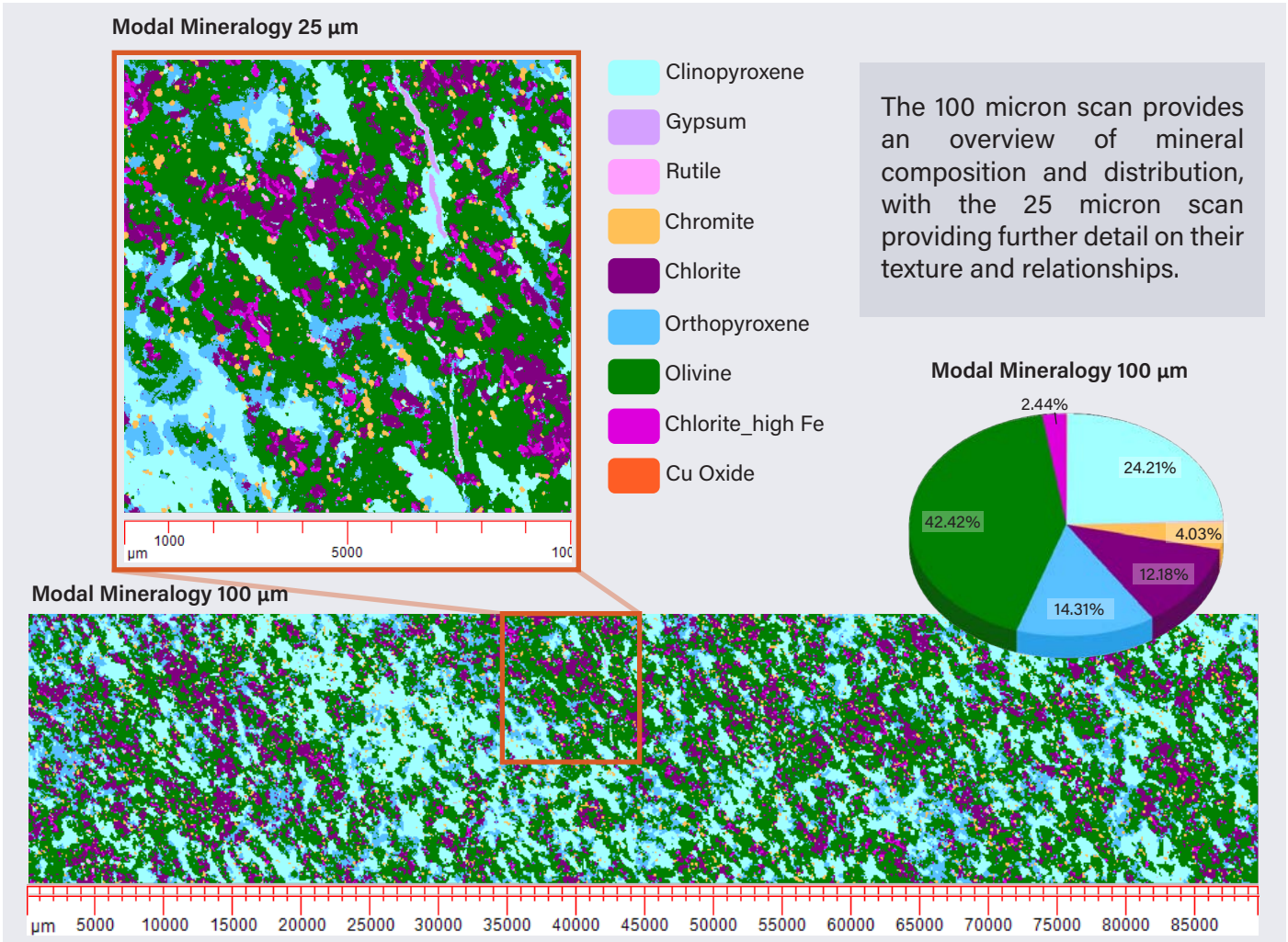
As well as identifying the minerals present, the mineralogy maps allow **visualisation of the textures and spatial arrangements of the minerals.** The processed maps can thus be used to determine grain sizes and shapes, as well as provide information on the mineral associations, mineral liberation, elemental deportment and elemental mapping.

AUTOMATED MINERALOGY VIA AMICS

Identify mineral phases, in situ, at the micron scale on drill core, drill chips, hand specimens, thin sections etc.

CODE	DESCRIPTION	APPLICATION	PRICE PER SAMPLE**
AMCS-M4	Semi-automated mineralogy, mineral anatomy, distribution and deportment	Identify preliminary geometallurgical and ore quality parameters	$200.00 per hour (capped at 2 hours)

** For atypical samples that may require more extenisve mineral processing beyond the standard parameters. Any additional processing required will only be performed with the clients prior approval.



PORTABLE XRF RENTAL

Portable XRF analysis can be used to screen **large volumes** of soil samples, drill pulps and grade control samples for a wide range of **trace and ore grade elements** quickly and efficiently, while the standard laboratory test is relatively costly, time consuming and chemical-intensive.

PORTABLE XRF RENTAL

The portable X-ray Fluorescence (pXRF) technique generates indicative element concentrations through the use of a generic calibration setup. By using the pXRF with the accompaniment of a thorough QAQC procedure, you will be able to acquire a comprehensive element and concentration range that is ideal for:

- Investigating the composition of most materials
- Screen large volumes of samples, quickly and efficiently
- Receive reliable instant results on site
- Analyse with minimal sample preparation

CODE	INSTRUMENT	DESCRIPTION	APPLICATION	PRICE PER DAY*
XRF-01 	Premium pXRF Instrument	Ideal for general use on most materials. Element range between Mg (Z_{12}) and U (Z_{92})	Chemical analysis of soils, PMI, RoHS, scrap metal, precious metals, etc.	$240
XRF- 02 	Standard pXRF Instrument	Ideal for general use on most materials. Element range between Mg (Z_{12}) and U (Z_{92})	Routine chemical analysis of soils, pulp and geological materials	$195
XRF-04 	Portable CounterTop XRF	Self-contained, safety interlocked pXRF, no operator licence required, ideal for general use on most materials. Element range between Mg (Z_{12}) and U (Z_{92})	When radation safety is paramount, ideal for large sample volumes	$230

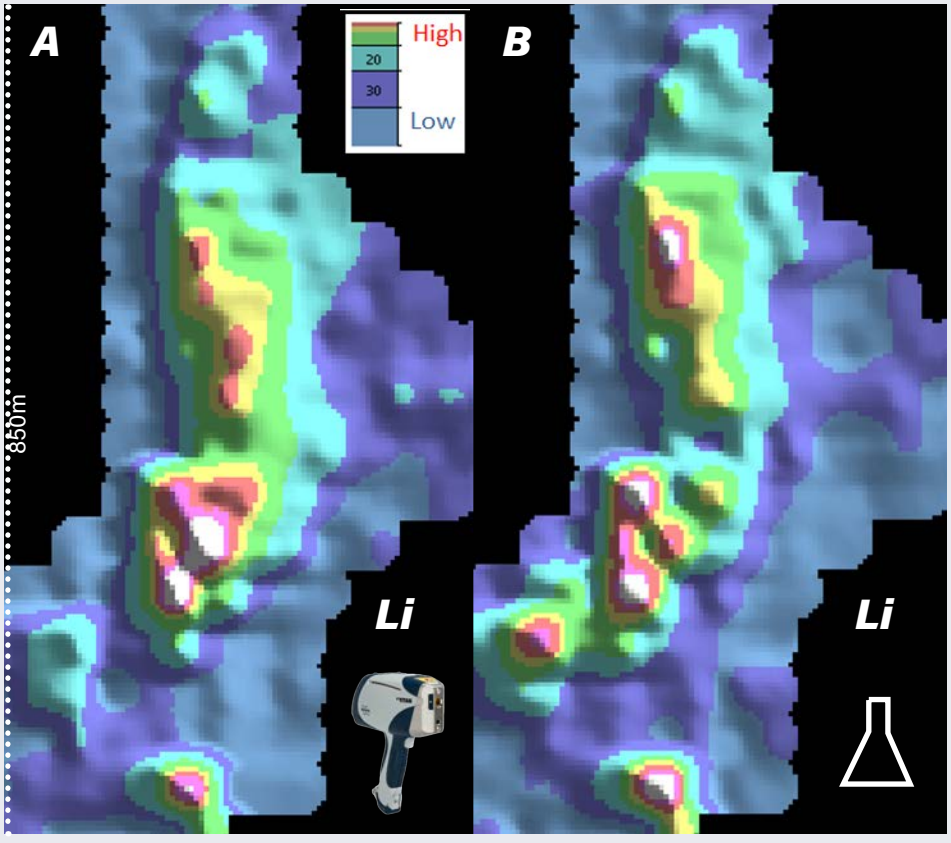
*Price based on two week rental rate

PORTABLE XRF INSTRUMENTS; ENHANCED CALIBRATIONS

Through our extensive Research and Development program and a proven track record, **Portable Spectral Services** has partnered with Bruker to offer manufacturer approved and client specific calibrations, which provide superior results to the generic calibration and standardisation approach. This enables additional elements to be included and more precise and accurate concentration ranges.

CODE	INSTRUMENT	DESCRIPTION	APPLICATION	PRICE PER DAY*
XRF-03 	epXRF instrument with enhanced calibrations	The enhanced calibration enables flexibility with element suites that have improved precision and accuracy	Grade control, speciality element suites (e.g. LCT pegmatites, REE etc.), Foreign body investigation, agriculture, etc.	$260
XRF-05 	Portable CounterTop XRF with enhanced calibrations	Self-contained, safety interlocked pXRF, no licence required, enhanced calibration enables flexibility with element suites improved precision and accuracy	When radiation safety is paramount, ideal for large sample volumes e.g., grade control, site & clean-up investigations	$270

*Price based on two week rental rate



Lithium cannot be directly measured by portable XRF as it is too light. A lithium index was developed to provide predicted lithium values infield to achieve a full suite of critical elements in the one analysis.

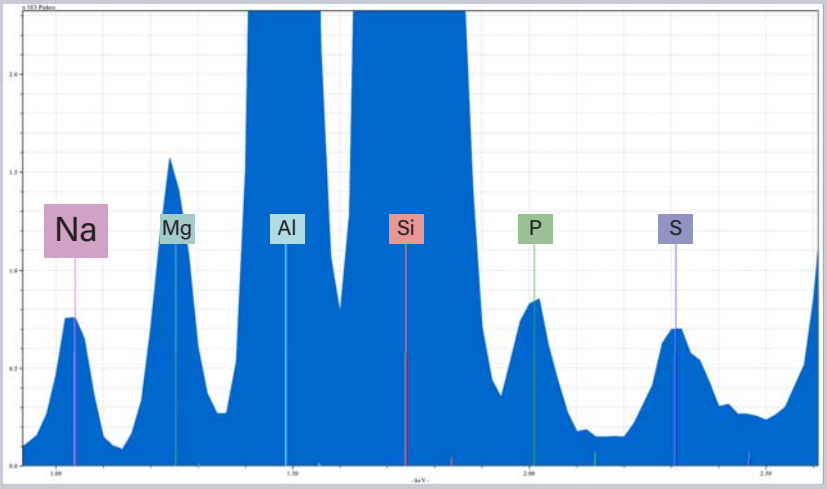
An example of an enhanced calibration detecting lithium using a Bruker Titan (A) compared to laboratory assays (B), samples taken in a 200 x 50m grid; n = 207

ADVANCED PORTABLE XRF SPECTROMETER

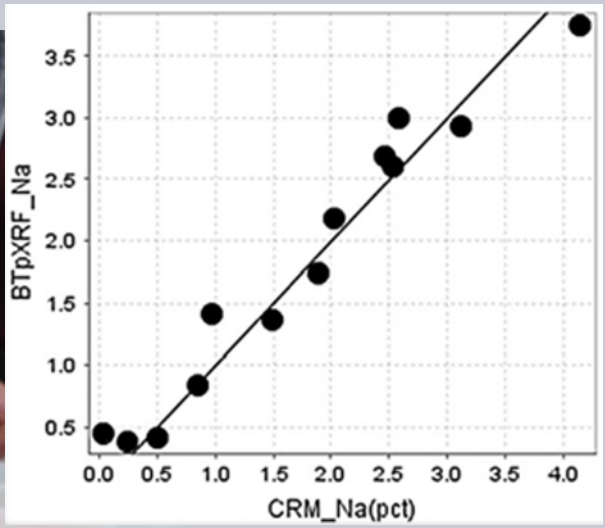
The Advanced Portable XRF Spectrometer (Bruker's TRACER 5g) enables the user full control of the instrument setup and is ideal for method development, research and development and investigating complex materials. It can detect F to U (with He atmosphere) and analyses Na to U (under standard conditions).

CODE	INSTRUMENT	DESCRIPTION	APPLICATION	PRICE PER DAY*
XRF-06 	Advanced pXRF instrument	Methods development, research and complex materials. Element range between Na (Z_{11}) and U (Z_{92}) with helium	Art, conservation and archaeology, forensic investigation, academic uses, research and development applications	$320

*Price based on two week rental rate



The Tracer 5g can be used on site to push the limits of the detectable elemental range. Sodium is not detectable with benchmark pXRF instruments. With the ability to create a helium atmosphere with the handheld Tracer, light elements can be accurately detected onsite, like never before.



The spectrometer above the rest.

The Bruker Tracer 5g is a powerhouse worth witnessing.

A SELECTION OF AVAILABLE CALIBRATIONS*

If you are unsure about which instrument and calibration best suits your application, our technical staff are more than happy to provide specialised knowledge to make sure you are provided with a unit that best fits your application.

CODE	APPLICATION	DESCRIPTION	TYPICAL INSTRUMENT	TYPICAL MARKET
cGEO1	GeoExploration	Geoexploration calibration is a fully comprehensive calibration, aimed at exploration and mining with light element capability (Mg to U) and trace to major concentration ranges	Titan CTX Tracer	Mining & Exploration
cGEO2	Enhanced (He)** GeoExploration	**Enhanced** Geoexploration calibration is a fully comprehensive calibration, aimed at exploration and mining with light element capability (Mg to U) and trace to major concentration ranges	Titan CTX Tracer	Mining & Exploration
cRCK	Whole Rock (He)**	**Whole rock** analysis including Na_2O, SiO_2, TiO_2, Al_2O_3, Fe_2O_3, MnO, MgO, CaO, K_2O, P_2O_5, Ba, Cr, S, Zr	Tracer 5g	Mining & Exploration
cGAU	Gold Pathfinder	**Enhanced** geochem scan including Ag, As, (Au), Bi, Cu, Hg, Mo, Ni, Pb, S, Sb, Se, Te, W, Zn, Cr, Sr, Ti, Zr	Titan CTX Tracer	Mining & Exploration
cLCT	Lithium Index	**Lithium calibration** targeting Li**, Cs, Ta, Nb, Ga, Rb, Tl, Sn, W, Ba, Ce, Cr, La, Sr, Ti, Y, Zr	Titan CTX Tracer	Mining & Exploration
cLAT	Laterite	Common elements enriched in the laterite and regolith	Titan CTX Tracer	Mining & Exploration
cREE	Rare Earth Elements	Enhanced **REE calibration** targeting La_2O_3, CeO_2, Pr_6O_{11}, Nd_2O_3, Sm_2O_3 , Eu_2O_3, Gd_2O_3, Y_2O_3	Titan CTX Tracer	Mining & Exploration
cPGE	Precious Metals	Enhanced PGE calibration targeting Ag, Au, Pd, Pt, Ru, Rh	Titan CTX Tracer	Mining & Exploration PMI
cMUD	Mudrock (He)**	Common elements enriched in the laterite and regolith Al, As, Ba, Ca, Co, Cr, Cu, Fe, K, Mg, Mn, Mo, Ni, P, Pb, Rb, S, Si, Sr, Th, Ti, V, Zn Zr	Tracer 5g	Oil and Gas
cLST	Limestone	**Limestone and dolomite calibration** for use both on powder and solid rock, Al_2O_3*, CaO*, Fe_2O_3*, K_2O*, MgO*, MnO*, P_2O_5*, SO_3*, SiO_2*, TiO_2*	Titan CTX Tracer	Construction
cCMT	Cement (He)**	**Cement calibration** for critical elements including Na_2O, SiO_2, SO_3, TiO_2, Al_2O_3, CaO, Fe_2O_3, K_2O, MgO, MnO, P_2O_5	Tracer 5g	Construction
cMAR	Maritime Sulfur (MARPOL)	**MARPOL** measurement of sulfur in maritime Fuels 0.01 -1% wt.% S	CTX	Maritime Engineering
cWAR	Wear metals	Indicative wear elements including Ag, Al, Cu, Cr, Fe, Ni, Pb, Sn, Ti	CTX	Maritime Engineering
cADD	Oil additives	Key additive elements including Ba, Ca, Mg, Mo, S, P, Zn	CTX	Maritime Engineering

* Calibrations listed are based on Bruker instruments.

** He refers to helium purge

A SELECTION OF AVAILABLE CALIBRATIONS*

CODE	APPLICATION	DESCRIPTION	TYPICAL INSTRUMENT	TYPICAL MARKET
cSHM	Heavy Metals	**Heavy metals calibrations** for environmental compliance and elemental nutrients in soil	Titan CTX	Agriculture Environment
cFTZ	Fertiliser	**Fertiliser calibration** for liquid fertilisers in sample cups, light and heavy elements	CTX	Agriculture Environment
cFOS	Food Safety	**Food safety calibration** designed to measure Foodstuff, packaging and food contact materials	Titan CTX	Agriculture Food Safety
cFOQ	Food Quality	**Food quality calibration** designed to measure nutrients and fortificants in foodstuff; includes powdered check sample	Titan CTX	Agriculture Food Safety
cFOP	Plant Materials	**Plant Calibration** targeting light and heavy elements in simple matrix plant materials	Titan CTX Tracer	Agriculture Food Safety
cFTR	Filter & Dust Wipes	**Filter & Dust Wipes Calibration** to measure hazardous elements on air filters, lead wipes, dust wipes	Titan CTX	Manufacturing
cSHV	Shavings & Turnings	**Shaving and Turnings Calibration** for small samples and stand off measurements	Titan CTX	Manufacturing
cASG	Alloys SmartGrade	**Alloy SmartGrade Alloy calibration** with light element (LE) capability for stainless steels, tool steels, low alloy steels, nickel alloys, cobalt alloys, copper alloys, zinc alloys, light (Al, Mg and Ti) alloys. Alloy grade library with UNS ISO alloy code and separate DIN grades, user editable and expandable	Titan	Manufacturing Positive Metal Identification
cGLS	Glass (He)**	**Glass calibration** for Al_2O_3*, As_2O_3*, BaO*, CaO*, CdO*, CeO_2*, CoO*, Cr_2O_3*, CuO*, Fe_2O_3*, Ge, K_2O*, La_2O_3*, MgO*, MnO*, MoO_3*, Na_2O NiO*, P_2O_5*, PbO*, SO_3*, Sb_2O_3*, SiO_2*, SnO_2*, SrO*, Sn	Tracer 5g	Manufacturing Positive Metal Identification
cRSH	Restricted Materials	**Restricted materials calibration,** consumer products calibration package with light element capability (Al-Bi). For all ROHSII, CPSIA, PROP65, WHEE compliance applications and Cl and Br for halogen free testing	Titan CTX	Manufacturing Restricted Materials
cPBP	Lead in Paint	Calibration for **detecting lead** in paint and other associated elements e.g. Zn, Ti	Titan	Domestic Commercial
cSPC	Spectrometer Mode	Confirm element presence by analysis & spectral evaluation [F (Z_9) to U (z_{92})]	Tracer 5g	All

*Calibrations listed are based on Bruker instruments.

** He refers to helium purge

RENT TO BUY

Portable Spectral Services offers the option of renting to buy your portable XRF with low rates on all brand new Bruker products, including the CTX , S1 Titan and Tracer 5g.

Rent to Buy can provide your company the opportunity of operating a brand new instrument without the upfront expense of purchasing an instrument outright. In addition to this our *Rent to Buy* program recieves special support services.

KNOW THE BENEFITS

FREE TRAINING

Portable Spectral Services will train your staff for FREE in the operation of your instrument (max. 3 persons), so your staff feel confident to utilise your instrument independently. Refer to *TRAU-01* for further information.

ACCESS TO PSS SERVICE CENTRE

Should any equipment prove to be problematic, our service centre is here to help!

We provide rapid service if any items need to be repaired or replaced during the Rent to Buy period.

CERTIFICATION & SERVICING

At the end of the *Rent to Buy* period, the **Portable Spectral Services** service centre will undertake a **full compliance test** on your equipment and provide you with a certified report.

RENT TO BUY AVAILABLE INSTRUMENTS

CODE	INSTRUMENT	DESCRIPTION	APPLICATION	PRICE
BXRF-01 	pXRF Instrument	Ideal for general use on most materials. Element range between Mg (Z_{12}) and U (Z_{92}). Includes training, multi matrix calibration, annual servicing and compliance testing	Routine chemical analysis of soils, PMI, RoHS, scrap metal etc.	POA
BXRF-02 	Portable CounterTop XRF	Self-contained, safety interlocked pXRF, no operator licence required, element range between Mg (Z_{12}) and U (Z_{92}). Includes training, multi matrix calibration, annual servicing and compliance testing	When radiation safety is paramount, ideal for large sample volumes	POA
BXRF-03 	Advanced pXRF Instrument	Methods development, research and complex materials. Element range between Na (Z_{11}) and U (Z_{92}). Includes 2 days training, ARTAX, EASYCAL, multi matrix calibration, stand, helium, annual servicing and compliance testing	Art and conservation, forensic investigation, research and development applications	POA

Please refer to terms and conditions.

INSTRUMENT TRAINING

Knowledge is Power!

All our training is conducted by our in-house team of experts who are highly experienced across the full range of industries and commodities.

Our staff are trained to the highest standard on all instrumentation to ensure **Portable Spectral Services** provides quality and valuable training to our clients.

pXRF INSTRUMENT & DATA TRAINING COURSES

Portable Spectral Services is one of the few organisations recognised by all state regulators for the provision of radiation safety and theory in the use of portable XRF instruments.

To enable pXRF users to maximise the value from their instruments and data, **Portable Spectral Services** has developed a set of intermediate and advanced training courses.

These courses provide you with skills that will better equip you with getting more out of your current pXRF and data. We are here to help with setting up instrument conditions, instruments modes, read times, filters, benchmarking, pXRF SOP, QC practices, batteries, data handling, spectra, calibrations, instrument conditions, assist in putting meaning to numbers and many other areas so that the user understands.

- Instrument capabilities and limitations set up and parameters
- Designing and implementing appropriate QAQC protocols
- Data collection and data analysis
- Interrogating and understanding spectral features
- ... and more!

For the advanced user, **Portable Spectral Services** offers an advanced course on spectra and spectral matching. This course is ideal for the pXRF power user.

pXRF USER LICENCE ESSENTIAL TRAINING

AUSTRALIAN STATE & TERRITORY

CODE	ITEM	DESCRIPTION	PRICE*
TRAU-01	pXRF User Licence	Accredited radiation theory, pXRF instrument training and examination; all Australian States	$425
TRAU-02	pXRF User Licence (refresher course)	Refresher Course: pXRF instrument training for all Australian States	$250

* Price shown is per person

pXRF INSTRUMENT AND DATA TRAINING COURSES

CODE	ITEM	DESCRIPTION	PRICE*
TRN-01	pXRF Intermediate	Understanding pXRF, instruments types, modes, read times, filters, benchmarking, pXRF SOP, QC practices, batteries, data handling including practicals (half day)	$750
TRN-02	pXRF Advanced	Understanding data from the instrument, spectra, calibrations, instrument conditions, assist in putting meaning to numbers including an introduction to ARTAX spectral software (1 day)	$1500
TRN-03	pXRF Spectra	Spectral matching, fingerprinting, understanding the pXRF spectra in detail e.g. sum peaks, escape peaks, Bragg peaks, spectral lines and false positives (half day)	$750

* Price shown is per person

SPECTRAL INSTRUMENT & SOFTWARE TRAINING

To enhance your understanding of our spectral instruments, **Portable Spectral Services** offers a set of Spectral Instrument Training Courses so you can maximise the value of the hire and operate the instrument and software effectively and efficiently to achieve your objective.

Portable Spectral Services training courses can introduce you and your team to the basics of spectral technologies. Advanced courses are also available to teach clients specialised software such as TSG, OPUS and Artax.

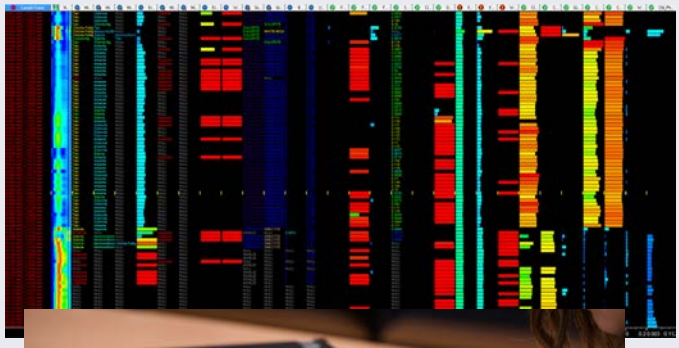
SPECTRAL INSTRUMENT & SOFTWARE FUNDAMENTAL TRAINING COURSES

CODE	ITEM	DESCRIPTION	PRICE*
pRAM-01	Raman Training	Raman instrument training, SOP's and introduction to OPUS software (4 hrs)	$900
FTIR-01	FTIR Training	FTIR instrument training, SOP's and introduction to OPUS software (4 hrs)	$900
SWIR-01	NIR Training	NIR - SWIR instrument training, SOP's and introduction to TSG software (4 hrs)	$900

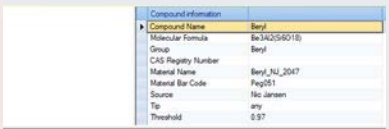
* Price shown is per person

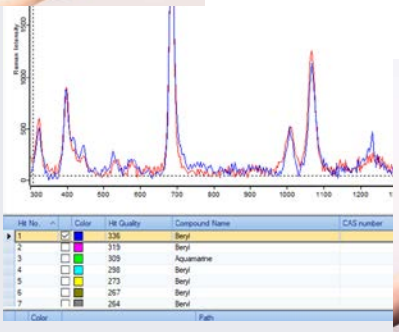
LEARN SPECIALISED SOFTWARE

TSG software is used for SWIR data processing for the identification of mineralogy and the application of scalars for relative mineral abundance, composition, and crystallinity.



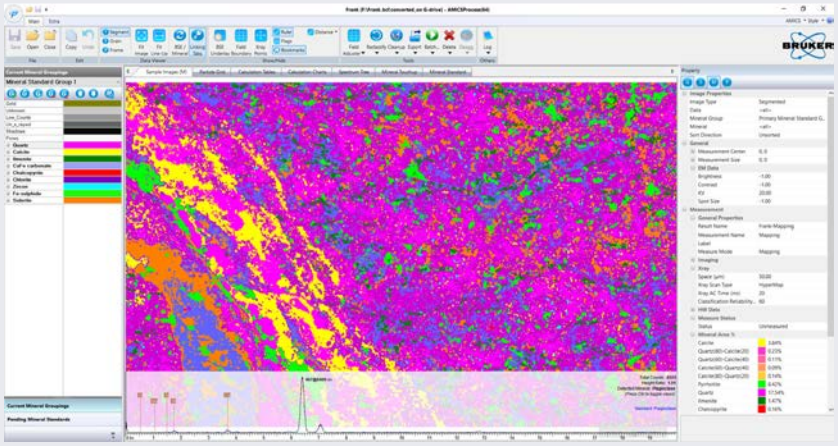
Raman and FTIR both have **onboard software** for data collection and interpretation. This data can then be further processed using **OPUS software** for FTIR and Raman mineral identifications and spectral manipulation.



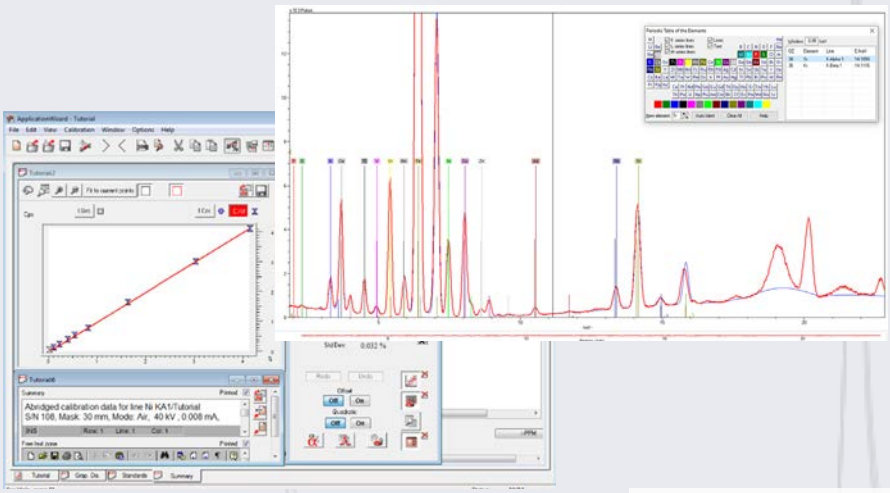


ADVANCED SPECTRAL INSTRUMENT & SOFTWARE TRAINING COURSES

CODE	ITEM	DESCRIPTION	PRICE
TRAC-01	Tracer (Basic)	Basic user training for TRACER 5G, including use of precious metals point-and-shoot calibration and connecting to BIT, EasyCal and ARTAX software (1 day)	$1800
TRAC-02	Tracer (Advanced)	Advanced user training for TRACER 5G including BIT Software encompassing selection of XRF excitation settings, qualitative spectral analysis, live spectrum functionality, grade table, limits and user field editor (1 day)	$1800
TRAC-03	Tracer (Basic & Advanced)	Basic and advanced training as TRAC-01 & TRAC-02 (2 days)	$3000
TRAC-04	Tracer (Custom)	Workshop designed to cover specific research areas including, agriculture, archaeology, art conservation & authentication, environmental & social responsibility, manufacturing materials, mudrock, multidisciplinary science education & research, soil & geochem, advanced scientific research or customised for your group	$4000
ECAL-01	EasyCal (Advanced)	Advanced EasyCal software training for empirical calibrations encompassing a selection of XRF excitation settings and qualitative analysis (1 day)	$1800
ATAX-01	ARTAX (Advanced)	Advanced ARTAX software training encompassing selection of XRF excitation settings, qualitative analysis, handling large datasets, Bayesian deconvolution (1 day)	$1800
AMIC-01	AMICS (Basic)	Advanced Mineral Identification Software (AMICS) training for mineral acquisition configuration and measurement control, sample management and automation in this SEM based system, software not included (3 days)	$4500



Advanced Mineral Identification Software (AMICS) allows for micro-XRF data to be further interpreted for mineralogy. At a micron scale, this specialist software enables advanced mineralogical interpretations such as semi-quantified mineralogy, predicted assays and grain size distributions.



Advanced Spectral Training offers the opportunity to develop your own skills to interrogate spectral data, create custom calibrations and develop rigorous data collection programs.

Custom training can provide specific applications to your area of research or project type.

PORTABLE XRF LICENSING & COMPLIANCE

To ensure our clients get full value from their instrument rental, **Portable Spectral Services** provides a complete and comprehensive set of services including pXRF user licencing, instrument competence, radiation testing and servicing along with all the consumables your project requires.

pXRF User/ Operating Licence

It is a legal requirement that an operator of a portable XRF instrument possesses a User Licence and the pXRF instrument is correctly licensed, registered and compliant for the jurisdiction in which it will be operated.

AUSTRALIA

Portable Spectral Services is recognised by all state regulators for the provision of Radiation Safety and Theory in the use of portable XRF, a pre-requisite for obtaining a user licence. **Portable Spectral Services** has been authorised by each state in Australia, to provide training and administer User Licence/Operator examinations.

CODE	ITEM	DESCRIPTION	PRICE*
TRAU-01	pXRF User Licence Training	Accredited radiation theory, Fundamental pXRF instrument training and examination; for WA, QLD, NSW, VIC, NT and SA. ACT recognises PSS course material	$425
TRAU-02	pXRF User Licence Training (refresher course)	Refresher course: Fundamental pXRF instrument training for WA, QLD, NSW, VIC, NT and SA. ACT recognises PSS course material	$250

* Price shown is per person

NEW ZEALAND

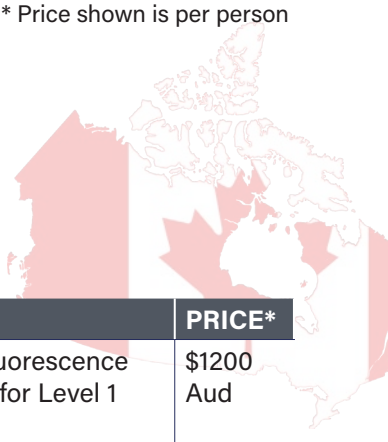
Portable Spectral Services has been authorised by New Zealand's Ministry of Health to provide training and administer User Licence/Operator examinations.

CODE	ITEM	DESCRIPTION	PRICE*
TRNZ-01	pXRF User Licence Training	Accredited radiation theory, fundamental pXRF instrument training and examination; New Zealand	$550 Aud

* Price shown is per person

CANADIAN ANALYZER OPERATOR CERTIFICATE

The National Resources of Canada (NRCan) have developed and implemented an XRF certification program which requires individuals who use portable handheld X-ray tube based open-beam XRF devices to be certified. **Portable Spectral Services** has been accredited by Canada's NRCan to provide training and administer User Licence/ Operator examinations.



CODE	ITEM	DESCRIPTION	PRICE*
TRCAN-01	Level 1 XRF Analyzer Operator Certificate	Natural Resources Canada (NRCan**) X-ray fluorescence (XRF) analyser operator certification training* for Level 1 (ISO 20807:2004 with modifications)	$1200 Aud
TRCAN-01 EX	Level 1 XRF Analyzer Operator Examination	Natural Resources Canada (NRCan**) X-ray fluorescence (XRF) analyser operator certification examination for Level 1	$300*** Aud
TRCAN-02	Level 2 XRF Analyzer Operator Certificate	Natural Resources Canada (NRCan**) X-ray fluorescence (XRF) analyser operator certification training* for Level 2 (ISO 20807:2004 with modifications)	$1200 Aud
TRCAN-02 EX	Level 2 XRF Analyzer Operator Examination	Natural Resources Canada (NRCan**) X-ray fluorescence (XRF) analyser operator certification examination for Level 2	$300*** Aud

* Price shown is per person
**NRCan XRF Analyzer Operator Certification is considered the gold standard for pXRF operators
***Examination costs are set by NRCan and may vary due to exchange rates

pXRF INSTRUMENT COMPLIANCE

AUSTRALIAN STATES AND TERRITORIES

In addition to the **User / Operator licence**, an important part of owning a portable XRF instrument is the **correct compliance**, which includes but is not restricted to:

- Instrument Registration
- Possession Licence
- Management Licence
- Radiation Compliance Certificate
- Radiation Management Plan (RPM)
- Relocation and Disposal notifications

STATE/TERRITORY	USER LICENCE	XRF REGISTRATION	POSSESSION LICENCE	MANAGEMENT LICENCE	RMP (PSS PROVIDED)	RELOCATION NOTICE	COMPLIANCE CERTIFICATE
Australian Capital Territory (ACT)	✓	✓	✓	✓	✓	✓	✓
New South Wales (NSW)	✓	×	×	✓	✓	×	×
Northern Territory (NT)	✓	✓	✓	×	✓	✓	✓
Queensland (QLD)	✓	✓	✓	×	✓	✓	✓
South Australia (SA)	✓	✓	✓	×	✓	×	✓
Tasmania (TAS)	✓	×	✓	×	✓	×	✓
Victoria (VIC)	✓	✓	×	✓	✓	×	×
Western Australia (WA)	✓	✓	×	×	✓	×	×

Compliance requirements in each Australian State and Territory varies along with licensing costs and registration time; failure to comply can result in hefty fines from the States radiation authorities. Over the last 10 years **Portable Spectral Services** has gained significant expertise in navigating these regulations and offers a service to clients to ensure regulatory compliance of their pXRF.

AUSTRALIAN STATE & TERRITORIES pXRF REGULATORY LICENSING & COMPLIANCE

CODE	ITEM	DESCRIPTION	PRICE
COMP-01	pXRF Licensing Preparation	Preparation of licensing paperwork including user, management, registration or possession licenses	$200
COMP-01a	Government Licensing Costs	Licensing application costs as per State & Territory	Cost + 10%
COMP-02	Radiation Management Plan	Radiation Management Plan created for your business in the State required	$400
COMP-03	pXRF Compliance Certificate	Compliance monitoring as approved by States & Territories of an open beam pXRF Instrument, includes certificate	$550
COMP-04	pXRF Licensing Check	Provide advice of the licensing required for the instrument and users as per State or Territory the instrument is in operation	$175 per instrument

SERVICES

pXRF INSTRUMENT SERVICE

Portable Spectral Services offers **Level 1 servicing** for **pXRF instruments** and **manufacturer approved Level 2 servicing** for all Bruker pXRFs along with other servicing needed to ensure full functionality of your instrument.

Over time and through constant use instruments accumulate and gather dirt which impact on functionality and operation of the pXRF.

1 Level

General diagnostics on all pXRF units within 48 hours

BATTERIES

Portable Spectral Services can recalibrate your battery back to its full working capacity.*

DIAGNOTICS

Portable Spectral Services have in-house expertise to diagnose hardware and software issues.

2 Level

BRUKER

Repair & replace key components of Bruker units.

SOFTWARE

As instruments improve, the software that controls their functionality is updated and can have a significant impact on the operation of the pXRF. It is always recommended to have the latest software onboard.

RECALIBRATION

Portable Spectral Services offers a full manufacturer approved recalibration service. A recalibration may be required from time to ensure consistent results. This may be due to new samples or elements being added, instrument drift etc.

pXRF SERVICING

CODE	ITEM	DESCRIPTION	PRICE
SERV-01	Level 1 Servicing	Systematic diagnostic testing program of the pXRF Instrument to identify problem and provide a recommended solution (within 48 hrs of receiving instrument)	$400
SERV-02	Level 2 Servicing	Manufacture approved replacement and/or repair of components, diagnostic verification testing, brief report (Bruker pXRF instruments only)	$600
SERV-02a	Replacement Component Costs	Manufacturer approved replacement components	Cost + 10%
SERV-03	Software Updates	Update to the latest software, diagnostic testing and functionality (recalibration not included)	$400
SERV-03a	Level 1 Servicing & Software Bundle	Systematic diagnostic testing program of the pXRF Instrument and software update and functionality testing (recalibration not included)	$600
SERV-04	Recalibration	Recalibration of instrument, additional samples and/or elements added to calibration, run, recalibrate, verify and report	$1500
SERV-05	Level 1 Clean	A 'static free' clean of the instrument head, detector and X-ray tube including free replacement window	$175 per instrument
SERV-05a	Level 2 Clean	Full deep clean of the instrument, case and components including a "static free" clean of the instrument head and free placement window to bring the instrument back to "new"	$375 per instrument
BATT-02	Battery Calibration	Recalibration of battery to bring it back to full working capacity*	$35

*Bruker and Olympus models only

pXRF INSTRUMENT FUNCTIONALITY

Your instrument needs to be regularly serviced to ensure it is in the best working condition. It is recommended to have a condition inspection on your pXRF carried out annually–regardless of whether the instrument has had daily or periodic use. It is a statutory requirement that compliance certificates are issued for open beam X-ray sources.

Portable Spectral Services is authorised by Australian States and Territories to conduct compliance monitoring, including:

- Instrument software checks and updates
- Battery check and recalibration if necessary
- Instrument stability and drift test
- Accuracy and precision of six elements over a range of concentrations and modes
- Radiation profile test of instrument to ensure compliance with state regulations
- Check of instrument accessories with recommendations

AUSTRALIAN STATES & TERRITORIES pXRF INSTRUMENT COMPLIANCE CHECKS

CODE	ITEM	DESCRIPTION	PRICE
FNCT-01	pXRF Condition Report	Full condition report on a PXRF instrument including stability & drift, accuracy and precision, radiation profiling, battery check, software checks, accessories, recommendations and compliance certificate	$950
FNCT-02	pXRF Functionality	Assessments of portable XRF instruments, along with recommendations on how to proceed with your instrument	$500
RAD-01	pXRF Radiation Profiling	pXRF instrument profiling to check radiation and radiation leakage including report	$425
DRFT-01	pXRF Stability and Drift	Test pXRF instrument for stability and drift through time including report	$425

CONSUMABLES & CERTIFIED REFERENCE MATERIALS

Your One Stop Shop!

CONSUMABLES

To ensure you get maximum value from your hire, **Portable Spectral Services** offers a number of consumable items that will enable you to work efficiently and effectively whilst obtaining quality measurements. Buy in person or online at our website www.portaspecs.com/store.


PCUP-01


ODD-01


ODD-02

BATT-01

PRE-ASSEMBLED CUPS

CODE	DESCRIPTION	PRICE
PCUP-01	pXRF cup with 4um Prolene pre-assembled	$6.00
PCUP-12	pXRF cup with 4um Prolene pre-assembled x12	$54.00
PCUP-48	pXRF cup with 4um Prolene pre-assembled; box x48	$180.00

pXRF BATTERIES

CODE	DESCRIPTION	PRICE
BATT-01	Battery replacement for Bruker or Olympus models	$400.00
BATT-02	Battery calibration for Bruker or Olympus models	$35.00

MISCELLANEOUS pXRF EQUIPMENT

CODE	DESCRIPTION	PRICE
ODD-01	pXRF cleaning brush for removal of fine dust	$15.00
ODD-02	Screwdriver for the purpose of changing pXRF windows	$15.00

INCORPORATE CUPS INTO YOUR WORKFLOW!

pXRF cups are a great asset to incorporate into your project workflow.

- Decrease risk of cross contamination on bulk analysis
- Reproducibility - re-analyse the same samples with ease
- Portable
- Easy storage and labelling

CERTIFIED REFERENCE MATERIAL

Certified Reference Material (CRMs), also referred to as 'standards', are an essential part of the daily use of portable XRF instruments. They enable us to evaluate the functionality and accuracy of our instrument readings and provides confidence in the quality of the obtained results.

Portable Spectral Services have a variety of CRMs that cover a wide range of matrices, elements and element concentrations. We also offer a range of certified reference material kits that are specifically aimed at a variety of environmental and mining settings.

INDIVIDUAL CRMs

CODE	ITEM	DESCRIPTION	PRICE
CRM-BK	Blank	A true blank with no detectable elements by pXRF	$75
CRM-SI	Silica Blank	High purity silica for use as a routine blank sample	$50
CRM-01	CRM	Single CRM, chosen to suit application	$35

CRM KITS

CODE	pXRF READY CRM PACKAGES	NO OF CRM'S PER PACK	PRICE
CP001	Porphyry Cu mineralised CRM's	4	$120
CP002	Sediment hosted Cu CRM's	10	$300
CP003	Sediment hosted Zn-Pb CRM's	8	$240
CP004	Magmatic Ni CRMs (paired)	14	$420
CP004a	Magmatic Ni CRMs	7	$210
CP004b	Magmatic Ni CRMs	7	$210
CP005	Lateritic Ni CRM's	13	$390
CP005a	Lateritic Ni CRM's Saprolite	9	$270
CP005b	Lateritic Ni CRM's Transition	4	$120
CP006	Uranium U CRM's	12	$360
CP006a	Uranium U CRM's primary	7	$210
CP006b	Uranium U CRM's	5	$150
CP007	Thorium Th CRM	9	$270
CP008	Rare Earth Elements REE CRM's	6	$180
CP009	Iron Fe CRM's	10	$300
CP010	Manganese Mn CRM's	7	$210
CP011	Gold Au CRM's	9	$270
CP012	Silver Ag CRM's	6	$180
CP013	Arsenic As CRM's	10	$300
CP014	Sulphur S CRM's	10	$300
CP015	Tin Sn CRM's	10	$300
	Lithogeochemical CRM's		
CP101a	Nickel Ni Lithogeochemistry	10	$300
CP101b	Copper Cu Lithogeochemistry	8	$240
CP101c	Zinc Zn Lithogeochemistry	10	$300
	Lithic Response		
CP102a	Calcium Ca CRM's	10	$300
CP102b	Magnesium Mg CRM's	9	$270
CP102c	Potassium K CRM's	9	$270
CP102d	Ti-Zr (Hallberg) CRM's	5	$150

What CRMs should you use?

Measurement of elemental concentration with pXRF is subject to sample matrix effects due to the interaction of X-rays with minerals and elements within the sample.

For this reason, when selecting CRMs to use you should choose an appropriate matrix. For example, if you are measuring soils to look for a nickel sulphides use a soil CRM to assess the elements that are important to that project NOT a nickel sulphide CRM.

If you would like assistance in identifying or purchasing CRMs appropriate for your project, contact us at info@portaspecs.com

RENTING vs BUYING

All businesses need a competitive edge. As everyone pours over the balance sheets and aspects of the business to find advantages, it can pay to explore and compare the costs of renting or leasing equipment versus the expenses of buying and owning. All businesses cannot afford to have ill matched instruments sitting idle and unused.

Portable Spectral Services offers a comprehensive inventory of equipment for rent and purchase. We can help you decide which option best suits your business needs, whether it be rental, ownership or a combination of both.

When Considering the Decision to Rent or Buy Factor in:

- How long is the instrument needed?
- Estimated rental cost for the period
- Approximate cost of a new instruments
- Availability of instruments
- Frequency of instrument use
- Possible, multiple spectral instruments required
- Cost of having instruments siting idle and unused
- Capability to test, maintain and service machines
- Instrument licencing, safety, compliance, versatility
- Estimated cost of maintenance and servicing
- Projected life span of new instrument
- Need for spectral skills with projects or equipment
- Financing options and available capital

BRUKER

As a Bruker distributor serving many industries from multiple locations, **Portable Spectral Services** sell new instruments and have a fleet of equipment for rent. Along with the excellence of Bruker, **Portable Spectral Services** also carries other allied brands for rental.

RENTING vs BUYING

Whether renting or buying, we can assist with a cost-benefit analysis. As a rule, if you are using your equipment greater than 60-70% of the time, then buying is probably best for you.

If you need your instrument long-term, the best option is often to purchase. However, as projects develop the technology requirements may change and as such renting a machine appropriate for each project stage is best.

Reasons Businesses Rent:

- Saves money
- An operating expense
- No upfront investment
- Flexibility
- Right instrument for the job
- Caters to short-term equipment need
- Provides specialty performance
- Temporary production increases
- Instrument maintenance or repair
- Increases overall capability when required
- No testing, maintenance, service or compliance
- Test latest models before purchase

Many industries can benefit from renting equipment including:

- Exploration and Mining
- Agriculture
- Environmental /Rehabilitation
- Recycling/Waste
- Construction/Renovation
- Government/Military/Defence
- Retail/Manufacturing
- Automotive/Transport/Maritime

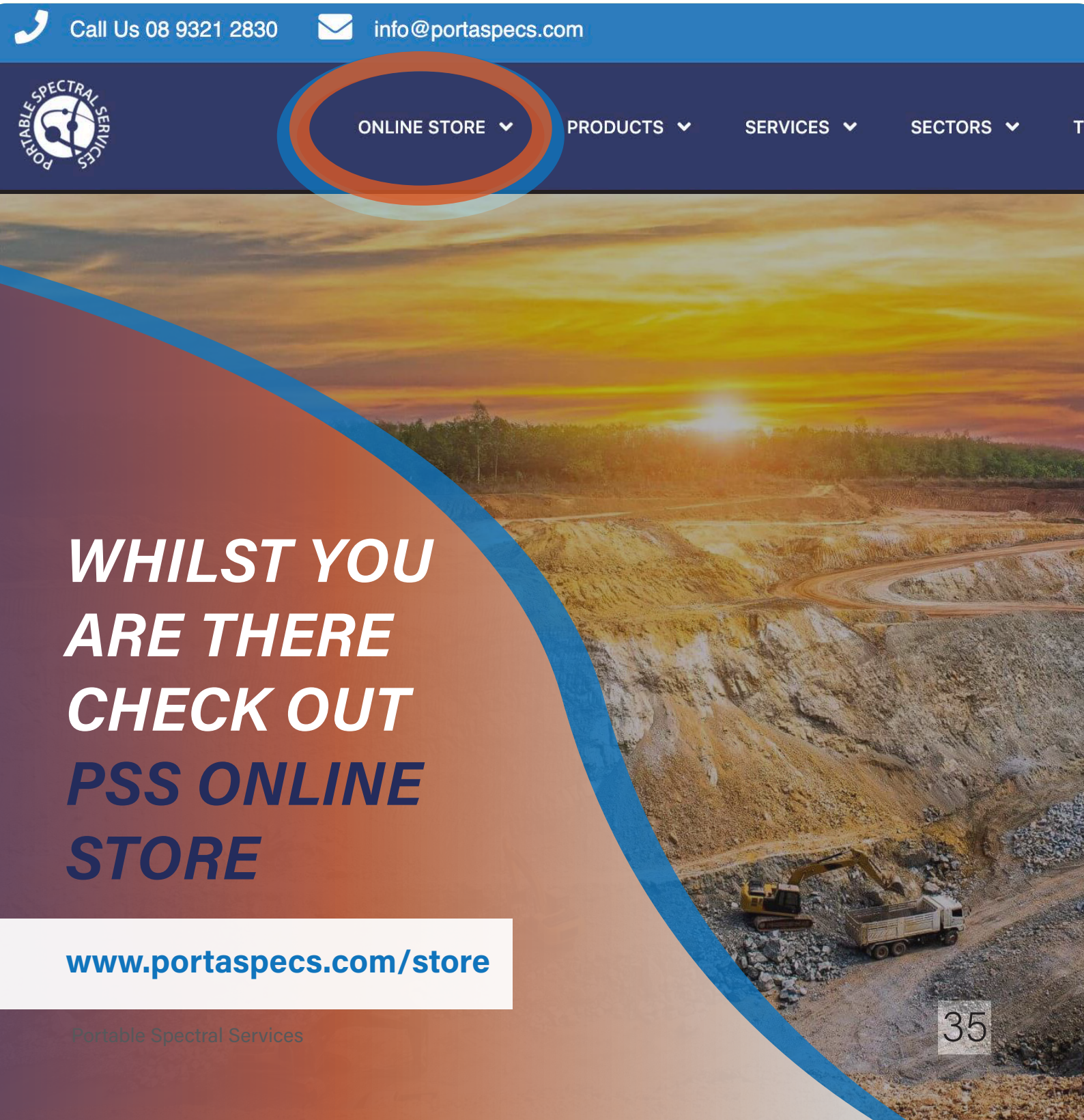
GET IN TOUCH!

Contact us to discuss how **Portable Spectral Services** can help assist your business progress into the future.

We are be happy to provide a quote and share more information about how to rent Bruker instruments (or other brands) and all the associated options including training, licencing, and fully trained operators.

For the most up to date Terms and Conditions refer to our website.

www.portaspecs.com/terms-conditions



PORTABLE SPECTRAL SERVICES

10 YEARS

2011 - 2021

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