



SPECTRACHEM ANALYTICAL

Autumn 2006

Welcome!

As the autumn days rapidly fade into a Wellington winter we're looking forward to sharing our "news and views" with you this season!

If you've missed previous news from SpectraChem please feel free to download copies of our newsletters from our [website](#) and pass them on. They're a great way to build your knowledge and skills in the use of analytical technology!

John Hunt & Lee Searle
Directors, SCA

*Australasia's only
IANZ accredited
independent XRF
specialists.*

In your newsletter:

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SpectraChem expands!

Demand for our analytical services has been increasing so rapidly that we've had to expand! This has largely resulted from an upturn in Asian mining activity and is great news because it's enabled us to install a third X-ray fluorescence spectrometer (XRF) at our Lower Hutt site. This newly commissioned instrument has a higher throughput than our two existing XRFs, which have been working overtime to keep up with an increase in demand for the analysis of laterites, bauxites, silicates and limestones. Our newest spectrometer will now be kept busy analysing the major oxides in geological materials.



90 Position XRF Sample Loader

We have also recently purchased an additional Fusilux fusion furnace to cope with this extra measurement capability.

Introducing... Microsilica New Zealand

At SpectraChem we work with an extremely diverse range of industries, and we like to keep you up to date with what's happening in these industries by introducing some of the great companies we're involved with.

So this autumn we'd like to introduce you to **Microsilica NZ**, with whom we've been working since the company was established in 1994. Microsilica NZ produces a supplementary cementitious material called Microsilica 600. This is a concrete additive which is used to enhance the properties of concrete and is a very important ingredient in the production of high performance light-weight concrete. Amongst other advantages, the material improves the durability and strength of concrete and increases its resistance to chemical attack.

Microsilica 600 is a very fine amorphous silica – a highly reactive, natural pozzolan, processed from a natural white geosilica deposit in Rotorua, New Zealand. Such natural pozzolans have been in use in the New Zealand building industry for over 50 years.

The quality and suitability of Microsilica's deposit for producing a supplementary cementitious material is to a large extent determined through regular monitoring of its composition. SpectraChem has been closely involved in this monitoring, of both research and production samples.



Operations
Manager
John
Fenwick at
Microsilica
NZ's
Rotorua
Deposit

For everyone interested in the specifics of analysis, here they are...

Typical Analysis of a Microsilica Sample [weight %].

SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	TiO ₂	CaO	MgO	K ₂ O	Na ₂ O	P ₂ O ₅	MnO	SO ₃	LOI
86.26	5.03	0.62	0.73	0.27	0.06	0.80	0.15	0.05	0.02	0.07	5.86

SpectraChem Prize!

Massey University winner delighted with hands on experience ...

Every year since 2003, SpectraChem has awarded a prize to a student currently studying in the field of earth sciences at a New Zealand tertiary institute. Our congratulations go to our latest winner, **Deborah Crowley**, from Massey University's Earth Sciences department!

Because some institutions don't have the analytical facilities or expertise necessary to carry out specialised analysis of soil and rock samples, we offer our successful recipients time at our laboratory in Lower Hutt to analyse geological samples that are relevant to their research.

Here's what Deborah had to say about her research and working with SpectraChem...

"My MSc research project is an investigation of the Caseley Conglomerate, which is a small deposit found near Parikino, a settlement approximately 30km up the Whanganui River, from Wanganui City. The Conglomerate was found and named by Peter Kemp and Avon McIntyre, who identified it as a non-marine channel fill deposit. They concluded that the channel was cut during low sea-level conditions, infilled with gravels as the sea-level started rising and was later flooded by a marine transgression, giving the conglomerate an approximate age of 2.65Ma.

The conglomerate consists mainly of coarse volcanic gravels, thought to have originated from the Taupo Volcanic Centre. Besides the andesitic clasts, there were a few ignimbrite clasts found within the conglomerate. The XRF analysis of the gravels has enabled me to take a more detailed look at the andesites and provided an opportunity to identify the origin of the ignimbrites. The XRF results are a close match with previous results obtained for the Whakamaru ignimbrite deposits, implying a minimum age of 340Ka.

I am extremely grateful to John Hunt, Lee Searle and the rest of the staff from SpectraChem for giving me the opportunity to perform the analyses and for being so friendly, accommodating and helpful. The XRF results have added significantly to my project and I most sincerely thank them for their generosity."

To further support research in New Zealand, SpectraChem also offers discounted rates to tertiary institutions for the analysis of research based geological samples.



SpectraChem's Lee Searle (left), with prize winner Deborah Crowley and Earth Sciences Professor Vince Neale, from Massey University

Your questions answered about... COAL

• Which method do you recommend for coal analysis?

When analysing elements in a matrix of relatively low atomic number, like coal, we recommend wavelength dispersive X-ray spectrometry (XRF). There are distinct advantages in using XRF analysis. In the case of the heavier elements in particular smaller concentrations can be measured in whole coal samples than in silicate rocks.

• What sample sizes and types do I need to send?

Generally we prefer to receive at least 20g of representative, finely ground material. Total carbon analyses can be carried out on as little as 0.03g of material.

• How are these samples prepared?

Due to a variety of circumstances samples received may not have been well dried, or may have absorbed moisture since initial air or oven drying. So we routinely dry sub-samples of 20g for 2-3 hours, with the moisture content being determined if this is required.

Where total carbon values are required, determinations are carried out by Leco combustion. Sample briquettes for XRF analysis are prepared from 10g of dried sample material thoroughly blended with 2.5g of wax powder.

• Is there anything else I need to know?

For the purposes of XRF trace and minor element analysis the sample matrix can be easily calculated from the XRF major oxide and Leco total carbon composition.

Each of the elements in the measuring program is calibrated using a combination of up to 20 coal SRMs and the chemical [synthetic] standards prepared from *Specpure* compounds and *Ultra-carbon*.

Comparison of X-ray fluorescence results with consensus values for 31 major and minor elements in NBS 1632a [values as ppm unless otherwise stated]

Element	Spectra Chem	Consensus	Element	Spectra Chem	Consensus
Al (%)	2.851	2.97	Ni	18	19
As	9	10	P(%)	0.025	0.028
Ba	118	130	Pb	13	12
Ca(%)	0.222	0.230	Rb	26	31
Ce	29	29	S (%)	1.586	1.640
Cl (%)	0.074	0.076	Sc	3	6
Co	8	7	Si (%)	5.750	5.9
Cr	33	35	Sn	1	na
Cu	14	16	Sr	85	88
Fe (%)	1.006	1.13	Th	3	5
Ga	9	8	Ti (%)	0.164	0.175
K (%)	0.392	0.410	U	<1	1
La	13	16	V	41	44
Mg (%)	0.126	0.13	Y	10	6
Mn (%)	0.003	0.003	Zn	25	28
Na(%)	0.060	0.076			na = data not available.

We're always happy to advise you on the requirements for your specific situation, so please feel free to email or call us on 64 4 589 6333.

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