

BGS laboratories gain accreditation

Auditing our methods to ensure excellent science

by Jenny Cook, Keyworth

At the start of the new millennium, it is worth reflecting on the progress made in analytical geochemistry over the past few decades.

To see how chemical analysis has changed during the 20th century one need look no further than a Geological Survey Memoir edited by Guppy in 1956. That volume contains the results of 270 chemical analyses of igneous and metamorphic rocks and minerals, carried out by the Chemical Laboratories of the Geological Survey and Museum between 1931 and 1954. It states that *'they constitute about one-third of all reputable analyses published during this period and represent a major contribution to the knowledge of the geochemistry of Great Britain'*. The data would have been obtained using classical methods of analysis, which were very labour-intensive, often involving lengthy chemical separations.

Progress in geochemical research is intimately dependent on developments in analytical science. The instrumental spectroscopic techniques that came to prominence after the Second World War ushered in an exponential increase in the quantity of chemical data that could be obtained compared with classical procedures. Techniques such as DC-arc optical emission spectrography and neutron activation analysis were widely used in the 1960s and 1970s for the bulk analysis of silicate rocks. X-ray fluorescence (XRF) and inductively coupled plasma (ICP) spectrometry grew in importance over the same period, with the result that the 23 years' worth of data collated by Guppy

represents merely a week's throughput of a modern XRF spectrometer.

Present day analytical methods enable us to determine more and more analytes down to vanishingly small concentrations in huge numbers of complex geological and environmental materials. Such issues as the BSE crisis, atmospheric pollution and global warming, the Brent Spar incident, drinking water quality and agrochemical residues in the food chain have focused public concern on the reliability of scientific information. The explosion in the quantity of chemical information now obtainable makes it even more vital that data are fit for purpose.



Director and Ms Jennifer Cook (UKAS Quality Manager) with the certificate of accreditation. Inset: The UKAS mark.

In recent years the analytical community has expended a great deal of effort on developing procedures for improving the quality of its data. These include the wider availability of appropriate certified reference materials, interlaboratory proficiency testing programmes and especially national and international laboratory accreditation schemes.

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Last August, the laboratories of the BGS Analytical and Regional Geochemistry Group gained accreditation from the United Kingdom Accreditation Service (UKAS), formerly known as NAMAS. The laboratories had to demonstrate that their work met all the key principles of sound analytical science. These include validated methods, quality systems, independent assessment and traceability to external reference points, taking due account of measurement uncertainty. An important component of the accreditation process is that the laboratories' performance is regularly reassessed by external UKAS auditors.

Our customers, whether they be a company undertaking resource evaluation or a government department trying to determine environmental impacts, increasingly demand the formal reassurance that accreditation confers. Over the coming years we will steadily increase the range of methods that are formally accredited.

Underpinning these accredited methods is an active research and development programme which aims to keep the BGS at the forefront of analytical geochemistry. For example, as one of the world leaders in laser ablation ICP-MS, the BGS laboratories have the ability to make direct multi-element and isotopic measurements on heterogeneous solids at a micrometre scale with a minimal amount of sample preparation. This capability has wide-ranging applications, including the analysis of single fluid inclusions, water-rock interaction studies and sourcing the origin of atmospheric particulates, which are some of the most challenging areas of geochemical research.