

The use of CRMs in 2002

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Introduction and objectives

In *RMR* 1/1 we invited participation in the Jenks Partnership Survey of the use of Reference Materials in 2002.

We said that questionnaires would be sent out to commercial and industrial analytical laboratories in the UK, Germany, France, Scandinavia and North America during 2002. The aim was to receive at least 200 replies, so giving a statistically significant sample from the user laboratories.

Well, 18 months on we have met our target and completed the survey. An overview was presented at the recent BERM-9 Symposium, reported on elsewhere in this edition of *RMR*. I promised *RMR* readers that they would be the first to read about the results.

We also said that we would offer a bribe, to encourage participation: there would be a draw from all those who responded, the first lucky scientist would get the only autographed copy of the book *Reference Materials Chemical Analysis* published by Wiley-VCH, the second a 12-month subscription to *RMR*!

Well, the draw has been made and the winners are: Dr Ingrid Buyara of NATEC, Hamburg, Germany, and Dr Cathy Bowles of Leatherhead Food International, Leatherhead, UK.

First, why survey the use of reference materials? As I explained in *RMR* 1/1 there have been many surveys in recent years to find out the CRMs and RMs people wish they could have. In the mid-1990s LGC in England, as part of the UK DTI funded "VAM" Programme conducted an in-depth survey of UK industry needs. A significant number of new CRMs were produced by LGC following this survey, but not all sold well.

In the Netherlands, New Zealand, India and elsewhere, local reviews were started and results analysed: in some cases new CRMs were introduced.

In 1998 the EC funded a much more detailed survey, the results were published as *Reference Materials in Europe: an enquiry into their use and prospects* [*TRAC* 18(2), 76–85 (1999)]. The main conclusion was that "the use and utility of reference materials are insufficiently known!"

Most recently, in 2000 the EC let a contract to PriceWaterhouseCoopers to carry out a survey on the use of certified reference materials in Europe. Intended to evaluate development strategies for the Competitive and Sustainable growth programme, part of the 5th Framework Program of the Research Directorate General. The results were published in 2002 and reported on in *RMR* 1/?.

The published results were not very helpful!

All of the previous reports had common characteristics: the questions were directed mostly at experts, academics and producers. Few end users contributed to the data and only a limited number of questions about how RMs, CRMs PT are used on a day-to-day basis were asked. As far as we have been able to discover no questions were asked about how users:

- interact with the producers
- find out about new CRMs
- actually use—or do not use—RMs and PT

The Jenks Partnership asked those questions – and more. For a copy of the questionnaire visit the *RM report* web site at www.rmreport.com/????????

Before we look at the results I'd like to thank a number of organisations for helping and supporting the distribution of the questionnaires:

In particular the research organisations the IAEA, and the GDCh, the commercial CRM producers RTC Inc., ROMIL Ltd and BAS Ltd, and of course the publisher of *RM report*, IM Publications.

Responses

We received more than 200 replies from scientists in 32 countries, so we met

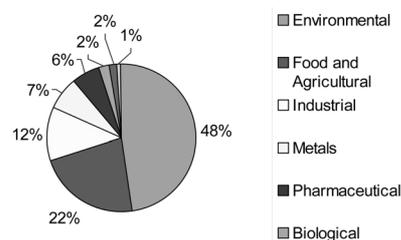
our sampling target. The data was analysed by Dr Matt Wilkinson, who found time to do the work whilst completing his thesis into aspects of Selenium chemistry.

What did we find?

- some surprises
- a few concerns
- many of our assumptions were confirmed
- a number of presently unfulfilled needs revealed—and not about the RMs and CRMs people need.

Who gave the answers?

Given the number of respondents and the scope of the questions we developed far too much data to be able to give more than an overview of the key points in this report. A full set of data and detailed results will be available as part of a comprehensive report, *The Use and Application of Analytical Reference Materials in 2002*, to be published jointly by the Jenks Partnership Ltd and Kymaera later in 2003.



Who gave the answers? Biological and environmental predominate!

Analysis of the type of laboratory responding to the survey produced no surprises, 58% were commercial laboratories, 18% were publicly-funded labs, 11% were in education and the remainder fell into a range of categories.

When asked the type of work undertaken, 48% of respondents said they worked in the biological and environmental arena, 22% were in food and agriculture and 12% classified themselves as "industrial laboratories". Indeed it seems that the use of CRMs in these three sectors is relatively widespread.

We went on to ask about the accreditation status of the laboratories: somewhat to our surprise only 61% of the sample were accredited, mostly to ISO 17025 as testing laboratories, although a number remained with an ISO 9000 type accreditation.

A further 20% said they had a quality system in place and were working towards accreditation. Worryingly 19% stated they were not, and had no intention of becoming accredited. A further review of the data set suggests that most of these respondents are publicly funded labs, mostly in education.

We also asked about the frequency of RM use: 2% said they never used RMs and 15% said that their use of RMs was occasional, or infrequent. We plan to further analyse the correlation between accreditation status and RM usage.

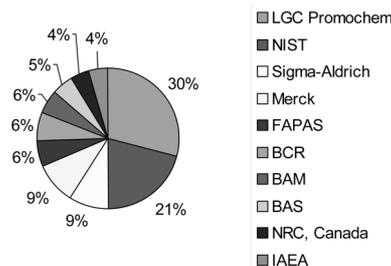
When asked about the uses to which RMs and CRMs were put the results were more or less as expected: 51% used them for primary instrument calibration, 42% said that the main application was the validation of methods and 7% said the assignment of values.

In recent years CRM producers have paid more and more attention to stability, shelf life and realistic expiry dates. It is unfortunate that very many CRM users pay scant attention to this part of the quality envelope: almost 50% of users use a CRM until it is empty, the rest follow have a procedure for determining usable life, either by observing the expiry date or a quality system

Use of CRMs

Although there is a trend to increased use of CRMs, with 7% of respondents commenting that the number of methods in their laboratory that specify a CRM is increasing a surprisingly large minority, 40% do not.

The increasing need seems to be met by one main supplier, with 30% of respondents admitting to sourcing from LGC Promochem: a significant number mentioned NIST and BCR: it is known that



Use of CRMs. LGC Promochem lead the market with at least 30% share.

LGC Promochem are major distributors for these two producers, so it is possible that in Europe LGC Promochem are the supplier of choice for between 40 and 50% of customers.

RMs and CRMs are not as easy to obtain as we expected: 71% of the users sampled said they had problems identifying the right CRM for their application: A substantial number, 27%, think there are not enough RMs available in the catalogues and a damning

62% of users are frustrated by lack of information from suppliers and producers, and the time taken to get it when requested.

Even when the right information and CRM had been identified the problems do not stop: 39% of the sample claimed that they waited a month or more to get their RM or CRM.

Quality perception

We asked our sample group for their opinions about the quality of the RMs and CRMs they purchased: this section of the survey revealed some major concerns: It was made very clear that the majority of users consider that most CRMs and RMs are not as good as they should be: indeed an overwhelming 89% said that they did not consider all RMs were good enough for purpose! This answer raises serious issues about the quality systems employed by the CRM producers.

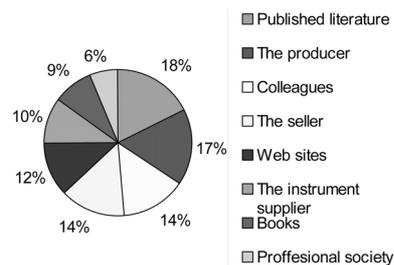
To explore this issue further we asked how the users monitored the quality of the CRMs they use: 61% of our sample said that they always checked certificates, expiry dates and other information before accepting a new using a new CRM into the laboratory. But as most users work in an ISO 17025 accredited environment and most CRMs are not produced un-

such an environment, this is hardly surprising.

Sources of information

We had already noticed that many users were frustrated by the difficulty getting information about CRMs, so the answers to the next set of questions were not very surprising: it became clear as we analysed the data that there is a clear need for more information and training on the use of CRMs, and that this need is not presently being met.

We asked our panel where the information and training should come from: perhaps surprisingly 36% the users do not want to see instrument suppliers involved—perhaps they feel that this would be a conflict of interest. The rest considered that the producers, suppliers and the published literature should meet their need.



Sources of information. There may be a need for more information and Training.

We probed further: asking about their relationship with instrument suppliers. Their views were consistent in that 36% said that instrument suppliers should not be involved with CRMs in any way at all. The preferred solution is for instrument suppliers to recommend specific CRMs from nominated suppliers: clearly there is an opportunity for some sort of synergistic relationship between the instrument makers and CRM suppliers.

Training

Given the clearly stated need for more information and training amongst the user group we probed to see where they

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Mercury Accumulation in Sediments of a Mangrove Ecosystem in S.E. Brazil. W. Machado, wmachado@geoq.ufb.br. *Water Air Soil Poll.* **145**, 67–77 (2003). RMs [No]: NIST 2704 (Buffalo River sediment). Analytes: Hg.

Arsenic in Drinking Water and in Scalp Hair by EDXRF: A Major Recent Health Hazard in Bangladesh. M. Ali, aecd@citechco.net. *J. Radioanal. Nucl. Chem* **256**, 361–364 (2003). RMs [No]: NIST 1571 (Orchard leaves), GBW 09101 (Human hair). Analytes: As.

Rapid Radiochemical Analysis of I-131 in Environmental Samples using a Well-Type Ge-Detector. P. Parekh, parekh@wadsworth.org. *J. Radioanal. Nucl. Chem* **256**, 225–230 (2003). RMs [No]: NIST traceable I-131. Analytes: I-131.

Mercury Content and its Bioconcentration Factors in Wild Mushrooms at Lukta and Morag, Northeastern Poland. J. Falandysz, jfalandysz@chemik.chem.univ.gda.pl. *J. Agr. Food Chem.* **51**, 2832–2836 (2003). RMs [No]: IAEA SD-N-1/2 (Baltic sediment). Analytes: Hg.

Cadmium Contents of Oats (*Avena sativa* L.) in Official Variety, Organic Cultivation, and Nitrogen Fertilization Trials during 1997–1999. M. Eurola, marja.eurola@mtt.fi. *Agricultural and Food Chem* **51**, 2608–2614 (2003). RMs [No]: ARC/CL Wheat flour; NIST 1568a (Rice flour). Analytes: Cd.

Quality control

Elements and organometallic compounds

Microbial Mercury Transformation in Anoxic Freshwater Sediments under Iron-Reducing

and Other Electron-Accepting Conditions. J.-C. Bonzongo, bonzongo@ufl.edu. *Environ. Sci. Technol.* **37**, 2159–2165 (2003). RMs [No]: IAEA 405 (Estuarine sediment). Analytes: Hg, MeHg.

Assessment of Tin and Butyltin Species in Estuarine Superficial Sediments from Gipuzkoa, Spain. E. Millán, qapmimae@sq.ehu.es. *Chemosphere* **51**, 643–649 (2003). RMs [Yes]: NRCC PACS-2 (Marine sediment). Analytes: Sn, MBT, DBT, TBT.

Isotope ratios

Iodine-129 and Caesium-137 in Chernobyl Contaminated Soil and Their Chemical Fractionation. X.L. Hou, xiaolin.hou@risoe.dk. *Sci. Total Environ.* **308**, 97–109 (2003). RMs [No]: NIST 4949c I-129 solution. Analytes: I-129/Cs-137 ratios.

Isotopic composition

¹²⁹I in Swedish Rivers: Distribution and Sources. A. Kekli, aziz.kekli@geo.uu.se. *Sci. Total Environ.* **309**, 161–172 (2003). RMs [No]: NIST 4949C (Iodine-129). Analytes: Iodine-129.

Organic compounds

Survey of Commercial Pasteurised Cow's Milk in Wallonia (Belgium) for the Occurrence of Polychlorinated Dibenzo-p-Dioxins, Dibenzofurans and Coplanar Polychlorinated Biphenyls. J.-F. Focant, jf.focant@ulg.ac.be. *Chemosphere* **52**, 725–733 (2003). RMs [No]: BCR 607 (Milk powder, PCDDs, PCDFs). Analytes: seven PCDDs, 10 PCDFs and four cPCBs.

Occurrence of PCBs in Ambient Air and Surface Soil in an Urban Site of Madrid. S. García-Alonso, susana.garcia@ciemat.es.

Water Air Soil Poll. **146**, 283–295 (2003). RMs [No]: NIST 1941a (Marine sediment, PCBs). Analytes: 16 PCBs.

Organometallic compounds

Retrospective Monitoring of Organotin Compounds in Marine Biota from 1985 to 1999: Results from the German Environmental Specimen Bank. H. Rüdél, ruedel@ime.fraunhofer.de. *Environ. Sci. Technol.* **37**, 1731–1738 (2003). RMs [No]: BCR 477 (mussel tissue). Analytes: TBT (tributyl tin), TPT (triphenyl tin), MBT (monobutyl tin).

Radionuclides

Radionuclides of Po-210, U-234 and U-238 in Drinking Bottled Mineral Water in Poland. B. Skwarzec, bosk@chemik.chem.univ.gda.pl. *J. Radioanal. Nucl. Chem* **256**, 361–364 (2003). RMs [No]: IAEA SD-N-1/2, SD-A-1 and 384. Analytes: Po-210, U-234, U-238.

RM homogeneity and content

Effects of Gamma-Sterilization on Butyltin Homogeneity and Content in Sediments: A GC-ICP-MS Study. L. Yang, LuYang@nrc.ca. *Anal. Bioanal. Chem.* **376**, 85–91 (2003). RMs [Yes]: NRCC PACS-2 and HISS-1 (Marine sediments). Analytes: TBT, DBT, MBT.

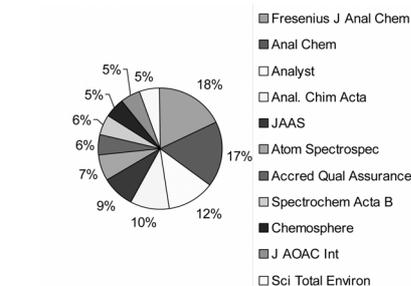
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thought this should come from. The results suggest that there is an opportunity for someone: a majority, 62%, said the CRM producers and suppliers should offer this information and not all expect to get it for free: 10% said they would be willing to pay the producers and 21% would purchase training information in the form of interactive web programs, CD ROMs and the like. Another opportunity for someone?

What people read

There is a perception in the industry that people in commercial laboratories do not have time to read scientific journals: our data does not support this. Paper is still the most important source of information with 70% of the sample group preferring to read a full text on paper—perhaps this reflects the age of the sample group: but as we did not ask for the age of respondents we shall never know!



What people read. Peer reviewed journals.

Both peer reviewed journals and free “controlled circulations” magazines are

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BAM CRMs catalogue

The 2003 Catalogue of CRMs has been released by BAM, (Berlin, Germany). This new and expanded catalogue includes CRMs in the following categories:



- iron and steel
- non-ferrous metals and alloys
- high technology materials

- environmental pollutants
- gasses
- elastomeric materials
- optical properties
- porous materials
- polymers

Also noted are the RMs and CRMs presently under development: these include 30 new CRMs that will be released on the coming months.

Or more information contact sales@bam.de or visit www.bam.de.

Chiron biomarker catalogue 2003

The new Chiron (Trondheim, Norway) biomarker catalogue has just been released: from the questionnaire that accompanied the catalogue request form it was clear that this innovative Norwegian company is continuing to extend into new areas in its established hydrocarbon/petroleum and environmental toxicology base into pharmaceutical metabolites and artefacts.

New CRMs already released in 2003 include the 16 EPA PAH standards in toluene, cyclohexane or acetonitrile, fluoro-PAHs to act as an alternative to deuterated PAH internal standards in low level analysis of PAHs.

New products scheduled for later in 2003 include the PAH 2-Nitropyrene, Alkylphenol standards, mixtures and custom mixes, Nonylphenol ethoxylate standards, NPD internal standards and an "All in One" internal standard for geochemical analysis. For more information: www.chiron.no.

Handbook of Elemental Speciation

A comprehensive review edited by four notable specialists in elemental speciation (Rita Cornelis, Klaus Heumann, Joe Caruso and Helen Crews), this book is essential reading for anyone who is concerned with, or interested in, elemental speciation.

The book brings together aspects of procedures for speciation analysis and considers sampling, sample storage, preparation and analysis, including chromatographic, electrochemical, biosensor, radioisotopic and solid separation techniques.

Published by Wiley, (Chichester, UK) in July 2003 the book costs £150.00/€247.00. ISBN 0-471-49214-0.

E-mail: customer@wiley.co.uk.

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important sources of information. The most popular peer reviewed journals were no surprise: *Fresenius Journal* (now *ABC* published by Springer), *Analytical Chemistry* and the *Analyst*. In the "free" category, whilst *LC-GC International* and *Spectroscopy Europe* were clearly in the lead, two non-commercial publications, *Chemistry in Britain* and the *VAM Bulletin* were ranked above all the other free circulation publications. *Chemistry in Britain* is supplied to all members of the UK's Royal Society of Chemistry and the *VAM Bulletin* is produced by LGC under the VAM programme funded by the UK Department of Trade and Industry.

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Despite the generally favourable comments there was still an element of frustration, with 46% saying that information was good – when they could find it.

Initial conclusions

Time and time again the answers from our sample group suggest that more needs to be done to provide working analyst with the information they need to identify the correct CRM for their application and then how to properly use it.

The production of CRMs, outside the US environmental sector is still firmly in the hands of the public sector, with most

manufactured by government funded research laboratories. Only in the UK is a part of this money used to educate and inform, with the work done by the DTI, through the VAM programme seeming to meet users needs. In the EU the funding of the European Virtual Institute for Reference Materials is a step in the right direction, but these are the exceptions. No other country seems to spend much time or effort in this area.

We believe that the producers and the distributors could, and should, do more. More easily available information will encourage greater use of CRMs, and probably correct use of CRMs. This has to be in the interests of good analytical metrology.