

SOUND ANALYTICAL MEASUREMENT FOR A SAFE, SOLVENT UK



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When George Phillips became, in effect, the first Government Chemist, appointed to help protect Her Majesty Queen Victoria's excise revenue in 1842, the strange new world of the rare earth elements was unfolding, while organic chemistry was still in its teens (Wöhler having synthesised urea in 1828). I wonder what my predecessor George would make of today's challenges, and a Government Chemist remit that has expanded to focus on easing business burdens while safeguarding public health and consumer choice. He might observe that my staff still rely on applying the best practical methods of measurement to solve complex, unpredictable problems.

The need for cutting edge science and technology has so far been served well by another significant change – the 1996

privatisation of the Laboratory of the Government Chemist. As a public authority in a corporate laboratory, the Government Chemist has benefited from new networks, strategic investment and an increasingly global purview. From a standing start 14 years ago, LGC – as the laboratory was renamed on privatisation – has grown to become a thriving international science company which recently changed hands for £257 million. Whereas the laboratory employed only 270 around that time, I can now draw on the expertise of a multi faceted enterprise with 1400 staff. Over the summer, I took on a new LGC Science and Technology divisional directorship as a way of streamlining input to core Government Chemist responsibilities while maintaining strategic links with the wider genomics, forensics and standard reference materials businesses that have grown up within the company.

In operational terms, the growth of LGC means that public functions ascribed directly to the Government Chemist now represent a relatively small part of the laboratory's portfolio. However, the company's new management are cognizant of our history, and the sense of identity and purpose that the Government Chemist role continues to engender. LGC's overarching value statement 'Science for a safer world' succinctly embraces my more

specific public functions.

Let me turn now to those functions. While a 'theory of everything' may be able to simplify the way we appreciate the physical world as a whole, many of the practical problems of day-to-day living remain intractably complex. For example, as an ever-increasing variety of food products appears on the supermarket shelves, safety, nutrition and consumer choice are paramount; we are coming to expect that any required packaging will be both clean and green; and the environment should be safeguarded from poorly understood chemical and biochemical cocktails. These circumstances pose increasingly complex analytical requirements, while global supply chains make it harder to predict the nature of chemical risks.

Local authorities are at the forefront of efforts to enforce risk management legislation. Three pillars of the consumer protection law they uphold are the Food Safety Act 1990, the Agriculture Act 1970 and the Medicines Act 1968. A network of Public Analysts (Official Control Laboratories) provides valuable scientific support as the front line of regulatory enforcement. But because public safety and wellbeing are at stake, these acts enshrine an additional safeguard – the right of appeal to a scientific referee, the Government Chemist, who acts

independently of businesses and enforcement authorities. The referee role is the salient feature of the Government Chemist's statutory function, which currently derives from seven Parliamentary acts in all.

Prior to enforcement action against a business, officials have powers to take formal samples, which they are typically required to divide into three portions. The business, which may analyse one of the portions, sometimes reaches conclusions at variance with those of the Public Analyst. The Government Chemist may then be required to analyse a further portion. When a formal sample is received, my staff develop a case-specific work plan to tackle the main areas of contention and uncertainty. Referee analysis usually prompts tactical research on related sample types and potential measurement methods. It also entails advice from a professional statistician and exploits an array of state-of-the-art LGC instrumentation, ranging from advanced mass spectrometers to DNA-based technologies. I discuss the results with experts and senior staff, and sign the certificate of analysis only when I am satisfied with the quality of the evidence presented.

The particular virtue of this statutory safeguard lies in its all-round economy. A Government Chemist opinion can be obtained without recourse to the

law courts – or, if a judge orders the referral, can be added to minimise the trial costs. If the appeal succeeds, business operators are spared unnecessary compliance costs and fines, while regulators and the public they represent benefit from a streamlined means of boosting confidence that only safe and appropriate products are available for sale.

In recent years, most of the samples referred to me have been of food or animal feed – a reflection of the variety, complexity and rate of change in these sectors. For instance, the risk of aflatoxins occurring in imported food products has been a persistent issue (see inset). Other cases have included the nutrient content of animal feed, food choking hazards, the authenticity of spirit drinks and fruit products, allergens, banned antibiotics and animal remains in organic cattle food.

Perhaps it is to the credit of effective local regulation that formal samples are not analysed more frequently. And as only a proportion are escalated to the Government Chemist, my staff can commit to the samples they do receive with an intensity which often spins off innovation such as more powerful and flexible methods of measurement. The fruits of this labour are disseminated to all interested parties, for example at a spring conference which is expanding rapidly through collaboration with leading research associations and the Food Standards Agency. Exchanges with countries such as India, China and Korea help to share best practice worldwide.

Historically, the Laboratory of the Government Chemist was a free-standing central

Aflatoxins are genotoxic carcinogens, implicated mainly in liver cancer, produced by *Aspergillus* moulds. Imported consignments of fresh foods, which may have been stored in warm, moist conditions, can be susceptible to contamination. UK port health authorities (PHAs) conduct official controls to check on compliance with legal concentration limits, but aflatoxin contamination is usually patchy and sporadic. Government Chemist staff have worked with PHAs to validate an optimised sampling protocol that is protective of consumers and fair to traders.

In most recent cases, the Government Chemist conclusions confirmed those of the Public Analyst. When the science points to a non-compliance, the risk that the consignment poses to the public may be eliminated by requiring re-export. In 2008-09, it is estimated that over 200 tonnes of products contaminated with aflatoxins were prevented from entering the UK by direct action of the Government Chemist, as well as many more by PHAs and their Public Analysts. Of course, the business under investigation would prefer to be acquitted, but an adverse expert opinion may be a blessing in disguise – hard evidence can curtail costly legal proceedings, and forestall an expensive recall of the contaminated product from the supermarket shelves. Moreover, opportunities for competitive ways of supplying similar products can only be enhanced.

department, with the resources to tackle just about any sample that the many and varied organs of government had cause to present for analysis. This flexibility lives on in a successful LGC, but more particularly through the wider function of the Government Chemist as ‘a source of advice for HM Government and the wider analytical community on the analytical chemistry implications on matters of policy and of standards and of regulations’¹.

I fulfil this wider advisory function by responding to government requirements, bringing together public and private sector scientists with a common interest in meeting regulatory requirements, and working to ensure that analytical science adds value to emerging measures. For example, my staff recently issued a set of questions and answers on the measurement implications of REACH², designed to help industry identify practical approaches and avoid the urgency premiums that could arise if essential analytical work is put off until the last moment. Here, as elsewhere across chemical and environmental regulation, the cost-effective co-ordination of sound scientific measurement and modelling

approaches will be of concern in the months ahead.

Within a privatised LGC, the authority of the Government Chemist rests on sound governance. The National Measurement Office (NMO) funds the programme of work supporting my public functions, and in so doing is advised by an independent expert working group representing both public and business interests. Last year an independent audit concluded that the Government Chemist function is highly regarded, delivers excellence, and fulfils the need for an independent and impartial service; maintaining the historical ties with LGC has worked well, and should continue to do so.

My work depends heavily on advice and resources available through complementary NMO-funded projects at LGC. These share in the vision of a universal chemical and biological measurement system needed to underpin free and fair global trade, rationalise scientific endeavour and create the conditions for long-term prosperity. They contribute to grand challenges ranging from advanced diagnostics and therapies to renewable fuels.

Meanwhile, a private sector LGC continues to benefit my work through investment in cutting-edge technology, economies of scale and a global perspective. In the UK, I believe we rightly stake our future on innovation, but securing prosperity on this basis means managing risk effectively. Thus the Government Chemist functions as a scientific referee and a voice for effective, evidence-based regulation are increasingly needed to protect the public and provide a level playing field for business.

1 Government Chemist Agreement between the Secretary of State for Business, Innovation and Skills and LGC Limited

2 Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals

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