30 Years of Excellence in Mercury Monitoring

In 2013 P S Analytical celebrates its 30th Anniversary as a leading supplier of analytical instrumentation and tailor made solutions for mercury monitoring. PSA was founded in the summer of 1983 by Professor Peter Bernard Stockwell. Prior to this Peter had an interesting and varied career, exposed to many areas of laboratory life working within academia, government and industry. After completing a BSc in Chemistry at Nottingham University Peter moved back to London to study for his PhD in Physical Chemistry at Imperial College. Peter began his work in analytical chemistry during his PhD, developing his own computer-controlled gas chromatograph to study the kinetics of ditrifluoromethylhexafluorocyclobutane.

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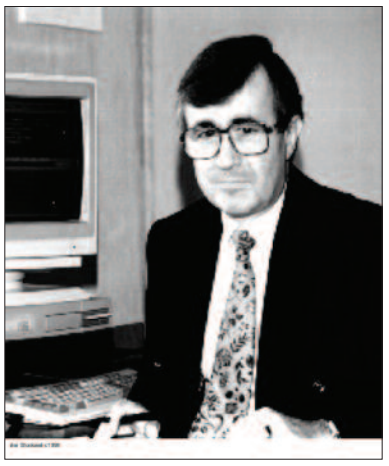

After a short but successful spell at Phillips Research Laboratory he joined the Laboratory of Government Chemist (LGC) managing the laboratory automation division. He became an international expert in this field, publishing more than 100 papers, several books and also started the Journal of Automatic Chemistry (JAC). These achievements were duly recognised and in 1978 he became the LGC Director of Research. After several years in this position Peter then moved into Industry as Technical Director of Plasma Therm Europe developing RF generators and accessories for plasma based analytical instrumentation.

In 1983, with the support of family and friends, Peter decided to start his own company; P S Analytical, manufacturing and selling accessories for laboratory analytical instrumentation with a focus on atomic spectroscopy. Initially working from home, the business grew steadily and within a short period moved to new premises in Orpington, Kent.

A good portion of the business at that time was supplying automated hydride generation systems as an OEM for AAS and ICP instrument companies. This technique improved the sensitivity and detection limits for Hg and hydride forming elements such as As, Se, Sb, Te, Bi, Sn, Pb and Ge. During the 1980's many laboratories in Europe were struggling to achieve the detection limits for these elements, especially for Hg which had the lowest detection limit requirement. PSA initially developed gold amalgamation systems to pre-concentrate mercury vapour prior to spectrometric detection. This added to the complexity of the technique and the performance was limited by the purity of the reagents used for the cold vapour technique. Aware of the gap in the market place and the need for a more sensitive Hg detector, the possibility of utilising atomic fluorescence spectrometry was explored. The solution was close to home. In 1971, UK scientists Thompson and Reynolds[1] published the first article highlighting the advantages of CVAFS. PSA released the first ever fully automated Hg analyser using this technique in 1987.

Historically the cold vapour technique had used acid permanganate chemistries to oxidise mercury prior to stannous chloride reduction. These chemistries were quickly replaced by the room temperature acid bromination chemistry that is commonly used today as the blanks were significantly reduced. One year later PSA improved the AFS design and the Merlin detector was launched. This system revolutionised the way Hg measurements were conducted and not surprisingly led to rapid growth and increased turnover for P S Analytical.

1988 was a turning point for PSA as they also moved to larger premises in Sevenoaks, Kent. It was during this year that Dr Warren Corns joined the company as a PhD student and became personally involved in the evolution and application development of the new AFS systems. The R&D programme during this period was very exciting and in 1991 PSA's Hg in gas analyser (Sir Galahad) was developed. This was the first fully automated commercial Hg analyser for gas phase mercury. It was based on gold amalgamation with AFS. Although it was originally designed for Hg in ambient air at low ng/m^3 levels it quickly became apparent that other industries, especially within the oil and gas sector, had Hg in gas measurement requirements. Initially this was an offline application but in later years there was need to perform this measurement online. Sampling systems were also developed as it quickly became apparent that this was the "Achilles Heel" of obtaining good accuracy.

In the late 80's a new buzz word crept into analytical science "Speciation". PSA were one of the first companies to produce dedicated systems for mercury and hydride chemical speciation. The coupling of AFS to GC and LC separation techniques was accomplished and by working closely with academia numerous systems were developed and commercialised. Today speciation is an increasingly important aspect of PSA's business.

In 1991 the atomic fluorescence detector was developed for hydride forming elements and a new product was released; the Excalibur[2]. This was the first ever dedicated system that offered fully automated ultralow detection of hydride elements.

In 1992 the research activities of PSA and Peter's contribution to

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analytical science was recognised and he was appointed Visiting Professor at the University of Plymouth, an appointment which he still deservedly holds today. In 1995 after a successful growth period PSA moved to new premises once again in Orpington, Kent. In the late nineties, PSA began the diversification into online emission and process control instrumentation. Forthcoming US EPA regulations for Hg continuous emission monitors (HgCEM) directed the focus of PSA to "across the pond". The HgCEM with optional gas phase speciation was developed for coal fired power stations and waste incineration.

PSA was the first company to demonstrate successful long term performance at numerous sites within the USA and much of its early work was the baseline for the Clean Air Mercury and MACT Rules. In 2002, with this rapid growth and potential expansion of the US market we established our US operation; P S Analytical Inc. More recently we have opened an office in SE Asia.

Over the last 3 decades the company has continued to grow and Peter is one of a handful of UK scientists who have become successful entrepreneurs.

The AFS products developed more than 25 years ago have now become industrial standards in many application areas and form the basis of various EPA, ASTM, ISO, BSI and EN official standards[3].

"When we look back at the last 30 years of PSA we feel very proud and honoured to have pioneered the science of mercury monitoring" said Prof Peter Stockwell, Managing Director, P S Analytical.

[1] Thompson KC and Reynolds DG, Analyst, Nov 1971, Vol 96, 771-775, [2] Stockwell PB, Corns WT and Allen J, J. Anal. At. Spectrom, 2009, 24, 1026-1033, [3] Corns WT, Stockwell PB, Ebdon L and Hill SJ, JAAS, Feb 1993, Vol. 8, 71-77