

**Operation of the Mass and Weighing Club
April 1998 to September 1999**

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September 1999

ABSTRACT

The Mass and Weighing Club (DTI reference MPU 8/45.10) has been operated by the National Physical Laboratory on behalf of the National Measurement System Policy Unit during the eighteen month period from April 1998 to September 1999. During this period the Club has attracted thirty-two members, held two annual meetings at the National Physical Laboratory, held two special interest meetings (one at the National Physical Laboratory and the other at Glaxo Wellcome), produced a newsletter and a Membership Directory.

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Approved on behalf of the Managing Director, NPL,
by Dr G R Torr,
Head, Centre for Mechanical & Acoustical Metrology.

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1 INTRODUCTION

The National Physical Laboratory (NPL) has operated the Mass and Weighing Club, on behalf of the National Measurement System Policy Unit (NMSPU) of the Department of Trade and Industry (DTI), during the eighteen month period from April 1998 to September 1999. This report details the activities and operation of the Club during that period.

2 PURPOSE OF CLUB

The Club provides a forum through which its members can exchange ideas on new techniques and discuss specific problems. It keeps its members up to date with latest information on international mass and density measurement issues affecting trade and competitiveness. It also provides the membership with the opportunity to influence future provision of the UK's national mass scale, associated services and infrastructure. These aims have been achieved by providing the following:

- two annual meetings
- two industrial visits
- two special interest meetings
- a newsletter
- a membership directory
- a World Wide Web home page
- a Club e-mail distribution list

3 OPERATION OF CLUB

3 Steering Panel

A steering panel was formed to oversee the activities of the Club. The steering panel has met twice during the year and is due to meet again in October 1999. The minutes and agenda for these meetings, together with a list of the steering panel members, are given in Appendix 1.

The first steering panel meeting was held at the National Exhibition Centre (NEC), Birmingham, on 28 April 1998. The purpose of the meeting was to:

- establish the role of the steering panel
- discuss the Club name and possible logo
- discuss the Club's operation - agenda of the annual meeting in July 1998
 - potential industrial visits
 - methods of membership renewal
- discuss Club publicity - recruitment
 - directory format
 - WWW links
 - newsletter content

The second meeting was held at the National Physical Laboratory on 3 November 1998. The following items were discussed:

- Club operation
- newsletter content
- potential special interest meetings and industrial visits
- new avenues for publicity

3.2 Membership

Initial membership was achieved by a focused mail shot using NPL's extensive marketing database and advertising on the NPL Internet site. Membership was increased by sending new mail shots before each Club event and encouraging members to advertise the Club to their contacts. The Mass and Weighing Club currently has thirty members (not including DTI or NPL). A list of these members is given in Appendix 2. Membership has been renewed on a rolling basis, with membership lasting one year from the start of subscription. A mechanism has been put in place to automatically invoice members for renewal at the appropriate time. The graph in Appendix 2 shows the membership over the eighteen month period.

3.3 Annual Meetings

The National Physical Laboratory have hosted two annual meetings. The minutes and agenda for each of these meetings are contained in Appendix 3. The first meeting, held on 10 July 1998, was attended by seventeen delegates from fifteen member organisations and six NPL personnel. Presentations on primary kilogram metrology, air density measurement, weighing in vacuum, weighing above 20 kilograms and solid and liquid density were given by NPL. A presentation on validation and verification of balances in an automated environment was given by Ted Scorer of Glaxo Wellcome and a presentation on Slovakian metrology was given by Dušan Trochta from the Slovak Institute of Metrology. As well as the presentations, members were given the opportunity to see the facilities of the NPL Mass and Density Standards Section. The meeting closed following an open discussion forum.

The second annual meeting, held on 2 September 1999, was attended by twenty-three members from eighteen member organisations and ten delegates from the National Physical Laboratory. Presentations on the design and assessment of an automated weight exchanger and testing the numerical performance of software were given by NPL. A presentation entitled 'Weighing - A New Millennium' was given by Mike Buckley of South Yorkshire Trading Standards Unit, and one called 'Density Matters' was given by Denis Fitzgerald of H & D Fitzgerald Ltd. Finally a presentation called 'Challenging the Assumptions' was given by Peter Kelley of the United Kingdom Accreditation Service. Members were given the opportunity to ask questions during an open discussion forum. The operation of the Club and any additional requirements that the members may have were also discussed as part of the open forum. The meeting was closed after a visit to see NPL's mass and density facilities.

3.4 Special Interest Meetings and Industrial Visits

There have been two special interest meetings, one of which was combined with an industrial visit. The minutes and agenda for these meetings are given in Appendix 4. The first special interest meeting related to 'Legal Metrology' and was held at the National Physical Laboratory on 2 June 1999. There were twenty delegates who saw three presentations from members covering a wide variety of issues relating to weighing in legal metrology.

The second special interest meeting on 'Balance Verification and Validation' was held at Glaxo Wellcome, Barnard Castle, County Durham on 22 September 1999. This meeting was attended by twenty-four delegates from fifteen member organisations. There were three presentations as well as a tour of Glaxo Wellcome's production facilities.

3.5 Newsletter

A newsletter, which was produced for Spring 1999, was distributed to all members and potential new members. The newsletter contained contributions from members as well as news and information about the Club, forthcoming events and the work of NPL in the area of mass and density. A copy of the newsletter is given in Appendix 5.

3.6 Membership Directory

A 'Membership Directory' was produced and distributed to all members in October 1998. The Directory is ready source of reference to members' interests and expertise. A copy of the Directory is given in Appendix 6.

3.7 World Wide Web (WWW) home page

WWW links to member organisations from the club pages on the NPL Internet site was established in December 1998. This page holds information about the Club and a frequently updated electronic version of the 'Membership Directory'. The address of the home page is <http://www.npl.co.uk/npl/clubs/mdclub.html>.

3.8 E-mail distribution list

A Club e-mail distribution list was set up in June 1999. This is a facility which enables members to communicate with each other more easily. E-mails sent by members to the address massclub@npl.co.uk are automatically forwarded to other members on the distribution list. The service facilitates question and answer interactions between members and the distribution of urgent reminders about Club matters. It has also been used to pass on requests, received by the National Physical Laboratory, for the supply of specialist products and services.

4 PROJECT MANAGEMENT

The project has been managed by NPL in accordance with NPL quality procedure QPNPL/B/007:Management of Small Projects. The project managers were Dr Ian Severn, Head of Mass and Density Standards and Nicola Raymond, Mass and Density Standards.

5 PROJECT PLAN

The milestones in Table 1, which were outlined in the proposal to the DTI, have all been completed on time.

Table 1

	MILESTONE	DATE
(i)	Form Steering Panel	Apr 1998
(ii)	Meeting to launch club	Jul 1998
(iii)	Progress report to NMSPU	Sep 1998
(iv)	Steering panel meeting to plan 1999 programme	Nov 1998
(v)	Create members directory	Oct 1998
(vi)	Create www links to members	Dec 1998
(vii)	Newsletter produced	Jan 1999
(viii)	Annual Meeting	Jul 1999
(ix)	Membership renewal	Aug 1999
(x)	Delivery of final report	Sept 1999

6 DELIVERABLES

The deliverables in Table 2, which were outlined in the proposal to the DTI, have all been completed on time.

Table 2

Deliverable	Delivered
Progress report to NMSPU (Sep'98)	September 1998
Create members directory (Oct'98)	October 1998
Delivery of final report (Sep'99)	September 1999

7 CONCLUSIONS

The Mass and Weighing Club has been operated by the National Physical Laboratory on behalf of the National Measurement System Policy Unit during the eighteen month period from April 1998 to September 1999. During this period the Club has attracted thirty-two members, held two annual meetings at the National Physical Laboratory, held two special interest meetings (one at the National Physical Laboratory and the other at Glaxo Wellcome), produced a newsletter and a Membership Directory. The creation of the Club has encouraged communication between members and has given end users the opportunity to discuss their needs with calibration laboratories and suppliers. The special interest meetings have facilitated the dissemination of information from the National Physical Laboratory to the membership and the exchange of technical information amongst the membership. There is an interest amongst the membership in expanding the scope of the Club to include density measurement and this should be implemented as part of the strategy for future development of the Club.

Appendix 1

- 1 List of Steering Panel Members
- 2 Agenda for Meeting on 28 April 1998
- 2.1 Minutes of Meeting on 28 April 1998
- 3 Agenda for Meeting on 3 November 1998
3. Minutes of Meeting on 3 November 1998

FIRST MEETING OF THE STEERING PANEL FOR THE NEW
MASS AND WEIGHING CLUB

28 April 1998

Atrium Suite, NEC, Birmingham

AGENDA

- 2.15 Role of Steering Panel
- 2.30 Club name, logo and stationery
- 2.45 Club Programme
 - Annual meeting in July
 - Two industrial visits
 - Membership renewal in August
- 3.30 Publicity
 - Recruitment
 - Members directory
 - WWW links
 - Newsletter
- 4.15 Any other business
- 4.30 Close

Timings are approximate although the intention is to close as near to 4.30 p.m. as possible.

**Steering Panel Meeting
Mass and Weighing Club
28 April 1998
Atrium Suite, Birmingham**

Minutes

Present

John Adams (EJA)	Army Calibration Laboratory
David Armitage (DRA)	National Physical Laboratory
David Jagger (DJ)	Jagger & Jagger Legal Metrology Consultants
Paul Liggins (PL)	Precisa Balances Limited
Tony Morris (AWM)	European Instruments
Nicola Raymond (NMR)	National Physical Laboratory
Graham Reed (observing) (GR)	Department of Trade and Industry
Ted Scorer (TS)	Glaxo Wellcome
Michael Scott (MS)	Process Measurement Technology Limited

Role of Steering Panel

The role of the steering panel was discussed. DRA said that the steering panel should oversee the activities of the Club and promote membership. GR supported the idea of the steering panel and its role.

Club Name, Logo and Stationary

The steering panel agreed the Club should be named the 'Mass and Weighing Club'. It was decided that NMR should design a logo and the stationery for the Club and send it to the steering panel members for approval. It was suggested that the Club should have an objective - 'Strong body of technical expertise to promote quality and understanding of mass measurement'. An aim was also suggested - 'Provide a forum for those interested in mass measurement'. DRA said that these will appear in the forms in some format.

Club Programme

It was agreed that the annual meeting and launch of the Club should be in the beginning of July 1998 at the National Physical Laboratory. The structure and content of the meeting was left for NMR to decide.

It was decided that one of the industrial visits will be at the National Physical Laboratory at the same time as the annual meeting. The second industrial visit will be discussed at the

STEERING PANEL MEETING

**3 November 1998
Sears Room, Glazebrook Hall
National Physical Laboratory**

Agenda

2.00	Coffee
	Review of Club
	Newsletter
	Special Interest Meetings/Industrial visits
	Publicity
	Any other business
4.30	Close

MASS AND WEIGHING CLUB STEERING PANEL

Minutes of meeting held on 3 November, 1998 at NPL

Present

Brian Chapman (NPL)
David Jagger (Jagger and Jagger)
Paul Liggins (Precisa Balances)
Tony Morris (European Instruments)
Ted Scorer (Glaxo-Wellcome)
Ian Severn (NPL, Chairman)

Apologies for absence

John Adams (Army Calibration Laboratory)
Michael Scott (Process Measurement Technology Limited)

Review of Club

Since its launch earlier this year the Club has attracted membership from twenty-one organisations and held its inaugural annual meeting at the National Physical Laboratory in July. The membership directory was published on 29 October and will be sent to all members. There is an introduction to the Club on the NPL internet site (<http://www.npl.co.uk/npl/clubs/mdclub.html>) which will shortly be expanded to include an electronic copy of the membership directory and hot-links to member's home pages.

Newsletter

The first Club newsletter will be published in January 1999. A copy of a recently published Humidity Club newsletter was presented as an example of the type of publication that is required. The first issue will contain an introduction to the Club as well as items that are usually present in publications of this type.

It was agreed that the content should be written in a manner such that it is of interest to end users, rather than being very technical. Paul Liggins suggested that there should be some articles describing fundamental aspects of weighing, such as weight handling issues, air buoyancy corrections and other areas of good practice. It was agreed that this is a good way to implement technology transfer within the Club. Tony Morris offered to send a copy of a recent paper that he has written on the validation of weighing instruments. It was also suggested that David Jagger could write an article about the Non-Automatic Weighing Instrument Directive. It was agreed that these would be good contributions to the newsletter together with updates of what is happening in mass and density metrology at NPL. Letters will be sent to all of the members asking them for contributions to the newsletter.

It was also agreed that a 'Reader's Questions' section would be a useful tool for the exchange of ideas. David Jagger proposed that an organisational chart showing the various branches of mass metrology and the committees and organisations which make decisions relating to them should be included in each issue.

STEERING PANEL MEMBERS

John Adams	Army Calibration Laboratory
David Jagger	Jagger & Jagger Legal Metrology Consultants
Paul Liggins	Precisa Balances Limited
Tony Morris	European Instruments
Ted Scorer	Glaxo Wellcome
Michael Scott	Process Measurement Technology Limited (Apr 1998 - Jul 1999)
David Armitage	National Physical Laboratory (Apr 1998 - Sept 1998)
Nicola Raymond	National Physical Laboratory
Ian Severn	National Physical Laboratory (Sept 1998 - Sept 1999)

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF CHEMISTRY

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RESEARCH REPORT

NO. 1

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annual meeting asking members to volunteer their organisation

DRA informed the steering panel that membership to Club will be £100 + VAT. He said that NPL will accept credit card payments as long as the organisation has signed an agreement of some form. NMR said that she will produce a form for members to complete for payment.

Publicity

DRA said that recruitment to the Club will initially be made by a mail shot using NPL's marketing database. He asked the steering panel to provide any names of potential new members to NMR. PL stated that a wide range of members could be a problem to meet all their needs. TM agreed and said the Club should be technically orientated and should not market at industry level. TS commented that if people were interested in the Club then the Club should be interested in them. This was the general consensus from the rest of the steering panel members.

It was decided that the 'Membership Directory' should take the form of the Pressmet Directory and that NMR will produce it.

DRA said that articles for the newsletter should be submitted by October 1998 in order for it to be published in January 1999. It was agreed that this would be announced at the annual meeting.

Any Other Business

It agreed that David Jagger should become a member of the steering panel, he accepted. TM suggested that a trading standards officer should be on the panel. DRA said that the panel was at its maximum size and agreed that in the new programme he would invite a trading standards officer to join.

Date of Next Meeting

The next meeting will be held in November 1998



The newsletter will be widely circulated, with member organisations being able to distribute it to their customers. It is hoped that such widespread distribution will help to increase the membership of the Club.

Special Interest Meetings

The panel were all keen to see a training workshop as a special interest meeting. A workshop of this kind would cover the basics of good mass metrology, traceability, calibration and uncertainty issues. Brian Chapman will investigate the possibility of such a workshop being suitable for the booking of professional development credit to the attendees.

A legal metrology special interest meeting will be held, subject to the response of the membership, at the same time as the first industrial visit (see below). David Jagger will make a presentation about various aspect of legal metrology and it was suggested that Alan Janes of European Instruments could talk about validation.

Industrial Visits

Ted Scorer offered the chance of a visit to the Glaxo-Wellcome facility at Barnard Castle, County Durham. It was agreed that this could take place in the Spring of 1999. It takes approximately one and a half hours to tour the building, accompanied by professional guides. There are also facilities available for a special interest meeting at the same time.

Publicity

Ted Scorer commented that he comes across publicity for many NPL events by accident. Is it possible that members of a particular NPL club could be informed of events organised by the other clubs? Brian Chapman will look into this with a possible NPL Corporate Clubs, News and Events Information Sheet.

A new introduction and membership application form will be produced to include examples of Club activities. This will be circulated by the members. Publicity will also arise as a result of the wide circulation of the newsletter.

New publicity material, emphasising actual deliverables (special interest meetings, newsletters, the proposed group email name and visits), will be distributed more widely. Glaxo Wellcome will publicise the Club in the "Pharmaceutical Manufacturers' Forum" and articles will be placed in trade magazines (Tony Morris and David Jagger are going to send Brian Chapman details of the relevant names and associations).

Dr Ian Severn

Mass and Density Standards Section

Centre for Mechanical and Acoustical Metrology

9 November 1998

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Dr Ian Severn
Mass and Density Standards Section
Centre for Mechanical and Acoustical Metrology

9 November 1998

THE HISTORY OF THE

REIGN OF
HAROLD GODWINSON

BY
J. H. M. J. VAN DER KAM

LONDON:
PUBLISHED BY

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Date of Next Meeting

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THE HISTORY OF THE CITY OF BOSTON
FROM THE FIRST SETTLEMENT TO THE PRESENT TIME

BY
JOHN H. COLEMAN

Author of "The History of the City of Boston,"
"The History of the City of New York," &c.

VOLUME II.

NEW YORK: PUBLISHED BY
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1854.

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Nicola Raymond	National Physical Laboratory
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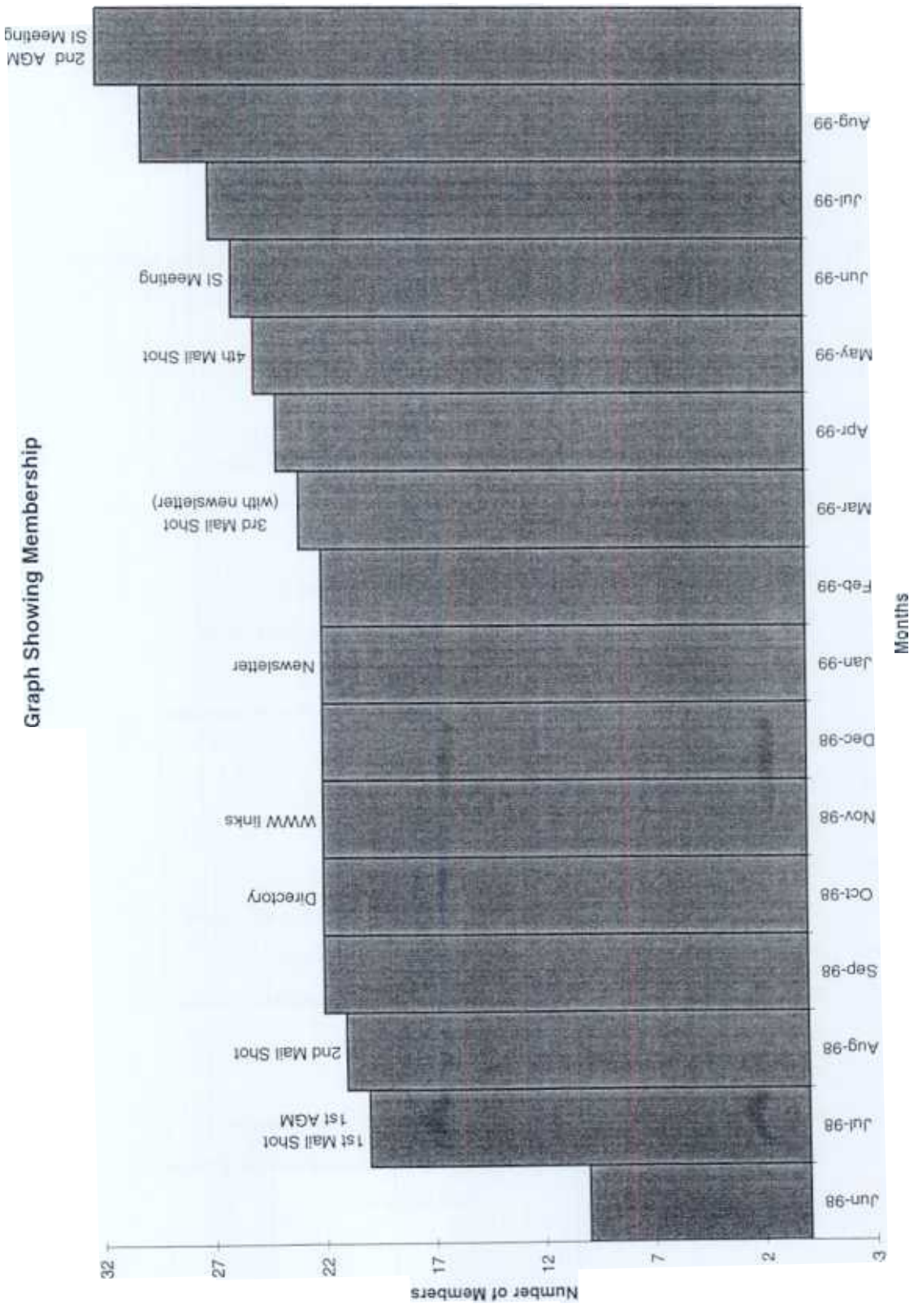
Appendix 2

List of Membership

2 Graph showing Membership

Members list

	Name		Company
	E.J	Adams	Army Calibration Laboratory
	Ian	Lavender	Humber Authorities Calibration Test Centre
		Liggins	Precisa Balances Ltd
	Adrian	Chapman	Norfolk County Council
		Groombridge	British Aerospace Military Aircraft & Aerosrtuctures
		Jagger	Jagger & Jagger
		Allen	Somerset Metrology Services
8	Keith	Pogson	East Sussex County Council
9	Robin	Ball	London Borough of Havering Trading Standard Service
10	Mike	Buckley	South Yorkshire Trading Standards Unit
11	Tony	Kowalski	Sartorius Limited
12	Ted	Scorer	Glaxo Wellcome Operations
13	David	Hill	Pressurements Limited
14	Carl	Halkier	West Yorkshire Calibration Laboratory
15	Michael	Scott	Process Measurement Technology Ltd
16	Alan	Janes	European Instruments
17	Adrian	Hunter	SI Pressure Instruments Ltd
18	Peter	Kelley	United Kingdom Accreditation Service
19	Norman	Reed	Solartron
20	Chris	Rosenberg	National Weights and Measures Laboratory
21	Tony	Mellor	Mettler Toledo
22	Chris	Jenkins	Kent Scientific Services
23	Denis	Fitzgerald	H & D Fitzgerald
24	Brian	Treherne	Paar Scientific Ltd
25	Graham	Reed	Department of Trade & Industry- NMSPU
26	Nicola	Raymond	National Physical Laboratory
27	Colin	Evans	3M Health Care - Pharmaceutical Division
28	Renton	Mein	Stevenson Reeves Ltd
	Brian	Law	Rhomax ITS Limited
	Michael	Barnes	London Borough of Brent & Harrow
		Glencorse	Cleveland Metrology and Calibration Centre
	Collette	Tully	Sanofi Winthrop



Appendix 3

Agenda for Annual Meeting on July 1998
Minutes Annual Meeting July 1998

2.2 Agenda for Annual Meeting 2 September 1999
Minutes Annual Meeting on 2 September 1999

MASS AND WEIGHING CLUB ANNUAL MEETING

10 JULY 1998

KAYE ROOM, NATIONAL PHYSICAL LABORATORY

AGENDA

	Registration and Coffee	Conference Reception Glazebrook Hall
10.00	Welcome and Introduction	Graham Torr NPL
10.15	The Mass & Weighing Club and Mass Section at NPL	David Armitage NPL
	Clubs in NPL	Anne Kearney NPL
10.45	Primary Kilogram and Balances	Ian Severn NPL
11.15	Air Density and Weighing in Vacuum	Stuart Davidson NPL
	Validation and Verification of Balances in an Automated Environment	Ted Scorer Glaxo Wellcome
	Lunch	Bistro, Glazebrook Hall
1.30	Slovakian Metrology	Dusan Trochta Slovak Institute of Metrology
	Weighing above 20 Kilograms	Gordon Peattie NPL
2.00	Solid and Liquid Density	Stephen Downes NPL
	Laboratory Visits	
3.20	Coffee and demonstration of Club Web pages	
3.45	Open discussion	David Armitage NPL
	Close	

**Minutes from the Mass & Weighing Club Meeting
held at the National Physical Laboratory
on 10 July 1998**

Present:

David Armitage	National Physical Laboratory
Stuart Davidson	National Physical Laboratory
Stephen Downes	National Physical Laboratory
Denis Fitzgerald	H & D Fitzgerald
Heather Fitzgerald	H & D Fitzgerald
Carl Halkier	West Yorkshire Calibration Laboratory
Peter Harrison	United Kingdom Accreditation Service
David Hill	Pressurements Ltd
Adrian Hunter	SI Pressure Instruments Ltd
Chris Jenkins	Kent Scientific Services
Peter Kelley	United Kingdom Accreditation Service
Anne Kearney	National Physical Laboratory
Tony Kowalski	Sartorius Limited
Paul Liggins	Precisa Balances Limited
H.S Mankia	SI Pressure Instruments Ltd
John Marklew	Mettler Toledo
John Pain	National Weights and Measures Laboratory
Andrew Passmore	guest of Sartorius Limited
Gordon Peattie	National Physical Laboratory
Nicola Raymond	National Physical Laboratory
Norman Reed	Solartron
Ted Scorer	Glaxo Wellcome
Michael Scott	Process Measurement Technology Ltd
Ian Severn	National Physical Laboratory
Graham Torr	National Physical Laboratory
Dusan Trochta	Slovak Institute of Metrology

Welcome & Introduction

A welcome and introductory talk was given by Dr Graham Torr. He described the role of the National Physical Laboratory and how the club fitted into its structure.

The Mass & Weighing Club & Mass Section at NPL

David Armitage outlined the setting up of the Mass and Weighing Club which had been a response to requests from a small group of interested people, and the success of the many other clubs run by the NPL. He stated that the principal roles of the Club are:

- A forum for discussion and dissemination of best practice in mass and density metrology.

- A basis for interaction between users and manufacturers to assist in the development of weighing equipment to meet specific needs.
- A focus for discussion of existing and forthcoming legislation affecting weighing and mass measurement, and a lobby group to influence legislators to secure appropriate legislation and standards.
- A meeting point to encourage collaboration between members in research and development, with particular emphasis on the production of measurement software.

The benefits of club membership include:

- An annual meeting including
 - Presentations from guest speakers
 - Reports on the work of NPL
 - Open discussion forum
- Industrial visits
- A WWW page with links to member organisations
- A newsletter
- A members directory

David mentioned that the Club is partly funded by the DTI and operated by the NPL with Nicola Raymond of NPL acting as the secretariat. He also said that a Steering Panel has been set up to provide ideas and guidance for the Club. The volunteer members of the Steering Panel are:

John Adams, Army Calibration Laboratory
 David Jagger, Jagger & Jagger Consultants
 Paul Liggins, Precisa Balances Ltd
 Tony Morris, European Instruments Ltd
 Ted Scorer, Glaxo Wellcome
 Michael Scott, Process Measurement Technology Ltd

David Armitage also talked about NPL Mass & Density Standards Section being responsible for the provision of the National Measurement System for mass and density, for the benefit of UK industry. This includes providing traceability to the International Prototype of the Kilogram for the mass scale from 0.5 mg to 2.7 tonnes. Traceability is ensured via the UK's primary standard, Kilogram 18, and the other platinum, platinum-iridium and stainless steel one-kilogram standards maintained by NPL. The mass scale is disseminated with reference to the stainless steel primary standards. The provision of traceable measurements of solid and liquid density is achieved via the mass scale and the density of pure water, using internationally-agreed data.

The Mass Section disseminates mass and density standards via measurement services. Mass calibrations are made to OIML Classes E1, E2 and F1 up to 50 kg. Dissemination above this value, up to 2.7 tonnes, is achieved with some of the best measurement uncertainties in the

world. Density measurements can be made on solid articles up to a mass of 20 kg, and on liquids at a range of temperatures up to 30 °C in the density range 600 kg m⁻³ to 1600 kg m⁻³.

The Section also undertakes research, both for the DTI in pursuit of improvements to standards and dissemination, and under contract to customers to investigate particular issues and problems. Current research in the DTI Programme includes improved measurement of air density by direct comparison of artefacts, support for various activities in pursuit of a future re-definition of the unit of mass, and the provision of traceability for solid density to an artefact standard as an alternative to the current reference to pure water.

The staff of the Section are:

David Armitage,	Head of Section
Stuart Davidson,	Mass and density metrology
Ian Severn,	Mass metrology and dissemination services
Stephen Downes,	Density metrology and dissemination services
Nicola Raymond,	Mass metrology and dissemination services
Stephen Brown,	Primary standards and one-kilogram comparators
David Chandler,	Mass and density dissemination services, IT support.
Gordon Peattie,	Large mass metrology (>20 kg) and dissemination services
David Bayliss,	Mass dissemination services, photographic/ admin. support

and currently Dusan Trochta, a guest-worker from SMU, the national standards laboratory of Slovakia, working on improvements to the high-accuracy solid density measurement rig.

Clubs in NPL

Anne Kearney briefly mentioned the other clubs operated by NPL on behalf of the DTI. She explained how the Mass & Weighing would run along side the other clubs and be managed by herself if it continued into the next programme. She spoke some of the benefits that the other clubs enjoy, such as half price subscription to 'Quality Today' and said that the Mass & Weighing Club would have the same benefits in the new programme.

Primary Kilograms and Balances

Ian Severn gave a presentation which illustrated how the SI unit of mass is realised both world wide and in the United Kingdom. The traceability of the mass scale to the International Prototype of the Kilogram, and the UK's official copy of the Prototype was illustrated. The reasoning behind the choice of platinum-iridium alloy as a material for Prototypes of the Kilogram and the choice of a cylinder as a shape for such weights was discussed.

The problems of transferring the mass scale from platinum-iridium standards to stainless steel weights was demonstrated by showing typical uncertainty budgets for the calibration of NPL's secondary platinum iridium standards and its best stainless steel reference standards. Reference was made to how the improvement in the measurement of air density, as discussed by Stuart Davidson, would allow for improvement in the calibration of stainless steel standards.

The mass comparators used at NPL for making measurements at the 1 kg level were shown pictorially and their performance was discussed. The advantages of NPL's new flexure strip balance were also described.

The mass and density comparisons undertaken by the NPL during the last ten years were shown to illustrate how NPL demonstrates the equivalence of its measurements in this field with those of other national measurement institutes.

Weighing in Vacuum

Stuart Davidson talked about the research which he had been undertaking looking at the behaviour of platinum-iridium and stainless steel weights in vacuum. The project studied the stability of weights of the two materials when stored in vacuum and to categorise the mass changes which occur when the weights are transferred between ambient and vacuum conditions.

The aim was to study the contamination of weights stored in air by comparing their values with weights held under vacuum conditions. The apparatus also eliminated the need for buoyancy correction when comparing platinum-iridium and stainless steel weights and so reduce the uncertainty on NPL's stainless steel kilograms.

Stuart described the equipment used for the work and its performance and gave details of the weighing results for weights of both materials in air and in vacuum.

Air Density Measurement

As described in the talk by Ian Severn, NPL holds the national standard kilogram which is made from platinum-iridium. As part of the dissemination of the value of this standard we must compare primary kilogram standards, made of platinum-iridium, with secondary mass standards of stainless steel. Due to the difference in the densities of the two materials this comparison involves an air buoyancy correction of the order of 0.1 gram. The measurement of the density of air, required to calculate this correction, is the major source of uncertainty in the comparison.

Stuart Davidson spoke about the need for air density measurement for high accuracy mass calibration. He described four methods for the measurement of air density which had been evaluated at NPL. These methods were:

- Calculation of air density from measurement of temperature, pressure and humidity using the CIPM recommended equation.
- Direct measurement using specially designed artefacts (both commercially available and NPL designed).
- Relating air density to refractive index and measuring this with a refractometer.
- Using a device incorporating a "floating" aerostat on a dedicated balance.

The results from a comparison of the first three methods were given together with a list of the pros and cons of all the methods.

Validation and Verification of Balances in an automated Environment

Ted Scorer summarised the steps of validating balances within Glaxo Wellcome as; the requirements of a new balance is specified before purchase (design qualification), on delivery the basic operation is tested (installation qualification), the balance is tested against the design qualification (operational qualification) and finally is tested by the user in an operational environment (performance qualification). Having installed a balance it is regularly subjected to verification by testing for reproducibility, linearity, hysteresis and eccentricity. A minimum frequency and specification for each being specified within the companies standards documents.

A quick introduction to the NAWI regulations was presented and using typical examples of a manual and robot checkweighing system. It was illustrated that the limits specified in the legislation were all broader than those already employed. Slides and a video were used to illustrate modifications that had been made to balances to allow them to operate successfully in an automated environment.

Slovakian Metrology

Dusan Trochta from the Slovak Institute of Metrology gave a presentation on metrology issues in his country. He outlined the role of his company and in particular the mass and density areas.

Weighing above 20 kilograms

An overview of the NPL's achievable uncertainties from 50 kg up to 1 tonne was outlined by Gordon Peattie. The various balances used in this range were described, including the modifications which have been made to some of the balances and remarks on the historical scientific significance of the balance used by Poynting to determine G . The improvements to mass scale in this range which have been made were presented including the design and manufacture of 4 x 250 kg stacks of 50 kg standards for the calibration of 500 kg and 1 tonne masses, this was then related to the initial uncertainties presented showing a reduction in the uncertainty of measurement by more than a third. Finally the work on developing an automatic weight exchanger for a commercial platform balance was described, as yet this work isn't complete but the initial results look promising.

Solid and Liquid Density

Stephen Downes provided an overview of the measurement of solid and liquid density at NPL. Measurement of solid density for artefacts from 1g to 20 kg; density of liquids within the range 600 to 1600 kg m⁻³.

He described the many applications for high accuracy density measurement: NPL standards; NAMAS accredited labs; Nuclear industry; UKAS audit samples; Petroleum industry; and National Standards Laboratories.

The principle of solid density was presented - Weigh in air to determine the true mass followed by hydrostatic weighing in water to determine the apparent mass. According to Archimedes the difference between the true mass and the apparent mass in water is equal to the mass of the water displaced by the artefact. If the density of the water is known the volume of the displaced water can be simply calculated which is identical to the volume of the artefact. As we already know the true mass of the artefact, density is simply calculated. Effectively pure water acts as a transfer standard.

Stephen also talked about the 1 kg solid density apparatus being used for both NPL's own standards and customers artefacts. Range of 100 g to 1 kg. It consists of a single-pan balance mounted over a temperature controlled water bath. The bath contains a separate glass vessel which is filled with pure water (i.e. de-ionised and distilled). An artefact can be suspended from the balance in the water and its apparent mass in water determined. As with all high accuracy mass measurements balance used as comparator.

Experimental detail described: platinising the suspension wire; acid cleaning the glassware; preparation of very pure water and its correction for absorbed gases, isotopic content, depth of immersion and variation of atmospheric pressure.

Liquid density was also presented. NPL have two apparatus for the measurement of the density of liquids (1) based on hydrostatic weighing methods (2) based on a commercial device.

The hydrostatic apparatus consists of an equal-arm, two-pan balance mounted over a temperature controlled bath. The bath contains a separate glass vessel which can be filled with the liquid under investigation. The operating principle very similar to solid density apparatus. Two glass sinkers have been manufactured so that they are closely equal in mass but their volumes differ by approx. 100 cm³. When submerged in a liquid, their apparent mass difference can be measured and is equal to the mass of the liquid displaced by the volume difference between the sinkers. If the volume difference is known the density of the liquid can be calculated.

The commercial apparatus consists of a Paar meter, a PRT for measuring temperature and a temperature controlled water bath. The Paar meter determines the density of a liquid by measuring the oscillation frequency of a U-tube containing the sample. This cell is electromagnetically excited to vibrate at its natural frequency. The portion of the tube which oscillates is well defined (i.e. it has a constant volume) and the mass of the liquid in the cell (and hence its density) determines the frequency of oscillation. The cell has to be calibrated prior to use to relate the frequency to density. Achieved with two reference fluids whose densities have been determined by independent means.

Laboratory Visits

The delegates visited three laboratories in NPL. Ian Severn showed the delegates around the mass laboratory where weighings from 0.001 gram to 20 kilograms are carried out. Stephen Downes showed them the hydrostatic bath in the density laboratory used for solid density measurements and the hydrostatic bath used for liquid density as well as the commercial

apparatus. Gordon Peattie showed the delegates the 2.7 tonne comparator for weighing from 500 kilograms to 2.7 tonnes, the bullion balance for weighings from 100 kilograms to 500 kilograms and the new weight exchanger for the 50 kilogram top-pan balance.

Open Discussion

The meeting was closed with an open discussion forum. Tony Kowalski asked if a leaflet advertising the Mass Club could be available for members to pass on to prospective members, especially more end users. It was agreed that one should be produced and that Nicola Raymond would organise it.

Michael Scott suggested that there should also be a press release in relevant journals and magazines. This was also agreed and a short article will go out with the press release for the "Guides to Measurements".

The subject of industrial visits and special interest groups was addressed. Ted Scorer offered a visit to Glaxo Wellcome and John Pain offered a visit to the National Weights and Measures Laboratory. It was decided that a special interest group meeting should be combined with the industrial visit. The subjects suggested for the interest group meeting were, uncertainties, software or solid and liquid density.

MASS & WEIGHING CLUB ANNUAL MEETING

2 September 1999

KAYE ROOM, NATIONAL PHYSICAL LABORATORY

AGENDA

	Registration and Coffee	Conference Reception, Glazebrook Hall
	Welcome and Introduction	Graham Torr National Physical Laboratory
	Club & Mass Section Update	Ian Severn National Physical Laboratory
	Weighing - A New Millennium	Mike Buckley South Yorkshire Trading Standards Unit
.40	Design and Assessment of an Automated Weight Exchanger	Gordon Peattie National Physical Laboratory
12.20	Density Matters	Denis Fitzgerald H & D Fitzgerald Ltd
1.00	Lunch	Bistro, Glazebrook Hall
2.00	Testing the Numerical Performance of your Software	Mark Dainton National Physical Laboratory
2.40	Challenging the Assumptions - Experiences from Accreditation of Mass and Weighing Machine Calibrations	Peter Kelley United Kingdom Accreditation Service
3.20	Questions and Open Discussion	Ian Severn National Physical Laboratory
4.00	Coffee, demonstrations and laboratory visits	

Timings are approximate although the intention is to close as near to 4.30 p.m as possible.

**Mass and Weighing Club Annual Meeting
National Physical Laboratory
2 September 1999**

Minutes

Present:

Luke Allen	Somerset Metrology Services
Michael Barnes	London Borough of Brent & Harrow
David Bayliss	National Physical Laboratory
Mike Buckley	South Yorkshire Trading Standards Unit
Brian Chapman	National Physical Laboratory
Mark Dainton	National Physical Laboratory
Kevin Douglas	National Physical Laboratory
Stephen Downes	National Physical Laboratory
Colin Evans	3M Health Care - Pharmaceutical Division
Denis Fitzgerald	H & D Fitzgerald Ltd
Heather Fitzgerald	H & D Fitzgerald Ltd
David Groombridge	British Aerospace Military Aircraft & Aerostructure
Frank Hardcastle	Mettler Toledo
David Hill	Pressurements Limited
David Jagger	Jagger & Jagger
Peter Kelley	United Kingdom Accreditation Service
Robert Kemp	Jagger & Jagger
Tony Kowalski	Sartorius Limited
Pauline Leggat	National Physical Laboratory
Peter Quill	Stevenson Reeves Ltd
Tony Morris	European Instruments
Steve Nicholls	Norfolk County Council
John Pain	National Weights and Measures Laboratory
Doug Palmer	South Yorkshire Trading Standards Unit
Gordon Peattie	National Physical Laboratory
Keith Pogson	East Sussex County Council
Barbara Price	Somerset Metrology Services
Nicola Raymond	National Physical Laboratory
Graham Reed	Department of Trade & Industry- NMSPU
Norman Reed	Solartron
Ian Severn	National Physical Laboratory
Graham Torr	National Physical Laboratory
Brian Treherne	Paar Scientific Ltd

Welcome & Introduction

Graham Torr
National Physical Laboratory

Graham Torr, Head of the Centre for Mechanical & Acoustical Metrology at the National Physical Laboratory opened the second annual meeting of the Mass and Weighing Club by welcoming all those present. He talked about the progress of the new building for NPL and

commented that the Mass and Density Standards Section should be moving to this new laboratory during November 2000.

Club and Mass Section Update

Ian Severn
National Physical Laboratory

Ian Severn, Head of the Mass and Density Standards Section at the National Physical Laboratory summarised the Club's activities over the year. He announced that the current membership was thirty. Ian outlined the contents of the newsletter that was produced earlier in the year and commented that it had been sent to four hundred interested people in March 1999. He also talked about the purpose and format of the new market digest which has been sent to members. Ian introduced the Club group e-mail. He said that its purpose was to allow easy access and open communication between members. Ian announced that the first special interest meeting on 'Legal Metrology' had been well attended and thanked those who had given a presentation. He also stated that the second special interest meeting on 'Balance Verification and Validation' was to be held on 22 September 1999 at Glaxo Wellcome, Barnard Castle, County Durham.

Weighing - A New Millennium

Mike Buckley
South Yorkshire Trading Standards Unit

Mike Buckley of the South Yorkshire Trading Standards Unit (SYTSU) gave a presentation on the future of weighing and the systems in place at SYTSU. He started by talking about how the new definition of the kilogram would affect the 'shop floor'. He also mentioned the need for a guide to good weight handling and why it is growing more important. He also discussed how weighing could be made easier and how they have achieved this at SYTSU. He talked about their fully automated mass comparator which uses a robotic arm to place weights on the weighing pan and their fully automatic data acquisition system for weight calibration. Mike summarised his presentation by giving his thoughts on weighing in the new millennium.

Design and Assessment of an Automated Weight Exchanger

Gordon Peattie
National Physical Laboratory

Gordon Peattie of the Mass and Density Standards Section at National Physical Laboratory gave a presentation on the design and assessment of an automatic weight exchanger. He began his presentation by describing why the work was undertaken. He said that NPL had recently purchased twenty new 50 kg weights, which may be combined into 250 kg stacks, for the calibration of large masses. The balances that were available at NPL to calibrate these weights were an equal arm two-pan balance with a 50 kg capacity and an electronic top-pan balance with a suspended cradle. Both balances had restrictions in the type of weight they could accommodate. However, the electronic balance could be used as an open top-pan balance which meant loading was unrestricted. The performance of this balance in this configuration was not adequate therefore, modifications were made. Gordon described the modifications made to the balance. He discussed the commercially available self centring plate that was used. He said the arrangement of the ball bearings being held between a pair of curved plates allowed the pan to swing and bring the centre of gravity of the load to the same position each time. However, because there is only a limited amount of travel in the system the pan may not be able to bring the weight's centre of gravity to the same position each time if the weight is placed at the extreme edges of the pan. Gordon then went on to describe the conceptual design

for a mechanism to keep the balance at a constant load whilst exchanging the weights. He described how the framework is made from carbon fibre with aluminium to connect the various parts together. This was chosen because of its strength and rigidity whilst also being light, inert and non-magnetic. He stated that the top and bottom stations use four jacks driven by stepper motors, to accurately position the weights in the vertical plane. Gordon then went on to discuss the assessment of the balance after the modifications had been made. He concluded that the weight exchanger had significantly improved the performance of the balance although there was no difference using the weight exchanger manually or automatically. This implied that the hysteresis of the balance was not significant when it is used a comparator and that finding a way of exchanging the weights so that the positioning of the weight was same each time was the most critical factor in obtaining repeatable and accurate results.

Density Matters

Denis Fitzgerald
H & D Fitzgerald Ltd

Denis Fitzgerald of H & D Fitzgerald Ltd gave a presentation on solid and liquid density. He described what density is, why it is measured and how it is traceable to the kilogram. He talked about the use of a Zerodur sphere as a primary artefact for the determination of density. He mentioned the difficulty in measuring the mass of this sphere to better than ± 150 to $250 \mu\text{g}$ due to its shape and air density problems. He also mentioned the use of a silica sphere and a hollow ULE glass sphere. He then discussed the transfer from the primary artefact to secondary artefacts. He discussed hydrostatic weighing methods, hydrometers, density meters and pycometers. Denis summarised his presentation by giving his thoughts on the future of density determination. He said that if the Avogadro project succeeds density will be tied up with the unit of mass more intimately with lower uncertainties by several orders of magnitude. He expressed his belief that there will be an increase in the number of density meters in use and his hope that they will be more realistically priced. He also thought that there will still be a place for hydrometers. However, meters will become more common as processes are de-skilled. Denis concluded by saying that for best measurement you still need competent and knowledgeable operators.

Testing the Numerical Performance of your Software

Mark Dainton
National Physical Laboratory

Mark Dainton of the Centre for Information Systems Engineering at the National Physical Laboratory gave a presentation on testing the numerical performance of software. He stated that as the use of software becomes increasingly more important in metrology, the need to ensure it is giving accurate results is vital. He described how the application of comparatively straightforward mathematical formulae can give inaccurate results if numerically efficient techniques are not employed. Moreover, it is possible to increase the accuracy of the inputs to a software system and see a decrease in the relative accuracy of the outputs. Two methods of black-box testing were introduced and discussed with the emphasis on data generation methods and data reference sets. Absolute methods of comparison of results were derived and the effects on the fitness-of-purpose was discussed.

Challenging the Assumptions - Experiences from Accreditation of Mass and Weighing Machine Calibrations

Peter Kelley

United Kingdom Accreditation Service

Peter Kelley of the United Kingdom Accreditation Service gave a presentation on the assumptions people make when making weighings. He stressed the importance on not making assumptions and always justifying your results, equipment and techniques. He gave a few examples of some of the assumptions he has seen some people make.

Questions and Open Discussion

Obtaining new membership was discussed at length. Ian Severn said that he thought the Club had exhausted the NPL marketing database for potential new members and asked if anyone had any other suggestions. Tony Kowalski offered to provide some names for Nicola Raymond to contact individually inviting them to join the Club. Others agreed that this was a good idea. Mike Buckley suggested that a leaflet advertising the Club should be produced for members to pass on to their customers. This leaflet should contain a faxback facility on the reverse side for people to respond to. It was also suggested that potential new members may be obtained from trade associates web pages and putting an advert in Lab News. Some members stressed the importance of having meetings in the north of the country and thought that this may attract more members. Another suggestion made was to include an application form in the newsletter.

Laboratory Visits

Several new members of the Club were given a tour of the laboratories of the Mass and Density Standards Section. Here they were shown the facilities and were given a brief summary of the work of the Mass and Density Standards Section. Some members were also shown the National Physical Laboratory's museum.

Appendix 4

- Agenda for Special Interest Meeting on Legal Metrology held on 2 June 1999**
- 1 Minutes of Special Interest Meeting on Legal Metrology held on 2 June 1999**
- 2 Agenda for Special Interest Meeting on Balance Verification and Validation held on 22 September 1999**
- 2.2 Minutes of Special Interest Meeting on Balance Verification and Validation held on 22 September 1999**

MASS AND WEIGHING CLUB SPECIAL INTEREST MEETING
LEGAL METROLOGY

2 JUNE 1999

GLOBE ROOM, BUSHY HOUSE
NATIONAL PHYSICAL LABORATORY

AGENDA

Registration and Coffee	Conference Room, Bushy House
Welcome and Introduction	Ian Severn National Physical Laboratory
Weighing in Legal Metrology	Chris Rosenberg National Weights & Measures Laboratory
Legal Metrology; What is its Precise Future?	Chris Jenkins Kent Scientific Services
Lunch	Conference Room, Bushy House
Weighing the Law	David Jagger Jagger & Jagger Legal Metrology Consultants
Questions and Discussion	
15.00 Close	

Special Interest Meeting - Legal Metrology
2 June 1999
Globe Room, Bushy House
National Physical Laboratory

Minutes

Present:

David Glencorse	Cleveland Metrology & Calibration Centre
Keith Pogson	East Sussex County Council
Ian Lavender	Humber Authorities Calibration Test Centre
Robin Ball	London Borough of Havering Trading Standards Service
Adrian Chapman	Norfolk County Council
Steve Nicholls	Norfolk County Council
Brian Treherne	Paar Scientific Ltd
Luke Allen	Somerset Metrology Services
Paul Clarke	Somerset Metrology Services
David Jagger	Jagger & Jagger Legal Metrology Consultants
Chris Jenkins	Kent Scientific Services
Chris Rosenberg	National Weights & Measures Laboratory
John Pain	National Weights & Measures Laboratory
Brian Chapman	National Physical Laboratory
David Simpson	National Physical Laboratory
Graham Torr	National Physical Laboratory
Ian Severn	National Physical Laboratory
Nicola Raymond	National Physical Laboratory
Stephen Downes	National Physical Laboratory
Stuart Davidson	National Physical Laboratory

Welcome and Introduction

Ian Severn
National Physical Laboratory

Ian Severn, Head of the Mass and Density Standards Section at the National Physical Laboratory opened the first of the Mass and Weighing Club's special interest meetings.

Weighing in Legal Metrology

Chris Rosenberg
National Weights & Measures Laboratory

Chris Rosenberg, director of Metrology and Quality at the National Weights & Measures Laboratory, gave a presentation on legal metrology in general and the place of weighing and mass metrology in measurement for trade. He started by defining legal metrology and outlining how such work was divided between government departments. He went on to focus on the weights and measures aspects and in particular weighing as part of the trade transaction process. Technical aspects of trade and weighing were mentioned including conventional value, traceability limits of

error, type approval and verification. The impact of European Union legislation was considered and some indication given on the likely time-scale and coverage of the forthcoming Measuring Instruments Directive.

Legal Metrology - What is its Precise Future?

Chris Jenkins
Kent Scientific Services

Chris Jenkins, Calibration Services Manager at Kent Scientific Services gave a presentation on his thoughts as to the future of legal metrology at the local authority level, with the hope of generating debate about the future provision of such services. The topics he covered were:

- The past, how we got to where we are today
- The present, where we are today
- The future, where are we going to from here?

Chris began with the topic of "The past, how we got to where we are today". He stated that the basic guiding principles of modern legal metrology in the UK were set down in the Magna Carta "... there shall be but one measure ... throughout the realm". He added that one early piece of relevant legislation after the Magna Carta was the Assize of Bread and Ale, of 1266 that set prescribed weights for bread, and prescribed measures for ale. He commented that it also controlled the prices of those goods by legislating a set of selling prices linked to prices of their constituent raw materials. An example of this was if wheat cost 1 shilling per quarter, then a best quality farthing loaf had to weigh 5 lb 3 oz, but if wheat cost 20 shillings per quarter a best quality farthing loaf had to weigh 3.75 oz. Penalties for a first offence; if any bread was short-weight by a deficiency of less than 1.2 oz (35 grams) then a fine was imposed on the seller, but if the deficiency was more than 1.2 oz (35 grams) then the seller was put in pillory immediately, with no option of a fine.

Chris then gave a brief history of the Weights and Measures Acts and legislations.

- The Weights & Measures Act 1824 set up a system of standards of weights and measures being kept in each localities, in order to facilitate the control of trade in that locality

The Weights & Measures Act 1835 set up a system of inspectors, tasked to compare and verify all weights and measures being used in their localities

- The Weights & Measures Act 1878 imposed uniform standards of weight and measure to trade transactions, penalised the use of unjust equipment, and transferred the inspectorate to local authority control
- In 1904 legislation provided for pattern approval and for the qualification of individual inspectors by examination
- In 1926 metrological controls were imposed on all sales of foods and domestically important non-food items
- In 1944, regulations required the quantity within a food pre-pack to be marked on the outside of that pack. The minimum actual quantity within the pack had not to be less than the quantity marked on the pack - this is the minimum system

- In 1980 the rules changed to also allow the quantity within the pack to be on average not less than the marked quantity, and such “average weight” packs to be acceptable anywhere within the EEC
- In 1988 Non Automatic Weighing Instrument Regulations introduced, based on OIML recommendations
- In 1994 EEC Directive 90/384 introduced acceptance of non automatic weighing instrument for trade use anywhere within the 21 countries of the EEA if marked in accordance with that Directive by a notified body (little green stickers with M’s on them)

In 1999 an order has been passed that introduces self verification of trade equipment by any manufacturer, installer or repairer so approved by the Secretary of State for Trade and Industry

Chris described the current situation being:

- | | |
|---|----------------------------------|
| • A national system of standardisation | NO EUROPEAN INVOLVEMENT |
| • A national system of pattern approval | NO EUROPEAN INVOLVEMENT |
| • A national system of verification | } OVERTAKEN BY EUROPEAN CONTROLS |
| • A national system of in use testing | |
| • A national system of packing control | |

He stated that over the years since the UK joined the EEC, a large number of metrological Directives have been implemented, and now a lot of trade equipment is controlled by European legislation. No UK government has ever been generous to local authorities, and under funding has become institutionalised over many decades.

Chris also mentioned that today your local weights and measures authority or local Trading Standards Department will be an under resourced service, perhaps struggling to perform all the duties imposed upon it by law, with staff who are quite stressed and occasionally demoralised. However the Audit Commission, the Department of Trade and Industry, and the National Weights and Measures Laboratory all monitor the legal metrological performance of each local weights and measures authority, and will be eager to ensure that the performance of each is sufficient to fulfil its statutory obligations. The staff of smaller departments will be jacks of all trades, dealing with the whole wide range of consumer legislation, whilst a few departments will be large enough to benefit from employing specialist officers. Such officers will be able to keep up to date with technical and legislative developments within their specialities, and will be able to develop and retain the skills needed to enforce relevant legislation.

Chris asked how can such a local authority meet its statutory obligations? His answer was one way is for it to buy in the service from another local authority that is prepared to provide it. Another way is enter a partnership with a service provider who then provides the service on behalf of the authority. When a local authority agrees to purchase a service then it effectively stops itself from investing in its own ability to provide that service. In fact it will quickly lose the ability to provide that service at all, and so will lose the ability, in that field, to compete with other local authorities. The service provider will benefit from both higher usage rates for specialist equipment and from employing knowledgeable, well trained specialist officers. The overall effect, albeit over a long term, will be that all local weights and measures authority within a region will come to depend on one capable competent laboratory. Chris thought that this will inevitably lead to the creation of regional lead authorities in particular specialisms, and in legal metrology, he believed it will lead

specifically to regional centres of excellence. Chris also thought that another result of the creation of regional centres of excellence amongst local weights and measures authority laboratories is that, due to the mutually exclusive nature of their client bases and the distance between them, such laboratories are prepared to support each other, as opposed to competing with each other. One example of such co-operation is that he has sent items that need UKAS certification (that Kent Scientific Services is not accredited for) to another local weights and measures authority laboratory with the necessary UKAS accreditation several hundred miles from Kent. That laboratory has sent him quite a lot of work for UKAS certification that they would normally calibrate themselves, but could not complete due to equipment breakdown. At the end of the day the clients of both laboratories received the service they expected, even though their first choice laboratory had problems meeting their needs, and importantly for Kent Scientific Services, the work was kept within the public sector.

Chris said that he could eventually see such arrangements being controlled with formal written contracts between the local authorities that own the laboratories involved. Effectively these laboratories will form a partnership, each agreeing not to invest their meagre resources to compete against each other, but investing to complement each others portfolio of services. From their clients point of view they will be providing a joint service. He stressed that he was not encouraging the formation of cartels and does not suggest that one laboratory would be setting prices for its partner laboratory as that would be both unrealistic and illegal, and would offend the Competition Act 1980.

Chris pointed out that whilst there are some legal problems involved with partnerships between local authorities and private companies, these problems are not always insurmountable and perhaps in the future legal metrology will benefit from such initiatives. An example of such a partnership is that between Kent Scientific Services and Hampshire Scientific Services. Both laboratories were good at some functions and not so good at others. Hampshire County Council proposed to Kent County Council a formal joint working agreement, that:

- each laboratory would do what they are best at
- each laboratory would give up work that the other laboratory is better at (i.e. no duplication)
- each laboratory would help develop new procedures and work practices
- each laboratory would draw on the knowledge of the staff of both laboratories
- each laboratory would consult with the other before entering new fields of work
- there would be a joint marketing policy

Chris stated that for European law the Measuring Instruments Directive was still going ahead, however, it was unclear what its final effects would be. He suspected that it will probably do away with the current national systems and control all trade equipment.

Chris also mentioned that the Notified Body Status System takes over all new trade weighing instrument control on 1 January 2003.

Chris then covered the topic of UK government policy. He said that the 'Blair' administration seems to continue the previous two governments policy of:

- reducing burdens upon small and medium enterprises
- promising a Consumers Charter to ensure fair trading and to make life tough for criminals

Chris asked if there would be regional policy change after the Scottish Parliament and the Welsh Assembly make an impact and would other parts of the United Kingdom want their own

assemblies? He gave an example of the Yorkshire Post newspaper describing itself as “Yorkshire’s National Newspaper”; many Yorkshire folk see it as a community, in the cultural, the historic and the political sense. He wanted to know whether legal metrology would be taken from the first tier of local authorities and be given to these bodies, after all if they are brought into existence then they will have to have responsibilities and would they want control of legal metrology?

Chris then commented on European policy. He said that Europe seems keen on developing regional identities within Europe that blur national boundaries. An example he gave was that several years ago the Nord Département in France, the Province of Wallonia in Belgium, and the County of Kent in the UK jointly formed a Euro-Region. Lots of European funding is given to that Euro-Region to develop human links within it and to develop joint working relationships between the three types of enforcement agencies. Currently a joint food law enforcement program is being prepared that will see enforcement action in each of these three countries at the same time later this year. Proposals for next year include inter-laboratory comparisons between the metrology laboratories importing traceability into these three areas, in several fields of measurement. The most likely speculation is that legal metrology operatives will in future include lowering levels of public sector staff. The De-regulation order has already created the licensed self verifier. There are many private sector organisations, both in the UK and abroad, that operate to the highest levels of accuracy and professionalism - they must do or they would not have achieved their ISO9000 or UKAS or UKAS equivalent third party quality accreditation. In the past private sector metrologists have tended not to operate in those fields of measurement closely controlled by statute, as to do so would have meant entering into competition with public sector metrologists. But now these distinctions are beginning to blur as some European staffing requirements are for a metrologist employed by a Notified Body. A Notified Body being any body (either in the public or the private sector) that is deemed competent enough, to perform within a field of expertise, by their national metrological authority to be notified as such to the European Commission. Their competence is determined by accreditation by their national metrological authority, the notification is from that national metrological authority to the European Commission, and the effect is be able to operate throughout the EEA. Currently the system applies only to the verification of weighing instrument. However, this system has been seen to work well, and could well be a role model for future metrological controls on other types of equipment. In theory certification under an ISO 9000 external quality accreditation is currently acceptable world-wide. In practise, many individuals who use calibration certificates do not know that a UKAS certificate is just as acceptable as a DKD certificate, or a Swiss Calibration Service certificate and so on. Perhaps we need a second logo on UKAS certificates to show the world-wide validity of UKAS certification, and in particular their universal acceptability.

Chris speculated the future. He thought that despite only a few years after their creation, it is now obvious that the Unitary Local Authorities are too small to provide an effective legal metrology service. Their principle problem is that they have too few staff to allow individual officers to specialise, as each is forced, by the nature of his workload to be a generalist. Also many small services are buying in the calibration, maintenance and repair of their equipment, at a price that includes their service providers profit element. Any move to abolish unitary authorities would see legal metrology becoming the responsibility of a larger unit within local government. However, the causes that led to the creation of the unitary authorities in the late 1990’s still exist, and will continue to exist for the first few decades of the 21st century. Thus any replacement for the unitary authorities will not be at County level. What alternative is there to that? The only feasible alternative will be a regional governmental body, with population bases of say, 2 to 5 millions.

Chris pointed out that in recent years Local Authorities have lost responsibility for some of their core functions:

- Police - now controlled from London
- Fire Service - now controlled from London
- Education - Grant maintained schools opted out, now controlled from London

He wondered whether legal metrology should now be controlled from London (i.e, Teddington). If so would there be regional offices of the National Weights & Measures Laboratory where currently there are (regional) centres of excellence. He claimed that there would be a huge reduction in the number of Local Standards maintained if this approach was followed

Chris also wondered whether the metrological function should be split from the enforcement function. It used to be a police function, with Police Authorities employing Inspectors of Weights and Measures until well after the Second World War.

Chris summarised what legal metrology services he thought would be provided by whom in ten years time, i.e. on Tuesday 2nd June 2009.

Function	Public Sector Service Provider	Private Sector Service Provider
Stamping of trade equipment	Regional Government inspectors	Future - Self verifiers
Inspection of trade equipment	Regional Government inspectors	Private sector metrologists operating as a bought in service
Control of Packing	Regional Government inspectors	Private sector metrologists operating as a bought in service
Calibration Services	As now, provision by any person willing to provide the service, but third party accreditation will be required by virtually all end-users	

Weighing the Law

David Jagger
Jagger & Jagger Legal Metrology Consultants

David Jagger, senior partner of Jagger & Jagger Legal Metrology Consultants gave a presentation on CE approval. He started by explaining that the Directive on the harmonisation of the laws of the Member States relating to non-automatic weighing instruments, No.90/384/EEC, was adopted by the EC Council of Ministers on 20 June 1990. He said that member states were required to implement the provisions of the new Directive into their national law by 1 July 1992 and to apply the new legislation with effect from 1 January 1993.

David stated that a non-automatic weighing instrument is defined as "a weighing instrument requiring the intervention of an operator during weighing". Directive 90/384/EEC is one of a number of "new approach" Directives adopted by the Council of the European Communities: it is the first such Directive on measuring instruments. The "new approach" to technical harmonisation is an important part of the overall plan for achieving the single market. It is intended to remove the technical barriers to trade caused by differing national laws which currently exist. Directives agreed under the new approach allow for the free movement, sale and use of goods which conform to their essential requirements. Such products will carry the "CE" mark and no member state will be allowed to refuse them access to its market. In the case of weighing , all non-automatic weighing

instruments covered by the Directive have free movement throughout the Community, but only those used for an "Article 1: 2.(a)" application have to meet the essential requirements.

David defined the "article 1: 2(a)" applications. He commented that the above section of the Directive defines which categories of weighing instrument use are subject to the essential requirements. "Essential requirements" are a set of metrological, design and construction requirements which are specified in the Directive and defined in greater detail in a European Standard - EN45501, "Metrological Aspects of Non-Automatic Weighing Instruments". The international equivalent of this latter document is OIML International Recommendation R76-1.

David listed the categories of instrument use as the following:

- Determination of mass for commercial transactions
- 2. Determination of mass for the calculation of a toll, tariff, tax, bonus, penalty, remuneration, indemnity or similar type of payment
- 3. Determination of mass for the application of laws or regulations; expert opinion given in court proceedings
- 4. Determination of mass in the practice of medicine for weighing patients for the purposes of monitoring, diagnosis and medical treatment
- 5. Determination of mass for making up medicines on prescription in a pharmacy and determination of mass in analyses carried out in medical and pharmaceutical laboratories
- 6. Determination of price on the basis of mass for the purpose of direct sales to the public and the making up of pre-packages

He stated that instruments used in any of the above applications must be "verified", a process broadly similar to the old procedure of "stamping" of weighing instruments which were "in use for trade" by Trading Standards Officers. Weighing instruments "in use for trade" were generally defined as those whose weighing results were used for some kind of transaction (e.g. sale of goods by weight). Items 1 and 6 of the new categories would be roughly equivalent to the old definition. The remaining four categories are principally new to the UK and affect some users of weighing equipment who may not be familiar with the Regulations applicable to equipment which must be "verified".

David spoke about the implementation of the directive in the UK. He said that the UK Regulations implement the requirements of the NAWI Directive and refer to the categories of instrument use listed earlier as "Schedule 3 Applications". Manufacturers of weighing equipment who wish to sell their products for use in Schedule 3 Applications must submit their product to assessment procedures which ascertain conformity to the essential requirements of the Directive or specifications of the EN Standard. Satisfying the EN Standard is deemed to automatically show compliance with the essential requirements of the Directive. Unlike some of the other harmonised Directives, the NAWI Directive does not allow manufacturers to simply make a declaration of type conformity; he has to make a choice from one of the following procedures:

- i) EC Type examination followed by EC verification
- ii) EC Type examination followed by EC declaration of type conformity (guarantee of production quality)
- iii) EC unit verification.

The majority of approved products on the market will have followed procedures i) or ii).

EC Type examination is the examination of a particular model or family of models of non-automatic

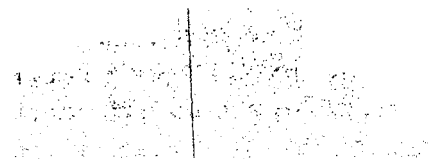
weighing instruments from a given manufacturer. The examination must be carried out by a Notified body (known as an "Approved" body in the UK) and the National Weights & Measures Laboratory (NWML) is that body for the UK. Manufacturers are free to choose any Notified body for their approval and the Type-approval certificate issued by them will be acceptable in any EC member state.

David said that EC verification is the process of tests and marking of individual weighing instruments either after their completion of manufacture or prior to their being put into use. This process is broadly similar to the old "stamping" procedure and may be carried out by a Trading Standards Officer or by a manufacturer who is able to make a declaration of type conformity based on an approved quality system covering his production. The quality system is the same as that required for ISO9000 with specific extensions to cover weighing equipment.

David described the implications for users. He said that non-automatic weighing equipment being used for any of the six listed applications is now subject to the Directive and UK Regulations. He also mentioned that there is a "derogation" (allowed breaking of the rule) for equipment which conforms to the national rules which were enforced before 1st January 1993; this derogation has about 3.5 years to run (June '99). In some countries there were no rules in force before 1 January 1993 for particular categories, for example in the UK with regard to analyses in medical and pharmaceutical laboratories. In these cases it is permissible to continue to use existing non-approved and non-verified equipment. There are, however, some good reasons for using equipment which has undergone Type-Approval, even if at present it is not required to be verified.

David then went on to talk about good manufacturing practice, good laboratory practice and quality assurance. He said that good laboratory practice requires that "adequate equipment should be available." and that it "should be suitable for its intended use and be properly calibrated and maintained to ensure accurate performance." Since both calibration and daily checks provide only "snapshot" information about a weighing instrument it is necessary to consider what factors could affect the instrument between checks or when in use. These include:

- Changes in temperature
- Static electricity; build-up of charges, discharges to personnel
- Electrical interference through the mains supply
- Voltage variations
- Electro-magnetic radio frequency interference from other equipment or transmitters (including hand-held portable communications devices)
- Inherent creep at practically constant temperature
- Warm-up effects (of the instrument upon itself)
- Effects of eccentric loading
- Non-linearity
- Repeatability
- Effects of out-of-level use



David considered that an altitude change of only 5 metres will cause an indication change of 3 divisions on a typical semi-micro balance due to gravity variation. Therefore it is hardly surprising that these extremely sensitive instruments might be effected by the factors given above. Weighing instruments which undergo Type-Examination for CE approval are stringently tested for their ability to meet specifications in the Standard on all these possible effects. Other equipment may not have been tested in these ways and if not, it is impossible to determine how these factors influence performance when the instrument is in normal use (i.e. not under controlled test conditions). The

categories of use listed in the Directive were wisely chosen, not only for legal protection of customer and vendor in transactions, but also for the good practical reasons of maintaining quality and safety in the carrying out of weighings that have important personal and social consequences.

David summarised the guidance. He said that weighing instruments in some of the 1.2(a) applications in the UK are not required to be approved for the time being because of the lack of any pre-1993 legislation. However, where weighing results may be challenged by a third party, it would seem a weak defence to claim that the equipment used did not need to be approved; particularly if there was no objective evidence that its accuracy had not been compromised by one of the environmental effects mentioned previously. Equipment capable of approval is available and, though costing slightly more than standard product, can currently be put into service without the added cost of verification. Where the full verification process is required it involves the following steps:-

Stage one of the verification can take place at the manufacturer's/supplier's premises, or any other location, if transport to the place of use does not involve dismantling or work after arrival which could affect the instrument's performance. Checks are carried out to see that the equipment conforms to the description in its Type-approval certificate and it is tested for metrological performance.

2. Stage two is carried out at the place of use and covers all tests which are gravity dependent. If certain provisions are satisfied, both stages can be carried out prior to delivery:-

a) The gravity value of the place of use is taken into account by adjustment/setting before verification

OR

b) The instrument's performance is insensitive to gravity variations (e.g. it measures mass not weight)

OR

c) The instrument has automatic or semi-automatic calibration (internally loaded weights to re-adjust the instrument for local gravity).

David informed that none of the foregoing precludes the full verification procedure from being carried out at the place of use if desired. The verification process can be carried out by the instrument's "Manufacturer" if he has an approved system which guarantees production quality. ("Manufacturer" can include an authorised supplier). Alternatively, a Notified body can carry out the work. These include some Trading Standards Offices in the UK.

Questions and Answers

The meeting was closed with a question and discussion forum. The following are some of the questions which were asked. Along with their answers

Q Will the Measurement Directive supersede the other directives?

A No - although it would be beneficial if there was just one directive.

Q Will there be any scope or framework in place for ensuring in-service inspection of instruments?

- A No. It will remain as it stands now, i.e, an instrument bought with a certificate 10 years ago will not be checked to see if it is still valid.
- Q Can you give a reason for not regulating checking equipment?
- A The government felt that it would unnecessary burden those who would have to enforce it
- Q Where does the table for gravity zones come from?
- A The guidelines set out in the 1992 regulations which have been reproduced in the 1995 regulations.
- Q How do you specify the usage (in terms of gravity) of a class III machine?
- A No answer
- Q What are the statistics behind the Average Value - how do you get a standard deviation from something which black and white?
- A There are upper and lower limits set in the regulations and no more than 2% of the population can be above or below these limits.
- Q Local Trading standards now have F1 standards - Law states that they have to send their local standards to NWML, despite the fact that they can calibrate them themselves. Will this ever change?
- A Hopefully there will be a move towards having the local standards calibrated regionally instead of having to go to NWML.
- Q How many instruments fail type testing?
- A Approximately 42 % although it is difficult to say as many of the instruments that do fail are often tweaked to pass.

Date of Next Meeting

The next special interest meeting will be on balance validation and verification at Glaxo Wellcome, Barnard Castle, County Durham on 22 September 1999. This will be combined with a tour of the production facilities of Glaxo Wellcome.

**MASS AND WEIGHING CLUB
SPECIAL INTEREST MEETING**

BALANCE VERIFICATION AND VALIDATION

22 September 1999

Glaxo Wellcome, Barnard Castle, County Durham

Agenda

10.30	Registration	
11.00	Welcome & Introduction	John Teward Site Director, Glaxo Wellcome
11.15	IQ Validation in Practice	Alan Janes European Instruments
11.50	Assessment of Balances at the National Physical Laboratory	Ian Severn National Physical Laboratory
12.25	Validation in the Pharmaceutical Industry	Ted Scorer Glaxo Wellcome
.00	Lunch	
2.00	Tour	
3.30	Questions, Discussion and Coffee	

Timings are approximate although the intention is to close as near to 4.00 p.m as possible

Special Interest Meeting - Balance Verification and Validation
22 September 1999
Glaxo Wellcome, Barnard Castle, County Durham

Minutes

Present:

Chris Beaumont	South Yorkshire Trading Standards Unit
David Binch	Cleveland Metrology & Calibration Centre
Adrian Chapman	Norfolk County Council
Brian Chapman	National Physical Laboratory
David Glencorse	Cleveland Metrology & Calibration Centre
C R Gurtner	Cumbria Trading Standards
Frank Hardcastle	Mettler-Toledo Ltd
Peter Harrison	UKAS
Alan Janes	European Instruments
Peter Kelley	UKAS
Tony Kowalski	Sartorius Limited
Ian Lavender	Humber Authorities Calibration Test Centre
Geoff Lloyd	Glaxo Wellcome
Tony Mellor	Mettler-Toledo Ltd
Tony Morris	European Instruments
John Pain	National Weights & Measures Laboratory
Doug Palmer	South Yorkshire Trading Standards Unit
Nicola Raymond	National Physical Laboratory
Graham Reed	Department of Trade and Industry
Ted Scorer	Glaxo Wellcome
Ian Severn	National Physical Laboratory
Collette Tully	Sanofi Winthrop
Peter Wilson	Glaxo Wellcome

Welcome and Introduction

Ian Hallstock
Glaxo Wellcome

Ian Hallstock of Glaxo Wellcome gave a brief introduction about Glaxo Wellcome and welcomed the delegates on behalf of the site director.

Instrument Qualification Validation in Practice

Alan Janes
European Instruments

Alan Janes of European Instruments described European Instrument's approach to instrument qualification. He summarised what is meant by instrument qualification and described the steps that are involved.

Appendix 5

1 Newsletter - Spring 1999 issue

Appendix

Membership Directory

NPL Mass & Weighing Club

Membership Directory

National Physical Laboratory
Queens Road, Teddington,
Middlesex, United Kingdom, TW11 0LW

Telephone: 0181 943 6148 (Club Manager)
0181 977 3222 (Switchboard)

Facsimile: 0181 943 2945

NPL 
National Physical Laboratory



Direct Line 0181-943 6148
Direct Fax 0181-943 2945
E-mail nicola.raymond@npl.co.uk
Internet <http://www.npl.co.uk>

Date October 1998

Dear Club Member

Welcome to the NPL Mass & Weighing Club

The Mass & Weighing Club is a new club run by NPL. It was formed in April 1998 to provide a forum for those with a professional interest in the science and technology of laboratory and industrial weighing, and accurate measurement of mass. The club is a unique channel through which members can learn about the latest developments in mass measurement, interact and exchange ideas on new techniques and discuss specific problems.

This Directory provides a ready source of reference to members' interests and expertise, as well as providing a promotional opportunity for the Club and its members. The Directory will be updated annually and we would welcome your views on its contents and format over the years ahead.

Yours sincerely

Nicola Raymond
Mass & Density Standards
Centre for Mechanical & Acoustical Metrology

MASS & WEIGHING CLUB DIRECTORY



.....

Company name: Army Calibration Laboratory

Member's name: John Adams

NPL membership number: MASS018-98/99

Company address: Donnington
TELFORD
TF2 8JT

Phone: 01952-672219

Fax: 01952-672219

E-mail:

WWW:

Company profile:

Main business.

ABRO is the "preferred" agency for the repair of armoured vehicles, weapon systems, electronic, optronic and telecommunication systems for the army.

Specialist areas.

The Army Calibration Laboratory calibrates test and measurement equipment from gauge blocks to microwave test systems. We can calibrate mass up to 25 kg using three-knife edge balances and E₂ reference weights.

General.



Company name: British Aerospace Military Aircraft & Aerostructures

Member's name: David Groombridge

NPL membership number: MASS020-98/99

Company address: Structures
Hertford House
PO Bcx 87
Farnborough Aerospace Centre
Farnborough
HAMPSHIRE
GU14 6YU

Phone: 01252 382894

Fax: 01252 382270

E-mail:

WWW:

Company profile:

Main business.

Design and manufacture of military aircraft and defence systems

Specialist areas:

Weighing and centre of gravity measurement of aircraft and aircraft components.

General.

MASS & WEIGHING CLUB DIRECTORY



Company name: European Instruments

Member's name: Tony Morris

NPL membership number: MASS007-98/99

Company address: Shotover Kilns
Old Road
Headington
OXFORD
OX3 8ST

Phone: 01865-750375

Fax: 01865-769985

E-mail: balances@euroinst.co.uk

WWW: <http://www.euroinst.co.uk>

Company profile:

Main business:

Supply, service and calibration of precision weighing equipment and weights from all leading manufacturers.

Specialist areas:

Accredited by UKAS for the calibration of weighing equipment up to 750 kg. Calibration No. 0438 SI and Mass from OIML Class F₁ and below No. 0438. UKAS weight calibration service for OIML Class F₁ and E₂.

General.

MASS & WEIGHING CLUB DIRECTORY

GlaxoWellcome

Company name: Glaxo Wellcome Operations

Member's name: Ted Scorer

NPL membership number: MASS001-98/99

Company address: Harmire Road
Barnard Castle
CO. DURHAM
DL12 8DT

Phone: 01833-692043

Fax: 01833-692850

E-mail: es32980@GlaxoWellcome.co.uk

WWW: <http://www.glaxowellcome.co.uk>

Company profile:

Main business:

Pharmaceutical manufacture

Specialist areas:

Analytical Development Group (ADG), part of Quality Division, have a role of supporting measurement science within Glaxo Wellcome throughout the world. ADG is heavily involved in the development of software for the control of balances and the installation and validation of manual and robotic checkweighing systems.

General.

H & D Fitzgerald Ltd.

Company name: H&D Fitzgerald Ltd

Member's name: Denis Fitzgerald

NPL membership number: MASS015-98/99

Company address: Cefn Du
Tremeirchion
ST ASAPH
LL17 0US

Phone: 01352-720774

Fax: 01352-720249

E-mail: denisf@density.co.uk

WWW: <http://www.density.co.uk>

Company profile:

Main business.

Density calibration laboratory.

NAMAS accreditation to produce liquid and solid density standards and to calibrate hydrometers.

Specialist areas:

Design density measuring instruments.

Assess and calibrate density meters.

General.

Precisa

■ Balances Limited ■

Company name: Precisa Balances Ltd

Member's name: Paul Liggins

NPL membership number: MASS014-98/99

Company address: 4 Vermont Place
Tongwell
MILTON KEYNES
MK15 8JA

Phone: 01908 211900

Fax: 01908 211909

E-mail: paul@precisa.co.uk

WWW: <http://www.precisa.co.uk>

Company profile:

Main business.

Precision weighing company, UK arm of Precisa Instruments Switzerland Manufacturer of Precision Balances. UKAS/NAMAS accredited for calibration of non-automated weighing machines. Supplier of calibration weights M₁, F₂, E₂, and E₁.

Specialist areas.

Calibration weights. Precision Balances. Balance calibration to UKAS Standards (all makes).

General.

MASS & WEIGHING CLUB DIRECTORY



Company name: Kent Scientific Services

Member's name: Chris Jenkins

NPL membership number: MASS011-98/99

Company address: 8 Abbey Wood Road
Kings Hill
WEST MALLING
ME19 4YT

Phone: 01732-220001

Fax: 01732-220006

E-mail: chris.jenkins@kent.gov.uk

WWW:

Company profile:

Main business:

Provision of calibration and analytical services.

Specialist areas:

Accredited calibration of Mass (at OIML Class F₁, Class F₂ and Class M₁ requirements), single pan electronic weighing instruments and thermometers. Provision of a weighbridge testing vehicle and of a mobile bulk fuel meter testing van.

Unaccredited calibration of water meters, bulk fuel meters, large weights, length measures and capacity measures.

General:

MASS & WEIGHING CLUB DIRECTORY



Company name:	Norfolk County Council
Member's name:	Adrian Chapman
NPL membership number:	MASS019-98/99
Company address:	Trading Standards Department Norfolk County Council County Hall Martineau Lane NORWICH NR1 2UD
Phone:	01603-222177
Fax:	01603-222999
E-mail:	adrian.chapman.trad@norfolk.gov.uk
WWW:	http://www.norfolk.gov.uk/

Company profile:

Main business.

- Local government organisation.
- Calibration of mass, weighing and measuring equipment.
- Hire of weights and some equipment.

Specialist areas.

Mass and weighing machine calibration

General.

MASS & WEIGHING CLUB DIRECTORY



National Physical Laboratory

Company name: National Physical Laboratory

Member's name: Nicola Raymond

NPL membership number: MASS000-98/99

Company address: Queens Road
Teddington
Middlesex
TW11 0LW

Phone: 0181-943 6148

Fax: 0181-943 2945

E-mail: nicola.raymond@npl.co.uk

WWW: <http://www.npl.co.uk>

Company profile:

Main business

The development of highly accurate measuring techniques and their applications.

As the UK's national standards laboratory, NPL supports the UK's national measurement system, ensuring traceability of measurement standards.

Specialist areas:

Measurement techniques; maintenance and dissemination of measurement standards; instrument design; development; application and evaluation; calibration services in mass (NAMAS accredited for E₁, E₂, and F₁), density, force, pressure and many others.

General.

MASS & WEIGHING CLUB DIRECTORY



National Physical Laboratory

Company name: National Physical Laboratory

Member's name: Nicola Raymond

NPL membership number: MASS000-98/99

Company address: Queens Road
Teddington
Middlesex
TW11 0LW

Phone: 0181-943 6148

Fax: 0181-943 2945

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Specialist areas.

Measurement techniques; maintenance and dissemination of measurement standards; instrument design; development; application and evaluation; calibration services in mass (NAMAS accredited for E₁, E₂, and F₁), density, force, pressure and many others.

General.

MASS & WEIGHING CLUB DIRECTORY



Company name:	Norfolk County Council
Member's name:	Adrian Chapman
NPL membership number:	MASS019-98/99
Company address:	Trading Standards Department Norfolk County Council County Hall Martineau Lane NORWICH NR1 2UD
Phone:	01603-222177
Fax:	01603-222999
E-mail:	adrian.chapman.trad@norfolk.gov.uk
WWW:	http://www.norfolk.gov.uk/

Company profile:

Main business.

- Local government organisation.
- Calibration of mass, weighing and measuring equipment.
- Hire of weights and some equipment.

Specialist areas:

Mass and weighing machine calibration.

General.

MASS & WEIGHING CLUB DIRECTORY



Company name: Kent Scientific Services

Member's name: Chris Jenkins

NPL membership number: MASS011-98/99

Company address: 8 Abbey Wood Road
Kings Hill
WEST MALLING
ME19 4YT

Phone: 01732-220001

Fax: 01732-220006

E-mail: chris.jenkins@kent.gov.uk

WWW:

Company profile:

Main business.

Provision of calibration and analytical services.

Specialist areas:

Accredited calibration of Mass (at OIML Class F₁, Class F₂ and Class M₁ requirements), single pan electronic weighing instruments and thermometers. Provision of a weighbridge testing vehicle and of a mobile bulk fuel meter testing van.

Unaccredited calibration of water meters, bulk fuel meters, large weights, length measures and capacity measures.

General:

Precisa

■ Balances Limited ■

Company name: Precisa Balances Ltd

Member's name: Paul Liggins

NPL membership number: MASS014-98/99

Company address: 4 Vermont Place
Tongwell
MILTON KEYNES
MK15 8JA

Phone: 01908 211900

Fax: 01908 211909

E-mail: paul@precisa.co.uk

WWW: <http://www.precisa.co.uk>

Company profile:

Main business:

Precision weighing company, UK arm of Precisa Instruments Switzerland Manufacturer of Precision Balances. UKAS/NAMAS accredited for calibration of non-automated weighing machines. Supplier of calibration weights M₁, F₂, E₂, and E₁.

Specialist areas:

Calibration weights. Precision Balances. Balance calibration to UKAS Standards (all makes).

General.

H & D Fitzgerald Ltd.

Company name: H&D Fitzgerald Ltd

Member's name: Denis Fitzgerald

NPL membership number: MASS015-98/99

Company address: Cefn Du
Tremeirchion
ST ASAPH
LL17 0US

Phone: 01352-720774

Fax: 01352-720249

E-mail: denisf@density.co.uk

WWW: <http://www.density.co.uk>

Company profile:

Main business.

Density calibration laboratory.

NAMAS accreditation to produce liquid and solid density standards and to calibrate hydrometers.

Specialist areas.

Design density measuring instruments

Assess and calibrate density meters.

General.

MASS & WEIGHING CLUB DIRECTORY

Company name: Process Measurement Technology Ltd

Member's name: Michael Scott

NPL membership number: MASS006-98/99

Company address: 27 West Green
Barrington
CAMBRIDGE
CB2 5RZ

Phone: 01223-870967

Fax: 01223-870967

E-mail: michaeljscott@compuserve.com

WWW:

Company profile:

Main business:

Consultancy.

Specialist areas:

Process and environmental measurement.

General:

Measurement and control.

MASS & WEIGHING CLUB DIRECTORY



Company name: Sartorius Limited

Member's name: Tony Kowalski

NPL membership number: MASS002-98/99

Company address: Longmead Business Centre
Blenheim Road
EPSOM
KT19 9QN

Phone: 01372-737102

Fax: 01372-729927

E-mail: t.kowalski@sartorius.co.uk

WWW: <http://www.sartorius.co.uk>

Company profile:

Main business:

Sales of laboratory balances including moisture analysers, microbalances, average weights systems, portable balances and industrial platforms.

Specialist areas:

Mass comparators for high precision determination of mass or small changes in mass of components due to the abrasive action of frictional forces.

General.

Sartorius offer full field and workshop service of balances and scales.

MASS & WEIGHING CLUB DIRECTORY



Company name: SI Pressure Instruments Ltd

Member's name: Adrian Hunter

NPL membership number: MASS008-98/99

Company address: Garretts Green Lane
Garrets Green
BIRMINGHAM
B33 OYA

Phone: 0121-784 6855

Fax: 0121-784 4795

E-mail: sales@si-pressure.com

WWW: http://www.si-pressure.com

Company profile:

Main business.

Manufacture of primary standards (deadweight testers), electronic pressure calibrators, digital indicators, hand held test pumps and pressure transducers.

Specialist areas.

UKAS accreditation for calibrations of deadweight tester weights in the range 10 g to 11 kg, deadweight testers and pressure calibrators in the range 1 MPa to 205 Mpa (hydraulic) and 100 Kpa to 4 Mpa (pneumatic). Calibration accreditation No. 0453.

General.

MASS & WEIGHING CLUB DIRECTORY



Company name:	Solartron
Member's name	Norman Reed
NPL membership number:	MASS010-98/99
Company address:	124 Victoria Road FARNBOROUGH GU14 7PW
Phone:	01252-376666 ext. 2271
Fax:	01252-521803
E-mail:	nreed@solartron.com
WWW:	http://www.

Company profile:

Main business.

Design and manufacture of on-line density and viscosity transducers, and data acquisition and laboratory instrumentation.

Specialist areas.

UKAS accredited for density, pressure, DC and LF calibration (Calibration laboratory accreditation nos. 0099 and 0011)

General.

Solartron is part of the Roxboro Group plc.

MASS & WEIGHING CLUB DIRECTORY



SOUTH YORKSHIRE TRADING STANDARDS UNIT

Company name: South Yorkshire Trading Standards Unit

Member's name: Mike Buckley

NPL membership number: MASS003-98/99

Company address: Thorncliffe Lane
Chapelton
SHEFFIELD
S35 3XX

Phone: 0114-246 3491

Fax: 0114-240 2536

E-mail: Mike@sytsu.co.uk

WWW: <http://www.sytsu.co.uk>

Company profile:

Main business:

Provision of calibration services to industry and local government both home and overseas.

Specialist areas:

UKAS calibration.

General:

UKAS accredited laboratory for the calibration of mass, humidity, electrical, temperature, non-automatic weighing machines, line scales, graticules and blocks.

MASS & WEIGHING CLUB DIRECTORY

United Kingdom Accreditation Service



Company name: UKAS

Member's name: Peter Kelley

NPL membership number: MASS009-98/99

Company address: 21-47 High Street
FELTHAM
TW13 4UN

Phone: 0181-917 8469

Fax: 0181-917 8500

E-mail: pjk2@ukas.com

WWW: <http://www.ukas.com/>

Company profile:

Main business.

Testing and calibration laboratory accreditation.
Inspection body accreditation.
Certification body accreditation.

Specialist areas.

Accreditation of mass and weighing machine calibrations.

General.

MASS & WEIGHING CLUB DIRECTORY



*West Yorkshire
Calibration
Laboratory*

Company name: West Yorkshire Trading Standards

Member's name: Carl Halkier

NPL membership number: MASS005-98/99

Company address: Nepshaw Lane South
MORLEY
LEEDS
LS27 0QP

Phone: 0113-289 8274

Fax: 0113-253 0311

E-mail: CDJ@wyts.demon.co.uk

WWW:

Company profile:

Main business:

Calibration of weights 1 000 kg to 1 mg.

Specialist areas:

General:

MASS & WEIGHING CLUB LIST OF MEMBERS

COMPANY	CONTACT NAME
Arm Calibration Laboratory	Adam
Europe Instruments	A W Morris
British Aerospace Military Aircraft & Airstructures	D Groombridge
Glaxo Wellcome Operations	T Sc
H&D Fitzgerald Ltd	D Fitzgerald
Humbly Anthony Inc bra T Co	D Lardie
Kent Scientific Serv	C Jenkins
Mettler-Toledo Ltd	T Mellor
National Physical Laboratory	N M Raymond
al Weights and Measures Laboratory	Pa
Norfolk County Co	A Chapman
Paar Scientific Export Ltd	cherne
Precisional Ltd	Li
Pressuremen Ltd	D H
oc Measurement Technology Ltd	M cott
Sartorius Limited	T Kolars
SI Press Instruments Ltd	A Hu
Solartron	Reed
South Yorkshire Trading Standards Unit	M Buckley
United Kingdom Accreditation Service	K ley
West Yorkshire Trading Standards	C Halkier

Mass & Weighing Club

news

Introducing Mass and Weighing Club News

Welcome to the first issue of *Mass and Weighing Club News*, which brings you information about the NPL Mass and Weighing Club, its members, activities, future events and NPL's work in this area. The newsletter's success depends upon contributions from members. You are invited to submit topical news items which are of general interest for publication and your comments and suggestions on the newsletter's content and style are always welcome. Details of how to make contact with us are given on the back page.

Members' directories: hard-copy and internet

The first edition of the hard-copy *Members' Directory* has been published and includes company profiles and contact details for each member, including e-mail and web site addresses where available. The information may also be found on NPL's web site at <http://www.npl.co.uk> which contains details of all of NPL's activities.

Any matters concerning the Club should be addressed to Ian Severn, NPL (Extension 6121) who should also be contacted for copies of the Members' Directory.

An Atomic Path to the Kilogram

A new definition of the kilogram which is based on fundamental physical constants is needed in order to avoid the difficulties associated with the current reference to the standard kilogram artefact kept at Sèvres, France. Consequently, NPL has carried out a review of the main approaches to the re-definition of the kilogram currently being undertaken in a number of national laboratories to identify areas of research to which the UK could make a significant contribution (NPL Report CMAM11, *Present Status of the Different Approaches to the Re-definition of the Kilogram*).

The Avogadro Project

As a result of this study, NPL is working on a project based on the use of the Avogadro constant N_A to relate the kilogram to the atomic mass of a fixed number of identical atoms. Silicon crystals have been chosen for this purpose as they are commercially available in near perfect structure and purity. The first step is the accurate determination of N_A for the silicon crystals - the link between the micro-and macroscopic worlds.

The project requires the determination of the mass of silicon artefacts by direct comparison with conventional mass standards. The surface of silicon is, however, far more reactive than the platinum-iridium of the standard.

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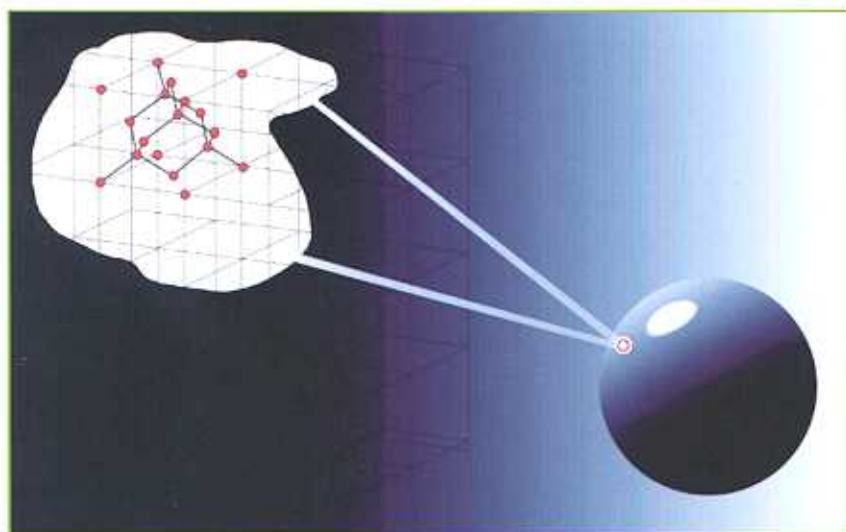
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National Physical Laboratory



kilogram. Following the manufacture and polishing of an artefact, an oxide layer forms on its surface. The measurement of mass and its long-term stability therefore require a thorough investigation of the factors affecting the surface stability of the silicon crystals.



Having the only facility worldwide for high precision weighing in a vacuum, NPL is well-positioned to undertake this research. Our apparatus also permits silicon artefacts to be weighed in a controlled environment. Their stability will be investigated in different environmental conditions; weighings will be performed over a range of humidities and pressures and also in a vacuum to overcome the limitations of weighing in air arising from the buoyancy effect. A series of silicon slices are being manufactured and polished in our optical workshop for investigations of mass stability.

The next stage will be to use an ellipsometer and atomic force microscope for an initial analysis of the surface condition (i.e. oxide layer

thickness and micro-roughness). This will lead to an investigation of the effect of polishing techniques, lattice orientation and surface geometry on the oxide condition. This analysis, combined with the mass stability experiments, will enable the optimum surface preparation to be determined to allow artefacts to function as mass standards.

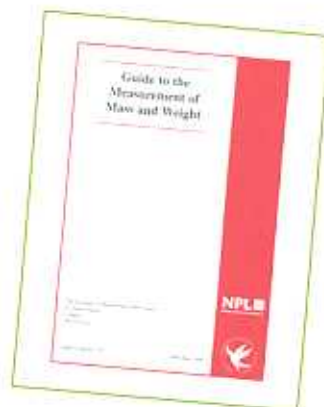
From an atomic definition, the realisation of the kilogram by the Avogadro approach will be through spherical silicon artefacts. The ultimate goal will be to manufacture and determine the mass of a 1 kg spherical silicon artefact to an uncertainty of ± 1 part in 10^8 .

For a copy of NPL Report CMAM11 and details of this project contact Steve Downes, NPL (Extension 6932).

Guide to the Measurement of Mass and Weight

A good practice guide of specific interest to readers involved in the measurement of mass and density was launched in Spring 1998.

The Guide to the Measurement of Mass and Weight was produced jointly by NPL and the Institute of Measurement & Control.



To order a copy of the guide, contact Sylvia Chantler, NPL Helpline (Extension 6880) or visit the NPL web site.



NEWS FROM THE MARKETPLACE

Paar DMA 5000 Density Meter

The DMA 5000 density meter from Paar Scientific Ltd has been evaluated by the Laboratory of the Government Chemist (LGC). LGC Report No AS90/98/68 affirms that the meter conforms with the requirements of Regulation 18 (The Spirits Regulations 1991) when using installed method 'C&E %vv' incorporating the official Laboratory Alcohol Table. The report also contains protocols for users to ensure that measurements of alcoholic strength made using the DMA 5000 are acceptable for excise declaration purposes.

For further information, contact Bryan Treherne at Paar Scientific Ltd, 594 Kingston Road, Raynes Park, London SW20 8DN. Telephone 0181 540 8553. E-mail paar@ps1.anton-paar.co.uk

New Weighing Systems from Sartorius

Sartorius have produced two new weighing systems for analytical, semi-micro and precision top pan balances.

The Monolithic weighing system is cut from a single block of aluminium alloy, leaving only the coil, magnet and position sensor to be added. A uniform thermal expansion coefficient minimises the effects of short term temperature fluctuations and dynamic temperature compensation allows sensitivity corrections to be made as the temperature changes.

The second weighing cell is a double lever system for top pan balances, again cut from a single block. The double lever transmission system improves the resistance to mechanical stress and also mechanical stability.

For further information, contact Tony Kowalski, Sartorius Ltd, Longmead Business Centre, Bleinheim Road, Epsom, KT19 9QN. Telephone 01372 737102. E-mail t.kowalski@sartorius.co.uk



Mass and Density Focus Group Looks into the Future

As part of the process of formulating the new UK National Measurement System programme in mass and density measurement a focus group met on 10 September. The meeting was well attended by representatives from leading equipment manufacturers, accredited laboratories and research

organisations, and provided valuable input into the development of the next three-year programme, starting in October 1999. Your input into new programmes is vital since their content will reflect a consensus from the user community. The draft programme has recently been circulated by DTI for public comment.

For further information on the new mass and density programme, contact Graham Torr, NPL (Extension 6022).



Validation of Laboratory Balances

*by Nick Parsons and Alan Janes,
European Instruments*

In all types of laboratory, particularly in the pharmaceutical sector, the requirement for the validation of the design, installation, operation and performance of both new and repaired equipment is of increasing importance. Requirements go beyond the application of ISO 9000 standards to manufacture and supply. Many customer requirements and the qualification documents that are supplied with equipment take the concept of validation to extremes. It can still, in part, be considered that the validation industry deems quality to equate to the quantity of documentation produced.

For laboratory balances, qualification can easily be broken down into four simple flow areas and the volume of documentation reduced:

1. user requirement
2. installation qualification
3. operational and performance qualification
4. maintenance qualification.

The user requirement is the basis for the successful purchase, installation and validation of the balance. The user needs to specify the required capacity, readability, pan size, reproducibility and some of the expected operating conditions. The supplier should also be advised of any application requirement and of GLP/GMP recording and calibration requirements. Where equipment qualification of the balance is required, an internal calibration adjustment weight has the great advantage of enabling the

operator to correct the balance calibration without affecting the integrity of the balance certification.

For certainty of design qualification, a CE Verified balance (not to be confused with CE marking) has the advantage that its design and construction have been approved by a notified body and the equipment manufacture complies with the EC Non-Automatic Weighing Instruments Directive (NAWI).

The installation documentation should include details of the equipment and accessories (make, model, serial number etc), stating that they conform to the customer's requirements and order, that the operating environment is acceptable and that the documentation chain has been recorded. The documentation should include details of manuals supplied and the versions of any software together with statements of conformity to safety standards and details of any electrical safety tests.

Operational qualification involves two stages. The first is for the user to identify and prove standard operating procedures (SOP). If the use of the balance is general, the SOP may be the equipment's user guide, but in other cases a specific SOP may be written. It should be noted that the laboratory environment may affect the performance of the balance and that the manufacturer's specifications may not always be achieved. The SOP should include a regular performance check, such as a daily calibration using a known artefact, with records kept to maintain a history of the equipment's calibration stability.

The second stage of operational qualification is for the supplier to document the balance's own error systems and functions such as the

tare, over and under load and range capability (especially important in multi-range balances). This stage should also include a statement of year 2000 compliance.

Performance qualification to show that equipment meets the requirement specification and the SOP is essential. This can only be achieved through formal calibration and the issuing of a recognised certificate. A UKAS (NAMAS) certificate of calibration ensures that the balance is tested according to recognised procedures and that the calibration is traceable to national standards. The calibration is carried out over the full weighing range of the instrument and includes repeatability, linearity and eccentric load. It will also detail the uncertainty of measurement and any observations regarding instrument location. UKAS certificates are widely recognised internationally.

Maintenance qualification of the instrument is demonstrated through logs kept of the balance's maintenance record and calibration history. Normally balances are serviced and re-calibrated every six months. Validation is not a one-off exercise. Once a balance has been validated and placed into service, many factors can affect the performance. A good SOP will ensure that performance failures are picked up at an early stage and should the balance need to be repaired, it will need to be re-qualified. Whilst the initial installation documentation will not change, the operational and performance qualifications must then be repeated.

For further information, contact Nick Parsons (Sales & Marketing Manager) or Alan Janes (Technical Director), European Instruments. Telephone: 01865 750375.





Liquid Density - an education problem?

by Denis Fitzgerald,
H&D Fitzgerald Ltd

A wide range of industries measure liquid density. As well as the obvious ones such as distilleries, breweries and oil refineries, there are manufacturers of soup, breakfast cereals, computers, conveyor belts and a whole host of others. Most of the measurements are for either fiscal or quality control purposes. As a measure of its importance, excise duty on fiscal liquids such as road fuels and alcohol brought about £48 000 into the UK Exchequer every minute of the tax year 1997-1998. It might therefore be thought desirable that density instruments should be traceably calibrated.

If we define a calibratable hydrometer as one which is worth calibrating, with a fiducial mark, serial number, nominated surface tension etc, there are probably at least 350 000 in use in UK laboratories, with about 30 000 new ones entering the system each year. Our calibration and recalibration records suggest that only about 1% of new instruments are calibrated, and if calibrations are valid for five years, only 0.5% of all hydrometers in UK industry have a valid certificate.

Why should hydrometers need calibration? About 1 in 1 000 of the new instruments submitted to H&D Fitzgerald for calibration contain the wrong scale and so would incorporate an error of at least 50 kg m^{-3} equating to an error of about 5% (in one case 100 kg m^{-3} or 10%) and a surprising number lose mass between calibrations; almost always due to

small chips of glass being removed from the base of the bulb.

Is the situation of density meters any better? There are thought to be about 6 000 density meters in use in UK laboratories. The manufacturers suggest calibrating them with air and water, but one could question whether this gives a traceable calibration, and it certainly places a lot of reliance on cell linearity. Experience has shown that even the latest dual frequency models, which have an outstanding performance, can generally have their error in displayed density halved if they are calibrated with a certified liquid standard and water. If a calibration with two liquids is valid for 6 months, the rate of consumption of standards suggests that only 5% of UK meters have a current calibration.

After all this, how many people actually apply the corrections on the certificate, and how many just keep it on file to satisfy the quality auditors?

All the estimates quoted in this note have very large uncertainties applied to them, but if anyone feels that they have more reliable figures, please publish.

Thanks to Bryan Treherne of Paar for data on density meter numbers, and Renton Mein of Stevenson Reeves and Stephen Gosling of Poulten, Selfe & Lee for estimates of hydrometer sales.

Responses to this article are invited and should be addressed to Ian Severn, NPL (Extension 6121).

For more details of hydrometer and density meter calibration at H&D Fitzgerald, contact Denis Fitzgerald, Cefn Du, Tremeirchion, St Asaph, LL17 0US, telephone 01352 720774.





UKAS News

UKAS has moved

The United Kingdom Accreditation Service (UKAS) has moved. Its address is now

UKAS
21-47 High Street
Feltham
Middlesex TW13 4UN

Information on all accreditation matters is contained on the UKAS web site at www.ukas.com or for general enquiries telephone 0181 917 8400.

Additional Accreditation for H&D Fitzgerald

H&D Fitzgerald Ltd now has UKAS accreditation (Calibration No. 0291) for the calibration of solid density standards in the density range 640 kg m^{-3} to $2\,000 \text{ kg m}^{-3}$ with a best measurement uncertainty of 0.1 kg m^{-3} . These are primarily for use in the calibration of density gradient columns.

A New National Measurement Partnership Programme

The National Measurement Partnership (NMP) is the title given to a new programme sponsored by the Department of Trade and Industry. It will, for the first time, bring together the scientific, industrial and government organisations which collectively assure the development and availability of accurate measurement techniques to UK Industry.

The Partnership will be managed by NPL and has three key aims:

- to increase the uptake of traceable measurement in the UK
- to increase the skill base in measurement through formal training
- to increase industrial access to measurement experts.

The programme will include a wide range of activities to promote good measurement practice and ensure that knowledge of measurement techniques is made available to the widest possible audience. A network of UKAS-accredited laboratories will be established with an associated national conference; the NMP will manage the roll-out of the new National Vocational Qualification for measurement technicians; and a National Measurement Helpline will give direct access to the UK's leading measurement problem solvers.

NPL and nine other partners including UKAS are involved in the NMP and all UKAS-accredited calibration laboratories are eligible to join the Partnership.

Contact Jerry Benson, NPL (Extension 6824) for further information on the National Measurement Partnership Programme.

Events Calendar 1999

25 March

DTI *Competing Precisely**
event at NEL, East Kilbride
focusing on the engineering
industry in Scotland

May (date to be confirmed)
Visit to Glaxo Wellcome facility
at Barnard Castle and Special
Interest Group meeting on
Legal Metrology

11 - 14 May

DTI *Competing Precisely**
event at Control and
Instrumentation, Birmingham

19 May

DTI *Competing Precisely**
event at QM99 exhibition,
The National Motor Cycle
Museum, Birmingham

13 - 18 June

IMEKO XV, Osaka, Japan.
World Congress of the
International Measurement
Confederation. For details
and registration see IMEKO
web site <http://mit.tut.fi/imeko/>

2 - 4 November

Measurement in Industry 99
The annual conference of
the National Measurement
Partnership (incorporating
BEMC99, the 9th
International Conference
on Electromagnetic
Measurement), Metropole
Hotel, Brighton

For details of events
contact Ian Severn,
NPL (Extension 6121)

* For details of DTI *Competing
Precisely* events, contact Gareth
Francis, NPL (Extension 6329).

Q & A

Questions and Answers

We are planning to include in this
newsletter a selection of the answers
to questions which we are frequently
asked. The first of these is:

Q: Can a meeting be staged for the
UKAS-accredited laboratories to
get together, perhaps using the
NPL clubs as a channel for this?

A: A meeting of senior managers
in UKAS-accredited laboratories
is planned to take place on
1 November 1999, the day before
the general opening of the *National
Measurement Conference 99*. This
conference is organised by the
National Measurement Partnership
(NMP) programme and will take
place from 2-4 November 1999
in Brighton. Through the NMP
a network of UKAS-accredited
laboratories has been set up,
with an accompanying website
and exhibition at this conference.

For further information on this
conference contact Gareth Francis,
NPL (Extension 6329)

Two specific questions from Dave
Groombridge of British Aerospace are:

Q: Some new equipment that we
have recently purchased from the
USA has an American calibration
certificate. Should these

be acceptable
to customers in
the UK?

A: The NPL, on behalf of the UK,
has an equivalence agreement
with its American counterpart, the
National Institute of Standards and
Technology (NIST). This means that
calibrations carried out in the USA,
which can be shown to be traceable
to NIST via an accredited route,
should be accepted in the UK
(in the same way that traceable
calibrations carried out in the UK
should be accepted in the USA).
However, in practice, it is
sometimes difficult to persuade
customers to accept this
equivalence. We are happy to assist
in any problems of equivalence and
are able to talk to our sister
organisations in other countries in
order to try to resolve any problems.

Q: We use weighing platforms of
20 000 kg capacity, but are unable
to calibrate them to their full
capacity as we cannot safely
arrange enough weights on them.
We need an accuracy of 1 part in
5 000 in our measurements. Does
anybody have any advice on how
we could best achieve this?

Responses to this question should
be addressed to Ian Severn, NPL
(Extension 6121).

Further Information

Additional copies of *Mass and
Weighing Club News* are available
from Min Horton, NPL
(Extension 6404)

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E-mail: min.horton@npl.co.uk

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Teddington
Middlesex TW11 0LW

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Internet: <http://www.npl.co.uk>

