www.forensic-isotopes.rdg.ac.uk

firms@dstl.gov.uk

FIRMS

Forensic Isotope Ratio Mass Spectrometry

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The network developing forensic applications of stable isotope mass spectrometry

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Inside this issue…

Forensic Explosives Laboratory
Dstl Fort Halstead
Sevenoaks
Kent
TN14 7BP, UK

2nd FIRMS Inter-Laboratory Exercise 2005

Following the success of the 1st collaboration in 2004, a 2nd FIRMS inter-laboratory exercise was conducted during 2005. This scheme gave laboratories within FIRMS an opportunity to isotopically examine standardised samples and compare their results with those obtained by the other groups.

Homogenous polyethylene and phenacetin test samples were supplied by MSA to FEL, who distributed these to participants and collated the results. The samples were sent out in Spring 2005 and the participating laboratories submitted their results within 4 months.

The results of the trial are presented within this issue of the newsletter, along with graphical representations and evaluations.

FIRMS 2005 ILE

The FIRMS inter-laboratory exercise (ILE) is a scheme aimed at improving quality assurance of IRMS sample testing.

Participants were asked to conduct 10 repeat analyses of phenacetin and polyethylene, looking at $^{13}C/^{15}N$ and ^{13}C isotopes respectively. In addition, if the laboratories had the capability, then ^{2}H results for polyethylene were also accepted.

Laboratories were also encouraged to submit information about the instrumentation used during analysis and the operator(s). In addition, participants were asked to submit data about the international reference and “in-house” standards that were used.

To allow anonymity during presentation of results, each laboratory has been assigned a number.

The results as shown here are presented in table format with a mean and standard deviation for each element that a particular laboratory analysed. The individual replicates for each element are also shown graphically, in an attempt to highlight any intra-analysis inconsistencies.

The data, along with that from the 1st ILE, has been subjected to statistical analysis, namely Z score calculation and the Youden test. However, these findings will be published by FEL in a separate report and so are not included here.

The network would like to provide a useful source of information for those interested in the advancement of IRMS by producing a list of available resources and placing it on the web site. The resources will be separated into sections; books, journals, web sites, poster presentations etc.
If you would like to list any information on the site please send the details to **firms@dstl.gov.uk**

...FIRMS 2005 ILE Results

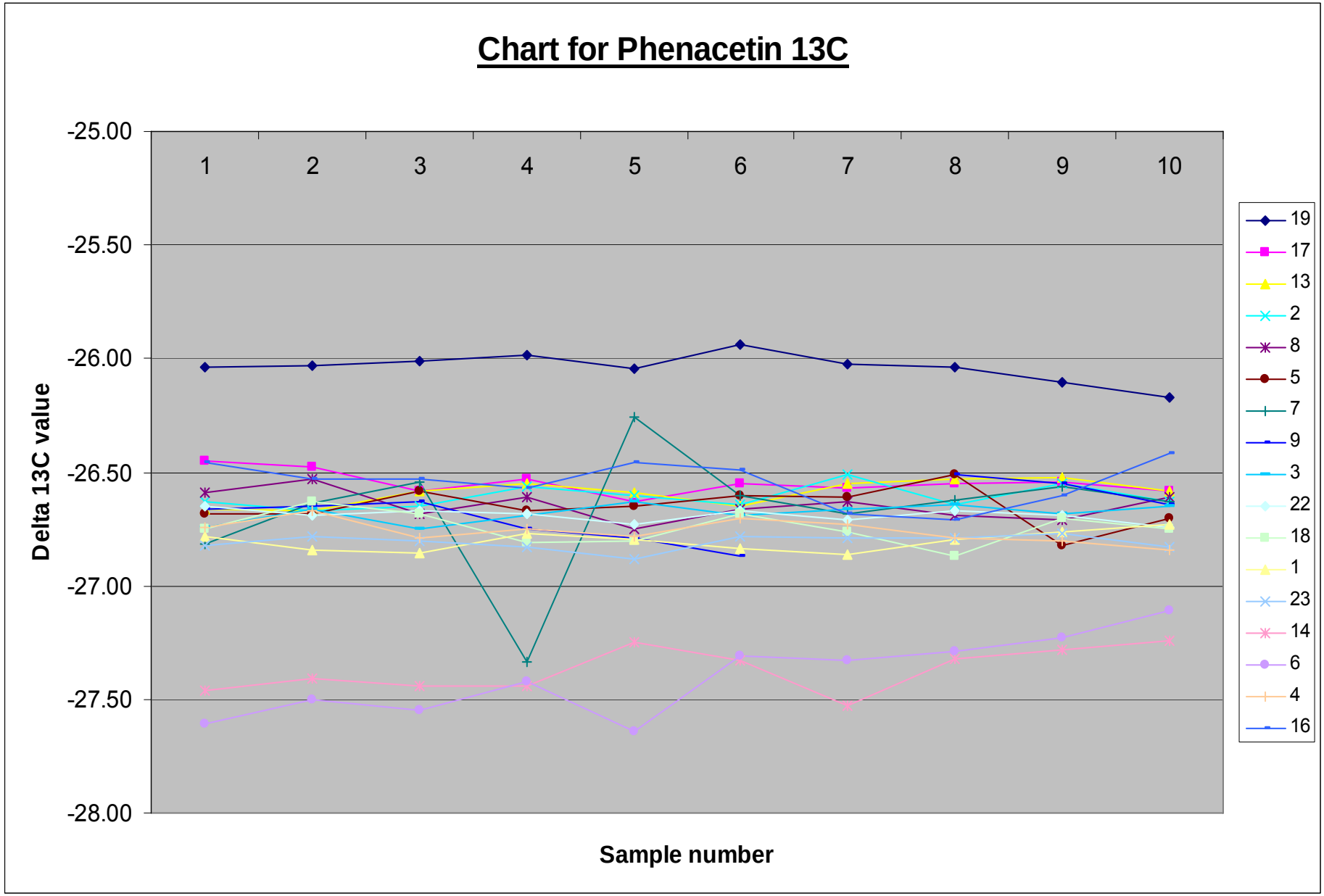
Summary of Results for the 2nd Forensic Isotope Ratio Mass Spectrometry Network Inter-laboratory Exercise 2005

Lab No.	Instrumentation	Phenacetin C-13		Phenacetin N-15		Polyethylene C-13		Polyethylene H-2		Carbon-13 International Reference Material			Nitrogen-15 International Reference Material			Hydrogen-2 International Reference Material			C-13 In house Standard			N-15 In House Standard			H-2 In House Standard		
		Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Standard	d value	+/-	Standard	d value	+/-	Standard	d value	+/-	Standard	d value	+/-	Standard	d value	+/-	Standard	d value	+/-
1	Costech EA with Conflo II interface and Delta Plus XP	-26.80	0.04	-7.87	0.08	-27.21	0.03	\	\	IAEA-CH7	-31.80	0.04	IAEA-N2	20.12	0.14				Tate +Lyle Sugar	-11.78	0.09	Urea	-0.68	0.04			
2	GVI Isoprime CF-IRMS + EuroVector EURO 3000 EA	-26.61	0.05	-8.72	0.08	-27.47	0.03	\	\	IAEA CH6 Suc. ANU	-10.52	0.31	IAEA-N1	0.20	0.05				Azucarem (Beet sugar)	-24.58	0.35						
										IAEA-CH7	-31.80	0.31	IAEA-N2	20.42	0.02												
													USGS-25	-30.32	0.11												
3	Sercon Hydra 20/20 with Ref gas in dual isotope mode	-26.68	0.04	-8.40	0.09	-27.21	0.04	\	\	IAEA-CH7	-31.80	0.05	IAEA-N1	0.37	0.13				EDTA	-38.30	0.03	EDTA	-0.90	0.14			
										IAEA-CH6	-10.40	0.04	IAEA-N2	20.29	0.23												
4	Thermo Delta XP + Conflo III with Flash 1112EA and TC/EA	-26.76	0.05	-8.47	0.19	-27.10	0.05	61.12	1.17	PEF1			USGS-25			PEF1											
										ANU-sucrise			IAEA-N1														
5	C/N Finnigan Delta S EA-IRMS + H GVI Isoprime EA-IRMS	-26.65	0.10	-8.50	0.25	-26.90	0.10	-56.68	2.58	IAEA CH6	-10.37		IAEA-N1	0.44					JCR Sucrose	-11.3		Ammonium Sulphate IHR	1.75				
										IAEA-CH7	-31.73																
6	GSL ANCA-ABCA EA IRMS and TC/EA Delta Plus XL via Conflo III interface	-27.40	0.17	-9.01	0.29	-27.30	0.16	-60.49	1.30	IAEA-CH6	-10.5					IAEA-CH7	-110.27		Leucine	-30.50		Leucine	10.85				
7	Thermo Finnigan, Flash EA 1112 Series, ConFlo III, Delta PlusXP IRMS	-26.67	0.27	-8.34	0.07	-27.18	0.25	\	\	IAEA-CH7	-31.76	0.04	IAEA-N1	0.34	0.02												
										IAEA NBS-19	1.95	0.04	IAEA-N2	20.40	0.09												
8	GV Isoprime	-26.65	0.06	\	\	-27.14	0.05	\	\	IAEA-CH6	-10.52	0.06							Urea	-48.33	0.08						
										IAEA-CH7	-31.73	0.08							Imidazole	-30.90	0.06						
9	Fisons EA 1108 with Finnigan MAT Delta C IRMS via Conflo interface (Finnigan MAT). EA Autosampler AS200LS	-26.67	0.10	-8.62	0.19	-27.20	0.10	\	\	IAEA-CH6	-10.4		IAEA-N1	0.20					Acetanilid (Merck)	-34.00		Acetanilid (Merck)	1.5				
										NBS-22 Oil	-29.7		IAEA-N2	20.1													
13	EA IRMS (Finnigan CHN/Finnigan MAT 251)	-26.59	0.05	-8.55	0.10	-26.95	0.06	\	\	ANU-Sucrose	-10.42	0.09	IAEA-N1	0.21	0.19				Flour	-27.04	0.05	N-Carbobenzyloxy-1-aspartic acid	-8.70	0.11			

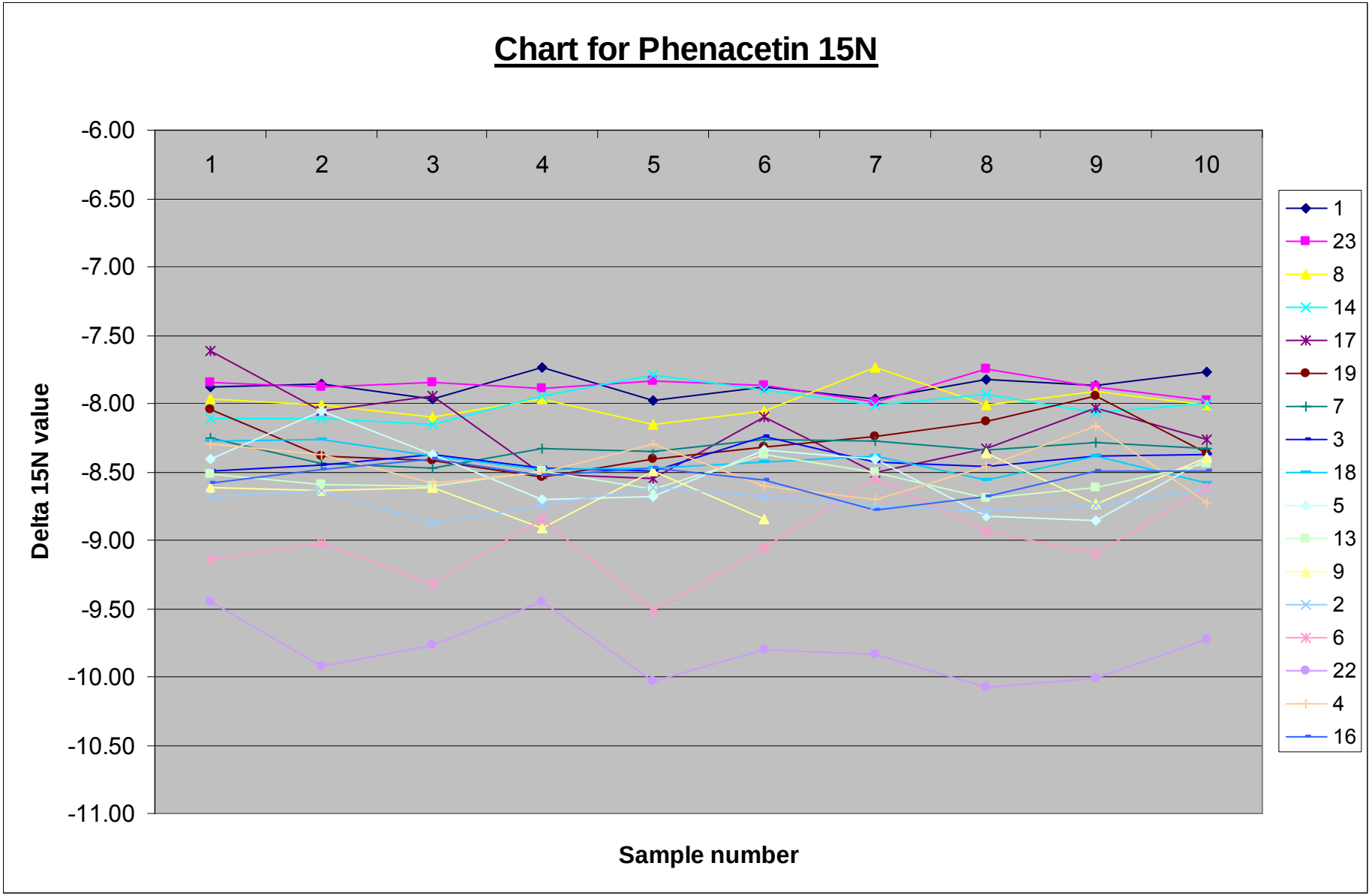
...FIRMS 2005 ILE Results continued

14	GVI Isoprime CF IRMS + EuroVector EURO 3000 EA	-27.37	0.10	-8.00	0.11	-27.89	0.08	\	\	IAEA-C3	-25.11		IAEA-N2	20.3			NIST 1547	-26.68	0.15			NIST 1547	2.02	0.18
										IAEA-C6	-10.69		IAEA-N2	0.40										
													IAEA-NO3	4.93										
16	C/N- EA/Conflo + Finnigan Delta S, H - Delta Plus XL with TCEA	-26.54	0.10	-8.55	0.11	-27.12	0.06	-60.83	0.85								Yeast	-20.02		Yeast	-1.24		NIST Polyethylene	-100.00	
																							Cellulose	-64.00	
17	GV Instruments IsoPrime EuroVector EA	-26.60	0.05	-8.20	0.30	-27.00	0.03	\	\	NBS-22 Oil	-29.70		IAEA-N1	0.40			Sugar	-11.90		Caffeine	-5.10				
										IAEA-CH7	-31.80		IAEA-N2	20.30										
18	VG Optima Continuous Flow MS with Fisons NA1500 EA	-26.74	0.07	-8.42	0.11	-27.18	0.05	\	\	IAEA-CH6	-10.43	0.03	IAEA-N1	0.40	0.06										
										IAEA-CH7	-31.80	0.05	USGS-25	-30.40	0.09										
19	Carlo-Erba EA DeltaPlus XP IRMS	-26.14	0.05	-8.28	0.19	-26.96	0.09	-58.17	1.05	NIST 8542	-10.47	0.15	NIST 8547	0.45	0.12	C36 N-Alkane	-244.14	0.94	Nicotinamide	-40.95	0.16	Nicotinamide	-2.049	0.04	
										NBS22 Oil	-29.56	0.11	NIStT 8548	20.43	0.13	IAEA-CH7 Foil	-100.96	0.30	Thiourea	-22.71	0.10	Thiourea	-1.00	0.11	
										NBS21 Graphite	-28.35	0.06	NIST 8550	-30.32	0.04	NBS22 Oil	-118.95	0.77							
22	CF-IRMS Costech ECS 4010 + Thermo Delta XP-Plus	-26.69	0.03	-9.81	0.22	-27.21	0.04	\	\	IAEA-CH7	-31.83	0.02	IAEA-N1	0.29	0.07				GEL (gelatin)	-20.44	0.04	GEL (gelatin)	5.64	0.08	
										IAEA-CH6	-10.43	0.04	IAEA-N2	20.37	0.04				14ALA (alanine)	-10.58	0.03	14ALA (alanine)	-5.88	0.10	
													USGS-25	-30.36	0.12				15ALA (alanine)	-23.27	0.01	15ALA (alanine)	16.21	0.12	
23	Flash EA, Conflo II interface, Delta Plus Advantage (Thermo)	-26.81	0.03	-7.88	0.07	-27.37	0.07	\	\	USGS-40	-26.28		USGS-40	-4.33					NIST 1547	-26.06					
										IAEA-CH6	-10.42														

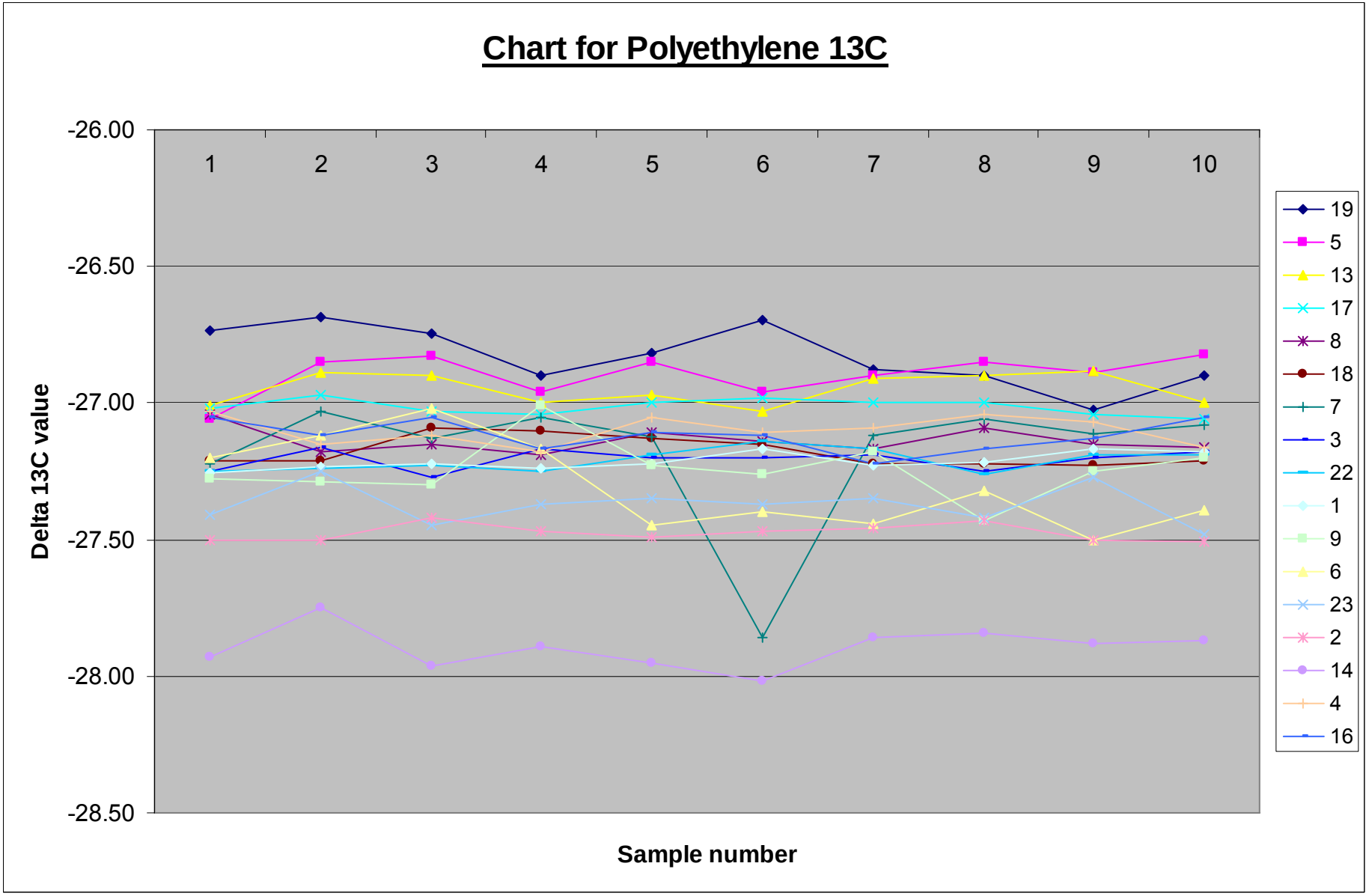
...FIRMS 2005 ILE Results continued



...FIRMS 2005 ILE Results continued



...FIRMS 2005 ILE Results continued



…research article

The following is a short summary of a recent paper that is of broad interest to forensic IRMS.

Stable isotope analysis of safety matches using isotope ratio mass spectrometry – a forensic case study

Farmer N. L., Meier-Augenstein W., Kalin R. M.
Rapid Communications in Mass Spectrometry, 2005, 19: 3182-3186

Despite methods having been published for the comparative analysis of paper matches, and the high prevalence of wooden safety matches at scenes of crime, there is no established method for comparative analysis of wooden matches. Work has been carried out using electrospray ionisation mass spectrometry and scanning electron microscopy to analyse unburnt match-heads, whilst physical comparison of the torn bases of matches with the match-book stubs has also been attempted. However, with match-books becoming less common, the authors of this paper felt, "it seems timely to develop analytical methods for the forensic examination of wooden safety matches".

Currently, one major company manufacturers the vast majority of matches sold in the UK and they provided the authors with the location of their production sites and the where each one sources its wood from. However, the sites of manufacture for each particular brand were not divulged.

IRMS has already been used extensively to study isotopic variation in tree-rings with regard to past-climate reconstruction. Here, the researchers have developed a rapid and cost efficient method, with the aim of carrying out comparative stable isotope analysis of matchstick samples. The objective was to determine if IRMS could be used to provide intelligence about mass-produced safety matches found at a scene of crime. To facilitate this, some systematic work was done to investigate natural variability of ^{2}H and ^{13}C isotope abundances in safety matches from different brands acquired at different times and from different locations. Additionally, isotopic variation in matches from the same box was investigated.

Methods

Match Brand Name	Made In	Sold In
BoPeep (batch X)*	EU	NI
BoPeep (batch Y)		
Swan Vesta (batch A)*	EU	NI
Swan Vesta (batch B)		
KTwo	EU	NI
Scissors	Czech Republic	NI
Swift*	EU	NI
Spar*	Czech Republic	NI
Volcano	India	Jamaica
Chavi	India	India
Diamond	USA	USA

…research article continued

Matches were purchased from a variety of outlets in the UK and Ireland, as well as a few brands from around the world, as shown in the table above. UK Swan and BoPeep brands were subjected to batch variation analysis. Additionally, matches from a crime scene and some seized from a suspect were submitted for analysis. Those marked with an * in the table were used as control sample matches, to serve as a benchmark for submitted matches.

Using the formula:

$$n = 0.5\sqrt{N}$$

based on an average of 40 matches per box, the authors randomly removed three matches from each box and analysed them in parallel to determine variation within a box.

All samples were handled and treated in the same way, allowing direct comparisons to be made. Following submission, they were stored in an unevacuated dessicator for ~ 2 days prior to being ground, to ensure they were all exposed to and equilibrated with the same ambient environment and, hence the same ambient humidity between collection and analysis. The match-heads were removed by scalpel and ground in a SPEX CertiPrep 6850 freezer mill. They were then placed in labeled glass vials, and residual moisture traces removed through storage in a dessicator containing phosphorus pentoxide.

Bulk ^{13}C isotope analysis by EA/IRMS:

- ANCA elemental analyser coupled to an ABCA IRMS (SerCon Ltd., Crewe, UK)
- 0.4mg of sample weighed into tin capsules, introduced via autosampler
- two EA reactor tubes, both self-packed
- one filled with chromium(III) oxide and copper oxide, the other with reduced copper
- combustion and reduction set at 1000°C and 1300°C respectively
- post-reactor packed GC column filled with molecular sieve 5Å kept at 80°C
- raw data processed using Callisto software

Isotope calibration and quality control of EA/IRMS instrument:

- each batch of samples was bracketed by a set of two certified standards of known isotopic composition, leucine ($\delta^{13}C_{VPDB}$= -30.52‰) and glycine (-45.54‰)
- system performance cross-checked at regular intervals by running these two standards against IAEA-CH-6
- batch analysis typically comprised six samples run in triplicate, preceded and followed by a set of standards, which acted as isotopic references and AQC's
- drift-corrections applied if necessary

Bulk ^{2}H isotope analysis by TC-EA/IRMS

- He and H of >99.995% purity and IAEA-CH-7 purchased
- TCEA coupled to a Delta^{Plus} XL IRMS via a Conflow III interface (all ThermoFinnigan)
- 0.2mg of sample into Ag capsules, introduced via Costech Zero-Blank autosampler

…research article continued

- reactor tube self-packed, comprised Alsint^{TM} ceramic tube, glassy C tube, glassy C granules, silver and quartz wool
- reactor at 1450°C, post-reactor GC column maintained at 90°C
- data processed on Isodat NT software, version 2.0.

Isotope calibration and quality control of TC-EA/IRMS instrument:

- working reference gas, H_2, calibrated against V-SMOW using IAEA-CH-7 (δ^2H_{VSMOW}= -204.45‰) and coumarin (δ^2H_{VSMOW}= +62.56‰)
- H^{3+} determined on H_2 pulses of differing signal size and found to be 5.48
- similar protocol to above, with a batch analysis comprised of 10 samples run in triplicate, preceded and followed by a set of standards
- measured δ^2H-values normalised by method described by Coplen with Z-factors typically being ~1.02-1.03

Results and discussion

Matches from one batch of Swan matches showed a variability in ^{13}C abundance of up to 6.0‰, while all other brands showed variability less than this. Matches collected from around the world showed an average δ^{13}C variation within one box of 1.5‰, up to a maximum of 2.5‰.

The authors state that the 6.0‰ intra-batch variation for ^{13}C abundance isn't completely unexpected, due to the large-scale fractionation processes that are known to occur within trees. Fractionation occurs routinely during:

a) diffusion through stomata (max. -4.4‰)
b) enzymatic processes involved in biochemical CO_2 fixation (max. -27‰)

A previous study noted differences in δ^{13}C values of up to 2.5‰ between growth rings on single trees, and differences up to 5.5‰ between trees on the same site. The authors suggest that the intra-batch variation seen for Swan matches may be the result of the matches being produced from two different trees, while the natural variation seen for all other brands is consistent with the natural variation seen within one tree. Therefore, if matchboxes contain matchsticks from different trees (albeit within one plantation), the authors believe this will seriously compromise the ^{13}C data when considered alone. The group consider that overall, the maximum observed variability of 2.5‰ in conjunction with the error of measurement leads to an uncertainty that will make it difficult to exploit the limited range of ^{13}C abundance in wood, of -20 to -30‰.

Unlike ^{18}O, which can be sourced from three distinct pools, ^{2}H can be attributed directly, and exclusively, to the meteoric water in the area of tree growth. Therefore, ^{2}H isotopes used in conjunction with ^{13}C isotopes should give some indication of from where in the world the tree originated. The researchers carried out comparative ^{2}H isotope analysis on a 'like-for-like' basis. During processing, the matchstick samples were all exposed to the same environment after they were received, to ensure labile H-atoms prone to exchange would all reflect the same ^{2}H level.

Combination of ^{2}H and ^{13}C data allows differentiation of samples in some cases. Control matches had δ^2H values of -100 to -130‰, unsurprising since these matches were all made in

…research article continued

the EU. The submitted crime scene matches fell within the range of the controls, but the seized samples fell well outside this group, with an average δ^2H of -65‰, indicative of a more equatorial growth site. Further support for this came from analysis of the 'Chavi' matches, which were known to be produced in India and yielded δ^2H values of -61‰, indicating that their wood was grown in a location geographically and climatically similar to that of the seized matches.

The authors accepted that the δ^2H values reported above do not reflect the 'true' ^2H isotopic composition of the wood from which the matchsticks are made, but for the purpose of direct comparisons, the approach of equilibrating exchangeable H-atoms within wood samples with ambient humidity under controlled conditions appears to be valid. This is supported by their analysis of bulk ^2H in the (known provenance) control matchsticks, which gave results consistent with published δ^2H values for precipitation in their regions of origin.

Conclusions

In this particular case, bulk ^2H and ^{13}C isotope analysis of wooden safety matches was able to exclude matches as circumstantial evidence. Matches found at the scene of a crime could clearly be differentiated from those seized from a suspect. However, it cannot be concluded that matches that appear to be indistinguishable on the basis of ^2H and ^{13}C signatures share any commonality other than being made from wood grown in a region meeting a certain profile with regard to climate and precipitation. Other analytical techniques would have to be used in conjunction with IRMS to increase the discriminatory power of wooden safety match examination.

The authors make several suggestions for further work on this subject, including;

- separation of the cellulose from lignin for more detailed isotopic information
- use of $\delta^{18}O$ data in conjunction with δ^2H and $\delta^{13}C$ values
- systematic studies investigating the effect of storage and handling of matchsticks, including exposure of the matchsticks to moisture of known isotopic composition

This article was published in Rap. Comm. In Mass Spec. (2005) **19**: 3182-3186

…publications

Below is a list of articles produced by a current literature search on IRMS from a wide spectrum of fields, and from submissions to the FIRMS network. This list is only a sample and should not be thought of as full and comprehensive.

Tracing the geographical origin of food: The application of multi-element and multi-isotope analysis
Kelly, S.; Heaton, K.; Hoogewerff, J
Trends in Food Science and Technology 16 (12): 555-567, (2005)

13C-Isotope ratio mass spectrometry as a potential tool for the forensic analysis of white architectural paint: a preliminary study
Reidy L. J., Meier-Augenstein W., Kalin R. M.
Rap. Comm. in Mass. Spec. 19 (13): 1899-1905, (2005)

Perchlorate isotope forensics
Bohlke J. K., Sturchio N. C., Gu B. H., Horita J., Brown G. M., Jackson W. A., Batista J., Hatzinger P. B.
Analytical Chemistry 77 (23): 7838-7842, (2005)

Stable hydrogen and oxygen isotope ratios of bottled waters of the world
Bowen G. J., Winter D. A., Spero H. J., Zierenberg R. A., Reeder M. D., Cerling T. E., Ehleringer J. R.
Rap. Comm. in Mass. Spec. 19 (23): 3442-3450, (2005)

Bulk and compound-specific isotopic characterisation of illicit heroin and cling film
Idoine F. A., Carter J. F., Sleeman R.
Rap. Comm. in Mass. Spec. 19 (22): 3207-3215, (2005)

Delta C-13 values of pyrolysis products from cellulose and lignin represent the isotope content of their precursors
Steinbeiss S., Schmidt C. M., Heide K., Gleixner G.
Journal of Analytical and Applied Pyrolysis 75 (1): 19-26, (2006)

Advances in chemistry applied to forensic science
Rendle D. F.
Chemical Society Reviews 34 (12): 1021-1030, (2005)

Application of heavy stable isotopes to forensic isotope geochemistry
Aggarwal J.
Geochimica et Cosmochimica Acta 69 (10) SU Suppl: A202, (2005)

Environmental isotope forensics of perchlorate
Sturchio N. C., Bohlke J. K., Horita J., Gu B. H., Brown G. M., Hatzinger P. B.
Geochimica et Cosmochimica Acta 69 (10) SU Suppl: A203, (2005)

Origin differentiation of a heroin sample and its acetylating agent with C-13 isotope ratio mass spectrometry
Zhang D., Sun W., Yuan Z. P., Ju H. X., Shi X. J., Wang C. H.
European Journal of Mass Spectrometry 11 (3): 277-285, (2005)

…publications continued

Choice of dietary protein of vegetarians and omnivores is reflected in their hair protein C-13 and N-15 abundance
Petzke K. J., Boeing H., Metges C. C.
Rap. Comm. in Mass. Spec. 19 (11): 1392-1400, (2005)

IRMS-TPD of ammonia for characterisation of acid site in beta-zeolite
Niwa M., Nishikawa S., Katada N.
Microporous and Mesoporous Materials 82 (1-2): 105-112, (2005)

Delta S-34 measurements on organic materials by continuous flow isotope ratio mass spectrometry
Yun M., Mayer B., Taylor S. W.
Rap. Comm. in Mass. Spec. 19 (11): 1429-1436, (2005)

Determination of bromine stable isotopes using continuous-flow isotope ratio mass spectrometry
Shouakar-Stash O., Frape S. K., Drimmie R. J.
Analytical Chemistry 77 (13): 4027-4033, (2005)

Carbon dioxide capture using a zeolite molecular sieve sampling system for isotopic studies (C-13 and C-14) of respiration
Hardie S. M. L., Garnett M. H., Fallick A. E.
Radiocarbon 47 (3): 441-451, (2005)

Botanical and geographical origin identification of industrial ethanol by stable isotope analyses of C, H, and O
Ishida-Fujii K., Goto S., Uemura R. et al
Bioscience Biotechnology and Biochemistry 69 (11): 2193-2199, (2005)

Advances in coupling a commercial total organic carbon analyser with an isotope ratio mass spectrometer to determine the isotopic signal of the total dissolved nitrogen pool
Huygens D., Boeckx P., Vermeulen J.
Rap. Comm. in Mass. Spec. 19 (22): 3232-3238, (2005)

Stable isotope ratios as a tool in microbial forensics – part 3; effect of culturing agar-containing growth media
Kreuzer-Martin H. W., Cheeson L. A., Lott M. J. et al
Journal of Forensic Sciences 50 (6): 1372-1379, (2005)

On-line systems for continuous water and gas isotope ratio measurements
Huber C., Leuenberger M.
Isotopes In Environmental and Health Studies 41 (3): 189-205, (2005)

Application of stable carbon isotope analysis to the detection of 17 beta-estradiol administration to cattle
Buisson C., Hebestreit M., Weigert A. P.
Journal of Chromatography A 1093 (1-2): 69-80, (2005)

…publications continued

An analytical system for determining delta O-17 in CO_2 using continuous flow-isotope ratio MS
Kawagucci S., Tsunogai U., Kudo S. et al
Analytical Chemistry 77 (14): 4509-4514, (2005)

Detection of exogenous citric acid in fruit juices by stable isotope ratio analysis
Jamin E., Martin F., Santamaria-Fernandez R. et al
Journal of Agricultural and Food Chemistry 53 (13): 5130-5133, (2005)

Authenticity assessment of gamma- and delta- decalactone from Prunis fruits by gas chromatography combustion/pyrolysis isotope ratio mass spectrometry (GC-C/P-IRMS)
Tamura H., Appel M., Richling E. et al
Journal of Agricultural and Food Chemistry 53 (13): 5397-5401, (2005)

Determination of the H-2/H-1 and N-15/N-14 ratios of alkylpyrazines from coffee beans (Coffea arabica L. and Coffea canephora var. robusta) by isotope ratio MS
Richling E., Preston C., Kavvadias D. et al
Journal of Agricultural and Food Chemistry 53 (20): 7925-7930, (2005)

Treatment methods for the determination of delta H-2 and delta O-18 of hair keratin by continuous-flow isotope-ratio mass spectrometry
Bowen G. J., Chesson L., Nielson K. et al
Rap. Comm. In Mass. Spec. 19 (17): 2371-2378, (2005)

Isotope ratio monitoring of small molecules and macromolecules by liquid chromatography coupled to isotope-ratio mass spectrometry
Godin J. P., Hau J., Fay L. B. et al
Rap. Comm. In Mass. Spec. 19 (18): 2689-2698, (2005)

Dynamics of microbial communities during decomposition of C-13 labeled ryegrass fractions in soil
McMahon S. K., Williams M. A., Bottomley P. J. et al
Soil Science Society of America Journal 69 (4): 1238-1247, (2005)

Differentiation of control endogen and exogen in urine by GC-C-IRMS method (gas chromatography - combustion - carbon isotope ratio mass spectrometry)
Grenier-Loustalot M. F.
Science and Sports 20 (4): 208-212, (2005)

…upcoming conferences and symposia

A selection of upcoming conferences are highlighted, relevant to forensic sciences in general and stable isotope studies. It is by no means a complete list and those requiring more details should look on the relevant web sites.

4th European Academy of Forensic Science Meeting

13-16th June, 2006
Helsinki, Sweden

- This 4th EAFS meeting will be different from the previous events, in that ENFSI Working Groups will not have their annual meetings as part of the conference; instead they will be invited to deliver their most significant results to a wider audience, which together with presentations from outside the ENFSI community will form the basis of this conference.
- Each theme will be organised under the headings, *Identification*, *Reconstruction*, *Reliability* and *Developing Technologies*. The format will consist of oral presentations in the morning and posters, workshops and commercial presentations in the afternoon. In addition, each day will start with a plenary presentation introducing the theme of the day.
- Programme framework has been developed, with each day addressing a specific theme, namely, *Scene of Incident*, *Laboratory Activities* and *Reporting Issues* to include interpretation and intelligence.
- The organisers are also offering a selection of tours and excursions to occupy you during any spare time you may have; these include Imperial Helsinki and the Tuusula Lake Road.

Forensic International Network for Explosives Investigation (FINEX) 3rd Conference 2006

19-21st April 2006
Novotel Lisboa, Lisbon, Portugal

- The Forensic International Network for Explosives Investigation was officially founded, and inaugurated as an ENFSI Expert Working Group, in April 2004. The network seeks to exchange information and expertise, provide support on technical issues, promote quality assurance and proficiency testing and harmonise crime scene guidelines, examination procedures and analytical techniques.
- The FINEX conference is internationally recognised as one of the primary professional meetings for all aspects of forensic explosives investigation. The conference provides a forum for high quality international exchange of information, including oral and poster presentations.

…conferences and symposia continued

→ FINEX 2006 will include four scientific sessions relating to post-explosion analysis, technical issues, case studies and a workshop, “setting up a quality system”.

→ Please contact finex@dstl.gov.uk for more information or visit the web site at www.dstl.gov.uk/finex/events.html

3rd National Meeting on Environmental Mass Spectrometry
University College Chester
11-12th April, 2006

17th International Mass Spectrometry Conference
Prague, Czech Republic
27th August -15th September, 2006

54th American Society of Mass Spectrometry Conference
Seattle, Washington
28th May -1st June, 2006

18th International Symposium of the Forensic Sciences
Freemantle, Western Australia
2-7th April, 2006

Isotope Symposium 2006
Edinburgh International Conference Centre, Scotland
16-20th July, 2006

5th International Conference on Applications of Stable Isotope Techniques to Ecological Studies
Queens University Belfast, Northern Ireland
13-18th August, 2006

…other news

2nd Inter-laboratory Exercise

The 2nd Inter-laboratory exercise has been completed by 17 international institutions – see this issue for the results.

The results will be issued in a comprehensive report currently being put together by FEL, and statistical analysis of both the 1st and 2nd FIRMS ILE's will be distributed. Many thanks must go to all groups who took part in this useful exercise.

FIRMS Focus Group Meeting

A FIRMS Focus Group meeting was held at Gatwick Airport on the 20th October 2005. Attendance was low although the event was held at relatively short notice. Minutes from this meeting have been produced and will be distributed to members.

The short, medium and long-term objectives of the FIRMS network were reviewed, as was FIRMS 2005 conference feedback and recent improvements to the FIRMS web site

FIRMS 2007/8 Conference

A bid from NZ Isotrace (University of Otago) to host the 2007/8 FIRMS conference has provisionally been accepted by the FIRMS Steering Committee. It currently seems likely that the conference will be held in early January 2008.

3rd Inter-laboratory Exercise

After the success of the first two schemes, a 3rd ILE is planned for 2006. Again, it is intended that MSA will provide the analytical samples and FEL will organise distribution of them and collation of results.

Joint Ph.D studentship between FEL and QUB

In a joint effort between FEL and Queens University, Belfast, FEL employee Claire Lock is undertaking a Ph.D studentship offered by the university, during which Claire will be looking at stable isotopic profiling of energetic materials.

Funding bid for isotopic profiling of drugs

A proposal has been submitted to EPSRC by several key members of FIRMS, applying for extensive funding of a project to determine the evidentiary value of drug isotope profiles. As the proposal states, "this would allow critical questions to be asked, including if and in what way isotope abundance analysis of light elements such as H, C, N and O will add discriminating power to existing methods of chemical identification of illicit drugs such as MDMA, heroin and cocaine".

The bid has been put forward by Prof. Robert Kalin and Dr. Wolfram Meier-Augenstein at Queens University, Belfast and Dr. Niamh NicDaeid and Prof Jim Fraser at the University of Strathclyde, in collaboration with a consortium of project partners.

Aims of the work include providing a capability to track individual seizures of controlled drugs and construct distribution maps based on isotope profiles. It promises to provide

information about drugs that is not accessible through current techniques. The information is envisaged to have the potential to be used by national and international law-enforcement agencies.

UK Home Office funding

The United Kingdom Home Office has agreed to fund the FIRMS network for a further 3 years. This is excellent news and demonstrates the Home office's appreciation of the importance of FIRMS, a sentiment that was also echoed in a letter of support to FEL.