

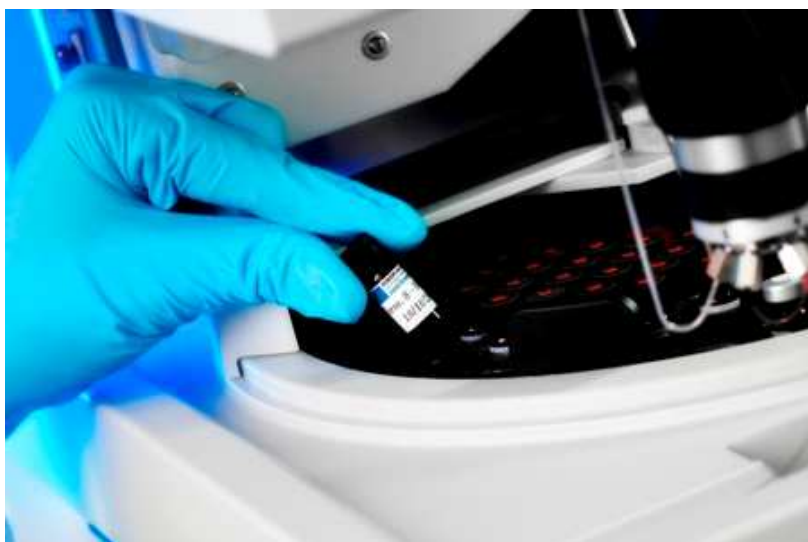


European  
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JRC SCIENTIFIC AND POLICY REPORTS

# Programme of pre-accession assistance "Improving Chemical and Ionising Radiation Metrology" in Turkey

Fifth interim report  
EMIT  
Project No TR080209



Josephine McCourt  
2012

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## EMIT I REPORTING PERIODS:

PHASE		PERIOD	DRAFT	FINAL
INCEPTION PHASE		01.10.2009 to 31.12.2009	02.12.2009	26.03.2010
IMPLEMENTATION PHASE	1 <sup>ST</sup> INTERIM	01.01.2010 to 30.06.2010	31.05.2010	30.06.2010*
	2 <sup>ND</sup> INTERIM	01.07.2010 to 31.12.2010	30.11.2010	31.12.2010*
	3 <sup>RD</sup> INTERIM	01.01.2011 to 30.06.2011	31.05.2011	30.06.2011*
	4 <sup>TH</sup> INTERIM	01.07.2011 to 31.12.2011	30.11.2011	31.12.2011*
	5 <sup>TH</sup> INTERIM	01.01.2012 to 30.06.2012	31.05.2012	30.06.2012*
FINAL		01.07.2012 to 30.09.2012	30.09.2012	30.11.2012*

\* Final publication dates of reports depend on many variables, so dates are only indicative.

## LIST OF ABBREVIATIONS

ABBREVIATION	NAME IN FULL
CIPM MRA	International Committee of Weights and Measures Mutual Recognition Arrangement
ÇNAEM	Turkish Atomic Energy Authority, Çekmece Nuclear Research and Training Centre
CRM	Certified Reference Material
EAL	Elemental Analysis Laboratories
ECTNA	European Chemistry Thematic Network Association
EMIT	Europe and Metrology in Turkey
EURAMET	European Association of National Metrology Institutes
HPLC	High Performance Liquid Chromatography
ICPMS	Inductively Coupled Plasma Mass Spectrometry
ICPOES	Inductively Coupled Plasma Optical Emission Spectrometry
IM	Isotope Measurements Unit of IRMM
IRMM	Institute for Reference Materials and Measurements
JRC	Joint Research Centre
LSC	Liquid Scintillation Counting
LTT	Long Term Trainee (or Traineeship)
NMI	National Metrology Institute
PAC	Project Advisory Committee
PTB	Physikalisch-Technische Bundesanstalt
RM	Reference Materials Unit of IRMM
RN	Radionuclide Metrology Group of IRMM
SANAEM	Turkish Atomic Energy Authority, Sarayköy Nuclear Research and Training Centre
SC	(Project) Steering Committee
SPE	Solid Phase Extraction
STGG	(Project) Scientific and Technical Guidance Group
STT	Short Term Trainee (or Traineeship)
TAEK	Turkish Atomic Energy Authority
TÜBİTAK	Scientific and Technological Research Council of Turkey
UME	Scientific and Technological Research Council of Turkey , National Metrology Institute
VERMI	Virtual European Radionuclide Metrology Institute
WI	Work Instruction

PROJECT SYNOPSIS

PROGRAMME	EMIT I - TURKEY
Project title	"Improving Chemical and Ionising Radiation Metrology" in Turkey
Project number	TR 080209
Overall objective	<p>The overall objective of the project is to contribute to the better functioning of the EU-Turkey Customs Union Agreement regarding the free movement of goods as well as to facilitate the implementation of <i>acquis communautaire</i> in quality of life related areas such as environmental, health and consumer protection and food safety.</p>
Specific Objectives	<p>The main purpose of this arrangement is to enhance institutional and measurement capacity in chemical and ionising radiation metrology to ensure that Turkish laboratories are able to produce traceable and comparable measurement results, leading to improvements in quality of life, and facilitating the adoption of the <i>acquis</i> related to the free movement of goods.</p> <ul style="list-style-type: none"> <li>▪ improving institutional capacities of beneficiaries</li> <li>▪ ensuring knowledge transfer in chemical and ionising radiation metrology</li> <li>▪ further developing human resources at laboratories and at academia in Turkey</li> <li>▪ strengthening networking and raising awareness.</li> </ul>
Planned Outputs	<p><b><u>Component 1: Institutional capacity building for TÜBİTAK UME</u></b>            New metrological capabilities/services in the field of chemical metrology developed and supported by documented and implemented strategies</p> <ul style="list-style-type: none"> <li>▪ TÜBİTAK UME quality system integrated with elements of a management system developed according to ISO Guide 34</li> <li>▪ TÜBİTAK UME chemistry laboratories advanced in their preparation for accreditation according to ISO Guide 34 as producer and supplier of CRMs to the PT providers</li> <li>▪ New calibration and measurement capabilities to support the implementation of the <i>acquis</i> are ready for submission to the CIPM MRA CMC database.</li> </ul> <p><b><u>Component 2: Institutional capacity building for TAEK</u></b></p> <ul style="list-style-type: none"> <li>▪ New metrological capabilities/services in the field of ionising radiation metrology developed and supported by documented and implemented plans and programmes</li> <li>▪ Secondary level standardisation procedures developed or improved</li> <li>▪ TAEK institutes quality management systems extended and covering the new metrological services</li> <li>▪ New calibration and measurement capabilities to support the implementation of the <i>acquis</i> are ready to submission to the CIPM MRA CMC database</li> <li>▪ Preparation on the development of primary standardisation initiated and foreseen in TAEK institutes' strategies.</li> </ul> <p><b><u>Component 3: Knowledge transfer and human resources development</u></b></p> <ul style="list-style-type: none"> <li>▪ TÜBİTAK UME and TAEK researchers familiar with functioning of metrology systems in EU Member States with similar economic needs</li> <li>▪ TÜBİTAK UME and TAEK researchers skilled and ready to carry out the new</li> </ul>

	<p>metrological services</p> <ul style="list-style-type: none"> <li>▪ Turkish laboratories' experts knowledgeable how to consider metrological aspects in their activities</li> <li>▪ Interested Turkish universities familiar with the alignment of EU university programmes in measurement science with Bologna requirements</li> <li>▪ Turkish universities interested in joining Euromaster Joint Degree Programme in measurement science conform to requirements.</li> </ul> <p><b><u>Component 4: Networking and raising awareness</u></b></p> <ul style="list-style-type: none"> <li>▪ European national metrology institutes (NMIs) familiarised with the development of TÜBİTAK UME and TAEK's capabilities</li> <li>▪ Network of contacts in the field of metrology established, strengthened and operational</li> <li>▪ Network of contacts with universities established and strengthened</li> <li>▪ Chemical and ionising radiation metrology topics discussed with national experts and stakeholders</li> <li>▪ International metrology community informed about TÜBİTAK UME and TAEK capabilities.</li> </ul>
<p><b>Activity fields (and deliverables) during the implementation phase.</b></p>	<p><b><u>Component 1: Institutional capacity building TÜBİTAK UME</u></b></p> <ol style="list-style-type: none"> <li>1. IRMM to advise TÜBİTAK UME on their strategic plan for the production and certification of reference materials.</li> <li>2. IRMM to provide consultation to TÜBİTAK UME on the development of procedures and management systems according to ISO Guide 34 and on their integration into the TÜBİTAK UME quality system.</li> <li>3. IRMM to advise TÜBİTAK UME on the preparation of their chemistry laboratories as CRM producer and international comparisons provider in selected areas.</li> <li>4. IRMM to provide recommendations on the necessary improvement of clean and climatic rooms at TÜBİTAK UME</li> <li>5. IRMM to provide consultation to TÜBİTAK UME on the needed equipment and technical specifications for the equipment for the production of CRMs</li> </ol> <p><b><u>Component 2: Institutional capacity building for TAEK</u></b></p> <ol style="list-style-type: none"> <li>6. IRMM to advise TAEK on their strategic plan for improving the capabilities for secondary standardisation at TAEK institutes.</li> <li>7. IRMM to provide consultation to TAEK on the development/improvement of their secondary level standardisation procedures.</li> <li>8. IRMM to provide consultation on the extension of the current quality management systems at TAEK institutes to the secondary level standardisation activities and support for preparation for participation in the CIPM MRA.</li> <li>9. IRMM to advise TAEK on their strategic plan for the development of primary standardisation.</li> </ol> <p><b><u>Component 3: Knowledge transfer and human resources development</u></b></p> <ol style="list-style-type: none"> <li>10. IRMM to help familiarise TÜBİTAK UME and TAEK researchers with the functioning of metrology systems in EU member states with similar economic needs.</li> <li>11. IRMM to organise short term and long term trainings for TÜBİTAK UME and TAEK researchers (18 * 1 yr LTTs).</li> <li>12. IRMM to organise seminars and workshops for the end users.</li> </ol>

	<p>13. IRMM to help familiarise Turkish universities providing education in chemical and (if any) in ionising radiation metrology with the status of alignment of EU university programmes in measurement science with the Bologna requirements.</p> <p>14. IRMM to provide consultation to Turkish universities interested in joining Euromaster Joint Degree Programme in measurement science.</p> <p><b><u>Component 4: Networking and raising awareness</u></b></p> <p>15. IRMM to help promote TÜBİTAK UME and TAEK amongst the scientific and metrological community at European level</p> <p>16. IRMM to help establish a network of direct and indirect users of CRMs and metrology services.</p> <p>17. IRMM to help establish a network of universities providing (or interested in providing) a master level university education in chemical and ionising radiation metrology.</p> <p>18. IRMM to organise national conference sessions and events.</p> <p>19. IRMM will support the participation of TÜBİTAK UME and TAEK experts in international events.</p>
<b>Activity fields during the final phase.</b>	20. The consultant (IRMM) and the contracting authority (EU Delegation, Ankara) will organise a final wrap-up event in order to present the final results of the project and to underline the impact of the IPA programme on the involved institutions and a broader public.
<b>Project starting date</b>	01.10.2009
<b>Project duration</b>	36 months



The overall objective of the project is to contribute to the better functioning of the EU-Turkey Customs Union Agreement regarding the free movement of goods as well as to facilitate the implementation of the *acquis communautaire* in quality of life related areas such as environmental, health and consumer protection and food safety.

To achieve this goal the project consists of an inception phase (complete since 31.12.2009) and 4 components, which are associated with certain interventions, during the implementation phase (01.01.2010 to 30.06.2012) with the project being consolidated during the final phase (01.07.2012 to 30.09.2012).

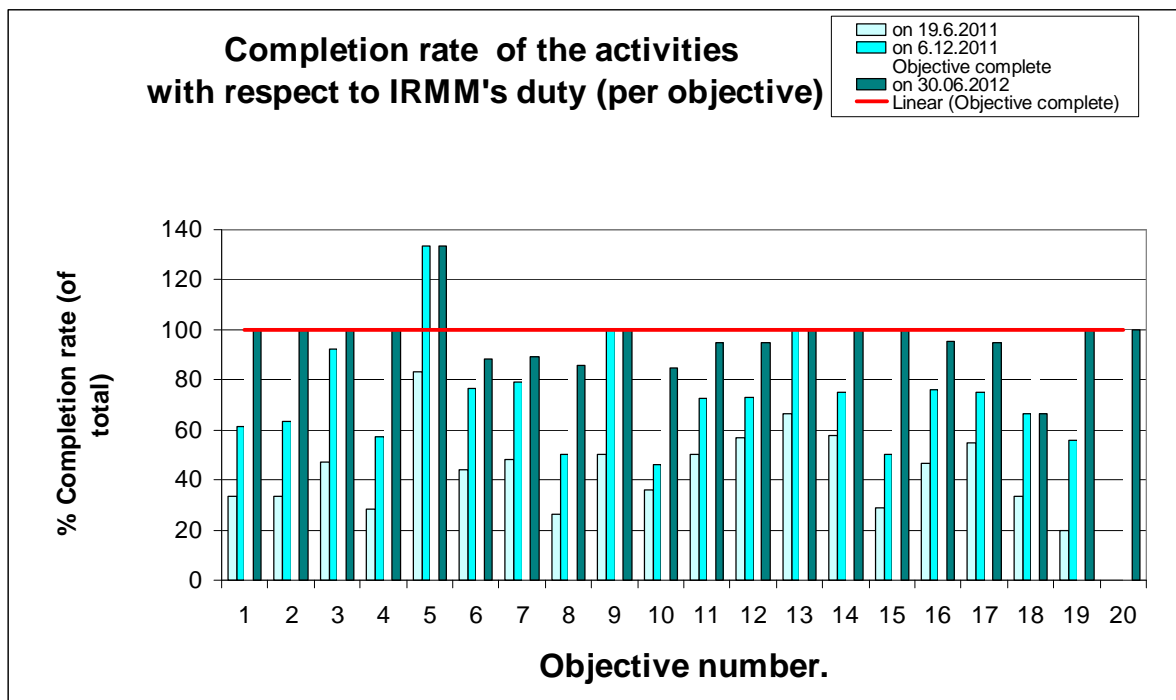
- Inception phase:
  - Establishment of the project office at TÜBİTAK UME
  - Identification of stakeholders in order to ensure awareness
  - Meetings with all relevant institutions to ensure awareness and confirm support
  - Contacts with other project teams
  - Gaps and needs analysis at TÜBİTAK UME, TAEK-ÇNAEM and TAEK-SANAEM
  - Planning of activities to be carried out
- Implementation phase - Component 1: Institutional capacity building for TÜBİTAK UME
  - Identification of requirements for production and certification of reference materials for country-specific products
  - Development of procedures and ISO Guide 34 management system, integration into quality system
  - Preparation of chemistry laboratories for CRM production and provision of international comparisons
  - Consulting on equipment needed for CRM production
- Implementation phase - Component 2: Institutional capacity building for TAEK
  - Identification of requirements and consulting for secondary standardisation at TAEK institutes
  - Extension of the quality management systems at TAEK institutes to secondary level standardisation activities and support for preparation for participation in the CIPM MRA
  - Planning of the development of primary standardisation
- Implementation phase - Component 3: Knowledge transfer and human resources development
  - Familiarising TÜBİTAK UME and TAEK researchers with metrology systems in EU member states with similar economic needs
  - Training for TÜBİTAK UME and TAEK researchers in matters of CRM, secondary standardisation and applicable quality systems
  - Organisation of seminars and workshops for end users
  - Co-operation with Turkish universities providing education in chemical and in ionising radiation metrology
  - Consulting to Turkish universities interested in joining Euromaster Joint Degree Programme in metrology
- Implementation phase - Component 4: Networking and Raising Awareness
  - Promotion of TÜBİTAK UME and TAEK among scientific and metrological community at European level
  - Enhancement of relationships with direct and indirect users of CRM and metrology services
  - Enhancement of relationships with universities providing a master level education in measurement science
  - Organisation of national conferences and events
  - Support of TÜBİTAK UME and TAEK experts participation in international events.

- Final phase

During the last phase of the project, a final wrap-up event in order to present the final results of the project will be held. The aim of this is to underline the impact of the IPA programme on the involved institutions and on the broader public. Invitees to this event should include representatives from all beneficiary institutions, other relevant ministries and state administrative bodies, the academic and legal professions, the business community, NGOs and members of the international donor community. Furthermore, the media should be encouraged to cover the event in order to ensure publicity.

This fifth interim report provides the overview on the project's progress for the duration of the fifth six months of the implementation period. It also offers a plan for the activities to be conducted within the final reporting period.

The "Logical Framework" tables (see section 6.1) summarise the status of the project to date in terms of completion of its objectives. However many of the objectives are split between the consultant having to deliver advice and training (to put it very simply) and the beneficiary (either TÜBİTAK UME, TAEK-ÇNAEM, TAEK-SANAEM) having to demonstrate that they have used this successfully to reach the stated goals). Seeing as we won't see for some time yet, the overall picture of the "total" objectives having been reached, the completion rate of the activities with respect to IRMM's duty is shown in Figure 1 for each objective. The status on the 19th June, 2011, the 6th December, 2011 and the 30th June, 2012 are shown separately as the achievement of nearly all objectives was being worked on throughout the project duration.



**Figure 1:** Completion rate (30.06.2012) of the activities with respect to IRMM's duty regarding each objective.

A summary of the long term training status of the TÜBİTAK UME, TAEK-ÇNAEM and TAEK-SANAEM traineeships is best represented graphically (see Figure 2).

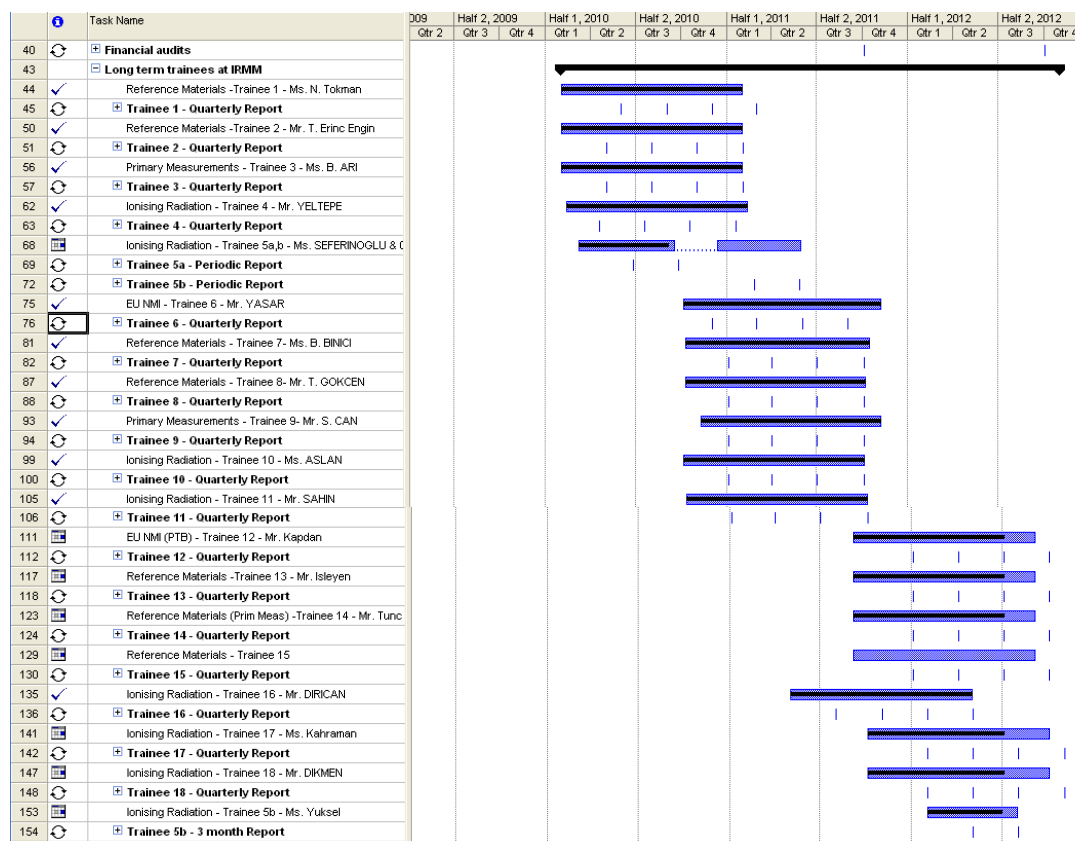
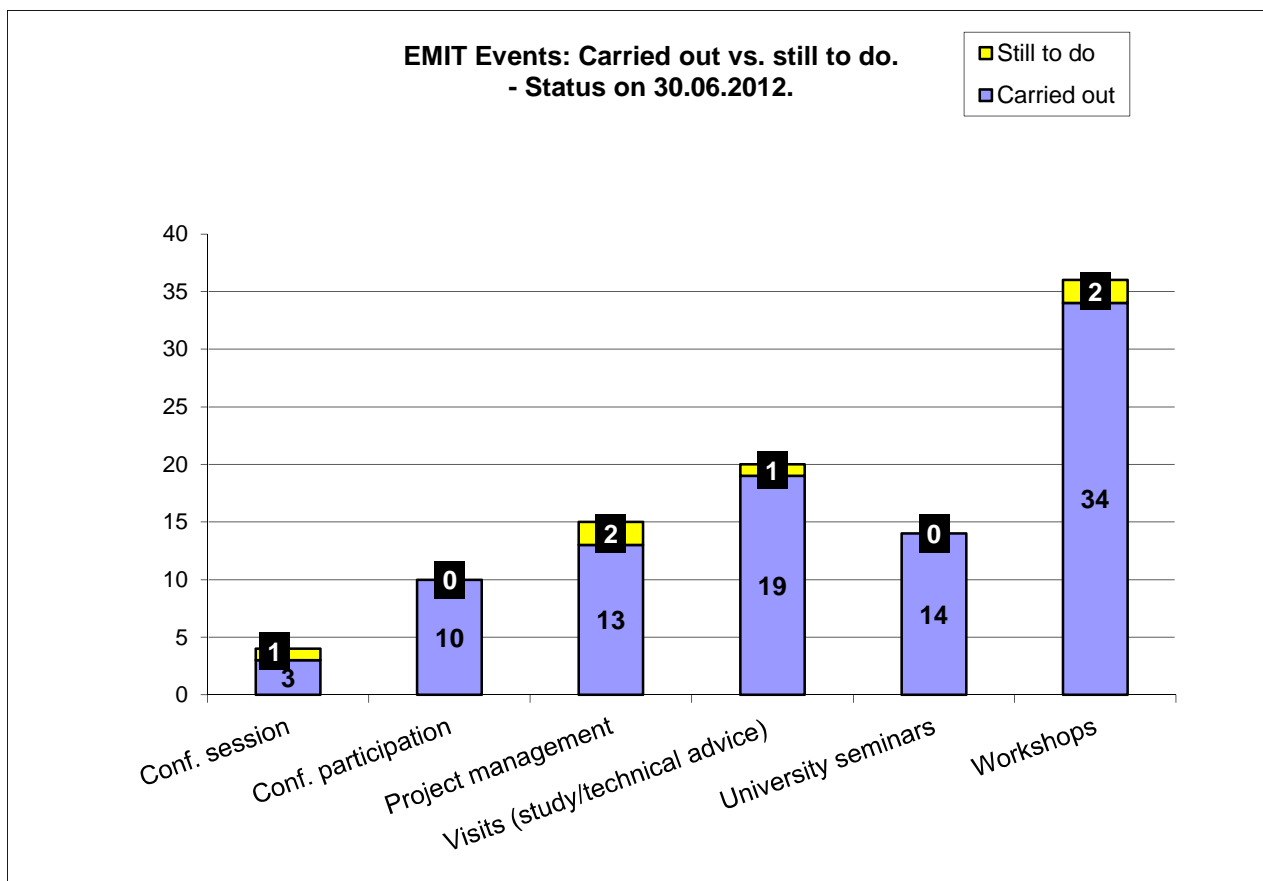


Figure 2: The long term training status (on 30.06.2012) of the TÜBİTAK UME, TAEK-ÇNAEM and TAEK-SANAEM traineeships.

Note: TÜBİTAK UME were unable to propose a suitable candidate for the last LT traineeship. This was then converted into 4 extra and separate short term traineeships (i) EMIT S04-15bis: 5 TÜBİTAK UME scientists participated in the EMIT S04-15 event in Antalya; ii) EMIT S02-03bis: 5 TÜBİTAK UME scientists to attend the 6th National Chemistry Congress, 5 days, Hatay in Sep. 2012; iii) EMIT S04-23: one TÜBİTAK UME scientist to receive a 4 day training course on Proteomics at Bruker Daltonik GMBH, Bremen in Sep. 2012 and iv) EMIT S04-24: one TÜBİTAK UME scientist to receive a 5 day training course on Gas Purity Analysis at the Dutch metrology Institute, VSL, Delft, The Netherlands, also in Sep. 2012.

A summary of the short term event status at the end of the fifth interim period is represented by Figure 3. Short term events comprise of scientific workshops, study visits, technical advice visits, seminar lectures, conference sessions, conference attendances and project management meetings (Steering Committee and Project Advisory Committee). It should be noted that two Study Visits/Technical Advice (the combined study visit of 2 TÜBİTAK UME scientists to JRC-IRMM EMIT S01-11,-20) and the combined EMIT S01-14, -19: technical advice visit of 1 IRMM expert to TÜBİTAK UME) were cancelled due to the fact that TÜBİTAK UME's parallel IPA (CRIS TR2009/0301.02 Chemical Metrology Equipment Supply IPA) was seriously delayed and this made the completion of these visits impossible. The point of those last visits was to look at any problems that might occur once CRM production had actually started in TÜBİTAK UME. The fact that CRM production will now only commence during 2013 makes these visits impossible as no (EMIT) resources (human or financial) are available after 30.09.2012.



**Figure 3: The short term event status at the end of the fifth interim period.**

To gain an insight into how the training workshops are being perceived across the scientific community in Turkey, evaluation forms are handed out to the participants. Unfortunately, it is very difficult to get 100% feedback. This varies with every workshop<sup>1</sup>. Table 1 shows the appreciation of Turkish scientists for the workshops provided (primarily by IRMM staff and also some external experts) to date. The number of participations in training events (all types, not just the workshops listed below) from the beginning (01.10.2009 'til 30.06.2012) is 2214 (1/3 of which are individual scientists coming to different workshops).

**Table 1: EMIT workshop appreciation by participants (%).**

Workshop tally to date	Workshop code	Workshop title	Nr external participants (varying restrictions on nr allowed).	Training course evaluations on "objectives (being met) and theme" (%)			
				Very good	Good	Fair	Poor
4	S03-01, -02, -06 and -12.	VERMI 5 (Primary standardisation techniques in radionuclide metrology; gamma ray spectrometry; liquid scintillation, ion chambers and radionuclide calibrators).	48	42	58	0	0

<sup>1</sup> The original individual evaluation sheets are available to the Project Steering Committee and the IRMM EMIT S&T guidance group, via the secure circa platform "JRC Metrology in Turkey".

5	S01-01	Use of certified reference materials and the estimation of measurement uncertainty.	39	81	19	0	0
6	S03-17	Radiochemical lab practice.	5	100	0	0	0
7	S03-18	Therapy level dosimetry.	120	<i>Not requested</i>			
8	S01-02	Processing of certified reference materials.	33	32	60	4	4
9	S04-03	Roadmap for facilitating educational innovations in metrology in chemistry and ionising radiation	38	7	62	31	0
15	S04-04_09	Sampling, metrology in chemistry, internal QC, applied statistics, method optimisation, selection and use of RMs, inter laboratory comparisons....	55	19	56	23	2
16	S01-03	Certification of reference materials	35	21	79	0	0
17	S02-01	Primary method measurements and uncertainty, method validation (IDMS perspective), accreditation (flexible scope), innovations in ICP-MS....	21	60	40	0	0
18	S04-14	Safety of food & feed – requirements of an analytical laboratory.	106	56	41	3	0
19	S04-13	Metrology in nanotechnology	36	43.5	43.5	13	0
20	S03-10	Sample preparation and instrument efficiency calibration in liquid scintillation counting.	17	88	12	0	0
21	S03-25	Contamination survey meter calibration.	5	40	60	0	0
22	S03-27	QA/QC for therapy and diagnostic irradiation systems.	71	41.5	41.5	17	0
23	S03-05	Advanced gamma-ray spectrometry, 1 - true/chance	20	67	33	0	0

		coincidence correction methods.					
24	S01-04	Use of certified reference materials	29	31	65	4	0
25	S01-10	Planning, preparation and certification of reference materials	20	15	69	15	0
26	S01-05	Preparation of reference materials	19	50	44	0	6
27	S04-02	Integrated quality systems: an interpretation for universities	43	36	61	3	0
28	S03-11	Multi-label liquid scintillation counting	5	100	0	0	0
29	S01-06	Certification of reference materials	27	40	60	0	0
30	S01-12	Assignment of the reference value for the CRM (statistical aspects)	23	61	39	0	0
31	S03-03	Advanced gamma-ray spectrometry	22	78	22	0	0
32	S04-16	Auditing of integrated management systems	25	56	40	4	0
33	S02-02	Isotopic methodology and metrology in chemistry to inorganic reference measurements	40	41	59	0	0
34	S04-15	Setting up your QM system - who to train, on what, when and how?	20	68	21	11	0

# 1 INTRODUCTION

## *Context:*

The IPA-Project TR080209 "Improving Chemical and Ionising Radiation Metrology" under the National Programme for Turkey under the IPA-Transition Assistance and Institution Building Component for 2008 is based on the Administrative Arrangement IPA/2009/214672 – JRC - 31331 between DG Enlargement and the Joint Research Centre, signed on 24th July, 2009. The project synonym is EMIT meaning "Europe and Metrology in Turkey".

The contracting authority for the project, acting on behalf of the Directorate General for Enlargement (DG ELARG), is the EU Delegation of the European Commission to Turkey, Ugur Mumcu Cad. No: 88/4, Gaziosmanpasa 06700, Ankara, Turkey.

The overall objective of the project is to contribute to the better functioning of the EU-Turkey Customs Union Agreement regarding the free movement of goods as well as to facilitate the implementation of *acquis communautaire* in quality of life related areas such as environmental, health and consumer protection and food safety.

The main purpose of this arrangement is to enhance institutional and measurement capacity in chemical and ionising radiation metrology to ensure that Turkish laboratories are able to produce traceable and comparable measurement results, leading to improvements in quality of life, and facilitating the adoption of the *acquis* related to the free movement of goods.

The Consultant support to EC Delegation Ankara and respectively to DG Enlargement will aim at:

- improving institutional capacities of beneficiaries
- ensuring knowledge transfer in chemical and ionising radiation metrology
- further developing human resources at laboratories and at academia in Turkey
- strengthening networking and raising awareness.

## *Content:*

The fifth interim report offers an overview of the *activities conducted during the fifth six months* of the implementation phase (01.01.2012 – 30.06.2012).

Furthermore, this document lists the planned activities for the final phase (01.07.2012 – 30.09.2012). They are derived from the overall scheduling of the project described in the Inception phase report.

Finally, the last chapter is meant to provide a summary of the results achieved in the course of the fifth reporting period, derive conclusions and list the key fields requiring further improvement.

## 2 Implementation phase activities

In line with the initial planning in the inception report, all activities under this project are structured within three **major objectives**:

- Institutional capacity building for both TÜBİTAK UME and TAEK,
- Knowledge transfer and human resources development
- Networking and raising awareness

Furthermore, each one of them is subdivided into twenty **deliverables** as follows:

**TABLE 2: EMIT I DELIVERABLES**

### **Component 1: Institutional capacity building TÜBİTAK UME**

- i. IRMM to advise TÜBİTAK UME on their strategic plan for the production and certification of reference materials.
- ii. IRMM to provide consultation to TÜBİTAK UME on the development of procedures and management systems according to ISO Guide 34 and on their integration into the TÜBİTAK UME quality system.
- iii. IRMM to advise TÜBİTAK UME on the preparation of their chemistry laboratories as CRM producer and international comparisons provider in selected areas.
- iv. IRMM to provide recommendations on the necessary improvement of clean and climatic rooms at TÜBİTAK UME
- v. IRMM to provide consultation to TÜBİTAK UME on the needed equipment and technical specifications for the equipment for the production of CRMs

### **Component 2: Institutional capacity building for TAEK**

- vi. IRMM to advise TAEK on their strategic plan for improving the capabilities for secondary standardisation at TAEK institutes.
- vii. IRMM to provide consultation to TAEK on the development/improvement of their secondary level standardisation procedures.
- viii. IRMM to provide consultation on the extension of the current quality management systems at TAEK institutes to the secondary level standardisation activities and support for preparation for participation in the CIPM MRA.
- ix. IRMM to advise TAEK on their strategic plan for the development of primary standardisation.

### **Component 3: Knowledge transfer and human resources development**

- x. IRMM to help familiarise TÜBİTAK UME and TAEK researchers with the functioning of metrology systems in EU member states with similar economic needs.
- xi. IRMM to organise short term and long term trainings for TÜBİTAK UME and TAEK researchers (18 \* 1 yr LTTs).
- xii. IRMM to organise seminars and workshops for the end users.
- xiii. IRMM to help familiarise Turkish universities providing education in chemical and (if any) in ionising radiation metrology with the status of alignment of EU university programmes in measurement science with the Bologna requirements.
- xiv. IRMM to provide consultation to Turkish universities interested in joining Euromaster Joint Degree



Programme in measurement science.

**Component 4: Networking and raising awareness**

- xv. IRMM to help promote TÜBİTAK UME and TAEK amongst the scientific and metrological community at European level
- xvi. IRMM to help establish a network of direct and indirect users of CRMs and metrology services.
- xvii. IRMM to help establish a network of universities providing (or interested in providing) a master level university education in chemical and ionising radiation metrology.
- xviii. IRMM to organise national conference sessions and events.
- xix. IRMM will support the participation of TÜBİTAK UME and TAEK experts in international events.

**Final**

- xx. The consultant (IRMM) and the contracting authority (EC Delegation, Ankara) will organise a final wrap-up event in order to present the final results of the project and to underline the impact of the IPA programme on the involved institutions and a broader public.

The twenty deliverables (as listed in TABLE 2) will be, for the most part, achieved by carrying out a number of events which have been listed in the Inception phase report (see EMIT I Event List in Annex 6.2). For practical reasons, each event was given a code and can be read as follows: Expert Group 1 Reference Materials events start with S01, Expert Group 2 Primary Methods of Measurement events start with S02, Expert Group 3 Ionising Radiation events start with S03, Expert Group 4 Quality & Metrology education events start with S04 and finally general events start with the code S05.

The event list comprises short term training actions, such as scientific workshops, university seminars, study visits / technical advice visits, participations to conferences and organised conference sessions. The only deliverables not covered by a corresponding entry in the event list are Long Term Traineeships (mostly 12 month duration) at IRMM (or NMI) and not all visits of IRMM experts to Turkey. The EMIT Project Management Meetings, such as the Project Advisory Committee and Steering Committee Meetings have also been added to the event list under S05 activities.

The methodology used to achieve EMIT deliverables is summarised in TABLE 3.

**TABLE 3: METHODOLOGY USED TO ACHIEVE EMIT DELIVERABLES**

METHODOLOGY	DESCRIPTION
A	Long term training (LTT) actions involving 18 trainees (LTTs) at IRMM or NMI (EU)
B	Short term training (STT) actions - to be used by the LTTs and expert speakers disseminating knowledge in TÜBİTAK & TAEK.
C	Study visits to EU member states - meant for Turkish scientists to come to IRMM or to EU NMIs
D	Participations to conferences - meant for Turkish scientists to attend conferences within the scope of EMIT
E	Workshops/seminars ( $\pm$ 20 participants) for TÜBİTAK UME/TAEK staff
F	Seminars/workshops (50-100 participants) for end-users (national lab staff, university staff, students.....)
G	Workshops (20-40 participants) for universities
H	Conference (or session in a conference) - chemical metrology
I	Conference (or session in a conference) - ionising radiation metrology
J	Conference (or session in a conference) - education in metrology
K	Visits of IRMM experts to Turkey (other than code B)
L	Concluding event/conference
M	Project Advisory Committee Meetings
N	(Project) Steering Committee Meetings

### 3 OVERVIEW OF THE ACTIVITIES FOR THE 5TH REPORTING PERIOD 01.01.2012 – 30.06.2012

The following overview (Table 4) is based on the previously elaborated reporting logic and summarises the results achieved during the fifth reporting period (01.01.2012 – 30.06.2012):

**Table 4: STATUS OF EMIT I DELIVERABLES & RELATED ACTIVITIES AT THE END OF THE FIFTH INTERIM PERIOD.**

Del. Nr.	Deliver-able type	Activity	Method-ology	Status
				Fifth interim completed activities (%) <sup>2</sup>
1	Capacity building for TÜBİTAK UME	IRMM to advise TÜBİTAK UME on their strategic plan for the production and certification of reference materials.	A, B, C, E, K, M, N	6 LTTs completed; 2 LTTs at 80% (100% of objective achieved)
2		IRMM to provide consultation to TÜBİTAK UME on the development of procedures and management systems according to ISO Guide 34 and on their integration into the TÜBİTAK UME quality system.	A, B, C, E, K	6 LTTs completed; 2 LTTs at 80% (100% of objective achieved)
3		IRMM to advise TÜBİTAK UME on the preparation of their chemistry laboratories as CRM producer and international comparisons provider in selected areas.	A, B, C, E, K	6 LTTs completed; 2 LTTs at 80% (100% of objective achieved)
4		IRMM to provide recommendations on the necessary improvement of clean and climatic rooms at TÜBİTAK UME	A, K	6 LTTs completed; 2 LTTs at 80% (100% of objective achieved)
5		IRMM to provide consultation to TÜBİTAK UME on the needed equipment and technical specifications for the equipment for the production of CRMs	A, B, C, K	6 LTTs completed; 2 LTTs at 80% (133% of objective achieved.)
6	Capacity building for TAEK	IRMM to advise TAEK on their strategic plan for improving the capabilities for secondary standardisation at TAEK institutes.	A, B, C, E, K	7 LTT s completed; 3 LTTs at 80-90%. 88% of objective achieved.
7		IRMM to provide consultation to TAEK on the development/improvement of their secondary level standardisation procedures.	A, B, C, E, K	7 LTT s completed; 3 LTTs at 80-90%. 89% of objective achieved.
8		IRMM to provide consultation on the extension of the current quality management systems at TAEK institutes to the secondary level standardisation activities and support for preparation for participation in the CIPM MRA.	A, B, C, E, K	7 LTT s completed; 3 LTTs at 80-90%. 86% of objective achieved.
9		IRMM to advise TAEK on their strategic plan for the development of primary standardisation.	A, B, C, E, K	7 LTT s completed; 3 LTTs at 80-90%. 100% of objective

<sup>2</sup> Expressed as percent of total actions necessary to complete the corresponding objective – see Figure 1.

Del. Nr.	Deliver-able type	Activity	Methodology	Status
				Fifth interim completed activities (%) <sup>2</sup>
				achieved.
10	Knowledge transfer and human resources development	IRMM to help familiarise TÜBİTAK UME and TAEK researchers with the functioning of metrology systems in EU member states with similar economic needs.	A, B, C, E, K	13 LTTs at 100% of traineeship; 5 LTTs at 80-90%. 86% of objective achieved.
11		IRMM to organise short term and long term trainings for TÜBİTAK UME and TAEK researchers (18 * 1 yr LTTs).	A, B, E	13 LTTs at 100% of traineeship; 5 LTTs at 80-90%. 95% of objective achieved.
12		IRMM to organise seminars and workshops for the end users.	F	95% of objective achieved.
13		IRMM to help familiarise Turkish universities providing education in chemical and (if any) in ionising radiation metrology with the status of alignment of EU university programmes in measurement science with the Bologna requirements.	F, K	100% of objective achieved.
14		IRMM to provide consultation to Turkish universities interested in joining Euromaster Joint Degree Programme in measurement science.	F, K	100% of objective achieved.
15	Networking and raising awareness	IRMM to help promote TÜBİTAK UME and TAEK amongst the scientific and metrological community at European level	D	100% of objective achieved.
16		IRMM to help establish a network of direct and indirect users of CRMs and metrology services.	M, N	PAC-06 and SC-07 meetings /seminars 96% of objective achieved.
17		IRMM to help establish a network of universities providing (or interested in providing) a master level university education in chemical and ionising radiation metrology.	B, D, F, J	95% of objective achieved.
18		IRMM to organise national conference sessions and events.	H, I, J, L	2 conf. complete 67% of objective achieved.
19		IRMM will support the participation of TÜBİTAK UME and TAEK experts in international events.	D	100% of objective achieved.
20	Result communication	The consultant (IRMM) and the contracting authority (EC Delegation, Ankara) will organise a final wrap-up event in order to present the final results of the project.	L	100% of objective achieved.

### 3.1 DETAILED REPORT ON ACTIVITIES

Based on the overview in Table 4, this section of the fifth Interim report lists the stage of achievement of the agreed activities as well as the expected result.

#### 3.1.1 Component 1: INSTITUTIONAL CAPACITY BUILDING - TÜBİTAK UME

Component 1: Institutional capacity building TÜBİTAK UME

- i. IRMM to advise TÜBİTAK UME on their strategic plan for the production and certification of reference materials.

<b>ACTIVITY</b>	i. IRMM to advise TÜBİTAK UME on their strategic plan for the production and certification of reference materials
Objective of the activity	Clear identification of production capabilities, evaluation methods and parameters to be measured for the production and certification of reference materials to be produced by TÜBİTAK UME for country specific products.
Methodology	A, B, C, E, K, M, N.
Implementation period	01.02.2010 – 30.09.2012
Expected result	A documented strategic plan will be produced by the beneficiary - TÜBİTAK UME - and the Consultant and will be submitted to the Advisory Committee for review and to the Steering Committee for approval.
Deliverables (before project end).	By TÜBİTAK UME and IRMM - A documented strategic plan. Internal approval by TÜBİTAK UME before review by the PAC . By PAC – a review of the strategic plan By SC – approval of the strategic plan.
Hosting institutions	IRMM, TÜBİTAK UME.
<b>Status at the end of the fifth interim period of the implementation phase.</b>	
Status	<p>TÜBİTAK UME: A draft strategic plan was sent to IRMM for review on the fifth March, 2012. Revisions (on the draft) were received from IRMM on the 13<sup>th</sup> March. The final strategic plan is to be submitted (by TÜBİTAK UME) at the final Steering Committee meeting on the 12.09.2012. Please also see the status of the parallel IPA (TR2009/0301.02 “Supply of Chemical Metrology Equipment to TÜBİTAK UME) described under iii as this has an effect on elements in the strategic plan.</p> <p>IRMM: 6 LTTS at 100% completion of traineeship. 2 at 80% completion. The completed events which supported the 100% completion rate wrt to IRMM's duty* concerning this objective are: S01-01, S01-13a,b, S01-02, S01-03, S02-01, S01-04, S01-10 and S01-05, S01-06, S01-12 and S02-02.</p> <p>*It should be noted that two Study Visits/Technical Advice (the combined study visit of 2 TÜBİTAK UME scientists to JRC-IRMM EMIT S01-11,-20) and the combined EMIT S01-14, -19: a technical advice visit of 1 IRMM expert to TÜBİTAK UME) were cancelled due to the fact that TÜBİTAK UME's parallel IPA (CRIS TR2009/0301.02 Chemical Metrology Equipment Supply IPA) was seriously delayed and this made the completion of these SV/TA impossible.</p>
Interim deliverables	<p>TÜBİTAK UME : Final strategic plan to be presented at the last Steering Committee Meeting (SC8 on 12.09.2012).</p> <p>IRMM: Final reports of 6 of the 8 LTTS complete. LTT reports are available via the secure circabc platform which is accessible by the EMIT steering committee members Descriptions of the events carried out in the fifth interim are provided in section 3.2.</p>

- ii. IRMM to provide consultation to TÜBİTAK UME on the development of procedures and management systems according to ISO Guide 34 and on their integration into the TÜBİTAK UME quality system.

ACTIVITY	ii. IRMM to provide consultation to TÜBİTAK UME on the development of procedures and management systems according to ISO Guide 34 and on their integration into the TÜBİTAK UME quality system.
Objective of the activity	TÜBİTAK UME quality system integrated with a management system developed according to ISO Guides 30-35
Methodology	A, B, C, E, K
Implementation period	01.02.2010 – 30.09.2012
Expected result	Quality principles and good practices shall be taken on board at the very beginning of activities leading to the new TÜBİTAK UME services in the area of reference materials. The definitive, long term goal is that TÜBİTAK UME is capable of carrying out a CRM project according to ISO Guide 34 so that it is capable of submitting for accreditation assessment the fully developed, operational and management system according to ISO Guide 34.
Deliverables (before project end).	By TÜBİTAK UME : - New or revised quality management procedures - Submitted application for TÜBİTAK UME's accreditation according to ISO Guides 30-35. By IRMM: - Completion of 9 LTT traineeships and completion of the events S01-01, S01-13a,b, S01-02, S01-03, S01-04, S01-10, S01-11, S01-05, S01 – 20, S01 – 19, S01-06 and S01-12
Hosting institutions	IRMM, TÜBİTAK UME.
Status at the end of the fifth interim period of the implementation phase.	
Status	TÜBİTAK UME: Integration of production and certification of reference material manuals to the already existing TÜBİTAK UME Quality manuals is in progress and about 75% of which has been completed. Similarly, the procedures for the production of reference materials according to ISO Guide 34 have already been completed and have been approved by the Quality Manager. Finalization of the instructions methods /experiments/instruments will be completed after having the equipment operational in our laboratories by mid 2013. IRMM: 6 LTTS at 100% completion of traineeship. 2 at 80% completion. The completed events which supported the 100% completion rate wrt to IRMM's duty concerning this objective are: S01-01, S01-13a,b, S01-02, S01-03, S01-04, S01-10, S01-05, S01-06 and S01-12. See *note under objective i.
Interim deliverables	TÜBİTAK UME: About 75% of the TÜBİTAK UME Quality Manual has been prepared. IRMM: Final reports of 6 of the 8 LTTS are complete. LTT reports are available via the secure circa platform which is accessible by the EMIT steering committee members Descriptions of the events carried out in the fifth interim period are provided in section 3.2.

- iii. IRMM to advise TÜBİTAK UME on the preparation of their chemistry laboratories as CRM producer and international comparisons provider in selected areas.

ACTIVITY	iii. IRMM to advise TÜBİTAK UME on the preparation of their chemistry laboratories as CRM producer and international comparisons provider in selected areas.
Objective of the activity	TÜBİTAK UME chemistry laboratories prepared for accreditation as producer and supplier of CRMs to the PT providers; New calibration and measurement capabilities to support the implementation of the <i>acquis</i> are ready for submission to the CIPM

	MRA CMC database.
Methodology	A, B, C, E, K
Implementation period	01.02.2010 – 30.09.2012
Expected result	<p>Improvement of the existing infrastructure will enable proper work of materials processing and analytical measurement equipment and the smooth implementation of the project. Therefore this activity shall deliver results shortly after the beginning of the project and TÜBİTAK UME's progress on the improvement of facilities shall be monitored during the project:</p> <ul style="list-style-type: none"> <li>- Increased number of TÜBİTAK UME services and CMCs</li> <li>- At least two candidate CRMs from the identified production scope released by UME</li> <li>- Validation of 5 new measurement methods developed in TÜBİTAK UME chemistry laboratories</li> <li>- Submitted to EURAMET minimum 5 CMC entries for inclusion into the CIPM MRA CMC database</li> </ul>
Deliverables (before project end).	<p>By TÜBİTAK UME :</p> <ul style="list-style-type: none"> <li>- Improved facilities; Increased services; New methods; New EURAMET submissions.</li> </ul> <p>By IRMM:</p> <ul style="list-style-type: none"> <li>- Completion of 9 LTT traineeships and events S01-01, S01-13a,b, S01-02, S01-03, S02-01, S01-04, S01-10, S01-11, S01-05, S01 – 20, S01 – 19, S01-14, S01-06, S01-12 and S02-02.</li> </ul>
Hosting institutions	IRMM, TÜBİTAK UME.
Status at the end of the fifth interim period of the implementation phase.	
Status	<p>TÜBİTAK UME: Concerning the first three CRMs to be produced at TÜBİTAK UME, i.e. Trace Elements in Hazelnut, Sulphur Dioxide in Dried Apricot and Aflatoxins in Dried Fig – the estimated dates (or status in some cases) of the small scale feasibility, large scale feasibility, processing, homogeneity, short and long term stability, characterization, reporting and market launch were outlined. It must be remembered that the status of the parallel IPA (TR2009/0301.02 "Supply of Chemical Metrology Equipment to TÜBİTAK UME) is such that Lots 1-3 and Lots 5-7 have to be re-published (delaying eventual orders by approx. 6 months). The purchase orders for equipment listed in Lots 4-5 are being finalised in Dec.2012. The success of the re-launch will have an effect on CRM production and eventual release dates.</p> <p>With respect to new methods developed in TÜBİTAK UME the knowledge gained via the LTTs is directly related to the completion of two new methods, a) the determination of Pb, Co and Cr in inorganic calibration solutions by Isotope Ratio Measurements and b) a method to be used in a interlaboratory comparison on Isotope Ratio Measurements (Pb in Bronze). The first method will also be submitted as a new CMC and it is the first time that UME have engaged in determining the molar mass of Pb so accurately. Apart from that the knowledge gained by the LTTs is being put to use in developing new methods and the know-how of working in a clean room environment is also being put to good use.</p> <p>IRMM: 6 LTTs at 100% completion of traineeship. 2 at 90% completion.</p> <p>The completed events which supported the 100% completion rate wrt to IRMM's duty concerning this objective are: S01-01, S01-13a,b, S01-02, S01-03, S02-01, S01-21, S01-18, S02-07a,b , S02-08, S01-04, S01-10, S01-05, S01-06, S01-12 and S02-02.</p>
Interim deliverables	<p>TÜBİTAK UME: Three CRMs - Feasibility studies, one complete, two draft. Two new methods. One CMC being prepared. Multiple method developments benefitting from LTTs new knowledge.</p> <p>IRMM: Final reports of 6 of the 8 LTTs are complete. LTT reports are available via the secure circabc platform which is accessible by the EMIT steering committee members</p> <p>Descriptions of the events carried out in the fifth interim are provided in section 3.2.</p>

iv. IRMM to provide recommendations on the necessary improvement of clean and climatic rooms at TÜBİTAK UME

<b>ACTIVITY</b>	iv. IRMM to provide recommendations on the necessary improvement of clean and climatic rooms at TÜBİTAK UME
Objective of the activity	Providing recommendations on the necessary improvement of clean and climatic rooms at TÜBİTAK UME
Methodology	A, K
Implementation period	01.02.2010 – 30.09.2012
Expected result	Improvement of the existing infrastructure will enable proper work of materials processing and analytical measurement equipment and the smooth implementation of the project. Therefore this activity shall deliver results shortly after the beginning of the project and TÜBİTAK UME's progress on the improvement of facilities shall be monitored during the project.
Deliverables (before project end).	By TÜBİTAK UME : - Improved facilities. By IRMM: - Completion of 9 LTT traineeships and events S02-07a,b, S02-01, S01-10, S01-11, S01-05, S01-14 and S02-02.
Hosting institutions	IRMM, TÜBİTAK UME.
Status at the end of the fifth interim period of the implementation phase.	
Status	TÜBİTAK UME: The construction of the clean room and the climatic rooms cannot start until the finalisation of the tendering procedure. The date foreseen for finalisation of the re-submitted tenders is mid 2013. IRMM: 6 LTTs at 100% completion of traineeship. 2 at 80% completion. The completed events which supported the 100% completion rate wrt to IRMM's duty concerning this objective are: S02-01, S02-07 (a,b), S01-10 , S01-05 and S02-02.
Interim deliverables	TÜBİTAK UME: Construction to begin after the finalisation of the tendering procedure in mid 2013. IRMM: Final reports of 6 LTTs complete. LTT reports are available via the secure circa platform which is accessible by the EMIT steering committee members Descriptions of the events carried out in the fifth interim are provided in section 3.2.

v. IRMM to provide consultation to TÜBİTAK UME on the needed equipment and technical specifications for the equipment for the production of CRMs

<b>ACTIVITY</b>	v. IRMM to provide consultation to TÜBİTAK UME on the needed equipment and technical specifications for the equipment for the production of CRMs
Objective of the activity	Consultations on the needed equipment and drafting the technical specifications for the equipment for the production of CRMs to be supplied under an IPA 2009 supply project.
Methodology	A, C, K
Implementation period	01.02.2010 – 30.09.2012
Expected result	This is a high priority activity. It will ensure timely launch of a separate IPA project called "Supply of chemical metrology equipment to TÜBİTAK UME" by which needed equipment for material processing and certification will be supplied to TÜBİTAK UME.
Deliverables (before project)	By TÜBİTAK UME : - Equipment delivered, installed and operational.



end).	By IRMM: - Consultation on the needed equipment for both CRM preparation and certification. - Completion of 9 LTT traineeships and events S01-01, S01-13a,b, S01-02, S02-07ab , S01-03 and S01-11
Hosting institutions	IRMM, TÜBİTAK ÜME.
Status at the end of the fifth interim period of the implementation phase.	
Status	TÜBİTAK ÜME: As fully described in the 4 <sup>th</sup> Interim Report, the tender files (under IPA (TR2009/0301.02 "Supply of Chemical Metrology Equipment to TÜBİTAK ÜME) were prepared, checked and submitted to the CFCU. However some lots have to be re-published. The status of the parallel IPA is such that Lots 1-3 and Lots 5-7 have to be re-published (delaying eventual orders by approx. 6 months). The purchase orders for equipment listed in Lots 4-5 are being finalised in Dec.2012. IRMM: 6 LTTs at 100% completion of traineeship. 2 at 80% completion. The completed events which supported the 133% completion rate (more advice occasions, than foreseen, were provided) wrt to IRMM's duty concerning this objective are: S01-01, S01-13a,b, S01-02, S02-07a,b and S01-03 as well as the intensive work carried out by Mr H. Emteborg and Mr C. Quetel in revising the technical specifications during the months of April and May 2011.
Interim deliverables	TÜBİTAK ÜME: New tender documents almost ready for submission (deadline 31.12.2012) IRMM: IRMM's duty with respect to providing advice on the technical specifications of the equipment was finalised in 2011. Final reports of 6 LTTs complete. LTT reports are available via the secure circabc platform which is accessible by the EMIT steering committee members. Descriptions of the events carried out in the fifth interim are provided in section 3.2.

### 3.1.2 Component 1: INSTITUTIONAL CAPACITY BUILDING - TAEK

- vi. IRMM to advise TAEK on their strategic plan for improving the capabilities for secondary standardisation at TAEK institutes.

ACTIVITY	vi. IRMM to advise TAEK on their strategic plan for improving the capabilities for secondary standardisation at TAEK institutes.
Objective of the activity	Clear identification of the scope and targeted capabilities for secondary standardisation at TAEK institutes.
Methodology	A, B, C, E, K, M, N.
Implementation period	01.11.2009 – 30.09.2012
Expected result	A documented strategic plan will be produced by the beneficiaries - TAEK research centres - and the Consultant and will be submitted to the Advisory Committee for review and to the Steering Committee for approval.
Deliverables (before project end).	By TAEK and IRMM - a documented strategic plan. By PAC – a review of the strategic plan By SC – approval of the strategic plan.
Hosting institutions	IRMM, TAEK
Status at the end of the fifth interim period of the implementation phase.	
Status	TAEK (SANAEM & ÇNAEM): <ul style="list-style-type: none"> <li>▪ Preparatory work for the calibration of the ionization chamber for secondary standardization (continues)</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Setup of the source preparation (drop deposition technique and electro-deposition),</li> <li>▪ VYNS coating and source thickness measurement for standardization studies (continues)</li> <li>▪ Acquisition of relevant radionuclide standard reference materials for use in gamma-ray spectrometry and ionization chamber studies (continues)</li> <li>▪ Installation of Autoradiography (Cyclone storage phosphore imaging system for sample characterization)-continues</li> <li>▪ Standardization studies with CIEMAT-NIST method</li> <li>▪ Preparatory work (requirements, detailed uncertainty budget calculations, ...) prior to the application to CMC tables</li> <li>▪ Secondary standardization studies with HPGe detectors</li> <li>▪ Secondary standardization studies with the ionization chamber</li> <li>▪ Standardization work as a basis to the CMC tables</li> </ul> <p>IRMM: 7 LTTs at 100% completion of traineeship. 3 LTTs at 80-90% of traineeship. The completed events which supported the 88% completion rate wrt to IRMM's duty concerning this objective are: S03-02, S03-06, S03-17, S03-29, S03-08, S03-16, S03-07, S03-10, S03-25, S03-27, S03-05, S03-30, S03-09, S03-13, S03-14_15, S03-20_23, S03-11, S03-03, S03-24 and S03-26. One final strategic advice session planned for Sep, 2012.</p>
Interim deliverables	<p>TAEK (SANAEM &amp; ÇNAEM):</p> <ul style="list-style-type: none"> <li>▪ A documented draft strategic plan is complete.</li> <li>▪ TURKAK surveillance assessments are scheduled for 02.07.2012 so will be reported upon in the FINAL Report.</li> </ul> <p>IRMM: Final reports of 7 LTTs complete. LTT reports are available via the secure circabc platform which is accessible by the EMIT steering committee members</p> <p>Descriptions of the events carried out in the fifth interim are provided in section 3.2.</p>

vii. IRMM to provide consultation to TAEK on the development/improvement of their secondary level standardisation procedures.

<b>ACTIVITY</b>	vii. IRMM to provide consultation to TAEK on the development/improvement of their secondary level standardisation procedures
Objective of the activity	Consultation on the development/improvement of secondary level standardisation procedures.
Methodology	A,B, C, E, K
Implementation period	01.11.2009 – 30.09.2012
Expected result	Improving two radioactivity measurement methods to secondary standard level. Improving two dosimetric measurement methods to secondary standard level
Deliverables (before project end).	By TAEK: - Two improved radioactivity measurement methods to secondary standard level. - Two improved dosimetric measurement methods to secondary standard level. By IRMM: - Completion of 9 LTT traineeships; nearly all S03 activities.
Hosting institutions	IRMM, TAEK
Status at the end of the fifth interim period of the implementation phase.	
Status	By TAEK-SANAEM: a) Application of CIEMAT-NIST Method for determination of Sr-90 in bilberry has started.

	<p>b) Secondary standardization studies with ionization chamber has started. By TAEK-ÇNAEM: Non-conformities determined by TURKAK, have been revised for two additional methods for "Gross alpha and beta analysis in drinking water in accordance with EPA 900.0" and "234U and 238U determination by alpha spectrometry in drinking water (self developed method). The final report from TURKAK is expected soon. 3H, 226Ra and 90Sr measurements by CIEMAT NIST method for different matrices are planned to start in 2014. "226Ra determination by alpha spectrometry in drinking water" measurements have already started. 210Po analyses in different matrices such as sediment, biota, water and soil have started. 210Pb determination by liquid scintillation spectrometry in a sediment matrix has begun. IRMM: 7 LTTs at 100% completion of traineeship. 3 LTTs at 80-90% of traineeship. The completed events which supported the 89% completion rate wrt to IRMM's duty concerning this objective are: S03-02, S03-06, S03-12, S03-17, S03-18, S03-29, S03-08, S03-16, S03-07, S03-10, S03-25, S03-27 , S03-05, S03-30, S03-32, S03-09, S03-13, S03-14_15, S03-20_23, S03-11, S03-03, S03-24, and S03-26. One final technical advice session planned for Sep, 2012.</p>
Interim deliverables	<p>TAEK-SANAEM: No interim deliverables for methods a and b. TAEK-ÇNAEM – Preliminary work on accreditation documentation for "protection level dosimeter calibration" such as uncertainty budget calculation, quality tests of irradiation systems have begun. Draft documents available. IRMM: Final reports of 7 LTTs complete. LTT reports are available via the secure circabc platform which is accessible by the EMIT steering committee members Descriptions of the events carried out in the fifth interim are provided in section 3.2.</p>

viii. IRMM to provide consultation on the extension of the current quality management systems at TAEK institutes to the secondary level standardisation activities and support for preparation for participation in the CIPM MRA.

ACTIVITY	viii. IRMM to provide consultation on the extension of the current quality management systems at TAEK institutes to the secondary level standardisation activities and support for preparation for participation in the CIPM MRA.
Objective of the activity	Consultation on the extension of the current quality management systems at TAEK institutes to the secondary level standardisation activities and support for preparation for participation in the CIPM MRA.
Methodology	A,B, C, E, K
Implementation period	01.11.2009 – 30.09.2012
Expected result	<p>Quality principles and good practices shall be taken on board at the very beginning of activities leading to the new TAEK services in the area of ionising radiation metrology. The definitive, long term goal is that TAEK institutes have fully developed, operational and accredited management system for these services according to ISO/IEC 17025. -Submitted applications for the extension of accreditation of TAEK laboratories according to ISO 17025 -Submitted to EURAMET minimum 4 CMC entries for inclusion into the CIPM MRA CMC database</p>
Deliverables (before project end).	<p>By TAEK: - accreditation extension application - EURAMET submissions</p>

	By IRMM: - Completion of 9 LTT traineeships; nearly all S03 training events.
Hosting institutions	IRMM, TAEK
Status at the end of the fifth interim period of the implementation phase.	
Status	<p>TAEK-SANAEM: The CMC applications for Cs-137, K-40 and Sr-90 in foodstuffs will be done after the submission of the final report of the supporting comparison (CCRI(II)-S8 Radionuclide activity measurements (Radionuclides: K-40, Cs-137 and Sr-90) in reference materials – bilberry) to BIPM by the pilot laboratory.</p> <p>TAEK-ÇNAEM: CMC tables have been performed for “Air kerma calibration at Co-60 beam for Therapy level dosimeters” and “Calibration of absorbed dose to water at Co-60 beam for Therapy level dosimeters” and sent to Dr Emin Yeltepe, who is the contact person of TAEK for EUROMET Technical Committee.</p> <p>IRMM: 7 LTTs at 100% completion of traineeship. 3 LTTs at 80% of traineeship. The completed events which supported the 86% completion rate wrt to IRMM's duty concerning this objective are: S03-07, S03-10, S03-25, S03-27, S04-03, S03-05, S03-30 and S03-32, S03-09, S03-13, S03-14, S03-20_23, S03-11, S03-03, S03-24, and S03-26.</p> <p>Outstanding events wrt this objective are S03-09bis and S03-15.</p>
Interim deliverables	<p>TAEK-SANAEM: No interim deliverables on this.</p> <p>TAEK-ÇNAEM: Two CMCs submitted.</p> <p>IRMM: Final reports of 7 LTTs complete. LTT reports are available via the secure circabc platform which is accessible by the EMIT steering committee members</p> <p>Descriptions of the events carried out in the fifth interim are provided in section 3.2.</p>

ix. IRMM to advise TAEK on their strategic plan for the development of primary standardisation.

<b>ACTIVITY</b>	ix. IRMM to advise TAEK on their strategic plan for the development of primary standardisation
Objective of the activity	Providing written recommendations on development of primary standardisation
Methodology	A, K
Implementation period	01.11.2009 – 30.09.2012
Expected result	Documented strategic recommendations will be produced by beneficiaries - TAEK research centres - and the Consultant and will be submitted to the Advisory Committee for review and to the Steering Committee for approval
Deliverables (before project end).	By TAEK and IRMM - documented strategic recommendations. By PAC – a review of the strategic recommendations By SC – approval of the strategic recommendations
Hosting institutions	IRMM, TAEK
Status at the end of the fifth interim period of the implementation phase.	
Status	<p>TAEK-SANAEM: IRMM reviewed draft 2 of the strategic plan in the fifth interim period and plans were made to submit the final strategic plan by the end of August 2012.</p> <p>TAEK-ÇNAEM: ÇNAEM doesn't have a strategic plan for the development of primary standardisation.</p> <p>IRMM: 7 LTTs at 100% completion of traineeship. 3 LTTs at 80-90% of traineeship. The completed event which supported the 100% completion rate wrt to IRMM's duty concerning this objective is S03-01 and by means of knowledge transfer via the</p>

	long term trainees.
Interim deliverables	TAEK-SANAEM: Draft 2 of the strategic plan. TAEK-ÇNAEM: N/A. IRMM: Final reports of 7 LTTS complete. LTT reports are available via the secure circabc platform which is accessible by the EMIT steering committee members Descriptions of the events carried out in the fifth interim are provided in section 3.2.

### 3.1.3 Component 3: Knowledge transfer and human resources development

- x. IRMM to help familiarise TÜBİTAK UME and TAEK researchers with the functioning of metrology systems in EU member states with similar economic needs.

ACTIVITY	x. IRMM to help familiarise TÜBİTAK UME and TAEK researchers with the functioning of metrology systems in EU member states with similar economic needs.
Objective of the activity	Familiarising TÜBİTAK UME and TAEK researchers with functioning of metrology systems in EU member states with similar economic needs
Methodology	A,B,C,E,K
Implementation period	01.11.2009 – 30.09.2012
Expected result	- 9 study visits to at least 2 EU Member States and prepared mission reports and presentations for each visit
Deliverables (before project end).	By TÜBİTAK UME and TAEK: - Completion of visits. - Associated presentations and mission reports. By IRMM: - Facilitation of all study visits
Hosting institutions	Various (at least 2 EU Member States).
Status at the end of the fifth interim period of the implementation phase.	
Status	TAEK: All study visits for TAEK are complete. TÜBİTAK UME: Some extra study visits (of TÜBİTAK UME staff) were planned during the fifth interim period, to take place before the end of Sep., 2012. IRMM: The extra study visits foreseen (during the final period) are: S04-22, S03-09bis, S02-03bis, S04-23 and S04-24.
Interim deliverables	TAEK: Associated presentations and mission reports to IRMM. TÜBİTAK UME: Associated presentations and mission reports to IRMM. Descriptions of the study visits carried out in the fifth interim are provided in section 3.2.

- xi. IRMM to organise short term and long term trainings for TÜBİTAK UME and TAEK researchers (18 \* 1 yr LTTs).

ACTIVITY	xi. IRMM to organise short term (51) and long term trainings for TÜBİTAK UME and TAEK researchers (18 * 1 yr LTTs).
Objective of the activity	Organisation of consultations and short term and long term trainings for TÜBİTAK UME and TAEK researchers.
Methodology	A, B, E
Implementation period	01.11.2009 – 30.09.2012
Expected result	Short term training events for TÜBİTAK UME and TAEK researchers

	Long term training of TÜBİTAK (TÜBİTAK UME or in justified cases, another TÜBİTAK institute) and TAEK researchers will take place at the laboratory site of the Consultant in Geel, Belgium and in the case of the dosimetry metrology, at a European national metrology institute. The training will be organised in one training session or where appropriate, in more sessions. The minimum duration of such a long term training is one year per trainee.
Deliverables (before project end).	By TÜBİTAK UME and TAEK: - Provision of suitable LTT candidates - Attendance, evaluation of short term training events or mission report. By IRMM: - Hosting and training the 18 LTTs. - Organisation of the 51 short term training events (see full event list in Annex 6.2 ).
Hosting institutions	Short term training events primarily at TÜBİTAK UME and TAEK institutes. Long term training at IRMM and an EU NMI.
Status at the end of the fifth interim period of the implementation phase.	
Status	TÜBİTAK UME and TAEK: The third intake of 6 LTTs arrived in Sep/Oct 2011 for their long term traineeships in IRMM (one to PTB for a dosimetry traineeship). One more started in IRMM on the 1 <sup>st</sup> Feb, 2012 for a six month traineeship. Some of the short term training events are hosted in one of the three institutes and some in university or other premises, sourced by TÜBİTAK UME or TAEK. IRMM: 13 trainees at 100% of traineeship; 5 trainees at 80-90% of traineeship. In total there were 99 events foreseen, 84 of those being of a scientific nature (remaining 15 being SC and PAC meetings). At the end of June 2012, 80 of the 84 events had taken place, corresponding to 95% completion rate of IRMM's duty concerning this objective (broken down into 34 Workshops, 14 University/Knowledge dissemination visits, 19 Study visit/Technical advice visits; 10 Conference participations and 3 conference sessions. This does not include the 5 extra STT opportunities provided to compensate for the loss of one LTT possibility.
Interim deliverables	IRMM: Final reports by 13 LTTs. LTT reports are available via the secure circabc platform which is accessible by the EMIT steering committee members Training event descriptions of all fifth Interim activities provided in section 3.2

xii. IRMM to organise seminars and workshops for the end users.

ACTIVITY	xii. IRMM to organise seminars and workshops for the end users.
Objective of the activity	Organisation of seminars and workshops for the end users
Methodology	F
Implementation period	01.11.2009 – 30.09.2012
Expected result	- 18 seminars/workshops for the end-users and published proceedings - 10 workshops for the universities and published proceedings
Deliverables (before project end).	By TÜBİTAK UME and TAEK: - Provision of contacts with end-users and university professors. By IRMM: - Organisation of the 18 seminars and 10 workshops.
Hosting institutions	TÜBİTAK UME and TAEK institutes; various stakeholder and end-user premises.
Status at the end of the fifth interim period of the implementation phase.	
Status	TÜBİTAK UME and TAEK: Some of the events are hosted in one of the three

	<p>institutes and some in university or other premises, sourced by TÜBİTAK UME or TAEK.</p> <p>IRMM: The completion rate of activities corresponding to this objective is reported by summing the nr of scientific workshops (34) and the nr of university seminars (14) totalling 48 events (out of 50) or 96% (at the end of June 2012). End users were not excluded from specific training originally designed for the three main beneficiary institutes, hence the number of training opportunities offered to all end users was much higher.</p>
Interim deliverables	<p>IRMM: Training material provided in handout manuals to the participants. Mission reports completed by the trainers. The participant list and the individual evaluation forms are uploaded onto circabc, after each event.</p> <p>Training event descriptions of all fifth interim activities provided in section 3.2</p>

xiii. IRMM to help familiarise Turkish universities providing education in chemical and (if any) in ionising radiation metrology with the status of alignment of EU university programmes in measurement science with the Bologna requirements.

ACTIVITY	xiii. IRMM to help familiarise Turkish universities providing education in chemical and (if any) in ionising radiation metrology with the status of alignment of EU university programmes in measurement science with the Bologna requirements.
Objective of the activity	Familiarising Turkish universities providing education in chemical and (if any) in ionising radiation metrology with the status of alignment of EU university programmes in measurement science with the Bologna requirements.
Methodology	F, K
Implementation period	01.02.2010 – 30.09.2012
Expected result	Presentations to Turkish universities
Deliverables (before project end).	By IRMM - Communication of Bologna requirements in Turkish universities and corresponding reports.
Hosting institutions	Various.
Status at the end of the fifth interim period of the implementation phase.	
Status	IRMM: Workshop S04-03, study visit S04-19 and the S04-12 conference completed during the third interim period (corresponding to 100% completion rate of IRMM's duty concerning this objective). However every event was used to communicate information about the Euromaster in Measurement Science possibility (as part of the general introduction).
Interim deliverables	IRMM: Presentation material provided in handout manuals to the participants. Mission reports completed by the lecturers. The participant list and the individual evaluation forms are uploaded onto circa, after each event.

xiv. IRMM to provide consultation to Turkish universities interested in joining Euromaster Joint Degree Programme in measurement science.

ACTIVITY	xiv. IRMM to provide consultation to Turkish universities interested in joining Euromaster Joint Degree Programme in measurement science.
Objective of the activity	Providing consultations to Turkish universities interested in joining Euromaster Joint Degree Programme in measurement science.
Methodology	F, K
Implementation period	01.02.2010 – 30.09.2012



Expected result	- Invitations to at least 20 universities on consultation of their curriculum programmes
Deliverables (before project end).	By IRMM - Completion of training events S04-01, S01-7, S04-18, S04-19, S04-03, S04-02, S04-04_09, S01-08, S01-16, S04-14, S04-13, S02-05, S04-12, S04-21, S01-09, S04-02, S01-17, S04-16, S02-02, S04-10, S02-06, S04-15, S04-11 and S02-03.
Hosting institutions	20 universities in 15 locations in Turkey.
Status at the end of the fifth interim period of the implementation phase.	
Status	IRMM: It was decided from the beginning to use every event carried out in every university (20 Turkish universities visited) as an opportunity to explain about the project in general (using the opportunity to peak their interest in the Euromaster Joint Degree Programme in Measurement Science). It was felt that this bottom-up approach would work better than the top-down approach, especially if the students were enthusiastic about their experience when they returned to their home university. Therefore during the fifth interim period, three places were arranged for three Turkish students to attend the Euromaster Summer school, to be held in Fatima, Portugal (15 – 28 July).
Interim deliverables	IRMM: Presentation material provided in handout form to the participants. Mission reports completed by the lecturers. The participant list and the individual evaluation forms are uploaded onto Circa, after each event. Descriptions of all completed events in the fifth interim period are provided in section 3.2

### 3.1.4 Component 4: Networking and raising awareness

- xv. IRMM to help promote TÜBİTAK UME and TAEK amongst the scientific and metrological community at European level

ACTIVITY	xv. IRMM to help promote TÜBİTAK UME and TAEK amongst the scientific and metrological community at European level
Objective of the activity	Promotion of TÜBİTAK UME and TAEK among scientific and metrological community at European level
Methodology	D
Implementation period	01.10.2009 – 30.09.2012
Expected result	- Information about the development of TÜBİTAK UME and TAEK's capabilities presented to EURAMET at TC meetings and at ICRM.
Deliverables (before project end).	By Turkish scientist: - Using the conference attendance possibilities (S01-15 (a,b,c), S01-18 (#11), S02-04 (a,b), S03-28 (a,b,c), S04-17 (a,b)) and study visits to NMIs or IRMM and workshops held at IRMM or an NMI to promote their home institute (TÜBİTAK UME and TAEK) among scientific and metrological community at European level.
Hosting institutions	Various EU scientific and metrological conferences and meetings.
Status at the end of the fifth interim period of the implementation phase.	
Status	IRMM: Events S03-28a, S03-29, S03-08, S03-16, S01 – 21, S01-18, S02-04a, S02-08, S03-25, S03-27, S03-30, S02-04a , S03-19 , S03-13, S03-14_15, S03-26, S03-24, S01-22, S03-09, S03-28bc, S03-11, S04-17, S02-04b and S01-15abc contribute to the 100% completion rate of this objective.
Deliverables	Mission reports provided by the conference participant and /or by the



	workshop/study visit organiser. The participant list and the individual evaluation forms are uploaded onto circa, after each event. Description of the relevant event is provided in section 3.2
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xvi. IRMM to help establish a network of direct and indirect users of CRMs and metrology services.

<b>ACTIVITY</b>	xvi. IRMM to help establish a network of direct and indirect users of CRMs and metrology services.
Objective of the activity	Establishment and improvement of relationships with direct and indirect users of CRMs and metrology services
Methodology	PAC and SC meetings
Implementation period	01.12.2009 – 30.09.2012
Expected result	- 8 coordination meetings with stakeholders in chemical and ionizing radiations metrology (PAC meetings)
Deliverables (before project end).	By TÜBİTAK UME and TAEK: - Hosting the twice yearly PAC meetings or arranging their hosting elsewhere. By IRMM: - Taking the PAC feedback into account and using it to make improvements throughout the project duration.
Hosting institutions	TÜBİTAK UME, TAEK and other stakeholder's/end-user's institutions.
Status at the end of the fifth interim period of the implementation phase.	
Status	TÜBİTAK UME and TAEK: PAC-06 (meeting and seminar) hosted at Dokuz Eylül University, Izmir. The report was sent to the consultant for uploading to circabc. 6 of the 7 PAC meetings have taken place to date. IRMM: Inclusion of PAC-06 feedback in the SC-07 meeting, held at TÜBİTAK UME, Gebze. Preparation of the SC-07 Meeting Report and inclusion of beneficiary feedback. 7 of the 8 SC meetings have taken place to date.
Interim deliverables	TÜBİTAK UME, TAEK: PAC-06 Meeting/Seminar Report. IRMM: SC-07 Meeting Report. The approved and final minutes of the SC-07 were uploaded onto circabc. SC-07 synopsis provided in section 3.2

xvii. IRMM to help establish a network of universities providing (or interested in providing) a master level university education in chemical and ionising radiation metrology.

<b>ACTIVITY</b>	xvii. IRMM to help establish a network of universities providing (or interested in providing) a master level university education in chemical and ionising radiation metrology.
Objective of the activity	Establishment and improvement of relationships with universities providing (or interested in providing) a master level university education in chemical and ionising radiation metrology
Methodology	B, F, G
Implementation period	01.12.2009 – 30.09.2012
Expected result	- Number of partner universities
Deliverables (before project end).	By IRMM: - Preparation of events S04-01, S04-03, S04-04_09, S04-18, S04-19 (20 university network). All seminar lectures given at universities during the frame of this project indirectly support this objective.
Hosting institutions	Various universities.

Status at the end of the fifth interim period of the implementation phase.	
Status	IRMM: We tackled this using a top down and bottom up approach. An explanation was made before every seminar (see list below) and every workshop, held in universities, about the Euromaster programme. Along with that a special conference session (S04-12) was held in June 2011, various meetings with senior professors were held, two professors were sent to the ACE conf in Milan, 2012 (code S04-17a,b) on this topic and finally, using the bottom up approach, a total of 6 students were sent to the two Summer schools (2011 and 2012) with the aim of giving these students from 6 different universities, the chance to experience what the Summer School entails and thus what the benefits of having either a National Joint Masters in Measurement Science (or joining a European Consortium) would / could be. The 20 universities which hosted EMIT workshops, seminars and conference sessions were: 1)METU, Ankara, 2) KTU, Trabzon, 3) IU, Istanbul,4) ITU, Istanbul, 5) Uludag, Bursa, 6) Ege, Izmir, 7) Adiyaman, 8) Gazi, Ankara, 9) Hacettepe, Istanbul, 10) YTE, Izmir, 11)Ataturk, Erzurum, 12) Omu, Samsun, 13) University Hospital, Izmir, 14) Çukurova, Adana, 15) Mersin, 16) DEU, Izmir, 17) Erciyes, Kayseri, 18) Trakya, Edirne, 19) Akdeniz, Antalya and 20) MKU, Hatay (last one foreseen for Sep.2012).
Interim deliverables	IRMM: Presentation material provided in handout form to the participants. Mission reports completed by the lecturers. The participant list and the individual evaluation forms are uploaded onto circabc, after each event. Descriptions of all completed events provided in section 3.2

xviii. IRMM to organise national conference sessions and events.

ACTIVITY	xviii. IRMM to organise national conference sessions and events.
Objective of the activity	Organisation of national conferences and events
Methodology	H, I, J, L
Implementation period	01.02.2010 – 30.09.2012
Expected result	Location of events will be chosen with a thought about providing equal information opportunities, as much as possible, for stakeholders and interested parties in the country's regions
Deliverables (before project end).	- 3 national conferences in chemical and ionizing radiations metrology organised, coded S02-03, S03-19 and S04-12. By TÜBİTAK UME and TAEK: - Provision of contact people in the organising committees of existing conferences. By IRMM: - Organisation of 0.5 day EMIT sessions at 3 national conferences (with external and Turkish expert speakers).
Hosting institutions	Various.
Status at the end of the fifth interim period of the implementation phase.	
Status	IRMM and TÜBİTAK UME: The preparation of the "chemical reference measurements" conference session (EMIT S02-03) to be held at the 6 <sup>th</sup> National Congress of Analytical Chemistry, Hatay, Sep. 2012 progressed (with significant difficulty) during the fifth interim period. The other two conference sessions (S04-12 and S03-19) took place in 2011.
Deliverables	IRMM: Description of the completed event is provided in section 3.2.

xix. IRMM will support the participation of TÜBİTAK UME and TAEK experts in international events.

ACTIVITY	xix. IRMM will support the participation of TÜBİTAK UME and TAEK experts in international events.
Objective of the activity	Support of participation of TÜBİTAK UME and TAEK experts in international events
Methodology	D
Implementation period	01.02.2010 – 30.09.2012
Expected result	- At least 10 participations of Turkish experts in international conferences and events
Deliverables (before project end).	By IRMM: - Funding the participation of Turkish scientists at international conferences and events coded S01-15 (a,b,c), S02-04 (a,b), S03-28 (a,b,c) and S04-17 (a,b) (attendance possibility spread equally over the 4 subject areas).
Hosting institutions	Various
Status at the end of the fifth interim period of the implementation phase.	
Status	Ten (of the 10) conference attendance opportunities have now been availed of. During the fifth interim period, 6 scientists (4 from TÜBİTAK UME [S01-15abc, S02-04b] and 2 from TAEK-SANAEM S03-28bc) attended the BERM 2012 conference in June. With respect to the S04 possibilities (S04-17a,b) two Turkish professors (Prof. Demir and Prof. Dogu) chose to attend the EC2E2N (ACE 2012), April, in Milan, Italy.
Interim deliverables	A table summarising the selected conferences and scientists is provided in section 3.2

### 3.1.5 Result communication

xx. The consultant (IRMM) and the contracting authority (EU Delegation, Ankara) will organise a final wrap-up event in order to present the final results of the project.

ACTIVITY	xix. The consultant (IRMM) and the contracting authority (EU Delegation, Ankara) will organise a final wrap-up event in order to present the final results of the project.
Objective of the activity	To communicate the results of the IPA by organising a final wrap-up event.
Methodology	L
Implementation period	01.02.2010 – 30.09.2012
Expected result	- A conference representing as many EMIT stakeholders (including end users) as possible.
Deliverables (before project end).	By IRMM and the EUD: - The conference.
Hosting institutions	Various
Status at the end of the fifth interim period of the implementation phase.	
Status	A 3 day Concluding Conference entitled “Improving chemical and ionising radiation metrology in Turkey – the achievements” was held (11-13 June 2012) with around 77 external participants (spanning all stakeholders) in the Green Park Pendik Hotel & Convention Center, Pendik Istanbul, Turkey.
Interim deliverables	Posters for 34 workshops and posters by each of the 18 LTTs were prepared and displayed during the conference. A book of abstracts (JRC 71696) was prepared containing 40 abstracts from dignitaries, directors, experts and long term trainees.

## 3.2 OBSERVATIONS ON THE FIFTH REPORTING PERIOD

The fifth phase of implementation comprised of 24 different events (eight scientific workshops, three study visits (with 7 scientists attending), eight conference attendances, three seminar lectures and two project management meetings). The key data and observations are provided below.

### *Key points from PAC meeting during the Fifth Interim Period (methodology M):*

#### **PAC6 meeting (22.03.2012)**

The PAC 6 meeting held in Dokuz Eylül university, İzmir, was preceded by a three day workshop entitled "Auditing of integrated management systems", which was attended by 20 Turkish scientists (spanning many types of end users).

The total number of participants, at the PAC06 meeting, was 11, 4 of whom were new PAC attendees. The PAC audience were asked to contribute suggestions as to an even better functioning of the project. See section 5.2.1 for recommendations from the PAC on this occasion.

### *Key points from SC meeting during the Fifth Interim Period (methodology N):*

#### **EMIT SC7 (08.06.2012)**

The SC7 meeting was hosted by Mr A. C. Goren, on behalf of Mr F. Üstüner, Director of TÜBİTAK UME. The minutes of the Steering Committee meetings are restricted to the SC members but in summary, the agenda topics were a) Feedback from the Project Director by Mr P. Taylor; b) Feedback from the EUD by Ms E. Yazici; c) Feedback from the 6<sup>th</sup> Project Advisory Meeting by the Senior Project Office (TÜBİTAK UME) – Mr O. Cankur; d) Feedback from the EMIT Project Team Leader (Ms J. McCourt) in terms of reporting the current LTTs topics and summarising the project training activities which took place between the last SC (October 2011) and now. The planning of Short Term Training (STTs) activities for the final period (July–September 2012) was also reported upon as well as e) AOB which was used for a laboratory tour in TÜBİTAK UME and for the ROM 3 interviews (with J. McCourt, P. Taylor and O. Cankur) . See section 5.2.2 for recommendations from the SC on this occasion.

### *Key points from the 3<sup>rd</sup> intake of Long Term Trainees –QT reports (methodology A):*

- NP Unit – EMIT Trainee – A. Dirican; Supervisor Dr S. Pommé
  - "Standardisation of activity and decay data measurements".

A one year long term traineeship commenced on the 1<sup>st</sup> June, 2011. The specific objectives are to:

- Assist with high resolution alpha-particle spectrometry
- Assist with alpha-particle counting at defined solid angle
- Assist with half-life measurements
- Become acquainted with essential principles of primary standardisation
- Assist with development of new techniques (NaI well detector)
- Assist with development of new projects

The training topics set for the third (01.11.2011 to 31.01.2012) and fourth quarter (01.02.2012 to 30.04.2012) were:

Q3:

- i. Source manipulation and data acquisition
- ii. Stability checks of alpha spectrometer (Aspec 2)

- iii. Time synchronization of measurement systems
- iv. Installation of CAEN digitizer for the measurement of Ac-225 by using  $2\pi$  alpha chamber
- v. Preparation of qualitative Ac-255 sources by recoil technique for  $2\pi$  alpha measurement
- vi. Preparation of Au foil for the measurement of Ac-225 by proportional counter
- vii. Ac-225 measurements by Defined Solid Angle spectrometer for half life calculation

Q4: Design of the electron bending magnet for alpha spectrometry.

Excerpt from Q3 report by A. Dirican:

*During the third period of my training, I assisted in the preparation of Au foils for the measurement of Ac 225 by using a proportional counter. I followed the measurement of recoil and electrodeposition sources of actinium. I received the necessary information about the installation of SymmTime software and the CAEN digitizer. I had an opportunity to apply theoretical information for the synchronization of  $2\pi$  alpha setup and assist in the installation of a digitizer ready for use in measurements of recoil actinium sources. I assisted with half-life measurements of Ac-225, At-217, Bi-213 and Fr-221 by using  $2\pi$  alpha spec., NaI well, alpha spec3 and Defined Solid Angle (DSA) spectrometry.*

Excerpt from Q4 report by A. Dirican:

*A new magnet suppression system was designed for the measurement of large sources by using high-resolution alpha spectrometry. An analytical model was used to determine the optimum magnetic field density to deflect the conversion electrons without too much affecting the alpha particles. This magnet system was simulated by using ANSYS 13 Finite element code. I had the opportunity to be involved in the establishment of the system in March 2012 and helped test it in April 2012 before the end of my traineeship.*



**Figure 4:** Vacuum evaporator in an IRMM lab where Mr A. Dirican (LTT) was being trained on Standardisation of activity and decay data measurements.

- PTB – EMIT Trainee – E. Kapdan; Supervisor Dr H. Janssen (PTB); Dr U. Rosengard (IRMM)
  - "Metrology for dosimetry".

A one year long term traineeship commenced on the 1<sup>st</sup> Sep., 2011. The specific objectives were to:

- Therapy level dosimetry applications including uncertainty calculations
- Brachytherapy level dosimetry applications including uncertainty calculations
- Diagnostic X-ray systems including uncertainty calculations
- Protection level dosimetry applications and uncertainty calculations.
- Monte Carlo dose calculations
- Neutron dosimeter (with Am-Be sources)

The training topics set for the third (01.03.2012 to 31.05.2012) were:

Q3:

- Diagnostic X-ray systems
- Generation of radiation fields according to IEC-61267 standard (RQR, RQA, RQT, RQM)
- The calibration of diagnostic ionization chambers (KAP meter, CT, Mamo ion chambers)
- Measurement of kV-mA values for X-ray units (invasive, non invasive), practical peak voltage calculations
- Uncertainty calculations
- Therapy level dosimetry applications
- Quality tests of irradiation system (Co-60 and LINAC)
- Uncertainty calculations and budget calculations
- Nk and NDW calibration methods for x-ray

Excerpt from Q3 report by E. Kapdan:

*In the third quarter of my training, I was at the "Dosimetry for radiation therapy and diagnostic radiology" department. During the month of March (2012), I was with the working group of high-energy photon and electron radiation, then with the working group of dosimetry for diagnostic radiology for the rest of this quarter.*

*During the month at the high-energy photon and electron radiation working group, I mainly dealt with quality tests of irradiation systems of LINACs, uncertainty calculations of absorbed dose to water for Co-60 energy, primary standard calibration processes for photons, LINAC irradiations with the solid phantoms, experimental electron accelerators and patient dose planning. In addition, the direct connection with the technicians of the Turkish SSDL for the development of that laboratory continued.*

*During the two months at the dosimetry for diagnostic radiology working group for two months, I was involved in secondary standard calibration processes of absorbed dose to water and air kerma with X ray energies. Then, I learned about primary standard calibration processes of air kerma calibrations with X ray energies. In addition, I studied the generation of the standard energy qualities of X-rays (RQR, RQA, RQT, RQM), with engineers of the same working group. I have also been involved in calibration processes of diagnostic ionization chambers. I also had the opportunity to follow uncertainty calculations for all types of ionizing radiation with the same group. Then I studied the calibrations of electrometers using standard voltage sources.*

*In addition to these, we made a poster study entitled "DETERMINATION OF TRANSFER FACTORS FOR THE ROOS-TYPE PARALLEL-PLATE THERAPY IONIZATION CHAMBERS IF USED IN SOLID STATE PHANTOMS" for the EMIT concluding conference with Dr Ludwig Bueermaan, the leader of the diagnostic radiology working group and also with the collaboration of Cekmece Nuclear Research and Training Center, Secondary Standard Dosimetry Laboratory (TAEK-ÇNAEM SSDL).*





**Figure 5:** A PTB lab where Mr E. Kapdan was trained on "Metrology for dosimetry".

- RM Unit – EMIT Trainee – Mr Alper İşleyen; Supervisor Dr J. Snell
  - "Aspects of reference material production - trace elements in milk (Reference Materials)".

A one year long term traineeship commenced on the 5<sup>th</sup> September, 2011. The specific objectives were to:

- Assess the homogeneity of certain trace elements in the milk powders
- Assess the short and long term stability of certain trace elements in the milk powders
- Organise and contribute to the characterisation study of the candidate CRM
- Contribute to the writing of the certification report

The extra training topics (other than the continuous ones described in the 4<sup>th</sup> Interim Report), set for the third quarter (05.03.2012 to 04.06.2012), were:

Q3:

- Use and validation of pipettes in the elemental analysis laboratories (EAL) according to RM WI/0243 by Geert Van Britsom.

Excerpt from Q3 report by Alper İşleyen:

*My training was based on the determination of elements in food matrices (RM WI/0247), the measurement of 7 elements by ICP MS (RM WI/0274) and 9 elements by ICP OES (RM WI/0240). Candidate CRM milk powders ERM BD-150 and ERM BD-151 along with the NIST's non-fat milk powder SRM 1549 and IRMM's skim milk powder BCR 063R were digested (according to RM WI/0246) and used in these measurements with three different dilution levels. The use of lower plasma power, He mode for all elements were evaluated.*

*An optimization study on ICP MS with the introduction of hydrogen gas to the collision cell and/or addition of acetic acid to digests for the improvement of selenium and other elements sensitivity was evaluated.*

*I had the opportunity to witness material processing, specifically the freeze-drying of cheese and impact milling of cow feed materials.*

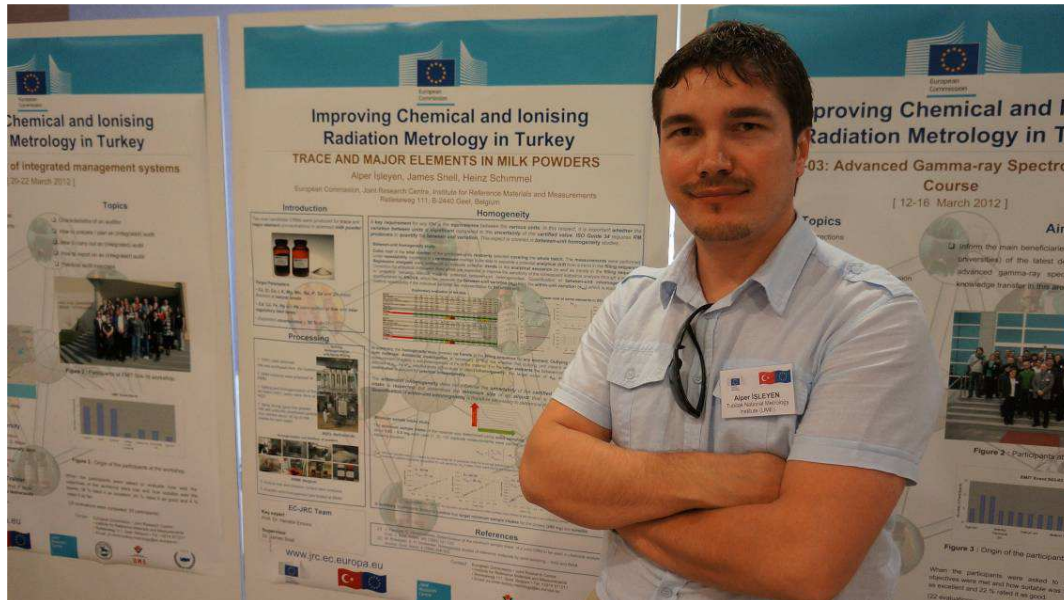
*Intermediate check of the validated pipettes used in the EAL was done according to RM WI/0243.*

*Preparation for the isotope dilution studies on cadmium quantification in the candidate CRM milk powders was continued with the purchase of SPE syringes and necessary chemicals, cleaning of the labware and testing. Heating blocks necessary for the removal of the acid from the digests were also produced.*

*Evaluation of the tenders for the characterisation exercise (considering the price and techniques available), making orders, dispatch of the samples and the QC material to the collaborating laboratories for the characterisation study were carried out.*

*An annex document for the Invitation to Tender (ITT) was prepared according to RM PR/0004 and RM PR/0008 on specifications for the measurements required for the long term stability assessment study.*

*I also had the opportunity to present what I learned and what I achieved during my Long term Traineeship at the EMIT Concluding conference (S05-15).*



**Figure 6:** Mr A. İslayem at the EMIT Turkey Concluding Conference (June 2012).

- RM Unit – EMIT Trainee – Mr Murat Tunc; Supervisor Dr C. Quetel.
  - "Inorganic Chemical/Isotopic methodology for Reference Measurements".

A one year long term traineeship commenced on the fifth September, 2011. The specific objectives were to:

- To receive training in working according to the IRMM and RM unit Quality Systems
- To receive training on ICPMS instrumentation, and help maintaining, on a daily basis, the ICPMS instrumentation
- To acquire practical experience in carrying out work in the ICPMS laboratories and sample preparation (incl. sample digestion, matrix separation etc.) laboratories, in particular the ultra-clean chemical laboratory; this will be done in conformity with the regulations of occupational health and safety, radiation protection, environmental protection and security
- To receive training on designing, optimising and implementing methods for reference isotopic ratio and isotope dilution measurements by ICPMS
- To develop some ability for checking and evaluating results, estimating uncertainty for isotopic measurement results and applying it as a tool for method validation
- To receive training in writing measurement reports and presenting results

The extra training topics (other than the continuous ones described in the 4<sup>th</sup> Interim Report) set for the third (05.03.2012 to 04.06.2012) were:

Q3: During part of the Q3 the trainee joined the EMRP ENV02-WP4 project "Providing underpinning traceability for mercury vapour measurement".

- Being trained and using the Elan 6000 on a daily basis.
- Hg vapour trapping system was set up in this quarter.



Excerpt from Q3 report by M. Tunc:

*As well as gaining experience using the Elan 6000 instrument and the cold vapour system, I was involved in the preparation and conduction of disseminating knowledge (via a university seminar) within the frame of the EMIT project. This seminar was about inorganic chemical isotopic reference measurements. Additionally, I contributed as co-author to the preparation of the poster entitled "Independent reference measurements of the cadmium and lead mass fractions in baby milk powder for the IMEP-113 comparison" for the concluding EMIT event S05-15.*

- NP Unit – EMIT Trainee – Ms Gülten Kahraman (TAEK-SANAEM); Supervisor - Dr Timos Altzitzoglou.
  - "Liquid scintillation counting for standardisation of radionuclides".

A one year long term traineeship commenced on the 3<sup>rd</sup> October, 2011.

The specific objectives were to become familiar with:

- Theory of Liquid Scintillation Counting
- Sample preparation (incl. gravimetric source preparation for standardization)
- Use of the Wallac 1220 Quantulus LSC
- Efficiency calibration - Quench curves
- The CIEMAT/NIST efficiency tracing method
- Dual- and Multi-label counting
- Uncertainty budget
- Good Laboratory Practice (GLP) and Instrument Performance Assessment (IPA)

The extra training topics (other than the continuous ones described in the 4<sup>th</sup> Interim Report), set for the third quarter (03.04.2012 to 02.07.2012), were:

Q3:

- Determination of the optimum measurement conditions for water samples in order to measure gross alpha/beta activity concentration in drinking water by Liquid Scintillation Counting.
- Participation to the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Istanbul-Turkey between 11 and 13 June, 2012.
- Oral and poster presentation of the "Liquid Scintillation Counting: Efficiency Calibration using the CIEMAT/NIST Efficiency Tracing Method" at the EMIT Concluding Conference in Turkey.
- Participation to EMIT S03-11 Workshop on Multi-label LSC, which was held at IRMM from June 18 to 29, 2012.

Excerpt from Q3 report by Ms Gülten Kahraman:

*EU Member States are obliged under Art.35 and 36 of the Euratom Treaty (and as further specified in Commission Recommendation 2000/473/Euratom) to inform the European Commission (EC) on a regular basis of the radioactivity levels in their environment, in some food products and in drinking water. In order to obtain more information on the measurement methods used and on the quality of the values reported by the Member States, the EC regularly organises a European interlaboratory comparison exercise. In this third part of my training, I participated in the gross alpha/beta activity measurements in drinking waters which JRC-IRMM carry out for the EC interlaboratory comparison exercise reference materials. In this project, we determined the optimum measurement conditions for water samples in order to measure gross alpha/beta activity concentration in drinking water by using Liquid Scintillation Counting (LSC).*

Secondly, I participated at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Istanbul-Turkey which was held between 11 and 13 June, 2012. I gave oral and poster presentations about the training I received at IRMM on "Liquid Scintillation Counting: Efficiency Calibration using the CIEMAT/NIST Efficiency Tracing Method".

Thirdly, I participated to the EMIT S03-11 Workshop on Multi-label LSC, which was held at IRMM from June 18 to 29, 2012. In this workshop, training on the CIEMAT/NIST efficiency tracing method, the Dual/Multi-label LSC and the double window method and alpha/beta discrimination in LSC was provided by Dr Timotheos Altitzoglou. Dr Viktor Jobbagy provided training on gross alpha and beta measurements in water samples. The opportunity to carry out many experiments and calculations was provided.

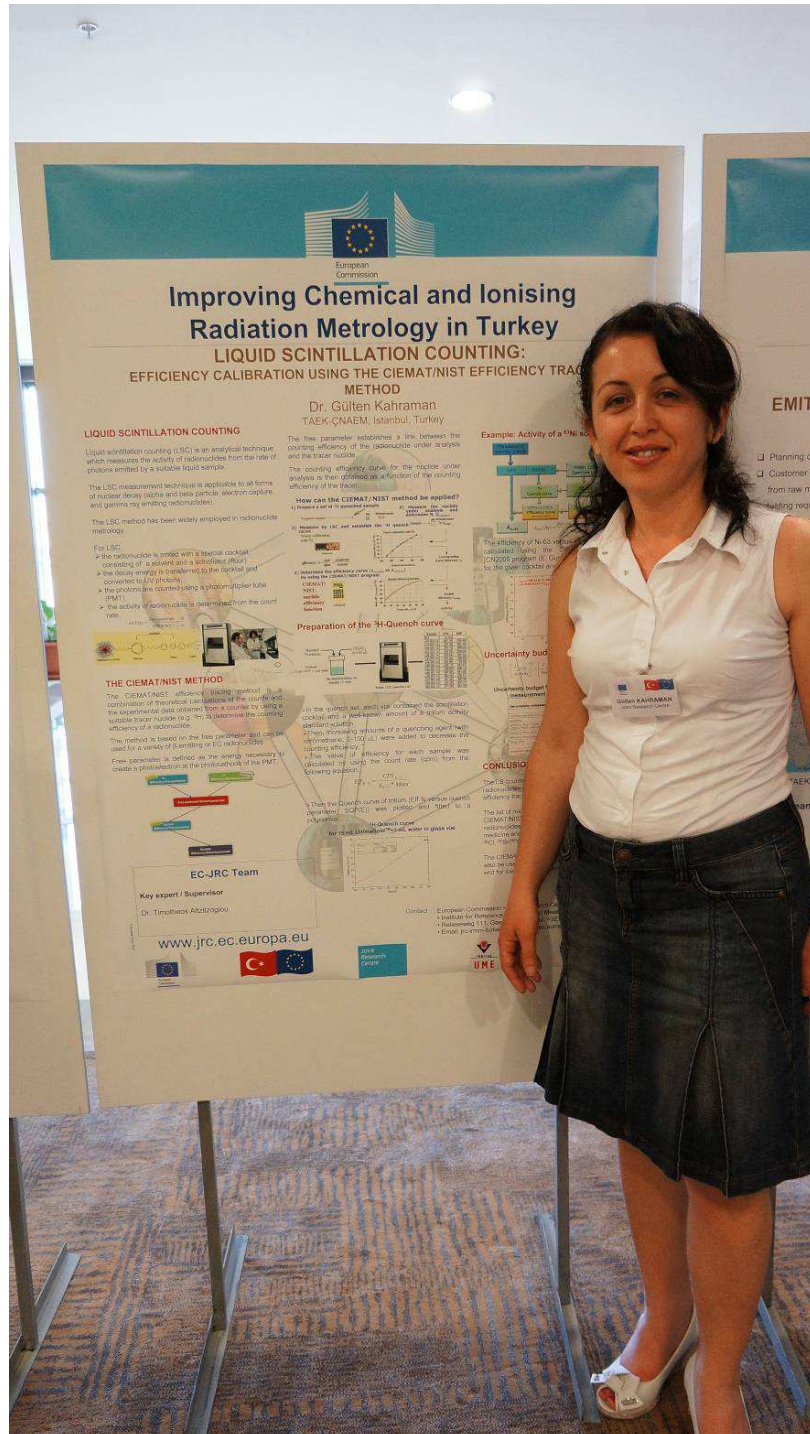


Figure 7: Ms G. Kahraman at the EMIT Concluding Conference (June 2012)..

- NP Unit – EMIT Trainee – Mr Hasan Dikmen (TAEK-SANAEM); Supervisor Dr S. Pommé.
  - "Primary and secondary standardisation of radionuclide activity".

A one year long term traineeship commenced on the 3<sup>rd</sup> October, 2011. The specific objectives are to:

- Become acquainted with different primary standardisation techniques. Become acquainted with ionisation chamber measurements.
- Learn to perform accurate activity concentration measurements and decay data (half-lives, emission probabilities).
- Learn to make uncertainty budgets.
- Assist with the design and carrying out of laboratory experiments.
- Assist with development of data acquisition/analysis software.
- Perform data analysis and contribute to the writing of reports/publications.
- Assist with gamma-ray spectrometry where useful in projects (impurity measurements, decay data measurements).
- Assist with the modelling of measurements where useful.

The extra training topics (other than the continuous ones described in the 4<sup>th</sup> Interim Report) set for the third (03.04.2012 to 02.07.2012) were:

Q3:

- Uncertainty calculation of half life measurement of Ac-225

Excerpt from Q3 report by Mr Hasan Dikmen:

*The radionuclide metrology unit had to be relocated to another building (for 3 months in early 2012) with the result that experiments were interrupted for at least one month. The experimental setup was not moved. The sample was kept in the detector. The electricity was shut down for safety. Nevertheless, during Q3, the experiments related with Ac225 half life measurements were finalized. My training was focussed on the final half life value and the associated uncertainty calculations.*

- NP Unit – EMIT Trainee – Mr Ayhan Yüksel (TAEK-SANAEM); Supervisor Dr M. Hult.
  - "Secondary standardisation of radionuclide activity – gamma-ray spectrometry".

A six month long term traineeship commenced on the 1<sup>st</sup> February, 2012. The specific objectives were to:

- Assist with the implementation of active Muon shielding for background reduction in gamma-ray spectrometry in the new Pacman shield in HADES.
- Work on characterising the Compton suppression unit in HADES.
- Perform efficiency calibrations and calculations
- Assist with various tasks needed for obtaining accreditation of the gamma-ray spectrometry activity in the low-level radioactivity group
- Assist in performing reference measurements (sample preparation, data analysis)
- Update records of detectors with respect to background and efficiency

Review 1: 01.02.2012 – 30.04.2012

- Introductory training on working procedures, maintenance, quality control, safety, structure of the shields and sample changing in HADES.
- Background analyses of Ge-3, Ge8, Ge-11 and GeMPI3 detectors.
- Impurity analysis of a powder sample.

Excerpt from R1 report by Mr Ayhan Yüksel:

*Working principles, procedures such as sample changing, quality control, shielding...etc were learned. These principles are very important for the studies during the next quarter and also some of the principles can be applied in the home institute of the trainee.*

*Detailed background analyses of four detectors, Ge-3, Ge-8, Ge-11 and GeMPI-3, were performed. When low-level activities are counted, the fluctuations in the background may be of the same order as the source strength and therefore must be carefully considered. During the detailed background analysis of these detectors, I got to be trained on the possible problems and related solutions which are important for a low-level gamma spectrometry laboratory analyses.*

*Impurity analysis of a powder sample was also carried out during this period. The analysis showed the principles of an ultra-low level gamma-ray activity measurement and the points that should be carefully taken into account. Also during this study, Monte Carlo modelling of the spectrometry system with EGS4 was learned and true coincidence corrections in EGS4 were applied.*



**Figure 8:** Mr A. Yüksel being trained by Mr M. Hult on Secondary standardisation of radionuclide activity – gamma ray spectrometry.

**Key points from (fifth interim) Short Term Training actions, workshops, seminars (methodologies B, E, F, G):**

The appreciation of Turkish scientists for the workshops provided (primarily by IRMM staff and some external experts) is summarised in Table 1 (page 10).

- **EMIT S01-06 and S01-12 workshops** on “Certification of reference materials” and “Assignment of the reference value for the CRM (statistical aspects)”
  - Trainer(s): Dr Andrée Lamberty, Dr Guy Auclair and Dr Laszlo Majoros
  - 31.01.2012 to 01.02.2012 TAEK-SANAEM, Ankara
  - Participants: 27 externals

The aim of this workshop was to provide:

- insight into the underlying concepts of reference material certification
- sound knowledge on the practical steps that are necessary for the certification of a reference material
- information on compliant production of CRMs with regard to ISO Guide 34.

The lectures covered the different phases and topics of a certification project:

- planning of a certification project
- customer orientation: explore your customer's needs
- from raw material selection to the processed material
- testing requirements
- selection of collaborators
- planning, execution and evaluation of homogeneity studies
- planning, execution and evaluation of stability studies
- planning, execution and evaluation of characterisation studies
- measurement uncertainty & metrological traceability
- value assignment
- certificates and documentation
- customer support

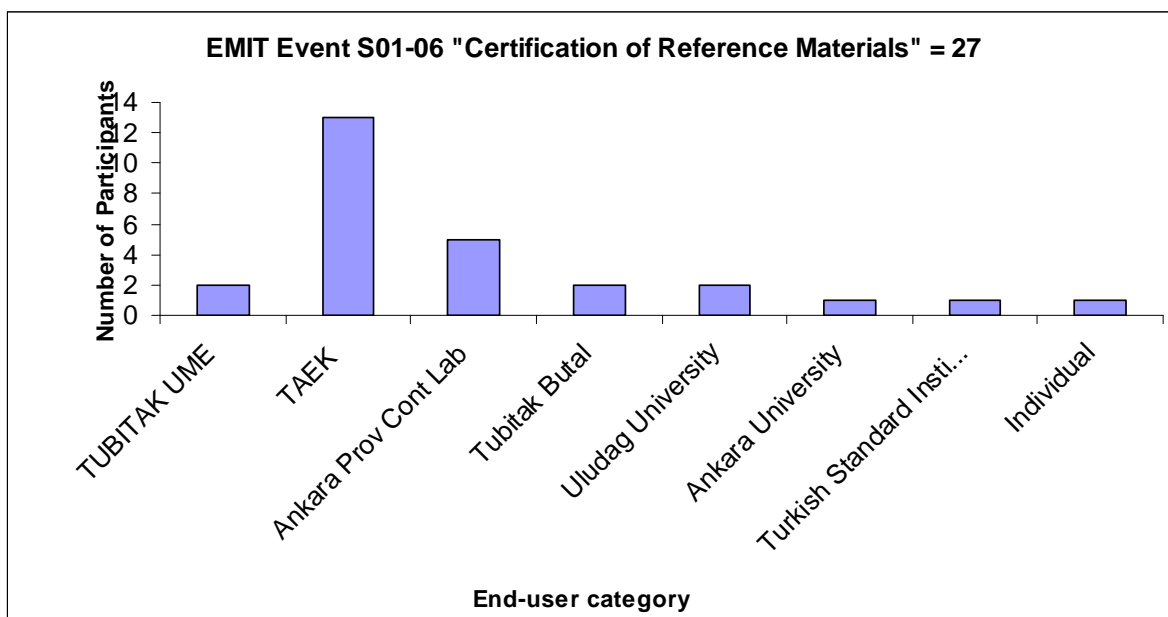
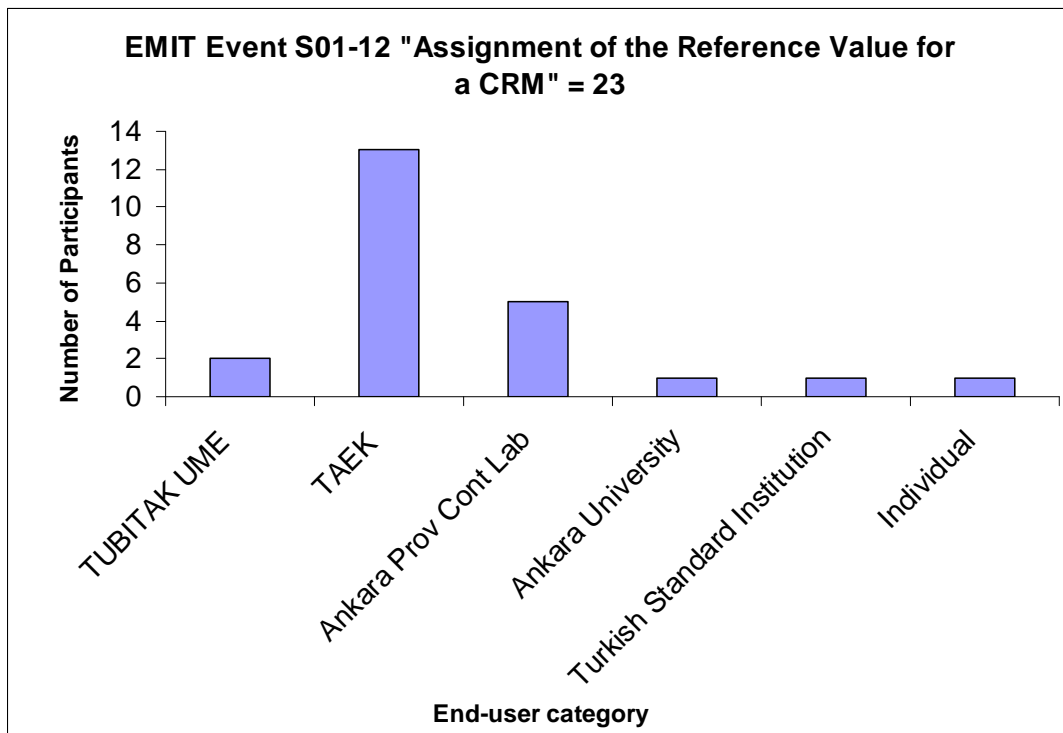


Figure 9: The origin of the participants at the S01-06 workshop.

When the participants were asked to evaluate how well the objectives were met and the theme of the workshop, 15 returned the evaluation sheets, with 40% saying "very good", 60% saying "good", 0% saying "satisfactory and 0% saying "unsatisfactory".





**Figure 10:** The origin of the participants at the S01-12 workshop.

When the participants were asked to evaluate how well the objectives were met and the theme of the workshop, 23 returned the evaluation sheets, with 61% saying "very good", 39% saying "good", 0% saying "satisfactory and 0% saying "unsatisfactory".



**Figure 11:** Participants at the S01-06 and S01-12 workshop in TAEK-SANAEM, Ankara

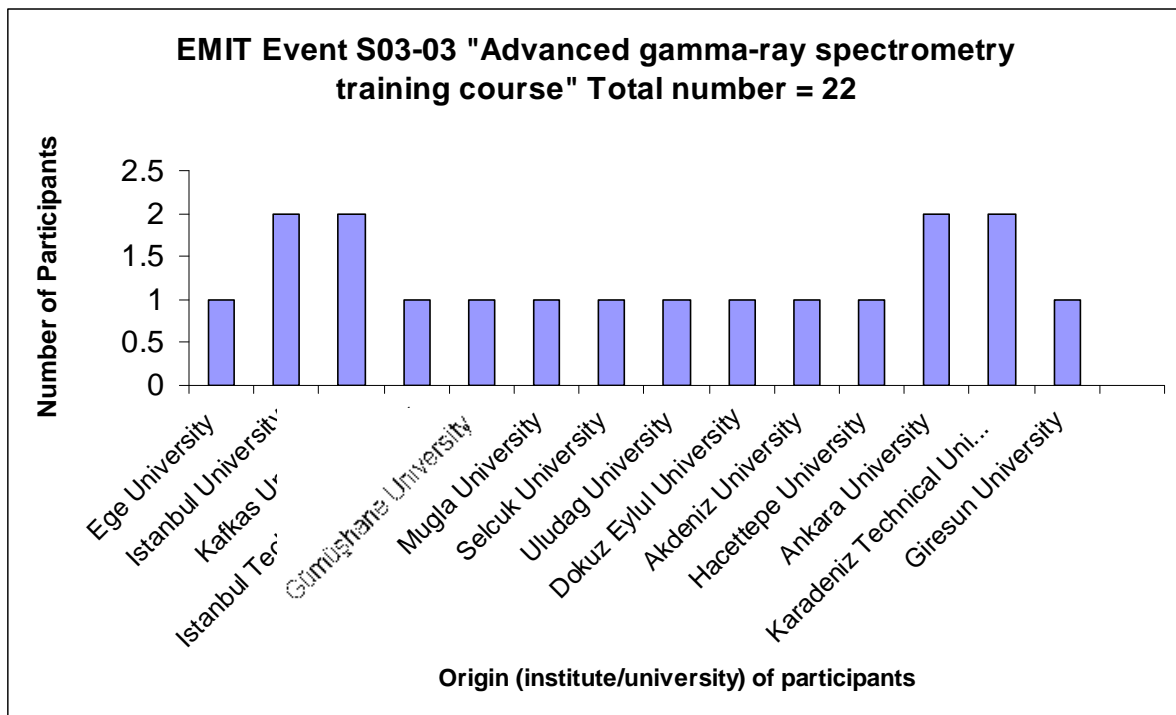
- **EMIT S03-03 workshop** on “Advanced gamma-ray spectrometry”
  - S03 Trainers: M. Hult (PhD), EC-JRC-IRMM; T. Vidmar (PhD) SCK•CEN; M. Bruggeman (PhD), SCK•CEN.
  - S03 Assistants: E. Yeltepe (MSc), TAEK-SANAEM; N. Sahin (MSc), TAEK-SANAEM.
  - 12.03.2012 – 16.03.2012, TAEK-SANAEM, Ankara.
  - Participants: 23 externals

The aim of this workshop was:

- To inform the main beneficiaries (Turkish researchers) of the latest developments in the field of advanced gamma-ray spectrometry and to facilitate knowledge transfer in this area.

The lectures and practical exercises provided were on:

- Coincidence summing corrections
- Nuclear decay data
- Natural radioactivity
- Advanced detector systems like
- Compton suppression and muon shield
- Monte Carlo simulations
- Efficiency transfer
- Uncertainty calculations and detection limits
- The course will mix shorter lectures with practical exercises both in front of a computer as well as in the gamma ray spectrometry laboratory.



**Figure 12:** The origin of the participants at the S03-03 workshop.

When the participants were asked to evaluate how well the objectives were met and the theme of the workshop, 18 returned the evaluation sheets, with 78% saying "very good", 22% saying "good", 0% saying "satisfactory" and 0% saying "unsatisfactory".



**Figure 13:** Participants at the S03-03 workshop in TAEK-SANAEM, Ankara

- **EMIT S04-16 workshop** on “Auditing of integrated management systems”
  - Trainers: P. Bode (Dr Ir. Assoc. Prof), Nuclear Science and Engineering, TU Delft, The Netherlands; M. Bickel (PhD), V. Gegevičius (PhD), J. McCourt (PhD) - all EC-JRC-IRMM, Geel, Belgium and Dr Halil Ibrahim CETIN, Laboratory Accreditation Department, TURKAK.
  - 20-23 rd March, 2012, Dokuz Eylul University, İzmir
  - Participants: 25 externals

The aim of this workshop was:

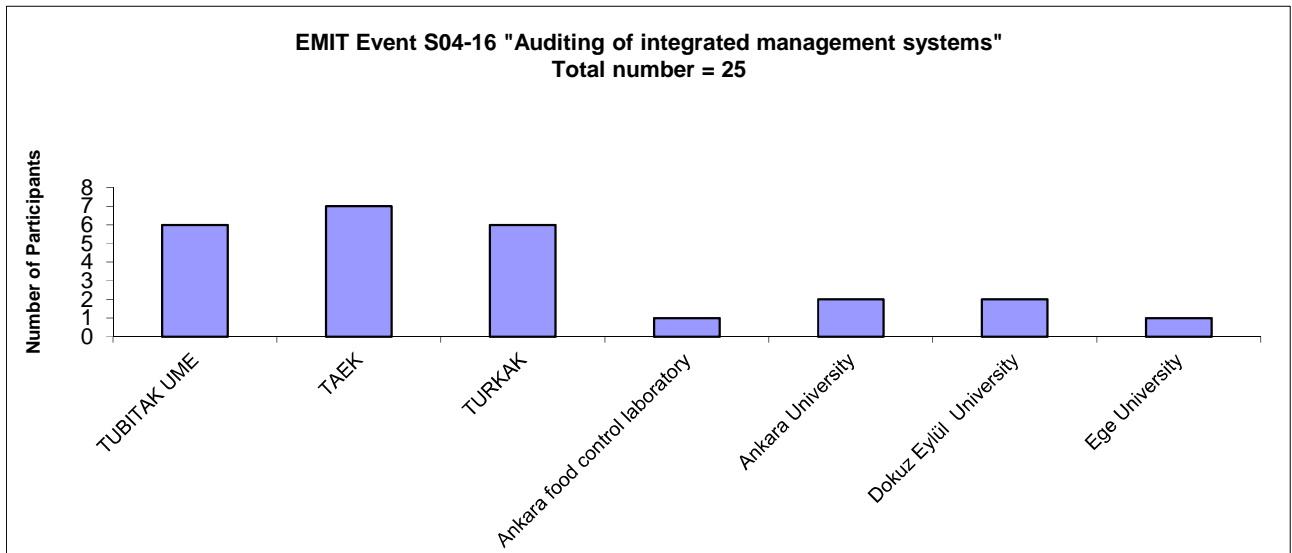
- To help organisations which are already accredited (or striving for accreditation) according to ISO 17025 and/or for organisations, already certified (or striving for certification) according to the ISO 9001, ISO 14001 and OHSAS 18001 and who need to perform internal audits on their (integrated) management systems:
  - to learn how to prepare an integrated audit
  - to learn best behavioural practice for auditors
  - to learn how best to ask questions during an audit
  - to learn how to audit efficiently and effectively
  - to learn how to report effectively.

The lectures and practical exercises provided were:

- Characteristics of an auditor
- How to prepare / plan an (integrated) audit
- How to carry out an (integrated) audit – audit methodology.
- How to report on an (integrated) audit

\*Integrated means combined quality, occupational health and safety and environmental protection audits.





**Figure 14:** The origin of the participants at the S04-16 workshop.

When the participants were asked to evaluate how well the objectives were met and the theme of the workshop, 25 returned the evaluation sheets, with 56% saying "very good", 40% saying "good", 4% saying "satisfactory" and 0% saying "unsatisfactory".



**Figure 15:** Participants at the S04-16 workshop in Dokuz Eylül University, İzmir

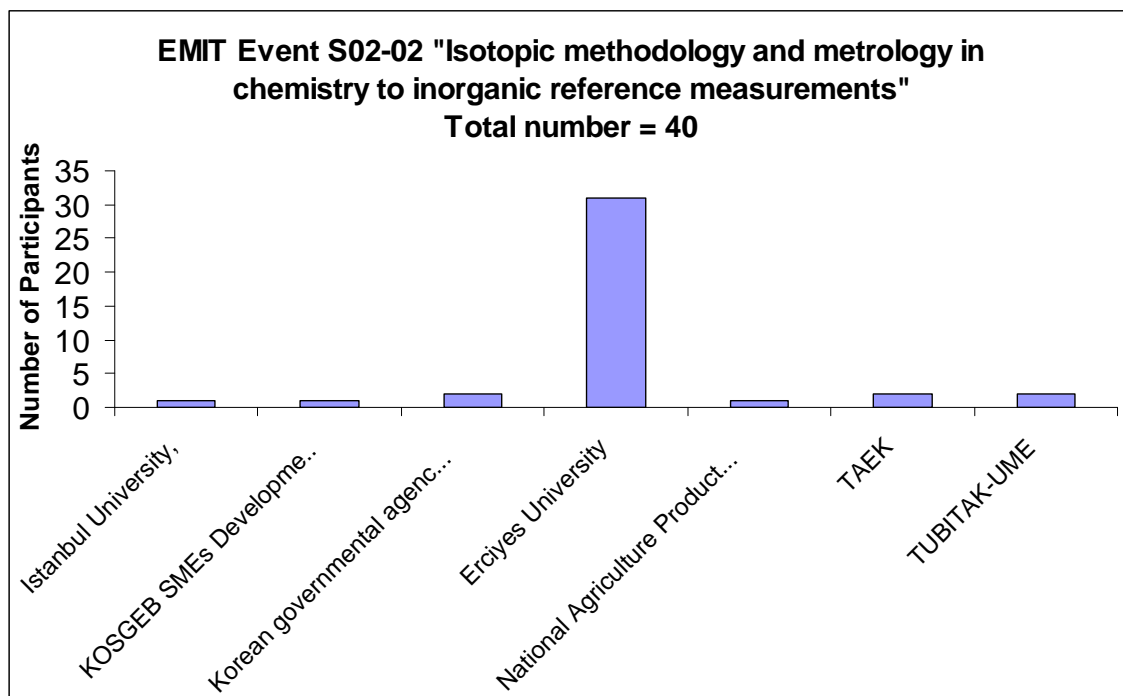
- EMIT S02-02 workshop on "Isotopic methodology and metrology in chemistry to inorganic reference measurements"
  - S02-02 Trainers: Dr C. Quénel, EC-JRC-IRMM, Belgium, Dr E. Vassileva, IAEA, Monaco, Dr J. L. Todoli, Univ. Of Alicante, Spain and Dr E. Ponzevera, IFREMER, France
  - S02-02 Assistants: Ms B. Ari, TÜBİTAK UME and Dr O. Cankur, TÜBİTAK UME.
  - 28-30th March, 2012, Erciyes University, Kayseri.
  - Participants: 38 externals

The aim of this workshop was:

- To provide information on isotopic research and principles behind isotopic reference measurements (isotopic ratios, isotope dilution)
- To provide information on isotope ratio measurements by ICPMS, from sample introduction to correction for biases and data processing
- To provide information on metrology in chemistry applied to inorganic reference measurements
- To provide information on uncertainty estimation for isotopic measurements and validation of isotopic methodology
- To provide information about the possibility of combining research activities with the metrological requirements of ISO/IEC-17025 for chemical analytical measurements
- To improve the quality of analytical results and contribute to the strengthening of the measurement infrastructure in Turkey by providing this training and promoting state-of-the-art practice in metrology in chemistry

Topics tackled:

- Isotopic methodology – isotope dilution ICP mass spectrometry:
  - Definitions and main principles;
  - Typical fields of application;
  - IDMS for reference values;
  - Traceability of results
- Sample introduction for and matrix effects during ICP mass spectrometry measurements:
  - Liquid sample introduction systems;
  - Sources of interferences;
  - Correcting for non spectral interferences
- Calibration and correction for instrumental biases during isotope ratio ICP measurements:
  - ICPMS for isotope ratio measurements;
  - Simultaneous isotope ratio measurements: corrections specific to multiple collection ICPMS;
  - Isotopic CRMs and standards: calibration and traceability related issues
- Method validation and uncertainty of measurements – application to isotope ratio results:
  - Purpose of method validation and measurement uncertainty;
  - Terminology;
  - Practical implementation for isotope ratio results
- Traceable reference values by ID-ICP mass spectrometry – a case study:
  - Trace element content in food by ID-ICPMS
  - Uncertainty estimation
- Accreditation SO-IEC-17025 flexible scope and research activities – the IRMM example:
  - Definitions and main principles;
  - Flexible scope of accreditation;
  - Practical implementation
- Exercises:
  - This workshop strongly emphasizes practical application of the theoretical concepts. Exercises will be proposed during which participants can check if they are able to put theory into practice. The trainers will help in finding the right questions and will guide the participants to successful conclusions.



**Figure 16:** The origin of the participants at the S02-02 workshop.

When the participants were asked to evaluate how well the objectives were met and the theme of the workshop, 32 returned the evaluation sheets, with 41% saying "very good", 59% saying "good", 0% saying "satisfactory" and 0% saying "unsatisfactory".



**Figure 17:** Participants at the S02-02 workshop in Erciyes University, Kayseri

- EMIT S03-24 Workshop entitled "X ray energy qualities, KAP meter calibration, CT ion chamber calibration"
  - Trainers: Dr Ludwig Büermann, Prof Dr Herbert Janßen, Dr Ulrike Ankerhold, Dr Stefan Neumaier, Dr Reinulf Böttcher, Dr Pavel Galimov, Dr Ralf-Peter Kapsch, Dr Achim Krauss, Dr Hans-Joachim Selbach and Dr Jana Klammer.
  - 4-8th June, 2012, PTB, Braunschweig, Germany
  - Participants: 6 (4 from TAEK-ÇNAEM and 2 from TAEK-SANAEM)

The aim of this workshop was:

- To provide "Dosimetry and calibration procedures for diagnostic radiology" training to six staff members from the Turkish Atomic Energy Authority (TAEK)

The lectures and practical exercises provided were:

- Quantities and units used in diagnostic radiology
- Application specific units in diagnostic radiology
  
- Radiation qualities according to the international standard IEC 61267
- General procedures in dosimetry for diagnostic radiology
- Primary air kerma standards for diagnostic radiology
- Calibration procedures for dosimeters used in diagnostic radiology
  
- Uncertainty assessment
- General principles (GUM)
- Specific uncertainty budgets according to the needs of the participants
- Calculation of patient dose, including uncertainty
- Practical exercises according to the needs of the participants, e.g. calibration of dosimeters in terms of air kerma, air kerma length product and air kerma area product
  
- Study visit of the new PTB underground laboratory
  
- Laboratory visits
- X-ray irradiation facilities
- Co-60 irradiation facility
- Electron accelerators
- Primary standards for dosimetry



**Figure 18:** Participants at the S03-24 workshop in PTB, Braunschweig, Germany

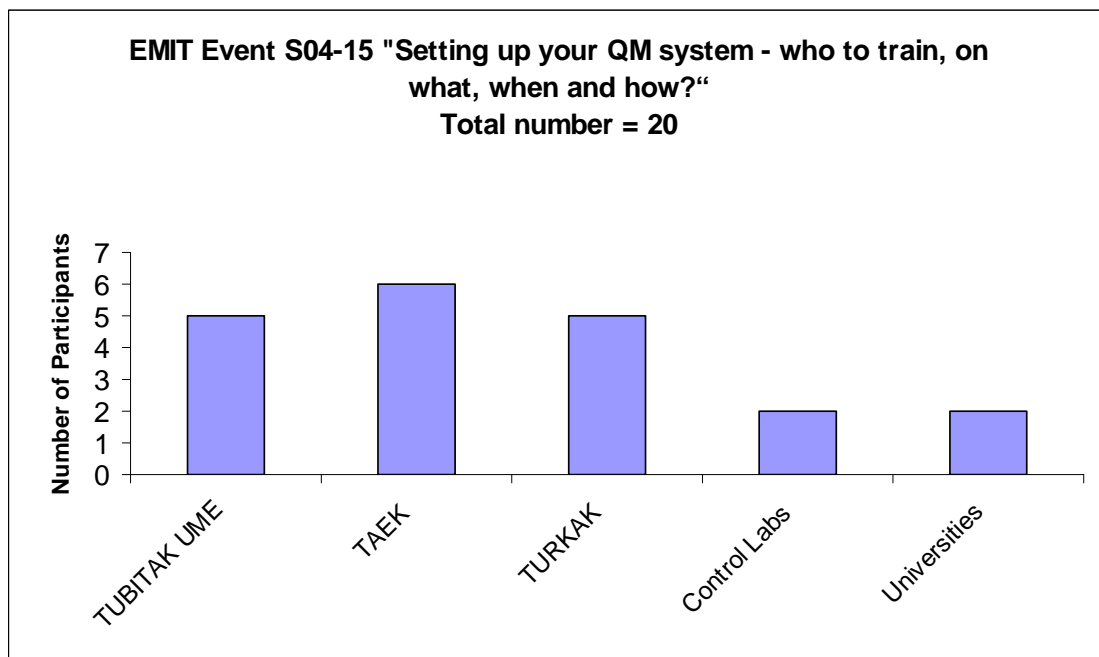
- EMIT S04-15 workshop on "Setting up your QM system - who to train, on what, when and how?"
  - Trainers: S. Holley (MSc), SH Training, U.K.; M. Bickel (PhD), V. Gegevičius (PhD), J. McCourt (PhD), L. van Nevel (MSc) - all EC-JRC-IRMM, Geel, Belgium.
  - 5-7th June, 2012, Akdeniz Üniversitesi, Antalya.
  - Participants: 20 externals.

The aim of this workshop was:

- To help organisations which are in the process of setting up their quality management systems:
  - to recognise their training needs
  - to set up a corresponding training schedule
  - to implement the training schedule.

Topics tackled:

- Introduction to training course management
  - How to prepare, deliver and evaluate a training course
  - Which type of staff to train on which subjects using which methodology
  - Assessments
  - Accreditation
- Exercises - The theoretical part will be followed by practical exercises where participants will have the opportunity to put the concepts learned into practice.



**Figure 19:** The origin of the participants at the S04-15 workshop.

When the participants were asked to evaluate how well the objectives were met and the theme of the workshop, 19 returned the evaluation sheets, with 68% saying "very good", 21% saying "good", 11% saying "satisfactory" and 0% saying "unsatisfactory".





Figure 20: Participants at the S04-15 workshop at the Akdenis Üniversitesi, Antalya.

- **EMIT S03-11 Workshop on "Training in Multi-label Liquid Scintillation Counting"**
  - Trainer: Dr T. Altitzoglou
  - 18 – 29th June, 2012, JRC-IRMM, Geel, Belgium.
  - Participants: 5 Turkish scientists.

The aim of this workshop was: to introduce the participants to advanced topics in Liquid Scintillation Counting. The focus was on the measurement and analysis of dual- and triple-label samples. In addition, the subjects of gravimetric source preparation, instrument control, instrument efficiency calibration (including the CIEMAT/NIST method) and data analysis were reviewed.

Topics to be tackled during the workshop

- Dual-, triple- and multi-label liquid scintillation counting.
- Analysis of various cases of multi-label samples.
- Presentation of different ways to analyse multi-label samples (double/triple window, full spectrum, spectrum deconvolution, use of different methods, alpha/beta discrimination, etc.).
- Source preparation for LSC.
- Instrument control and GLP.
- LSC efficiency calibration (Quench curve).
- CIEMAT/NIST efficiency tracing method.
- Uncertainty budget.
- Examples and hands-on practical exercises.

When the participants were asked to evaluate how well the objectives were met and the theme of the workshop, all 5 returned the evaluation sheets, with 100% saying "very good", 0% saying "good", 0% saying "satisfactory" and 0% saying "unsatisfactory".

- **EMIT S01-17 seminars** on "analytical methods for the production of reference materials in organic matrices"
  - Lecturers: Dr Laszlo Majoros, Dr Burcu Binici and Dr Erinc Engin.
  - 21-22nd February, 2012, Çukurova University (Adana) and Mersin University (Mersin).
  - Participants: 159 (46 + 113) externals

Day 1: Çukurova University, Adana. The seminar (on Analytical Methods for the Production of Reference Materials in Organic Matrices) was given to Turkish scientists by Dr Erinc Engin (TÜBİTAK UME) and Dr Laszlo Majoros (JRC-IRMM). An introduction to the following topics was provided: planning of a certification project, designing of homogeneity and stability assessments as well as explanation of characterisation studies according to ISO Guide 34. Thereafter a GC-IDMS analytical method was presented including all steps of a method validation. The example was one from an actual project which is currently in the development phase at IRMM.

Furthermore, practical information was delivered to the audience about reference materials such as, how to search for such materials in the most effective way. The COMAR database has also been shown with further explanations. Leaflets and posters about the EMIT events were also distributed.

Number of participants: 46

Day 2: Mersin University, Mersin. The same seminar was given at Mersin University that was described above. The university had a completely new building equipped with analytical techniques such as NMR, GC-MS, HPLC-MS-MS, ICP-OES etc... Our contacts were very much open for future collaboration.

Name of contacts: Prof Dr Nevzat Külcü and Dr A. Murat Gizir, Mersin University.

Number of participants: 113.

By disseminating this knowledge, the seminars at the universities gave the chance to the audience to get familiar with CRMs and some aspects of metrology in chemistry generally. It was also an ideal opportunity for the facilitation of future collaborations between universities, JRC-IRMM and TÜBİTAK UME.



**Figure 21:** Participants at the S01-17 seminar, Mersin University, Mersin.

- **EMIT S03-20\_23 Seminars** on "Protection level dosimetry"
  - Lecturers: Dr Ludwig Buermann and Dr Stefan Neumaier (PTB).
  - 01.03.2012 – 02.03.2012, TAEK-ÇNAEM, Istanbul.

- Participants: 21 participants from TAEK

Two experts from PTB, Dr Ludwig Buermann and Dr Stefan Neumaier gave six lectures concerning topics related to ionising radiation dosimetry.

Lecture 1: Determination of uncertainty in measurements (eg. radiation protection measurements) by Dr Stefan Neumaier

Lecture 2: X radiation qualities used in therapy, diagnostic, protection and comparisons by Dr Ludwig Buermann

Lecture 3: European intercomparisons of active dosimetry systems used in environmental radiation monitoring by Dr Stefan Neumaier

Lecture 4: Air kerma standards and application-specific dosimetric quantities in diagnostic radiology by Dr Ludwig Buermann.

Lecture 5: Calibration procedures of diagnostic dosimeters and their uncertainties by Dr Ludwig Buermann.

Lecture 6: Type testing of cabinet x-ray systems in Germany by Dr Stefan Neumaier

The workshop was attended by 21 participants (18 from TAEK- ÇNAEM/Istanbul and three from TAEK-SANAEM/Ankara). The opportunity was also used to discuss the remaining EMIT-PTB events with Dr Nurdan Gungör (TAEK-ÇNAEM EMIT coordinator). Dr Gungör informed me that TAEK nominated five participants (three from ÇNAEM and two from SANAEM) for the short term training event (S03-24) on X radiation qualities planned for the first week of June 2012 at PTB Braunschweig.

▪ **EMIT S02-06 Seminars** in the field of Inorganic chemical/isotopic reference measurements.

- Trainer: Dr C. Quétel.
- Assistants: Dr S. Can and Mr M. Tunc
- 22-23rd May, 2012 Trakya University (Edirne, 22 May) and İstanbul University (İstanbul, 23 May).
- Participants: 56 (30+26) externals.

Lectures from Dr C. Quétel, covered the introduction (presentations of JRC-IRMM, the EMIT project and the S02-06 event) and a talk on “Isotopic methodology – isotope dilution mass spectrometry”. This was then followed by a joint talk on “Isotope dilution mass spectrometry for traceable reference values in feed and food. Reference measurements for IMEP-113 (ultra-low levels of Cd and Pb in soja milk powder for babies)” by Mr M. Tunc and Dr S. Can. This presentation (by two TÜBİTAK UME scientists) covered concepts, experience and project results acquired and achieved during their one-year stay at JRC-IRMM (in 2011 for S. Can, and in 2012 for M. Tunc). It successively explained the nature of the training received at IRMM, main aspects of the EU infrastructure on food and feed safety, activities of the EU Reference Laboratory ‘Heavy Metals’ hosted by IRMM, methods developed for the production of independent IDMS based reference values for the international inter-laboratory exercise IMEP-113, and some conclusions (incl. on the training received at IRMM). Preparing this lecture, under supervision at IRMM, and delivering it was part of S. Can and M. Tunc’s training. With a total of 56 signatures on the presence sheets (30+26, for the two universities visited, successively) the attendance was considered ‘reasonable’.

In Trakya University discussions focused on powerful points of IDMS, IDMS vs external/std. addition calibration strategies, ICPMS instrumentation as regard to atomic absorption spectrometers and ICPOESs (price, performance, etc), infrastructure and technical resources at TÜBİTAK UME and the EMIT project. A visit of the laboratories was arranged after our presentations. Advice and suggestions to sort out some of the problems described (absence of suitable CRM, extraction techniques and sample introduction system for ICPOES) regarding one of their on-going projects (determination of trace element contents in different types of edible oils) were provided.

In İstanbul University discussions focused on issues regarding metrological measurements and traceability, method validation and uncertainty estimations in chemical measurements, IMEP



comparisons and the process of performance evaluation. We then had a rather extensive tour of the "Advanced analysis" Institute providing measurement services within the University of Istanbul (incl. a laboratory equipped with a quadrupole ICPMS). This visit was the occasion of an interesting and long discussion with the Institute Director (Prof Dr A. Kaşgöz) on fixed vs flexible scope approaches for an accreditation ISO/IEC17025, and on quality management policies in general

#### *Key points from (4<sup>th</sup> interim) Short Term Training actions – Study Visits (methodology C):*

- **EMIT S03-26 Study visit** to the IAEA's "Postal thermoluminescence dosimetry comparison applications, calibration" workshop
  - Hosts: IAEA, Vienna, Austria.
  - 21-22nd May, 2012, IAEA, Vienna, Austria.
  - Participants: 2 under EMIT (Mr Doğan Yaşar and Mr Muharrem Korkmaz (TAEK-ÇNAEM)).

Day 1: Nuclear Spectrometry Laboratory (hosted by Mr A. Markowicz)  
Terrestrial Environment Laboratory (hosted by Mr M. Groening)  
Food and Environmental Protection Laboratory (hosted by Mr A. Cannavan)  
IAEA quality System (explained by Mr A. Fajgelj)  
Dosimetry Laboratory (DOL) (hosted by Ms J. Izewska, Mr G. Azangwe and lab technicians)

Day 2: IAEA HQ - Radiation, Transport and Waste Safety (NSRW monitoring lab.)  
Dosimetry Laboratory (DOL), hosted by Ms J. Izewska, Mr G. Azangwe and laboratory technicians.

The attendees had the opportunity to gain an insight into how the IAEA is organised with respect to these activities, as well as gaining new knowledge on novelties and recent developments in these fields.

- **EMIT S01-22 Study Visit** entitled "XIII. International Chromatography School" LC-MS Training Course.
  - Trainer(s): N. Avdalović (Thermo Fisher Scientific, USA), J. Weiss (Thermo Fisher Scientific, GER), A. Gelemanović (Primalab, CRO), T. Tomić, (INA, CRO), V. Stankov (SP Laboratory, SRB), Š. Ukić (FCET, CRO), J. Zrostliková (Leco, CZE), O. Platiša (INA, CRO), S. Čavar (FS, BIH), L. Štajduhar (INA, CRO), H. Boiteux (Waters, FRA), M. Boras (Waters, AUT), Z. Majić (Vita Lab Nova, CRO), N. Rejc (Instrumentalia, SLO), J. Zrostliková (Leco, CZE), M. Zrnčić (FCET, CRO), A. Mornar (FPB, CRO), M. Sertić (FPB, CRO) and A. Drolc (NIC, SLO).
  - 18 – 19th June, 2012. Faculty of Chemical Engineering and Technology, University of Zagreb, Croatia.
  - Participant: Dr Kevser TOPAL as EMIT attendee.

The object of this training course was to give the attendee the opportunity to gain new knowledge in:

- novelties from the field of chromatography used for both scientific and routine analysis purposes.
- recent developments in LC& GC analysis,
- enhanced chromatography practice in analytical separations.
- Knowledge transfer from various European chromatography experts.

Dr Kevser TOPAL stated that she gained an introduction to new techniques such as UPLC, uHPLC, GC X GC, as well as new developments in the field, such as new software for statistical data evaluation for the drug development industry. Along with that, applications of these techniques in the analytical field were presented. She stated that the meeting was very valuable and fruitful in these terms.

It also provided Dr Topal, as a member of Turkish national TrainMiC team, the occasion to spot some "room for improvement" in the sense of encouraging the course organisers to include TrainMiC topics and trainers in their future meetings. Since, unifying the jargon in the field of analytical chemistry is extremely

important for knowledge transfer, she suggested that they meet Dr Philip Taylor and promised to assist them in this respect.

- **EMIT S03-09 Study Visit** "To compare the laboratory services and quality management systems at Radioactivity Measurement Laboratories of SCK•CEN, IRMM and SANAEM with the aim of identifying areas of improvement"
  - Visit hosts: Christian Hurtgen (Head of the Working Group on Low Radioactivity Measurements), Michael Bruggeman (Technical Manager) and Freddy Verrezen (Quality Coordinator) - SCK CEN and T. Altzitzoglou, H. Emteborg, C. Quetel, M. Tunc (JRC-IRMM).
  - 25 – 29th June, 2012. SCK CEN and JRC-IRMM.
  - Participants: Dr Ülkü YÜCEL and Dr Ruhsar GÜRELLIER

The study visit included explanations by Christian Hurtgen (Head of the Working Group on Low Radioactivity Measurements), Michael Bruggeman (Technical Manager) and Freddy Verrezen (Quality Coordinator) on the work of SCK•CEN's Radioactivity Measurement Groups. This was followed by detailed information on gamma measurement systems and the work done in the Gamma Spectrometry Laboratory, quality control studies and quality system.

Under the leadership of Christian Hurtgen, a half a day was spent in the laboratories for the analysis of Actinide and Polonium, Radium and Radon, Strontium and Iodine, Source Preparation and Sample Admission Office. This visit provided the opportunity for the comparison of laboratory facilities, measurement capabilities and capacities at Radioactivity Measurement Sections of SCK CEN and SANAEM. In the afternoon session, during the meeting with Freddy Verrezen, the structural organisation of SCK CEN and the implementation of the Quality Management System such as quality structuring, quality policy and documentation, quality objectives, proficiency testing, internal audits and management review etc. have been discussed.

During the study visit to IRMM, the ongoing workshop on "Multi- label Liquid Scintillation Counting" was attended. The lectures and exercises on "Radioactive Decay and Nuclear Dating", "Radioactivity Determination of Individual Radionuclides in a Mixture by Liquid Scintillation Deconvolution" and "Uncertainty in LSC" were followed with the other participants from TAEK-SANAEM and TAEK-ÇNAEM. The Linear electron accelerator facility used for neutron production was also visited as well as the impressive new facility for developing and producing reference materials. It was a great chance to see on site how the reference material ampoules were filled and sealed. The last laboratory visit was to Mass Spectrometry for Isotopic Measurements. The activities of the laboratory were explained by Dr Christophe Quélet and Murat Tunç, the long term trainee from TÜBİTAK UME. It was good to have a chance to discuss with the long term trainees from SANAEM and ÇNAEM about their work and to have a better idea for the expectations from them by their return.

Dr Ülkü YÜCEL and Dr Ruhsar GÜRELLIER deemed the study visit to have been very fruitful and beneficial providing the opportunity to compare the laboratory infrastructure and quality management system for similar laboratory services and accreditation studies. By the comparison of SCK•CEN and SANAEM laboratories, a particular perspective for continuous improvement activities for laboratory services and quality management system was gained. By the attendance of at least some courses of LSC Workshop, new topics were added to the existing experience and scientific background which will be useful for better understanding and steering the working group in the laboratory. By a visit to laboratories having different duties, new perspectives were gained in performing near future targets of SANAEM in measurement capabilities in addition to the radionuclide measurements.



**Figure 22:** At the EMIT S03-09 Study Visit to the Radioactivity Measurement Laboratories of SCK•CEN, Mol, Belgium.

*Key points from (4<sup>th</sup> interim) Conference session (methodology I):*

- **EMIT S05-15 Concluding Conference on "Improving chemical and ionising radiation metrology in Turkey – the achievements"**
  - Lecturers: 40 oral presentations (including 17 of the 18 LTTs).
  - 11-13th June, 2012. The conference took place at The Green Park Pendik Hotel & Convention Center, Eski Ankara Cad. No:204, 34890 Pendik Istanbul, Turkey.
  - Participants: 77 external participants (85 total).



**Figure 23:** The participants at the EMIT S05-15 conference session, held at The Green Park Pendik Hotel & Convention Center, Eski Ankara Cad. No:204, 34890 Pendik Istanbul





**Figure 24:** 17 (of the 18) Long Term Trainees at the EMIT S05-15 conference session, held at The Green Park Pendik Hotel & Convention Center, Pendik Istanbul (11-13<sup>th</sup> June, 2012).

The aim of this conference was to mark the successful completion of the EMIT Project lead by the European Commission's Joint Research Centre, IRMM.

The main objectives of the conference were the following:

- To provide a forum for the exchange of information on the outcome this uniquely tailored knowledge transfer project on enhancing Turkey's chemical and ionising radiation capacities.
- To summarise what was involved in completing all 20 objectives of this knowledge transfer and capacity building project.
- To hear how the stakeholders intend to build on this.
- To hear how projects, such as this, can help further increase Turkey's trade volume with the EU and facilitate the adoption of the *acquis communautaire*.
- To hear the views of Turkey's top executives and top scientists on the future of metrological matters in Turkey.

The topics covered were:

- Lessons learned by the long term trainees in the fields of reference material production, primary methods of measurement, ionising radiation metrology under a quality umbrella.
- Recent developments, current trends and future needs in each of the four fields (i. reference materials, ii. primary methods of measurement, iii. ionising radiation and iv. quality, metrology education and training).
- Research, science and innovation in metrological matters in Turkey.
- Discussions to capture the essence of the achievements and to identify the challenges ahead of us.
- The sustainability of the project once the implementation phase is over.

All 18 EMIT LTTs presented what they learned during their traineeships (16 in JRC-IRMM, 2 in PTB) in both oral and poster forms. The LTT focus day was preceded by two days of lectures from experts in the field of metrology, including IRMM's key experts as well as addresses from dignitaries from the Ministry for EU Affairs, the EUD, TAEK, TÜBİTAK, PTB, ECTNA and other eminent university professors.

The following conclusions were drawn i.e. that the project has made, and continues to make, a significant contribution to improving chemical and ionising radiation metrology in Turkey; that it has been an

extremely successful project, the only one (out of 46 IPAs) to get the top score "very good", twice in 2011. The project's accomplishments have also been submitted, by the EUD, to DG ELARG's progress report as a success story under IPA I. This report is submitted to other DGs and the EP.



Figure 25: Some of the posters presented by the Long Term Trainees at the EMIT S05-15 conference session, Istanbul (11-13th June, 2012).

#### **Key points re Conference Attendance (methodology D) preparations during the 4<sup>th</sup> interim period:**

- EMIT S04-17a,b Conference participations to EC2E2N (ACE 2012).
  - Hosts: EC2E2N at the University of Milan.
  - 24-27th April, 2012, Milan, Italy.
  - Participants: 2 under EMIT (Prof. M. Demir (Adnan Menderes University) and Prof. Dr Timur Dogu (METU)).

- Prof. Timur Dogu (METU) had the following to say, upon his return from the ACE 2012 conference:

*In this annual meeting of EC2E2N four plenary lectures were presented, workshops were performed and reports of 17 working groups were discussed. As for the plenary lectures, the first three were on "Knowledge Transfer Activities in Analytical Sciences" by Philip Taylor (IRMM, JRC EC), "Creativity in Chemistry" by V. Balzani (Univ. Bologna) and "The Education Audiovisual & Cultural Executive Agency (EACEA) and its functions" by A. Prieto-Gonzales. All three of these plenary lectures were highly informative and opened new views. The fourth plenary lecture was given by myself on "Outcome Based Chemical Engineering Education". In this presentation I had the chance to introduce engineering evaluation and accreditation activities in Turkey, with special emphasis on Chemical Engineering Education. Required outcomes of Chemical Engineering first cycle for accreditation and the recent trends in Chemical Engineering curricula were also discussed.*

*The workshops that I participated on "Lecturing Qualifications for University Teaching Staff", "Attractiveness of Chemistry", "Interface of Chemistry and Chemical Engineering" and "Internet Based Test Development" gave the chance to make new contacts with the academicians from all over Europe and also gave the chance to exchange ideas with chemists and chemical engineers. The*



*presentation on “Transparency Database” was especially quite new for me and my institute and I plan to discuss the possibility of inclusion of the Chemical Engineering and/or Chemistry programs of my university into this database with the administrators of my university. Internet-based test development studies in Chemistry related topics were also quite new for me and I also will convey my impressions on these topics to my institution with the possibility of being part of these activities in the future.*

*Another highly attractive session of this meeting was on student competition on “The Magic of Chemistry” where 5 different groups from Germany, Greece, Norway, Poland and Portugal made highly successful presentations. I strongly believe that such student activities should further be expanded to other countries like Turkey etc.*

*Overall, I can consider this meeting as a successful meeting to generate good contact and network within the Chemistry as well as Chemical Engineering academia in Europe. Being Chemistry and Chemical Engineering together in the same network, was also quite positive to discuss the interface between them. Professor Antony Smith was quite successful in the organisation of this meeting. Also, local organisers of Milano University tried to make the organisation as successful as possible.*

- Prof. Mustafa Demir (Adnan Menderes University) had this to say upon his return:

*It was a very interesting conference for me. I have learned many things about higher education systems in many European countries. I have found a chance to compare the systems in Turkey and in European countries. I am a member of “Bologna Process Commission” at the Turkish Chemist Society. So, I will use this information constructively upon my return.*

- **EMIT S02-04b, S01-15abc and S03-28bc Conference Participations** at the 13th International Symposium on Biological and Environmental Reference Materials (BERM 13)
  - 25 – 29th June, 2012, Vienna International Convention Center, Vienna, Austria.
  - Participants: 4 scientists from TÜBİTAK UME and 2 scientists from TAEK



**Figure 26:** The TÜBİTAK UME participants at BERM 13, Vienna, Austria.

The aim of providing the opportunity for six Turkish scientists to attend this conference was to:

- To create opportunity to interact with key players who are involved in RM development, production, distribution and use.
- To provide a forum for the exchange of information on recent developments of new RMs;
- To address issues related to international standardization and accreditation in the area of RMs;
- To address scientific and technical developments related to methods that are used in RM production;
- To address issues related to the availability of RMs and their role in lowering barriers to trade, specifically in least developed and developing countries.

To take one report (out of the six) - Dr Kevser Topal had this to say upon her return:

*I presented a poster on certification of Chloramphenicol (CAP purity). I found an opportunity for introducing this new reference material and discuss its applications. Many of the conference attendees (e.g. from INMETRO, LGC) left their contact address for further interactions. Additionally, the symposium was a venue for the reference material (RM) producers and users. Discussions were mainly on the developing fields, future needs, current situation of RM production, which are a useful and interactively formulized summary on the field. Our institution TÜBİTAK UME has different facilities in the field of RM production, method development and dissemination of knowledge on this field. Therefore the objectives of the symposium matched the TÜBİTAK UME perspective on the field and were very valuable.*

Table 5 below shows the list of IPA EMIT Training Events, carried out during the Fifth Interim Period of the Implementation phase (i.e. 01.01.2012 to 30.06.2012). The number of participations in training events is 514 in the fifth interim period and 2371 since the beginning.

The full list of events is annexed to this report.

**Table 5:** The list of IPA EMIT Training Events, carried out during the fifth interim phase of the implementation phase (i.e. 01.01.2012 to 30.06.2012).

Subject	Ref. in Gantt chart	Date	Precise topic	Event type	Duration (days)
01 Reference Materials	S01-06	2012-01-31	CERTIFICATION of reference materials	Workshop in Turkey (by L. Majoros, .....	3.5
01 Reference Materials	S01-12	2012-02-02	Assignment of the reference value for the CRM (statistical aspects)		
01 Reference Materials	S01-17	2012-02-21	Lectures on dissemination of knowledge in the field of analytical methods for the production of reference materials in organic matrices	Seminar lectures, Çukurova University (Adana) and Mersin University (Mersin), Turkey, 40-50 participants.	2
03 Ionising Radiation Metrology	S03-20_23	2012-03-01	Protection level dosimetry	Lecture on portable survey meters at ÇNAEM	2
03 Ionising Radiation Metrology	S03-03	2012-03-12	Workshop on Advanced Gamma-ray spectrometry	One workshop with practicals (TAEK-SANAEM labs)	5
04 Quality, metrology education and Training.	S04-16	2012-03-20	Workshop on "Auditing of integrated management systems",	Dokuz Eylul University, İzmir (Turkey), 3 days, 25 participants.	3
S05 GENERAL	S05-11	2012-03-22	PAC Seminar - Host speakers	PAC-06 Seminar in Dokuz Eylul University, İzmir (Turkey).	1
02 Primary Methods of Measurement	S02-02	2012-03-28	Workshop on Isotopic methodology and metrology in chemistry to inorganic reference measurements	Erciyes University (Kayseri), Turkey, 2.5 days, 40-50 participants.	3
04 Quality, metrology education and Training.	S04-17(a,b)	2012-04-25	Conference participations for Turkish univ. profs (a&b=max 2); Prof. M. Demir and Prof.Dr. Timur Dogu. EC2E2N (ACE 2012), Milan.	Meant for Turkish univ. profs	4
03 Ionising Radiation Metrology	S03-26	2012-05-21	Postal Thermoluminescence dosimetry comparison applications, calibration	Study visit to IAEA Vienna (4 people)	2
02 Primary Methods of Measurement	S02-06	2012-05-22	Lectures in the field of Inorganic chemical/isotopic reference measurements	Seminar lectures, Trakya University (Edirne, 22 May) and İstanbul University (İstanbul, 23 May), Turkey, 40-50 participants.	2.5
03 Ionising Radiation Metrology	S03-24	2012-06-04	X ray energy qualities, KAP meter calibration, CT ion chamber calibration	Workshop /short term training at PTB (5 trainees)	5
04 Quality, metrology education and Training.	S04-15 & extra STT 01	2012-06-05	Workshop on "Setting up your QM system - who to train, on what, when and how?",	Akdeniz University, Antalya (Turkey). Participation is restricted to those involved in QM in research labs, control labs, industrial labs and university labs.	3
S05 GENERAL	S05-12	2012-06-08	Steering Committee Meeting (2 from IRMM)	SC-07 in TUBITAK UME, Gebze (Turkey).	1
S05 GENERAL	S05-15	2012-06-11	CONCLUDING CONFERENCE	One conference in Turkey (3 days)	3
03 Ionising Radiation Metrology	S03-11	2012-06-18	Liquid scintillation, 2 - Double energetic window method for Sr-90, Pb-210 analysis with LSC	Short term training (in IRMM)	10
01 Reference Materials	S01 - 22	2012-06-18	LC-MS Course, Amoeba Sciences (Berlin, Germany).	Workshop provided by external body (1 trainee)	5
03 Ionising Radiation Metrology	S03-09	2012-06-25	Liquid scintillation	Study visit to SCK & IRMM (2 people)	5
02 Primary Methods of Measurement	S02-04(b)	2012-06-25	Conference participations for TUB staff : BERM 13, Vienna, 2012 (4 people)	Conference attendance	5
01 Reference Materials	S01-15(b,c)				
03 Ionising Radiation Metrology	S03-28 bc	2012-06-25	Conference participations for TAEK staff (BERM 13, Vienna, 2012, 2 people)	Conference attendance	5



### 3.3 EMIT – COMMUNICATION

Various means of communicating the EMIT project are being employed. Specific websites, on the consultant's and main partner institutes (TÜBİTAK UME and TAEK-ÇNAEM and TAEK-SANAEM) have been created with a snapshot of the IRMM one shown below. Communication within the EMIT steering committee is achieved by twice yearly meetings, frequent emails and by a specially assigned interest group "JRC Metrology in Turkey" on the European Commission's secure file sharing platform, known as Circa (see 3.3.3). Other means employed for communication towards externals are the presentation of the EMIT training events (which are open to multi-stakeholders) with the means of a special poster and a flyer at as many national scientific / quality / education events in Turkey.

Raising awareness of the EMIT project's work to date and communicating upcoming events is done at every event verbally and by means of a project poster and event list flyers. Along with that, the first EMIT newsletter was published in March 2011 (in both Turkish and English). This is widely distributed by means of emailing the newsletter link (on the EMIT website<sup>3</sup>) and by distributing printed versions at our various events. The EMIT website is continuously being adapted to suit the growing amount of information and upcoming events are advertised 2-3 months before the event (along with emails to everyone on the EMIT contact list).

An invitation to present the status and achievements of the EMIT project was extended to us by the parallel project "Strengthening the Quality Infrastructure in Turkey" (SQIT IPA) and this was done at the TURKLAB conference on the 13<sup>th</sup> Dec., 2011.

- McCourt J., "Improving chemical and ionising radiation metrology in Turkey – the scope and status after two years", Conformity Assessment Association of Turkey (UDDER) Journal nr 3, Dec., 2011.  
[http://www.udder.org.tr/images/bultenler/bulten\\_sayi\\_03.pdf](http://www.udder.org.tr/images/bultenler/bulten_sayi_03.pdf)

The press reporting at our events helps with raising awareness of the EMIT project's activities so we don't want to discourage this. However we impress on our hosts (who may come in contact with the press) that the text describing the events should be approved by EC-JRC-IRMM's communication team, after translation by TÜBİTAK UME, TAEK-ÇNAEM, TAEK-SANAEM or the EUD, depending on the subject.

The following is a selection of news articles concerning the activities of the project:

12/06/2012: Press release of Delegation of the European Union to Turkey about the successful completion of the EMIT project: English, Turkish

13/12/2011: SQIT and EMIT article.

07/10/2011: Samsunhaber (www.samsunhaber.com)

07/04/2011: Sertifikalı Referans Madde Üretimi Semineri (haberler.com)

07/04/2011: Sertifikalı Referans Madde Üretimi Semineri (sondakika.com)

07/04/2011: Sertifikalı referans madde üretimi semineri (haberdar.com)

07/04/2011: Sertifikalı referans madde üretimi semineri (beyazgazete.com)

27/10/2009: TÜBİTAK ve TAEK'ten radyasyon ölçümünde AB'ye uyum projesi (zaman.com.tr)

27/10/2009: Radyasyon ölçümünde AB'ye uyum projesi (veteknoloji.com)

27/10/2009: Press release of Delegation of the European Union to Turkey about new project: English, Turkish

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<sup>3</sup> <http://irmm.jrc.ec.europa.eu/Turkey>

### 3.3.1 EMIT ON IRMM WEB SITE.

<http://irmm.jrc.ec.europa.eu/Turkey>

Events Tab on 18.06.2012:

#### EMIT workshop S03-11: Multi-label Liquid Scintillation Counting

18 - 29 June, 2012  
Geel, Belgium

In the frame of the Europe and Metrology in Turkey project, a 10 day workshop entitled "Multi-label Liquid Scintillation Counting" will be held at the radionuclide laboratories, EC-JRC-IRMM, Geel, Belgium for five participants. The training will be provided by Dr. T. Altizoglou and participation is restricted to those nominated by TAEK. Further details are available in the workshop [leaflet](#) [412Kb].

#### EMIT Concluding Conference (S05-15)

11 - 13 June, 2012  
Istanbul, Turkey

A 3 day conference to mark the achievements of the EU programme of pre-accession assistance entitled "Improving chemical and ionising radiation metrology in Turkey" will be held in Istanbul for 300 participants. Further details are available in the workshop [leaflet](#) [412Kb]. Registration will be possible from the 16 March, 2012 via the [JRC Events Registration System](#). Deadline for submission of abstracts from invited contributors (orals and posters): 11 May, 2012. Deadline for registration: 14 May, 2012 for speakers and 21 May, 2012 for all others.

#### EMIT workshop S04-15: Setting up your QM system - who to train, on what, when and how?

5 - 7 June, 2012  
Antalya, Turkey

In the frame of the Europe and Metrology in Turkey project, a 3 day workshop entitled "Setting up your QM system - who to train, on what, when and how?" will be held at Akdeniz Üniversitesi, Antalya for 35 participants. Further details are available in the workshop [leaflet](#) [292Kb]. Registration will be possible from the 3 April, 2012 via the [JRC Events Registration System](#). Deadline for registration: 3 May, 2012.

#### EMIT workshop S03-24: Dosimetry and Calibration Procedures for Diagnostic Radiology

4 - 8 June, 2012  
Braunschweig, Germany

In the frame of the Europe and Metrology in Turkey project, a 5 day workshop entitled "Dosimetry and Calibration Procedures for Diagnostic Radiology" will be held at Physikalisch Technische Bundesanstalt (PTB), Braunschweig, Germany for six participants. The trainers will be from PTB and participation is restricted to those nominated by TAEK. Further details are available in the workshop [agenda](#) [422Kb].

Figure 27: Snapshot of the EMIT webpage (events tab) on the 18.06.2012.

### 3.3.2 EMIT PUBLICATIONS

There have been ten publications on the project in general with details of the project's progress to date:

- five reports (Inception phase, First Interim, Second Interim, Third Interim and the Fourth Interim in progress)
  - McCourt J., Bickel M. Programme of pre-accession "Improving Chemical and Ionizing Radiation Metrology" in Turkey. Inception phase report, JRC 57848-2010. European Union, 2010.
  - McCourt J., Programme of pre-accession "Improving Chemical and Ionizing Radiation Metrology" in Turkey. First Interim Report, JRC 61020, EUR 24549, ISBN 978-92-79-17080-5, European Union, 2010.
  - McCourt J., Programme of pre-accession "Improving Chemical and Ionizing Radiation Metrology" in Turkey. Second Interim Report, JRC 64333, EUR 24776, ISBN 978-92-79-19801-4, European Union, 2011.
  - McCourt J., Programme of pre-accession "Improving Chemical and Ionizing Radiation Metrology" in Turkey. Third Interim Report, JRC 67074, EUR 24957, ISBN 978-92-79-21436-3, European Union, 2011.

- McCourt J., Programme of pre-accession "Improving Chemical and Ionizing Radiation Metrology" in Turkey. Fourth Interim Report, JRC 70957, EUR 25337 EN, ISBN 978-92-79-24987-7, European Union, 2012.
- one general project poster
  - Gegevicus V., McCourt J., EMIT Events Poster, June, 2010
- two newsletters (two versions EN & TK)
  - McCourt J., "Improving Chemical and Ionizing Radiation Metrology" in Turkey. Newsletter 01, March 2011; EN and TK versions JRC 64366.
  - McCourt J., Schmitz P., "Improving Chemical and Ionizing Radiation Metrology" in Turkey. Newsletter 02, June 2012; EN and TK versions JRC 71698
- one article in a Turkish periodical
  - McCourt J., "Improving chemical and ionising radiation metrology in Turkey – the scope and status after two years", Conformity Assessment Association of Turkey (UDDER) Journal nr 3, Dec., 2011. [http://www.udder.org.tr/images/bultenler/bulten\\_sayi\\_03.pdf](http://www.udder.org.tr/images/bultenler/bulten_sayi_03.pdf)
- one oral presentation
  - McCourt J., "Improving chemical and ionising radiation metrology in Turkey – the scope and status after two years" at III Laboratory Quality Conference (TURKLAB), Istanbul, 13 Dec., 2011. <http://www.labkalite2011.org/docs/lqc%20turklab%202011%20programme.pdf>

There are also 18 final reports, prepared by the Long Term Trainees. Due to the fact that these can contain data which may be needed for a publication, they are only exchanged with the supervisors at the home institutes (TÜBİTAK UME and TAEK-ÇNAEM and TAEK-SANAEM).

Scientific publications<sup>4</sup> published (or in press) from the beginning of the project until now are:

#### Articles:

1. "High-resolution alpha-particle spectrometry of the <sup>230</sup>U decay series" M. Marouli, S. Pommé, J. Paepen, R. Van Ammel, V. Jobbagy, A. Dirican\*, G. Suliman, H. Stroh, C. Apostolidis, K. Abbas, A. Morgenstern. Appl. Radiat. Isot. (2012), in press. \*Trainee under the IPA TR080209 project - financed by the European Union.
2. "The use of solid angle for alpha detector efficiency in <sup>226</sup>Ra analyses of soil samples" by Abdullah Dirican\*, Pınar Esra Erden, Meryem Seferinoğlu\*, S. Pommé. Appl. Radiat. Isot. (2012), in press. \*Trainee under the IPA TR080209 project - financed by the European Union.
3. "Measurement of the <sup>177</sup>Lu half-life" by S. Pommé, J. Paepen, T. Altitzoglou, R. Van Ammel, E. Yeltepe\*, Appl. Radiat. Isot. 69 (2011) 1267-1273. \*Trainee under the IPA TR080209 project - financed by the European Union.
4. "Quantification of <sup>238</sup>Uranium in environmental samples using gamma-ray spectrometry", M. Hult, E. Andreotti, R. González de Orduña, S. Pommé, E. Yeltepe\*, Atti di Conferenze/Conference Proceedings (Società Italiana di Fisica/ Italian Physical Society) – in press. \*Trainee under the IPA TR080209 project - financed by the European Union.
5. "Distribution of <sup>60</sup>Co in steel samples from Hiroshima" by M. Hult, G. Marissens, N. Sahin\*, M. Hoshi, H. Hasai, K. Shizuma, K. Tanaka and S. Endo. Applied radiation and isotopes, in Press. \*Trainee under the IPA TR080209 project - financed by the European Union.
6. "Search for  $\alpha$  decay of <sup>151</sup>Eu to the first excited level of <sup>147</sup>Pm using underground  $\gamma$ -ray spectrometry" by F.A. Danevich, E. Andreotti, M. Hult, G. Marissens, V.I. Tretyak and A. Yuksel\*, Eur. Phys. J. A(2012)48:

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<sup>4</sup> Publications (including posters) arising from research carried out by the long term trainees whilst in IRMM, have the an associated sentence "Trainee under the IPA TR080209 project - financed by the European Union" to give the correct visibility to the IPA.

157, DOI 10.1140/epja/i2012-12157-7. \*Trainee under the IPA TR080209 project - financed by the European Union.

7. "Comparison of background in underground HPGe-detectors in different lead shield configurations", by Mikael Hult, Guillaume Lutter, **Ayhan Yüksel\***, Gerd Marissens, Marcin Misiaszek and Ulf Rosengård, Accepted for publication in Applied Radiation and Isotopes. \*Trainee under the IPA TR080209 project - financed by the European Union.
8. "A new versatile underground gamma-ray spectrometry system", by Guillaume Lutter, Mikael Hult, Gerd Marissens, Erica Andreotti, Ulf Rosengård, Marcin Misiaszek, **Ayhan Yüksel\*** and **Namik Sahin\***, Accepted for publication in Applied Radiation and Isotopes. \*Trainee under the IPA TR080209 project - financed by the European Union.
9. "The importance of the sample preparation in setting up maximum limits in European legislation: the outcome of IMEP-33". Submitted to Food Additives and Contaminants, by F. Cordeiro, I. Baer, P. Robouch, H. Emtborg, J. Charoud-Got, **S. Can\***, A. Krata, M. Zampella, C. Quézel, B. De la Calle, R. Hearn. \*Trainee under the IPA TR080209 project - financed by the European Union.
10. "Measurement of the <sup>225</sup>Ac half-life", S. Pommé, M. Marouli, G. Suliman, **H. Dikmen\***, R. Van Ammel, V. Jobbágy, A. Dirican\*, H. Stroh, J. Paepen, F. Bruchertseifer, C. Apostolidis, A. Morgenstern, Appl. Radiat. Isot. 70 (2012) 2608-2614. \*Trainee under the IPA TR080209 project - financed by the European Union.
11. "Decay data measurements on <sup>213</sup>Bi using recoil atoms", by M. Marouli, G. Suliman, S. Pommé, R. Van Ammel, V. Jobbágy, H. Stroh, **H. Dikmen\***, J. Paepen, **A. Dirican\***, F. Bruchertseifer, C. Apostolidis, A. Morgenstern. Submitted for publication in Applied Radiation and Isotopes. \*Trainee under the IPA TR080209 project - financed by the European Union.
12. "Half-lives of <sup>221</sup>Fr, <sup>217</sup>At, <sup>213</sup>Bi, <sup>213</sup>Po and <sup>209</sup>Pb from the <sup>225</sup>Ac decay series", by G. Suliman, S. Pommé, M. Marouli, R. Van Ammel, H. Stroh, V. Jobbágy, J. Paepen, **A. Dirican\***, F. Bruchertseifer, C. Apostolidis, A. Morgenstern. Submitted for publication in Applied Radiation and Isotopes. \*Trainee under the IPA TR080209 project - financed by the European Union.

#### Reports:

1. "The certification of the mass fraction of the total content and the aqua regia extractable content of Hg in loam soil" by E. de Vos, **E. Engin\***, A. Santoro, M. Ricci, A. Held, EUR 25141 EN - 2011, ISBN 978-92-79-22563-5, doi:10.2787/55675, Publications Office of the European Union, Luxembourg, 2012. \*Trainee under the IPA TR080209 project - financed by the European Union.
2. "IMEP-31: Total arsenic, cadmium, copper, lead and mercury, as well as extractable cadmium and lead in mineral feed" by Ines Baer, Beatriz de la Calle, Inge Verbist, **Betul Ari\***, Agnieszka Krata, Christophe Quézel, Piotr Robouch; JRC Scientific and Technical Report; 2011, EUR 24819 EN, 64 pp. \*Trainee under the IPA TR080209 project - financed by the European Union.
3. "IMEP-111: Total cadmium, lead, arsenic, mercury and copper and extractable cadmium and lead in mineral feed" by Beatriz de la Calle, Agnieszka Krata, **Betul Ari\***, Christophe Quézel, Hakan Emteborg, Piotr Robouch, Inge Verbist; JRC Scientific and Technical Report; 2011, EUR 24758 EN, 64 pp. \*Trainee under the IPA TR080209 project - financed by the European Union.
4. "IMEP-33: Total cadmium and lead in baby food" by Fernando Cordeiro, Ines Baer, Piotr Robouch, Inge Verbist, Bibi Kortsens, Håkan Emteborg, Jean Charoud-Got, Christophe Quézel, **Süleyman Can\***, Beatriz de la Calle; JRC Scientific and Technical Report; 2012, EUR 25176 EN, 59 pp. \*Trainee under the IPA TR080209 project - financed by the European Union.
5. "IMEP-113: Determination of total cadmium and lead in baby food" by Fernando Cordeiro, Ines Baer, Piotr Robouch, Inge Verbist, Bibi Kortsens, Håkan Emteborg, Jean Charoud-Got, Christophe Quézel, **Süleyman Can\***, Beatriz de la Calle; JRC Scientific and Technical Report; 2012, EUR 25177 EN, 52 pp. \*Trainee under the IPA TR080209 project - financed by the European Union.

#### Oral presentations:

1. "Development of a new candidate certified reference material for biota monitoring of hexachlorobenzene and hexachlorobutadiene" by Majoros L., Ricci M., **Binici Gokcen B\***, Emteborg H, Held A. and Emons H. at Dioxin 2011, Brussels, Belgium, 21-25th August, 2011. \*Trainee under the IPA TR080209 project - financed by the European Union.

2. "ÇNAEM SSDL'inin 0,6 cc hacimli iyon odaları için Ndw kalibrasyon faktörlerinin karşılaştırma metodları ile izlenebilirliği" by Hasan EREZ, Tülin ZENGİN, **Enis Kapdan\***, Selim Aydın and Muharrem Korkmaz (TAEK-ÇNAEM) at the XIII National Medical Physics Congress, İzmir, Turkey on 19.11.2011. \*Trainee under the IPA TR080209 project - financed by the European Union.
3. "IEC 61267 Standardına Uygun olarak SSDL x ışını sisteminde diagnostik x ışını radyasyon kontrollerinin oluşturulması" by **Doğan Yaşar\***, Tülin ZENGİN, **Enis Kapdan\***, Hasan EREZ (TAEK-ÇNAEM) at the XIII National Medical Physics Congress, İzmir, Turkey on 19.11.2011. \*Trainee under the IPA TR080209 project - financed by the European Union.
4. "Assignment of property values to a candidate CRM" by **Ms Burcu Binici\***, Dr Laszlo Majoros, Dr Marina Ricci, Dr Andrea Held at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
5. "Designing and planning of certified reference material projects and method validation" by **Dr Nilgün Tokman\***, Dr Beata Plutowska, Mr Gerhard Buttinger, Mr Stefan Harbeck, Dr Alessandra Moseriti, Dr Heinz Schimmel at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
6. "Method validation for the characterisation of a CRM" by **Mr Taner Gökçen\***, Mr Florian Sandor, Ms Berit Sejerøe-Olsen, Dr Jose Huertas-Perez, Dr Marta Dabrio-Ramos, Dr Heinz Schimmel at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
7. "Trace and major elements in milk powders" by **Dr Alper İşleyen\***, Dr James Snell, Dr Heinz Schimmel presented at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
8. "Characterisation and value assignment of a reference material" by **Dr Erinç Engin\***, Dr Anna Santoro, Dr Andrea Held at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
9. "IDMS based independent reference measurements of the extractable cadmium and lead mass fractions in mineral feed for IMEP-111" (in support to the EU Reference Laboratory for Heavy Metals) by **Ms Betül Ari\***, **Dr Süleyman Z. Can\***, Dr Agnieszka KRATA, Dr Christophe R. QUETEL at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
10. "The objectives and acquirements of training on Ionising Radiation Dosimetry in PTB" by **Dr Doğan Yaşar\***, Dr Oliver Hupe, Dr Ludwig Buermann, Dr Ralf-Peter Kapsh, Dr Herbert Jansen, Dr Ulf Rosengard at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
11. "Primary and secondary level calibration processes with ionising radiations" by **Mr Enis Kapdan\***, Prof. Dr Herbert JANSSEN at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
12. "Underground gamma-ray measurements for high precision and tracing former events" by **Mr Namık Kemal Şahin\***, Dr Mikael Hult, Dr Ulf Rosengård and Dr Tim Vidmar at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
13. "Methods for measuring extremely low levels of radioactivity in materials" by **Mr Ayhan Yüksel\***, Dr Mikael HULT, Dr Guillaume LUTTER at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
14. "Liquid scintillation counting for standardisation of radionuclides" by **Dr Nazife Aslan\***, Dr Timos Altitzoglou at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.



15. "Liquid scintillation counting: efficiency calibration using the CIEMAT/NIST efficiency tracing method" by **Dr Gulden Kahraman\***, Dr Timotheos Altitzoglou at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
16. "Half-life measurement of Lu-177 with a re-entrant gamma ionisation chamber and 4 $\pi$  gamma counting with a well type NaI(Tl) detector" by **Mr Emin Yeltepe\*** and Dr Stefaan Pommé at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
17. "Source preparation and alpha-particle counting" by **Dr Meryem Seferinođlu\***, Dr Stefaan Pommé at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
18. "Primary standardisation of activity and high-resolution alpha-particle spectrometry" by **Mr Abdullah Dirican\***, Dr Stefaan Pommé at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
19. "Decay data measurements for U-230, Ac-225 and daughter products" by **Mr Hasan Dikmen\***, Dr Stefaan Pommé at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
20. "Isotope dilution mass spectrometry for traceable reference values in feed and food" by **Ms Betül Ari\***, **Dr Süleyman Z. Can\***, Dr Christophe R. Quétel at the "Isotopic methodology and metrology in chemistry for inorganic reference measurements" workshop (S02-05), Ankara, Izmir (21-22 June, 2011). \*Trainee under the IPA TR080209 project - financed by the European Union.
21. "Isotope dilution mass spectrometry for traceable reference values in feed and food. Reference measurements for IMEP-113 (ultra-low levels of Cd and Pb in soja milk powder for babies)" by **Dr Süleyman Z. Can\***, **Mr Murat Tunc\***, Dr Christophe R. Quétel at the seminar on "Inorganic chemical isotopic reference measurements" (S02-06), Edirne, Istanbul (22-23 May, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
22. Çme Suyunda Eser Elementlerin Yüksek Çözünürlüklü ICP MS ile Tayini: SIM-QM.S2 Karşılaştırma Çalışması by Dr Emrah UYSAL, **Mr Murat Tunc\***, Dr Fatma Gonca COŞKUN, Dr Oktay CANKUR at the "Isotopic methodology and metrology in chemistry international session" (S02-03) of the VI. Ulusal Analitik Kimya Kongresi, Hatay (03-07 July, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union
23. "ICP-MS ile şarap İçinde kurşun tayini: CCQM-K30.1 karşılaştırma çalışması" by **Ms Betül ARI\***, **Dr Süleyman Z. Can\***, Dr Oktay Cankur at the "Isotopic methodology and metrology in chemistry international session" (S02-03) of the VI. Ulusal Analitik Kimya Kongresi, Hatay (03-07 July, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.

#### Posters:

1. "Hexachlorobenzene and hexachlorobutadiene in fish tissue: method development for implementation of the water framework directive" to be presented at Dioxin 2011, Brussels, Belgium, 21-25 August, 2011. **Binici Gokcen B\***, Majoros L., Ricci M., Held A., Emons H\*Trainee under the IPA TR080209 project - financed by the European Union.
2. "Selective determination of total Hg in soil and sewage sludge by using the Hydrea system: removing Hg memory effects" to be presented in CEST 2011, Rhodes, Greece, 8-10<sup>th</sup> September, 2011. **Engin E.\***, Santoro A., Ricci M., Held A. \*Trainee under the IPA TR080209 project - financed by the European Union.
3. "Quality Assurance Tools for Pesticide Analysis – an Ambitious Task" presented at fifth International Symposium on Recent Advances in Food Analysis (RAFA 2011), Prague, Czech Republic, 1-4 November 2011, Marta Dabrio Ramos<sup>‡</sup>, Amadeo R. Fernández-Alba, José Fernando Huertas Pérez, **Taner Gokcen\***, Florian Sandor, Berit Sejerøe-Olsen, Katharina Teipel and Heinz Schimmel. <sup>‡</sup>Corresponding author – E-mail: marta.dabrio@ec.europa.eu. \*Trainee under the IPA TR080209 project - financed by the European Union.

4. "Tedavi düzeyli dozimetre sistemleri için doz hesaplamalarında kullanılan su fantomu-Katı fantom (RW3) Doz Düzeltme faktörünün belirlenmesi" by Hasan Erez, Tülin Zengin, **Enis Kapdan\***, Selim Aydın and Muharrem Korkmaz (TAEK-ÇNAEM).
5. "Bilgisayarlı Tomografilerde Hasta Dozu Yönetimi" by Emin Güngör, Burhan Doğan and Cevdet Özuağ (TAEK-ÇNAEM)
6. "First steps towards the production of a certified reference material for biota monitoring of hexachlorobenzene and hexachlorobutadiene" by Majoros L. , Ricci M., **Binici Gokcen B\***, Emteborg H., Held A. and Emons H. presented at the ISEAC-2102, 22-25 May 2012 (International symposium on environmental analytical chemistry). \*Trainee under the IPA TR080209 project - financed by the European Union.
7. "Determination of transfer factors for the roos type parallel plate therapy ionization chambers if used in solid state phantoms" by **Mr Enis Kapdan\***, Mr Hasan Erez, Dr Ludwig Bueermann, **Dr Dogan Yasar\*** at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
8. "Independent reference measurements of the mercury mass fraction in mineral feed for the IMEP-111 comparison" by **Ms Betül ARI\***, Dr Agnieszka Krata, Dr Christophe R. Quetel at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
9. "Independent reference measurements of the cadmium and lead mass fractions in baby milk powder for the IMEP-113 comparison" by **Dr Süleyman Z. CAN\***, Dr Agnieszka Krata, Dr Mariavittoria Zampella, **Mr Murat Tunc\***, Dr Christophe R. Quetel at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
10. "Establishment of diagnostic radiation qualities in accordance with IEC 61267 standard in SSDL" by **Dr Doğan Yaşar\***, Dr Ludwig Bueermann, **Mr Enis Kapdan\***, Mr Hasan Erez at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
11. "Assignment of Property Values to a Candidate CRM" by **Ms Burcu Binici\***, Dr Laszlo Majoros, Dr Marina Ricci, Dr Andrea Held at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
12. "Designing and planning of certified reference material projects and method validation" by **Dr Nilgün Tokman\***, Dr Beata Plutowska, Mr Gerhard Buttinger, Mr Stefan Harbeck, Dr Alessandra Moseriti, Dr Heinz Schimmel at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
13. "Method validation for the characterisation of a CRM" by **Mr Taner Gökçen\***, Mr Florian Sandor, Ms Berit Sejerøe-Olsen, Dr Jose Huertas-Perez, Dr Marta Dabrio-Ramos, Dr Heinz Schimmel at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
14. "Trace and major elements in milk powders" by **Dr Alper İşleyen\***, Dr James Snell, Dr Heinz Schimmel presented at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
15. "Characterisation and value assignment of a reference material" by **Dr Erinç Engin\***, Dr Anna Santoro, Dr Andrea Held at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
16. "Underground gamma-ray measurements for high precision and tracing former events" by **Mr Namık Kemal Şahin\***, Dr Mikael Hult, Dr Ulf Rosengård and Dr Tim Vidmar at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
17. "Methods for measuring extremely low levels of radioactivity in materials" by **Mr Ayhan YÜKSEL\***, Dr Mikael Hult, Dr Guillaume Lutter at the Europe & Metrology in Turkey (EMIT) Concluding Conference

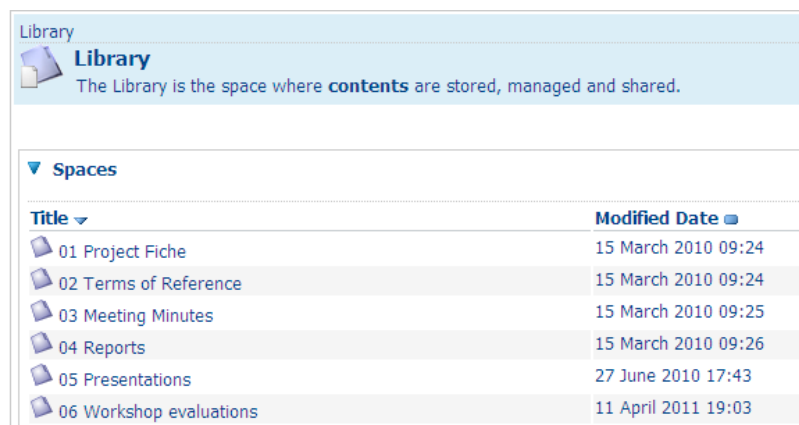


- (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
18. "Liquid scintillation counting for standardisation of radionuclides" by **Dr Nazife ASLAN\***, Dr Timos Altitzoglou at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
  19. "Liquid scintillation counting: efficiency calibration using the CIEMAT/NIST efficiency tracing method" by **Dr Gulden Kahraman\***, Dr Timotheos Altitzoglou at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
  20. "Half-life measurement of Lu-177 with a re-entrant gamma ionisation chamber and 4 $\pi$  gamma counting with a well type NaI(Tl) detector" by **Mr Emin Yeltepe\*** and Dr Stefaan Pommé at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
  21. "Source preparation and alpha-particle counting" by **Dr Meryem Seferinođlu\***, Dr Stefaan Pommé at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
  22. "Primary standardisation of activity and high-resolution alpha-particle spectrometry" by **Mr Abdullah Dirican\***, Dr Stefaan Pommé at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
  23. "Decay data measurements for U-230, Ac-225 and daughter products" by **Mr Hasan Dikmen\***, Dr Stefaan Pommé at the Europe & Metrology in Turkey (EMIT) Concluding Conference (S05-15), Pendik, Istanbul (11 - 13 June, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.
  24. Kalibrasyon çözeltilerinde cr, co ve pb elementlerinin icp-ms ile tayini: CCQM-K87 karşılaştırma çalışması" by **Mr Murat Tunc\***, **Ms Betül Ari\***, Dr Oktay Cankur at the "Isotopic methodology and metrology in chemistry international session" (S02-03) of the VI. Ulusal Analitik Kimya Kongresi, Hatay (03-07 July, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union
  25. "ICP-MS ile byoetanolde bakir tayini" by **Dr Süleyman Z. CAN\***, Dr Oktay CANKUR, **Ms Betül ARI\*** at the "Isotopic methodology and metrology in chemistry international session" (S02-03) of the VI. Ulusal Analitik Kimya Kongresi, Hatay (03-07 July, 2012). \*Trainee under the IPA TR080209 project - financed by the European Union.

### 3.3.3 CIRCABC INTEREST GROUP "JRC METROLOGY IN TURKEY"

Due to the modernisation of the secure file sharing platform, the "JRC Metrology in Turkey" secure interest group had to be transferred from Circa to Circabc. This was carried out in January with testing and finalisation carried out by the 26.01.2012, after which all members were informed.

A screen shot of the home page of Circabc is provided here below:



Library	
The Library is the space where <b>contents</b> are stored, managed and shared.	
▼ Spaces	
Title ▼	Modified Date ▾
01 Project Fiche	15 March 2010 09:24
02 Terms of Reference	15 March 2010 09:24
03 Meeting Minutes	15 March 2010 09:25
04 Reports	15 March 2010 09:26
05 Presentations	27 June 2010 17:43
06 Workshop evaluations	11 April 2011 19:03

### 3.3.4 EMIT EVENT LIST – OPEN TO MULTI-STAKEHOLDERS (ED 15)

Subject	Ref.	Date	Precise topic, duration and nr. participants foreseen.
01 RM	S01-02	2010-10-05	Workshop on preparation of certified reference materials (Turkey), 2 days, 40-50 participants.
04 QMET	S04-03	2010-10-20	Workshop "Roadmap for facilitating educational innovations in Metrology in Chemistry and Ionising Radiation" (Turkey), 1 day, 40-50 participants.
04 QMET	S04-04_09	2011-02-22	Workshop "Training methodologies in Metrology in Chemistry" (according to TrainMIC®)" (Trabzon, Turkey), 2.5 days, 40-50 participants.
01 RM	S01-03	2011-03-01	Workshop "Certification of Reference Materials" in TÜBİTAK UME premises (Turkey), 2 days, 40-50 participants.
01 RM	S01-08	2011-03-03	Lectures on "Certification of Reference Materials". İstanbul Üniversitesi & İstanbul Teknik Üniversitesi, Turkey, 1 location, 40-50 participants.
02 PMM	S02-01	2011-03-15	Workshop "Principles and application of isotopic methodology and metrology in chemistry to inorganic reference measurements" in TÜBİTAK UME (Turkey), 2.5 days, 40-50 participants.
01 RM	S01-16	2011-04-07	Lectures on "Use and certification of reference materials". Bursa Uludağ University on 7th and 2 seminars in İzmir Technology Institute on 8th, 40-50 participants.
04 QMET	S04-14	2011-04-04	Workshop on "Safety of food & feed – requirements of an analytical laboratory", Adiyaman (Turkey), 2 days, 40-50 participants.
04 QMET	S04-13	2011-05-24	Workshop on "Metrology in Nanotechnology" (Gazi University) (Turkey), 1 day, 40-50 participants.
02 PMM	S02-05	2011-06-21	Lectures in the field of Inorganic chemical/isotopic reference measurements (Turkey), METU & Hacettepe universities, Ankara and YTE university, İzmir, 40-50 participants.
04 QMET	S04-12	2011-06-29	Conference session on the subject of education in metrology in chemistry and ionising radiation at the 25th National Chemistry Congress (Erzurum, Turkey), 0.5 days, >50 participants.
01 RM	S01-04	2011-09-05	Workshop on the use of certified reference materials (Gebze, Turkey), 2 days, 40-50 participants.
01 RM	S01-05	2011-10-04	Workshop "Preparation of reference materials" (Gebze, Turkey), 2 days, 40-50 participants.
01 RM	S01-09	2011-10-06	Lectures on "Use and certification of reference materials". Ondokuz Mayıs University, Samsun (Turkey), 40-50 participants.
04 QMET	S04-02	2011-10-19	Workshop "Integrated Quality Systems: an interpretation for universities" (Uludağ University, Bursa, Turkey), 3 days, 40-50 participants.
03 IRM	S03-19	2011-11-17	Conference session on Therapy level dosimetry at the National Medical Physics Congress (Izmir, Turkey), 0.5 day, >50 participants.
01 RM	S01-06 & S01-12	2012-01-31	Workshop "Certification of reference materials" (TAEK-SANAEM, Ankara, Turkey), 2 days, 40-50 participants.
01 RM	S01-17	2012-02-21	Lectures on analytical methods for the production of reference materials in organic matrices, Çukurova University (Adana, 21 February) and Mersin University (Mersin, 22 February), Turkey, 40-50 participants.
03 IRM	S03-03	2012-03-12	Workshop (with practicals) in Advanced Gamma-ray spectrometry (TAEK-SANAEM, Ankara, Turkey), 5 days. Participation restricted to ~20 practitioners from universities and research institutes.
04 QMET	S04-16	2012-03-20	Workshop on "Auditing of integrated management systems", Dokuz Eylül Üniversitesi, İ (Turkey), 3 days. Participation restricted to 25 practitioners from TURKAK and other accredited and/or certified organisations (of those striving for accreditation and/or certification).
02 PMM	S02-02	2012-03-28	Workshop on Isotopic methodology and metrology in chemistry to inorganic reference measurements, Erciyes University (Kayseri), Turkey, 2.5 days. Participation restricted to practitioners from research labs, control labs, industrial labs and university labs.
02 PMM	S02-06	2012-05-22	Lectures on Inorganic chemical/isotopic reference measurements, Trakya University (Edirne) on 22nd May and İstanbul University (İstanbul) on 23rd May, Turkey, 40-50 participants.
04 QMET	S04-15	2012-06-05	Workshop on "Setting up your QM system - who to train, on what, when and how?", Akdeniz University, Antalya (Turkey), 3 days. Participation is restricted to those involved in QM in research labs, control labs, industrial labs and university labs.
05 GENERAL	S05-15	11-13 June, 2012	Concluding conference (Istanbul, Turkey), 3 days, ~300 participants. VIP day 11th June, 2012. See <a href="http://irmm.jrc.ec.europa.eu/activities/Turkey/Pages/ece_emit_concluding_event.aspx">http://irmm.jrc.ec.europa.eu/activities/Turkey/Pages/ece_emit_concluding_event.aspx</a>
04 QMET	S04-11	2012-07-03	Workshop with practicals "Statistics; Uncertainty Budget Determination for radionuclide metrology applications" (Ege University, Izmir, Turkey), 3 days. Participation restricted to practitioners from the Nuclear Institute and other rad chem labs.
02 PMM	S02-03	2012-09-06	Conference session on primary methods of measurement at the 6th Analytical chemistry congress (Mustafa Kemal University, Hatay, Turkey, 0.5 day - morning, >50 participants.
04 QMET	S04-10	2012-09-10	Workshop with practicals on proficiency testing and statistical evaluation, TÜBİTAK BUTAL, Bursa, Turkey, 2 days. Participation restricted to 40 scientists who will, or have already, take(n) part in a PT, are a PT provider or would like to be.

Abbreviations: RM = Reference Materials; PMM = Primary Methods of Measurement; IRM = Ionising Radiation Metrology; QMET = Quality, Metrology education and Training.

## 4 PLANNED ACTIVITIES FOR THE FINAL REPORTING PERIOD 01.07.2012 – 30.09.2012

The following activities (see Table 6) are scheduled for the Final reporting period.

**Table 6:** List of IPA EMIT Events scheduled for the Final Reporting Period of the EMIT project (01.07.2012 – 30.09.2012).

Subject	Ref. in Gantt chart	Date	Precise topic	Event type	Duration (days)
04 Quality, metrology education and Training.	S04-11	2012-07-03	Statistics; Uncertainty Determination and Budget for radionuclide metrology applications (+ expert Benedik...)	One workshop in Turkey with practicals	3
04 Quality, metrology education and Training.	S04-22	2012-07-12	Euromaster in Measurement Science Summer school.	3 x Study visit - Summer school, Fatima, Portugal.	10
03 Ionising Radiation Metrology	S03-09bis extra STT 03	2012-08-27	Laboratory services and QM systems at Rad Meas labs of SCK-CEN	Study visit to SCK (2 people from TAEK-CNAEM)	2
02 Primary Methods of Measurement	S02-03	2012-09-06	Conference (0.5 d session at 6th National Congress of Analytical Chemistry, Turkey).	Experts from EU (NMI and/or IRMM) and UME will lecture in 6th National Congress of Analytical Chemistry, Mustafa Kemal University, Hatay, Turkey	5
02 Primary Methods of Measurement	S02-03 extra STT 02	2012-09-03	Study visit at 6th National Congress of Analytical Chemistry, Turkey	Scientists (4-5) to attend the 6th National Congress of Analytical Chemistry, Mustafa Kemal University, Hatay, Turkey (as an extra STT in lieu of 1 LTT)	5
S05 GENERAL	S05-13	2012-09-07	PAC Seminar - Host speakers	PAC-07 Seminar in Mustafa Kemal University, Hatay, Turkey (from IRMM & UME)	1
03 Ionising Radiation Metrology	S03-13	2012-09-10	Ion chambers + RN calibrators	One expert visit from IRMM (discussion of achievements and future planning, SANAEM and CNAEM)	3
03 Ionising Radiation Metrology	S03-14	2012-07-01	Ion chambers + RN calibrators	Actual calibration of TAEK SANAEM's ionisation chamber at PTB - specific contract with PTB for that (U.R.)	NA
03 Ionising Radiation Metrology	S03-15	2012-09-10	Ion chambers + RN calibrators	Study visit to PTB (2 participants, Yeltepe and Sahin)	5
04 Quality, metrology education and Training.	S04-10	2012-09-10	Workshop on Proficiency testing and statistical evaluation	TÜBİTAK Butal, Bursa, Turkey, 2 days, 40-50 participants.	2
S05 GENERAL	S05-14	2012-09-12	Steering Committee Meeting (2 from IRMM)	SC-08 in TAEK-SANAEM (McCourt & Waetjen)	1
04 Quality, metrology education and Training.	S04-23 extra STT 04	2012-09-17	Training course on MicroTOF-Q-Proteomics and ESI Quantitation	One scientist from TUBITAK UME (Merve Oztug Senal) at Bruker Chemical Analysis, Goes, NL.	5
04 Quality, metrology education and Training.	S04-24 extra STT 05	2012-09-17	Training course on Gas Purity Analysis	One scientist from TUBITAK UME (Tanil Tarhan) at VSL, Delft, NL.	5

## 5 CONCLUSIONS AND RECOMMENDATIONS

### 5.1 KEY ASSUMPTIONS

The following key assumptions, as laid out in the initial administrative agreement, are:

- Increased demand for metrological services in the field of chemical metrology and ionizing radiation due to the implementation of EU regulations and directives
- Dedication to the objectives of competent ministries and stakeholders indirectly involved in the project
- The project is supported by a separate follow-up project by which CRMs for country specific materials are produced
- Appropriate international comparisons will be timely organised
- EURAMET will timely process TÜBİTAK UME's CMC entries submitted for inclusion into the CIPM MRA database
- TURKAK will timely process TÜBİTAK UME's application for accreditation
- Supply of equipment project is accepted and implemented
- Appropriate international comparisons will be timely organised
- EURAMET will timely process TAEK institutes' CMC entries submitted for inclusion into the CIPM MRA database
- TURKAK will timely process TAEK institutes' application for accreditation
- Available and interested Turkish laboratories' experts
- Enough interested Turkish universities for the metrology education aspects
- Key partnerships between existing institutions, laboratories and non-governmental organisations will be established
- Awareness events will be well attended
- Project teams of this and other EU financed projects in the fields of free movement of goods, food safety and environmental, health and consumer protection (if any) will cooperate and coordinate activities

Needless to say, the failure of any of these would affect (to some degree) the successful and timely implementation of the planned activities.

### 5.2 RECOMMENDATIONS ADDRESSING IDENTIFIED FIELDS FOR IMPROVEMENT

#### 5.2.1 Recommendations from the Project Advisory Committee (PAC)

The Project Advisory Committee meetings have resulted in some useful advice. The main points from the most recent advisory committee meeting have been:

PAC 06 (22.03.2012), Dokuz Eylül university, İzmir.

Followings presentations (by Mr O. Cankur) on the EMIT project activities to date, the audience (representing universities, national control labs, hospital labs, various TÜBİTAK and TAEK institutes) were asked to contribute suggestions as to how even more EMIT (potential) beneficiaries can be reached, some of which are listed below. General feedback on the project to date was also provided.

The issues discussed are mainly focused on the need of CRM's by the new attendees, namely Mr Bilal Dikmen from Ministry of Environment and Urbanism (MEU) and Ms İlgi KAPDAN from Dokuz Eylül University. They explained their CRM needs and asked UME to develop those CRMs

- Mr Bilal Dikmen (Ministry of Environment and Urbanization) mentioned the following issues:

- They need proficiency testing on different test materials  
Response: UME has already organised PT schemes but it is not possible to provide all the schemes needed in all sectors. If needed and there are adequate number of participants and also if UME has the capability to organise, UME will try to organise that one, but there are more PT providers needed, which will be the case with the completion of the EMIT project and another ongoing project SQIT (TKAG))

- They need some RM for Environmental samples

Response: currently, only soil as one of the environmental CRM will be produced by UME)

- Mr Bilal Dikmen emphasized the importance of production of CRMs at the national level.  
Response: Currently the project serves as the assistance to preaccession process. Therefore current aim is to facilitate the process and need for the Customs Union and the free movements of the goods. It is also mentioned that the production of primary level CRMs is difficult, time consuming and thus expensive. Therefore, it should be well programmed considering the programs of other producers or the availability of the produced CRM on the market.
- Ms İlgi Kapdan (Dokuz Eylül University)
  - Considering the economical issues, the production of CRMs in Turkey is very important. The CRMs produced from other countries are very expensive.
- Ms Ela Yazıcı (EU Delegation to Turkey).  
Ms Yazıcı mentioned about the other ongoing project SQIT which aims to support the quality infrastructure in Turkey related to measurements. One of the purposes of the project is to support to PT providers in Turkey. The project also aims to increase the number of PT providers. The project has organised approximately 20 rounds and TURKLAB is one of the collaborating institutions. Ms Zeliha Yıldırım is in charge of the component. The PT&ILC Committee established under this project is very active. UME is also participating in the PT&ILC Committee. The project will be finalised at the end of July and we expect UME's cooperation for the continuation and sustainability of the PT&ILC Committee.

### 5.2.2 Recommendations from the Steering Committee

The Steering Committee meetings have resulted in some useful advice. The main points from the most recent meeting have been:

EMIT SC7 (08.06.2012); TÜBİTAK UME, Gebze, Kocaeli.

Following the meeting's presentations and accompanying discussions (as listed in section 3.2) a number of actions spanning all agenda topics were agreed to be executed within three months of the meeting:

- Elaborate the strategic plan of TÜBİTAK UME
- Elaborate the strategic plan of TAEK
  - Add Mr M. Ince to the Circabc allowed users  
Status 06.08.2012: Mr M. Ince was successfully added.

## 6 ANNEXES

### 6.1 Annex 1: Updated Logical Framework

LOGFRAME PLANNING MATRIX For The Project Fiche		Programme name and number	Improving chemical and ionizing radiation metrology	Status at the end of the Third Interim Period (30.06.2011).
		Contracting period expires : FA + 2 years	Disbursement period expires: <i>3 years following the end date for contracting</i>	
		<b>Total Budget: EUR € 3,930,000</b>	<b>IPA Budget: € 3,930,000</b>	
Overall objective	Objectively verifiable indicators	Sources of verifications		
The overall objective is to contribute to the better functioning of the EU-Turkey Customs Union Agreement regarding the free movement of goods as well as to facilitate the implementation of <i>acquis communautaire</i> in quality of life related areas such as environmental, health and consumer protection and food safety	<ul style="list-style-type: none"> <li>- Improved implementation of harmonized legislation in the field of free movement of goods, food safety and environmental, health and consumer protection</li> <li>- The number of measurements linked problems related to export of products to EU countries decreased to one third of that encountered now</li> <li>- The number of measurements related problems reported for the domestic market decreased by one half</li> </ul>	<ul style="list-style-type: none"> <li>- European Commission Country Progress Reports</li> <li>- Publications of Rapid Alert System for Food and Feed</li> <li>- Foreign Trade Secretariat Reports</li> <li>- Reports by both Governmental and Non-Governmental Organisations</li> </ul>		
Project Purpose	Objectively verifiable indicators	Sources of verifications	Assumptions	
To enhance institutional and measurement capacity in chemical and ionizing radiation metrology to ensure that Turkish laboratories are able to produce traceable and comparable	<ul style="list-style-type: none"> <li>- TÜBİTAK UME and TAEK metrological capabilities support the implementation of the <i>acquis</i>, are improved and internationally recognized</li> </ul>	<ul style="list-style-type: none"> <li>- CIPM MRA CMC database</li> <li>- EURAMET records</li> <li>- TURKAK records</li> <li>- Individual PT providers reports</li> <li>- Universities information and</li> </ul>	<ul style="list-style-type: none"> <li>- Increased demand for metrological services in the field of chemical metrology and ionizing radiation due to the implementation of EU regulations and directives</li> </ul>	



<p>measurement results</p>	<ul style="list-style-type: none"> <li>- Turkish laboratories in chemical measurements and ionizing radiation fields and end users of CRMs better cope with measurement issues</li> <li>- Improved opportunities for academic education in chemical and ionizing radiation metrology</li> <li>- Chemical metrology topics included in the curriculum program or in the analytical chemistry courses of at least 2 universities included</li> <li>- Available trainers for training people in chemical metrology</li> <li>- The number of laboratories accredited for the chemical analysis in the field of environmental, food safety and life quality doubled</li> <li>- Increased metrological activities and number of PT providers as well as number of test materials</li> <li>-</li> </ul>	<p>lecture notes</p>	<ul style="list-style-type: none"> <li>- Dedication to the objectives of competent ministries and stakeholders indirectly involved in the project;</li> <li>- The project is supported by a separate follow-up project by which CRMs for country specific materials are produced</li> </ul>	
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Results	Objectively verifiable indicators	Sources of verifications	Assumptions	
<p><b>Component 1: Institutional capacity building for TÜBİTAK UME:</b></p> <p>1.1 New metrological capabilities/services in the field of chemical metrology developed and supported by documented and implemented strategies.</p> <p>1.2 TÜBİTAK UME quality system integrated with a management system developed according to ISO Guides 30-35</p> <p>1.3 TÜBİTAK UME chemistry laboratories prepared for accreditation as producer and supplier of CRMs to the PT providers</p> <p>1.4 New calibration and measurement capabilities to support the implementation of the acquis are ready for submission to the CIPM MRA CMC database</p>	<ul style="list-style-type: none"> <li>- Validation of 5 new measurement methods developed in TÜBİTAK UME chemistry laboratories</li> <li>- Increased number of TÜBİTAK UME services and CMCs</li> <li>- New or revised quality management procedures</li> <li>- Submitted to EURAMET minimum 5 CMC entries for inclusion into the CIPM MRA CMC database</li> <li>- At least two candidate CRMs from the identified production scope released by UME</li> <li>- Submitted application for TÜBİTAK UME's accreditation according to ISO Guides 30-35</li> </ul>	<ul style="list-style-type: none"> <li>- TÜBİTAK UME strategy, quality management system, list of services and reports</li> <li>- TURKAK database</li> <li>- EURAMET information and the CIPM MRA CMC database</li> </ul>	<ul style="list-style-type: none"> <li>- Appropriate international comparisons will be timely organised</li> <li>- EURAMET will timely process TÜBİTAK UME's CMC entries submitted for inclusion into the CIPM MRA database</li> <li>- TURKAK will timely process TÜBİTAK UME's application for accreditation</li> <li>- Supply of equipment project is accepted and implemented</li> </ul>	<p>IRMM input - See section 3.1.1. and 3.2.</p> <p>TÜBİTAK UME: Final strategic plan to be presented at the last Steering Committee Meeting (SC8 on 12.09.2012).</p> <p>IRMM: Final reports of 6 of the 8 LTTS complete.</p> <p>TÜBİTAK UME: About 75% of the TÜBİTAK UME Quality Manual has been prepared.</p> <p>3 CRMs at early stages i.e. ongoing feasibility studies, one complete, two draft. Two new methods (one being prepared for submission as a CMC). Multiple methods benefitting from LTT experience.</p> <p>Cold room construction to begin after the finalisation of the tendering procedure (mid 2013). New tender documents submitted on 09.11.2012</p> <p>IRMM: IRMM's duty with respect to providing advice on the technical specifications of the equipment was finalised in 2011.</p>

<p><b>Component 2: Institutional capacity building for TAEK:</b></p> <p>2.1 New metrological capabilities/services in the field of ionizing radiation metrology developed and supported by documented and implemented plans and programmes</p> <p>2.2 Secondary level standardisation procedures developed or improved</p> <p>2.3 TAEK institutes quality management systems extended and cover the new metrological services</p> <p>2.4 New calibration and measurement capabilities to support the implementation of the acquis are ready to submission to the CIPM MRA CMC database</p> <p>2.5 Preparation on the development of primary standardisation available and foreseen in TAEK institutes' strategies.</p>	<ul style="list-style-type: none"> <li>- Validation of minimum two new radioactivity measurement methods at TAEK radioactivity measurement laboratories.</li> <li>- Validation of minimum two dosimetric measurement methods at TAEK SANAEM dosimetry laboratories</li> <li>- Developed/Increased number of TAEK radioactivity measurement services</li> <li>- Improving two radioactivity measurement methods to secondary standard level.</li> <li>- Improving two dosimetric measurement methods to secondary standard level</li> <li>- Submitted applications for the extension of accreditation of TAEK laboratories according to ISO 17025</li> <li>- Submitted to EURAMET minimum 4 CMC entries for inclusion into the CIPM MRA CMC database</li> </ul>	<ul style="list-style-type: none"> <li>- TAEK institutes' strategies, quality management systems, lists of services and reports</li> <li>- TURKAK database</li> <li>- EURAMET information and the CIPM MRA CMC database</li> </ul>	<ul style="list-style-type: none"> <li>- Appropriate international comparisons will be timely organised</li> <li>- EURAMET will timely process TAEK institutes' CMC entries submitted for inclusion into the CIPM MRA database</li> <li>- TURKAK will timely process TAEK institutes' application for accreditation</li> </ul>	<p>TAEK (SANAEM &amp; ÇNAEM):</p> <ul style="list-style-type: none"> <li>☑A documented draft strategic plan is complete.</li> <li>☑TURKAK surveillance assessments planned for 02.07.2012.</li> <li>IRMM: Final reports of 7 LTTS complete.</li> </ul> <p>TAEK-SANAEM: Method 90-Sr in Bilberry has started. Secondary standardisation studies with ionization chamber has started.</p> <p>TAEK-ÇNAEM – Ready for assessment on “Gross alpha and beta analysis in drinking water in accordance with EPA 900.0” and “234U and 238U determination by alpha spectrometry in drinking water (self developed method) in July 2012.</p> <p>CMC tables have been performed for “Air kerma calibration at Co-60 beam for Therapy level dosimeters” and “Calibration of absorbed dose to water at Co-60 beam for Therapy level dosimeters” and sent to Dr Emin Yeltepe, who is the contact person of TAEK for EURAMET Technical Committee.</p>
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<p>Component 3: Knowledge transfer and human resources development</p> <p>3.1 TÜBİTAK UME and TAEK researchers familiar with functioning of metrology systems in EU member states with similar economic needs</p> <p>3.2 TÜBİTAK UME and TAEK researchers skilled and ready to carry out the new metrological services</p> <p>3.3 Turkish laboratories' experts knowledgeable how to consider metrological aspects in their activities</p> <p>3.4 Turkish universities familiar with the alignment of EU university programmes in measurement science with Bologna requirements</p> <p>3.5 Turkish universities interested in joining Euromaster Joint Degree Programme in measurement science conform to requirements</p>	<ul style="list-style-type: none"> <li>- 9 study visits to at least 2 EU Member States and prepared mission reports and presentations for each visit</li> <li>- 51 short term trainings and consultations for TÜBİTAK UME and TAEK and for each training, a training feedback or mission reports prepared</li> <li>- 6 experts from TÜBİTAK UME and TAEK annually on a long term training at JRC-IRMM and for dosimetry field, at an EU NMI</li> <li>- 18 seminars/workshops for the end-users and published proceedings</li> <li>- 10 workshops for the universities and published proceedings</li> <li>- Invitations to at least 20 universities on consultation of their curriculum programmes</li> </ul>	<ul style="list-style-type: none"> <li>- TÜBİTAK UME and TAEK reports and presentations</li> <li>- Reports from training providers</li> <li>- Workshop and seminar documents</li> <li>- TURKAK database</li> <li>- Universities' information database</li> </ul>	<ul style="list-style-type: none"> <li>- Available and interested Turkish laboratories' experts</li> <li>- Interested Turkish universities</li> </ul>	<p>TAEK: Associated presentations and mission reports to IRMM.</p> <p>TÜBİTAK UME: Associated presentations and mission reports to IRMM.</p> <p>Descriptions of the study visits carried out in the fifth interim are provided in section 3.2.</p> <p>IRMM: Final reports by 13 LTTs.</p> <p>IRMM: Training material provided in handout form to the participants. Mission reports completed by the trainers. The participant list and the individual evaluation forms are uploaded onto circabc, after each event.</p> <p>IRMM: It was decided from the beginning to use every event carried out in every university (20 Turkish universities visited) as an opportunity to explain about the project in general (using the opportunity to peak their interest in the Euromaster Joint Degree Programme in Measurement Science).</p> <p>Three places were arranged before the end of June 2012 (for three Turkish students) to attend the Euromaster Summer school, to be held in Fatima, Portugal (15 – 28 July).</p>
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<p>Component 4: Networking and Raising Awareness</p> <p>4.1 European NMIs familiarised with the development of TÜBİTAK UME and TAEK's capabilities</p> <p>4.2 Network of contacts in the field of metrology established, strengthened and operational</p> <p>4.3 Network of contacts with universities established and strengthened</p> <p>4.4 Chemical and ionizing radiation metrology topics discussed with national experts and stakeholders</p> <p>4.5 International metrology community informed about TÜBİTAK UME and TAEK capabilities</p>	<ul style="list-style-type: none"> <li>- Information about the development of TÜBİTAK UME and TAEK's capabilities presented to EURAMET at TC meetings</li> <li>- 2 proposed joint research projects with partner organisations (other NMIs) in the field of chemical metrology</li> <li>- 8 coordination meetings with stakeholders in chemical and ionizing radiations metrology</li> <li>- Number of partner universities</li> <li>- 4 national conferences in chemical and ionizing radiations metrology organised</li> <li>- At least 10 participations of Turkish experts in international conferences and events</li> </ul>	<ul style="list-style-type: none"> <li>- EURAMET Technical Committees on Ionizing Radiations (TC-IR) and Metrology in Chemistry (TC-MC)</li> <li>- Minutes from the stakeholders' meetings</li> <li>- Minutes from meetings with universities</li> <li>- Conference materials</li> <li>- Symposiums and workshops</li> </ul>	<ul style="list-style-type: none"> <li>- Key partnerships between existing institutions, laboratories and non-governmental organisations will be established</li> <li>- Awareness events will be well attended</li> <li>- Project teams of this and other EU financed projects in the fields of free movement of goods, food safety and environmental, health and consumer protection (if any) will cooperate and coordinate activities</li> </ul>	<p>By TÜBİTAK UME and TAEK:</p> <ul style="list-style-type: none"> <li>- Hosting the twice yearly PAC meetings or arranging their hosting elsewhere.</li> </ul> <p>By IRMM:</p> <ul style="list-style-type: none"> <li>- Taking the PAC feedback into account and using it to make improvements throughout the project duration.</li> </ul> <p>IRMM: The 20 universities which hosted EMIT workshops, seminars and conference sessions were:</p> <p>1)METU, Ankara, 2) KTU, Trabzon, 3) IU, Istanbul,4) ITU, Istanbul, 5) Uludag, Bursa, 6) Ege, Izmir, 7) Adiyaman, 8) Gazi, Ankara, 9) Hacettepe, Istanbul, 10) YTE, Izmir, 11)Ataturk, Erzurum, 12) OMU, Samsun, 13) University Hospital, Izmir, 14) Çukurova, Adana, 15) Mersin, 16) DEU, Izmir, 17) Erciyes, Kayseri, 18) Trakya, Edirne, 19) Akdeniz, Antalya and 20) MKU, Hatay (last one foreseen for Sep.2012).</p> <p>IRMM and TÜBİTAK UME: The preparation of the "chemical reference measurements" conference session (EMIT S02-03) to be held at the 6<sup>th</sup> National Congress of Analytical Chemistry, Hatay, Sep. 2012 progressed (with</p>
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				<p>significant difficulty) during the fifth interim period.</p> <p>A 3 day Concluding Conference entitled “Improving chemical and ionising radiation metrology in Turkey – the achievements” was held (11-13 June 2012) with around 77 external participants (spanning all stakeholders) in the Green Park Pendik Hotel &amp; Convention Center, Pendik Istanbul, Turkey.</p> <p>Posters for 34 workshops and posters by each of the 18 LTTs were prepared and displayed during the conference. A book of abstracts (JRC 71696) was prepared containing 40 abstracts from dignitaries, directors, experts and long term trainees.</p>
				<b>Preconditions</b>
				-



## 6.2 Annex 2: EMIT Event List

Subject	Ref. in Gantt chart	Date	Precise topic	Event type (workshop with practicals/seminar lectures/visit....)	Duration (days)	Participant origin
03 Ionising Radiation Metrology	S03-01	2009-11-25	Primary standardisation techniques in RN metrology	Workshop in Turkey	1	TAEK & from universities
03 Ionising Radiation Metrology	S03-02	2009-11-25	Gamma-ray spectrometry	Workshop in Turkey	1	TAEK & from universities
03 Ionising Radiation Metrology	S03-06	2009-11-25	Liquid scintillation	Workshop in Turkey	1	TAEK & from universities
03 Ionising Radiation Metrology	S03-12	2009-11-25	Ion chambers + RN calibrators	Workshop in Turkey	1	TAEK & from universities
03 Ionising Radiation Metrology	S03-28a	2010-01-20	Conference participations for TAEK staff (max 3); a) <b>Proficiency Testing Workshop</b> , NPL, London, U.K.	Meant for Turkish scientists (3 x 1 person at each conf.)	1	TAEK
03 Ionising Radiation Metrology	S03-28b	2010-03-08	Conference participations for TAEK staff (max 3) b) <b>IM2010</b> , Athens, Greece.	Meant for Turkish scientists (3 x 1 person at each conf.)	5	TAEK
04 Quality, metrology education and Training.	S04-01	01/04/2010 and 02/04/2010	Visit to establish contact with university co-ordinator of the "out-reach to universities" part of EMIT.	Visit	2	TUBITAK UME & university
01 Reference Materials	S01-01	2010-05-04	Use of certified reference materials	Workshop in Turkey (by L. Majoros, ....)	2	TÜBİTAK - 7; TAEK -9; National control labs - 8; universities -11, industry -4
01 Reference Materials	S01-07	2010-05-06	Use of certified reference materials	1 day training visit to Marmara university and Yeditepe university	2	Professors, lecturers and students: 59 at Marmara university and 22 at Yeditepe university
03 Ionising Radiation Metrology	S03-17	2010-05-10	Radiochemical lab practice (in IJS labs)	Short term training on practical lab techniques	10	TAEK & from universities (8 partic)
03 Ionising Radiation Metrology	S03-18	2010-05-20	Therapy level dosimetry	Workshop on IAEA dose protocols,	3	Medical physicists from radiotherapy centers
01 Reference Materials	S01-13	2010-06-09	Technical advise (Study Visit) of IRMM expert to TÜBİTAK UME for the investigation of their needs for the preparation and certification of CRMs (including info on technical requirements of CRM production equipment).	Training visit by IRMM expert TÜBİTAK UME by H. Emteborg	2	TÜBİTAK UME and TÜBİTAK MAM Experts
04 Quality, metrology education and Training.	S04-18a	2010-06-22	University outreach meeting -2/20 (Erzurum University)	Visit	3	TÜBİTAK UME & 51 Turkish universities represented (74 Turkish scientists personally addressed)
03 Ionising Radiation Metrology	S03-08	2010-09-13	Liquid scintillation	Study visit to IRMM (1 participant)	3	SANAEM
03 Ionising Radiation Metrology	S03-16	2010-09-13	Alpha-spectrometry + DSA counting	Study visit to IRMM (1 participant)	10	SANAEM
02 Primary Methods of Measurement	S02-07	2010-09-20	Advise on ToR for the clean rooms	Training visit by 2 IRMM (IM) experts to TÜBİTAK UME.	3	TÜBİTAK
01 Reference Materials	S01 - 21	2010-09-27	GC MS Course, Liverpool, U.K.	Workshop provided by external body (Amoeba Sciences) (1 trainee)	5	TÜBİTAK
01 Reference Materials	S01-02	2010-10-05	Processing of certified reference materials	Workshop in TÜBİTAK UME	2	Mostly TÜBİTAK participants expected (due to topic) but open places also available.
S05 GENERAL	S05-05	2010-10-05	PAC Seminar - EMIT Project status and FSQ talk.	PAC-03 Seminar in Yeditepe University, Istanbul. (2 IRMM experts)	1	Mostly PAC and university participants.
04 Quality, metrology education and Training.	S04-19	2010-10-06	Visit to Ataturk University, Erzurum (to prepare S04-12 Conference session).	Visit	1	Conference organising committee
S05 GENERAL	S05-06	2010-10-19	Steering Committee Meeting (2 from IRMM)	SC-04 in Ankara (TAEK-SANAEM premises).	1	Steering Committee members
04 Quality, metrology education and Training.	S04-03	2010-10-20	Roadmap for facilitating educational innovations in Metrology in Chemistry and Ionising Radiation	Workshop in Turkey (1 day)	1	2/3 places will be open for free registration (for any relevant institution or university in Turkey)
04 Quality, metrology education and Training.	S04-20	2010-10-21	IRMM participation in Turkish TrainMic (2 from IRMM)	Turkish TrainMic event	2	TUBITAK UME (71 participants - not counted in EMIT as this was organised by the National TrainMic team)
01 Reference Materials	S01-18	2010-11-23	"The Future of Reference Materials - Science & Innovation" <b>IRMM Symposium</b> participations for TUB & TAEK staff.	Seminars (F) or Workshop (E) (11 EMIT participants)	3	TÜBİTAK and TAEK scientists.

Subject	Ref. in Gantt chart	Date	Precise topic	Event type (workshop with practicals/seminar lectures/visit....)	Duration (days)	Participant origin
04 Quality, metrology education and Training.	S04-04_09	22/02/2011 - 24/02/2011	Sampling, Metrology in Chemistry, Internal QC, Applied Statistics, Method optimisation, Sel. & Use of RMs, Inter Lab comparisons....	Workshop in Karadeniz University, Trabzon, Turkey (2.5 days for 40 participants)	2.5	2/3 places will be open for free registration (for any relevant institution or university in Turkey).
01 Reference Materials	S01-03	2011-03-01	CERTIFICATION of reference materials (Trainers L. Majoros, R. Koeber, A. Lamberty).	Workshop in Turkey in TÜBİTAK UME premises	2	2/3 places will be open for free registration (for any relevant institution or university in Turkey)
01 Reference Materials	S01-08	2011-03-03	Lectures on "Certification of reference materials".	İstanbul Üniversitesi & İstanbul Teknik Üniversitesi, Turkey.	1	Open
02 Primary Methods of Measurement	S02-01	2011-03-15	PMM topics - Uncertainty, Method validation (IDMS perspective), Prim. Meth. Meas (e.g. ICP-ID-MS), Accreditation (flexible scope), Innovations in ICP-MS....	Workshop in TUBITAK UME, Gebze, Turkey	2.5	2/3 places will be open for free registration (for any relevant institution or university in Turkey)
01 Reference Materials	S01-16	2011-04-07	Lectures on "Use and certification of reference materials". (L. Majoros and E. Engin).	Seminars (F); Bursa Uludağ University on 7th and 2 seminars in İzmir Teknoloji Enstitüsü on 8th.	3	Universities & other end-users.
04 Quality, metrology education and Training.	S04-14	2011-04-04	Workshop on "Safety of food & feed – requirements of an analytical laboratory"	Workshop, Adiyaman University.	2	Universities & other end-users.
S05 GENERAL	S05-07	2011-04-06	PAC Seminar - Host speakers	PAC-04 Seminar in Adiyaman University, Adiyaman	1	Mostly PAC and university participants. 34 at seminar lectures and 17 at PAC meeting (restricted attendance).
04 Quality, metrology education and Training.	S04-13	2011-05-24	Workshop on "Metrology in Nanotechnology" (Gazi University)	Workshop	1.5	Universities & other end-users.
03 Ionising Radiation Metrology	S03-10	2011-06-06	Sample preparation and Instrument efficiency calibration in LSC	Workshop at SANAEM	3	ÇNAEM + SANAEM (restricted participation).
03 Ionising Radiation Metrology	S03-25	2011-06-07	Contamination survey meter calibration	Short term training at PTB (when LTT there) - 3 ÇNAEM staff	4	ÇNAEM
03 Ionising Radiation Metrology	S03-27	2011-06-17	QA/QC for therapy and diagnostic irradiation systems	Workshop /short term training	2	ÇNAEM, QA, QC responsables from hospitals
03 Ionising Radiation Metrology	S03-05	2011-06-20	Advanced Gamma-ray spectrometry, 1 - True/Chance coincidence correction methods	Short term training (at TAEK-SANAEM)	4	ÇNAEM + SANAEM (restricted participation to 15).
02 Primary Methods of Measurement	S02-05	2011-06-21	Lectures in the field of Inorganic chemical/isotopic reference measurements. C. Quétel, S. Can, B. Ari.	Seminar lectures, Ankara, Izmir, Turkey. 40-50 participants.	2.5	Universities & other end-users.
04 Quality, metrology education and Training.	S04-12	2011-06-29	Conference (0.5 d session at the 25th National Chemistry Congress, Erzurum, Turkey)	Experts from EU and Turkey will lecture at a special session of the 25th National Chemistry Congress, Erzurum.	3	Universities, other end-users & Turkish institutes
03 Ionising Radiation Metrology	S03-30	2011-07-07	Dosimetry	Study visit to PTB (1 participant)	1	ÇNAEM
04 Quality, metrology education and Training.	S04-21	2011-07-10	Euromaster in Measurement Science Summer school.	Summer school, Poznan, Poland.	10	Post-graduate students from a Turkish university.
01 Reference Materials	S01-23	2011-08-21	Dioxin 2011, Brussels, Belgium (1 person)	Study visit (in Belgium).	5	LTT from TÜBİTAK UME (B. Binici)
01 Reference Materials	S01-04	2011-09-05	USE of certified reference materials (Trainers LM, TL, GA)	Workshop in Turkey	2	TÜBİTAK UME and TÜBİTAK MAM Experts (20-30 people)
02 Primary Methods of Measurement	S02-04(a)	2011-09-08	Conference participations for TUB staff : CEST 11, Rhodes, Greece. (1 person).	Conference attendance	3	TÜBİTAK UME and TÜBİTAK MAM Experts
01 Reference Materials	S01-10	2011-09-20	Planning, Preparation and Certification of reference materials.	Workshop at IRMM (21 participants)	3	TÜBİTAK UME and TÜBİTAK MAM Experts.
01 Reference Materials	S01-05	2011-10-04	PREPARATION of reference materials (PHE, JCG, LM)	Workshop in Turkey	2	TÜBİTAK UME and TÜBİTAK MAM Experts (20-30 people)
01 Reference Materials	S01-09	2011-10-06	Lectures on "Use and certification of reference materials".	3 x 1 day training visits to different places in ( <b>Samsun</b> ) Turkey (by L. Majoros, IRMM expert) <b>Seq. 3 of 3</b>	1	TÜBİTAK UME and TÜBİTAK MAM Experts, Universities and End Users
04 Quality, metrology education and Training.	S04-02	2011-10-18	Integrated Quality Systems: an interpretation for universities	Workshop in Uludag University, Bursa.	3	UME, MAM, universities & TAEK
S05 GENERAL	S05-09	2011-10-20	PAC Seminar - Host speakers	PAC-05 Seminar in Uludag University, Bursa.	1	Mostly PAC and university participants.
S05 GENERAL	S05-10	2011-10-27	Steering Committee Meeting (2 from IRMM)	SC-06 in TAEK-ÇNAEM, Istanbul.	1	Steering Committee members
03 Ionising Radiation Metrology	S03-19	2011-11-17	Conference (session) - Therapy level dosimetry	2 NMI and 2 TAEK will lecture in National Medical Physics Congress in Izmir (17-19 Nov., 2011)	5	Medical physicists from radiotherapy centers (including staff/students from universities, other end-users & Turkish institutes)

Subject	Ref. in Gantt chart	Date	Precise topic	Event type	Duration (days)	Participant origin
01 Reference Materials	S01-06	2012-01-31	CERTIFICATION of reference materials	Workshop in Turkey (by L. Majoros, ...)	3.5	TÜBİTAK UME and TÜBİTAK MAM Experts, universities and other endusers (30-40 people)
01 Reference Materials	S01-12	2012-02-02	Assignment of the reference value for the CRM (statistical aspects)			TÜBİTAK UME and TÜBİTAK MAM Experts
01 Reference Materials	S01-17	2012-02-21	Lectures on dissemination of knowledge in the field of analytical methods for the production of reference materials in organic matrices	Seminar lectures, Çukurova University (Adana) and Mersin University (Mersin), Turkey, 40-50 participants.	2	Universities & other end-users.
03 Ionising Radiation Metrology	S03-20_23	2012-03-01	Protection level dosimetry	Lecture on portable survey meters at ÇNAEM	2	Industrial radiography workers, medical workers, TAEK staff.
03 Ionising Radiation Metrology	S03-03	2012-03-12	Workshop on Advanced Gamma-ray spectrometry	One workshop with practicals (TAEK-SANAEM labs)	5	Universities
04 Quality, metrology education and Training.	S04-16	2012-03-20	Workshop on "Auditing of integrated management systems",	Dokuz Eylül University, İzmir (Turkey), 3 days, 25 participants.	3	Practitioners from accredited/certified labs are the target audience.
S05 GENERAL	S05-11	2012-03-22	PAC Seminar - Host speakers	PAC-06 Seminar in Dokuz Eylül University, İzmir (Turkey).	1	Mostly PAC, control lab, industry and university participants.
02 Primary Methods of Measurement	S02-02	2012-03-28	Workshop on Isotopic methodology and metrology in chemistry to inorganic reference measurements	Erciyes University (Kayseri), Turkey, 2.5 days, 40-50 participants.	3	Practitioners from control labs, industrial labs and university labs (incl TÜBİTAK UME & TÜBİTAK MAM) are the target audience.
04 Quality, metrology education and Training.	S04-17(a,b)	2012-04-25	Conference participations for Turkish univ. profs (a&b=max 2); Prof. M. Demir and Prof.Dr. Timur Dogu. EC2E2N (ACE 2012), Milan.	Meant for Turkish univ. profs	4	Conf. participants.
03 Ionising Radiation Metrology	S03-26	2012-05-21	Postal Thermoluminescence dosimetry comparison applications, calibration	Study visit to IAEA Vienna (4 people)	2	ÇNAEM
02 Primary Methods of Measurement	S02-06	2012-05-22	Lectures in the field of Inorganic chemical/isotopic reference measurements	Seminar lectures, Trakya University (Edirne, 22 May) and Istanbul University (Istanbul, 23 May), Turkey, 40-50 participants.	2.5	Universities & other end-users.
03 Ionising Radiation Metrology	S03-24	2012-06-04	X ray energy qualities, KAP meter calibration, CT ion chamber calibration	Workshop /short term training at PTB (5 trainees)	5	ÇNAEM
04 Quality, metrology education and Training.	S04-15 & extra STT 01	2012-06-05	Workshop on "Setting up your QM system - who to train, on what, when and how?";	Akdeniz University, Antalya (Turkey). Participation is restricted to those involved in QM in research labs, control labs, industrial labs and university labs.	3	Universities & other end-users.
S05 GENERAL	S05-12	2012-06-08	Steering Committee Meeting (2 from IRMM)	SC-07 in TÜBİTAK UME, Gebze (Turkey).	1	Steering Committee members
S05 GENERAL	S05-15	2012-06-11	CONCLUDING CONFERENCE	One conference in Turkey (3 days)	3	Participants - 300
03 Ionising Radiation Metrology	S03-11	2012-06-18	Liquid scintillation, 2 - Double energetic window method for Sr-90, Pb-210 analysis with LSC	Short term training (in IRMM)	10	ÇNAEM + SANAEM
01 Reference Materials	S01 - 22	2012-06-18	LC-MS Course, Amoeba Sciences (Berlin, Germany).	Workshop provided by external body (1 trainee)	5	TÜBİTAK
03 Ionising Radiation Metrology	S03-09	2012-06-25	Liquid scintillation	Study visit to SCK & IRMM (2 people)	5	SANAEM
02 Primary Methods of Measurement	S02-04(b)	2012-06-25	Conference participations for TUB staff : BERM 13, Vienna, 2012 (4 people)	Conference attendance	5	TÜBİTAK UME and TÜBİTAK MAM Experts
01 Reference Materials	S01-15(b,c)					
03 Ionising Radiation Metrology	S03-28 bc	2012-06-25	Conference participations for TAEK staff (BERM 13, Vienna, 2012, 2 people)	Conference attendance	5	TAEK
04 Quality, metrology education and Training.	S04-11	2012-07-03	Statistics; Uncertainty Determination and Budget for radionuclide metrology applications (+ expert Benedik...)	One workshop in Turkey with practicals	3	Universities & TAEK
04 Quality, metrology education and Training.	S04-22	2012-07-12	Euromaster in Measurement Science Summer school	3 x Study visit - Summer school, Fatima, Portugal.	10	Post-graduate students from a Turkish university.
03 Ionising Radiation Metrology	S03-09bis extra STT 03	end August	Laboratory services and QM systems at Rad Meas labs of SCK-CEN	Study visit to SCK (2 people from TAEK-ÇNAEM)	2	ÇNAEM
02 Primary Methods of Measurement	S02-03	06 or 07/09/2012	Conference (0.5 d session at 6th National Congress of Analytical Chemistry, Turkey).	Experts from EU (NMI and/or IRMM) and UME will lecture in 6th National Congress of Analytical Chemistry, Mustafa Kemal University, Hatay, Turkey	5	Universities, other end-user labs & Turkish institutes
02 Primary Methods of Measurement	S02-03 extra STT 02	2012-09-03	Study visit at 6th National Congress of Analytical Chemistry, Turkey	Scientists (4-5) to attend the 6th National Congress of Analytical Chemistry, Mustafa Kemal University, Hatay, Turkey (as an extra STT in lieu of 1 LTT)	5	Universities, other end-user labs & Turkish institutes
S05 GENERAL	S05-13	2012-09-07	PAC Seminar - Host speakers	PAC-07 Seminar in Mustafa Kemal University, Hatay, Turkey (from IRMM & UME)	1	Mostly PAC and university participants.
03 Ionising Radiation Metrology	S03-13	2012-09-10	Ion chambers + RN calibrators	One expert visit from IRMM (discussion of achievements and future planning, SANAEM and ÇNAEM)	3	TAEK
03 Ionising Radiation Metrology	S03-14	2012-07-01	Ion chambers + RN calibrators	Actual calibration of TAEK SANAEM's ionisation chamber at PTB - specific contract with PTB for that (U.R.)	NA	SANAEM
03 Ionising Radiation Metrology	S03-15	2012-09-10	Ion chambers + RN calibrators	Study visit to PTB (2 participants, Yeltepe and Sahin)	5	SANAEM
04 Quality, metrology education and Training.	S04-10	2012-09-10	Workshop on Proficiency testing and statistical evaluation	TÜBİTAK Butal, Bursa, Turkey, 2 days, 40-50 participants.	2	Practitioners from control labs, industrial labs and university labs (incl TÜBİTAK UME & TÜBİTAK MAM) are the target audience.
S05 GENERAL	S05-14	2012-09-12	Steering Committee Meeting (2 from IRMM)	SC-08 in TAEK-SANAEM (McCourt & Waetjen)	1	Steering Committee members
04 Quality, metrology education and Training.	S04-23 extra STT 04	2012-09-17	Training course on MicroTOF-Q-Proteomics and ESI Quantitation	One scientist from TÜBİTAK UME (Merve Oztug Senal) at Bruker Chemical Analysis, Goes, NL.	5	TÜBİTAK UME
04 Quality, metrology education and Training.	S04-24 extra STT 05	2012-09-17	Training course on Gas Purity Analysis	One scientist from TÜBİTAK UME (Tanil Tarhan) at an EU course provider (3 RITT nec)	5	TÜBİTAK UME

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#### Abstract

The overall objective of the Europe and Metrology in Turkey (EMIT) project is to contribute to the better functioning of the EU-Turkey Customs Union Agreement regarding the free movement of goods as well as to facilitate the implementation of the *acquis communautaire* in quality of life related areas such as environmental, health and consumer protection and food safety.

To achieve this goal the project consists of an inception phase (complete since 31.12.2009) and 4 components, which are associated with certain interventions, during the implementation phase (01.01.2010 to 30.06.2012) with the project being consolidated during the final phase (01.07.2012 to 30.09.2012).

This fifth interim report provides the overview on the project's progress for the duration of the fifth six month period of the implementation. It also offers a plan for the activities to be conducted within the final reporting period.

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