

## Report to the EURAMET GA on TC-IR activities

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 TC-IR Chair

### 1. General Aspects

This report summarizes the activities of the EURAMET Technical Committee for Ionizing Radiation for the period May 2016 to May 2017. The TC-IR currently has contact persons from 27 EURAMET member countries. IAEA and BIPM as liaison organization are observers. The TC-IR annual contact person meeting was organized by METAS in Berne end of January 2017. Among others one topic was the internal structure of TC-IR that was laid down in the separate document *Objectives of TC-IR*. EURAMET TC-IR is organized in three working groups to focus on CMCs and work related to the roadmaps. BEV in Vienna, Austria, will be the host of the next TC-IR CP meeting in early February 2018. The meeting will be held over 2.5 days, one of which will be a joint meeting with TC-MC to foster knowledge exchange between the TCs and to identify ideas for cooperation. A separate meeting with focus on presentations and discussions of project proposals for the EMPIR calls 2018 will be held end of November 2017 in Brussels.

### 2. Projects – comparisons

There are 11 ongoing EURAMET-TC-IR projects. Five projects were completed May 2016 through May 2017.

ID	Starting Date	Title	Coordinating institute	Collaboration type
608	2001-10-01	International Inter-comparison Test Program of instrument calibrations for neutron dosimetry	LNE-IRSN	Comparison
1132	2013-01-17	Comparison of the ambient dose equivalent rate for photon radiation	PTB	Comparison
1285	2013-03-01	Comparison of air kerma and dose to water standards for Co-60 radiation beams for radiotherapy	METAS	Comparison
1383	2015-09-01	Bilateral Comparison on I-131 standardisation	POLATOM	Comparison
1326	2014-09-01	Comparison of the air kerma standards for Cs-137 and Co-60 gamma-ray beams for radiation protection measurements	IST/ITN	Comparison
1362	2015-05-18	Comparison of air kerma measurements for Tungsten anode based mammographic X-ray beam qualities	IAEA	Comparison
1387	2016-02-01	Supplementary comparisons of the calibration of low energy x-ray air kerma standards	NRPA	Comparison

1388	2016-02-01	Supplementary comparisons of the calibration of protection level x-ray air kerma standards	NRPA	Comparison
1386	2016-02-01	Supplementary comparison of the calibration of medium energy x-ray air kerma standards	NRPA	Comparison
1389	2016-02-01	Bilateral comparison of air kerma and absorbed dose to water measurements for Co-60 and Cs-137	BEV	Comparison
1398	2017-01-01	Comparison of personal dose equivalent at 0.07 mm and 3 mm depth, Hp(0.07) and Hp(3), for beta radiation	PTB	Comparison

### Projects completed May 2016 through May 2017

ID	Date	Title	Coordinating institute	Collaboration type
628	2003-10-14	Direct comparison of primary standards of air kerma for medium energy (300 kV) X-rays	NPL	Comparison
936	2007-07-01	Comparison of long counter measurements of monoenergetic neutron fluences	NPL	Comparison
1104	2009-07-01	Comparison of the neutron spectra of reference neutron sources for the improvement of the ISO 8529 Standard series	NPL	Research
1243	2013-03-01	The interlaboratory comparison of the radionuclide calibrations	FTMC	Traceability
1284	2013-10-01	Survey of European countries' legal regulations and practices in ionising radiation calibrations	NRPA	Consultation

### 3. CMCs of TC-IR

TC-IR has organized a separate working group for CMCs and comparisons. Both leaders Bruno Chauvenet, LNHB, France and István Csete, IAEA stepped down end of January 2017 because of their retirement in 2017. They have done an excellent job over more than ten years and their work and contributions were extremely valuable for TC-IR.

The working group is split in the three teams Radioactivity, Dosimetry and Neutrons for the CMC reviews in the three IR fields. Dirk Arnold, PTB, Germany was elected as new working group leader. Team leaders and volunteers being members of the review teams were also found and nominated. Detailed information is given in the annex.

One topic at the last annual meeting was the revision of the CIPM-MRA. The document *Recommendations from the Working Group on the Implementation and Operation of the CIPM MRA (08/2016)* (available on the BIPM website) was presented and consequences for TC-IR were discussed. As outcome, an AdHoc group was established for the preparation of a document *TC-IR*

Proposal for a revised scheme for the CMCs for the IR fields Radioactivity, Dosimetry and Neutrons. This group held a meeting in Berlin end of April, the proposal is currently being approved by the members of TC-IR and shall be presented at the next CCRI meetings end of June at BIPM.

### CMC review completed and published in the reporting period (2016-2017)

Subfield	JCRB file name	NMI/country	Claims/date
Radioactivity	EURAMET.RI.26.2016	LNE/LNHB, France	205, (29/09/2016)
	EURAMET.RI.23.2015	CIEMAT, Spain	104, (22/04/2016)
Dosimetry	EURAMET.RI.24.2015	IAEA, Int. Org.	27, (29/02/2016)
	APMP.RI.9.2015	NMIJ, Japan	29, (20/03/2015)
	COOMET.RI.11.2016	NMI, Moldova	2, (25/11/2016)
	SIM.RI.14.2015	ININ, Mexico	6, (29/02/2016)
Neutron	----	----	----

### Overview of the ionizing radiation CMCs

	Country/lab	Dosimetry	date of publ.	review	review	Activity	date of publ.	review	review	Neutron	date of publ.	review	review	published
				pending IRTC	pending RMOs			pending IRTC	pending RMOs			pending IRTC	pending RMOs	
1	Austria/BEV	50	31/01/2012			100	15/09/2003							150
2	Bulgaria/BIM NCM	7	14/02/2007	3		16	04/06/2013							23
3	Czech Republic/CMI	7	11/03/2005	7		104	15/09/2003	98		12	19/05/2005	22		123
4	Finland/STUK	30	31/01/2012											30
5	France/LNE-LNHB	82	10-04-2013			166	16/09/2016			15	19/05/2005			263
6	Germany/PTB	90	07/10/2014			158	20/01/2010			20	19/05/2005	26		268
7	Greece/GAEC	35	12/10/2009											35
8	Hungary/MKEH	26	31/01/2012			74	04/06/2013							100
9	IAEA	27	29-02-2016											27
10	Italy/ENEA	76	11/03/2005	76		13	15/09/2003			9	19/05/2005			98
11	Netherlands/VSL	21	31/01/2012			57	15/09/2003							78
12	Norway/NRPA	22	31/01/2012											22
13	Poland/GUM	4	31/01/2012			68	15/09/2003							72
14	Portugal/ITN	43	11/03/2005	38										43
15	Romania/IFIN					36	10/05/2013							36
16	Slovakia/SMU	30	15/05/2008			37	15/05/2008			9	15/05/2008			76
17	Spain/CIEMAT	52	15/05/2008	17		104	22.04.2016							156
18	Sweden/SSM	26	31/01/2012											26
19	Switzerland/METAS	3	31/01/2012			21	15/09/2003							24
20	United Kingdom/NPL	27	20/07/2015			116	15/09/2003	115		42	19/05/2005			185
21	Slovenia/MIRS-IJF-F2	9	30/11/2015			5	30/11/2015							14
22	Turkey/TAEK					3	26/08/2014							3
23	Denmark/Riso	9	20/04/2015											9
Total EURAMET		676		141		1078		213		107		22		1955
All IR CMCs		1021				2717				199				3937

The yellow colored claims are older than 5 years and have to be revised.

## 5. Organizational structure of TC-IR

At the last CP annual meeting the TC-IR internal structure and rules of procedure as well as responsibilities were discussed. The agreements were laid down in the document *Objectives of TC-IR*. Following functions and bodies were established (see also the annex):

- a) TC-IR annual CP meeting
- b) TC-Chair
- c) Management Board
- d) Working group *CMCs and Comparisons*
- e) Working group *Ionizing Radiation and Radionuclides in Health*
- f) Working group *Ionizing Radiation and Radionuclides in Environment, Energy and Industry*
- g) Contact person *Capacity Building*

### **Working group *CMCs and Comparisons*** (leader: Dirk Arnold, PTB, Germany)

This working group has CMC reviewing as its main task. The work is under the supervision of the CIPM MRA. The technical procedures, set up by the documents CIPM MRA D-04 and EURAMET Guide No. 3 *EURAMET Procedures and Review Criteria for CMCs*, should be followed. Strict deadlines must be adhered to and a large metrology network is to be coordinated. The group leader organizes the CMC reviewing, follows the results of comparison projects and coordinated the TC-IR activities in all aspects concerning CIPM MRA revision. For review of CMC claims three review teams for the fields Radioactivity, Dosimetry and Neutron were established. The review process is organized and/or done by the respective team leader.

### **Working group *Ionizing Radiation and Radionuclides in Health*** (leader: Jean-Marc Bordy, LNE-LNHB, France)

This working group focuses on important topics concerning the application and use of ionizing radiation in the field of Health which are given and described in the roadmap *Ionizing Radiation and Radionuclides in Health*. An important task is also to observe the developments in ionizing radiation to identify new metrological challenges for developing the TC-IR strategy. The working group establishes connections with stakeholders, standardization bodies and research organizations and institutes to enhance the interdisciplinary work in metrology for Health as well as to be able to realize important topics in project proposals for EMPIR and other funding bodies.

At the last annual TC-IR meeting new activities and progress of research projects were presented. A special focus laid on the update of the two existing roadmaps for the topic Health. Since the last revision many new developments and approaches in medicine using ionizing radiation have come up and should be considered. It was agreed that the combination of both roadmaps into one with the title *Ionizing Radiation and Radionuclides in Health* is much more appropriate. The working group will prepare the new roadmap and present it at the next annual meeting in February 2018.

### **Working group *Ionizing Radiation and Radionuclides in Environment, Energy and Industry*** (leader: Franz-Josef Maringer, BEV, Austria)

This working group has the focus on important topics concerning the application and use of ionizing radiation in the field Environment, Energy and Industry which are given and described in the roadmap *Ionizing Radiation and Radionuclides in Environment, Energy and Industry*. An important task is also to observe the developments in ionizing radiation to identify new metrological challenges for

developing the TC-IR strategy. The working group establishes connections with stakeholders, standardization bodies and research organizations and institutes to enhance the interdisciplinary work in metrology for Environment, Energy and Industry as well as to be able to realize important topics in project proposals for EMPIR and other funding bodies.

At the last annual meeting TC-IR an overview was given about new interesting topics and the progress of research projects in the fields Environment, Energy and Industry. The current version of the roadmap for these fields was presented and changes for considering new approaches were discussed. The working group will prepare a new version of the roadmap and present it at the next annual meeting in February 2018.

**Contact persons *Capacity Building*** (contact person: Denis Glavič-Cindro, MIRS, Slovenia)

A couple of TC-IR contact persons come from countries with emerging metrological infrastructure in ionizing radiation. At the last meeting, these CPs again requested support, e.g. training visits in other institutes or training in organizing and performing comparisons. To coordinate the TC-IR activities for capacity building and to stay in touch with the EURAMET officer for capacity building the position of a TC-IR contact person *Capacity Building* was established.

## 6. Participation in EMRP/ EMPIR

### I. New EMPIR JRPs with start in 2017:

<b>MetroRadon</b>	16ENV10, Metrology for radon monitoring, Franz-Josef Maringer (BEV, Austria), start June 2017
<b>MetroDecomII</b>	16ENV09, In-situ mMetrology for decommissioning nuclear facilities, Steven Judge (NLP, UK), start June 2017
<b>Preparedness</b>	16ENV04, Metrology for mobile detection of ionising radiation following a nuclear or radiological incident, Stefan Neumaier (PTB, Germany), start August 2017

### II. Current EMPIR projects:

<b>Absorb</b>	14RPT04, Absorbed dose in water and air, Jean Marc Bordy (LNE-LNHB, France)
<b>Digital Standard</b>	14SIP07, Standard for digital data format for nuclear instrumentation, John Keightley (NPL, UK)
<b>PerfusImaging</b>	15HLT05, Metrology for Multi-Modality Imaging of Impaired Tissue Perfusion, Tobias Schäffter (PTB, Germany)
<b>MRTDosimetry</b>	15HLT06, Dosimetry for molecular radiotherapy, Vere Smyth (NPL, UK)
<b>MRgRT</b>	15HLT08, Metrology for MR guided RadioTherapy, Jacco de Pooter (VSL, The Netherlands)
<b>MetroBeta</b>	15SIB10, Radionuclide beta spectra metrology, Mark Kellett (LNE-LNHB, France)

### III. Current EMRP projects:

<b>MetroDECOM</b>	ENV54, Metrology for Decommissioning of Nuclear Plants, Jiri Suran (CMI, Czech Republic)
<b>MetroERM</b>	ENV57, Metrology for Early Warning Networks, Stefan Neumaier, (PTB, Germany)

### IV. EMRP projects completed in 2016:

<b>MetroNORM</b>	IND57, Metrology for processing materials with high natural radioactivity, Franz Josef Maringer (BEV, Austria)
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## 7. Capacity Building: future needs

TC-IR currently has 27 registered contact persons, 16 from NMIs and 11 from DIs. 10 contact persons come from EU member states with an emerging metrological infrastructure in IR, 3 institutes do not have any CMC claims.

Future needs in capacity building of great importance are practical training courses in the calibration of dosimeters or standard instruments and training in organization and coordination of comparisons. The TC-IR supports these requests and has therefore established the position of the contact person for Capacity Building (see chapter 5).

## 8. Meetings

### TC-IR Contact Person meeting in 2017

The TC-IR Contact Person annual meeting was organized by METAS in Bern in January 2017. The meeting was held over 2.5 days and combined with a brainstorming meeting to discuss project proposals for the EMPIR calls 2017 Fundamental, Industry, Normative, RPot and SIP.

### Collaboration with EURADOS

EURAMET TC-IR was represented at the 1<sup>st</sup> EURADOS Stakeholder Meeting for European Research in Dosimetry held in Munich on 20 June 2016. The focus of the meeting was on EURADOS' new strategic research agenda. A EURADOS representative attended the last TC-IR Contact Person meeting in January 2017 and gave an overview about current and planned EURADOS activities and presented the main topics of the strategic research agenda.

## 9. Issues

### Comparisons:

There is a problem with supporting key comparisons for the CMCs for the field Radioactivity. Some key comparison exercises have not yet been reported even ten years or more after initiation. This creates a significant problem with CMCs and was discussed with the BIPM's head of the ionizing

radiation department at the last TC-IR annual CP meeting. The missing reports will be completed soon.

At the last TC-IR contact person meeting all pending TC-IR comparisons (see EURAMET-TC-IR website) were discussed.

## 10. Strategic Planning

Work will continue to strengthen cooperation with stakeholders, standard bodies and international organizations. Efforts will be focused on interdisciplinary work, especially to find and initiate interdisciplinary projects within the Grand Challenges. The new EMPIR projects (calls 2015 and 2016) with TC-IR members as partner or coordinator are all interdisciplinary. Especially the recent developments in the field Health require interdisciplinary metrological research. For the preparation of the EMPIR Calls 2018, especially the Health Call, a separate brainstorming meeting will be held end of November in Brussels.

## 11. Outlook for 2017/2018

1. Next TC-IR CP meeting:
  - February 7-9, 2018,
  - hosted by BEV in Vienna, Austria,
  - 2.5 days meeting. First meeting day is reserved for a joint meeting with TC-MC.
2. EMPIR Calls 2018: TC-IR Brainstorming meeting will be held end of November 2017 in Brussels.
3. CMC review is ongoing.
4. TC-IR Proposal for a revised scheme for the CMCs for the IR fields Radioactivity, Dosimetry and Neutrons: Presentation at the next CCRI meetings end of June and depending on the discussions working on the implementation of the proposed new scheme.
5. Capacity Building: supporting the requests of the contact persons by e.g. training visits in other institutes or training courses in organizing and performing comparisons. One possibility could be RPot - EMPIR projects dedicated for training in metrological IR-topics.
6. Possible collaborations with other European projects / programs in the field of ionizing radiation shall be identified and intensified.





## ANNEX

### Internal organization of TC-IR: chair, group leaders, group members (status: March 2017)

1. **TC-Chair:** Ulrike Ankerhold (PTB, Germany), elected: 2016
2. **Management Board:**  
Member: Ulrike Ankerhold (PTB, Germany), Jean\_Marc Bordy (LNE-LNHB, France), Franz Josef Maringer (BEV, Austria), Dirk Arnold (PTB, Germany), Denis Glavič-Cindro ((MIRS/IJS, Slovenia)
3. **Working group *CMCs and Comparisons***  
**Group leader:** Dirk Arnold (PTB, Germany), elected: 2017  
Review team *Radioactivity*:  
Team leader: Dirk Arnold (PTB, Germany), nominated as team leader: 2017  
Member: Franz Josef Maringer (BEV, Austria), László Szücs (BKMH, Hungary), Marco Capogni (ENEA, Italy), Carole Fréchou (LNE-LNHB, France)  
Review team *Dosimetry*:  
Team leader: Linda Persson (SSM, Sweden), nominated: 2017  
Member: Jean-Marc Bordy (LNE-LNHB, France), Jacco de Pooter (VSL, The Netherlands), Maja Vojnić Kortmiš (IRB, Croatia), João Cardoso (IST/ITN, Portugal), Argiro Boziari (EXHM/GSCL-EIM, Greece)  
Review team *Neutrons*:  
Team leader: Andreas Zimbal (PTB, Germany), nominated: 2017  
Member: Neil Roberts (NPL, UK), Zdenek Vykydal (CMI, Czech Republic), Vincent Gressier (IRSN, France)
4. **Working group *Ionizing Radiation and Radionuclides in Health***  
**Group leader:** Jean-Marc Bordy (LNE-LNHB, France), nominated: 2012  
Member: Jean-Marc Bordy (LNE-LNHB, France), Jacco de Pooter (VSL, The Netherlands), Andrew Robinson (NPL, UK), Linda Persson (SSM, Sweden), Teemu Siiskonen (STUK, Finland), João Henrique Garcia Alves (IST/ITN, Portugal), Ulrike Ankerhold (PTB, Germany)
5. **Working group *Ionizing Radiation and Radionuclides in Environment, Energy and Industry***  
**Group leader:** Franz Josef Maringer (BEV, Austria), nominated: 2012  
Member: Franz Josef Maringer (BEV, Austria), Carole Fréchou (LNE-LNHB, France), Monika Mazanova (CMI, Czech Republic), Stefan Neumaier (PTB, Germany)
6. **Contact person *Capacity Building***  
Contact person: Denis Glavič-Cindro (MIRS/IJS, Slovenia), elected: 2017