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Federal Institute of Metrology METAS

METAS CCRI(I) Report 2011-2013

B. Boillat, C. Meyer, A. Steiner, A. Tschudin, D. Twerenbold, S. Vörös

METAS new status

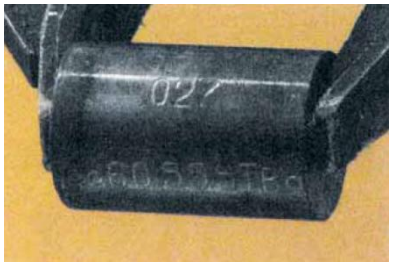
Swiss NMI, 1st January 2013 new status:

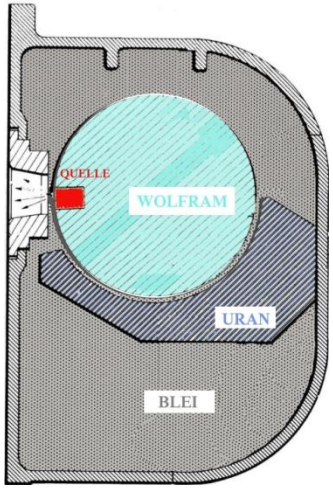
“Federal Institute of Metrology METAS”.

Agenda

1. **New Co-60 source**
2. Intercomparisons
3. Photon dosimetry
4. Electron dosimetry
5. Proton dosimetry

New Co-60 source (I): April 2012

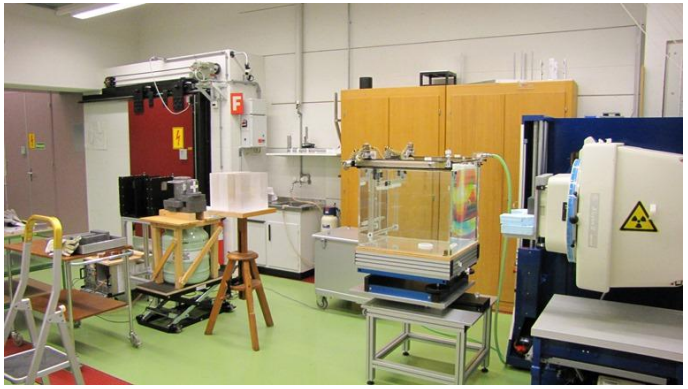


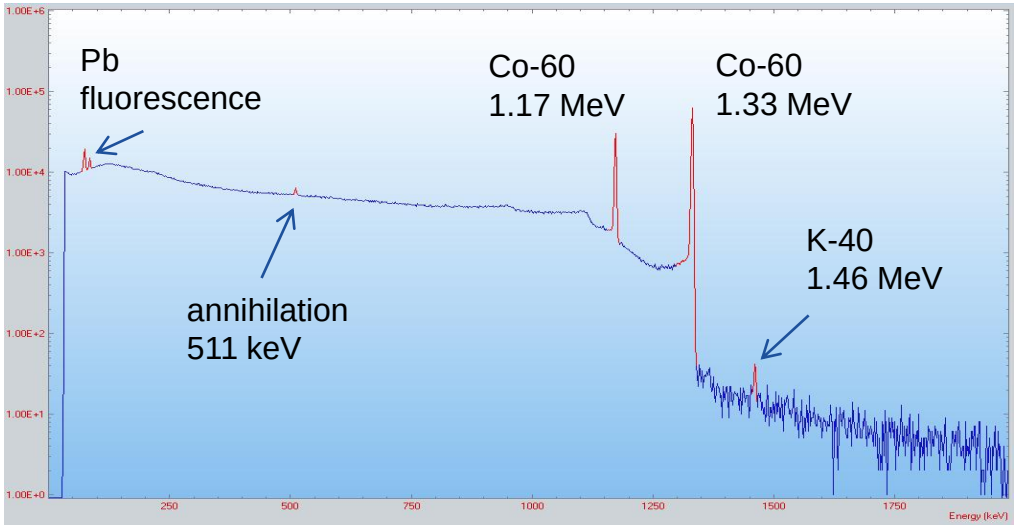


Alcyon II

21.03.2013
old: 0.378 Gy/min
new: 1.151 Gy/min

New Co-60 source (I): Gamma Spectrum



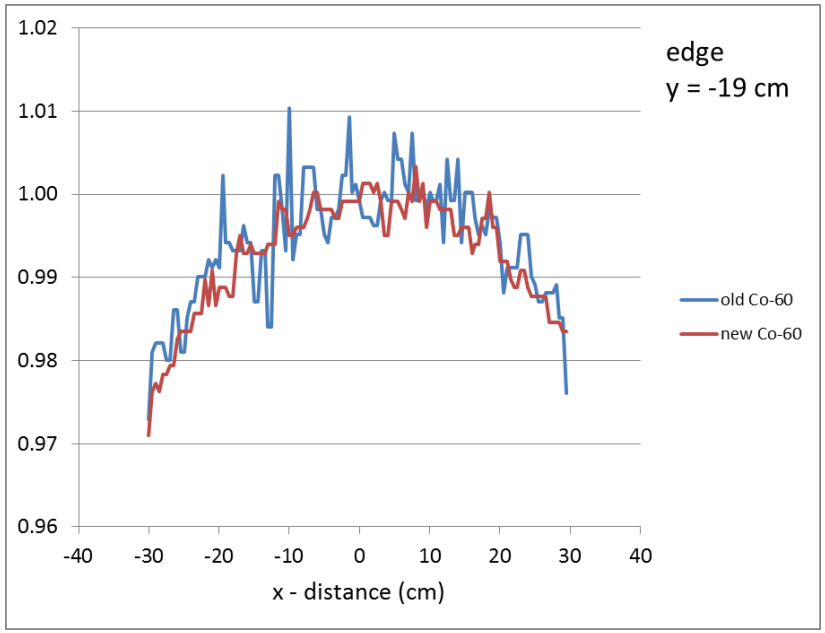


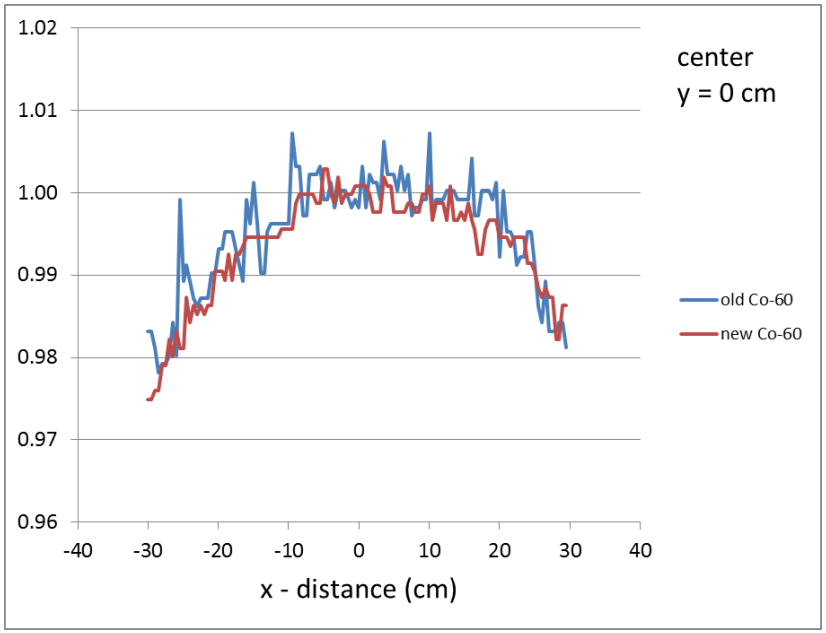
New Co-60 source (I): x-y beam profile

depth: 5 g/cm2

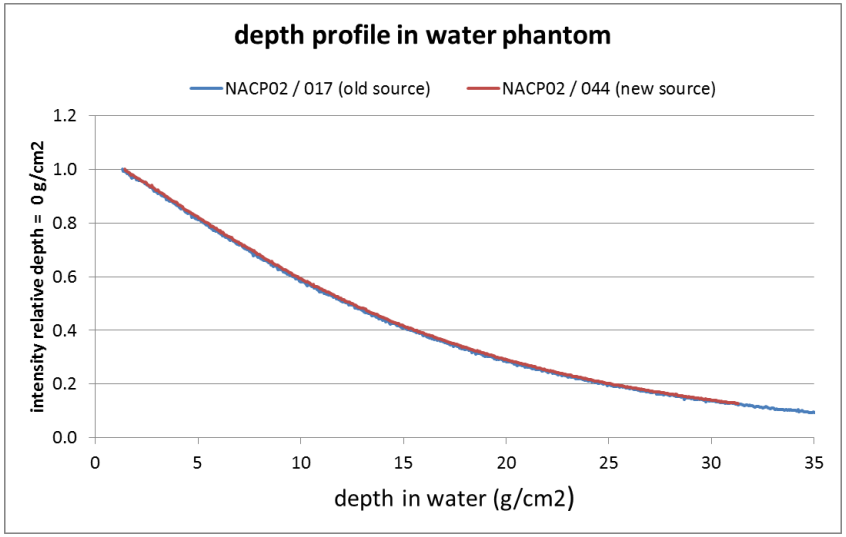
field: 10 cm x 10 cm @ SCD=1000 mm

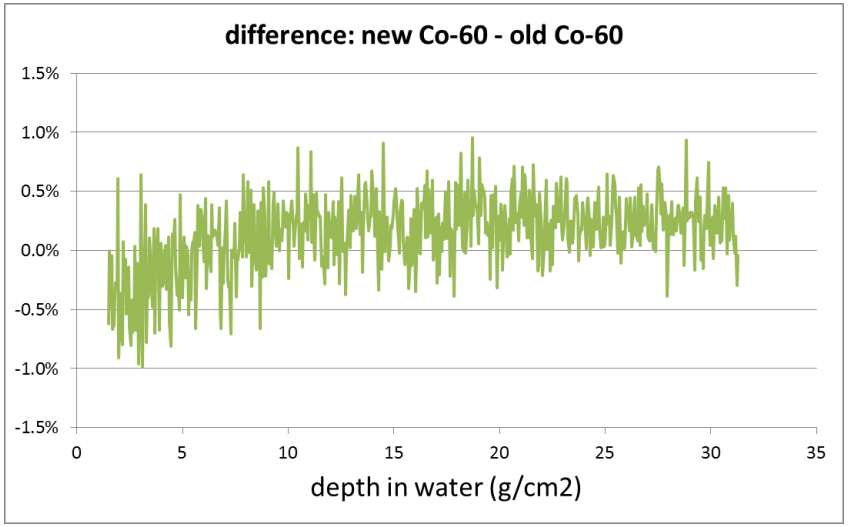
IC10: small cylindrical ionization chamber





New Co-60 source (II): depth profile





parallel plate
ionization chamber
NACP02

Intercomparisons

- BIPM.RI(I)-K4
  - On going Co-60 absorbed dose to water
- BIPM.RI(I)-K6
  - absorbed dose to water in accelerator photon beams (BIPM graphite calorimeter at METAS March 2014)
- EURAMET.RI(I)-K1.1 (to be submitted)
  - Supplementary comparison with BEV, LNE-LNHB, VSL for supporting the METAS CMC claims of the Co-60 air kerma.
- EURAMET.RI(I)-K4.1 (to be submitted)
  - Supplementary comparison with BEV, LNE-LNHB, VSL for supporting the METAS CMC claims of the Co-60 absorbed dose to water.
- Electron dosimetry comparison: NPL/NRC/METAS
  - Pilot study started January 2013

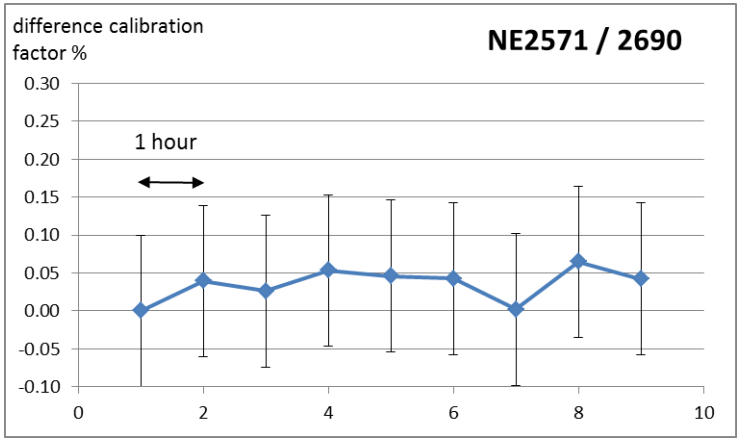
Photon Dosimetry (I)

- New METAS water calorimeter campaign started in Dec 2012: new Co-60 source
  - Still using established NRC design
  - New supplier of thermistors by a Swiss company

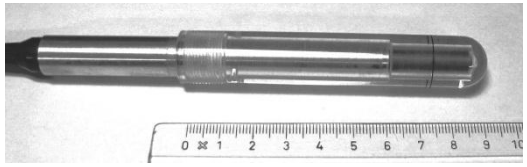
- Co-60 air kerma
  - Two reference chambers calibrated at BIPM
  - EURAMET.RI(I)-K1.1 comparison for supporting evidence of METAS CMCs
  - Some (for us) unexpected results

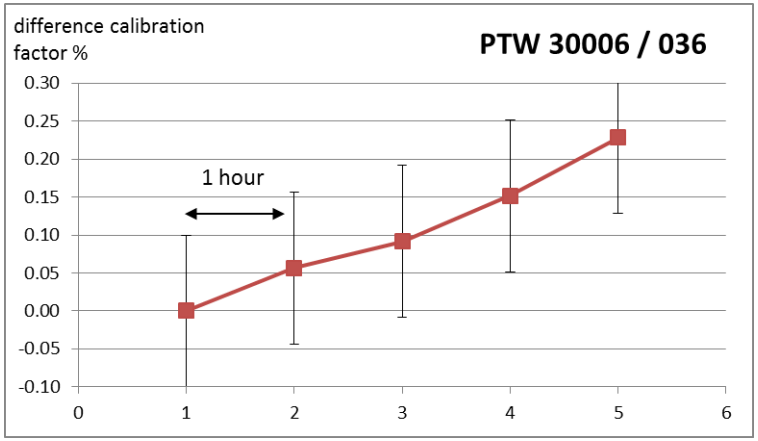
Photon Dosimetry (III): air kerma build-up cap

- NE2571 / POM (Delrin)



- PTW 30006 (Plexi)



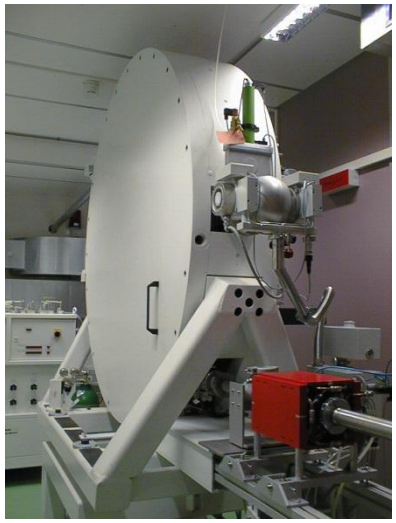


Our protokoll: (Co-60 with 1.2 Gy/min)

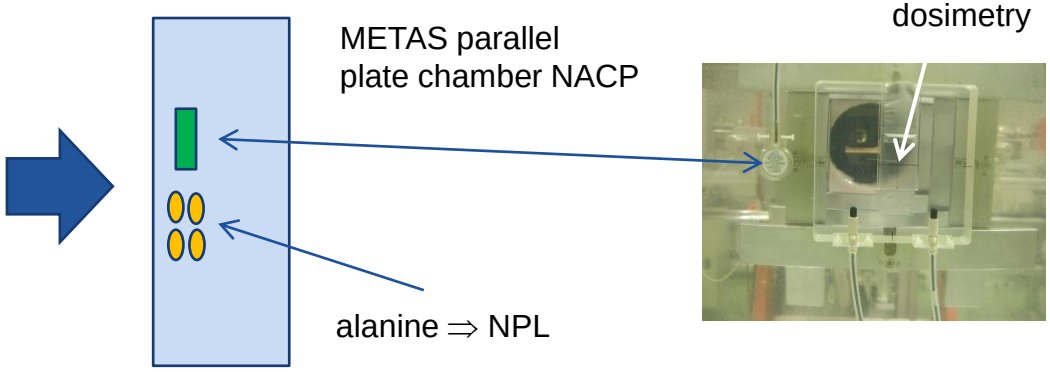
1. 10 min no irradiation / zero current
2. 8 min preradiation (10 Gy)
3. 25 x 1 min irradiation
4. 5 min pause
5. 10 min no irradiation / zero current

Electron Dosimetry Comparison: NPL / NRC / METAS

- Pilote study for a possible future BIPM electron dosimetry comparison
- Virtual (solid) water phantom with alanine pellets (NPL) and parallel chambers (transfer chambers of laboratory)
- Electron energies: Dose is 15 Gy for all energies.

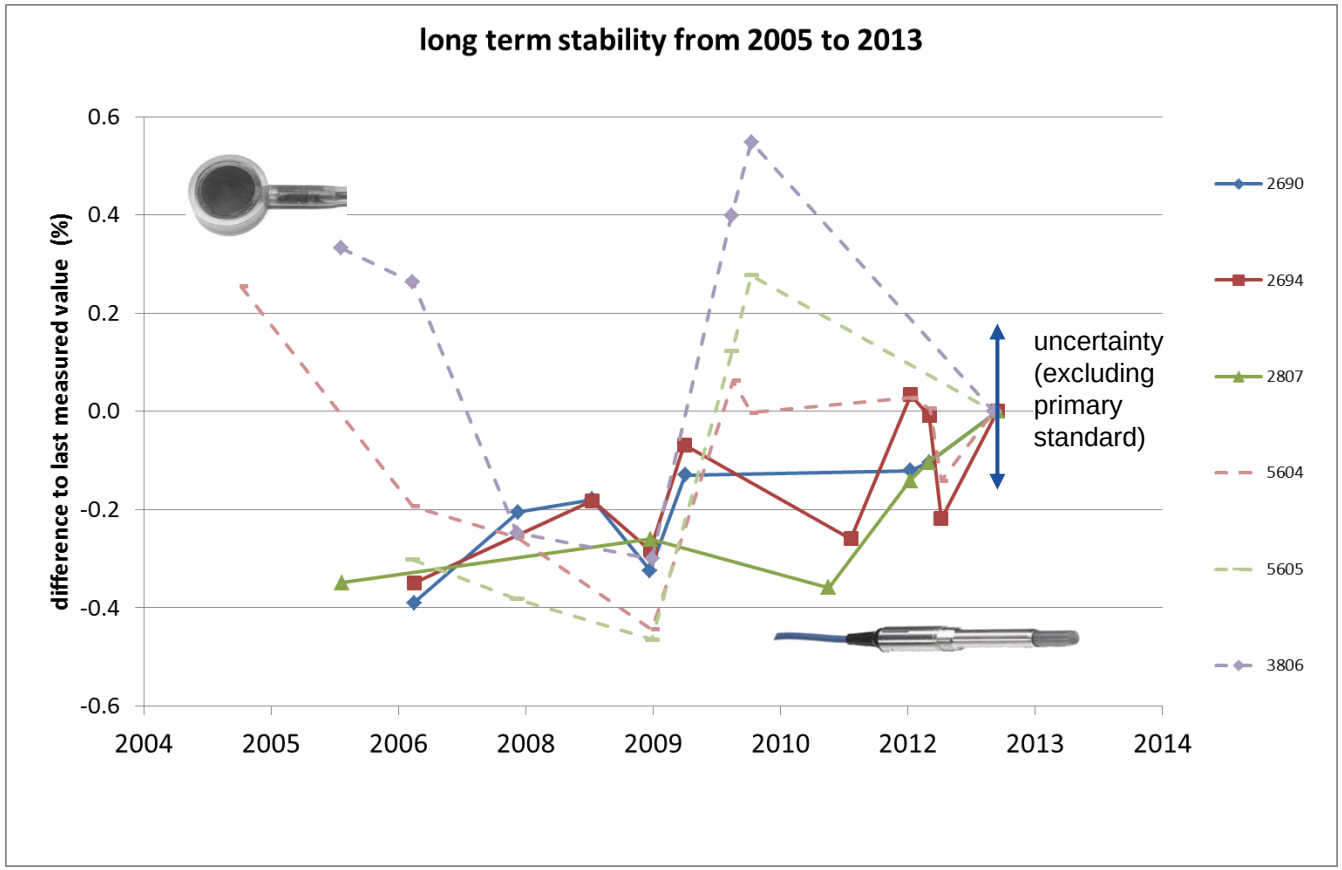


- NRC: 12, 18 and 22 MeV
- NPL: 12, 15, 18, 22 MeV
- METAS: 12, 15, 20 MeV



Electron Dosimetry Comparison: long term stability of parallel plate chambers

- METAS Co-60 absorbed dose to water



Proton Dosimetry

- METAS proton water calorimeter is at KVI Groningen
  - KVI proton accelerator: 190 MeV scattered beam
  - Collaboration with Kernversneller Institut Groningen, Medical University Groningen and VSL Delft on a Dutch national project
  - First test runs in July and December 2012

- Collaboration with Paul Scherrer Institute (PSI)
  - PSI proton accelerator: 250 MeV spot-scanning beam
  - From the proton medical physics new concerns about proton dosimetry protocoll
  - New proton water calorimetry design (planned: 2014-2016)

Thank you very much