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Progress report 1999-2001 on radionuclide metrology at IRA-METAS

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Information for CCRI section II members

1.- Activity measurements

- Activity measurements of ^{152}Eu by 4πγ and 4πPC(β,e,x)-γ (comparison).
- Activity measurement of ^{89}Sr by liquid scint. count. (comparison).
- Activity measurement of ^{238}Pu by liquid scint. count. (comparison).
- Activity measurement of ^{139}Ce by 4πPC(e,x)-γ (contribution to SIR).
- Activity measurement of ^{222}Rn by 4πγ (pilot contribution to SIR).
- Ionization chamber measurements and contribution to SIR for ^{57}Co, ^{60}Co, ^{109}Cd, ^{137}Cs.

2.- X and g spectrometry

- Improvement of the HpGe spectrometer calibrations.
- Determination of coincidence summing corrections and transfer factors for different geometries by MC calculation.
- Test measurements in connection with a study about detection limits.

3.- Developments

- Design and acquisition of equipment to built a ^{222}Rn measuring system (according to the "Picolo method").
- Redaction of documents related with the quality insurance system.
- Simulation experiments with the IG11/A20 and IG11/N20 ionization chambers using the Monte Carlo code GEANT. Optimisation of physical parameters in progress.
- Ionization chamber ref. System: introduction of a time interval measuring system directly traceable to the national frequency standard.

- Digitising and numerical integration of counting signals from detectors are investigated as an alternative to conventional counting.

4.- Metrological service

- Distribution of a standardised mixed radionuclide solution (^{109}Cd, ^{57}Co, ^{139}Ce, ^{137}Cs, ^{88}Y and ^{60}Co) to the swiss nuclear power plants.
- Organisation of a traceability exercise including the distribution of a mixed radionuclide solution to 18 swiss laboratories engaged in environmental survey.
- Distribution of reference sources of ^{57}Co, ^{60}Co and ^{137}Cs to the organisms in charge of the verification of the ionization chambers in use by nuclear medicine services.
- Preparation of low level tracers of ^{242}Pu and ^{243}Am (50 mBq per ampoule).

5.- Plan for future work

- Realisation of the system for direct activity measurement of ^{222}Rn.
- Simulation of detection systems.
- Activity measurement of ^{88}Y by 4πγNaI and 4πPC(e,x)-γand contribution to SIR.
- Attempt to contribute to SIR for ^{18}F.

6.- Publications, reports

- J.-P. Laedermann and M. Décombaz: ”Simulation of nuclear decay”, Appl.Radiat.Isot. 52, 419-425.
- J.-J. Gostely and J.-P. Laedermann: ”Simulation of the IG11 4πγ ionization chamber using GEANT Monte carlo code", Appl.Radiat.Isot. 52, 447-453.
- M. Décombaz, J.-C Gostely, J.-J. Gostely, G. Triscone, M. Leresche: "Campagne 2000 auprès des laboratoires suisses mesurant la radioactivité dans l'environnement", rapport IRA-OFMET 001218, December 2000, 37p.

- "Collaboration avec l'OFMET", rapport d'activité 1999, 18p.

- "Collaboration avec l'OFMET", rapport d'activité 2000, 15p.

- M. Décombaz: "Facteurs de transfert liquide-gaz pour la géométrie FP100", rapport IRA-OFMET, October 2000, 8p.

- G. Triscone: "Test des limites de détection selon L.A. Currie", rapport 16/01/2000, 7p.