

Progress report of NMIJ/AIST (May 2001 to April 2003)

Y. HINO

Radioactivity and Neutron Section, Quantum Radiation Division
National Metrology Institute of Japan,
National Institute of Advanced Industrial Science and Technology (NMIJ/AIST)
e-mail: y.hino@aist.go.jp <http://www.aist.go.jp/>

1. International comparisons and SIR contributions.

- In this period, NMIJ/AIST has took part in the CCRI(II) key comparisons of ^{204}Tl , ^{32}P , ^{65}Zn , ^{192}Ir and ^{241}Am radioactivity measurements.
- As for the APMP regional comparisons, NMIJ/AIST organized “portability of the calibration factors of ionization chambers” in collaboration with KRISS and INER. The sealed $^{166\text{m}}\text{Ho}$ sources were sent to 5 participant labs, and 10 μCi (0.4MBq) γ -source set (Amersham point source set) was also sent these labs in turn. NMIJ/AIST, KRISS and INER will calculate the chamber response by Monte Carlo code and compare with the point source results.
- The comparison of β -emission rate from a large area source of ^{36}Cl was continued with bilateral base, and in the year of 2002, VNIIM of Russia took part in this program.
- ^{67}Ga and ^{111}In sources were sent to the SIR/BIPM in 2001. In this trial, the chemical form of ^{67}Ga was gallium citrate because it was widely used in the field of medical diagnostic, so that it was selected for the domestic comparison between medical institutes. The SIR results were very interesting that the ^{111}In was in very good agreement but ^{67}Ga was about 1% lower than expected. The same sources were also sent to KRISS and INER for bilateral comparison, and the output current ratios of $^{67}\text{Ga}/^{111}\text{In}$ from their ionization chambers were exactly same as the SIR/BIPM. We checked precipitation of gallium citrate, and found nearly 10% of activities were adsorbed (and/or precipitated) at the inner ampoule wall after chilled few hours. This effect should increase the output current of IC, so that NMIJ/AIST prepared GaCl_3 source and sent it again to the SIR in 2002. The result of the second run was in the reasonable agreement with our expected value. This was the very good exercise for selecting the chemical form for international comparisons.

2. Standardization and calibration services.

- Several measurement systems of Japan Radioisotope Association (JRIA) were calibrated with the primary standard sources from NMIJ/AIST, and JRIA was officially recognized as the secondary standard organization in Japan.
- Domestic comparison of ^{67}Ga and ^{111}In radioactivities between medical institutes and radioactive pharmaceutical manufactures were carried out by NMIJ/AIST through JRIA.

- New production techniques for area source have been tested in NMIJ/AIST. An unique technique using a inkjet printer was successfully done to produce 10cm by 10cm area source of ^{36}Cl , and also logarithmic scale for imaging analyzer system. This new technique will be presented in the coming ICRM meeting.
- Remote control calibration system has been studied between NMIJ/AIST and JRIA. The calibration test of ionization chamber of JRIA (in Tokyo) was successfully monitored by NMIJ/AIST in Tsukuba through the computer network system.

3. Plans for fiscal years of 2003 and 2004.

- NMIJ/AIST will continue “Portability of the calibration factors of ionization chambers” program within the framework of APMP. In addition, several mono-energetic gamma sources will be sent to the participant labs and SIR to establish the response functions of each ionization chamber.
- The new production method of area sources will apply to make very low level surface sources for calibration of imaging plate system and try to adopt the clearance test of radioactive waste.
- Remote calibration will be continued and expand to some other secondary standard equipments using computer network system to reduce the load of primary standard lab of NMIJ/AIST.