NORM measurements and its possible difficulties

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IRMM - Institute for Reference Materials and Measurements

Geel – Belgium http://irmm.jrc.ec.europa.eu/

7 Institutes in 5 Member States

IRMM - *Geel, Belgium*
Institute for Reference Materials and Measurements

ITU - *ITU-Karlsruhe and Ispra, Germany and Italy*
Institute for Transuranium Elements

IE – *Petten and Ispra, The Netherlands and Italy*
Institute for Energy and Transport

IPSC - *Ispra, Italy*
Institute for the Protection and Security of the Citizen

IES - *Ispra, Italy*
Institute for Environment and Sustainability

IHCP - *Ispra, Italy*
Institute for Health and Consumer Protection

IPTS - *Seville, Spain*
Institute for Prospective Technological Studies

Total staff: ca 2800 people

http://ec.europa.eu/dgs/jrc/index.cfm

- **Established in 1960**
- **the Central Bureau for Nuclear Measurements**
- **1993 IRMM**

The mission of IRMM **is to promote a common and reliable European measurement system** in support of EU policies

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IRMM activities

- Development of rapid and accurate measurement methods
- Production and characterization of certified reference materials (CRM's)
- Coordination and organization of laboratory intercomparisons

ERM
European Reference Materials

Do you measure what you are supposed to measure?

Some other important aspects:

-Sampling (Homogeneity)

-Background measurement

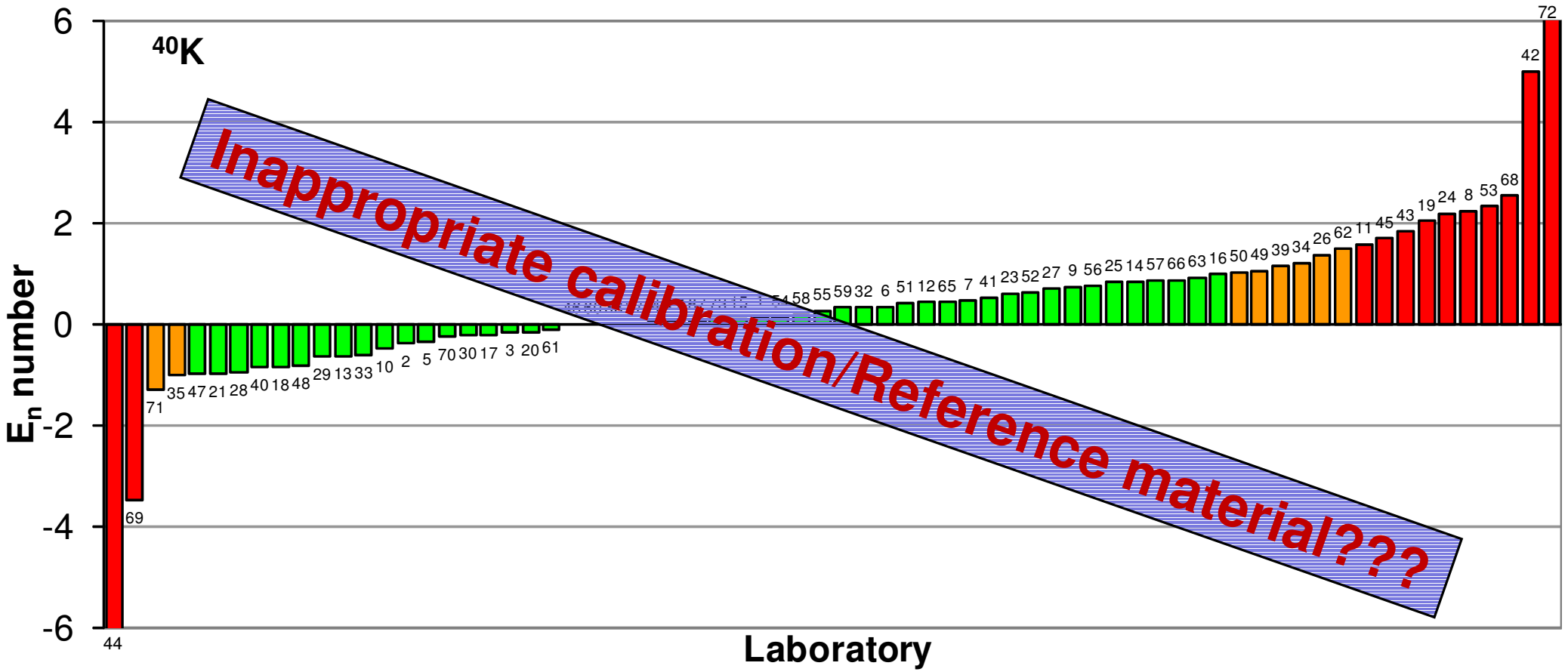
-Standardized/Validated method

-when I=X, X is really equals to 1? Measurement uncertainty!!!

Deviation from the TRUE value

-Measurement results: traceable to SI?

^{40}K in soil intercomparison

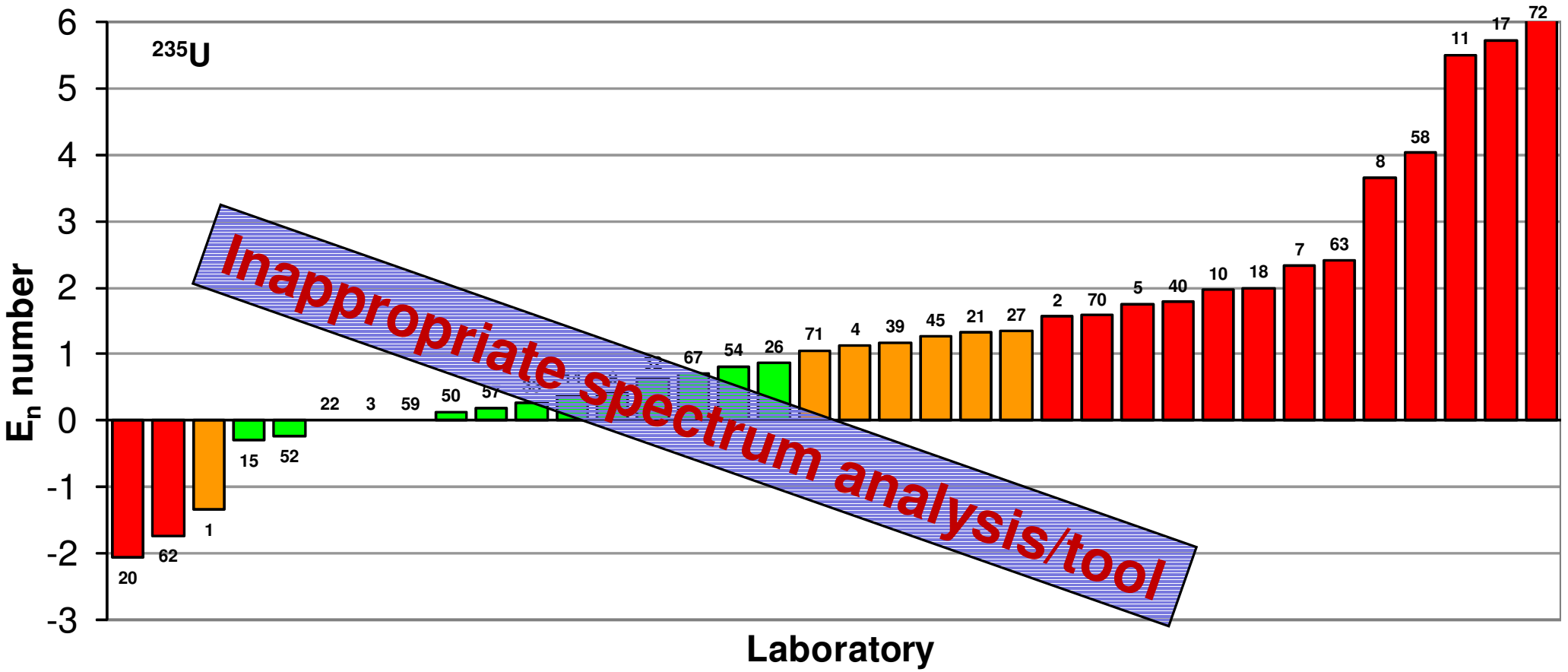


70 results

Relative deviations:
- 89% of results within 20% from reference value

E_n numbers:
- 72% compatible (50 labs)
- 11% warning signal
- 17% action signal

^{235}U in soil intercomparison



38 results
Relative deviations:
- 26% of results within 20% from reference value

E_n numbers:
- 42% compatible
- 16% warning signal
- 42% action signal

Results of the participating laboratories were evaluated versus the reference values by

- relative deviation $$D_{\%} = 100 \frac{A_{lab} - A_{ref}}{A_{ref}}$$

- E_n number (ISO/IEC 13528:2005) $$E_n = \frac{A_{lab} - A_{ref}}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

which are interpreted as:

$|E_n| \leq 1$, the laboratory values are compatible with the reference value

$|E_n| > 1$, "warning signal", the laboratory values differ significantly from the reference value, sources of deviation to be corrected

$|E_n| > 1.5$, "action signal", urgent need to correct for the sources of the large deviation

NORM reference materials

Available reference materials in the market

- ✓ **Phosphogypsum** (IAEA-434) as of 2010.03.01.

  IAEA

- ✓ **Coal fly ash** (SRM–1633b)?

  National Institute of Standards and Technology

Shortage of NORM reference materials!
Homogerneity and stability analysis.

Future plans

- Production of NORM CRM's
- Building material (clay type?)
- Laboratory intercomparison

Further comments

- Training of staff
- Test your performance! Proficiency tests; laboratory intercomparisons

Thank you for your attention!