Technical Visit on

Coincidence summing and geometry correction in gamma spectrometry

IAEA Laboratories, Seibersdorf, Austria

19-23 July 2010

Self absorption correction

Canberra Genie 2000/LABSOCS

Alessia Ceccatelli

Terrestrial Environment Laboratory-Chemistry Unit

IAEA

International Atomic Energy Agency

Geometries and materials – 1/3

Detectors parameters

Parameter	Detector A	Detector B	Detector C	Detector D	Detector E	Detector F
Crystal type	p	n	p	n	p	n
Crystal material	Ge	Ge	Ge	Ge	Ge	Ge
Crystal diameter (mm)	60	60	76.2 (60)	82.55 (60)	101.6 (90)	101.6 (80)
Crystal length (mm)	60	60	133.4	133.4	60.3	134.4

IAEA

Geometries and materials – 2/3

Samples parameters

Parameter	Reference	Soil 1 (vol. = 254 cm^3)	Soil 2 (vol. = 56 cm^3)
Sample diameter (including container) (mm)	60	90	60
Sample height (including container) (mm)	20	40	20
Sample material	Water	Quartz	Quartz
Container-to-detector-window distance (mm)	0.0	0.0	0.0

IAEA

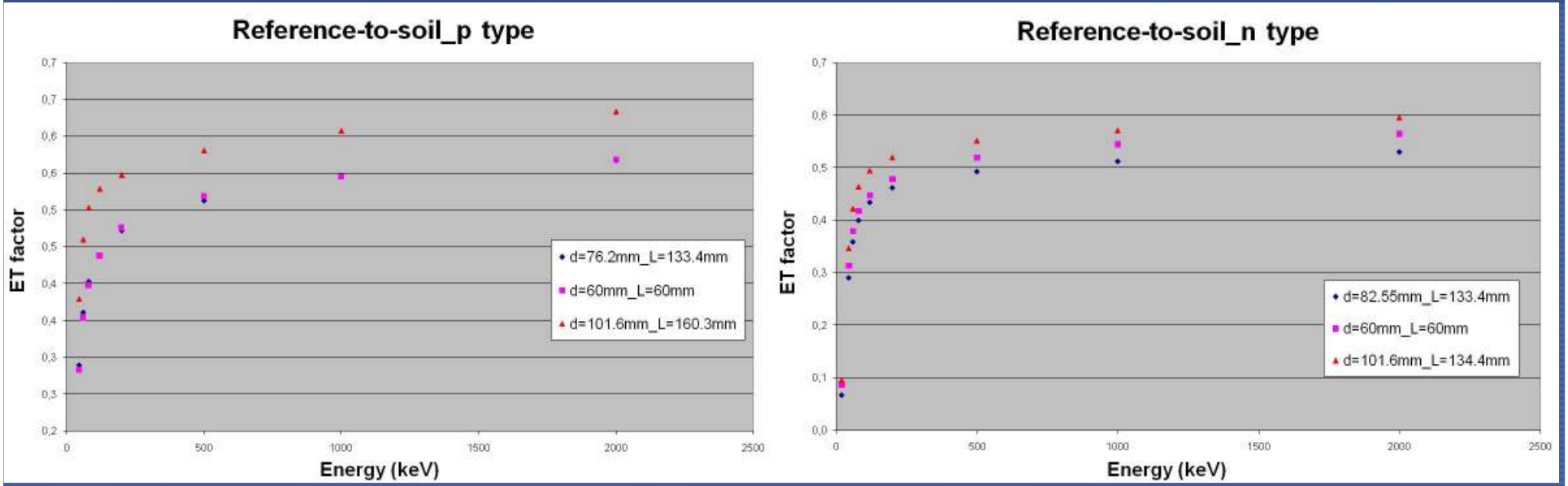
Geometries and materials – 3/3

Samples materials

Material	Density (g/cm^3)	Chemical formula
Water	1.00	H_2O
Quartz	1.40	SiO_2
Plastics (polystyrene)	1.05	C_8H_9

IAEA

ET factors_ reference-to-soil 1



- CF ↓ if E ↑ in the whole considered energy range
- High CF at low energies

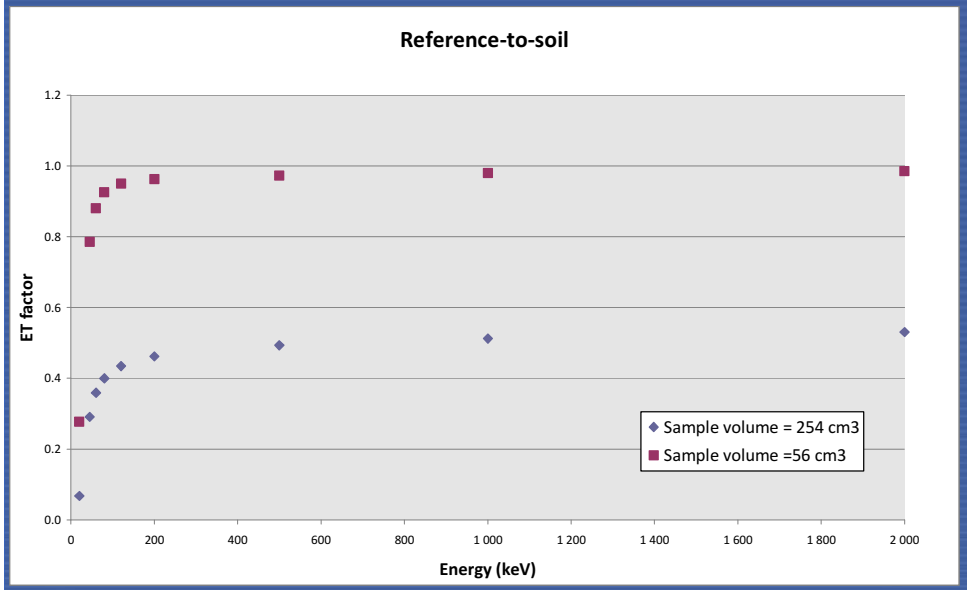
Both for p and n type, low dependence of CF on detector dimensions

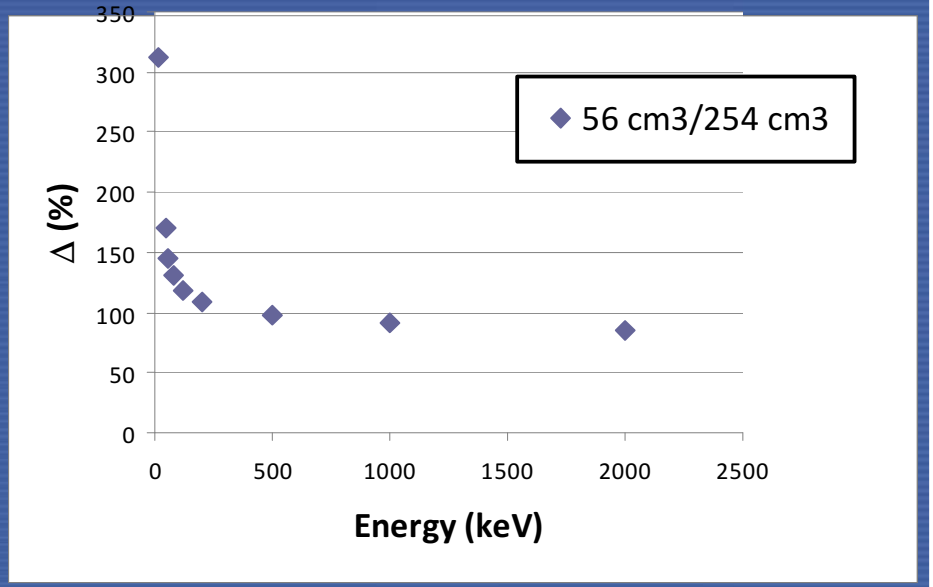
sample effect (self-absorption) is dominant

IAEA

Comparison of ET factor_different volumes

Detector D





In each sample self-absorption effect is constant from 500 to 2000 kev ➡ ratio between the ET factors is constant

E < 500 keV: higher dependence on energy of ET factor in the big sample (higher self-absorption)

IAEA

References

[1] T. Vidmar et al. *Testing efficiency transfer codes for equivalence*. Applied Radiation and Isotopes 68 (2010) 355-359

IAEA

Thank you

IAEA