

The Effect of Large Area Source Non-Uniformity

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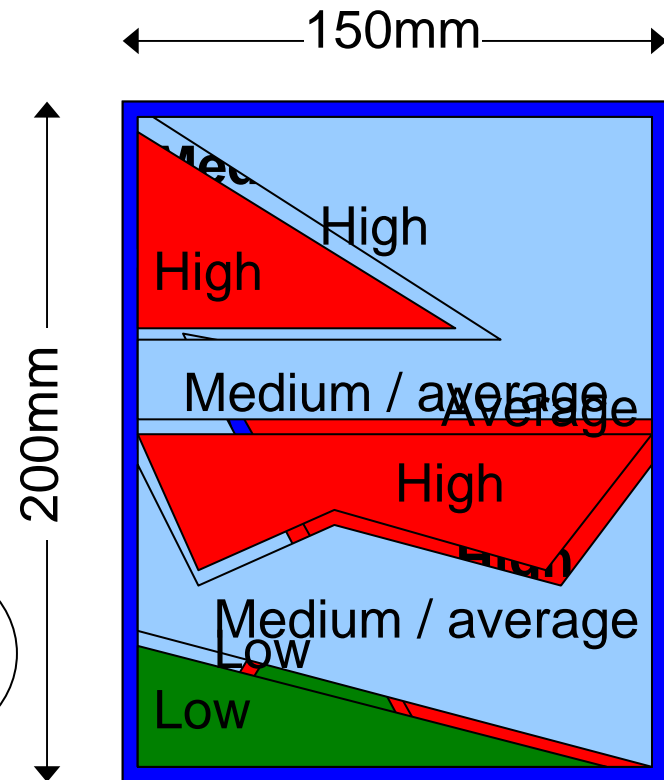
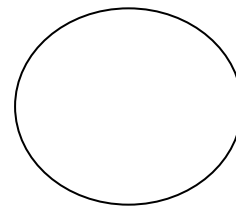


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- The purpose of investigating source uniformity
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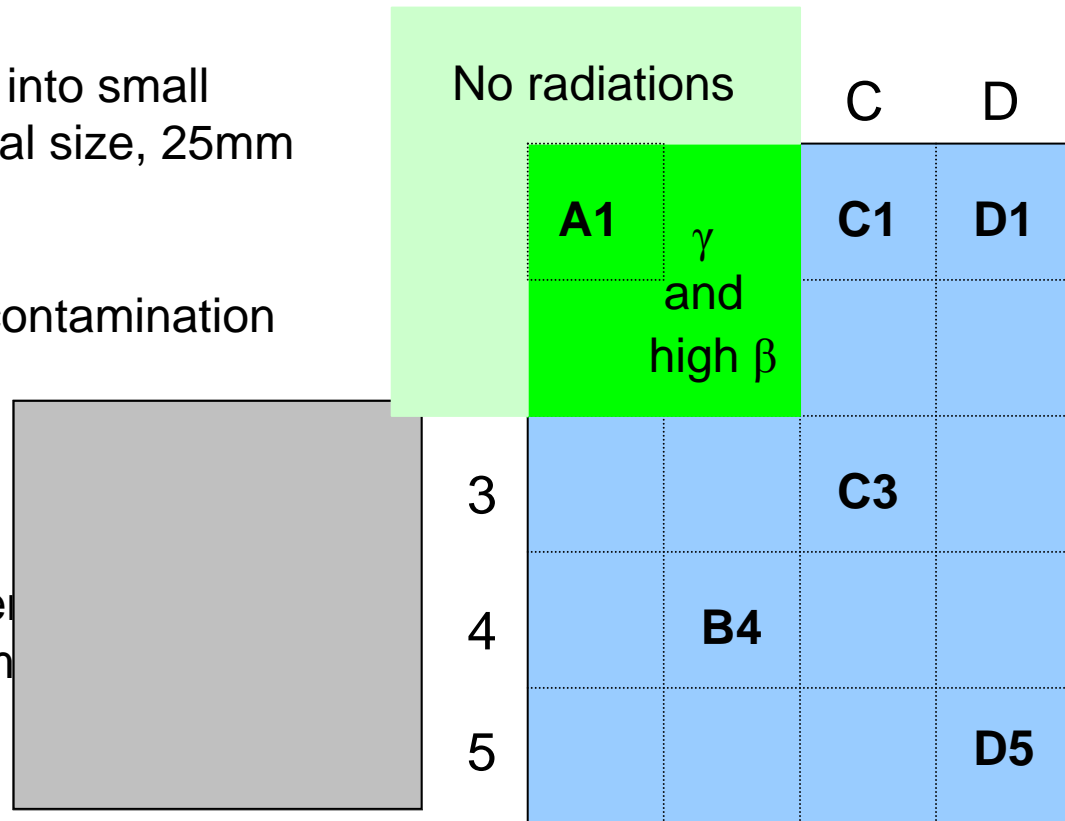
The Sources

- Flat, rectangular, anodised sources
- Active area of 200mm by 150mm
- One or two part construction
- Sr-90, Cs-137, Co-60, C-14, Cl-36, U-234, Am-241
- Don't know uniformity
- Measurements to find out!



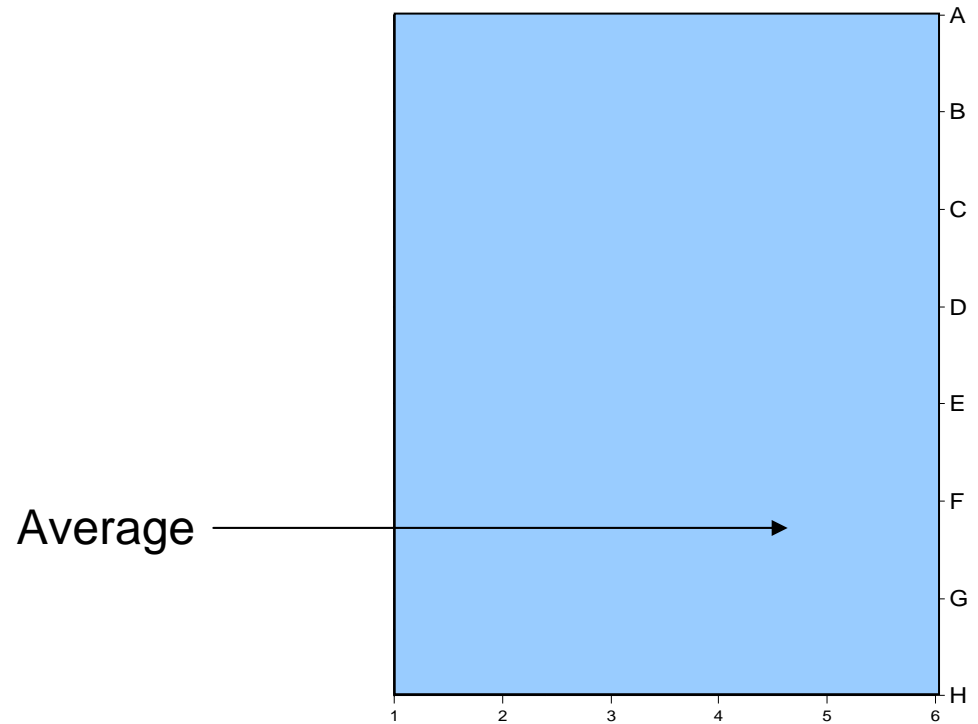
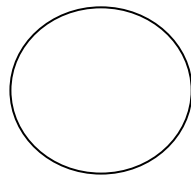
Method

- Source divided into small sections of equal size, 25mm by 25mm
- BP7 and AP4 contamination monitors
- Beta shield
- Lower energy emissions indicate uniformity



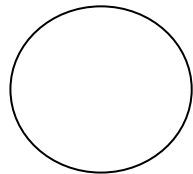
Results – Co-60

- Average cps of 39.54
- Max of 45.82
- Min of 34.52

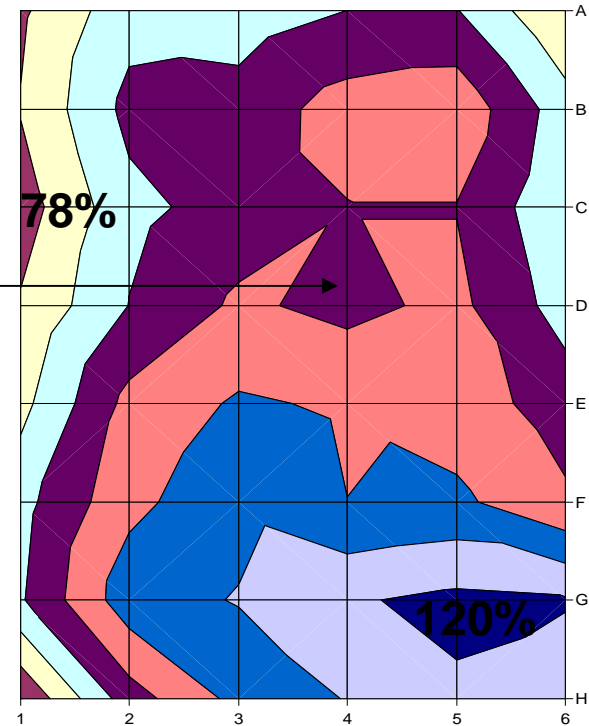
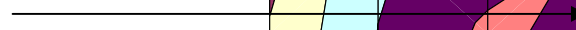


Results – Sr-90

- Mean cps of 69.27
- Max of 82.99
- Min of 54.27
- Peak near edge



Average



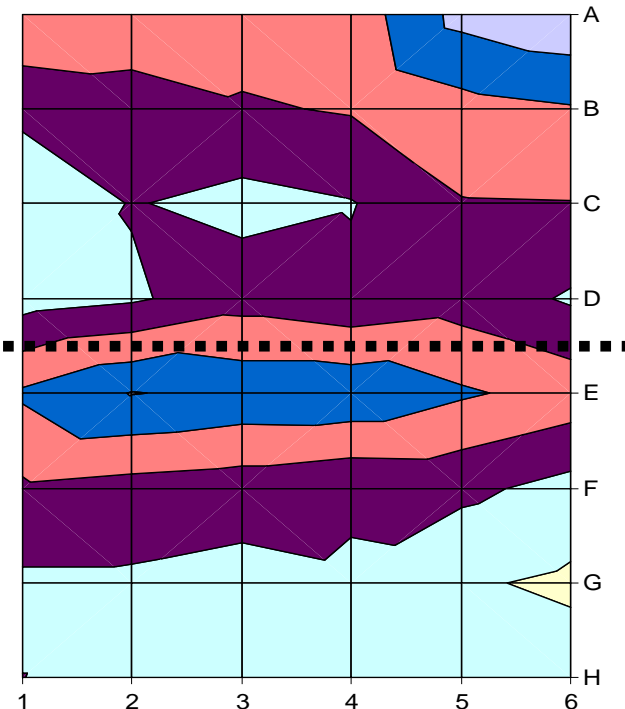
Summary of Results

Source	Average CPS	Maximum %	Minimum %
Cs-137	74	132	28
Sr-90	69	120	78
Co-60	40	116	87
C-14	59.52	117	75
Cl-36	67.21	115	70
Am-241	80.17	124	77
U-234	9.32	168	60

Results - U-234

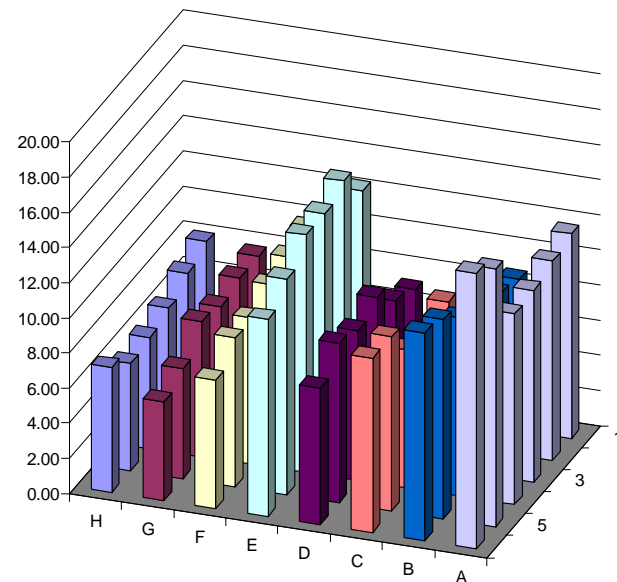
- Non-uniformity across join?
- Compare D and E measurements
- D only 64% of E on average
- Join does not create largest variation in cps
- Geometry of peak could be important, does introduce some non-uniformity

Division - - - - -



Join Discontinuity

Source	Discontinuity %	
	Average	Maximum
Cs-137	1	12
Sr-90	5	8
Co-60	1	4
Average	2.3	8
C-14	1	12
Cl-36	4	22
U-234	36	45
Am-241	0	6
Average	10.25	21.25



Conclusion

- Max variation found as 72% for portions
- Max variations likely to decrease with increase in detector size
- Potential with small faced detector to achieve two calibration measurements with over 30% difference, perhaps greater than 100%
- Potential for two part sources to have steep activity gradients
- Can now use sources regardless of non-uniformity since we know the extent of non-uniformity

Acknowledgements

- Reg Bosley, John Simpson and Malcolm Atkins
- Questions?