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- Recent Nuclear Medicine Work
  - Incorporation of new electrometer system
    - Switching unit : Low leakage current
    - Attempt to minimise waiting periods
  - Calibration Factors for I-125 brachytherapy seeds
  - Investigation into commercial calibrator linearity
  - RCUF issues : will discuss tomorrow

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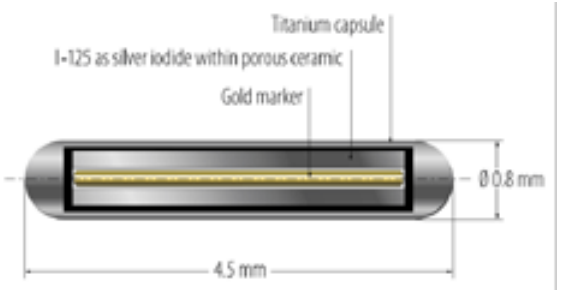
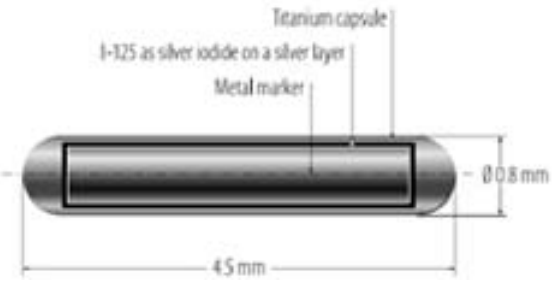
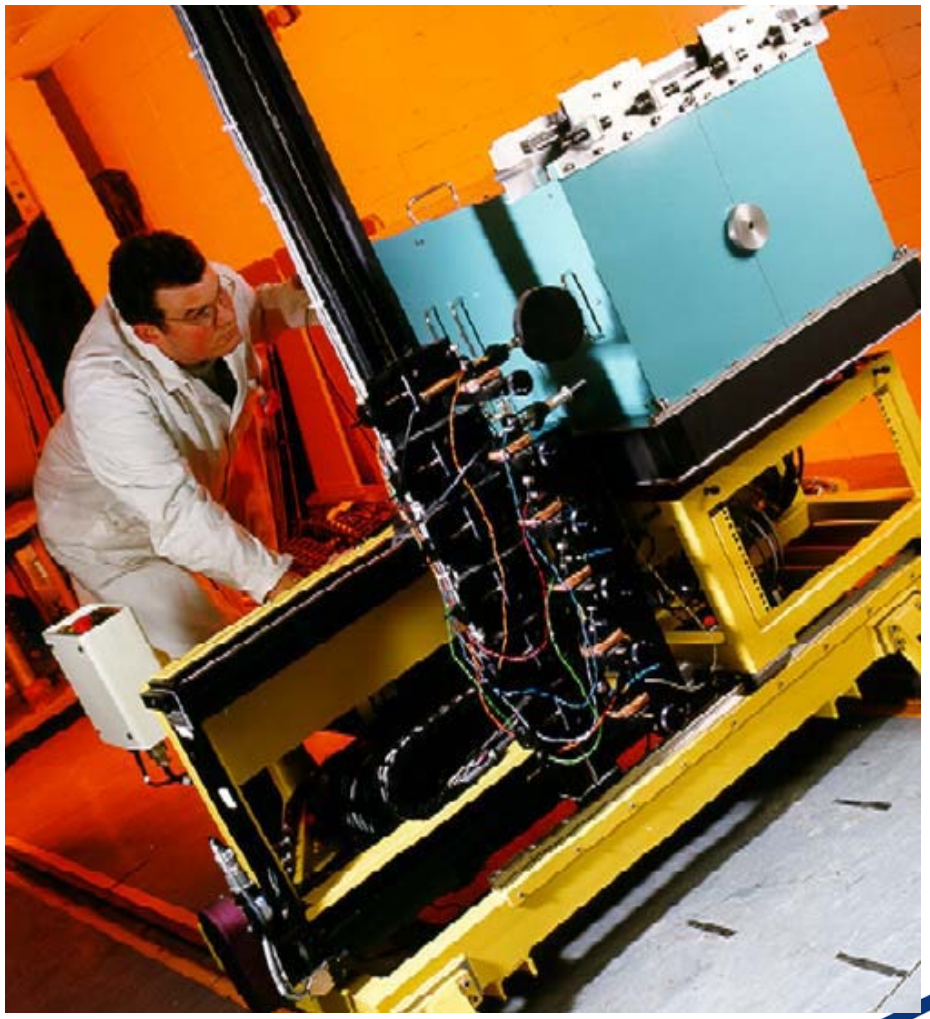
I-125 Brachytherapy seeds

- New range of I-125 seeds
  - Various manufacturers (ie: BEBIG etc .., S06, S17)
  - Becoming more widespread in use





NPL Air kerma Primary Standard



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Air KERMA rate measurements at NPL: Primary Standard : 50 kV free air chamber

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NE 2551 protection level secondary standard

- Spherical Ion Chamber calibrated at NPL in terms of air kerma in appropriate fields
  - ISO 4037-1 narrow spectrum X-rays
  - Cs-137
  - Co-60
  - Response factor calculated
- 3 litres sensitive volume
- Sources placed in low density holder 1 m from floor in large room
- Sources rotated through 360 degrees, and mean response calculated (source uniformity)
- Temperature controlled room
  - Temperature and Pressure monitored throughout

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Corrections to measurements

- Background/leakage current
- Air density (20 ^{o}C and 101.3 kPa)
- Air attenuation
- Radiation scatter
- Chamber size correction
- Radioactive decay

Summary of AKR measurements at NPL

Table 1 – Summary of NPL Calibrations in terms of Air Kerma Rate

Nuclide	Source ID	NPL Calibration Certificate	Air Kerma Rate ($\mu Gy.m^2.h^{-1}$)	Uncertainty	Reference Time
^{125}I	S1707/196 6 17126	E07100248/1	0.545	± 5%	31 December 2007 1200 GMT
^{137}Cs	67505 E8-287	E07100248/2	38.2	± 3%	1 February 2008 1200 GMT
^{192}Ir	IRF-1 (Ir2.A81) Batch 956	E07100248/3	59.3	± 3%	3 January 2008 1200 GMT

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Calibration of HDR 1000 Plus Well Chamber

Table 2 – Calibration factors N_{Sk} and N_A, used to convert induced current to Air Kerma Rate and 'Apparent Activity' respectively.

Nuclide	Source ID	Corrected current (pA)	N_{Sk} (Gy.m^2.h^{-1}.A^{-1})	N_A (GBq.A^{-1})
^{125}I	S1707/1966 17126	-2.189	-2.489 x 10^5 ± 5%	-7.251 x 10^9 see note (a)
^{137}Cs	67505 E8-287	-75.871	-5.035 x 10^5 ± 3%	-6.484 x 10^9 see note (b)
^{192}Ir	IRF-1 (Ir2.A81) Batch 956	-136.6	-4.341 x 10^5 ± 3%	-3.983 x 10^9 see note (c)

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Ongoing Work :

- Derivation of Calibration factors for NPL Secondary Standard Ionisation Chamber
- Use NPL Holder, or design another ??
- I-125 Seeds
  - Existing factors for Oncoseed
    - IMC6711 Single Seed
    - IMC7000 Rapid Strand
  - Various Manufacturers
  - BEBIG : Seeds and Strands
    - ISOCORD S06
    - ISOSEED S17
    - ?

Y-90 Comparison Exercise

- Comparison for UK hospitals
  - Planned early 2009
- Aim to include manufacturers/suppliers
- NIST have recently performed a similar exercise
  - Ask Brian/Jeff ?

Commercial Calibrator Linearity