





Canberra Tritium Monitoring

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Application Support EMS
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Current Canberra Products

▶ TAM73– Portable

- ◆ Battery (2 hrs) or AC power
- ◆ 6 decade range from 37 kBq/m³
- ◆ Rn & gamma compensated
- ◆ 2.4 I FTIC @ 3 – 5 lpm

▶ TAM100 Fixed Monitor

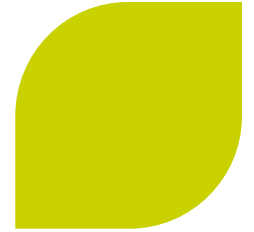
- ◆ 6 decades from 18 kBq/m³
- ◆ 2.4 I FTIC @ 7 – 9 lpm
- ◆ Rn & gamma compensated
- ◆ Chamber heater for decontamination
- ◆ Optional remote display/control via ADM606M

▶ Both can be rescaled for NG monitoring

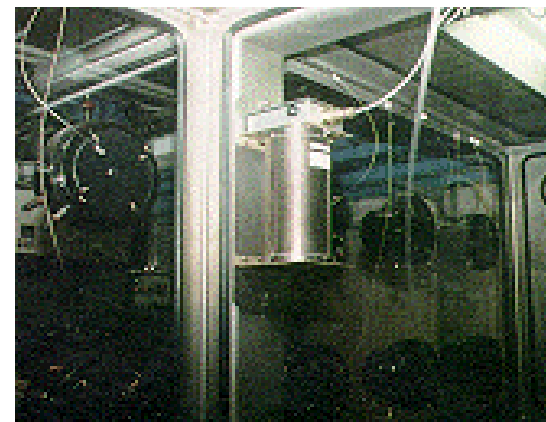
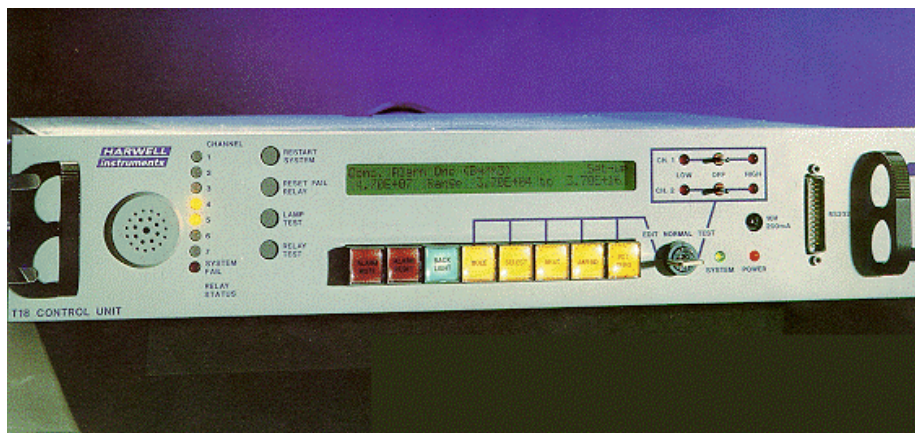
- ◆ T100DSI sensitivity for ⁸⁵Kr < 4 kBq/m³
- ◆ Scaling factors for other gases available



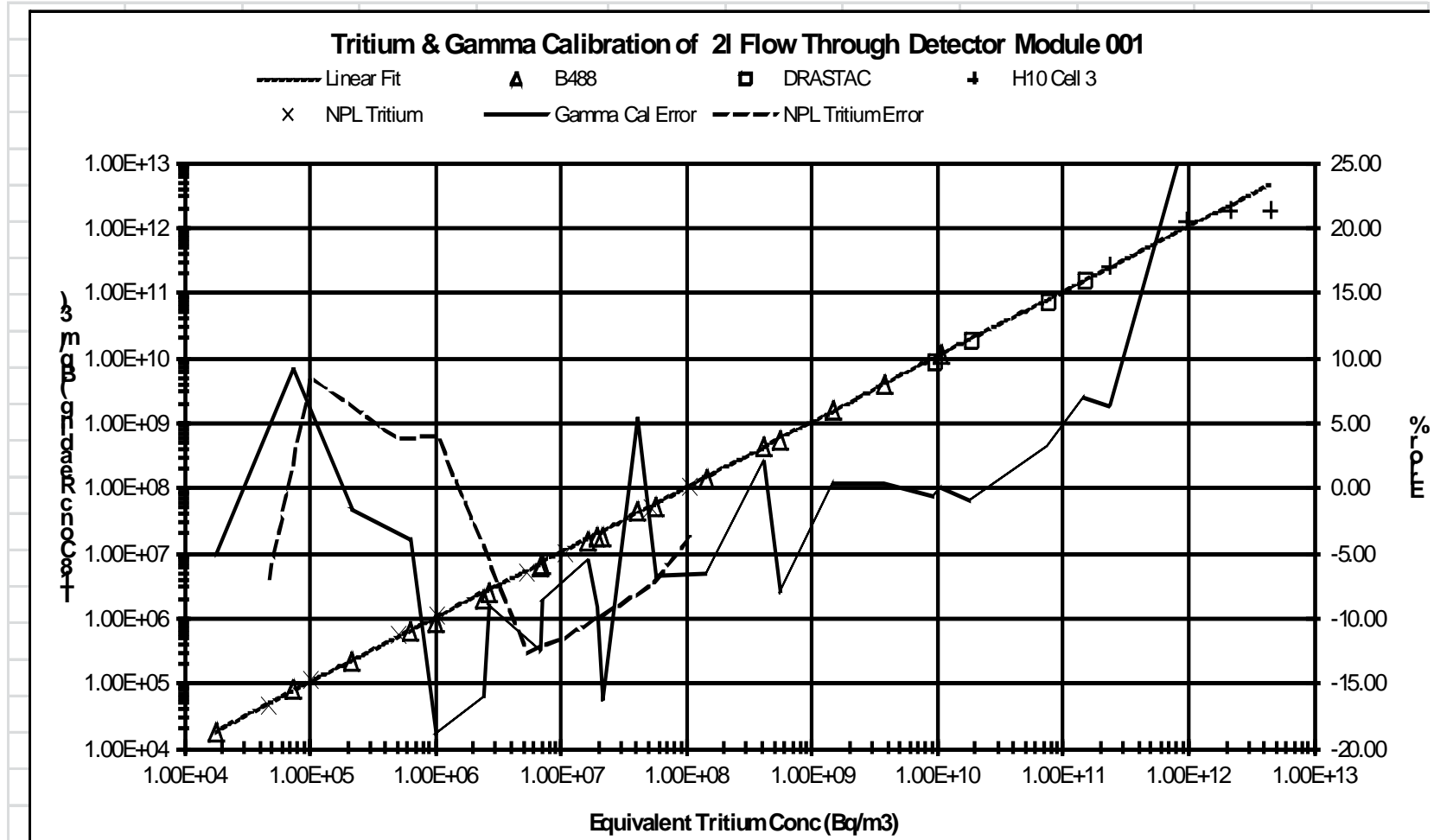
Old Harwell Products



- ▶ **Old designs back to 1950s**
 - ◆ Including a coaxial mylar chamber for Noble Gas compensation!
 - ◆ Vibrating reed electrometers
- ▶ **1980s- 1990s: T15 & T18 2l Flow Through & Diffusion Ion Chambers also 0.5l CF flange mounted Diffusion chamber**
 - ◆ Solid state electrometers
 - ◆ No gamma compensation
 - ◆ Rn compensation in later T18 models (> 90%)



2I FTDM Calibration Curve



T19 Portable Tritium Monitor

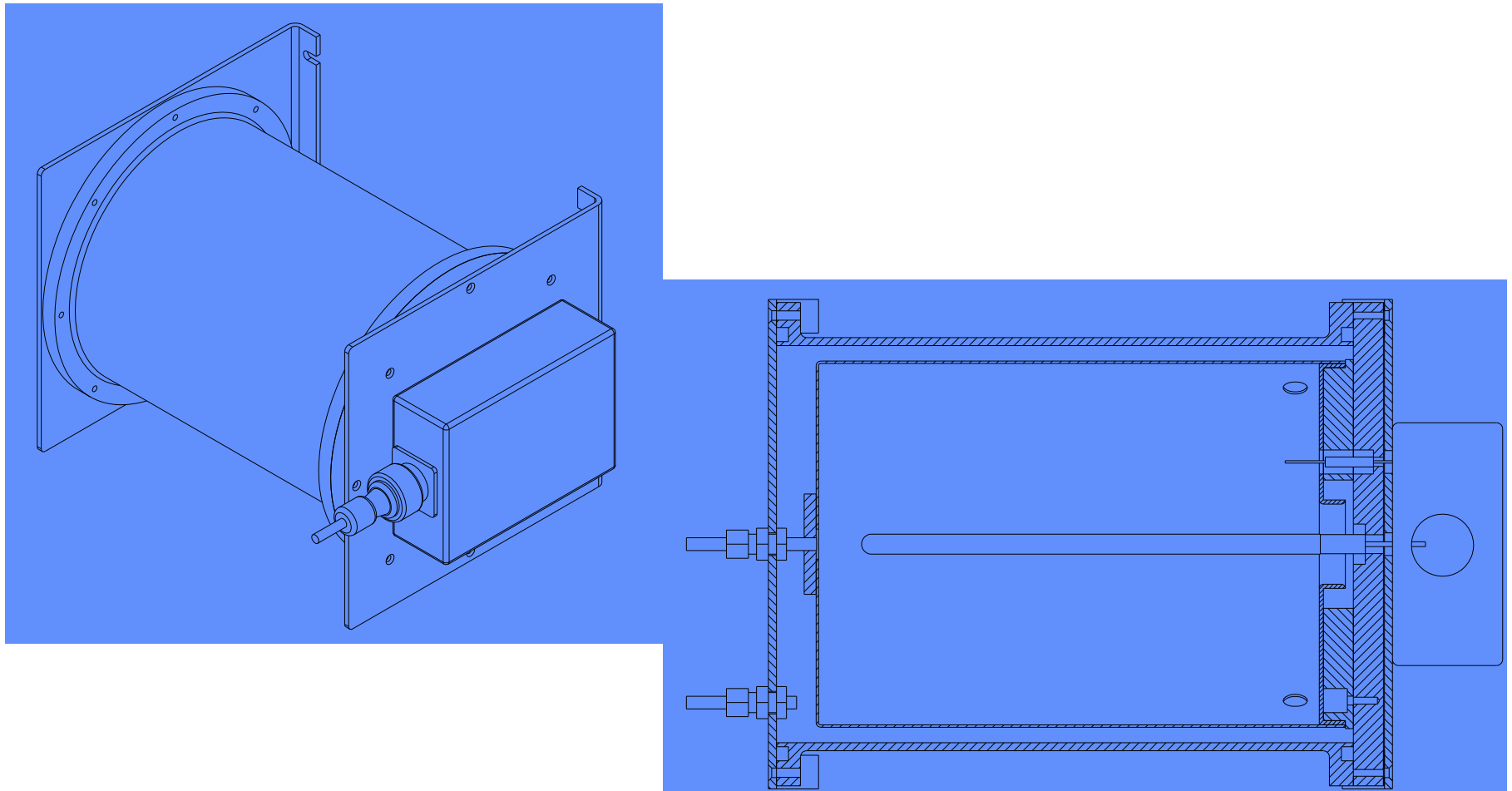


▶ 2 x 2l ion chambers

- ◆ 1 x diffusion, 1 x sealed for gamma comp
- ◆ Lightweight as no pump!
- ◆ single log scale from 10kBq m⁻³ to 100MBq m⁻³
- ◆ Radon and gamma compensation



Proposed 6l Chamber Design



Issues of Interest



- ▶ **Surface plateout/adsorption: strongly affected by materials & treatment**
 - ◆ Chromated Al Alloy showed v high adsorption/build up
 - ◆ 0.5L chambers stripped and gold plated
- ▶ **Exposed insulators leading to charge collection**
 - ◆ Minimise exposed area
- ▶ **2L & 0.5L Chambers calibrated at NPL**
 - ◆ 0.5L design calibrated in different atmospheres: Air, Ar & N2: Response exactly tracked differences in mean ionisation energy
- ▶ **Response to other gases not a strong function of geometry only volume**
 - ◆ Based on work in WAGR in 1970s
- ▶ **Long term stability of electrometers still a problem?**