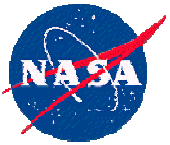


ISS TEPC Measurement Results

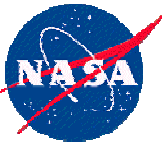
Jun 07 – Sep 08

Space Radiation Analysis Group
Johnson Space Center

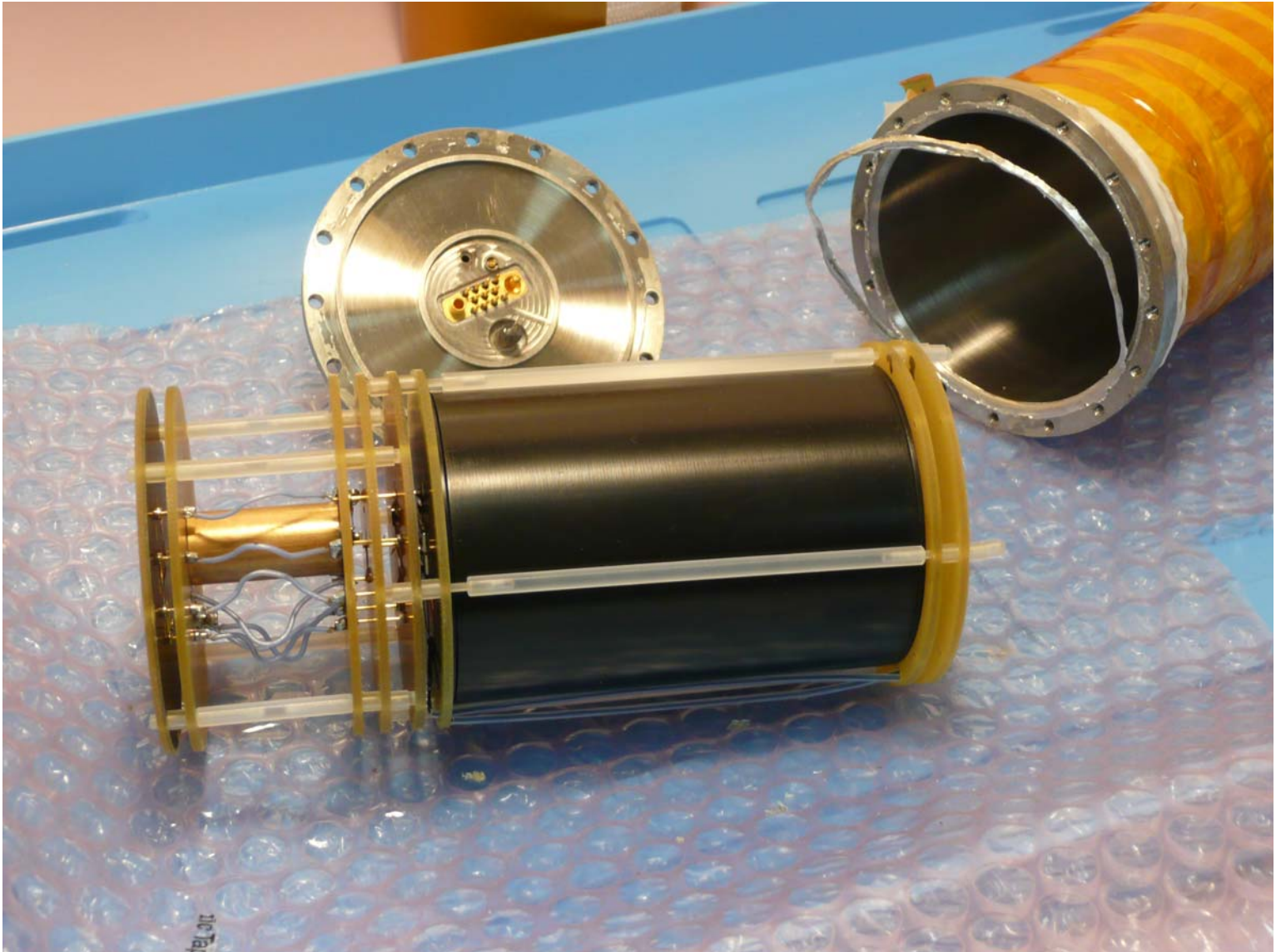


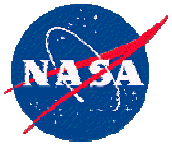
ISS TEPC Summary

- Right cylinder of A150 plastic – 5 cm x 5 cm
 - Gas is pure propane, simulating 2 μm of tissue
 - the projected area is 30 cm^2 and sensitive volume of the detector is 103 cm^3 for isotropic exposure.
- Current measurement location is JPM
 - New modules recently mapped Node 2, **Columbus**, and JPM
- Measures lineal energy (y) in the range 0.4 – 1000 $\text{keV}/\mu\text{m}$
 - y spectra recorded 1 per minute and dose rate/dose equivalent rate calculated every ~4 seconds
- Data sent to the ground every minute and has an alarm threshold of 0.05 mGy/min
- Currently used to officially track Expedition exposures = **MRE**
- ISS TEPC launched on STS-117 to replace failed unit.
 - Operational since 6/2007



ISS TEPC





Current Location - JPM 1A5



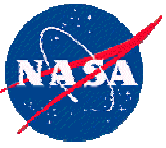
ISS017E014022



ISS Configuration

S124E009973

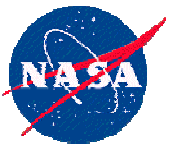




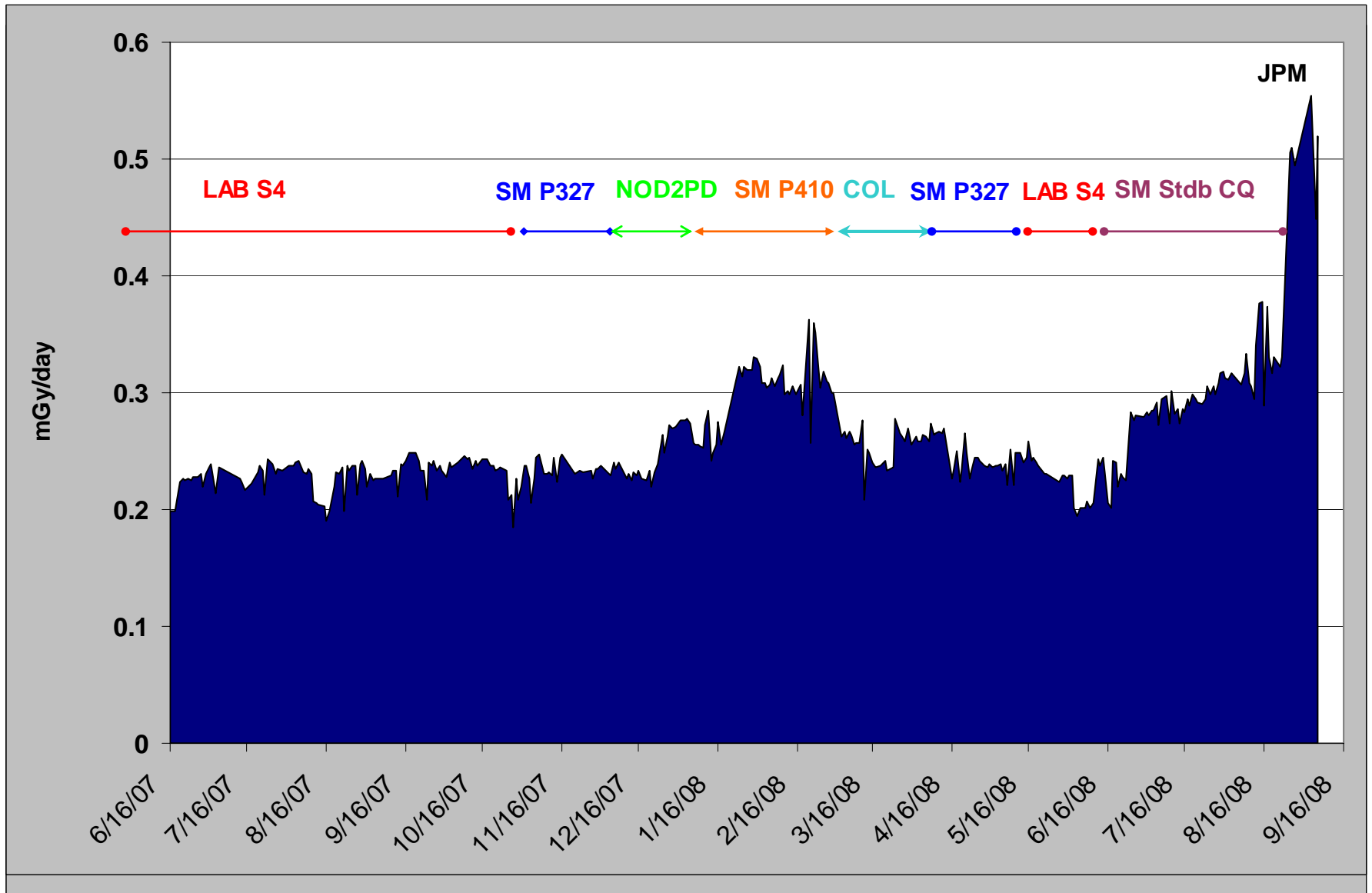
ISS TEPC on ISS

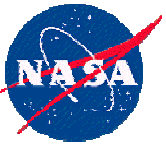


ISS015E22462

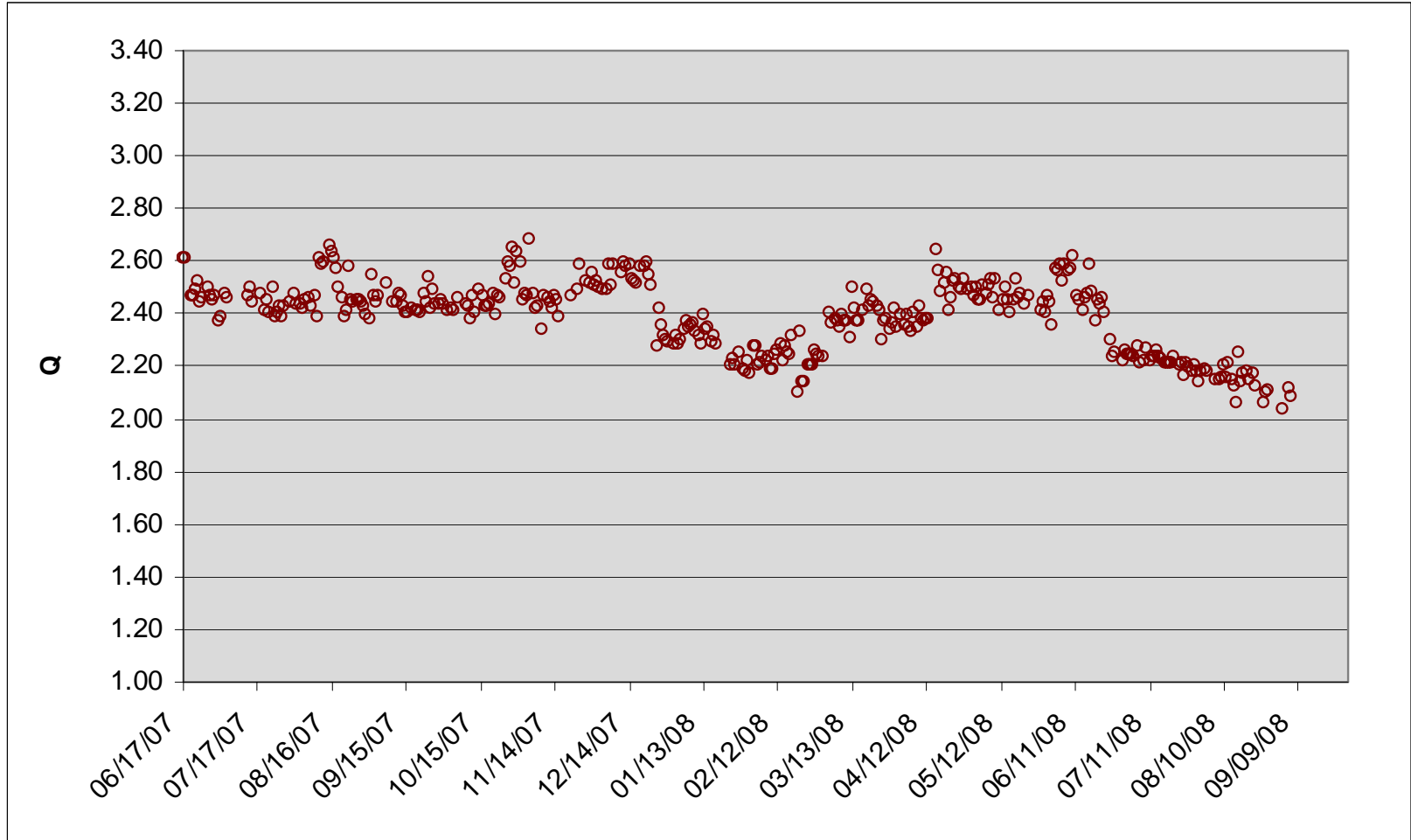


ISS TEPC Long Term Dose Rate



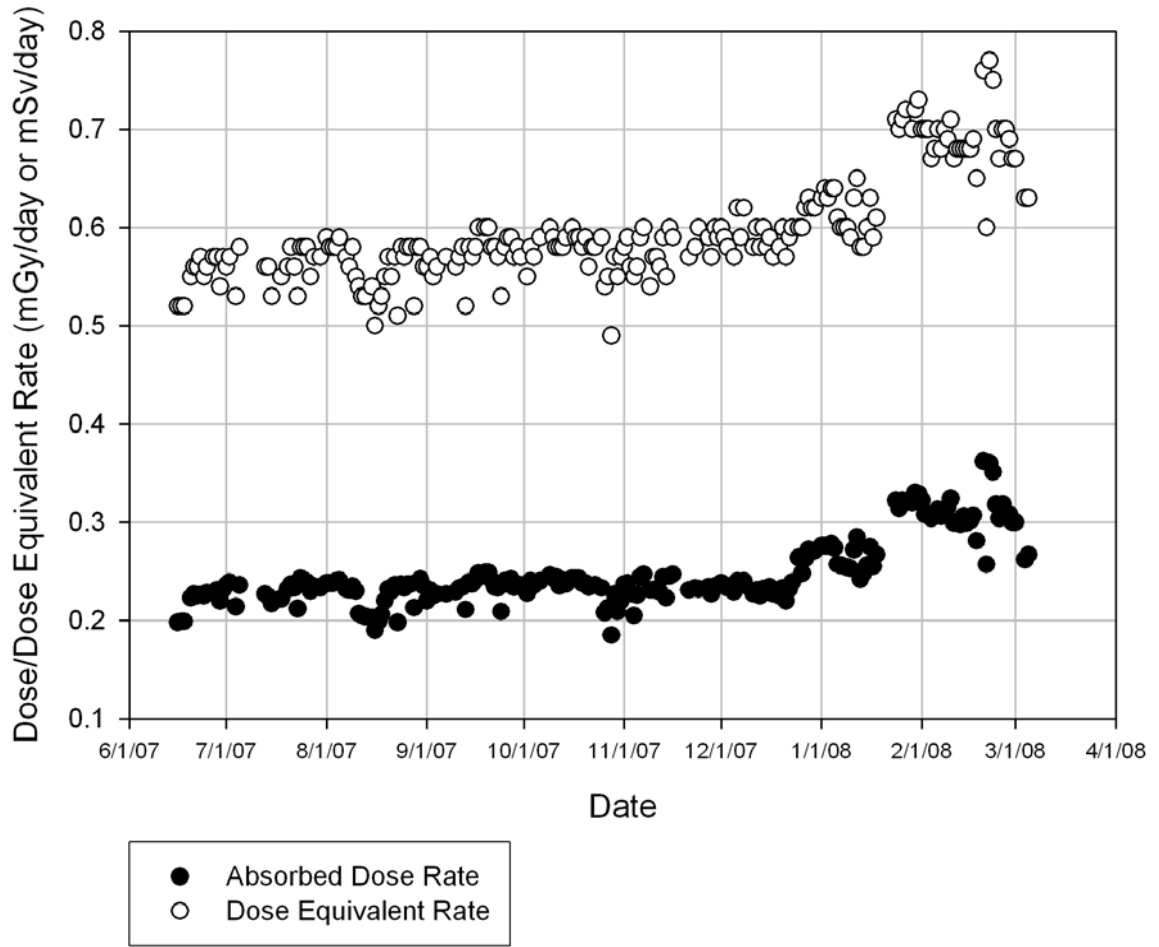


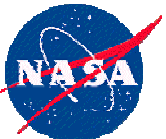
Daily Quality Factor





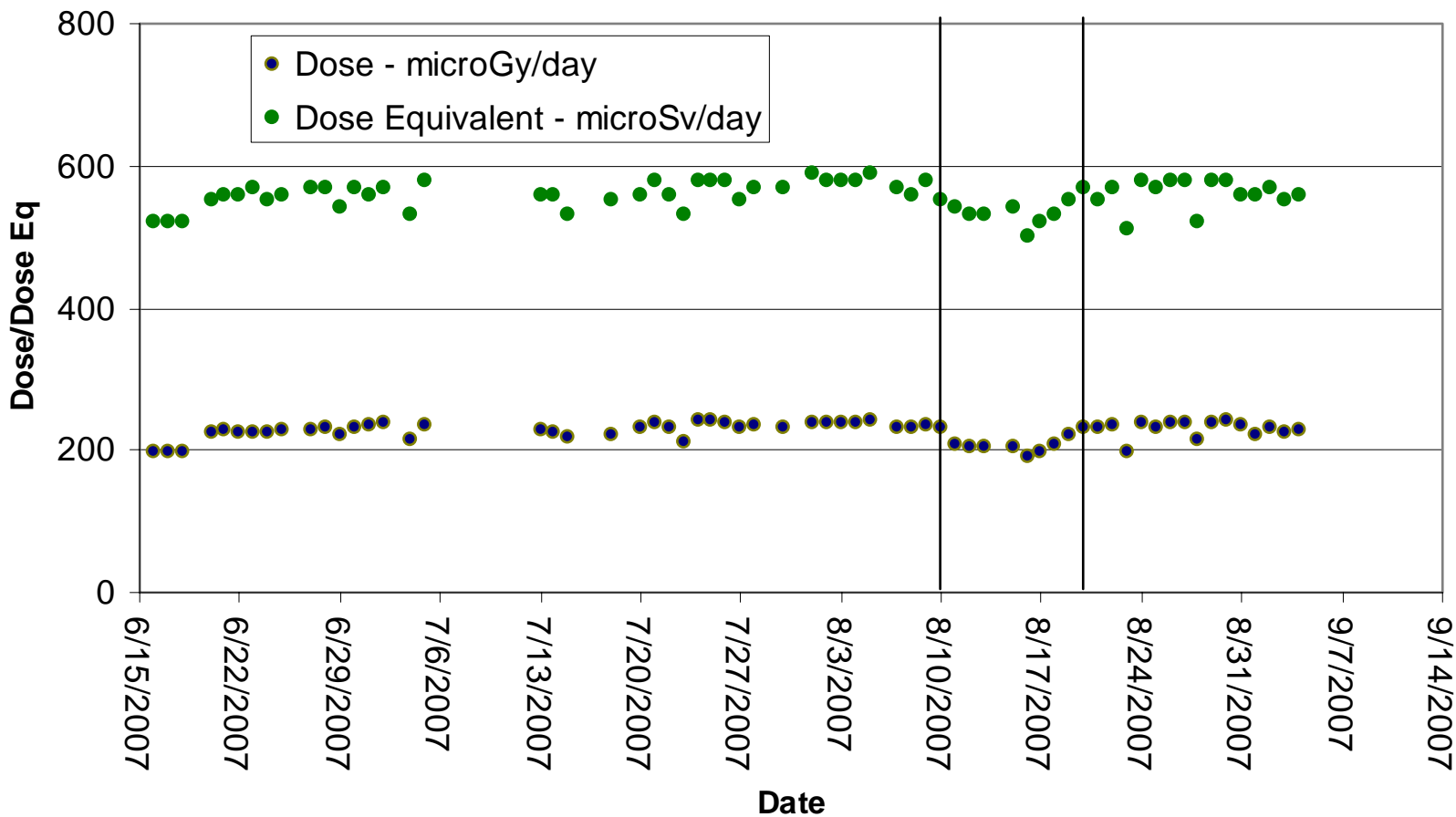
ISS TEPC Daily Measurements

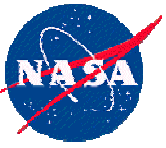




Real Time ISS TEPC Data

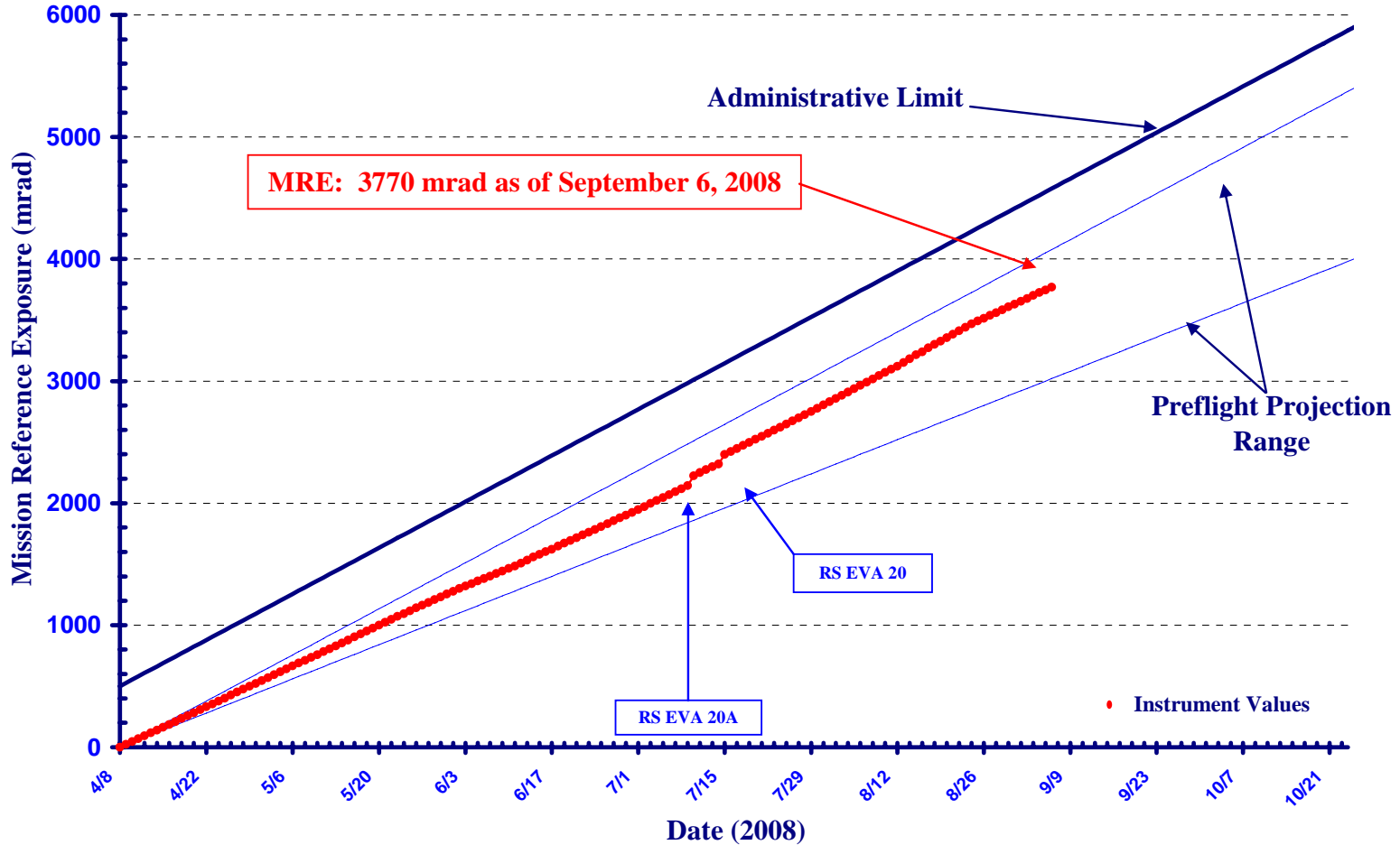
Shuttle Docked

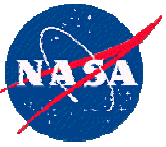




ISS TEPC MRE

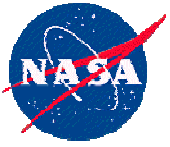
ISS Expedition 17 Crew Mission Reference Exposure



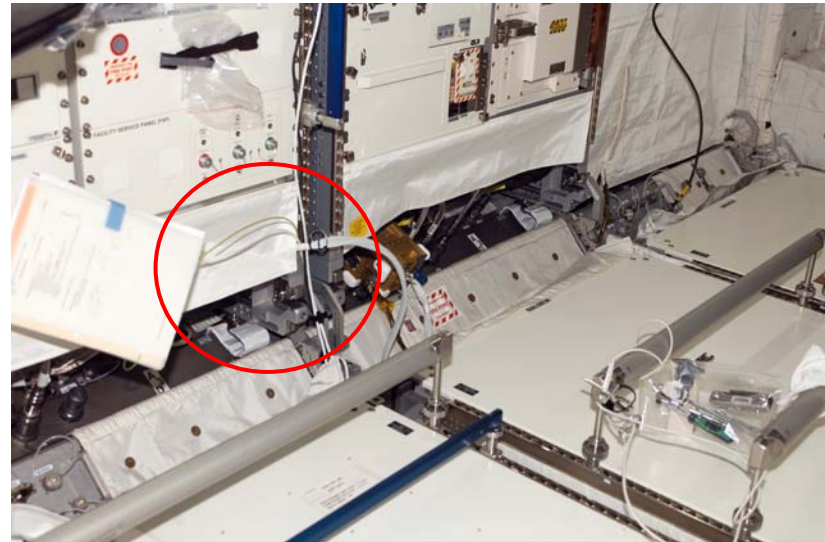
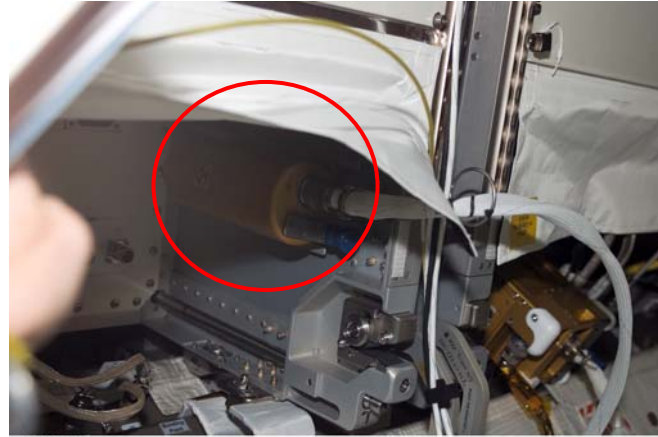


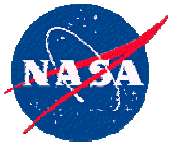
Columbus Module

- The NASA ISS TEPC has completed a measurement campaign in the Columbus Module.
- We moved the detector on March 3, at ~10:43 GMT to the Columbus EPM Rack COL1A3. The measurement period ended on 4/14/08.
 - We have 42 days of monitoring data available.
- We also have overlapping measurement data from the Shuttle-based TEPC during the STS-123 mission (3/11/08- 3/26/08). Docking of the Shuttle to ISS occurred on 3/12 and Kibo was installed
- The average altitude of ISS during the period was 346 km.

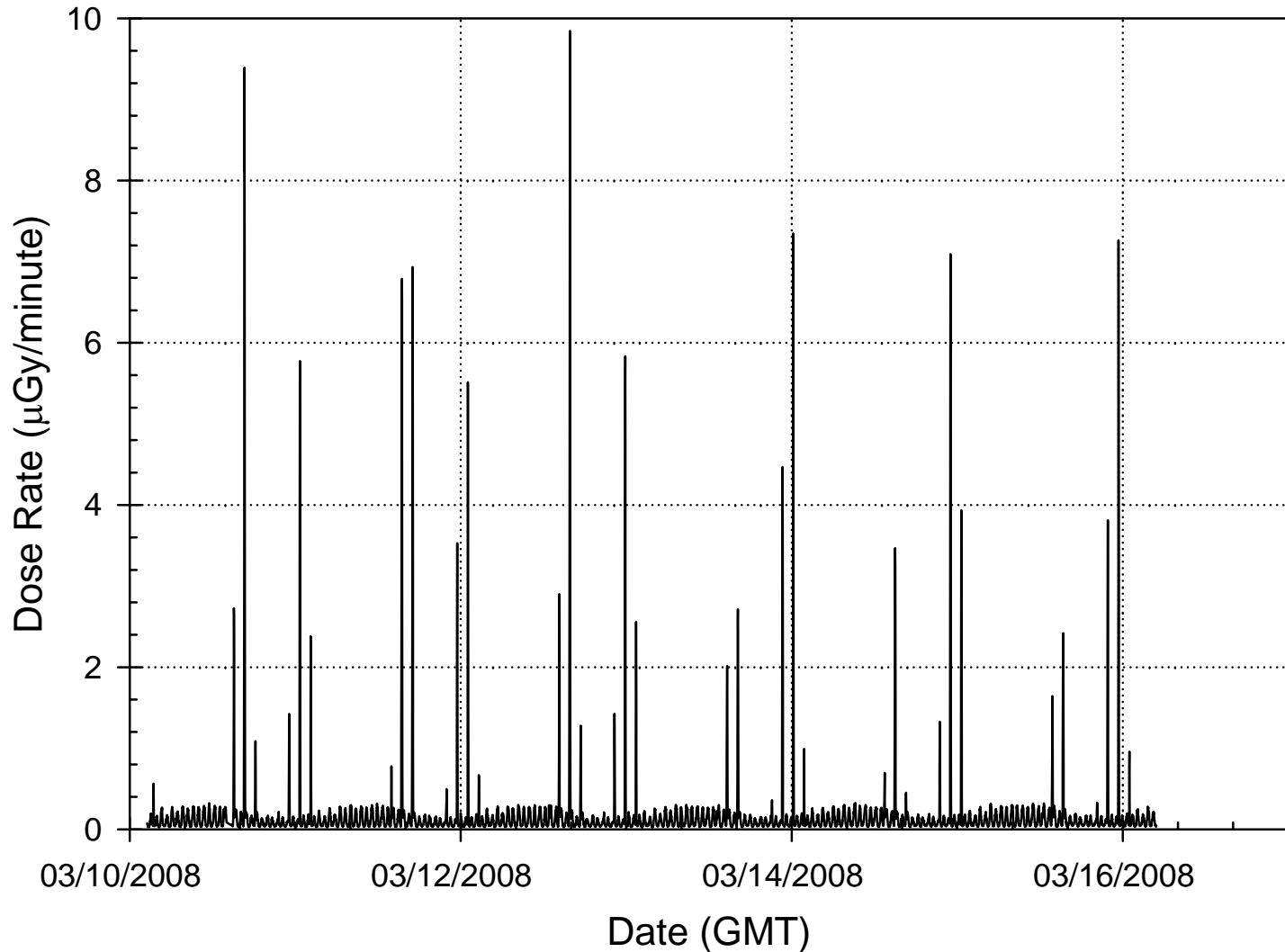


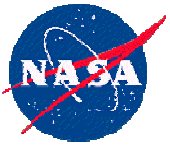
TEPC Location in Columbus





March 18, 2008 - Files 51-100





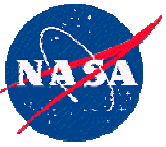
Columbus Results

March 4 - 10

	GCR	Trapped	Total
Dose (μGy)	922.506	790.482	1712.988
Dose Eq (μSv)	2768.831	1413.807	4182.638
Particles Count	16883289	12613729	29497018
Time (minutes)	8816	626	9442
$\mu\text{Gy/day}$	140.691	120.556	261.248
$\mu\text{Sv/day}$	422.275	215.62	637.894

March 18 - 24

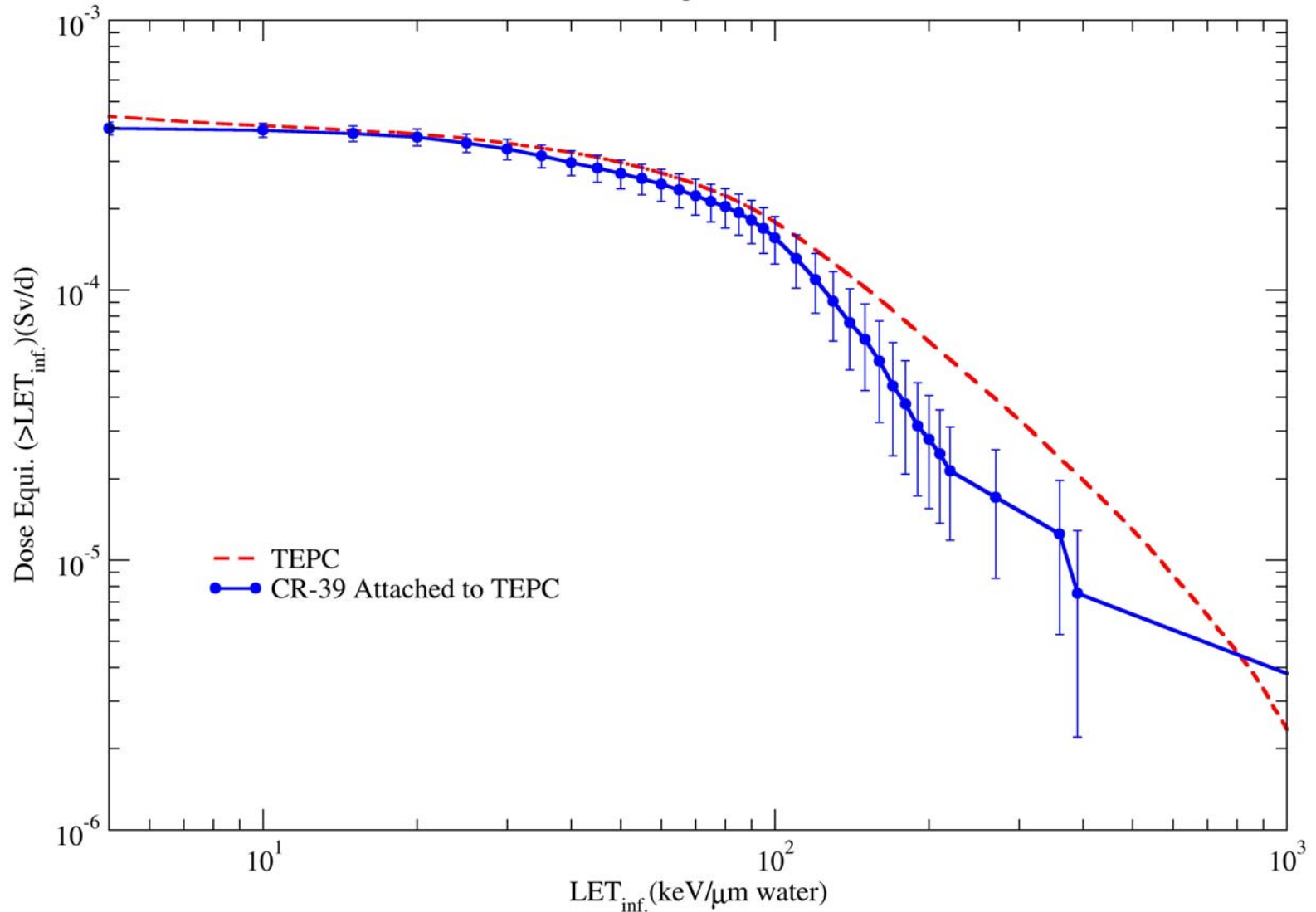
	GCR	Trapped	Total
Dose (μGy)	872.357	592.419	1464.776
Dose Eq (μSv)	2571.033	1067.608	3638.642
Particles Count	16168033	9620668	25788701
Time (minutes)	8232	502	8734
$\mu\text{Gy/day}$	143.828	97.674	241.502
$\mu\text{Sv/day}$	423.894	176.02	599.913

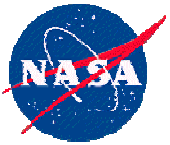


ISS TEPC and CR-39: 8/07 - 3/08

Integral LET Spectrum (Dose Equivalent, ICRP 60)

(ISS - Expedition 15)

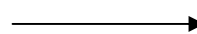




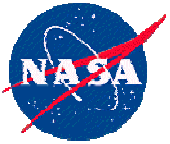
ISS TEPC RAM Results

JSC Space Radiation Dosimetry Laboratory		ISS Expedition 15/13A.1		Dosimetry Report			
				Date: 07/11/08			
Radiation Area Monitors (RAM) Data (Exposure Time = 231.1 d)							
Dosimeter/ Location	Dosimeter Type	Measured Dose (mGy)	¹ Dose Low-LET (<10 keV/ µm water) Q=1 (mGy)	¹ Dose CR-39 High-LET (>10 keV/ µm water) Q>11 (mGy)	^{1,2} Total Dose (mGy)	^{1,2} Dose Equivalent (mSv)	^{1,2} Quality Factor
TEPC	TLD-100	44.32 ± 0.36	39.68	7.93 ± 0.47	47.60 ± 0.59	130.17 ± 5.42	2.73 ± 0.11
	TLD-300	47.25 ± 0.97	40.24		48.16 ± 1.08	130.73 ± 5.50	2.71 ± 0.11
	OSLD- Luxel 300s	45.99 ± 0.67	41.59		49.51 ± 0.82	132.08 ± 5.45	2.67 ± 0.11
	OSLD- Luxel 3s	49.59 ± 1.02	43.29		51.21 ± 1.12	133.78 ± 5.51	2.61 ± 0.11
Comments: ¹ Quantities may not be measured/calculated for all of the dosimeter locations ² Quantities calculated by combining the CR-39 dose results with the TLDs/OSLDs dose results, as recommended by NCRP 142 (2002), Equation (6.1).							

ISS TEPC



58 mGy 140 mSv 2.4



Conclusions

- Dose & Dose Eq Range
 - **0.18-0.55** mGy day⁻¹
 - **0.50-1.1** mSv day⁻¹
- Q factor range
 - 2.04 – 2.68
- GCR/Trapped ratio
 - 70% Dose Eq is GCR
- ISS TEPC operating well for over 1 year