

# TG-106

Accelerator Commissioning and  
Acceptance Testing

- Reduce measurement errors below 1% in beam data acquisition
- Relevant Task Groups
  - TG-54: SRS
  - TG-120: IMRT
  - TG-74: Head Scatter
  - TG-69: Radiographic Film
  - TG-70: Electron Beams

- Typical time

- Photon beam scanning: 1-2 weeks
- Point data collection: 1 week
- Electrons: 1-2 weeks
- Verification: 1 week

# Minimum Req'd Measurements

- Photons
  - PDD, Profiles
  - Wedges, MLC
  - Leakage, Penumbra, Tongue & Groove
  - Scatter – Collimator, Total, Tray, Wedge
- Electrons
  - PDD, Profiles
  - Cone Factors, Insert Factors
  - Virtual Source Position

# Equipment

- 40x40 field sizes and 40 cm depth in water
- 75x75 cm tank

TABLE I. (a) Typical commissioning measurements for photon beam data for each energy and wedge. (b) Typical commissioning measurements for electron beam data for each energy.

		Square field size (cm)															
(a)	Description	1	2	3	4	5	6	8	10	12	14	16	20	25	30	40	>40
Scan data	Application	IMRT data				Traditional radiation oncology fields										Magna field	
	PDD/TMR	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
	Profiles @ 5–7 depths Diagonal or star profiles	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Nonscan data	$S_c$	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
	$S_{cp}$	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
	WF/TF				×	×	×	×	×	×	×	×	×	×	×		
	Surface dose	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
(b)	Description	Cone size (cm×cm)															
		5×5				10×10				15×15				20×20			
Scan data	PDD			×			×				×			×			×
	Profiles @ 5–7 depths			×			×				×			×			×
Nonscan data	Cone factor			×			×				×			×			×
	Cutout factor			×			×				×			×			×
	Virtual source			×			×				×			×			×
	Surface dose			×			×				×			×			×

TABLE II. Physical characteristics of commercially available water equivalent materials. NA: Nuclear Associates, NY; Radiation Product Design, Albertsville, MN; RMI: Radiation Measurements, Inc., Middleton, WI; CIRS: Computerized Imaging Reference Systems, Inc. Norfolk, VA.

Material, manufacturer	Color	Density (kg/m <sup>3</sup> )	$(\mu_{\text{en}}/\rho)_{\text{med}}^{\text{water}}$			
			6 MV	10 MV	15 MV	18 MV
Polystyrene, NA, RPD	Opaque	1050	1.035	1.037	1.049	1.059
Acrylic/PMMA, RPD	Clear	1185	1.031	1.033	1.040	1.044
Solid water, RMI	Maroon	1030	1.032	1.039	1.049	1.052
Plastic water, CIRS	Lavender	1012	1.032	1.031	1.030	1.030
White water-RW-3, NA	White	1045	1.035	1.036	1.049	1.056