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NIST ^{60}Co Radiation-Processing Calibration Fields

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1. Excerpts from a notice to customers

NIST announces the availability of its new MDS Nordion Gammacell ^{60}Co irradiator, model 232, serial number 207 (GC207). The high dose rate associated with this source will allow for calibrations to be completed at least three times faster than currently possible in the other NIST high-dose irradiators. The GC207 was added to our facility rather than refurbishing an existing source; the added capacity will also increase our service throughput. The GC207 has been calibrated for the dosimeter geometries designated for alanine vials, radiochromic films, perspex and 2 ml ampoules. These geometries are the standard configurations for the other NIST high-dose irradiators.

In our efforts to offer the best possible calibration services to our customers, we continually conduct research aimed at improving our measurement capabilities and services. In the process of calibrating the new GC207, we took the opportunity to include an extensive measurement and analysis of the existing source-geometry dose rates. The techniques were the same as the last measurement, the results of which were reported in a letter dated Mar 31, 2000.

For high-dose-rate irradiations and dosimeter calibrations, the Radiation Interactions and Dosimetry Group utilizes four ^{60}Co irradiators: an underwater source (referred to as the Pool source) and three Nordion Gammacell 220 sources (GC45, GC232 and GC207). The new absorbed-dose rates are listed in the attached table. This table gives the absorbed-dose rate in each source geometry and, where applicable, the percent change from the previous rate. These new dose rates became effective on 16 December 2002.

NIST High-Dose ^{60}Co Calibration Facility Dose Rates for December 31, 2002

Gammacell 220-207 (GC207)		
Sample Geometry	**Dose Rate, kGy/h**	
Alanine Vial	**18.500**	
Film Block	**18.390**	
Perspex Cup	**18.052**	
Ampoule Cup	**17.815**	

GC207 with Stainless-Steel Dewar		
Sample Geometry	**Dose Rate, kGy/h**	
Alanine Vial	**17.971**	
Film Block	**17.865**	
Perspex Cup	**17.536**	
Ampoule Cup	**17.306**	

Gammacell 220-232 (GC232)		
Sample Geometry	**kGy/h**	**Percent Change**
Alanine Vial	**4.845**	**0.5**
Film Block	**4.812**	**0.5**
Perspex Cup	**4.730**	**0.5**
Ampoule Cup	**4.683**	**0.5**

GC232 with Stainless-Steel Dewar		
Sample Geometry	**kGy/h**	**Percent Change**
Alanine Vial	**4.723**	**0.5**
Film Block	**4.691**	**0.4**
Perspex Cup	**4.611**	**0.6**
Ampoule Cup	**4.565**	**1.1**

Gammacell 220-45 (GC45)		
Sample Geometry	**kGy/h**	**Percent Change**
Alanine Vial	**1.466**	**0.6**
Film Block	**1.456**	**0.6**
Perspex Cup	**1.431**	**0.6**
Ampoule Cup	**1.417**	**0.6**

F101 Pool Source		
Sample Geometry	**kGy/h**	**Percent Change**
Alanine Vial	**0.5308**	**0.1**
Film Block	**0.5253**	**0.1**
Perspex Cup	**0.5208**	**0.1**
Ampoule Cup	**0.5184**	**0.1**

2. Comparisons

Homeland security activities curtailed inter-laboratory comparisons in 2001 & 2002. A 2003 comparison is in progress between NPL and NIST.

3. Internet-based services

An Internet-based system for fast remote calibration of high-dose radiation sources against the U.S. national standard gamma-radiation source is being constructed at NIST. At present, the procedure of calibrating an industrial radiation source is comprised of mailings and evaluations, which take several days and considerable labor at NIST that translates into relatively high calibration costs. Once built, the Internet-based transfer calibration system will be the most modern radiation calibration service. The Internet calibration program would provide industry with on-demand calibrations, immediate turnaround times, lower cost, and improve the quality of the manufacturing process. The service would be a 24-hour, 7-day per week operation that would perform without the need for NIST staff to be present. The reduction in NIST staff time will lead to significant cost reductions.

References

e-Calibrations: Using the Internet to Deliver Calibration Services in Real Time at Lower Cost, M. Desrosiers, V. Nagy, J. Puhl, R. Glenn, R. Densock, D. Stieren, B. Lang, A. Kamlowski, D. Maier, A. Heiss, Radiat. Phys. Chem. (2002) 759-763.