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1.0 目的 PURPOSE

该程序文件描述了评价测量仪器和人员在剂量计校准和日常使用过程中的不确定度的方法。
This procedure describes the methods of evaluating the uncertainty of instrumentation and personnel during dosimeter calibration and routine use.

2.0 材料 MATERIALS

2.1 WINdose 剂量测量系统
WINdose Dosimetry System

2.2 GEX Doc#100-252，仪器和人员鉴定表
GEX Doc#100-252, Instruments and Personnel Characterization Form

3.0 频率 FREQUENCY

3.1 一批剂量计剂量响应鉴定期间
During the dose response characterization of a batch of dosimeters

3.2 培训新员工
Training of new hires

3.3 从业人员年度鉴定
Annual re-certification of employees

4.0 WINDOSE 剂量计支架差异测试 WINDOSE DOSIMETER HOLDER VARIANCE TESTING

4.1 取出样品室的小杯并关上 Genesys20 分光光度计样品室的盖子。打开仪器的电源开关并允许仪器经过它的完整的自动启动程序，这需要大约 3 分钟 才能完成。仪器完成其启动程序后，在试图使用仪器之前允许其有一个 30 分

钟的预热时间。预热时间完成后，就可以安全的将小杯归位，并可在恰当的吸光度测量波长将仪器归零以便使用。
Remove the cuvette cup from the sample compartment and close the Genesys 20 Spectrophotometer sample compartment cover. Turn the instrument on from an off position and allow the instrument to go through its complete automated start-up sequence that will take about 3 minutes to complete. After the instrument has completed its start-up sequence, allow a full 30 minute warm-up period before attempting to use the instrument. Following completion of the warm-up period it is safe to replace the cuvette cup and zero the instrument at the appropriate absorbance measurement wavelength for use.

4.2 如果使用的是 WINdose 剂量计支架，将剂量计支架的锥形孔朝向光束插入杯形支架里并将仪器归零。反复练习插入支架数次并获得“0”读数，直到感觉放置手法舒适为止。
If using the WINdose dosimeter holder, insert the holder with the conical facing toward the light beam and zero the instrument. Practice inserting the holder several times and achieving “zero” readings until the comfortable with the placement technique.

4.2 开始记录单个操作者的结果。插入空的支架 32 次并将读书（包括正的和负的吸光度值）记录在《仪器和人员鉴定表》上。
Begin documenting the individual operator’s results. Insert the empty holder 32 times and record the readings (including positive and negative absorbance values) on the Instruments and Personnel Characterization Form.

4.3 如果 32 次测试中没有测量数据大于±0.003A，则测试通过。
Successful performance of the test is met when no measurement greater than ±0.003A or greater is observed during the 32 cycle test.

5.0 测量仪器差异测试 MEASUREMENT INSTRUMENTATION VARIANCE TESTING

5.1 选择一个经辐照的、剂量介于 25 和 50 kGy 中间（或介于校准范围中间部分）的剂量计。
Select a dosimeter that has been irradiated to approximately the middle of the range 25 and 50 kGy (or the middle portion of the calibrated range).

5.2 测量已辐照的测试剂量计的吸光度 Ai，将测试剂量计放入薄膜支架后一起放入 Genesys20 样品室支架，关闭盖子并记录显示的吸光度值。打开样品室的盖子，从仪器里取出剂量计支架，并在每个分光光度计上重复该循环最少

32 次，将这些数值输入《仪器和人员鉴定表》或等同物的恰当的单元格里。

Measure the irradiated absorbance, Ai, of the test film by placing the dosimeter into the film holder positioning the holder into the sample cell holder of the Genesys 20, closing the lid and recording the displayed absorbance value. Open the sample compartment lid, remove the dosimeter holder from the instrument and repeat this cycle a minimum of 32 times in each spectrophotometer. Enter these values into the appropriate cells in the Instruments and Personnel Characterization Form or equivalent.

5.3 每次都从剂量计支架里取出和放置剂量计，这可以测试日常剂量计测量中典型的操作不确定度。操作剂量计时要谨慎，以避免测试过程中导致薄膜上的压痕、污点或颗粒的累积。一个损坏的或弄脏的剂量计薄膜会扭曲测试结果。

Remove and replace the dosimeter from the holder each time. This tests typical handling uncertainty during routine dosimeter measurements. Use care when handling the dosimeter so as to avoid dents, smudges, or the accumulation of particulate on the film during this test. A damaged or dirty dosimeter film may skew the test result.

5.4 预置了公式的《仪器和人员鉴定表》将为测试薄膜的读数计算平均值、最小值、最大值、标准偏差和变异系数 CV。单个操作者按照 5.1， 5.2 和 5.3 的说明执行的三次连续测试可以提供必要的数据，以确定一个对测量仪器（分光光度计和剂量计支架）可重复性（单个剂量计，单个仪器系统和单个操作者）的评估。该测试可以通过几个不同的操作者、跨越数天重复进行，以便为该仪器系统建立一个再现性差异。从该测试中收集的数据可以用来为仪器系统建立一条基准线。该信息对于理解剂量计系统对总体剂量测量系统的不确定度的贡献也是很有用的。

The preformatted formulae in the Instruments and Personnel Characterization Form spreadsheet will calculate the mean, minimum, maximum, standard deviation, and coefficient of variance (CV) for the readings from the test films. Performing three consecutive tests for a single operator following the instruction in 5.1, 5.2 and 5.3 provides data necessary to determine an estimate of the measurement instrumentation (spectrophotometer and dosimeter holder) repeatability (single dosimeter, single instrument system and single operator). This test can be repeated over several days with different operators to establish a reproducibility variance for the instrument system. The data collected from this testing can be used to establish a baseline for the instrument system. This information is also useful in understanding the contribution of the dosimeter system to overall dosimetry system uncertainty.

5.5 在吸光度大于等于 0.250 时，如果使用的是 DoseStix 支架，仪器系统应该可以获得小于等于 0.3%的可重复性变异系数 CV；如果使用的是 WINdose 支架，则可以获得小于等于 0.5%的可重复性变异系数 CV。
The instrument system should be expected to result in a repeatability CV of 0.3% or less at an absorbance of 0.250 or higher if using a DoseStix holder and 0.5% when using the WINdose holder.

5.6 这些剂量计在完成测试后即可丢弃。
The dosimeter may be discarded upon completion of testing.

6.0 修订历史 REVISION HISTORY

日期 **Date**	版本 **Revision**	修改描述 **Change Description**
07/27/07	C	增加了明确的仪器预热说明 Added explicit instrument warm –up instruction 修改了关于系统差异的语言描述 Changed language pertaining to system variance 修改了对于系统差异的测试通过/失败标准 Changed test pass/fail criteria for system variance.