

## Landauer's Hierarchy of Control Subtraction

Landauer has recently moved to a new method for separating ambient background radiation dose from occupational radiation exposure from dosimeter results. The new method should provide a better estimate of the occupational dose for clients when controls are not present for the account.

Landauer now utilizes a hierarchal approach in determining the ambient background radiation to subtract from dosimeters. The preferred control subtraction technique has always been based on control dosimeters that were shipped and returned with the occupational dosimeters. These dosimeters provide the best estimate of what actual background radiation the dosimeters received. However, in the past if control dosimeters were not available or an unused dosimeter was not designated as a control, clients could opt to have automatic background subtraction (ABS) rate of 0.2 mrem per day subtracted from the occupational dosimeters. Clients now can have a background radiation rate subtracted from the dosimeters that is based on actual historical customer average control dose (HCACD) from the account. In the new control subtraction hierarchy means that even if a control was not present in a shipment returned to Landauer an estimate of the background radiation will be subtracted from the occupational dosimeters thus arriving at a better estimate of the dose received by the participant.

The historical customer average control dose background subtraction technique uses actual controls from account to provide an estimate of the background radiation rate in units of mrem/day. Using actual controls from the account or series provides a more reliable estimate of the background radiation for the dosimeters than a national, state, or regional average values. This results in the observed historical background being subtracted from the dosimeter and a better estimate of the occupational dose for the participant when the actual control is not available. If the historical customer average control dose technique is used the average background radiation rate in mrem/day will be multiplied by the number of days between the ship work order (SWO) date which is the day the dosimeter shipment was assembled and the analytical work order (AWO) date which is the date the dosimeters arrived back at Landauer. For example, if the total number of days between the SWO and the AWO was 30 days and a historical customer average control dose rate of 0.267 mrem/day was estimated then a value of 8 mrem ( $0.27 \text{ mrem/day} * 30 \text{ day} = 8 \text{ mrem}$ ) would be used to subtract from the dosimeter. The historical customer average control dose technique is only used if a control was not returned or the control was determined to be invalid (control shows signs of beta exposure or reading much higher than the participants in the same file).

The automatic background subtraction technique uses an average ambient background rate of 0.2 mrem per day, which can be found in National Council on Radiation Protection (NCRP) Report 94. If the automatic background subtraction technique is used the rate of 0.2 mrem/day will be multiplied by the number of days between the ship work order (SWO) date which is the day the dosimeter shipment was assembled and the analytical work order (AWO) date which is the date the dosimeters arrived back at Landauer. For example, if the total number of days between the SWO and the AWO was 30 days a value of 6 mrem ( $0.2 \text{ mrem/day} * 30 \text{ day} = 6 \text{ mrem}$ ) would be used to subtract from the dosimeter. The automatic background subtraction is only used if a control was not returned or the control was determined to be invalid (control shows signs of beta exposure or reading much higher than the participants in the same file) and there was not a sufficient number of historical controls results to make a solid estimate of the ambient background radiation for the account.

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