Aurion Reference Guide

BY LANDAUER®

aurion™
Quantum Leap Dosimetry

Unless otherwise noted, the names of companies, street addresses, and persons contained in this document are fictitious and meant solely to support the use of the Aurion product.

FCC Compliance and Advisory Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this equipment not expressly approved by the manufacturer, Intermarketing Ltd., could void the user's authority to operate this equipment.

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Aurion Reference Guide

Chapter 1: Introduction

Aurion System

Landauer's Aurion System focuses on operational monitoring where the radiation safety professional or worker needs prompt and reliable radiation dose information locally. The intent of this dosimeter is not dose of record. The Aurion system consists of the Aurion dosimeter and display unit/reader, smart card identification technology and web-based data management programs. Aurion includes semiannual recalibration services and calibration certification of each dosimeter.

Aurion is a lightweight, rugged dosimeter that can be worn in a variety of work environments and read out as many times as needed. Readings are logged by date and time into memory residing on both the dosimeter and reader. The battery-less dosimeter provides the dose information to the reader through radio frequency technology making for easy, foolproof operation. The display unit shows both the total integrated dose since activated by a given user as well as the incremental dose monitored since the last readout.

Smart card technology provides the means to personalize each dosimeter as well as electronically identify the user to the dosimeter and reader for a secure chain of custody. The smart card permits multiple people to use any Aurion dosimeter without the administrative burden of keeping issuance logs. The service is ideal for short-term monitoring of visitors or staff that infrequently enter a radiation controlled area.

All readout data can be uploaded through the Internet into Landauer's web site and Aurion database where reports and queries enable the radiation safety professional to view the information from various perspectives such as by user, time, dose threshold or dosimeter. Data can also be exported from the Aurion database into a Microsoft ® Word or Adobe® Acrobat® PDF file, or as a text file where it can be imported into local spreadsheet or database software.

General Operation

Your initial shipment for Aurion service contains dosimeters, smart cards for insertion into the dosimeters to identify the user, and a display unit(s) accompanied by a charger with a cable that connects the display unit to your personal computer.

Before using Aurion for the first time, charge and configure the display unit and complete a performance check on each dosimeter. After a dosimeter has passed its performance check, insert a smart card into the dosimeter and activate the dosimeter on the display unit. The dosimeter is now ready to wear. After use, read out the dosimeter on the display unit that records and displays your current dose.

You establish the intervals for reading dosimeters and transferring data from the display unit through your personal computer and the Internet to the Aurion database at Landauer's web site. You manage the reporting results at the Aurion web site by choosing the criteria of reports to view, print or export to your personal computer to perform onsite analysis.

Operating System Requirements

Computer, Monitor with 800 x 600 resolution or greater, Mouse, Modem, one available COM (RS232 serial) port, and access to Internet

Microsoft® Internet Explorer 5.0 plus service pack SP1, 5.5 SP2, IE6 or later

Microsoft Windows® 98 or later

Microsoft Word 97 plus service pack SP1, 2000 SP1 or SP2, XP or later for optional export of reports from the web site

Adobe® Acrobat® Reader 5.0 or later for optional export of reports to a PDF file from the web site

The screens from the Aurion web site represented throughout this reference guide are displayed as they would appear using Microsoft Internet Explorer with a screen resolution of 1024 x 768. Typeface, font size and colors may vary if you have made changes to your Internet or Windows display options.

Aurion System Hardware Components

Your first shipment for Aurion service contains:

Dosimeter(s) – device worn by the user to measure occupational radiation exposure

Smart Card(s) – a card that once inserted into the dosimeter electronically identifies the user to the dosimeter and display unit

Display Unit(s) – for the scan in/read out of the dosimeters

Charger(s) – the plug-in device that maintains the charge of the battery in the display unit. Two types are available for use: a) the locked box version is the default sent with all display units; b) the optional portable version allows the display unit to slip into an unsecured holder

Calibration Certificate – provides calibration information on the dosimeters as required by regulatory agencies and should be kept on file for reference

Subsequent shipments for exchanges contain only smart cards and/or Aurion dosimeters that are exchanged on a routine basis. Dosimeters are used for six months and returned to Landauer at the end of the use period to exchange for replacement dosimeters. Smart cards are used for one year and are not returned to Landauer. New smart cards are shipped each year to replace expired smart cards.

For a detailed explanation of information given on the packing list, see Appendix C.

Chapter 2: Using the Aurion System Immediately

1. **Read Chapter 1:** General Operation, p. 4.

2. **Charge display unit:** Charge the display unit for a minimum of twelve hours before use for the first time. Plug in the charger and place the display unit into the charger to automatically begin charging.

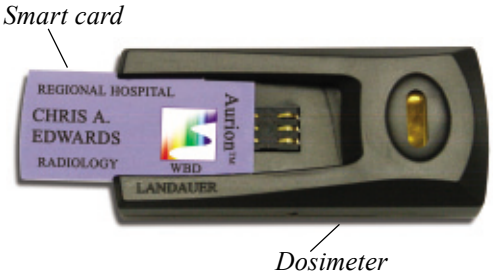
3. **How to turn the display unit on:** Turn on the display unit for use by pressing any key of the unit. Wait for the "Ready" message or the "Upload Reader" reminder message on the display unit screen to begin use.

   Turn off the display unit by sliding the unit out of the charger and pressing the function key [F4] and then the [0] key. If the display unit is idle when out of the charger for the default of ten minutes, it automatically shuts off to save power.

4. **Connect the display unit to your personal computer:** Connect the display unit to your personal computer for configuration and data transfer.
   - Place the display unit into charger.
   - Connect the cable from the charger to your personal computer COM port. If you are setting up your computer for the first time, refer to the setup instructions that came with your computer. Turn off your computer when connecting any cables, connect the cable, and then turn on the computer.

5. **Configure display unit:** Configure the display unit before use for the first time. During the configuration process, Landauer downloads software from Landauer's web site and installs the software on your computer. Administrative privilege for your computer is required to successfully download and install this software, and you may need to contact your network/information services administrator for assistance.
   - Connect the display unit to your personal computer as described in step 4 above.
   - Go to Landauer's web site www.landauerinc.com. Select E-Solutions and Aurion to log-in using the ID and password assigned to your account by Landauer.
   - Turn on the display unit. Wait for the "Ready" screen on display unit.
   - Select the Display Units - Configuration link on Aurion's sidebar menu.
   - Select with mouse [Yes] to a series of installation dialog boxes (installs software on your hard drive, and may take up to forty minutes depending on the speed of your Internet connection).
   - Select your display preferences.

- Select [Save Changes]. A series of dialog boxes appear indicating the progress of the transfer. Do not disconnect or use the display unit while transfer of configuration data is in progress.



6. **Activate dosimeter:** Each dosimeter must complete a performance check before use for the first time.
   - Remove the red unassigned card from the dosimeter and place the dosimeter face down on the display unit in the read out area.
   - After the display unit screen displays "Pass", insert a participant smart card and activate the dosimeter by placing the dosimeter face down on the display unit in the read out area.
   - Wait for the "Activated" message on the display unit screen. The dosimeter is now ready to wear.
7. **Read out dosimeter:** After use, read out dosimeter by placing the dosimeter (with smart card inserted) face down on the display unit in the read out area. The display unit message screen displays the monitored dose and the integrated dose on separate screens sequentially.
8. **Transfer data:** Transfer exposure records from the display unit to the web site to create dose reports. During the data transfer process, Landauer downloads software from Landauer's web site and installs the software on the computer used to transfer exposure data from the display unit to the web site. Administrative privilege for the computer used to transfer data is required to successfully download and install this software, and you may need to contact your network/information services administrator for assistance.
   - Connect the display unit to your personal computer as described in step 4.
   - Go to Landauer's web site www.landauerinc.com. Select E-Solutions and Aurion to log-in using the ID and password assigned to your account by Landauer.
   - Turn on the display unit. Wait for the "Ready" screen on the display unit.
   - Select the Transfer Data link on Aurion's sidebar menu. Select [Yes] to a series of installation dialog boxes that may appear.
   - Select [Upload Display Unit Data]. A series of dialog boxes appear indicating the progress of the transfer. Do not disconnect or use display unit while data transfer is in progress.
9. **Create dose reports:** Create dose reports at Landauer's web site.
   - Go to Landauer's web site www.landauerinc.com. Select E-Solutions and Aurion to log-in using the ID and password assigned to your account by Landauer.
   - Select the Dose Reports link on Aurion's sidebar menu.
   - Select the report criteria.
   - Select [Generate Report].
10. **Deactivate dosimeter:** Deactivating a dosimeter after each use is not necessary unless there is a change in assignment. After an assignment*, deactivate the dosimeter by removing the smart card and placing the empty dosimeter face down on the display unit in the read out area. Follow the instructions on the display unit screen.

* An assignment may be as short as a task for a visitor, a larger unit of time for a temporary assignment, or as long as six months for a permanent assignment.

Chapter 3: Web Site www.landauerinc.com

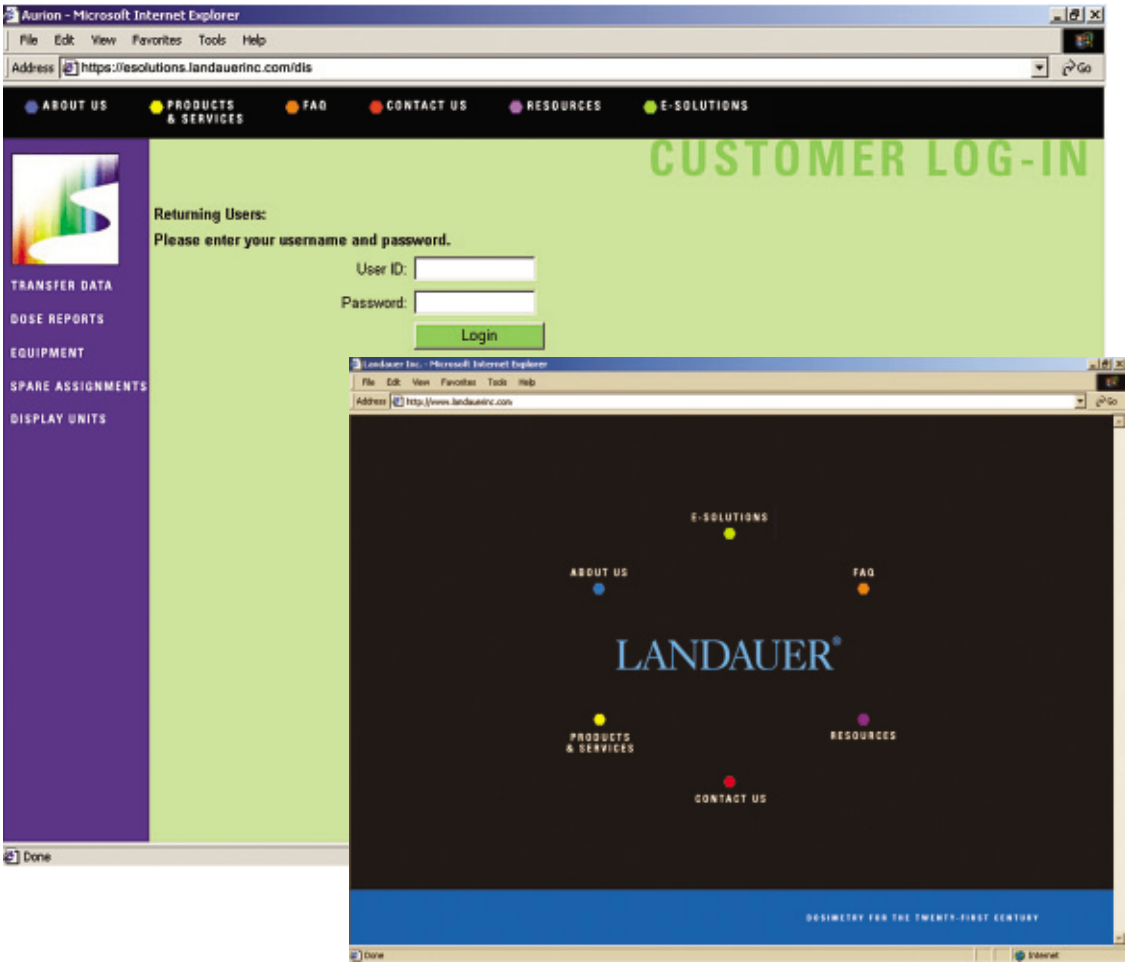
Purpose, Security and Log-In

Aurion's data management program is located on Landauer's web site at E-Solutions – Aurion. Your initial log-in to Landauer's web site will be to configure the display unit for use (Chapter 4, p. 9). Subsequent log-ins will be to transfer data from the display unit (Chapter 8, p. 16), to create various reports (Chapter 9, p. 18), and to manage spare smart cards (Chapter 10, p. 23).

Log-in (user access privilege) is required to access Aurion's database at Landauer's web site. RSA ClearTrust® security software controls and manages user access privileges to Aurion data, and all data transfers are encrypted for security protection.

Two user IDs and passwords for log-in are assigned by Landauer at the time of an Aurion order—one for full access and one for restricted access. After successful log-in, the left sidebar has a menu of links. Full access users have access to all Aurion links plus additional E-Solutions options. Restricted access users have access only to the Display Units - History Log and Transfer Data links.

Go to Landauer's web site www.landauerinc.com. Select E-Solutions and Aurion to log-in. For security reasons, if there is no input for thirty minutes after log-in, your log-in time expires. Close and then reopen your browser to log-in and continue your task.



Chapter 4: Display Unit

Primarily, the display unit activates and deactivates dosimeters, and provides an immediate digital readout of an exposure. The display unit initiates all communication between the display unit and the dosimeter, and works by emitting a field of RF (radio-frequency) energy (13.56 MHz) that powers up the dosimeter and allows the unit to interact with the dosimeter. At the time of read out, an exposure record is logged into memory on both the dosimeter and the display unit.

The display unit must be charged and configured before using Aurion for the first time. During the configuration process, Landauer downloads software from Landauer's web site and installs the software on your computer.

Exposure records on the display unit can be transferred to Aurion's database on Landauer's web site for data management. During the data transfer process, Landauer downloads software from Landauer's web site and installs the software on the computer used to transfer data from the display unit to the web site.

Charging

Charge the display unit for a minimum of twelve hours before use for the first time. Plug in the charger and place the display unit into the charger to automatically begin charging. Retain the display unit when not in use in the charger to maintain charge. If the display unit is idle when out of the charger for the default of ten minutes, it automatically shuts off to save power.

Turn on the display unit for use by pressing any key on the unit. Turn off the display unit by sliding the unit out of the charger and pressing the function key [F4] and then the [0] key.

Keypad Function Keys

F1 = Yes
F2 = No
F3 = <Reserved>
F4 = Function
C = Cancel
* = Enter

Dosimeter read out area

Display unit message screen

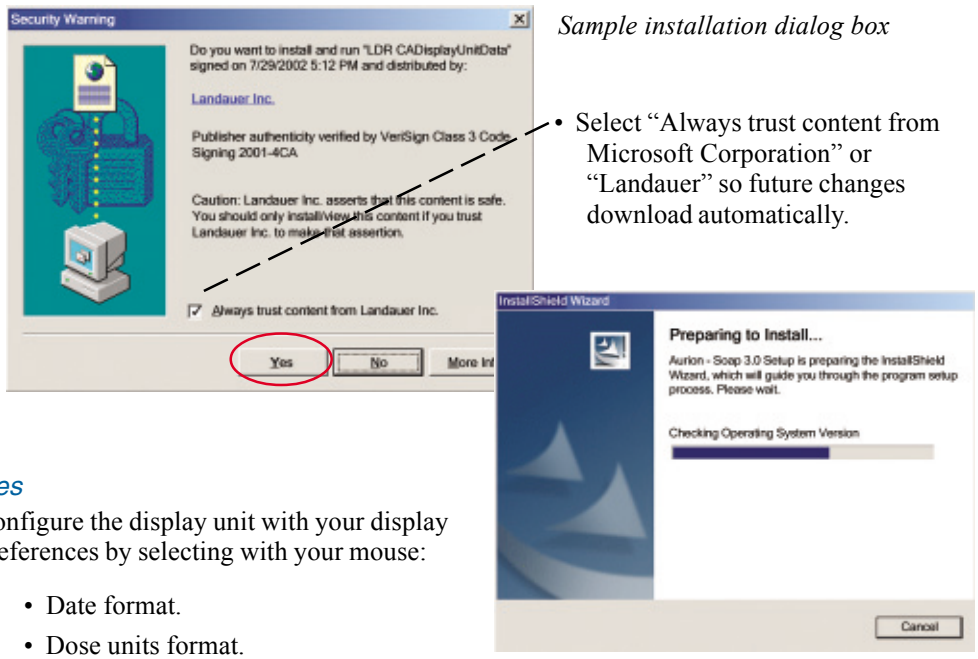
Configuration

Configure each display unit before use for the first time. During the configuration process, Landauer downloads software from Landauer's web site and installs the software on your computer. Administrative privilege for your computer is required to successfully download and install this software, and you may need to contact your network/information services administrator for assistance.

- Place the display unit in the charger and connect the cable from the charger to your personal computer COM port[1].

[1]If you are setting up your computer for the first time, refer to the setup instructions for your computer. Turn off your computer when connecting any cables, connect the cable, and then turn on the computer.
Alternately, you may supply and connect an Ethernet patch cable with a RJ45 connector on each end directly to the display unit and then to a RJ45 female to a supplied DB9 female adapter that you can connect to your personal computer COM port for communication.

- Go to Landauer's web site www.landauerinc.com; select E-Solutions and Aurion to log-in.
- Turn on the display unit by pressing any key of the unit. Wait for the "Ready" message or the "Upload Reader" reminder message on the display unit screen.
- Select the Display Units - Configuration link on Aurion's sidebar menu.
- A first time user must answer [Yes] to a series of installation dialog boxes. This installs software on your local hard drive, and may take up to forty minutes depending on your Internet connection speed and hardware. Ignoring these dialog boxes prevents configuration.



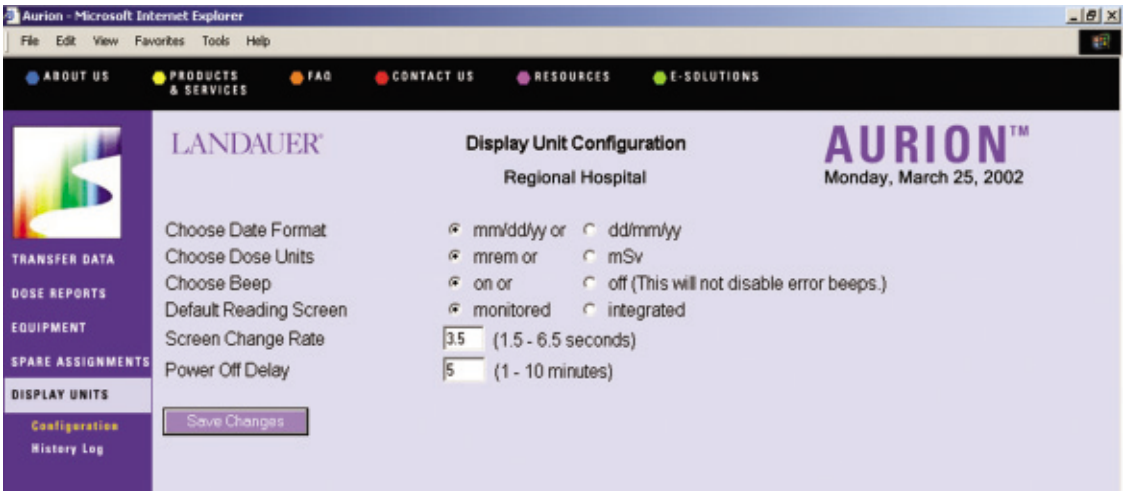
Sample installation dialog box

- Select "Always trust content from Microsoft Corporation" or "Landauer" so future changes download automatically.

Preferences

Configure the display unit with your display preferences by selecting with your mouse:

- Date format.
- Dose units format.
- Beep - Establishes whether the display unit will beep when a message is delivered.
- Default reading screen - The display unit displays the monitoring dose (since the last read out) and integrated dose (since dosimeter was activated) on separate screens sequentially. The default reading screen establishes which screen will display first.



- Screen change rate - Establishes how long each screen is displayed.
- Power-off delay - Establishes how long the display unit is idle while not placed in charger before it automatically shuts off to save power (the default is ten minutes).
- Select [Save Changes]. A series of dialog boxes appear indicating the progress of the data transfer.

Do not use display unit while transfer of configuration data is in progress. When configuration is complete, you have the option to disconnect the cable from your personal computer or retain the connection for future use.

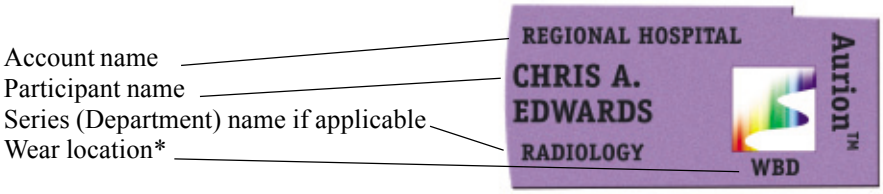
Chapter 5: Smart Card

A smart card is the removable component of the Aurion dosimeter that electronically identifies the user (participant) and wear location to the dosimeter and display unit. It can be specifically assigned to a participant and wear location, or be generic in nature such as Spare 1, Visitor 1, etc., that can be used by anyone several times.

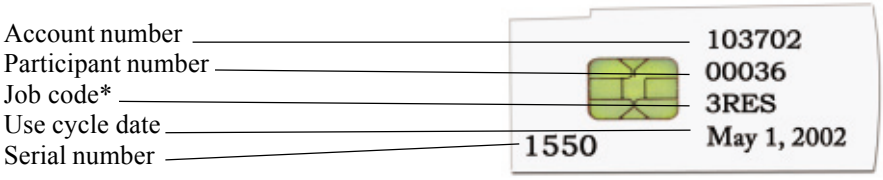
Permanent smart cards are assigned and shipped directly to you from Landauer. You can also assign an individual to a spare smart card for automated tracking through the Landauer web site at the Spare Assignment link on Aurion's sidebar menu (Chapter 10).

Landauer ships each Aurion dosimeter with a red unassigned card inserted in the dosimeter with the following text message: "Remove this red card and replace with your smart card to start the activation procedure." This is a disposable card or is usable as a reminder to always insert your smart card for use. Place the smart card when not in use in the plastic card protector provided.

Participant information



Smart card front



Smart card back

*See Appendix D for definitions of wear location codes. See Appendix E for definitions of job codes.

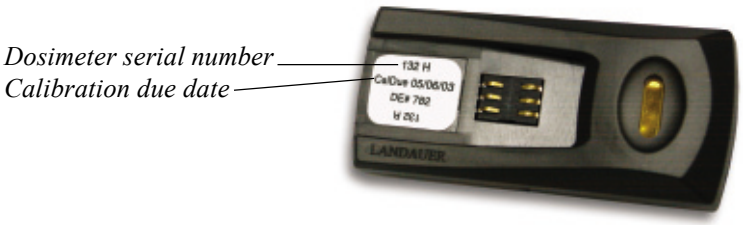
Chapter 6: Aurion Dosimeter

Dosimeter Specifications

Range	Photon: Gamma and X-Ray	Beta Particle
Energy Measurement	> 5 keV	> 200 keV
Dose Measurement	5 mrem - 5 rem (onsite)	5 mrem - 5 rem (onsite)
	5 rem - 50 rem (Landauer reader)	5 rem - 50 rem (Landauer reader)

Aurion reports all exposure results in increments of 5 mrem or .05 mSv. Dosimeters are activated, deactivated and read out on the display unit. At the time of read out, an exposure record is logged into memory on both the dosimeter and the display unit.

An Aurion dosimeter must be activated (Chapter 7, p. 14) before use to enable the exposure results to be reported to the current user (participant).



Obtain additional information about the dosimeter by placing the unassigned dosimeter with no smart card inserted face down on the display unit in the read out area (display unit must be configured). The following information appears on the display unit screen:

S/N: 58	*Dosimeter serial number*
Available Dose: 7286 mrem	*Available dose in mrem*
Cal Exp: 03/12/2003	*Calibration due date*
Use Exp: 10/14/2002	*Use cycle expiration*

Review the available dose and other dosimeter information after data transfer at Landauer's web site at the Equipment – Dosimeter Detail link on Aurion's sidebar menu (Chapter 9, p. 21).

Overdose

When an integrated dose exceeds 5 rem, an emergency read out by Landauer may be required. The following information appears on the display unit screen:

S/N: 58
Dose > 5 R Received
contact RSO.

Overflow

When a dosimeter approaches its maximum dose capacity of 8 rem, the dosimeter remains functional, but should be replaced as soon as possible. The following information appears on the display unit screen:

```
S/N: 58
Dosimeter max. dose
exceeded.
Replace dosimeter.
```

When a dosimeter exceeds a maximum accumulated dose capacity of 8 rem, the dosimeter is disabled. The dosimeter is deactivated and disabled if it is active. Return the dosimeter to Landauer to zero and recalibrate. The following information appears on the display unit screen:

```
S/N: 58
Measurement
range exceeded.
Replace dosimeter.
```

Chapter 7: Using the Aurion Dosimeter and Display Unit

Interaction between the display unit and the dosimeter is communicated on the display unit message screen. Screens also display problems or errors. Error screens beep three times regardless of configuration settings.

The display unit must be charged and configured before using Aurion for the first time (Chapter 4, p. 9). Turn on the display unit for use by pressing any key on the unit. The “Power Up” screen is the first screen displayed and includes the date and serial number of the unit. The display unit is ready to use when either the “Ready” screen or the “Upload Reader” reminder screen displays.

Power Up Screen

```
03/05/2002  10:14:20
Landauer - Aurion
Versions: 667
S/N: 1652
```

Date, time
Software version
Serial number of unit

Screen 7.0

To review Power Up screen, press key [C] twice.

Ready Mode Screen

```
READY

14:26:02
```

Time

Screen 7.1

Performance Check Screen

Landauer irradiates each dosimeter shipped with a known dose to check its performance before use. To check a new dosimeter before use for the first time, place dosimeter without a smart card inserted face down on the display unit in the read out area. The Performance Check screen indicates a **"**PASS" or **"**FAIL**."** A dosimeter is permanently disabled for use if it fails the performance check.

Performance Check
S/N: 40
PASS

Dosimeter serial number

Screen 7.2

If the dosimeter fails its check:

Performance Check
S/N: 40
FAIL

Screen 7.3

Seconds later:

Dosimeter disabled.
Use another dosimeter or
contact RSO.

Screen 7.4

If a smart card is inserted into the dosimeter for activation before completing the performance check, the performance check is automatically completed in the background. If the dosimeter passes, it is activated for use. If the dosimeter fails, Screens 7.3 and 7.4 display.

Activation of Smart Card and Dosimeter

Activate each dosimeter before use to make it possible to report a dose to the current user (participant). To activate a dosimeter, insert a smart card into a dosimeter to electronically identify the participant and place the dosimeter face down on the display unit in the read out area until Screen 7.5 displays.

Smart card inserted into Aurion dosimeter

CHRIS A. EDWARDS — *Name*
Wear Loc: WBD — *Wear location*
ACTIVATED

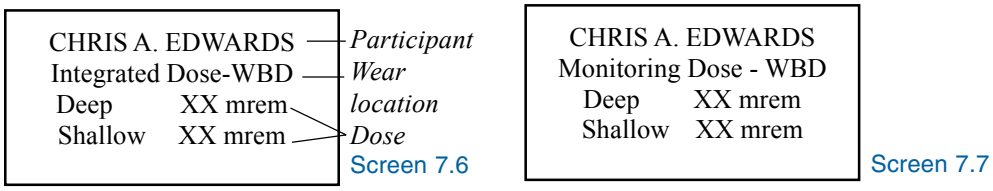
Screen 7.5

After the dosimeter is read out, all doses are reported to the participant assigned to that smart card. Each readout is date and time stamped within the display unit's memory. After data transfer, exposure records can be viewed at Landauer's web site at the Dose Reports link on Aurion's sidebar menu (Chapter 9, p. 19).

Read Out of Dosimeter on Display Unit

Placing the dosimeter with the smart card inserted face down on the display unit in the read out area starts the read out process. The following information appears on the display unit screen:

Seconds later:

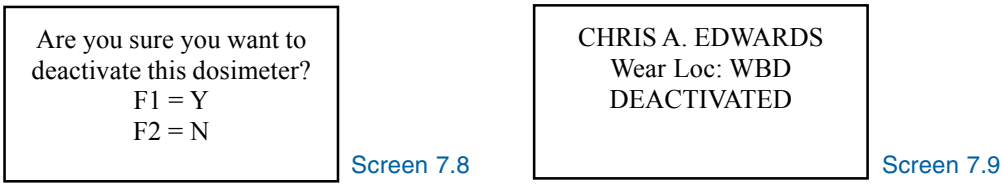


The display unit displays the monitoring dose (since the last read out) and integrated dose (since last activation of this dosimeter) on separate screen sequentially. You can change which dose displays first at Landauer's web site on Aurion's Display Units – Configuration page (Chapter 4, p. 10). Aurion reports exposure results in increments of 5 mrem or .05 mSv.

Deactivation of Smart Card and Dosimeter

When the participant is finished using the dosimeter for an assignment, the participant removes their smart card from the dosimeter and places the empty dosimeter face down on the display unit in the read out area. The following information appears on the display unit screen:

Press [F1] key and following message is displayed:

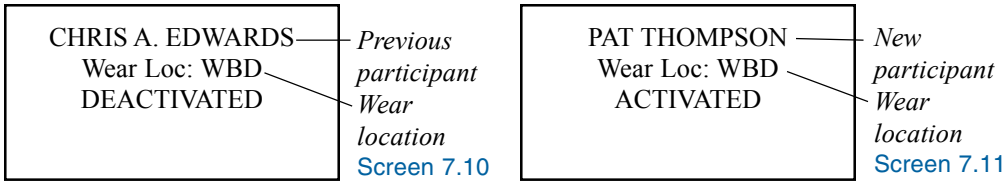


Note: An assignment may be defined as a task accomplished by a visitor, a larger unit of time for a temporary assignment, or as long as six months for a permanent assignment.

Forced Deactivation and Activation

If a smart card was removed from the dosimeter without performing a deactivation, and a new smart card is inserted into the dosimeter, the display unit automatically deactivates the dosimeter for the previous participant and immediately activates the dosimeter for the new participant with their smart card. The following information appears on the display unit screen:

Seconds later:



Caution: This is not recommended for routine operation. Unpredictable dose assignments can occur if you do not follow appropriate deactivation and activation steps.

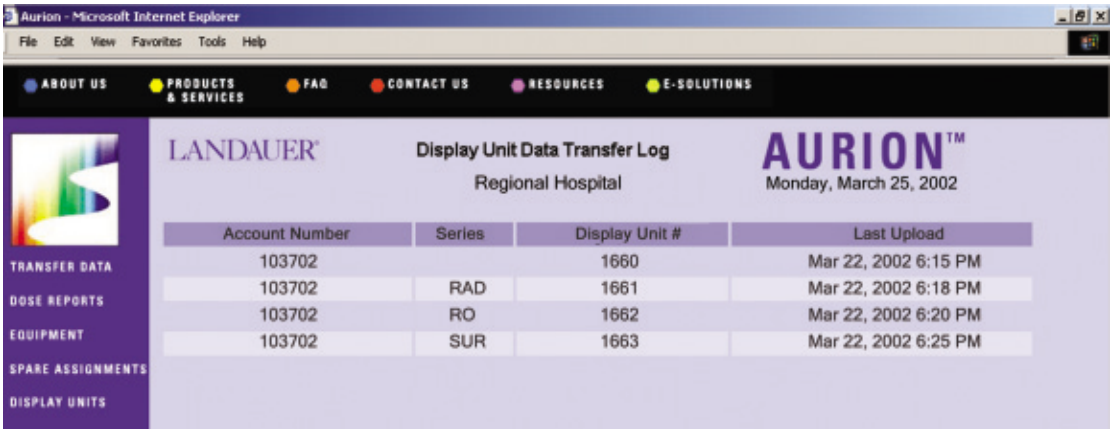
Chapter 8: Transfer Data From the Display Unit to the Web Site

Exposure records that have been logged into memory in the display unit can be transferred to Aurion's database on Landauer's web site for data management. Log-in at Aurion on Landauer's web site is required to transfer data (Chapter 3, p. 8).

Display Unit Data Transfer Log

After successful log-in, the Display Unit Data Transfer Log page is the first page displayed. It lists the most recent data available for review including the last date and time each display unit transferred data to the Aurion database.

A complete history of data transfers for a display unit is available by selecting the Display Units - History Log link from Aurion's sidebar menu. The Display Unit History Log Report lists for each upload, the account, series, display unit serial number, domain name, upload date and time, and number of records uploaded. Select from the Display Unit History Log Selection Criteria page any combination of account number, series, display unit, and/or date to customize your report. Base your selection criteria on the composition of your account. For example, don't specify a series for a display unit if no display unit is assigned to that series. Select the report destination (see Chapter 9 - Report Overview, p. 18), then select [Generate Report].



Transfer Data

Transfer the data from the display unit to Aurion's database at Landauer's web site through your personal computer using the Internet. During the data transfer process, Landauer downloads software from Landauer's web site and installs the software on the computer used to transfer data. Administrative privilege for the computer is required to successfully download and install this software, and you may need to contact your network/information services administrator for assistance.

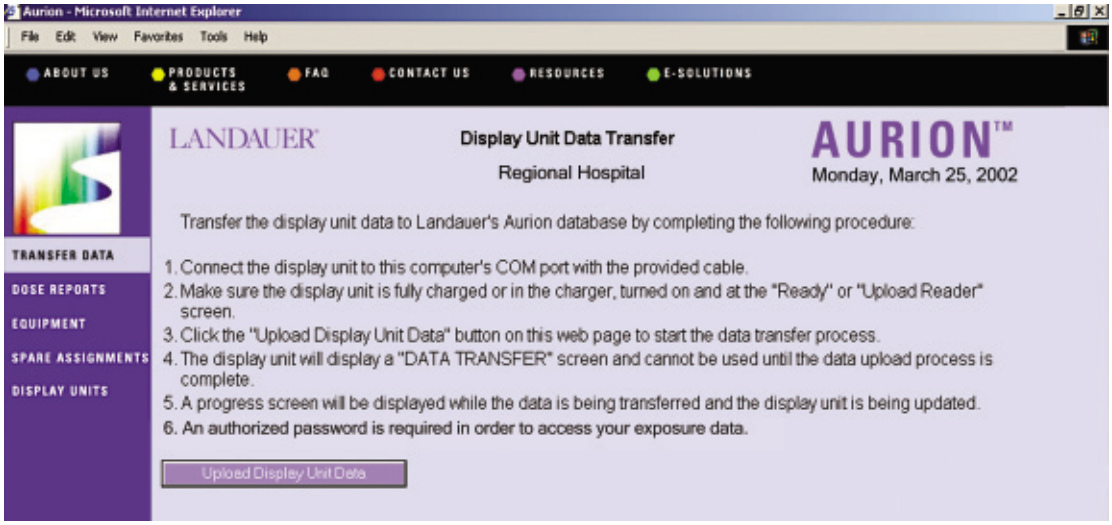
- Place the display unit in the charger and connect the cable from the charger to your personal computer COM port[1].
- Go to Landauer's web site www.landauerinc.com; select E-Solutions and Aurion to log-in.
- Turn on the display unit by pressing any key of the unit. Wait for the "Ready" message or the "Upload Reader" reminder message on the display unit screen.

[1]Caution: Turn off the computer when connecting any cables, connect the cable, and then turn on the computer.

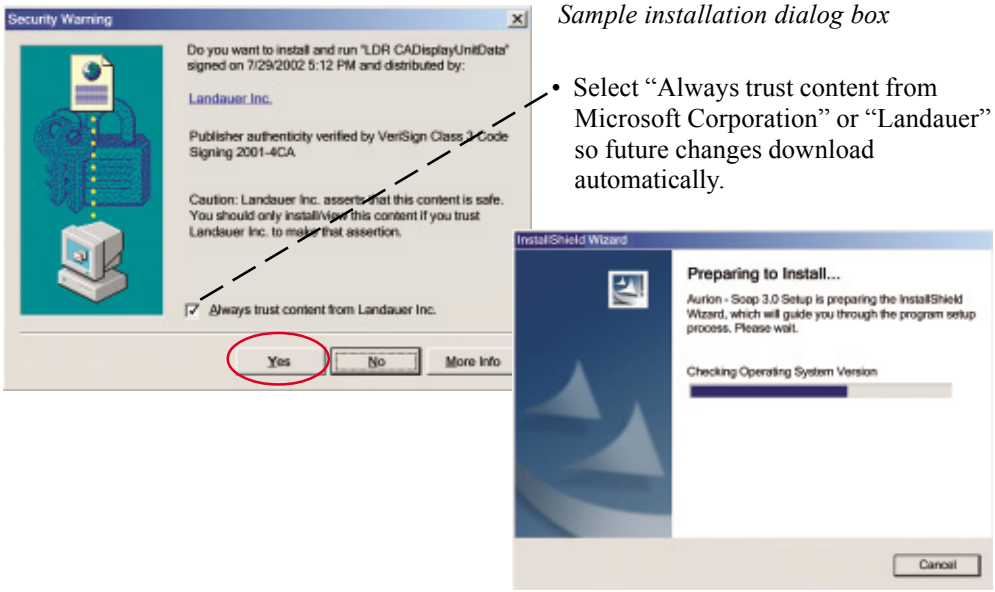
- Select the Transfer Data link from Aurion's sidebar menu.
- Select [Upload Display Unit Data]*.

The display unit screen first displays "Data Transfer..." and is not operational during data transfer. Do not disconnect cable during data transfer.

During data transfer, a series of dialog boxes display the progress of data transfer appear on the web site. The web site acknowledges receipt of the data, updates the Aurion database, and relays a message to the display unit to clear the recently uploaded exposure data. When data transfer is complete, you have the option to disconnect the cable from your personal computer or retain the connection for future use.



* A computer used for the first time for "Transfer Data" must answer [Yes] to a series of installation dialog boxes. This installs software on your local hard drive, and may take up to forty minutes depending on your Internet connection speed and hardware. Ignoring these dialog boxes prevents the data transfer function.



Sample installation dialog box

- Select "Always trust content from Microsoft Corporation" or "Landauer" so future changes download automatically.

Landauer's Web Site

Report Overview

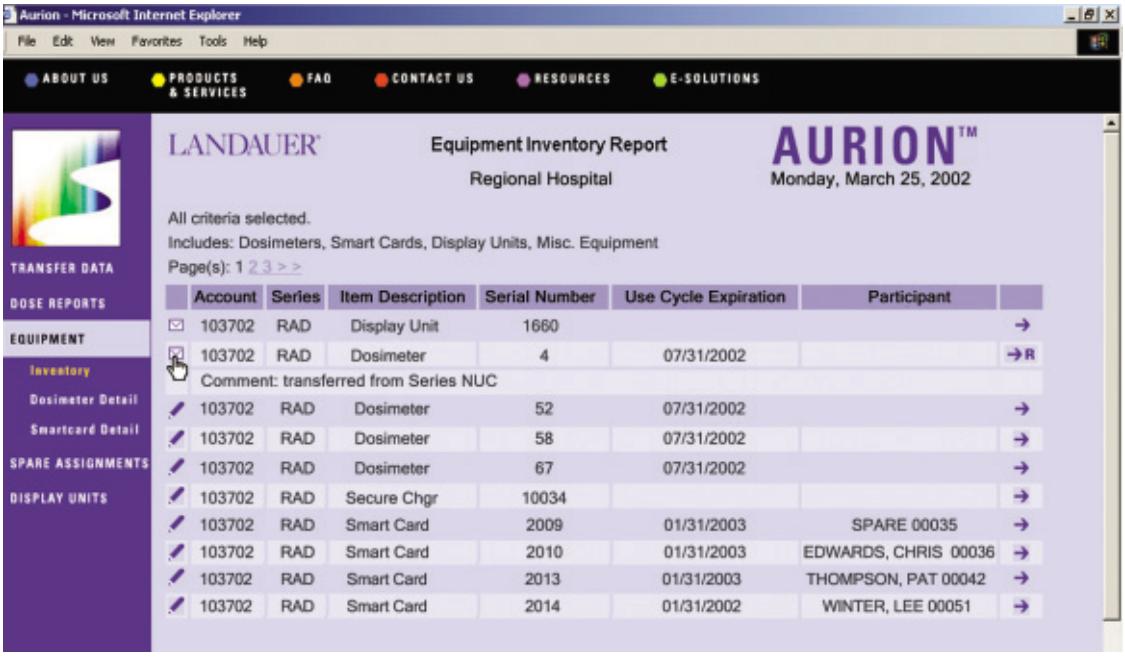
Log-in at Landauer's web site is required to create reports (Chapter 3, p. 8). All reports begin with a selection criteria page that filters data for a report. All available data may be included in a report or only specific items of interest based on selected criteria. No specific selection order is required in filtering the data, however, the initial choice affects subsequent choices. For example, choosing a specific account will affect which participant names become available.

All Aurion reports offer a data output destination to either "View Report" (HTML) formatted to your personal computer screen or the option to export as a Microsoft® Word file (formatting required), Adobe® Acrobat® PDF file, or comma delimited text file where it can be imported into local spreadsheet or database software. For the best print results when printing reports directly from the web site, select "PDF" as the destination output.

Notes in View Report Destination

The "pencil" icon seen in the "View Report" destination enables the viewer to write a special note associated with a specific line of a report. Select the pencil icon and a note dialog box appears where you can type a note to be associated with that line. After you complete the note, press [save] and exit the dialog box. Refresh the browser screen and the "pencil" changes to an "envelope" icon when a note is present. Place your mouse over the envelope icon and the note associated with that line appears on the following line (see following example report).

Sample View Report Destination



Navigation

Detailed headers appear on all reports to identify each section. You can navigate pages of the report by selecting the link to the page number just above the detailed header or at the end of a report. When a report extends past the edge of the screen, a scroll bar appears.

Error messages, equipment exceeding its useful life cycle, or expiration dates are highlighted on the page to draw your attention.

Dose Reports

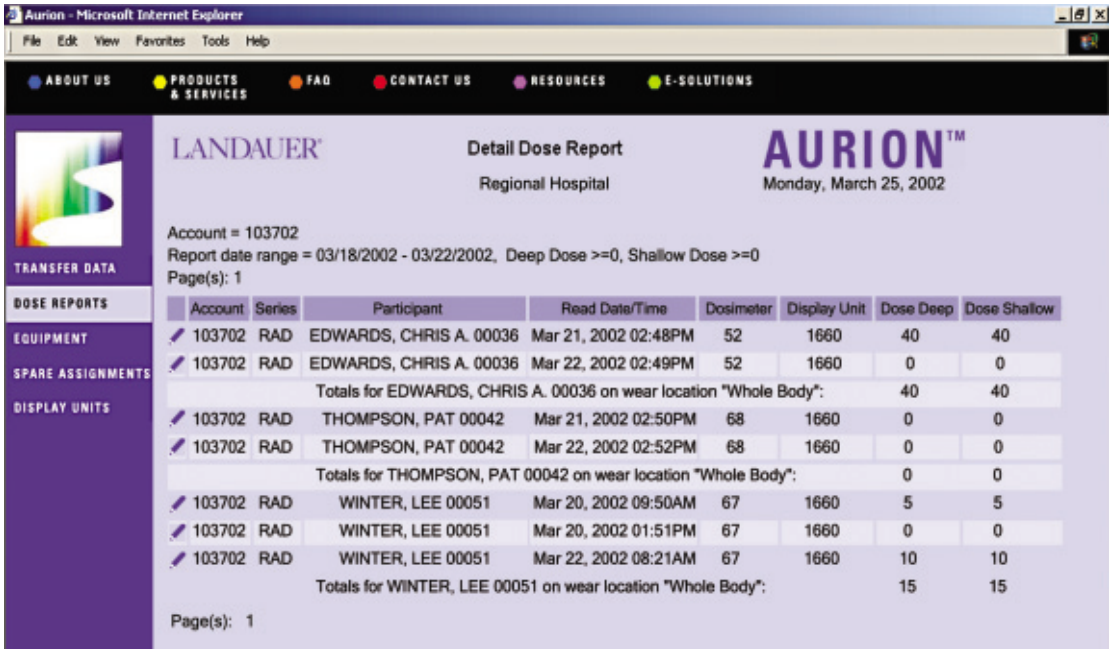
Dose reports list exposure results for participants including the time and date the dose was read on which display unit. The Detail Dose Report displays each date and time a dose was read for a participant plus a total for each participant and wear location. The Summary Dose Report displays totals of the various readouts for each participant and wear location.

In addition, you can choose one of the following quick reports:

- Last Month – A detail or summary dose report for selected criteria for the past month.
- Quarter to Date – A detail or summary dose report for selected criteria for the past quarter.
- Accumulated Threshold Dose – A summary report for selected participants who have exceeded a Landauer defined dose threshold of 500 mrem.
- Single Event Threshold Dose – A detail report for selected participants that exceeded the Landauer defined dose threshold of 125 mrem for any single exposure.

Select the Dose Reports link from Aurion's sidebar menu. Select from the Dose Report Selection Criteria page any combination of account number, series, participant, display unit, occupation and job code, deep and shallow dose threshold, and/or date to customize your report. Select the report destination (see Report Overview, p. 18), then select [Generate Report].

Sample Detail Dose Report



Equipment

Inventory

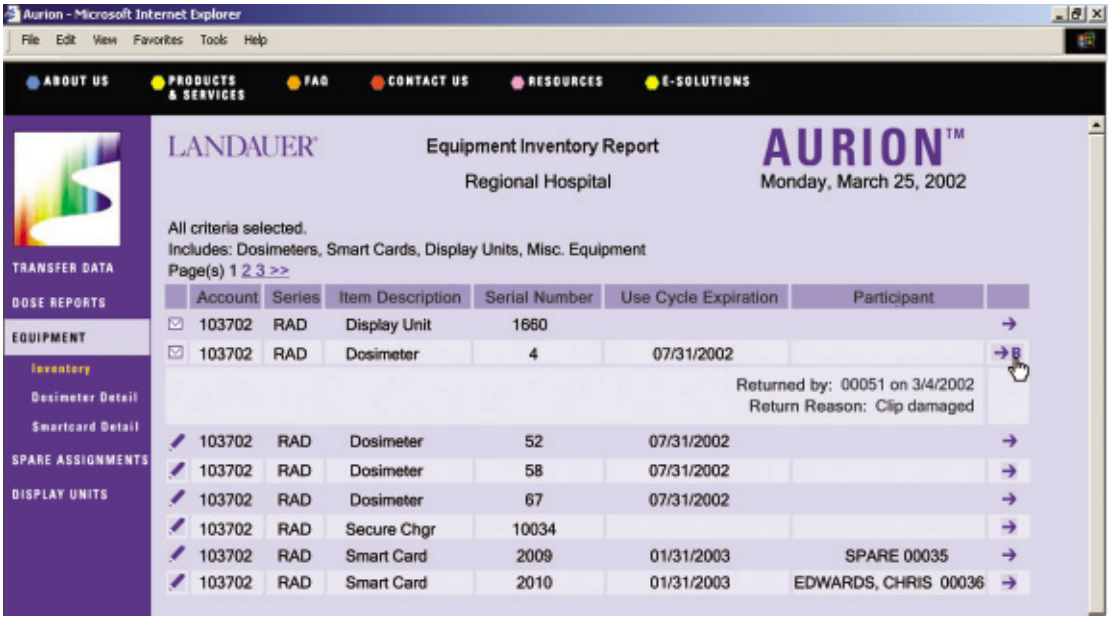
The Equipment Inventory Report lists everything in the customer's possession including display units, dosimeters, smart cards, and chargers. The report includes the account number, series assignment (if applicable), serial number, use cycle expiration dates, and smart card name assignments. Equipment returned and received at Landauer for calibration or repair and expired smart cards are purged from inventory and not reported. Unreturned dosimeters that have exceeded their expiration date are highlighted.

- Select the Equipment - Inventory link from Aurion's sidebar menu.
- Select from the Equipment Inventory Selection Criteria page any combination of account, series, display units, smart cards, and/or chargers to customize your report.
- Select the report destination (see Report Overview, p. 18).
- Select [Generate Report].

Tagging Equipment

The arrow icon located to the far right in the output destination "View Report" screen of the Equipment Inventory Report is used to tag and notify Landauer that an item of equipment is damaged and is considered a non-routine return. To tag an item, select the arrow icon and in the return submission dialog box select the reason for return from the drop-down list. Selecting [Save] automatically sends the note as an e-mail message to Landauer Customer Service alerting service support that this piece of equipment is returning, and to send replacement equipment. As soon as Landauer receives the item, it is noted as a return due to a problem. A credit, a new charge, or a no charge on the replacement item will depend upon Landauer's damage assessment of the item.

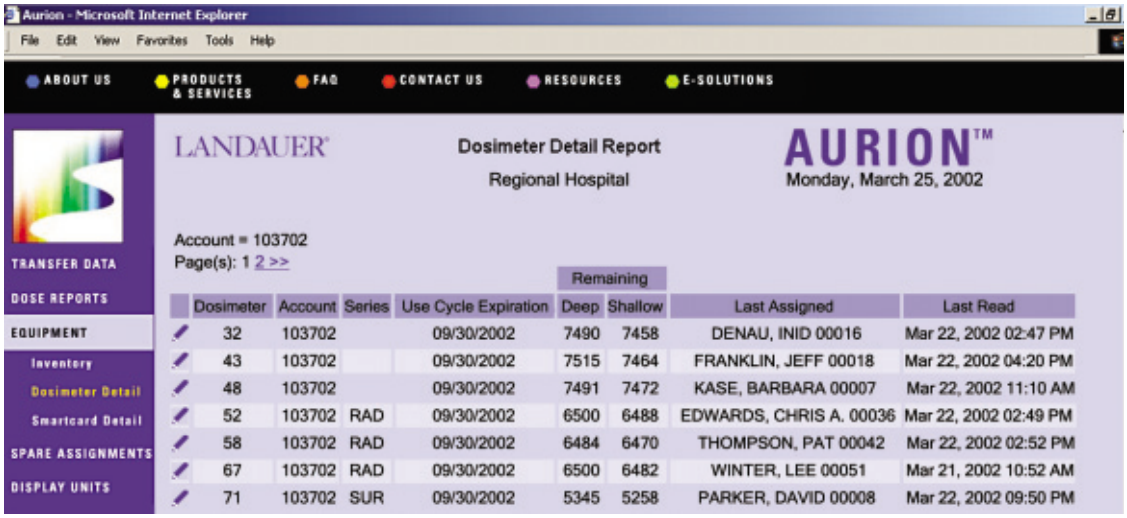
When an item has been tagged for a non-routine return, the "R" appears next to the arrow icon. Place your mouse over the "R" icon to display the date and the reason why the item of equipment was returned to Landauer (see example below).



Dosimeter Detail

The Dosimeter Detail Report lists all dosimeters at the customer site and includes the account number, series (if applicable), dosimeter serial number, use cycle expiration date, remaining dose available on dosimeter before zeroing is required, the last participant name assignment, and the last date the dosimeter was read out on a display unit.

- Select the Equipment - Dosimeter Detail link from Aurion's sidebar menu.
- Select from the Dosimeter Detail Selection Criteria page any combination of account number, series, dosimeter serial number, and/or use cycle to customize your report.
- Select the report destination (see Report Overview, p. 18).
- Select [Generate Report].

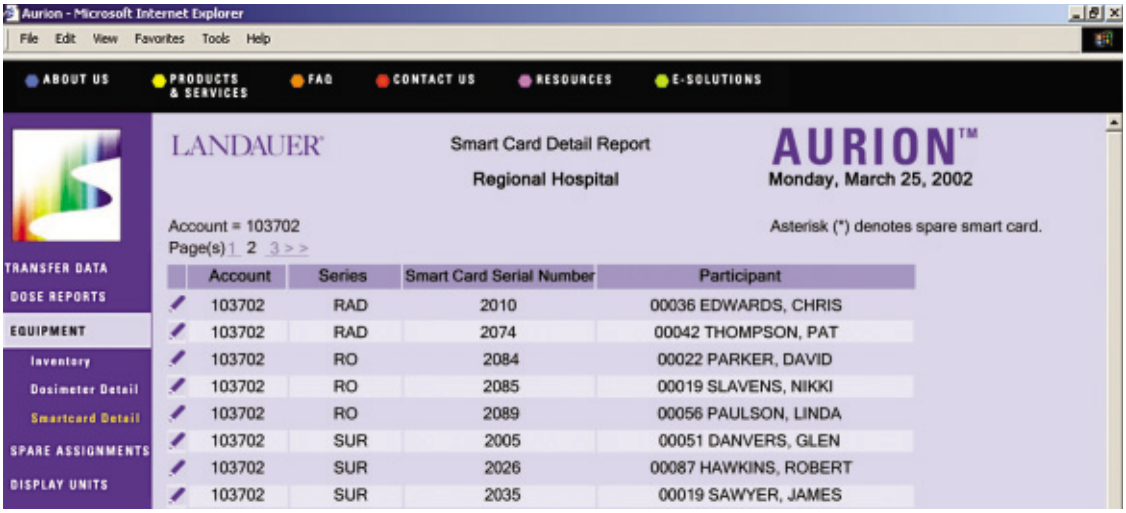


	Dosimeter	Account	Series	Use Cycle Expiration	Remaining Deep	Remaining Shallow	Last Assigned	Last Read
	32	103702		09/30/2002	7490	7458	DENAU, INID 00016	Mar 22, 2002 02:47 PM
	43	103702		09/30/2002	7515	7464	FRANKLIN, JEFF 00018	Mar 22, 2002 04:20 PM
	48	103702		09/30/2002	7491	7472	KASE, BARBARA 00007	Mar 22, 2002 11:10 AM
	52	103702	RAD	09/30/2002	6500	6488	EDWARDS, CHRIS A. 00036	Mar 22, 2002 02:49 PM
	58	103702	RAD	09/30/2002	6484	6470	THOMPSON, PAT 00042	Mar 22, 2002 02:52 PM
	67	103702	RAD	09/30/2002	6500	6482	WINTER, LEE 00051	Mar 21, 2002 10:52 AM
	71	103702	SUR	09/30/2002	5345	5258	PARKER, DAVID 00008	Mar 22, 2002 09:50 PM

Smart Card Detail

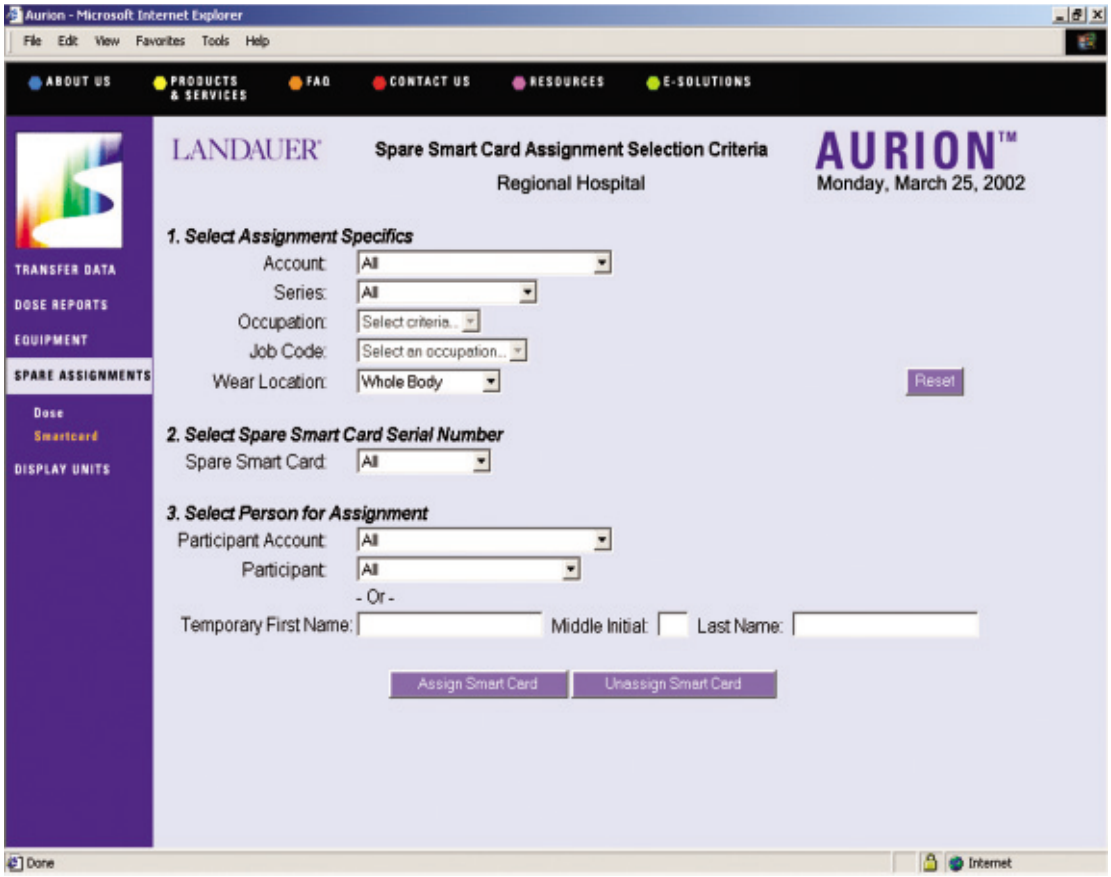
The Smart Card Detail Report lists all assigned smart cards and includes the account number, series, smart card serial number, and assigned participant name. The report also lists spare or visitor smart cards including all information about current assignments.

- Select the Equipment - Smart Card Detail link from Aurion's sidebar menu.
- Select from the Smart Card Detail Selection Criteria page any combination of account number, series, participant, and/or use cycle to customize your report.
- Select the report destination (see Report Overview, p. 18).
- Select [Generate Report].



Chapter 10: Spare Assignments

To automatically track dosimeters worn by visitors, temporary participants, or current participants who lost their smart cards, spare smart cards can be assigned at Landauer's web site. These spare smart cards that you have ordered in advance from Landauer are typically labeled as "Spare 1", "Visitor 1", etc. Go to www.landauerinc.com; select E-Solutions and Aurion. Log-in is required at Landauer's web site (Chapter 3, p. 8).



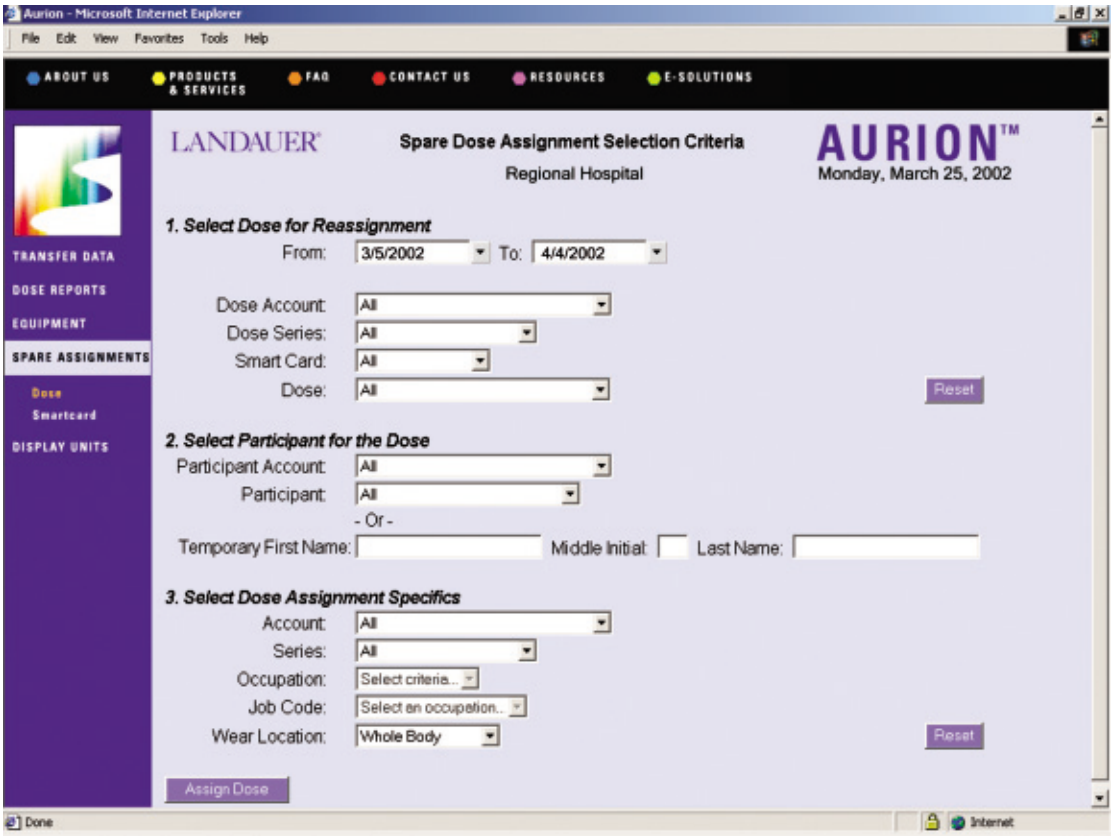
Spare Smart Card Assignment

1. Select the Spare Assignments - Smart Card link from Aurion's sidebar menu.
2. Select the assignment specifics for the participant assignment. Select any combination of account, series, occupation and job code, and wear location for participant assignment.
3. Select a spare smart card from the drop-down list. Smart cards that have already been assigned have an "(A)" designated after the smart card serial number. You can review smart card assignment details in the Smart Card Detail Report found at the Equipment - Smart Card Detail link on Aurion's sidebar menu.
4. Select a person from an existing account, or create a temporary participant by inserting their name into the temporary name fields.
5. Select [Assign Smart Card]. The top of the web page displays a confirmation message stating whether the assignment was successful.

The (A) designator now appears after the smart card serial number. All exposure results now register to the assigned participant.

Unassign a Smart Card

To make a smart card available for another assignment and remove the (A) designator, select the Spare Assignments - Smart Card link on Aurion's sidebar menu. Identify the smart card serial number under "2. Select Spare Smart Card Serial Number" and select [Unassign Smart Card].



Spare Dose Assignment

Landauer recommends that a spare smart card be assigned before use. If the assignment was not completed before use, you can transfer doses as appropriate at the Spare Assignments - Dose link on Aurion's sidebar menu. This is only allowed with spare smart cards and not with smart cards that have been permanently assigned by Landauer.

1. Select the Spare Assignments - Dose link from Aurion's sidebar menu.
2. Select the dose for reassignment. Select the time period, account, series, smart card serial number, and dose.
3. Select the participant for the dose. Select an existing account and participant, or create a temporary participant by inserting their name into the temporary name fields.
4. Select the dose assignment specifics. Select the account, series, occupation and job code, and wear location.
5. Select [Assign Dose]. The top of the web page displays a confirmation message stating whether the assignment was successful. View the assignment also in the Detail Dose Report found at the Dose Reports link on Aurion's sidebar menu.

Chapter 11. Equipment Return Procedures

Routine Exchange

Dosimeters are used for six months and returned to Landauer at the end of the use period to exchange for replacement dosimeters. Return expired dosimeters to Landauer within 30 days of the expiration date or an unreturned charge incurs. Credit is given after 30 days if the dosimeter is returned in good condition; however, a handling fee is assessed.

Smart cards are used for one year and are not returned to Landauer. New smart cards are shipped each year to replace expired smart cards. Discard expired smart cards.

Landauer does not exchange display units or chargers unless the equipment is broken or damaged. Returning a display unit or charger is considered a non-routine return.

Non-Routine Return

When returning damaged inventory as a non-routine return, tag damaged items on the Landauer web site at the Equipment - Inventory link on Aurion's sidebar menu (Chapter 9, p. 20). Tagging an item will automatically send an e-mail message to Landauer Customer Service alerting service support that the piece of equipment is returning, and to send replacement equipment. Discard, do not return damaged or expired smart cards.

Chapter 12. Troubleshooting

Web Site Problem	Solution
Web site not responding	Close and then reopen your browser to log-in and continue your task.
You do not have sufficient privileges to complete this installation for all users of the machine. Log on as administrator and then retry this installation. or INF Install failure. Reason: Access is denied.	Communication with the web site is required to configure the display unit and transfer data from the display unit to the web site. To enable each computer to successfully communicate with the Aurion functions on Landauer's web site, upon initial log-in and selection of the Configuration or Data Transfer links on Aurion's sidebar menu, software is downloaded from the web site and installed on each personal computer. Administrative privilege is required to allow installation of the software on each of your computers used to communicate with the web site. If you receive this message from Landauer's web site, contact your network/information services administrator for assistance.

Equipment Malfunction

Dosimeter Problem	Solution
Validity error	The dosimeter is automatically disabled and must be returned to Landauer.
Physical damage	Return to Landauer

Smart Card Problem	Solution
Damaged/No communication	Discard smart card and request replacement.

Display Unit Problem	Solution
Battery/Memory	With display unit out of the charger, turn unit off by pressing [F4] and then [0]. Plug in the charger and place the display unit in the charger. Charge the unit for a minimum of 12 hours before use for the first time. Thereafter, charge the unit for a minimum of one hour.
Broken display	Return to Landauer
Digit missing	Return to Landauer
Will not communicate with web site	Check the connection from the display unit to the personal computer COM port. Display unit must be turned on with the "Ready" message or the "Upload Reader" reminder message on the display unit screen. If the problem persists, call Landauer.

Appendix A

Display Unit Screen	Explanation
Data Transfer...	This is the screen displayed when data transfer is in progress from the display unit to the web site through your personal computer. Wait until the web site confirms that the data transfer is complete before disconnecting or using the display unit.
Display unit memory is full upload data to Landauer	This is the screen displayed when the display unit memory is full and the unit can no longer read out a dosimeter. Upload the display unit data to the web site.
Dose > 5 R Received, Contact RSO.	This is the overdose screen where the integrated dose measured exceeded 5 rem. Contact your radiation safety officer. An emergency read out by Landauer may be required.
Smart Card Error Re-insert Smart Card	Reinsert the smart card into the dosimeter and try read out again. If error repeats, request a new smart card or return the dosimeter for a replacement.
S/N XXXX Available Dose: XX mrem Cal Exp: MM/DD/YY Use Exp: MM/DD/YY	This is the readout screen displayed when a deactivated dosimeter without a smart card inserted is read out.
S/N: XXXX Calibration Expired Use another dosimeter or Contact RSO	This is the screen displayed when a dosimeter is read out and the dosimeter has exceeded its calibration date. A dosimeter that has exceeded its calibration date will still function for 30 days after that date, and this warning screen displays first before the readout results are displayed. However, a dosimeter that has exceeded its calibration date and the 30-day grace period beyond that date can no longer read out. The dose results register even though a digital readout is not displayed. Contact your radiation safety officer for a replacement dosimeter.

Display Unit Screen	Explanation
S/N: XXXX Measurement range exceeded. Replace dosimeter.	This is the overflow screen displayed when a dosimeter is read out and has exceeded its maximum dose capacity of 8 rem. The dosimeter is disabled for use and must be replaced. You can view the useful life for dose measurement remaining on a dosimeter at Landauer's web site at the Equipment - Dosimeter Detail link on Aurion's sidebar menu.
S/N: XXXX Smart Card Expired Contact RSO for a new Smart Card.	This is the screen displayed when the dosimeter is read out and the one-year use period for the smart card has expired. Contact your radiation safety officer for a replacement card.
S/N: XXXX Use cycle expired Use another dosimeter or Contact RSO.	This is the screen displayed when the dosimeter is read out and the dosimeter has exceed its use cycle period. A dosimeter that has exceeded its use cycle period will still function for 30 days after that date, and this warning screen displays first before the readout results are displayed. However, a dosimeter that has exceeded its use cycle period and the 30-day grace period beyond that date can no longer read out. The dose results register even though a digital readout is not displayed. Contact your radiation safety officer for a replacement dosimeter.
Upload Reader Last Upload: mm/dd/yy hh:mm.ss	This is a reminder screen that appears every twenty days or after 2,000 readouts, whichever occurs first, requiring that the display unit data be uploaded to the Aurion database at Landauer's web site.

APPENDIX B

Calibration Certificate Information

Serial #:	Dosimeter identification
Chamber:	Deep and shallow chambers being irradiated
Delivered Dose:	Deep or shallow dose equivalent delivered
Measured Dose:	Dose equivalent the dosimeter reported
%:	Percent difference between the delivered dose and measured dose
By:	Calibration specialist or technician
Calibration Date:	Date dosimeter calibrated
Calibration Expiration:	Date after which the dosimeter is no longer in regulatory compliance
Use Period Expiration:	Period of time dosimeter can be use before exchange is necessary
Source:	Radiation source used for irradiation
Activity:	Strength of source
Source Date:	Date of original activity of source
Current Activity:	Activity of source at calibration date
Source Dose Rate:	Dose rate emitted from the source at 100 cm
Exposed Dose Rate:	Dose dosimeter exposed at 99 cm
Dosimeter Model:	Dosimeter type
Tolerance Limit:	Dosimeter results must be within +/- 10% to pass calibration
HP Review:	Health physicist signature
License Number:	Landauer's Illinois State license number for performing calibration

Appendix C

Packing List Information

Customer address:	Address dosimeters shipped
Ship Date:	Date shipment was sent
P.O. #:	Purchase order to be used for payment
Exchange Release Date:	Date the exchange shipment will be manufactured
Account #:	Customer's Aurion account number
Series:	Department, if applicable, where dosimeters will be used
Qty:	Number ordered
Item - Description:	Model number and description
Serial #:	Unique identification number
Use Cycle:	Period of time item can be used from start date to time of exchange
Part #:	Unique number assigned to each user
Name:	User identification on Smart Card
Location:	Location dosimeter worn on the body
Job:	Standardized work environment code

Appendix D

Wear Location Codes

Area Monitor	AMN	Other Whole Body	OWB
Collar	COL	Right Ankle	RAK
Eye	EYE	Right Upper Arm	RUA
Fetal	FET	Right Upper Leg	RUL
Left Ankle	LAK	Right Wrist	RWR
Lower Back	LBK	Special Purpose	SPP
Left Upper Arm	LUA	Upper Back	UBK
Left Upper Leg	LUL	Whole Body	WBD
Left Wrist	LWR	Waist	WST

Appendix E

Occupational Codes

Medical, Dental, Veterinarian	1
Nuclear	2
Education, Research	3
Industrial	4
Transportation	5
Government	6
Uranium Fuel Cycling	7

Job Codes

Medical, Dental, Veterinarian	
Dentist	1DDS
Dental technician	1DTC
Medical physicist	1PHY
Radiation safety officer	1RSO
Radiation safety technician	1RTC
Radiologist	1RAD
Physician	1MD
X-ray technician	1XTC
Nurse	1NUR
Nuclear medicine	1NUC
Medical lab	1LAB
Radiation oncology	1ONC
Angiography	1ANG
Fluoroscopy	1FLU
General radiography	1GEN
Cardiac cath	1CAR
Visitor	1VIS
Veterinarian	1VET
Chiropractor	1CHR
Podiatry	1POD
Janitor	1JAN

Nuclear Power	
Radiation safety	2RS
Operations	2OPR
Maintenance	2MNT
Technician	2TEC
Naval sub	2NVY

Education, Research	
Radiation safety officer	3RSO
Radiation safety tech	3SAF
Research scientist	3RES
Research technician	3TEC
Reactor	3RCT
Visitor	3VIS

Industrial	
Radiography	4RGR
Manufacturing	4MNF
Distribution	4DIS
Well Logging	4LOG
Visitor	4VIS
Nuclear pharmacy	4PHM
Irradiators/sterilizer	4IRR
Waste handling	4WAS
Decommissioning	4DEC

Transportation	
Airport security	5SEC
Airline crew	5CRW
Trucking	5TRK

Government	
DOE	6DOE
Weapons	6WPN
Fuel fabrication	6FUE
Reactor	6RCT
Uranium enrichment	6URN
General research	6RES
Visitor	6VIS
Inspector	6INS
Waste handling	6WAS

Uranium Fuel Cycle	
Miners	7MIN
Fuel fabricators	7FUE
Fuel processors	7PRC
Uranium enrichment	7URN

Glossary

Accumulated dose - total dose accumulated on dosimeter

Active dosimeter - dosimeter that has a participant smart card inserted, has been properly activated by the display unit, and is ready for use

Calibration Certificate – a certificate that provides calibration information on a dosimeter as required by regulatory agencies and should be kept on file for reference (see Appendix B)

Calibration expiration – regulatory agencies require that dosimeters be calibrated on a regular defined basis to be in compliance; the calibration expiration date in the U.S. is the date the dosimeter was calibrated plus one year; check with your regulatory agency for your calibration compliance period.

Charger - the plug-in device that maintains the charge of the battery in the display unit

Deactivate – process where an active dosimeter is made available so that a new participant can use the dosimeter with a new smart card

Disabled dosimeter – a non-functioning dosimeter that cannot be used and must be returned to Landauer

Display unit – piece of equipment required for reading out the exposure information from the dosimeter

Grace period – a 30-day period that is allowed for use past the expiration date

Inactive dosimeter – a new dosimeter just received by the customer and never used, or a dosimeter that has been properly deactivated by the display unit and is ready for activation by a new participant

Integrated dose - dose since last activation of dosimeter for a given participant

Job code – standardized code for identifying different radiation work environments

Monitored dose - dose since last readout of dosimeter for a given participant

Overdose - the integrated dose exceeded 5 rem

Overflow - dosimeter exceeded its maximum dose capacity of 8 rem

Smart card - the removable component of the dosimeter that electronically identifies the participant and wear location to the dosimeter and display unit

Use period expiration – Landauer's defined period of time that a dosimeter or smart card is used by a customer before an exchange or replacement is required (dosimeter: 6 months; smart card: 1 year)

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112502 Edition